Colonel Fred Smith's scrap-book of diplomas, testimonials, photographs and other souvenirs

Publication/Creation

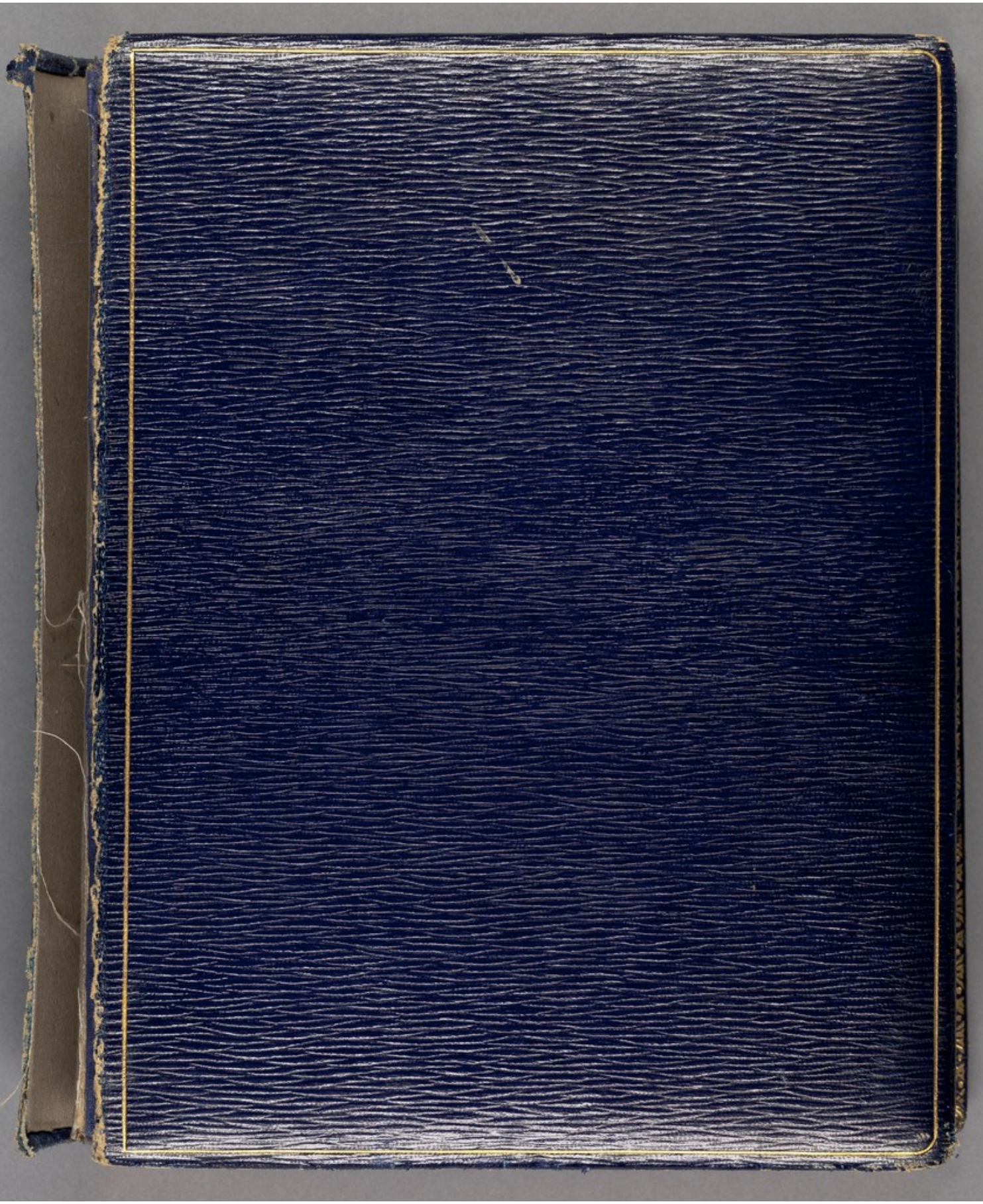
1886-1918

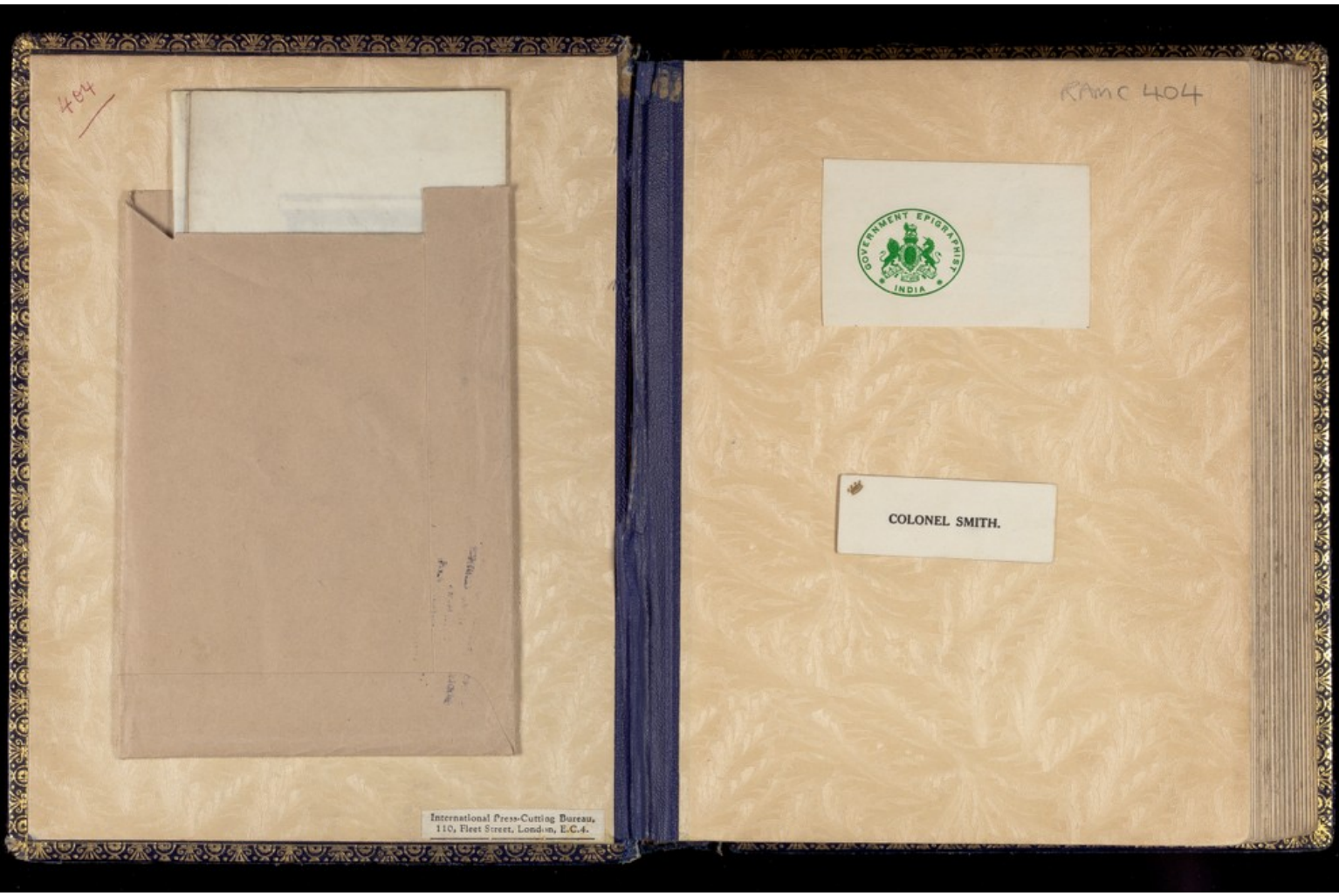
Persistent URL

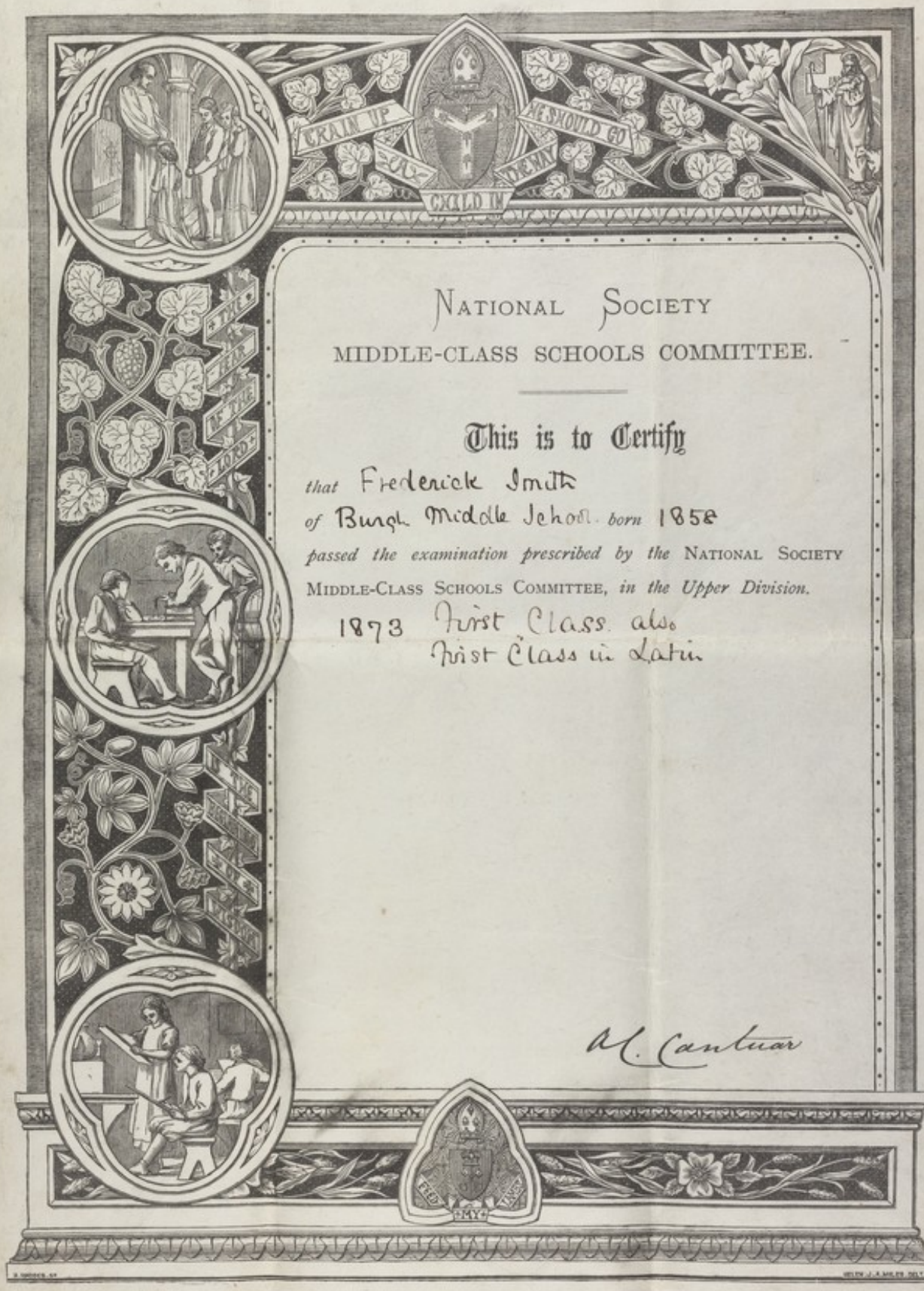
https://wellcomecollection.org/works/ef6dvxmh

License and attribution

Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
https://wellcomecollection.org




404
RAMC 404
GOVERNMENT EPIGRAPHIST
INDIA
COLONEL SMITH.
International Press-Cutting Bureau,
110, Fleet Street, London, E.C.4.



NATIONAL SOCIETY

MIDDLE-CLASS SCHOOLS COMMITTEE.

This is to Certify

that Frederick Smith

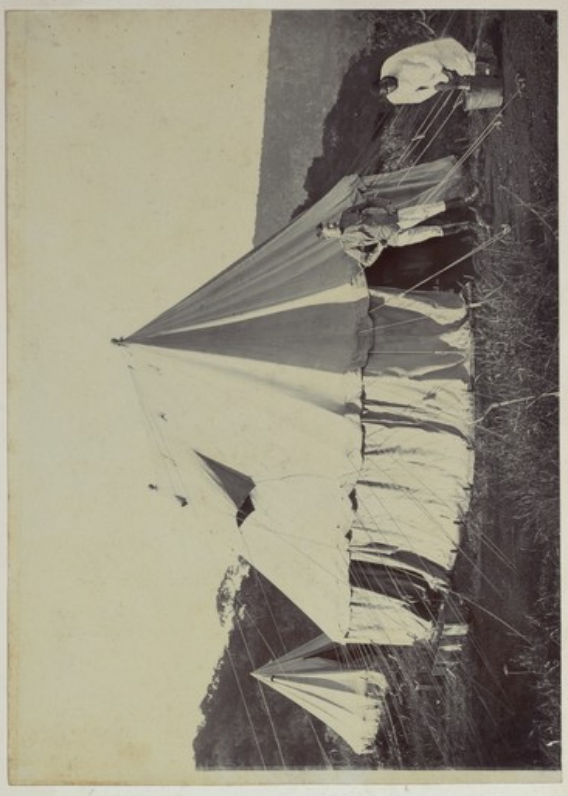
of Burgh Middle School *born* 1858

passed the examination prescribed by the NATIONAL SOCIETY MIDDLE-CLASS SCHOOLS COMMITTEE, *in the Upper Division.*

1873 First Class also
First Class in Latin

M. Cantuar

OPEN-AIR INVESTITURE.—Sir Andrew Caird (extreme right) was the only civilian to receive the accolade of Knighthood at Buckingham Palace on Saturday.



Flight in Maurice Farman's Biplane

THE News and Gazette of the Royal Army Medical Corps

The Army Dental Corps and Q.A.I.M.N.S.

Editor and Manager—
Major J. M. Maclie, M.C., R.A.M.C.

No. 3. SEPTEMBER, 1933 Vol. VII.

CONTENTS.

The following Lieutenants on probation R.A.M.C., have assembled for the Junior Course at the College: Lieutenants D. A. Beattie and W. H. Hargreaves, St. Bartholomew's Hospital; R. V. Wright, Victoria University, Manchester; J. N. Concannon and C. King, Trinity College, Dublin; J. P. Douglas, St. Andrews; J. C. Reed, Melbourne; T. M. McNie, Glasgow; P. V. O'Reilly, Royal College of Surgeons, Dublin. Lieutenants T. D. Phelan and W. F. L. Fava are due to join the course early in September.

* * *

We have great pleasure in congratulating one of our most valued contributors, Sjt.-Maj. F. G. Summers, on his promotion to commissioned rank, and trust that his hand will never grow weary nor his Duofold lack for ink.

* * *

A very remarkable figure in the history of the

Corps has passed away in Colonel Fred Smith who died on July 25.

Born in 1858, and educated at Horncastle Grammar School, Fred Smith served in the ranks of the Army Hospital Corps and Medical Staff Corps for over twelve years, during which time he rose to the rank of 1st Class Staff Serjeant, and obtained the diplomas of the Royal College of Physicians and Surgeons of Ireland—a very notable achievement. He passed through Netley gaining the Herbert and 2nd Montefiore prizes, and was appointed Surgeon, Medical Staff (ranking as Captain), in March, 1890. He twice gained the Parkes Memorial Medal, twice the Alexander Medal and four other notable awards. In 1897 he obtained the D.P.H. of Durham University. He rendered distinguished service in six campaigns, contributed many well-informed articles on a great diversity of subjects to the CORPS JOURNAL, and wrote a short history of the Royal Army Medical Corps. A life of great achievement and a remarkable personality.

* * * *

We commend to our readers the appeal printed on another page made by Admiral of the Fleet Sir Roger Keyes on behalf of the Incorporated Soldiers and Sailors Help Society and the Lord Roberts Memorial Workshops.

* * *

Now You Know.

Getting out a magazine is no picnic.

If we print jokes, people say we are silly.

If we don't, they say we are too serious.

If we publish original matter, then we lack variety.

If we publish things from other papers, we are too lazy to write.

If we don't print contributions, we don't show proper appreciation.

If we do print them, the magazine is filled with junk.

Like as not, some fellow will say we took this from another paper.

We did.

We read in the daily press that men, as opposed to women, prefer music halls, an observation that is worth making at a time when the feminine point of view is ubiquitous. Women in music halls have the appearance of indulgently accompanying their menfolk who, it is felt, are better versed in the rites, and besides, there are other reasons.

"Man desireth not to change his clothes, nor to make up his mind beforehand in time to book seats; is not easily hurried over his dinner; liketh not to endure three acts of anything. Man, even more than woman, wisheth to smoke continually and to visit the bar as oft as he will."

* * * *

Said a Cockney on furlough from Ypres:—

"Its a rotten old village for snypres,
An' the things as they do
Ain't exactly wot you
Reads abart over 'ere in the pypres."

* * * *

Dr. First-Aid's weekly consultations in a largely circulated evening paper are, no doubt, largely read, and whether a recently published note on heatstroke is meant to be in serious vein or an elaborate leg pull, we doubt the advisability of making it available to a voracious public.

The article describes how, in the overheated city street, there is a sudden gasp, a face goes pale, the pupils dilate, the heart beats like the drummer in a Haarlem band, and a quivering mass of protoplasm lies at our feet. A crowd collects, effectively absorbing every breath of fresh air.

Then appears (like a bolt from the blue) the efficient V.A.D., who tactfully disperses the crowd and takes the temperature, which may be as high as 109° F. Drastic and urgent treatment is necessary. The patient is taken somewhere where he can be undressed, rolled in a large sheet soaked in cold water, surrounded by small pieces of ice, and sponged with iced water. No effort is relaxed until the temperature is brought down to 102° F.

Births, Marriage and Deaths.

Births.

TABUTEAU.—On April 7, 1933, at the Bevan Nursing House, Sandgate, to Sheila, wife of Major T. B. H. Tabuteau, R.A.M.C., a daughter.

BARNARD.—On July 17, 1933, at Newcastle-on-Tyne, to Gwendoline, wife of Sjt. H. M. Barnard, R.A.M.C., a son (Dennis Henry Arthur).

Marriage.

ROWE—RITCHIE.—On August 21, 1933, at St. Werburgh's Church, Chester, by the Very Rev. Maurice Canon Hayes, assisted by Rev. J. Irish, Major John Rowe, R.A.M.C., to Evelyn Gordon Ritchie, widow of the late Major Robert Linton Ritchie, R.A.M.C.

Deaths.

SMITH.—On July 26, 1933, in London, Colonel Frederick Smith.

