these recommendations as "unworkable," and liable to lead to "friction and failure." The only practical point on which there is agreement is as to the advisability of the organization of a cadre of officers specially trained in sanitation. This does not, so far as we can judge, fully meet the requirements of the case. Either the further measures recommended by Dr. Simpson are practicable or not. If not, then alternative practicable suggestions which do not appear in this report should be forthcoming. Will public opinion allow the matter to remain in its present most unsatisfactory condition?

PREHISTORIC SANITATION IN CRETE.

By Captain T. H. M. CLARKE, M.B., D.S.O., R.A.M.C.,
Medical Adviser to H.B.H. the High Commissioner.

WE must all remember reading in our schooldays of the Minotaur, that monster half-man half-beast of the labyrinth with its tales of horror and romance. Lately most of your readers must have seen in the daily press articles and allusions to the many interesting discoveries made in the course of the excavations at Knossos, Crete, where, owing to the indomitable energy and perseverance of Mr. Arthur Evans, who had the valuable assistance of Mr. Hogarth and others we are now able to see and examine the palace of King Minos, that royal personage round whom so many myths have been woven.

No special training is required to appreciate the graceful statuary, the huge amphorae, the beautiful vases, the marble throne of prehistoric kings, or the lifelike figures in the brilliantly-coloured frescoes—some of which are so curiously modern in appearance. There are also the tablets bearing writing—as yet undeciphered—which prove the existence of a written language many hundred years older than was previously believed possible. The appreciation of art, the artistic skill—silent witnesses to the refinement and culture of life in that ancient court—are all rather bewildering when we remember how very old it all is. Mr. Evans places the date of the palace in its existing shape at about 1800 B.C., somewhat earlier than Mycenae, and contemporaneous with the Shepherd Kings of Egypt, but proofs have been found of a lofty civilization long before this, and the remains of a still more ancient palace beneath the present one, going back to 2800 B.C. These dates may not convey very much at first; they are to many of us merely figures; but let us try to imagine the world at that epoch if we can, let us search our minds for our old historic landmarks. Knossos flourished over 2,000 years before Rome was thought of, many hundred years before Hector fell fighting beneath the walls of Troy, in those days when the gods mingled in the battles of this earth of ours. Let us think of England as she is and as she was at the period of the Christian era, of the mighty changes that have taken place in those nineteen hundred years, and then when we must add another nineteen hundred years to reach the epoch with which we are dealing, perhaps it may help us to realize its immense antiquity. Amidst the débris of Minœan civilization at Knossos a discovery has been made which will appeal with peculiar interest to the members of our profession—namely, that a large and well-designed system of sanitation existed in the palace. The remains are fortunately sufficient to enable us to appreciate how advanced these ancients were in this as in many other respects.

Before entering on a detailed description of these remains, it would be perhaps best to give a general idea of the palace and its environs.

About three miles from the north coast of the island of Crete and about the same distance due south from the city of Kandia, there is a valley surrounded by rather high hills forming roughly a V, the apex of the letter being due south and its legs open towards the sea. In the midst of this somewhat narrow valley there is a low ridge, and it is on the southernmost end of this ridge that the palace is situated: the town extended between it and the sea to the port of Knossos. A stream enters the valley at the apex of the V, and in its course to the sea passes to the east of the ridge and close beneath the palace walls. This stream, in the olden days, was once a river, judging by the markings in its bed.

The great central court of the palace (54 metres by 24) ran due north and south along the top of the ridge, and the palace buildings for the most part occupy the slopes on either side, that is to say, they lie east and west of this court. The buildings to the west consisted of magazines and storerooms, in which were found the huge jars, once full of corn and oil,

still in position along the walls; but those on the east and more precipitous slope facing the river presented a marked difference; the rooms in this part were evidently used as dwelling rooms, and were occupied by the "royalties" and their chief retainers. No evidence of any strongly-fortified city walls has been found, as the "Knossians" relied, like ourselves, on their fleet as their chief protection. In this they differed from Tyrras and Mycenae, whose inhabitants had to put their trust on the strength and position of their walls, and subordinated everything to that consideration. It is interesting to note how the Knossian architects, being free from this anxiety, were guided by sanitary considerations in placing the dwelling rooms on the river side, although, owing to the sudden slope of the ground, it entailed the raising of at least two if not three stories. It is on this side that the remains of a sewage system of drains have been found.

It is unfortunately impossible to construct a complete plan of these drains and sewers, but sufficient still exist to show that these people were by no means ignorant of sanitary truths, and that they went to great trouble to apply them.

WATERBORNE SYSTEM OF SEWAGE.

