SOME OBSERVATIONS ON AN OUTBREAK OF MEDITERRANEAN FEVER IN MALTA LAST YEAR, WITH SPECIAL REFERENCE TO THE "AIR-BORNE" THEORY OF CONVEYANCE OF THE INFECTION.

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In the "Editorial" on Mediterranean Fever which appears in the current number (April) of the Journal, allusion is made to the unusually severe outbreak which occurred in Malta last year.

Having had charge of the Floriana district, where the battalion was quartered which suffered more severely than any of the other troops in the island during this outbreak, I have read with particular interest the detailed statement concerning the extent and limitation of our present knowledge of Mediterranean fever, more especially with reference to the probable mode of conveyance of the contagion. I would not, however, have ventured into the discussion of this vexed question had it not been for two reasons.

(1) Because, I gather, from certain remarks in this "Editorial," that the "air-borne" theory of propagation has been definitely adopted by certain officers in Malta, as affording a satisfactory explanation of the origin and spread of the disease among the troops last summer.

(2) Because, I believe, that the chief (if not the only) grounds of suspecting the infection to have been "air-borne" arose from undue importance being attached to certain special local conditions, which chanced to exist in connection with the Floriana barracks and married quarters, at the time that the origin of the epidemic was under investigation.

I may say at once that I have no belief in the correctness of this view, whether it be considered as of general application, or merely as explaining the origin of this particular outbreak.

The theory of conveyance of the infection by some blood-sucking insect (not, perhaps, necessarily of the gnat species), which is advocated by Dr. Zammit, bacteriologist to the Public Health Department, Malta, and others (and of which I myself am a humble adherent) will, I believe, eventually be found to be the correct one, as it best explains many otherwise unaccountable cases, and fits in with all known facts. I must, however, at once admit that I can bring forward no absolute scientific proof in support of this belief.
For, as far as I know, all attempts to find the specific micro-organisms in the bodies of gnats, flies, or other blood-sucking insects, which exist in Malta, have hitherto failed; and, moreover, my acquaintance with the disease has been rather that of the clinical physician and sanitary officer than that of the bacteriologist. Nevertheless, in the present uncertain state of our knowledge, discussion of the question, from different points of view, by officers who have served in the Mediterranean, may help to throw a little more light on the obscurity which still surrounds the subject.

In order to explain my reason for refusing to accept the "air-" or "dust-borne" theory of the spread of the infection in Malta last summer, I must briefly describe certain pre-existing conditions in the Floriana district, Malta.

The battalion which suffered so severely arrived in Malta from South Africa in October, 1902, and was at once quartered in the Floriana Barracks. These barracks consist partly of stone buildings and partly of huts, the latter being of modern construction. Their situation is superior, from a hygienic point of view, to most others in the island, and, in spite of certain structural defects in the older parts, their sanitary condition (ventilation, drainage, water supply) has been satisfactory, at any rate of recent years.

When the battalion in question first arrived it contained a fair proportion of seasoned men; but during the winter its strength was increased, and the places of old soldiers sent home, time expired, were filled by the arrival of two or three drafts from the Depot. So that by the time the warm weather began, there were a good many young soldiers in the ranks, who, by reason of their immaturity, may reasonably have been considered as specially liable to infection. Consequently, in whatever way the disease was conveyed (the fever being endemic in the island) a good number of cases might have been expected to appear during the summer.

It is admitted, however, that the percentage attacked, as compared with other regiments apparently less favourably quartered, was too great to be completely accounted for in this way; and it did not explain the cause of the outbreak among the women and children. Some other local condition had, therefore, to be sought for.

It happened that a new block of married quarters had been completed just before the arrival of this regiment, which was occupied for the first time by the married people belonging to it. These quarters overlooked the Quarantine Harbour. The site was a good and airy one, and every modern sanitary improvement had been provided. For the first six months the occupants enjoyed
good health. About the middle of June, however, cases of Mediterranean fever appeared, and the infection passed from quarter to quarter until a large proportion of the families were affected.

(I regret that being obliged to write from memory—not having the necessary records by me—I cannot give the exact figures and dates, but the statements made throughout are sufficiently definite for the purpose of this paper.)

In attempting to trace the origin of these cases it was at once obvious that the old convenient scapegoat of "local insanitary conditions" which has done duty so often, to account for outbreaks of the disease under all sorts of different circumstances, could not be made to serve here. Nor could the milk or water supply be reasonably brought under suspicion as the vehicle by which the specific germ had gained admission; some other special local condition had to be found. Attention was at once directed to the fact that the soil within a few yards of the affected building had recently been disturbed in digging the foundations for another block of quarters. This was at once seized upon to explain the appearance of the disease in this recently-constructed and sanitary building. A soil (theoretically) contaminated by the presence beneath the surface of the micrococcus melitensis had been dug up and dust from it, dried by the sun, and containing the specific germ, had been carried by the wind and inhaled or swallowed by susceptible persons. Such were the facts which were held to point to the air-borne conveyance of infection in these cases, and if in these cases (it was argued) probably in others in the island.

About the same time that the disease showed itself among the women and children, cases also appeared among the single men and grew more numerous as the summer went on. The barracks proper are within two or three minutes' walk of the block of married quarters in question, but stand on a higher level and are protected to a great extent by the ramparts of the old fortifications from winds coming from the direction of the Quarantine Harbour, and therefore from the supposed source of infection.

Within a stone's throw, however, of the entrance to the barracks, two new blocks had been for some time under construction; the ground here had necessarily been disturbed in digging the foundations, so that a similar source of infection existed, or was supposed to exist, as in the former instance.