Born at Horncastle, Lincolnshire, on February 8, 1858, and educated at Horncastle Grammar School, he joined the Army Hospital Corps, and after 12 years and 173 days' service in the ranks, during which time he obtained the L.R.C.P.I. and L.M., L.R.C.S.I. and L.M. in 1889, was appointed Surgeon on March 30, 1890. He also took the D.P.H., Durham, in 1897. From June, 1901, to July, 1902, he was S.M.O., Sierra Leone, with the local rank of Major; became Lieutenant-Colonel on August 14, 1912; received the brevet of Colonel, September 4, 1912; and was appointed temporary Colonel from December 31, 1915, to January 24, 1918. He was placed on retired pay on December 26, 1917, and re-employed from the same date until November 18, 1919.

His war services included the South African War of 1879, where he took part in the Zulu campaign, receiving the Medal and clasp; and the South African War of 1881, where he took part in the Transvaal campaign.

In the operations in Sierra Leone, 1898-99, he took part in the Mendi and Protectorate expeditions, receiving the Medal and clasp.

During the South African War of 1899-1901, he took part in the operations in the Orange Free State; the Orange River Colony and the Transvaal, including the action at Biddulphsberg, Bethlehem and Wittebergen; and the operations in Cape Colony; was mentioned in despatches, *London Gazette*, September 10, 1901, and received the D.S.O. and Queen's Medal with four clasps.

On the North West Frontier of India he served as staff officer to the P.M.O. during the Mohmand Expedition of 1908, receiving the medal with clasp.

During the War of 1914-19 he was O.C. Trianon Palace Hospital and S.M.O. Paris area in 1914; A.D.M.S. 27th Division, 1915; D.D.M.S. 16th Corps, 1917-18. Was mentioned in despatches *London Gazette* of October 19, 1914; January 1, 1916; December 6, 1916, and November 28, 1917; was appointed C.B., C.M.G., and received the 1914 Star, British War Medal and Victory Medal.

Colonel Smith was Parkes' Memorial Prize Essay Gold Medallist in 1898 and 1907; Alexander Prize Essay Gold Medallist in 1903 and 1906. In 1903 he was awarded the Emmo-Sander Gold Medal of the United States Army; the Lady Macgregor and Bellilios Prize of the *Journal of Tropical Medicine*; and in 1905 was awarded the second Seaman Prize, U.S.A.

Among his many literary contributions was "A Short History of the Royal Army Medical Corps" published in 1930.

1877 – 1914
from age 19 to age 61
last public function in uniform 1930

CERTIFICATE OF REGISTRATION IN THE MEDICAL STUDENTS' REGISTER.

BRANCH MEDICAL COUNCIL
18 SEP 86
IRELAND

Medical Registration Office,
35, Dawson-street, Dublin.

*Antedated 1 January 1886 (Ed.)

I hereby Certify that the name of Frederick Smith

was entered on the 10th day of August 1886, in the

Register of Medical Students for Ireland.

BRANCH MEDICAL COUNCIL
10 AUG 86
IRELAND

W. Houghton
Registrar of the Branch Medical Council for Ireland.

Qualified Dublin
August 1889 - MED. DEG. and MIDWIFERY

Government House,
Jamaica, 10th Sept. 1889

Captain Surgeon F. Smith
Royal Malta Fencibles

Sir

I have the honor to acquaint you for the information of His Excellency the Governor that I have received a letter from the Secretary of State for the Colonies dated 10th August 1889 informing me that Her Majesty has been graciously pleased to accept the resignation of your commission as Surgeon in the Royal Malta Fencibles.

I have the honor to be
Sir
Your obedient
humble Servant
[illegible]
Private Secretary

Surgeon Captain F.Smith A.M.S. has held the appointment of Health Officer of the Municipality of George Town,Penang from the 18th November 1894 up to the present date,having now resigned in consequence of his leaving the Settlement. The Commissioners desire to express their satisfaction at the manner in which the Sanitary work of the Municipality has been carried out whilst under his supervision,and would refer more especially to the careful steps taken by Dr Smith to avoid an outbreak of Cholera within the Municipality when there was an epidemic of this disease in Singapore and other places in close communication with Penang.

President of the
Municipal Commissioners

Secretary to the
Municipal Commissioners

Municipal Office
Town Hall
Penang 23rd December 1895

The ties in the CHESS TOURNAMENT must be played on or before Saturday the 12th October, 1895.

The ties in the 1st and 2nd rounds of the BILLIARD HANDICAP must be played off on or before Saturday the 26th October 1895.

PENANG, *23rd Sept. 1895.*

E. FARRER-BAYNES, *Honorary Secretary.*

"Straits Maritime Journal."

Saturday, 28th September, 1895.

WAR OFFICE,
LONDON, S.W.,
20 June, 1898.

No. 56066/33

It is requested that in any further communication on this subject, the above Number may be quoted, and the Letter addressed to—

The Under Secretary of State,
War Office,
London, S. W.

Medical Division.

...ina were

but Mrs. F. O. Hallifax as an Infant was excellent. Mrs. W. T. Martin, as a Gipsy Fortune Teller made quite a little fortune for some charity by plying her mystic trade and Mrs. D. Logan looked well indeed as Pierette. Mrs. Rogers as Carmen was conspicuous and Miss Anthony, in white, made a handsome figure. Miss Ross, as an Italian peasant and Miss Caunter as a Wasp carried out the ideas of their dresses and the Misses Allen as Rainbow and a Doctor of music wore charming costumes. The Hon. Vermont was a jovial Simon the Cellerar. Doctor Robertson, Doctor Kerr and Mr. W. A. McArthur were the best disguised men. Mr. Moore, of the Bank, in a rich Eastern dress looked well and Mr. W. T. Martyn as the New Man was funny. Among the three Barristers present, J. Y. Kennedy looked the best and Captain Smith as a Demon, scored. There were five Jack Tars and a gentleman who called himself British Dollar but who looked like a Jack Tar with his month's pay hung about him. Mr. F. O. Hallifax made a capable Clown. There were the usual assortment of shape dresses of various periods, Mr. J. C. Ross, as a hatless Toreador, Mr. Harwood as the moody Dane, Mr. Nicholson as the M. F. H. Mr. Adams as Magpie, presumably, Mr. P. D. Stephens as a Curate, a Priest, a Knave of Hearts, a Knight of the Bath and Mr. Kruijt as a Dutch peasant were all good. Despite the known wishes of the host and hostess, there were several plain uniforms and evening dresses present. A. P. K. was well advertised. Dancing was kept up until after one o'clock, a most enjoyable evening being spent.

2

HWV 2000 6—97
1000 1—98

No. 56066/33

It is requested that in any further communication on this subject, the above Number may be *quoted*; and the Letter addressed to—

The Under Secretary of State,
War Office,
London, S. W.
Medical Division.

WAR OFFICE,
LONDON, S.W.,
20th June, 1898.

Sir,

I am informed that the Assessors of the Essays sent in competition for the Parkes' Memorial Prize of this year have been unanimous in awarding the prize to Surg. Capt. F. Smith, A.M.S., and have also expressed their opinion that he submitted an Essay of great literary merit, which was remarkable "for its independence and original work."

I have to request that you will be good enough to acquaint Surg. Capt. Smith with this gratifying result, and convey to him my congratulations.

A note on this subject has been made in that Officer's record of service.

I am
Sir
Your obedient Servant

ior Medical Officer
Sierra Leone

99 answers

SIERRA LEONE,
WEST AFRICA.

This is to certify
that for several months
during the year 1899
Captain F. Smith R.A.M.C
has acted as District
Surgeon in the Colonial
Medical Service of the
Protectorate during
the absence on sick
leave of the proper
holder of the appointment

Horace Albert Prince

I solemnly make oath and declare that I have given up all arms and ammunition demanded of me by the British authorities, and I further swear that I will not take up arms against the British Government during the present war, and I promise to remain quietly at my home at TURFONTEIN District Waterberg until the war is over.

Dated at Warmbads this 24th day 1900.

Horace Albert Prince So help me God.

Before me. T. G. Gilmer Lt
5th Dragoons.

Report on the Medical Arrangements.

South African War.

Report on the Medical Arrangements.

South African War.

With the approval of the Director General A.M.S., Committees have been formed to assist in the preparation of certain sections of the report.

The following Committee, of which you have been selected as a Member, will deal with the Medical aspect of the Campaign.

Lieut. Col. H.H. Johnston, C.B.
Lt.Col. G. Coutts.
Major G.E. Moffet.
Major F. Smith, D.S.O.
Capt. W.D. Erskine.

The general history of, and the consideration of the circumstances accompanying the rise and spread of Enteric Fever and Dysentery among the troops will not come within the scope of the Committee's report.

All available information will be furnished to the Committee, and any additional details which the Committee may desire to have will be supplied as far as possible. But pending the completion of the statistics, the Committee should consider more particularly the clinical aspects of disease during the war.

The Senior member will arrange for the circulation of the material supplied to the Committee, and for the preparation of the joint report.

The Committee will prepare a joint report on Enteric Fever, Dysentery, and such other diseases as

they

they think advisable, but apart from this, the following division of the work is suggested as the most likely to give the best result.

Disease in Natal.

Lieutenant Col. H.H. Johnston, C.B.
Captain W.D. Erskine.

Disease in the Transvaal, with special reference to Malarial Fevers.

Lieutenant Col. G. Coutts.
Major F. Smith, D.S.O.

Disease in the O.R.C. & Cape Colony.

Lieutenant Col. G. Coutts.
Major G.E. Moffet.

This will include the consideration of the Enteric outbreak on the Western line between December 1899 and March 1900.

The material available for the preparation of this report will be forwarded to the Senior Member as soon as it can be got ready.

W. D. Wilson.

Surg. Gen. A.M.S.

late P.M.O. S.A.F.F.

68, Victoria Street, S.W.
4th April, 1903.

No. 8 of 1900.

V. R.

PROCLAMATION.

WHEREAS THE GOVERNMENT OF THE S.A.R. has, since the commencement of hostilities, by

68 Victoria Street S.W.
25th February 1903.

S I R,

I am directed by the Committee of the Alexander Memorial Prize Fund to inform you that at a Meeting held at this Office on February 17th 1903 the prize of £50-0-0 and the Gold Medal were awarded you for your Essay entitled "Andanda Beyow" on Injuries to joints and long bones caused by modern Small Arm projectiles, their nature Diagnosis and treatment with special reference to the appliances required and available on Field Service.

I am to request that when acknowledging the cheque enclosed that you will be so good as to inform me of the address to which you desire the Medal to be sent when finished.

The Committee while congratulating you on your valuable essay consider that in the interests of Surgery you should publish it, and for that purpose they are willing to offer you the sum of £10-0-0 towards defraying the expense. If you desire to avail yourself of this offer will you kindly let me know for the information of the Committee, when the arrangements for publishing have been made

No. 8 of 1900.

V. R.

PROCLAMATION.

WHEREAS THE GOVERNMENT OF THE S.A.R. has, since the commencement of hostilities, by virtue of a certain Law, to wit, Law No. 1, 1900, issued and continues to issue, certain Gouvernements Noten, or promissory notes of various amounts, payment of which has been guaranteed on the security of the immovable property of the State:

And whereas Her Majesty's Government decline to recognise the validity of such promissory notes, whether issued before or after the date of this Proclamation, or the right of the S. A. R. Government to hypothecate the property of the State in manner hereinbefore set forth:

Now, therefore, I, Frederick Sleigh, Baron Roberts of Kandahar and Waterford, K.P., G.C.B., G.C.S.I., G.C.I.E., V.C., Field Marshal, Commander-in-Chief of the British forces in South Africa, do hereby give notice that Her Majesty's Government will refuse to honour any such promissory notes that may be presented for payment, and expressly repudiates all liability in respect of them whatsoever.

GOD SAVE THE QUEEN.

Given under my hand at Pretoria, this 11th day of July, 1900.

ROBERTS,
Field Marshal,
Commander-in-Chief, South Africa.

No. 8 van 1900.

PROCLAMATIE.

AANGEZIEN HET GOUVERNEMENT van de Zuid-Afrikaansche Republiek sinds den aanvang der vijandelijkheden krachtens zekere wet, met name Wet No. 1, 1900, zekere Gouvernements banknoten of schuldbekentenissen van verschillende bedragen heeft uitgegeven waarvan de betaling verzekerd werd door de vaste eigendommen van den Staat.

En aangezien Hare Majesteit's Gouvernement de geldigheid van zulke schuldbekentenissen niet erkent, hetzij uitgegeven vóór of na den datum van deze Proclamatie, of het recht van het Gouvernement der Zuid-Afrikaansche Republiek om het eigendom van den Staat op eene wijze te hypothekeeren, zooals hierboven uiteengezet.

Daarom geef ik, FREDERICK SLEIGH, Baron ROBERTS van Kandahar, K.P., G.C.B., G.C.S.I., G.C.I.E., V.C., Veldmaarschalk, Opperbevelhebber der Engelsche troepen in Zuid-Afrika, kennis, dat Harer Majesteit's Gouvernement eenig zulk eene schuldbekentenis weigert te erkennen, welke ter uitbetaling moge aangeboden worden, en uitdrukkelijk weigert zich daarvoor aansprakelijk te houden.

GOD BEHOEDE DE KONINGIN.

Gegeven onder mijne hand te Pretoria, dezen 11den dag van Juli 1900.

ROBERTS,
Veldmaarschalk,
Opperbevelhebber in Zuid-Afrika.

---

toria Street S.W.
25th February 1903.

ee of the Alexander Memorial
Meeting held at this Office
£50-0-0 and the Gold Medal
titled "Andanda Beyow" on
caused by modern Small Arm
s and treatment with special
ed and available on Field

nowledging the cheque enclosed
orm me of the address to which
en finished.
lating you on your valuable
ts of Surgery you should publish
it, and for that purpose they are willing to offer you the sum
of £10-0-0 towards defraying the expense. If you desire to
avail yourself of this offer will you kindly let me know for the
information of the Committee, when the arrangements for publishing

68 Victoria Street S.W.

25th February 1903.

S I R,

I am directed by the Committee of the Alexander Memorial Prize Fund to inform you that at a Meeting held at this Office on February 17th 1903 the prize of £50-0-0 and the Gold Medal were awarded you for your Essay entitled "Andanda Beyow" on Injuries to joints and long bones caused by modern Small Arm projectiles, their nature Diagnosis and treatment with special reference to the appliances required and available on Field Service.

I am to request that when acknowledging the cheque enclosed that you will be so good as to inform me of the address to which you desire the Medal to be sent when finished.

The Committee while congratulating you on your valuable essay consider that in the interests of Surgery you should publish it, and for that purpose they are willing to offer you the sum of £10-0-0 towards defraying the expense. If you desire to avail yourself of this offer will you kindly let me know for the information of the Committee, when the arrangements for publishing have been made.

I am,

Sir,

Yours faithfully,

E Un Wilson

Hon. Sec. Alexander Memorial Prize Fund.

Major F. Smith D.S.O.

R.A.M.C.

Woolston.

WAR OFFICE

3rd March 1903.

Dear Smith,

Herewith the Alexander Memorial Prize Medal, with many congratulations.

Please acknowledge receipt.

Yours sincerely,

Edmund Elles

Major F. Smith D.S.O.
R. A. M. C.
Woolston.

Major F. SMITH. — **Anti-typhoid or anti-enteric inoculation** (Vaccination antityphique). *Journ. of tropic. medicine.*, 1er sept. 1904.

Les statistiques établissent que la méthode de Wright réduit de 3 à 1 les chances de morbidité par fièvre typhoïde. La vaccination doit être pratiquée 2 mois avant l'époque où le sujet sera exposé à l'infection : on a toujours en vue les troupes coloniales. Le bénéfice peut être appréciable, si l'on songe que dans les troupes de l'Inde, en 1898, il y a eu, pour 1.000 soldats, 36 cas de fièvre typhoïde et 10 décès (contre 1,2 cas et 0,24 décès dans le Royaume-Uni, chiffres moyens des années 1881-1890).

Ev. BURNET.

Bulletin de l'Institut Pasteur 30 Nov 1904

Now Ready, crown 8vo, limp cloth, lettered, 2s. net, post free, 2s. 1d.

Reprinted from the Journal of Tropical Medicine.

Drainage, Sewerage, and Conservancy in Tropical Countries and Elsewhere.

Being a Belilios Prize Article on "The System of Drainage and Sewerage (Domestic and Municipal) best suited for Tropical Climates."

By Major F. SMITH, D.S.O., Royal Army Medical Corps.

JOHN BALE, SONS, & DANIELSSON, Ltd., 8-91 Great Titchfield Street, London.

NOW READY. *Crown 8vo, Limp Cloth, Lettered.* 2s. net, post free 2s. 1d.

Reprinted from the "JOURNAL OF TROPICAL MEDICINE."

Drainage, Sewerage and Conservancy in Tropical Countries and Elsewhere.

Being a Belilios Prize Article on "The System of Drainage and Sewerage (Domestic and Municipal) Best Suited for Tropical Climates."

By MAJOR F. SMITH, D.S.O., Royal Army Medical Corps.

BALE, SONS & DANIELSSON, LTD.,
87-91, GREAT TITCHFIELD STREET, W.

Public Health Engineer June

1905

THE STAFF OF THE PRINCESS CHRISTIAN COTTAGE HOSPITAL.

SISTER HUGO. SISTER MACDONELL. SISTER EVA. MR. PEEL. SISTER AGNES. SISTER JULIA. SISTER LILIAN. THE MATRON, MISS RIDGES.

My Laboratory in the wild bush of Sierra Leone.

From the Annals and Magazine of Natural History,
Ser. 7, Vol. xv., *March* 1905.

Descriptions of new West-African Frogs of the Genera Petropedetes *and* Bulua.

By G. A. Boulenger, F.R.S.

A few years ago * I had occasion to offer some remarks on the genus *Petropedetes*, Reichenow, and pointed out the differential characters of the three species then known, all three from West Africa, viz. *P. cameronensis*, Reichen., the type of the genus, with the toes half-webbed and the tympanum half the diameter of the eye; *P. Johnstoni*, Blgr., with a mere rudiment of web between the toes, and the tympanum half the diameter of the eye; and *P.* (*Tympanoceros*) *Newtoni*, Bocage, with a mere rudiment of web between the toes and with a very large tympanum, remarkable for the presence, in the male, of a dermal appendage projecting from its centre. I have since received examples of two new species, differing from those previously described in the fully webbed toes, and for these I propose the names *P. natator* and *P. palmipes*; the former is from Sierra Leone, the latter from South Cameroon. The genus *Bulua* was described by me quite recently † for a new frog from South Cameroon, *B. ventrimarmorata*; a second species, from the same country, may now be added, and is here described as *B. albiventris*.

Petropedetes natator.