As Mr. Evans justly points out, we must look on the drainage system of the palace as a means in the first instance of getting rid of the surface water which fell on its courts and roofs. The Minôans, however, skilfully availed themselves of these rain conduits, and by bringing into connexion with them various sanitary conveniences, such as the watercloset (described below), they were enabled to have a waterborne system of sewage.

There are four large shafts, constructed of cut stone and lined with cement, which descend vertically from the upper stories of the "domestic quarter," and open into a strongly-constructed, flat-roofed stone conduit, which is about a yard in height and half a yard in width. This conduit is made of limestone flags set edge to edge, and was also originally lined with cement. These shafts probably served a threefold purpose: (1) as a means by which the rain water reached the drains; (2) as ventilating shafts; and (3) as a means of access to the sewers for cleansing purposes. Labour was abundant, as slaves were employed in large numbers.

In the attached plan (Fig. 1) can be seen part of five drains and the shafts A, B, C. It is rather interesting to note that

Fig. 1.—Plan of part of 5 drains, showing position of shafts A, B, and C.

shaft c opens into the angle formed by the sewer as it turns sharply to the east, after it has received the drainage of the watercloset, whose position is marked by a X in the sketch. In on of the upper stories of the domestic quarter a kind of "housemaid's closet" has been found, a small and narrow chamber, with a floor sloping into one of the shafts, down which rubbish could be shot. There are certain points of general interest about these drains to which attention may be drawn. One must be struck by the care with which they were laid, so that the stones composing them still preserve

their position and their correct level; that limestone and not the perishable gypsum has been used in their construction, although the latter was more easily obtainable, and was employed almost exclusively in the other parts of the building; also that they were laid as far as possible beneath passages and "light-wells," so that they were easily accessible, and were not a danger to the sleeping apartments. Although Knossos abounds in evidences of the "jerry-builder's" art; still it is consoling to note how carefully he was excluded from tampering with the sewers, a precaution not always taken nearer home.

DESCRIPTION OF THE WATERCLOSET.

The discovery of the watercloset, to which I have alluded before, must prove most interesting to us. A good idea of this can be obtained from the plans (Figs. 2 and 3).

Fig. 2.—Section of latrine.

It consists of a small chamber about a metre in width and two metres in length, resembling in its shape and size a similar room in a modern house. Outside the lintel of the door is a flag sloped towards a hole, which opens into a short drain beneath the floor, and down which water could be thrown for flushing purposes, and also the household "slops." From the groove seen in the wall there appears to have been a wooden seat about 57 c.m. from the ground. The floor, as well as the walls, is faced with gypsum slabs which cease just within the outer line of the seat, so as to leave an access to the drain below. This drain can be seen communicating with the north branch of the main drain in the plan Fig. 1.

Fig. 3.—Plan of latrine.

The curious projection shown in black (Fig. 2) is rather difficult to explain. It has been suggested that it may have been used for the attachment of a balance flap to shut off the escape of sewer gas; perhaps it was employed as a support for an earthenware basin or receptacle for the excreta. Judging by the shape of the cavity, this basin would have been vertical in front and sloping at the back, or, in other words, it would resemble in shape the "wash-out" closet of the present day, in which a certain amount of water is kept in the basin by a ridge, over which the excreta are carried by a flush of water. One notices in the plan (Fig. 3) that the drain beneath the floor of the closet deviates markedly to one side, and it looks

as if this deviation was devised to leave room for a vessel with water for flushing purposes.

Another feature of scarcely secondary interest to the water-closet has been unearthed on the same side of the palace, but lying further to the north and separated by a considerable interval from the system of sewers.

A stone staircase has been found and descending beside it a shallow runnel for water. This water runnel descends in a series of curves forming a system of "parabolae," each curve of the system corresponding to the step of the stair alongside of which it lies. At the bottom of the staircase the runnel continues its way as a narrow channel which presents many sharp turns and elbows in its course until it reaches a small tank from which it again emerges, at the same level, but this time to run a straight and direct course to a place where was formerly a large cistern. The parabolae were admirably designed to permit water to change its level suddenly without increase of velocity. We find the same object pursued in the abrupt bendings of the channel when it quits the stairs, so that the water eventually enters the small tank very slowly and gently. The reason of all this care is evident when we realize that this was a small sedimentation tank, meant to intercept any suspended impurities before the water entered the storage cistern. Two small stone projections in the sides of the channel just before it reaches the sedimentation tank may have given support to a filtering screen of some porous material, an arrangement not uncommon in our times.

We may conclude from all this that King Minos was fully alive to the importance of a pure water supply, at least for his own household.

TERRACOTTA PIPES.