This theory of "air-borne" infection was accepted and advocated at the time by the S.M.O. in Valetta, and the sanitary recom-
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mendations put forward to check the disease were based upon it. It is apparent from the statements in the Editorial that Capt. J. C. Kennedy, R.A.M.C., who was then in charge of the Valetta Laboratory, has also adopted this view, which, for reasons set forth below, I hold to be an erroneous one.

Apart from the fact that the existence of the micrococcus melitensis in the suspected soil could never be demonstrated, there are several other facts which to my mind make it (to say the least) doubtful whether the connection between the digging up of the ground and the appearance of the disease can be considered anything more than coincidental. Briefly described these facts are as follows:—

(1) By the time the fever made its appearance among the single men the new blocks of barracks were practically completed. The disturbance of the soil, involved in digging the foundation, had taken place during the time that another battalion was stationed in the Floriana district, among whom no exceptional number of cases had occurred.

(2) Within a few yards of these new barracks there is a larger and much older block of married quarters, and, from a sanitary point of view, inferior to those of the Quarantine Harbour. I never heard of any outbreak of Mediterranean fever among the inmates during the time the foundations were being dug and the building operations were in progress.

(3) As regards the new married quarters, already spoken of several times, cases did not appear among the occupants until the digging operations had been completed for (if I recollect rightly) several weeks. Not in fact till the warm weather—the usual fever season—had commenced. The fever season of last year was a very bad one, an unusual proportion of R.A.M.C. Officers being among the victims of this scourge of Malta; consequently, it is no matter for surprise that a considerable proportion of the women and children of the newly-arrived battalion began to suffer at this time.

(4) If, however, the disease originated among them from the turning up of the germ-infected soil close to their dwelling place, we should certainly have expected an earlier appearance of the disease, that is, while the actual digging operations were in progress. It must be remembered that Mediterranean fever is by no means uncommon in the winter and spring in Malta, and supposing that a special source of infection had really been laid bare, as suggested, the result would surely have become apparent during the earlier months of 1903.
I have been led to comment at some length on the favour shown to this "air-borne" theory of propagation by some, as I fear that if it should come to be generally accepted by military medical officers still in Malta, and who have opportunities for studying the disease there, as a "working hypothesis," they will be following a wrong track, and the distinction of clearing up the obscurity in connection with the conveyance of this disease, and so leading to a really efficient method of prophylaxis, will not belong to an officer of our Service, as I most sincerely hope it may.

As it was owing to the perseverance and acumen of an R.A.M.C. officer that the real cause of the fever was first discovered, and its right to be considered a specific disease, distinct from enteric, malaria, &c., demonstrated; and as it is also due to the work of the former Professor and Assistant Professor of Pathology at Netley, that we possess the method of serum diagnosis, Mediterranean fever may be considered in a great degree as the special property (if I may use such a term) of our Corps.

One could scarcely help, I think, feeling some regret if the secret of its spread should eventually be discovered by some civilian or foreign scientist, or even by a medical officer of the sister service.

As repeated investigations by competent bacteriologists have failed to demonstrate the existence of the micrococcus in the excreta of patients suffering from this disease, surely the method of aerial propagation should not be considered a satisfactory explanation of the origin and spread of infection in epidemic or isolated cases. If the excreta do not contain the specific germ, as up to the present we are entitled to assert, how can the soil become infected? Until the micrococcus melitensis has been shown to be passed out of the body in the excreta, the theory of the conveyance of the disease by inhalation of germ-laden dust should be considered "out of court."

Whereas the theory that infection is conveyed from sick to healthy individuals by means of a blood-sucking insect seems, with the analogy of malarial and yellow fevers before us, far the most reasonable we can adopt as a "working hypothesis"; especially as since the presence of the micrococcus in the blood has been demonstrated in several cases, the only really insuperable difficulty to its tentative acceptance has disappeared.

I have already I fear made these observations too long. I would like, however, just to allude, in conclusion, to one more point bearing on the subject, namely, that as a result of having had to investigate the origin of numerous cases of Mediterranean fever I have been led to the conclusion that the influence of insanitary
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conditions as a directly causative agent has been exaggerated, or at any rate that the inmates of the most sanitary barracks and houses do not appear to be more exempt from the disease than those less happily placed.

Dr. Zammit, of Valetta, has made some investigations with regard to the civil population, which point to a similar conclusion. His figures showing the incidences of the disease, for several years, among the inhabitants of the most insanitary parts of the island, as compared with the same among those in the better parts, are a very striking exemplification of this curious fact; and in spite of the undoubtedly great improvement in the sanitation of Valetta and other Maltese towns, effected of late years, the same observer told me that it seemed to him, that Mediterranean fever was rather on the increase than otherwise.

To guard myself against misconception, I will conclude by saying that I do not, of course, doubt of ultimate benefit to the public health resulting from every sanitary improvement, or of the necessity for the utmost vigilance in this particular as regards the troops under our care. What I do mean to assert is, that the best obtainable sanitary conditions will not prevent the appearance of cases of Mediterranean fever, and that there is some factor or factors to be sought other than those generally included in the term " insanitary conditions."

NOTE.—While serving in Malta it occurred to me that it would be a good thing if permission could be obtained to bring out a new edition of the late Capt. Hughes' book on Mediterranean fever. It is now a good many years since it was published, and if an R.A.M.C. officer would undertake to "edit" a second edition, embodying in it the work done and the additional experience gained of recent years, it would be a most useful piece of work, and serve also to prevent the book from falling into oblivion, as it seems in danger of doing.

The idea of seeking permission to undertake the task myself did, I confess, cross my mind, but I came to the conclusion that my knowledge and experience of the disease was not sufficiently extensive to warrant me making the attempt, a considerable portion of my "tour" having been spent in Crete, where Mediterranean fever certainly exists, but is quite insignificant as compared to "malaria," which is the important disease in that island.