Tongue rather feebly notched behind, without conical papilla. Vomerine teeth in two small groups close together behind the level of the choanæ. Head strongly depressed, a little broader than long; snout rounded, shorter than the

* P. Z. S. 1900, p. 439.
† Ann. & Mag. Nat. Hist. (7) xiii. 1904, p. 262.

orbit, with obtuse canthi and nearly vertical, concave lores; interorbital space as broad as the upper eyelid; tympanum moderately distinct, barely half the diameter of the eye. Fingers moderately elongate, much depressed, with large, cordiform terminal disks; first finger shorter than second; toes rather short, broadly webbed to the disks, which are a little smaller than those of the fingers; subarticular and inner metatarsal tubercles feebly prominent. The tibio-tarsal articulation reaches to between the eye and the tip of the snout; tibia half as long as head and body; foot about two fifths length of head and body. Upper parts closely covered with round granules intermixed with elongate warts; lower parts smooth. Male with internal vocal sacs, a sharp tooth-like process at the symphysial extremity of each ramus of the mandible, and a more or less distinct large oval gland on the lower side of the thigh. Olive-brown above, with round darker spots on the body and cross-bars on the limbs; lower parts brown.

From snout to vent 55 mm.

Several specimens from Sierra Leone, presented to the British Museum by Major F. Smith, R.A.M.C.

Major Smith informs me the specimens were taken from a mountain torrent in a rocky bed at an altitude of 800 feet. The frog is a powerful swimmer and jumper, and clings to rocks, roots of trees, &c. by means of its digital disks.

Petropedetes palmipes.

Tongue rather feebly notched behind, with a conical papilla in the middle. Vomerine teeth in two short transverse or oblique series behind the level of the choanæ. Head strongly depressed, as long as broad; snout obtusely pointed, a little shorter than the orbit, with obtuse canthi and very oblique concave lores; interorbital space narrower than the upper eyelid; tympanum rather indistinct, about one third the diameter of the eye. Fingers rather elongate, with large, cordiform terminal disks; first finger shorter than second; toes moderately elongate, webbed to the disks, which are a little smaller than those of the fingers; subarticular and inner metatarsal tubercles feebly prominent. The tibio-tarsal articulation reaches beyond the tip of the snout; tibia three fifths to two thirds as long as head and body; foot nearly half as long as head and body. Skin shagreened or glandular above; a more or less distinct glandular line along the middle of the head and body; lower parts smooth. Male with internal vocal sacs and a well-defined large oval gland

THE STAFF OF THE PRINCESS CHRISTIAN COTTAGE HOSPITAL.

1905

5 & 6, Chelsea Court,
Chelsea Embankment,
L o n d o n, S.W.
27th February, 1908.

Dear Sir,

From time to time in the past you have been good enough to send me various specimens of fleas for my collection. The papers that I have published on these insects during the last few years prove, I think, that your kind help has not been in vain. If you should be able to send me any more of these insects in the future I should be most grateful.

As several parcels have recently gone to the wrong address I should like to point out that (except in a friendly way) I am not connected at all with the Hon. L. Walter Rothschild's Zoological Museum at Tring. All communications for me should be addressed The Hon. N. Charles Rothschild, Tring Park, Tring, Herts, England.

I remain,

Yours very truly,

N. Charles Rothschild.

Major F. Smith,
W o o l s t o n.

BRITISH MUSEUM (NATURAL HISTORY),

CROMWELL ROAD,

LONDON: S.W.

24. VI. 07.

My dear Smith,

One of the two tubes forwarded with your letter of the 6th inst., which has just reached me, arrived smashed to atoms, with no trace of its occupant. The other tube is fortunately intact, & the mosquito therein contained is a specimen of Myzomyia culicifacies, Giles.

Yours sincerely,

E. E. Austen.

Major S. Smith,
I.S.O., R.A.M.C.,
Station Hospital,
Benares, India.

"The Entomologist"
April 1905

NEW CULICIDÆ FROM THE WEST COAST OF AFRICA.

By FRED. V. THEOBALD, M.A.

THE new Culicidæ described here were sent me by Mr. Austen, of the British Museum, and were collected at Bihé, Angola, Portuguese West Africa, by Dr. Creighton Wellman in 1904, and at Sierra Leone by Major Smith, D.S.O., R.A.M.C.

The new *Danielsia* and *Ædimorphus* are very marked and beautiful species. The *Pyretophorus* was pointed out as being distinct from *P. costalis*, Loew, by Mr. Austen, after whom I have named the species. The *Anopheles* closely resembles *A. nigripes*, Staeger, but is clearly distinct.

The types are deposited in the National Collection. The strange genus *Heptaphlebomyia* is more fully described than in my Monograph, as fresh material was included in the collection from Angola.

Genus ANOPHELES, Meigen.

(Syst. Beschr. 1818, Meigen; Mono. Culicid. iii. p. 17, Theobald.)

ANOPHELES SMITHII, n. sp.

Head black, with a patch of frosty grey scales in front; proboscis black; palpi black, with three narrow pale bands, apex black. Antennæ with outstanding scales as well as hairs on the second segment, giving a tufted appearance. Thorax frosty grey in the middle, deep brown at the sides, and with a median dark line and brown hair-like scales. Abdomen black, with dull golden hairs. Legs black, unbanded. Wings unspotted, the veins clothed with dense dark brown scales.

♀. Head black, with a patch of frosty grey upright forked scales in front, dense black upright forked scales behind, over which shows a prominent tuft of large grey narrow-curved scales projecting forwards from the thorax; several thick black bristles project forwards between the eyes; proboscis and clypeus black, the former thin; palpi as long as the proboscis, thin, scaly, black, with three pale bands, the apical segment black. Antennæ black, the second segment with a small dense tuft of hairs on the inner side as well as the normal longer black ones. Thorax frosty grey in the middle, showing a median dark line and a pale yellowish brown one on each side of it in front, more or less tessellated behind, and with many small black specks, the sides deep brown, the pale frosty area contracted in front, thus widening the dark brown lateral areas; hairs or hair-like scales of thorax brown; scutellum and metanotum deep brown, posterior border-bristles of the former black. Abdomen black, with deep brown hairs. Legs long and thin, deep brown; ungues equal and simple, thin, rather long. Wings clothed with dense rather stumpy lanceolate scales, uniformly dark brown; the first submarginal cell considerably longer and narrower than the second posterior cell, its base nearer the base of the

BRITISH MUSEUM (N.

CROMWE

My dear Smith,

One of the tu
with your letter of the
just reached me, arri
atoms, with no trac
the other tube is for
& the mosquito there
a specimen of Myz
Giles.

Yours

Major F. Smith,
I.S.O., R.A.M.C.,
Station Hospital,
Benares, India.

wing than that of the latter, gradually becoming acute at the base, its stem about two-thirds the length of the cell; stem of the second posterior cell longer than the cell; supernumerary and mid cross-veins close together, the mid a little behind the supernumerary posterior cross-vein about its own length distant behind the mid. Length, 3·5 to 4 mm.

Habitat. Sierra Leone (800 ft.) (Major Smith).

Observations.—Described from several females collected by Major Smith. It is a very dark species, coming near *A. nigripes*, Staeger, but can be told at once by the denser wing-scales and banded palpi. The structure of the second antennal segment is very marked; the scales are rather long and outstanding, giving a tuft-like appearance.

Genus PYRETOPHORUS, Blanchard.

(Comp. Rend. Soc. d. Biol. p. 795 (1902); Mono. Culicid. iii. p. 66, 1902, Theobald.)

PYRETOPHORUS AUSTENII, n. sp.

Head black, with grey scales in front; proboscis black, with two broad snowy white bands, the last forming a white apex to the palpi, and a third very narrow white band. Thorax brown, clothed with silvery grey scales; also the scutellum. Abdomen black, with golden hair. Legs black, with apical white tips. Wings with black and white patches of scales, costa with two small white spots and traces of a minute third spot towards the base; most of the veins pale-scaled, but prominent black spots at base of the second posterior cell and apex of lower branch of fifth long vein.

♀. Head black, with upright snowy white forked scales in front, black ones behind; proboscis black; palpi black-scaled, densely at the base, with two broad white bands towards the apex, one forming the apex of the palpi, and a third small one towards the basal half. Antennæ black, with grey pubescence. Thorax black, with scattered broad curved snowy white scales; also the scutellum. Abdomen black, densely clothed with golden hairs; the two lobes with black scales. Legs black, the apices of all the segments, except the last in the fore and mid legs, with a narrow white band; in the hind legs all the segments are banded; ungues equal and simple, rather long. Wings with rather dense *Pyretophorus*-like scales; the costa with three white spots, the apical one large, the second smaller, and the third very small; all three spread fairly evenly on to the first long vein, which has in addition a small white spot between the two apical costal ones, and another near the third spot, its base mostly white. On the base of the costa is another small white spot not reaching the top of the costa; the branches of the third long vein are black at the tips and bases near the fork, and there is another black patch near its base; the third long vein pale, except for a black spot *near* the apex, and two near the base; the fifth has two black spots *near* the apices of its branches, a *large* black-scaled area in front of and including the base of the fork and its stem near the fork, rest of the vein pale-scaled; the sixth has three black spots, the median one the largest; wing-

THE ALEXANDER MEMORIAL PRIZE.

The prize of £50 and the gold medal of the Alexander Memorial Fund for 1905 has been awarded to Major F. Smith, D.S.O., R.A.M.C., for his essay on Syphilis in the Army, its Causes, Treatment, and Prevention. The essay sent in by Major H. C. French, R.A.M.C., was considered by the assessors to be worthy of commendation.

The subject for the next competition is Functional and Organic Diseases of the Heart in the Army, their Prevalence and Influence on Efficiency, their Causes, Suggestions for Preventive Measures, and their Treatment. The essay should embody the results of personal observation and research. Essays must reach the Secretary of the Prizes Committee, Royal Army Medical College, on or before Dec. 31st, 1906. They must have a brief motto and be accompanied by a sealed envelope similarly superscribed containing the name and address of the author. No essays should exceed about 20,000 words, exclusive of tables, which may be added in the form of appendices. The competition is limited to executive officers of the Royal Army Medical Corps on full pay. Professors and assistant professors at the Royal Army Medical College are not eligible while so employed.

From

The Secretary,

The Prizes Committee.

To

Major F.Smith, D.S.O.,

Royal Army Medical Corps.

London, W.C.

June 14th, 1906.

Sir,

I have the honour to inform you that at a meeting of the Prizes Committee held this day, your essay bearing the motto 'Orang Jahat' was awarded the Alexander Memorial Prize.

Will you kindly inform me, to what address I may send the cheque for £50, the gold medal and your essay?

I have the honour to be,

Sir,

Your obedient servant

C.S.P. Foster. Major R.A.M.C.

Secretary. Prizes Committee.

COMPAGNIE FRANÇAISE DE L'AFRIQUE OCCIDENTALE

COMPTOIR DE ..... à M.

le ..... 180 .....

MOULLOT - Marseille — 10788

Dear Daddy Smith

Just flying news
Dear that the Son is coming
& he will be at Motopolme in
few days.

Send your man
Speedy Wake Board
Yours Sincerely
R Evans

Office Form No. 3 (P.M.O.)

Heading:— Officers.

No. 4519. R.

Head Quarters, 2nd (Rawalpindi) Division.

MEDICAL BRANCH.

Rawalpindi, 5th September, 1911.

Murree,

Extract/Copy of a letter, No. 2050-1Medical dated, 29th August, 1911., from the General Officer Commanding, 8th (Mhow) Division. to The General Officer Commanding, 2nd (Rawalpindi) Division.

Office Form No. 3 (P.M.O.)

Heading :— Officers.

No. 4519 R.

Head Quarters, 2nd (Rawalpindi) Division.

MEDICAL BRANCH.

Rawalpindi, Murree, 5th September, 1911. 1911.

Extract Copy of a letter, No. 3050-Medical dated, 29th August, 1911., from the General Officer Commanding, 8th (Lucknow) Division. to The General Officer Commanding, 2nd (Rawalpindi) Division.

With reference to the Principal Medical Officer, His Majesty's Forces in India, No. 866/23 (P.M.O.2), dated 22nd August, 1911, I have the honour to request that you will kindly issue the necessary instructions for Major F.Smith, D.S.O., R.A.M.C., to arrive at Calcutta on or about the 2nd October, 1911, to relieve Major T. Mc Culloch, R.A.M.C., of the command of the Station Hospital at that Station.

2. Major McCulloch is due to embark in the " Rewa " sailing from Bombay on the 12th October, 1911.

Memorandum.

For information in continuation of my No. 4333-R, dated 24th August, 1911.

2. Please acknowledge receipt.

Surgeon General, I.M.S.,
P.M.O., 2nd (Rawalpindi) Division.

To

Major F.Smith, D.S.O., R.A.M.C.,
C/O Postmaster,
Srinagar.

Reprinted from the JOURNAL OF THE ROYAL ARMY MEDICAL CORPS, *November*, 1906.

NOTES FROM ALDERSHOT.—Major F. Smith, D.S.O., R.A.M.C., writes (October 8, 1906) :—

"*With the 3rd Division Field Ambulance—Aldershot Army Corps.*—Hearing of all the suggested names for the combined units, it never occurred to me, until I had command of the Ambulance above referred to, that a better one than any of them would have been 'Field Hospital and Bearer Company,' or the other way about. It would not have been more unwieldy than the existing unit 'Divisional Transport and Supply Column,' and it would have explained itself. It will take a long time to make the whole of the Army conversant with the new unit. Moreover, we British have got so accustomed to speaking of an 'ambulance waggon" as an 'ambulance,' that a good deal of confusion arises. However, it is too late to alter it now. As a somewhat annoyed General remarked when he found he had to learn his medical organisation over again, this change of name will be making trouble all over the world—the change will be creeping around the Empire for years, every colony following the old country.

"In spite of the name, we have enjoyed a very good time—for after all, there is no more pleasing military duty than capering about on a horse in a pretty country, watching the progress of military science. Our General (Sir Edward Hutton, K.C.M.G., C.B.) being as keen on his medical service as on any other branch, we were out on every divisional day. For training purposes we formed a complete Field Ambulance and regimental medical service in skeleton, in which were some elements of humour. One of the earliest results of the training was a marvellous reduction in the weight and girth of our somewhat rotund senior non-commissioned officers, who had been dragged forth from a life of ease and plenty in hospitals. It will be seen from the following copy of orders that promotion from the ranks to a commission was very rapid in the medical service of the 3rd Division. The acting medical officers took very kindly to their new positions. The commanding officer of a battalion informed me that seeing a portly N.C.O. of my Corps and having a desire to send a message to me, he said to the N.C.O., 'Do you belong to the Bearer Company?'—the N.C.O. drew himself up and replied, 'No sir, I'm the medical officer of the ———shire Regiment.' It will be judged from this that all ranks entered into the spirit of the thing. In this respect, they were only on a par with the rest of the Division. In all my soldiering I have never seen soldiers work so enthusiastically, with such little sickness and falling out, as this 3rd Division in the 1906 training. More than once the Division went through a long and arduous day's marching and fighting without a single man falling out.

"As there was a universal ignorance of the new medical organisation, I drew up, at the General's request, a memorandum on the subject, and it was issued throughout the Division with the orders, as below :—

"'MEMORANDUM OF MEDICAL ARRANGEMENTS FOR FIELD TRAINING, 3RD DIVISION, ALDERSHOT ARMY CORPS.

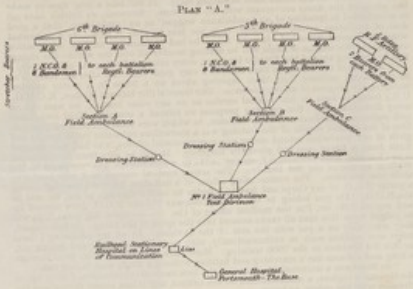
"'*Regimental Medical Aid.*—The Regulations now require that all the authorised bandsmen of a unit be trained to act as stretcher bearers. Royal Artillery, in lieu of bandsmen, continue to provide two men per battery or company for stretcher bearing. It has been decided that eight men and a N.C.O. from each band will be sufficient to represent the band as stretcher bearers during the training.[1] On divisional training days, when the Field Ambulance is ordered to accompany the Division, the regimental bearers will take out their stretchers and will be prepared to co-operate in the removal of wounded from the field. These bearers, in action, will be at the disposal of the medical officer attached to their battalion, and will deal chiefly with the wounded of their own unit. The stretcher bearers of the Royal Artillery, similarly, will be under the medical officer attached to the artillery brigades. The stretchers for use by regimental stretcher bearers generally will be held on charge by the units to which the bearers belong. The wounded will be carried by regimental bearers to the point where

[1] This arrangement was made in order that the bands might not be broken up altogether.

they meet the ambulance waggons of the Field Ambulance. In exceptional cases of dangerously wounded men, who would be liable to be injured by the jolting of a waggon, the bearers may be directed by the medical officer to carry the wounded by hand to the dressing station.

"'*Field Medical Units.*—Under the new organisation of the field units of the medical service the bearer company and field hospital are abolished as such, and a unit called a Field Ambulance has been created, to combine the functions of a bearer company and those of the field hospital. For special use with large bodies of cavalry there is a new unit styled the Cavalry Field Ambulance. There are two field ambulances to a division of infantry, and each ambulance can accommodate 150 patients. The total number of patients for whom accommodation is available is therefore the same as under the old organisation of three field hospitals to a division, for each field hospital was estimated to deal with 100 sick. The Field Ambulance is composed of three sections, each practically identical in composition. The equipment is so packed that a section is always ready to move independently at a moment's notice. Each section of a Field Ambulance is sub-divided into a bearer division (doing bearer company work), and a tent division (taking the place of the old field hospital). It will be seen, therefore, that the new arrangement is more elastic than the old one, inasmuch as the two divisional units afford us six organised bodies, each capable of accommodating 50 patients, and available for any part of the division as a matter of course (not attached to brigades as in the old scheme). The main idea of the new arrangement is to move wounded as little as possible, bringing the hospitals to the wounded, instead of the wounded to the hospitals. The dressing station will often, therefore, become merged in the tent division of the Field Ambulance. It is contemplated that the Field Ambulance will not be opened in its entirety at the commencement of an engagement, but that sections will be held in reserve to be distributed under the General's orders, wherever there are most wounded. The remaining medical units, the stationary hospitals, hospital trains, advanced depôts of medical stores, general hospitals, base depôts of medical stores and hospital ships, remain practically the same as under the old organisation. The accompanying plan (marked 'A') shows the lines of medical assistance in the field. The Division has been supplied with but one weak section of a Field Ambulance. For the purpose of illustrating the working of the medical arrangements in the field during divisional training, then, it must be assumed that one entire Field Ambulance and two sections of the other Field Ambulance of the Division have been left behind crowded with wounded and unable to move with the Division. The remaining available section will meet the situation, as far as possible, by sub-dividing into three attenuated sections, to do the medical work of the Division.

PLAN "A."