If the lady of the fresco in the modern-looking ball dress causes a feeling of astonishment, I am sure a like sensation must be created by a section of terracotta piping recently uncovered at the northern end of the palace. Unfortunately, owing to the subsidence of an ancient wall the line of piping was broken and interrupted, so that it is only possible to form a guess at its purpose. Its direction points to communication with a room in which stands a small olive press, so that it may have conveyed the oil to another place for storage as it was crushed from the olives.

Fig. 4.—Elevation of drain pipes below floor in "corridor of draught board" (measurements in centimetres).

The sections are 76 cm. in length, beautifully graduated; the bore at the larger end is 13 cm., tapering almost imperceptibly to 9 1/2 cm. at the other. The narrow end of one fits into the expanded end of the next, as seen in Fig. 4, thus forming a spigot and socket-joint. At 6 cm. from the spigot end there is a collar, and in the socket end a groove. The space between was filled with cement, and the joint thus rendered watertight.

Mr. Evans considers that they belong to the earlier period of the later palace, that is to say that they must have been placed in position over 3,000 years ago, still they are as fresh and new looking as the day they left their maker's hands. They show a finer finish and workmanship than one is accustomed to find in modern pipes of the same kind. The fact that certain sections were still found in position is sufficient testimony to the method in which they were laid, and a closer inspection confirms this impression, as we find that the ground had been prepared beneath them, and that they are reclining in a bed of cement. In fact such precautions were taken as we find laid down in our own textbooks on this subject.

Some years ago, when sanitary member of Sir Herbert Chermiside's administration, I had a good opportunity of making the acquaintance of modern Cretan sanitation and of appreciating how far they have fallen from the standard of

the Minôans, although, indeed, this is not surprising considering the many vicissitudes of this unfortunate island, least of all need it astonish us who are aware of the attitude of some of our own people at home on similar questions.

The *Spectator* recently observed in a leading article that "the plain truth is that care for sanitation is one of the last teachings of wisdom that reach even the civilized." This quotation may serve to prevent us from overlooking the real importance of the broken drains and pipes at Knossos—namely, the strong additional proofs which they afford of a civilization so advanced that it has been attained to by few nations even in the present day.

In conclusion, I would like to express my indebtedness to Mr. Evans and to Dr. Duncan Mackenzie for their kind assistance when I was at Knossos, and also to the former for lending me the excellent architectural plans of Mr. Theodore Fyfe.

THE PARLIAMENTARY SESSION.

THE session recently closed cannot be regarded as one fruitful of legislation interesting to or affecting the medical profession. There were no fewer than 234 public Bills introduced, and of these 60 were Government measures. The Government succeeded in passing 39 of their Bills and hanging up one—the Port of London Bill—for consideration in the next session of Parliament. Of the 39 Acts of Parliament, the Irish Land Act and the measures dealing with London Education, Scotch Licensing, the Employment of Children, Motor Cars, and the Sugar Convention were the most important. The Employment of Children Act was, in its progress through the House, made a permissive measure, and local authorities were given full powers to regulate the age of children trading in the streets, and the clause which provided that children attending school should not be allowed to work more than twenty-five hours a week was omitted on the motion of the Home Secretary. The Expiring Laws Continuance Act had a special medical interest this year, inasmuch as the Vaccination Act of 1898 was included in its schedules, and by this device the conscientious objector was given another year's lease of life.

In the other 32 Acts passed by the Government there are a few that deal with questions of Local Government. Of these the Housing of the Working Classes Act (No. 2) passed by Mr. Long late in the session is the most important, as it extends the period of the repayment of loans for buildings and the purchase of land, and makes other improvements which will be of some use in large towns. The Poor Law (Dissolution of School Districts and Adjustment) Act is an administrative measure of some use, and the same may be said of the Act to enable the county councils to promote Bills in Parliament. By another Act the Board of Agriculture has added to its duties the supervision of fisheries, and further departmental measures deal with the Local Government transfer of powers, and the control of Borough Funds. The remainder of the legislative record of the Government calls for no comment as it was mostly concerned with naval and military matters and finance. When we turn to the public Bills introduced by private members, which numbered 174, we find that only 11 of these had the good fortune to become Acts of Parliament. One of these is the only purely medical measure passed this session and is called the Addenbrooke's Hospital Act. It was introduced and carried by Sir Richard Jebb in order to confirm a scheme of the Charity Commissioners for the better management of the hospital. Of the other 10 none are of professional interest, unless it be the Guinea Postal Order Act of Mr. Henniker Heaton, which may be a convenience for the transmission of fees as well as subscriptions. When the long list of the failures is considered, and the 183 Bills dropped, withdrawn, or rejected are analysed there is much more interesting matter to consider.