"'*Bordon,*
"'*July 18, 1906.*'

"'*F. Smith, Major,*
"'*Royal Army Medical Corps.*

"'MEDICAL ARRANGEMENTS FOR THE DIVISIONAL MANŒUVRES OF JULY 19TH, 1906, 3RD DIVISION.

"'*Infantry and Royal Artillery under Artillery Fire.*—First dressing station, Section 'A,' opened behind houses at the foot of hill on the road from Whitehill to Blackmoor. Section 'B' will advance with the infantry, and establish a dressing station at some suitable place. The officer commanding Section 'C' will establish a station at the best position he can find on Hexshead Common as soon as the Royal Field Artillery have taken up position. The bearer divisions and regimental bearers will move out to collect wounded. Medical officers of battalions will carry wound-tallies, and in order to approximate to the conditions of real warfare (in which the colour-sergeant is as likely as the private to be suddenly put out of action) will give them from time to time to N.C.O.'s and men. The wounded will remain with their dressings on until orders are given for their release. Section 'B' will evacuate as many wounded as possible on the headquarters, Section 'A,' at the position given above. The medical officer in charge of Hampshire Regiment will be in medical charge of divisional headquarters. The headquarters of each brigade will be in medical charge of the senior medical officer of the brigade. The medical officer Artillery Brigades will assume medical charge also of the Supply and Transport Column, Field Troop, Royal Engineers, and Squadron of Divisional Cavalry.

"'R. FANSHAWE, *Lieutenant-Colonel,*
"'*General Staff.*

"'*Bordon,*
"'*July 18 1906.*'

"'MEDICAL *Personnel*, 3RD DIVISION.

"'*Major F. Smith, D.S.O., R.A.M.C.*—Acting Principal Medical Officer Division, and Officer Commanding Field Ambulance.

"'*Lieutenant V. H. Symons, R.A.M.C.*—Officer Commanding Section 'A' Field Ambulance. This officer will also be available in case of real casualties in the 6th Brigade.

"'*Lieutenant C. T. Edmunds, R.A.M.C.*—Officer Commanding Section 'B' Field Ambulance, and will be available for real casualties in 5th Brigade.

"'*Lieutenant L. G. Gibson, R.A.M.C.*—Officer Commanding Section 'C' Field Ambulance.

"'*Lieutenant P. Sampson, R.A.M.C.*—Medical Officer in charge of two Brigades, Field Artillery.

"'*Lieutenant and Quartermaster Audus, R.A.M.C.*—Field Ambulance.

"'*Acting Medical Officers in charge of Regiments.*

1	Warrant Officer	R.A.M.C.
1	Quartermaster-Sergeant	"
1	Sergeant	"
5	Nursing Orderlies	"
8		

"'*Principal Medical Officer's Clerk and Acting Sanitary Officer.*
1 Staff-Sergeant, R.A.M.C.

"'*Field Ambulance.*

	Section A.	Section B.	Section C.
Bearer Division	1 Corporal, R.A.M.C. 4 Privates " 2 Stretchers	1 Corporal, R.A.M.C. 4 Privates " 2 Stretchers	1 Corporal, R.A.M.C. 4 Privates " 2 Stretchers

"'*Test Division, Dressing Stations.*
2 Privates, R.A.M.C. 2 Privates, R.A.M.C. 2 Privates, R.A.M.C.

"'*Test Division, Field Ambulance.*
1 Quartermaster. 1 Man (cook).

"'R. FANSHAWE,
"'*Lieutenant-Colonel, General Staff.*
"'*Bordon,*
"'*July* 18, 1906.'

"The acting Principal Medical Officer was expected to follow the operations and to fit the Field Ambulance in with the tactical situation—advising the General Staff from time to time as to what should appear in Operation Orders. He had also to attend all the conferences, vulgarly termed 'pow-wows.'

"We succeeded in giving satisfaction, and were mentioned in terms of commendation in orders. Our performances at night operations were really interesting, when we searched for wounded with no light but the bull's eye lantern. The wounded whose lives had been imperilled in the descent of rugged hills in the dark, were rewarded on a cold night with hot Bovril or Lemco, prepared at the dressing station. This reconciled them to their fate, and they slumbered peacefully till released from their surgical bonds. Either the General or one of his staff usually visited all the dressing stations, and criticised the work and arrangements. We had our instruments cooking in the steriliser, and everything ready for business, but we were quite unprepared for such realism as a stern order from the General to our latest joined surgeon to 'remove that patient's leg.' It is hard to say which looked most alarmed, the young officer on receiving the order, or the paling patient being borne to the operation tent. The patient, I am sure, took care to avoid wound-tallies ever afterwards.

"The non-commissioned officer acting as Sanitary Officer was a capable rider—booted and spurred, on a tall 'hairy'; he took the part of galloper to the acting Principal Medical Officer very well.

"A NEW ROYAL ARMY MEDICAL CORPS 'MARCH!'

"Having to appear on a review parade, steps were taken in advance to see that we were not neglected in the music line at the march-past. The Washington Post seemed to be the favourite among the men—one of them said, 'Nobody can play it like our own band, Sir!'—but there was also an opinion abroad that that rousing tune had been abandoned for something new to the eternal and, in this instance, regretted desire for change. Anyway, it did not matter which was right because the bands had not the necessary music. Ultimately it was arranged that the excellent Middlesex band should play us by to our old march the 'British Grenadiers'—and very proudly we stepped out to that inspiring air. All the same, a medical grenadier does not seem quite right. When the Bandmaster (Mr. G. P. Robertson) came into the mess-room on a guest-night a few days later he told me he had thought of a march for us—an old song known as 'The Perfect Cure.' It is a jaunty air (as I remember it). He thought it could be made into a good march. If we are as proud of our work as the Army Service Corps, with their 'Wait for the Wagon,' I think we could not do better than adopt the air of the 'Perfect Cure' type. A more lively march of this character might be made out of an old tune styled 'Medicine Jack.'

"*The Good of It.*

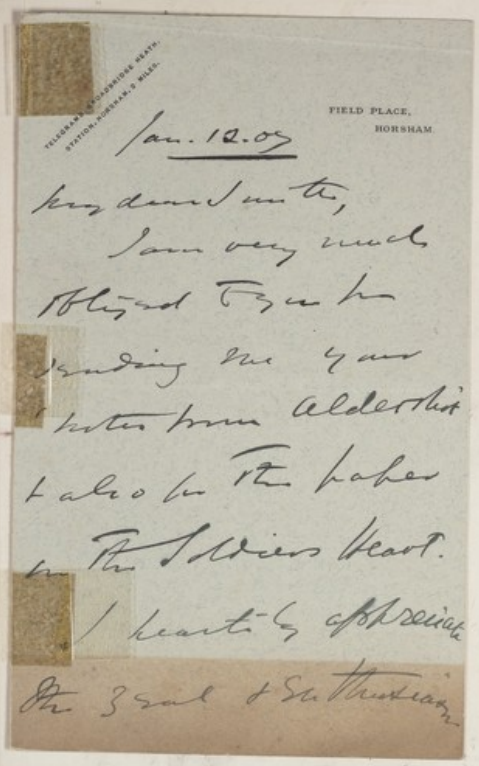
"It may be asked regarding the training, of what good is it all? Well! we have learnt our own work as members of the Royal Army Medical Corps, and of the grand army in the field of war, and it is for war that we exist. We have rubbed shoulders for our mutual benefit with other branches of a division in training. We have gathered a store of health to last us for a long time.

"Our feeling on the breaking up of the Division is one of regret that circumstances will not allow of the training of all the Royal Army Medical Corps with the rest of the Army every year—for if they did *we should be better known and know better.*

"We have another feeling, and that is one of hope, that we may go on service with the 3rd Division before it gets out of training."

[redacted]

Oh, boys, carry me along.



FIELD PLACE,
HORSHAM.

Jan. 12. 07

My dear Smith,

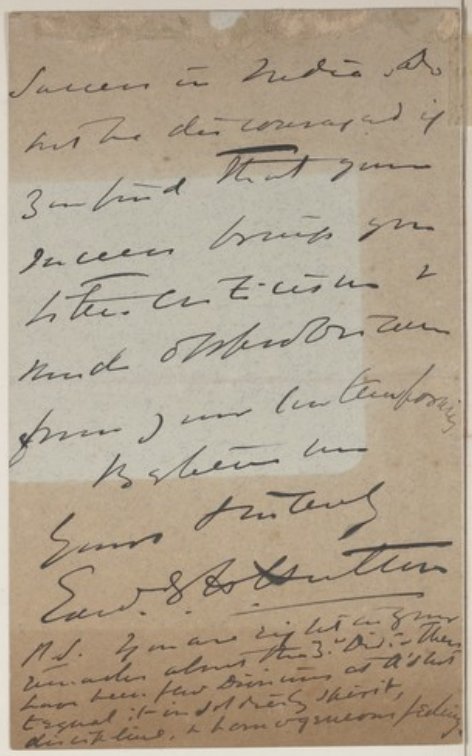
I am very much
obliged to you for
sending me your
letter from Aldershot
I also like the Ladies
in The Soldiers Heart.

I heartily approve
the Grand Old Duke

which you put into
your professional
work. The result
can only be a success
both to the Company &
to yourself. Enthusiasm
in the Ideal gives us
steam & the loco-
motive - I have
met many students

need in your work,
inspiration, but who
does himself do
better work in Science
than yourself. I take
that if I have a
command in Workshop
I may have your
assistance.

I am, my dear Sir,



THE INCORPORATED

LIVERPOOL SCHOOL OF TROPICAL MEDICINE.

Telephone 19 X, Royal.

JOHNSTON TROPICAL LABORATORY,
UNIVERSITY OF LIVERPOOL.

10th Sept: 1908

My dear Smith,

Look up Journal of Hygiene January 1901 page 20 and you will see that Anopheles were found in Portsmouth. Newstead our entomologist says that Anopheles are only just beginning to come into the houses so that you may have over-looked them in the barracks. I have long been expecting an outbreak in England - So look out for fresh cases -

Yours very truly

R. Ross -

Dr. K. S. Tso.

Vladang, China.

Sept. 6th 1904

72 Anson Road

Tufnell Park N.

Dear Sir,

I have read over your essay on Modern Bullet Wounds and Modern Treatment with deep interest. I beg to ask if you will be so kind as to grant me your permission for translating the same into the Chinese language and am sure it will be very valuable to our country.

I remain

Yours faithfully

K. S. Tso.

From
The Secretary,
The Prizes Committee

To
Major F. Smith, D.S.O.,
Royal Army Medical Corps.

From

The Secretary,

The Prizes Committee

To

Major F. Smith, D.S.O.,

Royal Army Medical Corps.

Army Hygiene Laboratory,

Examination Hall,

Savoy Street,

London, W.C.

February 8th, 1907.

Sir,

I have the honour to inform you that the Assessors for the Parkes Memorial Competition have awarded your essay, bearing the motto "Hopeful", the prize.

Kindly inform me to what address I may send the cheque in payment and the bronze medal.

The Committee wish me to inform you that they may consider it desirable to publish your essay, in perhaps a some-what modified form, in either the Journal of the Royal United Service Institution, the Journal of the Royal Army Medical Corps , or in some other suitable periodical.

Will you kindly state if you have any objection to offer to such an arrangement.

I have the honour to be,

Sir,

Your obedient servant,

C. S. P. Fowler

Major, R.A.M.C.,

Secretary Prizes Committee.

BRITISH MUSEUM,

LONDON: W.C.

11th August 1902

Dear Sir,

I am today sending the two pieces of material to Mr. Rudler, of the Geological Museum, Jermyn Street, with the request that he will communicate with you as to their nature.

The implement is of a remarkable type, and we shall be very glad to have it. A formal letter of thanks will be sent to you as soon as our Board of Trustees meets again, but that will not be before October.

Yours faithfully,

for C. H. Read.

Dr. Dalton

Major J. Smith. D.S.O.
R. A. M. C.
Coo-ee Station
Hants.

Journal Association Military Surgeons U.S.A. September 1903

THE ENNO SANDER PRIZE MEDAL AND THE BRITISH MEDICAL SERVICES.

THE Enno Sander Prize Medal for 1903 which was awarded to Major Frederick Smith, D.S.O. of the British Royal Army Medical Corps was made a feature of the recent graduating exercises of the Royal Army Medical College in London, upon which occasion the medal was formally presented by Sir William Taylor, K.C.B., to the successful competitor. In a letter to the editor, Sir William Taylor remarks:

"I read to the Commandant, Professors, Staff and Class at the College your letter of June 20th, and I think that if you had heard the applause with which the reading of your letter was greeted, you would have been quite convinced of the good feeling and hearty reciprocity that exists in my service towards the Association of Military Surgeons of the United States.

"We all appreciate to the fullest extent the generous good feeling that prompted you to allow Officers of the Royal Army Medical Corps to compete, and that appreciation was greatly increased by our knowledge of the kind way in which Major Smith's success was greeted by your Officers.

"I feel sure that this event will, as you hope, undoubtedly still further cement that friendship between the Medical Departments of our countries which already exists."

This event will certainly tend to deepen the cordial feeling already existing between the medical officers of the British Army and those of the United States. Not the least of the products of the nineteenth century has been the development of the feeling of comity between the medical departments of the various nations of the world and the growth of the idea that whatever differences may exist between the nations which they serve, they at least are always united in the common labor of alleviating suffering,—a fact which this happy event auspiciously accentuates.

Journal

of the

Royal Army Medical Corps.

ENNO SANDER PRIZE.—We have great pleasure in announcing the fact that this prize of the Association of Military Surgeons of the United States Army has been awarded to Major Frederick Smith, D.S.O., of the Royal Army Medical Corps, for his Essay on "The Differential Diagnosis of Typhoid Fever in its Earliest Stages." We are sure that the news will be received with the greatest satisfaction by all ranks of the Corps, and that we are united in offering Major Smith our warmest congratulations. This award establishes another link in the already strong bond of friendship which has existed between ourselves and our colleagues in the Medical Service of the United States Army in the past, and which we are sure will continue to gain strength in the future.

Journal. Association Military Surgeons U.S.A.
September 1903

THE ENNO SANDER PRIZE MEDAL AND THE BRITISH MEDICAL SERVICES.

THE Enno Sander Prize Medal for 1903 which was
ed to Major Frederick Smith, D.S.O. of the
h Royal Army Medical Corps was made a fea-
cent graduating exercises of the Royal Army
ge in London, upon which occasion the medal
presented by Sir William Taylor, K.C.B., to
competitor. In a letter to the editor, Sir Wil-
marks:

the Commandant, Professors, Staff and Class
your letter of June 20th, and I think that if
the applause with which the reading of your
eted, you would have been quite convinced of
ng and hearty reciprocity that exists in my ser-
the Association of Military Surgeons of the
.

ppreciate to the fullest extent the generous good
rompted you to allow Officers of the Royal Army
s to compete, and that appreciation was greatly
our knowledge of the kind way in which Major
ss was greeted by your Officers.

ure that this event will, as you hope, undoubt-
her cement that friendship between the Medical
of our countries which already exists."

nt will certainly tend to deepen the cordial feeling
ing between the medical officers of the British
ose of the United States. Not the least of the pro-
ineteenth century has been the development of the
omity between the medical departments of the
ns of the world and the growth of the idea that
ferences may exist between the nations which
hey at least are always united in the common la-
ating suffering.—a fact which this happy event
accentuates.

Journal
of the
Royal Army Medical Corps.

ENNO SANDER PRIZE.—We have great pleasure in announcing the fact that this prize of the Association of Military Surgeons of the United States Army has been awarded to Major Frederick Smith, D.S.O., of the Royal Army Medical Corps, for his Essay on "The Differential Diagnosis of Typhoid Fever in its Earliest Stages." We are sure that the news will be received with the greatest satisfaction by all ranks of the Corps, and that we are united in offering Major Smith our warmest congratulations. This award establishes another link in the already strong bond of friendship which has existed between ourselves and our colleagues in the Medical Service of the United States Army in the past, and which we are sure will continue to gain strength in the future.

Exec. & Stores Press, London.

POST OFFICE TELEGRAPHS. No. of Telegram.....

If the accuracy of an Inland Telegram be doubted, the telegram will be repeated on payment of half the amount originally paid for its transmission, any fraction of 1d. less than ½d. being reckoned as ½d.; and if it be found that there was any inaccuracy, the amount paid for repetition will be refunded. Special conditions are applicable to the repetition of Foreign Telegrams.

Office Stamp.

Charges to pay £ s. d.

Handed in at Wilton Rd Salisbury at 4. 5/6 P.M. Received here at 5 P.M.

TO Jatrophic Netley

Please warn Major F Smith R.A.M.C to attend examination Hall Victoria Embankment at ten thirty a.m. on 29 inst. to receive ~~the~~ Enno-Sander prize uniform frock coat.

Staff

N.B.—This Form must accompany any inquiry made respecting this Telegram.

The Association of Military Surgeons
OF THE UNITED STATES.

President, BRIGADIER GENERAL ROBERT A. BLOOD,
Surgeon General, Massachusetts Volunteer Militia.
First Vice President, MEDICAL DIRECTOR J. C. WISE,
United States Navy.

Second Vice President, SURGEON GEN. WALTER WYMAN,
Public Health and Marine Hospital Service
Treasurer, LIEUTENANT HERBERT ALONZO ARNOLD,
Assistant Surgeon Pennsylvania National Guard

Secretary and Editor, MAJOR JAMES EVELYN PILCHER,
Brigade Surgeon, U. S. V.; Captain, Retired, U. S. A.
Assistant Secretary, CAPTAIN WILLIAM ALFRED ROLFE,
Assistant Surgeon Mass. Volunteer Militia.

Office of the Secretary and Editor,
Carlisle, Pennsylvania.

Journal of the Association of Military Surgeons of the United States.

May 29, 1903.

Major Frederick Smith, D. S. O., R. A. M. C.
Woolston, Hants, England.

My dear Sir:

I have very great pleasure in announcing that at the recent annual meeting of this Association held in Boston, Mass., the Enno Sander Gold Medal Prize of this Association for the present year was awarded to you. The medal is now being engraved, and when completed will be sent to you through the Director General of your Army Medical Services.

Congratulating you upon your success in this contest and assuring you of the pleasure with which the Association confers its highest honor upon a member of so distinguished a corps as your own, I remain my dear Sir,

Very cordially yours,

James Evelyn Pilcher

Journal of the Association
of Military Surgeons of
the United States.

Th

First Vice

Second Vi

Dictated No. 5

Major F. Smith

Woolsto

My dear Major

your valuable

Kibbi," was aw

Essay competiti

ested to know,

distinguished

With

The Association of Military Surgeons
OF THE UNITED STATES.

President, SURGEON GENERAL WALTER WYMAN, Public Health and Marine Hospital Service.
First Vice President, MAJOR ALBERT HENRY BRIGGS, Surgeon, National Guard of New York.
Second Vice President, BRIG. GEN. ROBERT M. O'REILLY, Surgeon General, United States Army.
Third Vice President, REAR ADMIRAL PRESLEY M. RIXEY, Surgeon General United States Navy.
Treasurer, MAJOR HERBERT ALONZO ARNOLD, Surgeon, Pennsylvania National Guard.
Secretary and Editor, MAJOR JAMES EVELYN PILCHER, Brigade Surgeon, U. S. V.; Captain, Retired, U. S. A.

Journal of the Association of Military Surgeons of the United States.

Office of the Secretary and Editor,
Carlisle, Pennsylvania.

Detroit, Mich., September 26, 1905.

Dictated No. 5.

Major F. Smith, R.A.M.C.,
Woolston, Hampshire, England.

My dear Major Smith:-

I have much pleasure in informing you that your valuable essay, submitted under the nom de plume "Jon Kibbi," was awarded first honorable mention in the Seaman Prize Essay competition for 1905. The first prize, you may be interested to know, was carried off by Major Jefferson R. Kean, a distinguished officer of the American Army Medical Department.

With kind regards,

Very cordially yours,

James Evelyn Pilcher

British Museum (Natural History)

Cromwell Road, London, S.W.

21st June, 1904.

Sir,

I am directed by the Trustees of the British Museum to convey to you the expression of their best thanks for the Present mentioned on the other side, which you have been pleased to make to them.

19 Tabanidæ and 1 Microdon inermis,

from Sierra Leone.

I have the honour to be,

Your obedient Servant,

E Ray Lankester

Director.

Major F. Smith, D.S.O., R.A.M.C.

al Medical Officer, Home District.

CORONATION SECTION.)

St. George's Barracks,

10th June. 1902.

Smith.

Office of Principal Medical Officer, Home District.

(CORONATION SECTION.)

St. George's Barracks,

MEMORANDUM. 10th June. 1902.

To Capt. A. H. Smith.

Dear Sir.

Referring to your application of to be employed on duty at the approaching Coronation. I beg to state that I am prepared to accept your services on the following conditions:-

(a) That you will have no claim on the Public for pay or the expenses of your journey to and from the Metropolis including your sojourn therein.

(b). That you are prepared to perform any duty connected with the Army Medical arrangements for the Coronation, to which you may be detailed.

Will you kindly favour me with a reply at your earliest convenience.

Believe me

faithfully yours

W. Babtie

Colonel.

P.M.O. H.D.

Parade of the Elephants and Buffaloes

Oh ! I like to hear the hutties
With their stately martial tread,
And the sound of elephants galloping,
It quite runs through my head,
For Oh a sweeter music far
Than ever man has played
Is, the sound of the elephants and buffaloes
A-marching to parade.

Oh ! It's Huttie ! Huttie ! Huttie ! Huttie !
Twist your tails and go,
Shillo ! Shillo ! Shillo ! Shillo !
Elephant and buffalo
Hungya ! Hungya ! Hungya ! Hungya !
Chara man Shillo !
And that's the way they ~~shout all day~~ shout all day
Driving the buffalo.

MEDICAL DIVISION.
BOMBAY BRIGADE,

No. 381

Bombay, 25 January 1907.

Extract from Telegram No. 275
dated 24th January 1907.
from The P. M. O. Eastern Command
to The A. O. C. Bombay Brigade
Instructions for:—

Rank Major
Name F. Smith D. S. O.
Corps R. A. M. C.
will proceed to Bangalore
to command station Hospital
there

H. H. Thuan

Colonel. R. A. M. C.
Principal Medical Officer.
Bombay Brigade.

K. P. Press, Bombay.

Mrs Frederick Smith
(Née Laing of Musselburgh)

2nd RAWALPINDI DIVISION.

Rawalpindi, 15th February 190 8.
~~*Murree,*~~

Copy of
~~Extract from~~ a Memorandum No. 906-M.

[illegible] 1908 from the General

2nd RAWALPINDI DIVISION.

Rawalpindi, 15th February 1908.
~~*Murree,*~~

Copy of
~~Extract from~~ a Memorandum No. 906-M.

Dated 12th February 1908, from the General Officer Commanding, Kohat Brigade, Kohat,

to the General Officer Commanding, 2nd (Rawalpindi) Division.

I have the honour to acknowledge receipt of your No. 680-M, dated 8th February 1908.

2. I would ask that, with your concurrence, my thanks may be conveyed to Major B.H.Scott, R.A.M.C. and Major F.Smith, D.S.O.,R.A.M.C for the thorough manner in which they investigated the water Supply and for their very valuable report which sets at rest certain hitherto doubtful points. This is the more satisfactory as the local water supply is a very pressing and complicated matter.

----------00000----------

Heading Mobilisation. No. 815 R.

M E M O R A N D U M.

For information.

J. J. Hamilton

Surgeon General I.M.S.,

D.M.O 2nd (Rawalpindi) Division.

GHB

To
Major F.Smith, D.S.O.,R.A.M.C,
Sanitary Officer,
2nd (Rawalpindi) Division.

The Effect of Climate upon Health and Disease.—Second Report of the Committee, consisting of Sir T. Lauder Brunton (*Chairman*), Mr. J. Barcroft (*Secretary*), Colonel D. Bruce, Dr. A. Buchan, Dr. S. G Campbell, Sir Kendal Franks, Professor J. G. McKendrick, Sir A. Mitchell, Dr. C. F. K. Murray, Dr. C. Porter, Professor G. Sims Woodhead, Sir A. E. Wright, *and the* Heads of the Tropical Schools of Liverpool and London.

In the following list of the co-opted members of this Committee the names of those who are not members of the British Association are indicated by an asterisk :—

*Aldridge, Lieut.-Col. A. R., R.A.M.C., Simla, India.
*Allbutt, Sir T. Clifford, K.C.B., F.R.S., Cambridge.
*Anderson, Dr. Barcroft, East London
*Ashe, Dr., Kimberley.
*Balfour, Prof. A., Khartoum.
*Benedict, Prof., Middletown, Conn., U.S.A.
Bohr, Prof. C., Copenhagen.
Branfoot, Surgeon-General A.M., C.I.E., I.M.S., India Office.
*Bulloch, Dr. Wm., London.
*Bulstrode, Dr. H. Timbrell, Local Government Board, S.W.
*Bumm, President, Berlin.
Charles, Sir R. Havelock, K.C.V.O., I.M.S., London.
*Chittenden, Prof. R. H., New Haven, Conn., U.S.A.
*Clarke, Dr., Bulawayo.
*Chemow, Dr. F. G., Constantinople.
*Cumming, Hamilton, Torquay.
Currie, Dr. O. J., Pietermaritzburg.
*Curtis, Dr., London.
Cushny, Prof., F.R.S., London.
*Dixon, Prof. W. E., Cambridge.
*Douglas, Capt. H. E. M., V.C., D.S.O., India.
*Dunbar, Sir Wm. C., Bart., C.B., Registrar-General, London.
*Dunlop, Dr. J. C., Edinburgh.
Dunstan, Prof. Wyndham, F.R.S., London.
*Ellis, Sir, H. M., K.C.B., K.H.P., Director-General, Naval Medical Service, London.
*Evatt, Surgeon-General G. J. H., C.B., Camberley.
*Ewald, Prof. A., Berlin.
*Franklin, Surgeon-General Sir B., K.C.I.E., London.
Fraser, Sir Thos. R., F.R.S., Edinburgh.
Gaugee, Prof. A., F.R.S., Montreux.
Grabham, Dr. M. C., Madeira.
Gregory, Dr. A. J., Cape Town.
*Hann, Prof. J., Vienna.
*Hardy, W. B., F.R.S., Cambridge.
*Harford, Dr. C. F., Leyton.
*Hay, Prof. Matthew, Aberdeen.
Herbertson, Dr. A. J., Oxford.
*Herdman, Dr. Ronald, Filabusi, near Bulawayo.
*Hill, Dr. Leonard, F.R.S., London.
*Hyslop, Dr., Pietermaritzburg.
*Jaffé, Dr., Berlin.
Keltie, Dr. J. Scott, F.R.G.S., London.
*Keogh, Sir A., K.C.B., K.H.P., Director-General, Army Medical Department, London.
*Kerp, Prof., Berlin.
*King, Lieut.-Col., Sanitary Commissioner, Madras.
Kronecker, Prof. Hugo, Berne, Switzerland.
*Langgaard, Prof., Berlin.
Lankester, Sir E. Ray, F.R.S., London.
Latham, Baldwin, C.E., London.
Lempfert, R. G. K., London.
*Leslie, Lieut.-Col. J. T. W., I.M.S., India.
*Liebreich, Prof., Berlin.
Liversidge, Prof. A., F.R.S., Sydney, N.S.W.
MacAlister, Principal, Glasgow.
*Mackenzie, Dr. Leslie, Edinburgh.
*McGregor, Sir Wm., G.C.M.G., F.R.S., Newfoundland.
*McCulloch, Major T., R.A.M.C., India.
*Manners, Dr., Calabar, West Africa.
*Manson, Sir Patrick, K.C.M.G., F.R.S., London.
*May, Deputy-Director-General A. W., Naval Medical Service, London.
*Meek, Lieut.-Col. J., R.A.M.C., Poona, India.

Head Quarters, 2nd (Rawalpindi) Division,
Medical Division,
Murree. 19th June 1908.

Copy of a telegram No.1839, dated 14th May 1908, from the Principal Medical Officer, His Majesty's Forces in India, to the General Officer Commanding, 2nd (Rawalpindi) Division.

" Please direct Major F.Smith, R.A.M.C., to proceed forthwith Peshawar on special duty as temporary measure. Addressed General Division Murree repeated General Division Peshawar to whom it is suggested above officer should be employed in sanitary supervision of cholera camp and lines of communication.

[illegible]

TRUE COPY,

C.E. Ford
Superintendent,
Head Quarters, 2nd (Rawalpindi) Division
Medical Division.

*Melville, Lieut.-Col., C. H., R.A.M.C., London.
*Mitchell, Dr. Weir, Philadelphia.
*Mitchell, Dr. J. A., Colonial Office, Cape Town.
*Moffat, Dr., C.M.G., Uganda, Central Africa.
*Moore, Sir John, Dublin.
*Morgan, Major J. C., R.A.M.C., India.
*Mosso, Prof. Angelo, Turin, Italy.
*Müller, Dr. Franz, Berlin.
*Murison, Dr. P., Public Health Department, Durban, South Africa.

*Nuttall, Dr. G. H. F., Cambridge.

Oliver, Prof. T., Newcastle.
*Osler, Dr. T. H., Cape Colony.
Osler, Prof. W., F.R.S., Oxford.
*O'Sullivan, Lieut.-Col. D., R.A.M.C., India.

Palliani, Prof., Turin, Italy.
*Pearce, Capt. C. R., I.M.S., India.
*Pembrey, Dr. M. S., London.
*Phillips, Dr. L. C. P., Cairo.
*Pinching, Sir Horace, K.C.M.G., Cairo.
Prain, Lieut.-Col. D., C.I.E., I.M.S., Kew.

*Raymond, Major G., R.A.M.C., Wellington.
*Reymond, Prof. René du Bois, Berlin.
*Rochfort-Brown, Dr. H., Pietermaritzburg.
*Rogers, Capt. Leonard, Calcutta.
Ross, Major Ronald, C.B., F.R.S., Liverpool.
*Rost, Dr. E., Berlin.
Ruffer, Dr. M. A., C.M.G., Ramleh, Egypt.

*Salmond, Dr. W., Ladysmith.
*Sanders, Dr. A. W., Pretoria.
*Schilling, Dr., Berlin.
*Scott, Major B. H., R.A.M.C., India.
Scott, Dr. R. H., F.R.S., London.
Shaw, Dr. W. N., F.R.S., London.
*Simpson, Lieut.-Col. R. J. S., C.M.G., R.A.M.C. (Secretary), London.
*Smith, Major Fred, D.S.O., R.A.M.C., India.
Stephens, Dr. J. W. W., Liverpool.
*Strangeways, Dr. T., Cambridge.
*Strong, Surg.-Capt. E. H., Buluwayo.

*Tatham, Dr. John F. W., London.
*Theiler, A., Pretoria.
Todd, Dr. J. L., McGill University, Montreal.
Turner, Dr. G., Pretoria.

*Usmar, Dr. G. H., Bloemfontein.

Wager, Harold, F.R.S., Leeds.
Walker, Dr. G. T., F.R.S., Simla, India.
*Ward, Dr. A. B., Bloemfontein.
*Watkins, Dr. A. H., Kimberley.
*Weber, Dr., Berlin.
*Weber, Dr. Parkes, London.
*Welsh, Fleet-Surgeon, R.N., London.
*Will, Lieut.-Col., R.A.M.C., British East Africa.
*Woeikoff, Prof., St. Petersburg.
*Woodhouse, Lieut.-Col. T. P., R.A.M.C., India.
*Wutzdorff, Dr., Berlin.

*Yule, Dr. Pratt, Bloemfontein.

*Zuntz, Prof. N., Berlin.

The work of the Committee has closely followed the lines which were indicated in its report of last year. Investigations of three kinds are being undertaken:—

I. The collection of data regarding climate and statistics of disease and death in various parts of the world.

II. The collection of original communications dealing with the health of various localities by competent authors

III. The production of original researches.

I. The collection of data to be collected under the first heading are:—

(i.) Climatological data regarding various places.

(ii.) Death statistics in communities where the total number of persons under investigation is known, *e.g.*, in the Army.

(iii.) Death statistics over the general population of the district investigated.

For the performance of this task a document has been drawn up giving the necessary instructions, and is being circulated with the forms on which the returns are to be made. It is intended to send these papers to four classes of persons, viz.:—

(*a*) Members of the Sub-Committee, for distribution to observers known to them.

(*b*) Heads of all Government departments who are likely to be able to assist.

(*c*) Medical officers of health.

(*d*) Certain private observers.

The Medical Department of the Navy has undertaken the distribution of these forms to their officers.

II. For the purpose of collecting original papers of value on the health of various localities by competent authors, a list of assessors has been drawn up, who shall report to the Committee on the merits of the original communications as they come to hand.

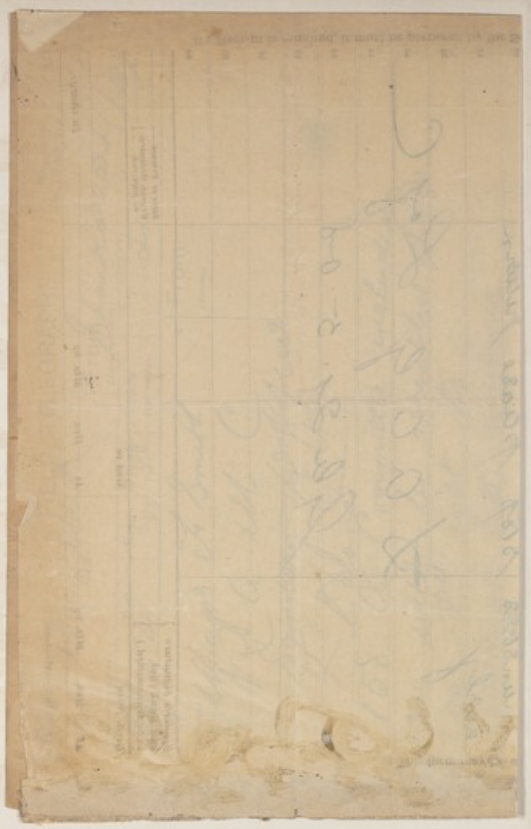
III. The production of original researches. A commencement has been made in this direction by a preliminary research on the subject of perspiration.

Professor Zuntz has interested himself actively in this portion of the work of the Committee. He is putting at its disposal the results which are being obtained by Drs. Jaffe and Schilling, who are investigating the conditions of metabolism in Togo, German West Africa. It seems probable that an effort will be made to perform researches on the same lines in English and other dependencies under the auspices of the Committee.

It is obvious that if the work of the Committee is to be of any value it must be done with very great care; and therefore they have devoted their whole time and all the money at their disposal to the preparation of forms which will be issued for the collection of statistics. In order that the collections should be comparable, it was necessary to have the forms drawn up with the utmost possible care, and this would have been practically impossible without the constant attendance and active co-operation of the Registrar-General, Sir Wm. C. Dunbar, Bart., C.B., of Dr. J. F. W. Tatham, Superintendent of Statistics, General Register Office; of Dr. W. N. Shaw, F.R.S., Director of the Meteorological Office; and of Lieut.-Col. R. J. S. Simpson, C.M.G., R.A.M.C., to all of whom the Committee are deeply indebted for the labour which they have undertaken. In connection with the drawing-up of the forms for distribution, the Director-General of the Army Medical Department has interested himself greatly in the work of the Committee, and, being unable to attend himself, deputed Colonel Simpson to act for him. The Director-General of the Navy has deputed Inspector-General May, who has been a constant attendant at the meetings and given valuable help, and has arranged that the forms drawn up by the Committee shall be distributed to medical officers of the Navy all over the world.

The amount of work entailed was more than could be accomplished by the Honorary Secretaries, and it was found necessary to employ a paid Secretary at a rate of 25*l.* a year.

The whole of the grant of 55*l.* has been expended, and the Committee ask that a further grant of 100*l.* be placed at their disposal for the purpose of sending out the forms which have been drawn up dealing with the material that is being collected.



No. 206

ROYAL BOTANIC GARDENS,
KEW,
19 June 1902.

SIR,

I have to acknowledge the receipt ~~this day~~ of the contribution mentioned in the margin, made by you to the Royal Botanic Gardens, for which I beg to tender my best thanks.

I am,
SIR,
Your obedient Servant,

W. T. Thiselton-Dyer
Director.

Plants:-
2 Gloriosa ~~superba~~ ? *virescens*

To Major F. Smith,
Royal Army Medical Corps.
Melrose, Woolston,
Hants.

W B & L (x)—48554—2000-10-01

Code Class. }

FIELD TELEGRAPHS.

Monthly Number. } 15 F. B1.

To (Telegraph Office) MM MK

From (Telegraph Office) Shankargarh (Dr)

Words.	Day.	Hour.	Minute.	Official Instructions.
37	2		50	21

To (Person) Major F Smith
R.A.M.C.
Sanitary Officer
Lolanga

From (Person)

158 A Committee including you will be assembled here on 23rd inst to investigate late epidemic musters stop please return early

Lacy LoC

Qla 21. 5. 08

This form may be used for any Telegrams.

If a Receipt is required, it must be prepared by the Sender and presented with the telegram for signature.

Sender's Signature and Rank (not to be transmitted.)

State or Private Urgent, Ordinary, or Deferred.

Recd. from At Hrs. Mts. by

Sent to At Hrs. Mts. by

In charge.

C & P—No. 128 T—3 ½ 5—10000.

ROYAL BOTANIC GARDENS,
KEW,
19 June 1907.