The Ministry dropped 20 Bills in the course of the session, most of them small measures of little import. Among these were Bills dealing with the creation of new Bishopsrics for Bristol, Southwark, and Birmingham, and a Bill to increase the strength and emoluments of the Ecclesiastical Commissioners. Two Bills of considerable importance, however, failed to pass—namely, the Prevention of Corruption Bill, which was carefully considered in the Lords, and in the Standing Committee on Law in the Lower House, but was finally abandoned on August 11th. The other, the Butter Bill, afterwards rechristened the Adulterated Butter Bill, was finally withdrawn after a very stormy passage through Grand Committee. The 163 Bills promoted by private

members, which failed to pass, dealt with almost every variety of legislative problems. Many were of special interest from a medical and public health point of view. There were 4 proposals for the amendment of the Medical Acts. The chief one, introduced by Sir John Tuke, sought to modify in some particulars the disciplinary powers of the General Medical Council, while the three others, introduced by General Laurie, one of which was a modification of a Bill previously introduced, were directed to bring about reciprocity of medical practice between the United Kingdom and Canada, and to enable Canadian surgeons to serve in the military and civil services of the Crown. There were two Bills dealing with vaccination, one to abolish compulsory vaccination (Mr. Bayley), and the other to provide that no prosecutions should be undertaken under the Vaccination Acts without the consent of the guardians (Mr. Channing). Sir Francis Powell and Sir Walter Foster again introduced the Public Health Bill and the Rivers Pollution Bill, but were unsuccessful in reaching the Committee stage with either. The Plumbers' Registration Bill had no better success. There were three Bills dealing with superannuation—the Local Authorities Officers' Superannuation Bill of Mr. Jessel, Mr. Maxwell's Poor-law Officers' Superannuation Bill for Scotland, and a measure for Poor-law Superannuation in Ireland, introduced and persevered with to the last day of the session: by Mr. Joyce. There were four Housing Bills introduced by Dr. Macnamara, Sir J. D. Poynder, Mr. C. Hay, and Sir Walter Foster, which served a useful purpose in forcing the Government to pass their measure. Other Bills worthy of mention, but which never got a second reading, are the Cottage Homes, Elementary Education (Blind and Deaf Children), the Coroners Inquests (Railway Fatalities), the Infant Life Protection, and the Pharmacy Bill. Two Bills of importance came down from the Upper House, but failed to obtain progress in the Commons—namely, the Lunacy Acts Amendment (London) Bill and the Shops Early Closing Bill. The Bill that excited most medical opposition was perhaps the Cruelty to Animals Bill, of which the second reading was moved a few minutes before midnight on one of the early days of the session. The Bill after that incident was carefully watched, and no more progress was made, although the notice was kept on the paper up to the last day the House sat. In the 200 odd private Bills, including some 20 for Scotland, and in the large number of Provisional Order Bills, which received the Royal assent during the session, a good deal of local government work has been authorized for local areas, which it would be impossible in any moderate space to analyse. There was, however, one Act passed among these which deserves especial mention, and that is the Act which creates a University at Liverpool, and so provides the Medical School of that city with power to grant medical degrees to its students.

LITERARY NOTES.

A WRITER in the *New York Medical News* states that while in New Orleans he saw one of the most precious bibliophilic treasures of American medical literature. This is the first book ever printed and published in New Orleans. It is in the possession of Mr. T. P. Thompson, whose choice collection contains more of the important documents relating to old Louisiana before and after its acquirement by the United States than any other private library in the country. The book is a little work on medicine, the title of which is *Médecins et Précis de la Méthode de Mr. Masdevall Docteur Médecin du Roi d'Espagne Charles IV pour guérir toutes les Maladies Epidémiques*, etc.—that is, Remedies and a Brief Description of the Methods of Mr. Masdevall, Doctor of Medicine to the King of Spain, Charles IV, for the Cure of all Epidemic Diseases. As the little book contains less than 100 pages, the assumption that it contains remedies for all epidemic diseases shows striking confidence on the doctor's part. This is not all, however, for the title proceeds to include the cure of putrid and malignant fevers and the means of protection against them. "Price, four escalinos. To be obtained at the establishment of Louis Duclot, Printer, at New Orleans, 1796, with permission of the Government." The dedication is to Baron Carondelet, the Spanish Governor at the time. Although the author vaunts his remedies as practically infallible in every kind of disease, they are only ordinary drugs, most of them now used very commonly in so-called family remedies; practically all of them are inert. Antimony, however, in various forms is prescribed on all possible occasions. Tartar emetic,