Sir,

I acknowledge the receipt ~~with thanks~~ mentioned in the margin, made Botanic Gardens, for which I thanks.

I am,
Sir,
Your obedient Servant,
W. T. Dyer
Director.

Lt. Smith,
Army Medical Corps,
Rec. Worcester,
Hants.

20.10.01

Recently in command at Lincoln's Inn November 1950.

F. E. making a point during discussion to an invisible guest.

IVIE—SMITH.—A wedding of interest took place at Our Lady and St. Joseph, Hanwell, on Saturday, the bride being Miss Margaret Mary Hamilton ("Peggy") Smith, only daughter of Dr. and Mrs. Henry Smith, of 118, Uxbridge-road, Southall, and a grandniece of Mrs. Hamilton, of Barnes, and of the late Col. T. H. C. Smith, C.B., C.M.G., D.S.O., R.E.

The bridegroom was Mr. Charles James Ivie, of Richmond, Surrey, son of the late Mr. Charles Ivie, of Co. Waterford, Ireland. He is manager of the dept. of W. H. Smith and Son at the Regal, Acton.

The Rev. Donald Rathe (friend of the bridegroom) officiated, assisted by the Rector (the Rev. Leonard Cox).

The bride, who is serving as a L.A.C.W. in the W.A.A.F., was given away by her father. She wore a powder blue crepe frock, and carried a Victorian posy. Miss Marjorie Smith (youngest sister of the bride) was page.

Mr. Ivie (the groom) was attended by Mr. John Hankinson (friend of the bride), and Mr. Bridgeman (brother-in-law of the bride), are medical students. Ushers, all students, were Messrs. Ward and Bowen, who were assisted by the 120 guests who were entertained at the reception at the bride's home.

Later the bride and bridegroom left by car for Bournemouth and Cadenza, Barnes, left to spend their honeymoon at Bournemouth. The bride's frock was covered by a pale grey suit.

Amongst a large number of presents received from friends, the bride and staff at Messrs. T. Wall and Son presented silver tea knife and a cheque.

22.11.18

11/38

INDIAN TELEGRAPHS. No.

DF LG LONDONSUB 22 EASTERN 7

LCO COLONEL SMITH STATION HOSPITAL CALCUTTA.

THROUGH.

23/8

This form must accompany any enquiry respecting this telegram

This is Hector, wire that he has passed M.B. London University

Calcutta.
25-11-1913.

My dear Hector.

Your letters & birthday
greetings reached his captors
at 2 a.m. on the 23rd we
were aroused by much
chattering of natives &
ultimately found a man
with your cable - so
we spent a jovial
morning - in bed -
I think it is jolly

At Calcutta.


REDMOND HAMILTON SMITH. (grandson of Col F SMITH)
(and son M.B. F.R.C.S.) Secretary of St Mary's Hospital
Students' Union, with the Royal family at
a performance of the MIKADO.

REDMOND HAMILTON SMITH. (grandson of Col Smith) (and son MB. FRCS) Secretary of St Mary's Hospital 'students' Union', with the Royal family at a performance of the MIKADO.

Telle to the 83rd — Wallachabad Light Infantry — a better station than Cawnpore. What's the next move I wonder. It will take you a little time to realise that you are not a student — that no exam. is before you

Yours affect. Father

E. H. Smith.

REDMOND HAMILTON SMITH (grandson of CHESMITH) (and son of MR. FRED) Recruiting, at the Manly Hospital Students' Uniform, with the Royal Humane a Life Preserver and the MIKADO.

at Lucknow.

Medical Officer,
and The Nurse.
.....
H.O.180

Parish
N. Fs

Sister Vine 52 Gn
Wellings

[illegible] 1918.

126. ANTI-MALARIA CAMPAIGN. In the 27th Division it has been found that when billets are sprayed with Lofrey's solution hibernating mosquitoes are disturbed and make for the windows where they are easily killed by further spraying. By leaving open one window and covering it with a mosquito net as many as 150 mosquitoes are said to have been captured in one billet.

By placing a net over a window of an undisturbed billet a record of the migrations of mosquitoes might be obtained day by day.
(D.D.M.S. 16th Corps No. 66/59.)

127. CASES WITH HISTORY OF PREVIOUS DYSENTERY. As far as possible the numbers of "H.D." (i.e. history of previous dysentery) cases should be notified prior to evacuation daily to D.D.M.S. Base & L. of C. Area. This will assist in the distribution of cases (other than dysentery) where beds are available.
(D.M.S. No. 1043/13 of 21/1/18. D.D.M.S. 16th Corps No. 1898/273.)

128. EVACUATION - STRUMA DECAUVILLE. Reference R.O. 124 the time table of the ambulance trains quoted therein is cancelled and the following substituted, commencing 24th inst. :-

		Dep.			Arr.
"A" Train to GOLOS DERE	Engine.	[illegible]	0950	1150	*
"K" Train to DIMITRIC	Mule	0630	0800	0845	1015
"L" Train to WESSEX BRIDGE	Mule	0900	1015	1045	1145

* Halts at 143rd Field Ambulance 1015-1030.
(D.D.M.S. 16th Corps No. 2277/63.)

129. DISPENSERS, DENTAL MECHANICS, MENTAL ATTENDANTS. The following information received from the Officer i/c Home Records is published for information of all concerned.

R.O./T.F./Woking.
D617/115T.F. d/- 28/12/17.

DISPENSERS, should possess :-
Certificate of the Pharmaceutical Society.
Certificate of Society of Apothecaries in London or Dublin.
Testimonial of over 3 years experience in Dispensing signed by late employer.
R.M.No.89 Sub.No.8.R.A.M.C. W. O. (A.G.2.b) dated 12/2/1916.

DENTAL MECHANICS, should possess:-
If previously employed by a Dentist a testimonial stating ability.
Certificate signed by Dental Officer to the effect that he considers the man capable of carrying out efficiently the duties of a Dental Mechanic.

MENTAL ATTENDANTS should possess:-
(a) Certificates which he may be in possession of.
or (b) Testimonial of the Officer in Charge, Mental Ward to the effect that he has been employed on such duties, and is a competent Mental Attendant.
(O. i/c R.A.M.C. Records, B.S.F. No. R.A.M.C. H.15/19/18. of 22/1/18. D.D.M.S. 16th Corps No. 1034/360.)

N O T I C E.

The D.D.M.S. on leaving the 16th Corps regrets that owing to his somewhat sudden departure is unable to say "Good-bye" in person.
He wishes to thank all ranks of the R.A.M.C., I.M.S., Dental, Nursing, and attached Services for the loyal support which has rendered his tenure of appointment an easy and pleasant duty. His heart will remain with you in the War in which, he has no doubt, you will continue to play a distinguished part to the credit of your respective Services, the 16th Corps, and the Army.

Fred Smith.
Col., A.M.S.
D.D.M.S. 16th Corps.

H.Q. 16th Corps.
23 / 1 / 18.


404

Drainage, Sewerage and Conservancy in Tropical Countries and elsewhere

By Major F. SMITH, D.S.O.

TWO SHILLINGS.

Drainage, Sewerage, and Conservancy in Tropical Countries.

Drainage, Sewerage, and Conservancy in Tropical Countries and Elsewhere

BEING

A ~~THE~~ BELILIOS PRIZE ARTICLE

ON

"The System of Drainage and Sewerage (Domestic and Municipal) best suited for Tropical Climates"

BY

Major F. SMITH, D.S.O.

Royal Army Medical Corps

(*D.P.H. Durham. Ex-Medical Officer of Health, Penang Municipality. Formerly Assistant in Pathological Laboratory, Army Medical School, Netley. Sanitary Officer for Imperial Forces, West Africa*)

[Reprinted from the "Journal of Tropical Medicine"]

London
JOHN BALE SONS AND DANIELSSON, LIMITED
OXFORD HOUSE,
83-91, GREAT TITCHFIELD STREET, OXFORD STREET, W.

1904

NOTE.—The Prize was presented by the Hon. E. R. BELILIOS, C.M.G., under the auspices of the "Journal of Tropical Medicine."
The judges were :—
Sir PATRICK MANSON, K.C.M.G., F.R.S., LL.D., Medical Adviser, Colonial Office and Crown Agents of Colonies.
Surgeon-General ROE HOOPER, C.S.I., President Medical Board, India Office.
Colonel KENNETH MACLEOD, LL.D., Professor of Clinical and Military Medicine, Staff College, London.

CONTENTS.

PREFACE.

I MAY say that this article was completed in the early part of the year, and was sent to the Editors of the JOURNAL OF TROPICAL MEDICINE in March, 1903, but did not appear in the JOURNAL till the end of the year.

Though written mainly for those having to do with warm countries, it contains a good deal which applies to sanitation generally.

Freetown, Sierra Leone.

DRAINAGE, SEWERAGE AND CONSERVANCY

IN

TROPICAL COUNTRIES AND ELSEWHERE.

Part I.

The System of Drainage and Sewerage (Domestic and Municipal) best suited for Tropical Climates.

The author of this article has assumed that it is intended that the system of drainage should provide for the natives as well as for the Europeans of a community. Apart from considerations of duty to our native dependents, we have to bear in mind that the conditions that make for good health in the one class may be expected to benefit all classes either directly or indirectly.

In selecting a system of drainage and sewerage for tropical climates we are met at the outset by this difficulty, viz., that conditions of climate, soil, rainfall, &c., in tropical countries are not all the same. In some parts of the torrid zone there are torrential deluges during part of the year and absolute dryness during the remainder. In other regions the rain is

more evenly distributed. The total rainfall varies within very wide limits in countries not very far distant from each other, thus: In the Gold Coast Colony, at Accra, the annual rainfall is about 17 inches, whereas in Sierra Leone or Freetown, 140 inches of rain fall in the year. This, of course, affects the general water supply in the way of streams and rivers, so that while Accra is always more or less short of water, Sierra Leone possesses this precious liquid in abundance. In some places the sun is generally hot, the humidity of the air slight, and evaporation in consequence rapid; in others the reverse is the case, and for part of the year water dries up so slowly that a cupped dead leaf may contain the fluid continuously for weeks. The soil, again, may range from the rocky and impervious to the sandy and absorbent. The surface of the ground may be flat or hilly—a few feet only above sea-level or of great altitude. The two last-mentioned variations, however, are not peculiar to the Tropics.

The habits of the people may be totally different in one country to what they are in another.

It follows, therefore, that systems of sanitation designed for one part of the world may be unsuitable for other parts.

In this article, then, I shall endeavour to set forth clearly the main principles which should guide us in tropical sanitary undertakings and afterwards lay down a scheme suitable for one tropical region with which I am well acquainted. Such modifications of the system as may appear desirable to meet the wants of other

types of countries and communities may be then deduced.[1]

Diseases likely to be Affected as to their Prevalence by Drainage.—Before proceeding further it will be as well to briefly discuss such diseases met with in the Tropics as are likely to be affected as to their prevalence by any system of drainage or sewerage. For the purposes of the article I shall take it that the term "sewerage," which is commonly associated with sewers, is really intended to include dry methods such as, for instance, the "dry earth system."

Enteric fever, malaria, dysentery, cholera, filariasis, yellow fever and (possibly) guinea-worm are the chief diseases which it may be hoped will be diminished in frequency either directly or indirectly by drainage.

Enteric.—Enteric fever has for some years been looked upon as almost entirely a waterborne disease. Among the medical men of the army, however, an opinion has long prevailed that many of the cases which are dealt with in their practice cannot be accounted for unless some agency other than water exists. This opinion, coming from a body of specially trained sanitary experts, each individual of which may be looked upon as a Medical Officer of Health, does not seem to have attracted much notice outside. The much neglected annual report of the Army Medical Department contains many well thought out reports on the subject.

[1] The question of making a profit by the use or sale of excreta has been left entirely out of consideration in this article.

But this article is not the place in which to go deeply into etiological matters. Recent experiments, however, have shown clearly enough that a community cannot rest satisfied that it is enteric-proof merely because it may have provided a pure water supply for its members. For all that, there is little room for doubt that enteric is carried into the human body mainly by water in some form.

The typhoid bacillus thrives for some time in organically polluted water, and, according to Busquet, more especially in the sediment of such water. It also lives in organic refuse of all sorts and in polluted soil. Major Firth, Professor of Hygiene at the Army Medical School, and his assistant, Major Horrocks, R.A.M.C., in a paper presented at the last (1902) annual meeting of the British Medical Association,[1] showed clearly that it has more viability under adverse conditions than had previously been thought to be the case. It exists for weeks in the soil, even when the soil is dried. It may therefore be blown about from place to place along with bits of fæces, dried earth, &c., especially in the sudden tempestuous hurricanes of the Tropics. The Netley professors demonstrated, moreover, that the statements which have been made from time to time as to the agency of flies in carrying about typhoid germs have foundation in fact. The British army surgeons had in Egypt and elsewhere reported the spread of enteric by flies, and in the *Medical Record* for September, 1898, American

[1] *British Medical Journal*, September 27th, 1902.

surgeons made similar observations. The reason it was noticed so little in England is difficult to account for, unless it is because flies are less common. It was well known enough, by inference, to the army sick attendants who knew nothing of bacteria. Some years ago in South Africa a ward orderly pointed out to me what I had often enough observed for myself, viz., flies pouncing upon enteric fæces in the bed-pan taken from under a patient, and when driven off settling on the milk cups, patients' lips, &c. The thing was so obvious that nobody seems to have thought it necessary to prove it experimentally till last year. In *Public Health*, December, 1898, is an account of a small experiment of mine proving that flies can carry diphtheria bacilli, and the Editor in a footnote thereto, shows that he, at least, was familiar with the army idea that enteric could be conveyed in the same way. In a paper on the rarity of enteric fever in Sierra Leone, read at the same meeting as Professor Firth's paper, I mention a case in which it seemed that the typhoid bacillus had been carried on the person or belongings of a woman for three months before it got into her system, and caused an attack of fever.[1]

It is open to question whether the bacillus exists long in any given volume of water—presumably, its own poisonous secretions must be carried off and fresh supplies of water, full of organic matter, provided in order to keep it going for very long.

As for the supply of bacilli from the human body

[1] *British Medical Journal*, September 20th, 1902.

for infection of water, soil, &c., they are excreted with the fæces, and in pneumonic cases probably with the sputum. Professor A. E. Wright and Major D. Semple —pathologists of the Army Medical School—showed some years ago,[1] moreover, that the urine of typhoid fever patients contains the bacilli, and this has since been confirmed by Dr. Horton Smith and others. It may be supposed, indeed, that, owing to the indiscriminate way in which people micturate in all sorts of places, the urine is the cause of enteric outbreaks more frequently than the fæces.

Any system of drainage for the Tropics, then, should be calculated to do away with the danger of direct infection of water, soil, refuse, &c., by the fæces, urine, or sputum of typhoid fever cases, and of their indirect contamination by the bodies, or by the soiled linen of such patients; this last resolving itself chiefly into a means of harmlessly removing the water in which patients and clothes have been washed.

Malaria.—Malaria is only secondarily affected by systems of drainage and sewerage, and then only if these be designed also to remove surface water. In the latter case it may be expected that the drainage would diminish the number of breeding waters for Anopheles mosquitoes.

Filariasis, Yellow-Fever, &c. — The remarks under malaria apply also to filariasis and yellow fever in connection with the breeding places of their particular mosquito hosts.

[1] *Lancet*, July 27th, 1895.

Dysentery.—Dysentery is supposed to be conveyed by drinking water, but exactly to what extent and in what manner has not yet been accurately determined. Assuming that it is a waterborne disease, and that the infecting material exists in the fæces, the considerations applying to enteric fever will meet also the case of this complaint. Manson, in "Tropical Diseases" (1900), says, "One thing, however, is fairly well ascertained, and that is that these germs, whatever they may be, are often introduced by means of drinking water." There is little doubt the disease is also connected in some way with insanitary conditions such as are apt to be found in standing camps.[1] This fact has been recognised ever since camps came to be written about. The military writers of the eighteenth century and the last century were quite clear on the point, and the outbreaks seemed sometimes to be unconnected with the water supply. The bacteriology of the disease has not yet been worked out—it remains to be proved whether there are several varieties of dysentery—whether the amœba coli, the colon bacillus, Shiga's bacillus, Durham's coccus, and the other organisms put forward in this connection by various observers, are each or any of them causally related to the disease.

[1] An old idea of some Anglo-Indian surgeons was that dysentery could be caught by using the same latrine as a dysentery patient. There may be something in this. Experiments on animals have shown that the disease can be inoculated *per rectum*. The ubiquitous fly may therefore be a dysentery inoculator in open camp latrines.

Cholera. — Cholera is largely waterborne. In my opinion, however, it is not exclusively so. Cases coming from an infected place have been so long in developing the disease as to lead me to believe that the victims had carried the disease about with them for some time before they became infected.

The bacillus has, as far as is known, a feeble saprophytic existence, and soon dies out even in water. An infected well does not long remain infectious, though nothing may have been done by way of purifying the water. Here, again, the fæces are the principal (and probably only) source of infection.

General Ill-health for Want of Drains, &c.—In addition to the above-mentioned specific ailments, there are to be borne in mind diarrhœa, ankylostomiasis, bilharzia, fevers of various unnamed kinds, diphtheria, sore throat, tonsillitis, dyspepsia, anæmia, &c., and general loss of tone bringing about some of the above and the condition known as debility; some of these affections we are accustomed to regard as signs of general ill-health, most prevalent among people living amid insanitary surroundings which encourage the growth of the bacillus coli and various septic organisms, nematodes, &c.

A well-drained, well-sewered locality will have a purer, sweeter air than one badly drained, and though we cannot say exactly why it is so, we are all of us fully conscious of a general feeling of well-being when we live in such a healthy atmosphere, whereas in the close, heavy sensation noticeable in what we call an unhealthy air we are prone to be lax, depressed, to have

a bad appetite, and in a general way to feel, as we say in the vulgar tongue, "not up to the mark."

Plague.—I might have mentioned plague as indirectly connected with insanitary conditions, dependent on drainage and, more directly, in connection with refuse heaps and so forth, encouraging the multiplying of rats and other vermin.

Having said thus much as to what we seek to avoid, I may now mention the chief systems of drainage and sewerage, from which it is open to me to select the one which I consider most suitable to the needs of the Tropics, beginning with the primitive forms of sanitation and passing on to the more highly developed modern plans of dealing with excreta and other deleterious matter.

Domestic Drainage and Conservancy.

Households, Drainage of.—The following are the chief household systems of conservancy, drainage, &c. :—

(1) The bush or open ground.
(2) The latrine trench, pit, or place.
(3) The river or sea.
(4) The privy.
(5) The pail—with or without dry earth.
(6) The water closet discharging into cesspool.
(7) The water closet, discharging into a water system.
(8) House drainage for surface water, slops, &c.
(9) Refuse, disposal of.

(1) "*The Bush.*"— The bush system, by which is

meant passing the excreta directly on to a convenient plot of ground, is in general use chiefly, but not entirely, among uncivilised communities. In those places, however, in which it is recognised among civilised people, it is only for the use of the natives employed by the whites.

Even this system, bad as it may appear at first glance, is not quite so hopeless as might be imagined, especially in open country districts, where there is no necessity to accumulate excreta in one spot. It has been a matter of surprise to me to find scarcely any fæcal odour in the neighbourhood of a good-sized native village where this plan has been in vogue for years. Each particular deposit of fæces is removed so quickly by various natural agents day by day that no great nuisance results. The evil of such practice is, of course, that in the majority of cases the village is near a river or stream, which is inevitably polluted.

When this plan is adopted for natives ruled by a white community in a large town the conditions are different and a good deal of nuisance results. The system has been allowed not so much from unwillingness of the whites to provide proper accommodation for their black servants and workmen, as from their inability to induce the blacks to use any accommodation so provided. To a son of the plain or bush the departure from the custom of attending to the calls of Nature in a retired spot in the open air, in favour of our fashion of accumulating our excreta in an odorous privy, is most distasteful; for that matter it is quite natural in a man who does not know or cannot bring himself

to believe that disease may be caused by his practices. The white man, therefore, adopts the lesser of two evils, and in order to prevent the blacks from defiling his premises, and the town generally, he appoints a place a mile or so outside the town, a field to which the native is ordered to go for his daily evacuations. Such fields have been provided in some parts of South Africa. Not many years ago near an important city in that part of the world I inadvertently entered the "bush" when making a short cut across country, and I shall never forget it. But as far as I know it was productive of no evil to the inhabitants of the town, and there is no reason why such a place should do harm if care has been taken in the selection of the spot. The danger would be to other communities towards which this place drained. To a smaller extent also villages and farms near enough to be affected by heavy dust from the field might suffer. . . . The users of the place were not likely to bring back anything on their feet, as they are more dainty, in respect to things of that kind, than Europeans. How the native managed on a dark night or when he was ill I do not know. But it is not my intention to advocate such a plan for general acceptance; nevertheless, inasmuch as any system adopted, must, I take it, provide for natives as well as for Europeans, it may still be found essential to recognise and provide for some such practice when we have to arrange for a large and intractable coloured population which is very much averse to more civilised customs.

(2) *Latrine Trenches.*—The trench or hole in the ground may be a privy or cesspool if it is large and used as a permanent place. The latrine proper I take to be a temporary excavation in the soil, intended to be filled up again with earth after it has been used for a short time as a receptacle for fæces. It is mostly in use for bodies of people suddenly assembled in places where there are none of the ordinary conveniences available, such as military camps, railway works, and so forth.

A trench about 2 feet wide, 2 to 4 feet in depth, and as long as may be required, is made in the ground. The earth thrown out is the base for a screen of bushes at the back, and a pole seat is fixed up in front.[1] Latrines of this kind, but enclosed in a wooden fence, were used in the Parks by the troops on Coronation duty in 1902. In the Army the usual order is that every man should cover his own excreta with earth. —this order is rarely more than half obeyed. A man is also told off to visit the place at intervals and cover up everything in the trench with two or three inches of earth. This is never done regularly or properly unless some one in higher authority makes it his business to see that the man does his work. Separate pits ought to be provided for urine, but they rarely are.

The users are apt to soil the ground with fæces at the edges of the trench—the edges should be chipped into the trench daily. The ground for a foot or so in

[1] "Regulations and Instructions for Encampments," Section 16. War Office, 1895. Eyre and Spottiswoode.

front of the trench is invariably soiled with urine, this is covered copiously with chloride of lime or other disinfectant powder daily, and finally with earth when the trench is abandoned. At night the men are apt, owing to rain, laziness, security from detection in the darkness, fear of enemies (ghostly and material), illness, &c., to relieve themselves on the ground somewhere in the direction of the trenches.

In South Africa I endeavoured to have this system rigidly carried out in one regiment, and had urine pits fairly close to the tents—nearer than the latrines. Men in reliefs were told off to cover contents every half hour in the day and put plenty of lime round about—all in the hope of keeping off flies and dung beetles. It was only by constant, wearying supervision that any approach to efficiency was maintained.

If thoroughly carried out this system is the best I know of for camps—but there should be some provision for the night, and for urine more than the usual number of pits. The carrying out, however, in this as in so many plans, is just the difficulty. Well done it gives rise to scarcely any nuisance in the way of odour, and the excreta being buried on the spot are safely out of the way of doing harm—at any rate for some time, as the ground is not likely to be dug over until all traces of the grave-like latrines have disappeared—and with a suitable selection of site no danger need be apprehended in the way of water pollution. Ill done, the trench becomes an open privy with an infected surface soil around it, the flies browse in it in the day

time and occupy the men's tents at night. On visiting a deserted camp during the recent campaign it was common to find half a dozen or so open latrines containing a fœtid mass of excreta and maggots. This because the responsible persons so often failed to comply with the regulations for encampments by filling in latrines on the departure of the troops.

Here we may leave this subject. It is not likely that the latrine trench will be recommended for city communities, for want of the necessary waste land; withal it seems to the writer that a brief mention of the method is not out of place in this article.

(3) *The River System.*—The river system—by which I mean the passage of excreta by individuals direct into a river or stream or into the sea—is common in some parts of tropical Africa and Malaya. It still prevails, too, in some English country districts and probably in many other lands as well. In West Africa (among the Mendi people in the hinterland of Sierra Leone for instance) the people go into the stream when it is shallow enough, at other times they perch on a rock or on the bank. The more timid and retiring women and children seem to prefer the wooded bank close to the water, and in flood times, for obvious reasons, everyone favours the bank.

In England I have come across some closets erected over small brooks, and others on the banks, so that excreta passed into the water. This procedure is economical enough for the householder, but that is the only thing that can be said in its favour. It is absolutely unsafe and ought soon to be a thing of the past. It is more insidiously dangerous than the pollution of rivers by large volumes of sewage, in that it does not usually create any obvious impurity of the water. I have in mind now a rippling, clear-watered brook of the poetical type, with gravelly bed and fringes of water-cress, forget-me-not, &c.; the sight of this stream would make a wayfarer thirsty, yet it was, and probably is, being steadily fouled throughout the year in the manner above described.

The direct passage into sea-water is common near the mouths of rivers and on the borders of creeks. In primitive countries it is usual to go on to the beach to evacuate. In the Malay country where towns are built on piles some little distance from the land, everything goes into the water. In some other tropical countries closets are purposely built in such positions that the evacuations pass either into the sea or on to a part of the shore which is daily washed by the tide. This is the same as in Europe, of course, and we commonly lead the sewage of cities into estuaries, harbours and so on. The evils thereof will be referred to under the head of municipal sewerage.

Some curious results of the survival of these customs have come under my notice. In Malaya some natives who had left the sea front to reside at the back of a large town had erected little retiring houses on piles on the land. The excreta dropped through the floor on to the ground, where they remained in an unpleasing heap. This survival of a Malay custom is also seen

in the houses of many of the people; they are raised to some height, and all sorts of rubbish passing through the floor—sometimes purposely a mere lattice work in the kitchen part of the dwelling—create a foul smelling mess underneath the house: there is no sea to remove the filth.

At one of our English seaport towns the same kind of thing came to my knowledge recently. An old-time small fishing hamlet on a creek had become part of a large modern town. With the building of sea-walls, houses, railways and so forth, the creek had disappeared as far as holding sea-water is concerned; but the old closets arranged so that excreta might pass direct into the creek were still in use—the filth instead of going out to sea accumulated on the dry land, a good deal soaking into the ground and a friendly rain-storm removing a little now and again.

The above methods take no account of slop water, which is generally, in places such as those described, thrown on to the ground or into a stream.

We now come to something in more general use among civilised peoples both in town and country.

(4) *The Privy.*—The privy, privy-midden (or cesspit) varies in character. (The term cesspit or cesspool is sometimes taken to mean only a pit which receives matter drained into it from a smaller privy or from a closet.) It may be a mere hole in the ground or it may be lined with bricks, cement, &c. It is sometimes a built-up chamber with its base at ground level or raised a few inches from the ground. In short, we may

say that the word privy includes any receptacle which man can devise for the collection and storing of human excretal matters; but for our purpose we may consider pails as excluded from the above.

Arrangement is sometimes made for throwing ashes and refuse, either or both, into the privy—the ashes being supposed to absorb the fluid part and to deodorise the remainder thereby, inasmuch as the separation of the urine retards decomposition.

Whatever particular form of receptacle be provided it requires emptying at longer or shorter intervals according to its size in relation to the number of persons using the closet.

The removal of the contents is in some cases carried out by the local sanitary authority, in others it is left to the occupiers. If by the former, the emptying is at stated intervals; if by the latter, more commonly, when necessary owing to the receptacle being full. The interval, therefore, varies between a week and some months, or even years.

A large hole in the ground, if the soil be porous and not waterlogged, takes an astonishing length of time to get filled by one or two households.

The style of thing mostly recommended where privies are to be used is a small watertight pit, protected from the entrance of rain water and raised half a foot or so above the level of the surrounding ground. Such a privy is supposed to be emptied every week or few weeks as the case may be.

Unless ashes or some drying absorbent material in

considerable quantity is put into the privy the contents are always more or less fluid owing to the admixture with urine.

In the process of removal, the contents are scooped by means of special shovels or pails into carts and disposed of in one of many ways (when privately removed they are sometimes got rid of either by burying or by use as manure on the premises of the occupier; more rarely by a destructor). The ideal cart for such a purpose is watertight and covered—a lid at the top permitting access to the interior. The methods of ultimate disposal will be discussed under the head of municipal sewerage; for the methods of the contractor are much the same as those of municipalities in these matters.

The evils of the privy system lie in the necessity of removal of contents, in the danger of contaminating well water by the pollution of the surrounding soil, and in the production of an unpleasant heavy fæcal odour in the air near the privy.

The watertight receptacle is the only variety which could be safe, and it is very well in theory but is rarely met with in practice; if watertight when first made it does not usually remain so for long.[1]

[1] In some Anglo-Chinese towns the Chinamen's houses have a marvellously built privy. The privy is in the basement of the house and opens up at the roof like a low chimney. The user squats on the edge of this chimney. The contrivance rarely requires emptying. The Chinese object to our pails as being offensive and entailing intrusion of scavengers into the houses or premises where their women live.

The removal of the contents is scarcely ever achieved without fouling of the ground somewhere between the privy and the cart or other place of destination. Owing to the offensive odours consequent on the disturbance of contents local bye-laws generally require the removal to be effected at night. As a rule the night-soil cart has to remain in the street, or at least some distance from the privy, and the soil is carried from one to the other in pails, which are apt to be dripping small portions of filth from their befouled exterior all the way. The shovels, too, are always fouled. These evils are the more pronounced when ashes have not been used, and the privy contents are semi-fluid. Yet the average householder is quite content when once the scavengers have left his premises and the smell has died out. As to the carts, I shall have more to say further on.

A typical instance of the false security engendered by a merely theoretically perfect system of disposing of excreta was afforded me in South Africa—a case where truly the eye saw not and therefore the heart did not grieve. In a renowned National Hospital the head surgeon (who left home to help the soldiers and did yeoman service too) proudly escorted me round his large establishment, and descanted upon the perfection of the arrangements. Stress was laid on the fact that all pails and pans of excretal matter were mixed as to their contents with earth, and the mixture carried away into the country to be suitably disposed of so that no harm could be caused to town or troops. What I saw in one direction is here detailed. The chief

surgeon could never have seen it himself, I feel sure (he had plenty of other work to do), and I am not aware that he had any special conservancy officer. The pail system (which is next to be described in this article) was in vogue. In a small enclosure behind the building I found the establishment of the man whose duty it was to empty the pails. It was within a few feet of the main street on to which the yard door opened, and there was the cart awaiting its burden. A stout native was manipulating the pails. He certainly mixed the contents thoroughly with earth. He worked, standing among the earth, in a loosely made wooden affair, much like those used by bricklayers' labourers for making mortar, and the resultant mud in the pails was of similar consistence to mortar. He used one shovel for everything. He fearlessly dabbled in the earth. There was a sticky fringe a foot or two in width outside the enclosure. The native was actually walking about in this paste (which was hanging about his feet like the earth does on a ploughman's boots). He made frequent journeys to the cart and occasional excursions into the yard, among the out-buildings near which was the hospital kitchen — contaminated enteric-laden material from his feet was being deposited in the street and on the footway all day, and taken thence on other feet to all parts. The native's home was probably fouled by himself.

(5) *Pail System.*—The pail is generally of iron, zinc, or galvanised iron, but wooden ones are also used.

Practically it is a movable privy. Its supposed advantage is that, for the purpose of emptying, it can be taken away without disturbance of contents, and at the same time be replaced by a clean pail. The pail is placed under any kind of seat, and there are many contrivances for facilitating access to the pail. Sometimes the pails contain excreta alone, in other cases ashes, dry earth, and so forth, are added. The ashes or earth may be put in by each person using the closet, or at intervals by some one told off for the purpose, or, again, by an automatic arrangement. The household cinder sifter may be so arranged that the ashes which pass between the bars are conducted into the closet pail. A variety is the Goux system, in which the pails are lined with dry absorbent material. The chief aim of all these additions is to render the excreta less offensive by reducing the odour. Underlying this, however, is the idea that whatever smells badly must be injurious to the human organism. In reality, also, the covering of the excreta prevents access of flies thereto.

The pail system[1] is that chiefly used in the Tropics now, and it is largely in vogue at home and in non-tropical lands. Indeed, in the form of the dry earth system it has long been regarded by Anglo-Indians as the ideal plan. The said Anglo-Indians as well as the Anglo-Malayan and the rest of the oriental and occidental British exiles being mostly men of intelligence, leisure, and comfortable pecuniary circumstances, have been able to ensure perfection in the carrying out of the

[1] Commodes are included in this system. Further reference to them is on page 48.

system, each in his own house. Odour is reduced to a minimum, excreta are removed daily, there is nothing to get out of order. The said exile sees the plan in use in barracks, where strict supervision results in some amount of success in the attainment of the ideal aimed at. His own immediate surroundings are free from nuisance. He is happy.

Not long ago in a castle on the West Coast of Africa, I saw a pail closet which opened at the back on to a flat roof for collecting drinking-water—both the roof and the closet floor were on the same level. On my suggesting that this was rather a dangerous thing for other people, though convenient for the persons using the closet—I was told that So-and-So was "a very careful man." Dysentery and various fevers are not unknown in the part of the world I speak of. For aught I know the arrangement above detailed still exists. Such frightful death-traps are common all the world over if looked for. I mention this case merely in illustration of the unwarranted confidence of pail users—man is not individually altruistic with regard to his sanitary arrangements.

Still, there is a good deal to be said for the use of pails, especially as regards the householder, provided the pails fit the seat; that they are of such shape and so accurately placed that fæces and urine do not pass outside as well as inside, thus fouling the pail and the place on which it stands; that they are never filled so full that the contents slop over the sides of the pail in the course of removal. But as a matter of fact these

conditions are scarcely ever fulfilled among the lower classes. The combination of care required to make the method successful can hardly be hoped for. Thus (1) The pail-maker must supply a properly shaped oblong pail with an anterior lip projecting well under the front of the seat and a handle behind. (2) The builder must make a water-tight receptacle for the pail, it must slope backwards and converge into a drain or catchpit. In the centre of its floor must be a slot into which the bottom of the pail fits accurately, but easily. (3) The carpenter must fit the seat so that the hole accurately corresponds with the centre of the top of the pail. (4) The place should be easily got at from behind and the posterior opening should be large enough to admit of the removal without tilting of the pail. (5) The man who changes the pail must do his work punctually at the prescribed intervals or the pail will overflow. (6) In putting in the empty pail at night he must be careful to fit it into its slot. (7) Each person using the closet must be careful to do so in such a manner as to make sure that the pail is receiving all the fæces and urine passed. (8) The number of persons per pail must be limited.

Now if we take the trouble to visit a dozen or so pail closets in succession we shall certainly find: here a round pail with no handle; here a pail with a dent in the side causing a leakage; here a pail receptacle which is either bare earth or cracked masonry, sloping anywhere but towards a drain or pit and so situated that the most patient scavenger finds it difficult of

access for changing pails; in another closet there is no spot marked for the pail to stand on, it has been so carelessly placed that only one half of it is under the seat hole and excreta are on its sides and on the floor. The next place is even worse, the pail has been forgotten altogether, one has been removed and no fresh one supplied—the people use the closet all the same; here a pail has evidently not been emptied for weeks, and is overflowing, while in the next house one is in the same state because too many people use it; here is a high seat and no foot rest so that the user is tilted forward and his motions are apt to go behind the pail.

Supposing the dry earth system to be in use a difficulty of its successful application to large communities lies in the fact that ignorant, very busy, hard-worked, or poor people, especially natives, will not take the trouble to use the dry earth, even if it can be had for nothing; and as far as my experience goes, it is by no means the rule to find dry earth at hand in barracks, civil and military hospitals, private houses of the better classes, schools, &c., where the conditions are most favourable and efficient working of the system might be looked for.

There are serious disadvantages of the pail system to be mentioned under the head of municipal sewerage.

It is seen then that there is much to be said both for and against the pail system as far as regards household arrangements.[1] For the ordinary run of people,

[1] The pail system makes no provision for waste water.

natives particularly so, it is not sufficiently automatic; it requires too much care and thought on the part of individuals. But in theory it is good. The reader will perhaps say to himself at once: but is there any system which will work perfectly without the exercise of great care by the people who are utilising it? To this the reply is: perfection can be aimed at only, it will never be attained absolutely.

The system which will commend itself most, which comes nearest to perfection, will be such a one as will be least likely to get out of working order, which can do least harm under the circumstances in which individual control is wanting. It may be that in some conditions of life this would be found in the pail system. I am, however, rather anticipating conclusions, and will pass on to the next in order of the list of systems.

(6) *The Water-closet with Cesspool.*—The water-closet discharging into a local cesspool—that is to say a separate cesspool for the w.c. or w.c.'s, of each house or group of houses.

To give details of the varieties of water-closets would be beyond the scope of this article. Suffice it to say that the water-closet is a mechanical contrivance in which deposited excreta are flushed away by water into pipes which lead to some larger receptacle—in this case a cesspit not very far away. The water may be thrown into the closet by hand-bucket or by pulling up a valve which liberates water from a tank. The closet may be for one person only to use at a time or be a trough which more than one can use.

The essentials of a good water closet are :—

(1) The pan should be smooth and non-absorbent, so that it may not become offensive owing to adherent or absorbed fæces.

(2) It should be so fitted to the drain pipes that it does not leak.

(3) It should be trapped by a bend in the exit pipe in order that the water in the bend may act as a seal to prevent foul gas coming from the drain pipes into the closet.

(4) On the side of this trap farthest from the closet should be a ventilating shaft leading into the open air—this to prevent gas at high pressure from forcing the trap. The ventilator should not open near a window or chimney.

(5) There should be an adequate supply of water for flushing.

Providing a closet fulfils these requirements, *and is carefully looked after* it is not likely to be a source of illness (our chief consideration) or even discomfort. Any *reputable* builder nowadays would construct such a closet as a matter of course if ordered simply to *make a good water-closet*.

There is no objection to pouring slop water into the closet provided it is not thrown in in such volume that the closet-pan overflows.

As for the remainder of this system, the drain pipes should not be too large in proportion to the size of the closet. They should be of smooth glazed earthenware, properly fitted, the joints cemented, and the pipes set

in cement. There should be a second trap near the cesspool—the cesspool should have a couple of ventilating shafts. Pipes from the sink or from a second closet should join obliquely in the direction of the flow, and, preferably, with a slight fall into the principal pipe.

The cesspool is usually a roundish bricked pit. It is supposed to be cement-lined, or to be of impervious bricks set in cement, that is to say, water-tight. Needless to say, it rarely is water-tight. The cesspool is covered with a slab of stone or sheet of iron, and over this a foot or so of earth is piled. The cesspool may be emptied by private arrangement with men who make a livelihood by removing night-soil, and as a rule please themselves as to the mode of removal and the ultimate disposal of the soil. In some places the local sanitary authority empties cesspools periodically, or when requested. In actual practice the cesspool is cleared out at much longer intervals than it is supposed to be. Inspection manholes are not generally provided on the drain pipes leading to cesspools ; therefore, there is no indication except the overflow of the w.c., that the cesspool is full. There is, however, no reason why an inspection hole should not be provided in order that the state of affairs in the cesspool may come to light before the catastrophe above mentioned occurs.

The things to be said for and against the w.c. and cesspool combined may be summed up as follows :—

(1) The excreta are removed at once.

(2) Flies can gain little or no access to them.

(3) There is no stale fæcal odour making the air unpleasant.

(4) There is no daily danger of polluting the ground as in conveying pails, &c., to a cart.

(5) The slop-water may be allowed to go into the w.c., or direct into the cesspool.

In fact, all the evils of the pail system are absent as far as the closet is concerned, and provided the thing is in working order. But it is very apt to get out of order through misuse (see the next section), as well as from faulty construction. A special evil of the system now being dealt with lies in the clearing out of the cesspool. True, this is not done very often, and is therefore, in that respect, less dangerous than the frequent removal of pails. But the clearing out is such a difficult performance that it cannot well be done without fouling the surrounding ground, the carts and so forth. The least objectionable system would be by a fixed pump, high enough to pour the contents of the pit directly into a water-tight cart, and having a drip-catcher leading back into the pit; but in the majority of places the pit is so situated that a cart cannot get near it. For all that, the w.c. and cesspool is the best of the systems mentioned heretofore.

Cesspools and Wells.—There is one danger which ought to be mentioned, viz., the pollution of wells. But this is not an essential part of the system—for the well situated dangerously near to a privy ought not to be used. For that matter no drainage plan that

we know of is safe unless it is properly carried out, and this I shall have had occasion to remark more than once in my article.

The Life of a Cesspool.—When a cesspool is situated in porous ground and is not water-tight it lasts an astonishing length of time without requiring to be emptied. In fact, it would almost seem that in some cases they never would really require clearing out at all, as they contain little more than water. It is not an unusual experience on taking over a house on hire that the outgoing tenant is not quite sure in what part of the grounds the cesspool is to be found.

Pathogenic Germs in Cesspools.—As to how long pathogenic bacilli live in these places we do not know, but probably not for very long. Manson[1] says that the embryos of the ankylostomum will not live in the excreta fermented and rotted in the store-pits of the Chinese—the case, however, is not quite the same, as the Chinese pits may not be having continual additions of fresh fæces like the cesspit.[2] The cesspit may be looked upon as a septic tank, and, conversely, we may regard the modern septic tank as a glorified cesspool.

Defence of the Cesspool.—I may say that I think the danger to health from cesspools—except as regards contamination of drinking water—has been much overrated. More, I am not aware that actual specific illness has ever been definitely traced to cesspools,

---

[1] "Tropical Diseases," 1900. Cassell and Co.

[2] See, however, page 51.

except when drinking water has been polluted.[1] I would go further, and say that in those places in which there is a pure supply of water through pipes, *i.e.*, where well-water is not used, where the soil is porous and not water-logged, where the cesspools are not too close to each other, and where they have 18 inches to 2 feet of earth above them, the cesspool of itself does not constitute a greater danger to health than do drain pipes and sewers ramifying in the soil. In both there is danger of the water-pipes sucking in deleterious material. For that matter, it seems undesirable that the water-pipes should be put under ground at all in towns. I should say that in such cesspools the amount of brick or stonework about the pool ought only to be just sufficient to preserve its form and prevent the earth from obliterating it by falling in. Rideal says that "in towns, the crowding together of cesspools renders a large area of soil water-logged with black and fœtid matter, which undergoes little or no oxidation"; and "at Hampstead . . . . the earth and often the basements were heavily infiltrated." On what grounds the statement is made does not appear, but if anyone watches the taking up of pipes in the streets of London now he will find the soil is still black, water-logged and fœtid, even in the best streets—possibly owing to the low elevation and the nearness of the river. As for basements, in

[1] I refer here to proper cesspools and do not wish to exculpate mere uncovered holes in the ground, for in such places mosquito larvæ are apt to flourish.

the house in which I am writing the cellar is just being cleared of sewage, which has got into it from a modern drain pipe which choked and burst.

For all that I have said above I am not disposed to advocate cesspools for general use, especially in large towns, if any better system can be found. I am aware too that to commend cesspools under their own name is a bold procedure, but as before stated it has yet to be shown in what way they are necessarily harmful—more harmful, that is, than other systems. Farther on we shall see that more fashionable modern plans are also likely to foul the drinking water, and that on a more extended scale than the cesspool. For after all an epidemic (of enteric for instance) is not looked for, or at any rate it would be of slow development, in a cesspitted place. A household only or perhaps two or three families would be affected by the pollution of one well (I am assuming that cesspools would not be placed near public wells), whereas a poisoned river or reservoir may attack large numbers simultaneously, *e.g.*, the Maidstone outbreak.

Complete Water System. — Professor E. A. Parkes, F.R.S., wrote in his "Manual"[1] concerning the removal of excreta by water: "This is the cleanest, the readiest, the quickest and in many cases the most inexpensive method," but he modifies this statement by pointing out some dangers in the water system.

[1] "Manual of Practical Hygiene," E. A. Parkes. J. and A. Churchill.

(7) *The Water Closet Discharging into a General Water System of Sewerage.*—This, the last system to be described, is that mostly in use in European countries; for large towns and under suitable conditions it is probably as perfect as any at present known. Any evils lie not so much in the house portion of the drainage as in the municipal portion—the main sewers, that is, and the outfall. But the drains just outside the house are liable to get out of order. Once the pipes are put down they are rarely taken up again or examined unless sewage appears in the basement or somewhere else on the surface—perhaps the whole system is blocked and the closet pan cannot be emptied. In the latest made drains, however, inspection manholes are provided and the choking nuisance thereby mitigated. But anyone who takes the trouble to go and see them taken up for any reason will become aware that drains which do not leak somewhere are not very common. Theoretically, the pipes are close fitting, sealed with cement, laid in a firm bed, and, moreover, a bed which is equally firm in all portions of its extent—a very unusual condition it may be thought. Practically these things are only partially existent, the pipes sink in parts and break, &c., so that danger to water supply is nearly as bad as in the case of cesspools—in some respects worse, owing to the false sense of security engendered, permitting wells to be too close to the drains. The drains are not infrequently near to the water pipes too. Fortunately, water pipes are of metal, and not likely to be broken, but under

the head of "municipal sewerage" will be described a way of contamination of pipe water by sewage.

The things to be said in favour or disparagement of the method—as regards household drainage—are the same as those mentioned under system No. 6, except that in the present case there is no cesspool to be emptied on the premises. The water closet shares with all the sanitary appliances the liability to go wrong owing to misuse.

The Closet at its Worst.—To understand what frightful objects water closets may become we must go into the habitations of the poor, who after all form the majority of the population, and are the most prone to suffer from zymotic sickness. It is the exception to find an effective water supply or adequate flushing arrangements; a clean pan is most unusual; everything which ought to be is not; the pan is of old pattern, badly joined on to the pipes, perhaps not trapped; the closet is most likely used by several families, it is consequently nobody's business to look after it; the pan is half full of foul matter; the closet floor is wet with urine, so is the seat; possibly there are fæces on the floor owing to someone's objection to using the wet seat, so that altogether what ought to be a model appliance is an indifferent privy. If a trough had been supplied matters may not be quite so bad, but this is unusual in private dwellings or groups of dwellings. The habitation of the poor man in a town consists generally of one or two rooms in a house formerly occupied by one richer family and now given over to as many poor families as

can be got into it. The provision of increased accommodation is unusual except under legal compulsion, and the consequences are as stated—with all due respect to some of the more enlightened Councils.

Obstruction of Closets by solid Objects.—A great difficulty about w.c.'s generally is that the uneducated classes rarely understand anything at all about the construction of such an appliance. They regard the pan as a convenient hole in which to dispose of all sorts of things which such a contrivance is quite unable to deal with. The result is that pipes burst, or excreta come through ventilators, regurgitate into pans, &c. If none of these things happen insanitary fouling of the soil is caused every time the pipes have to be taken up in order that the obstruction may be removed. In large institutions, barracks, &c., this is a constant source of trouble, expense and annoyance. If such things happen among disciplined bodies, where sanitation is being constantly practised in sight of the men, what must be the state of affairs in an irresponsible, overworked, poverty-stricken community. In barracks, for instance, the soldiers themselves take it in turn to form members of fatigue parties told off to clean latrines daily, yet the records of any Royal Engineer District Office will show that drains are again and again blocked by articles which ought not to go into them at all—and this in spite of the fact that the soldier is often made to pay, in the form of "barrack damages" a share of the expense of the clearing operations entailed by the improper use of the w.c.'s. Personally, I have seen

taken out of drains in barracks such things as, among others, bottles, jam tins and pots, glengarry caps, linseed poultices on tow, woollen socks, broken tobacco pipes, mutton chop bones, &c. On one occasion I came across a man in the act of endeavouring with a stick to induce a pair of trousers to disappear out of his sight down a w.c. Nothing remained in view but a piece of one leg, and the rest of the garment having gone too far to be drawn back, the delinquent was in a hurry to hide the evidence of his crime from any responsible person who might identify the trousers. I say delinquent, because there was a large notice paper in the closet promising punishment to anyone who should so misuse the appliances provided for his comfort and good health. Where troughs are used, as in some of the barracks, instead of single pans, there is less liability to obstruction inasmuch as the pipes are larger.

The point intended to be emphasised by the above is that all the known systems are far less perfect in practice than in theory.

The good sanitary appliances of modern type, which entail expenditure of large sums of money to begin with, require intelligent appreciation on the part of the users, if they are to be any better in practical value than the primitive means of our ancestors. When the school authorities take to teaching elementary hygiene properly to children we may hope for some improvement. Probably modesty will for a long time to come prevent us from instructing children in the art of safely removing excreta.

Religious Difficulties.—A difficulty about the using of any sanitary appliance in the Tropics is the religious one. The great Moslem sections, for instance, object more than the rest of us to being soiled by urine, even if it be their own. No good Moslem would squat on a soiled stand—the Mahomedan does not sit down in the European fashion to void his excreta. Therefore, the stand must be kept clean for him, because, although he dislikes filth he also dislikes removing it. Still, something must be done; excreta must be removed in such a manner as to cause the least harm to the mass of people.

A Moslem Privy.—Although the Islamite prefers to find a secluded place and there deposit his excrement, he does sometimes build a closet, generally for his women folk. I have seen such in the shape of a cess-pool as privy—a deep hole in the ground. The hole had a small surface opening, and around this a raised mud wall on which the users could perch. There were generally a couple of mud steps leading up to the wall, and the latter was about 8 inches wide at the top—the top was dry and invariably more or less polished by the feet of the people. When the pit was nearly full it was filled up by demolishing the wall and steps on the top of it, and a new site was found for the privy hut. One privy lasts a long time, as it is not lined in any way. No danger beyond any which may be supposed to be conducted aerially can arise from such a practice in a country village unless water is contaminated.

Before deciding upon any plan of house drainage

it will be well to consider the various municipal systems, for the two are bound up together. I have first, however, to say something about house drainage for surface water, slops, &c. A few lines may be devoted also to the subject of solid refuse.

(8) *Household Drainage for Surface Water, Slops, &c.*—This is not much less important than the matter already discussed. In Europe the surface water is sometimes conducted into the house drains (more particularly the water off the roof), and the slop water usually is—special provision being made for storm water. In other cases the surface water is dealt with separately—where one of the dry methods is in use it must be so. When the roof or the surface water is admitted into the drains it helps to flush them and carry along the contents. The storm water of most tropical countries is, however, so immense in volume and so sudden in its coming that it cannot be treated exactly the same as in Europe; the drains and sewers would inevitably burst or overflow unless they were made so large that the contents would be stagnant when the storm water was not present. Moreover, there is the dry season to be reckoned with—a period during which there will be absolutely no water in the drains except such as may be artificially supplied.

Where there is any provision for waste water in the Tropics beyond that provided naturally by the lie of the ground and the wearing effect of water, it usually takes the form of a system of open surface drains, general more or less imperfect; but where such

drains are well laid at a proper level and plentifully supplied with water for the dry season, they are not productive of a great amount of smell, nor, as far as we know, of disease. They have the merit of simplicity —a great desideratum among natives[1] — and the only thing necessary to keep them in order is an occasional brushing. It is true that the people throw all sorts of rubbish and filth into them, but this is in a way a good thing; it prevents them from committing worse evils. The house drain begins in an outdoor shallow convex slab or sink at the ground level, and on this the native cleans fish, vegetables, &c. In the better-class houses there may be a sink inside the kitchen and a pipe therefrom through the wall to the head of the surface drain. Surface water from the grounds and the roof is conducted into the same drain, which it tends to flush and keep clean. The house drain joins the street drain at the side of the road near the house; it passes below the level of the footway, and in this part of its extent is usually covered with a board or slabs of stone. In a well-ordered community the householder is responsible for his house drain. It is, of course, essential before he assumes this responsibility that there should be a street drain (not by any means a universal reality) into which he can lead his house drain. In one eastern town in which I was for a short time Health Officer, I found that the Municipality had an elaborate code of bye-laws dealing with drainage. There were all sorts of

[1] I use the popular misnomer—native—to signify coloured, uncivilised, or partly civilised people.

printed forms of summons, from which one could be selected to meet almost any case. These were served on the householder or landlord as the case might be, by the Health Officer. A man would be called upon to fill up a pool or an old well in his garden or yard, to provide a proper drain for his yard and house, to keep the drains clean, remove rubbish, cut down obstructing grass and herbage, and so on. If he passed the time of grace without complying he was brought before the magistrate, who gave an order, a fine and costs, with a cumulative penalty for neglect to comply. If he still failed to comply, the work was done by the Municipality, and the man charged for this in addition to his fines. The last resort was rarely required. Under this system, vigorously but tactfully carried out, great results were obtained from the natives, and, more, the people were educated up to knowing that something also was due to them. The Municipality was being continually called upon by individuals to fulfil their part of the contract and make it possible for the people to comply properly with the bye-laws.

As far as I am able to judge, I should say that the manholes over the mains in the streets of some of our up-to-date towns are more offensive than the open drains above described.

There is no reason why the street drains should not be covered in the greater part of their extent; as a matter of fact, in the town spoken of above, the terminal portions of the surface drainage system were built-up and closed-in channels the same as ordinary sewers,

and so arranged that a man could walk along them, for inspection purposes, by a footway inside.

West African Lethargy.—In a West African town, notoriously unhealthy, I saw a large well-built main surface drain, which had been made by cementing the bed of the local stream. This was evidently the result of a mere sanitary spasm; I found the fairly perfect drain blocked by rubbish which one man could have cleared away in half-an-hour, and no attempt apparently had been made to get house and street drains made to culminate in this large drain. West African lethargy had prevented more being done; within fifty yards of the cemented main was a long virtually stagnant ditch, simply swarming with Anopheles larvæ. In another West African town I saw many places in which such drains as there were in the streets had been in some places purposely dammed by the people in the adjacent houses, in order that they might have a handy water supply during the rainy season.

(9) *Solid Refuse.*—Solid refuse is sometimes thrown into built up "ashpits" or "refuse pits," "middens," or whatever they may be called, to be removed when the receptacle is full. This system was usual and is still met with in England, but iron-bins are now more common. A later development is the provision of a pail for each house; the pail is put outside the house every morning, and the passing scavenger empties it into his cart. This last was the practice in the enlightened eastern town before alluded to. In most tropical places, however, as in many British towns, a good deal of the

refuse is simply thrown in a heap on the ground—for all people seem instinctively inclined to accumulate refuse in one spot, presumably only to get it out of the way Some careful householders make a practice of burying the refuse in the garden; others the most sensible of all, it may be thought, burn it. Burning is fairly easy in a kitchen fire where coal is used, but not quite the same in the outdoor wood fire, or wherever there is no grate—it is not likely to be done by a native, inasmuch as it would not only take time and trouble, but increase his consumption of fuel. The best practical method is the large iron pail or tub, preferably with a lid to reduce smell, prevent access of disturbing wind and keep off flies, chickens and children. Unless the method is made compulsory, and none but Municipal pattern pails allowed, it has elements of failure. The householder will substitute a box or basket for the pail; he not infrequently will deposit a heap of refuse on the bare ground in front of his house—this last is productive of much nuisance and street pollution; when not promptly removed by the Municipality—and, in my experience, Municipal servants often do their work even worse than contractors—the heap of rubbish is spread all over the street in the course of the day, a few fowls and an infant or two are usually to be seen amusing themselves with it, and, on the whole, it might as well have been left on a refuse heap in the garden or yard.

It is well to remember that fæcal matter is not infrequently found in the refuse pail.

MUNICIPAL SEWERAGE AND CONSERVANCY.

Part II.

The systems to be dealt with under this heading are :—

(1) The privy.

(2) The cess-pit.

(3) The pail or dry-earth plan.

(4) The complete water system—main discharging into :—

(4*a*) The river or sea.

(4*b*) Sludge tanks.

(4*c*) Septic tanks.

(4*d*) Irrigation farms.

(5) Waste water removal.

(6) Refuse disposal.

(1 and 2) *The Privy or Cess-pit emptied Municipally.*—The privy or cess-pit may be emptied periodically by the municipal authorities. In such cases specially constructed carts are used. It is essential that the carts should be water-tight and not be filled so full that the contents can wash over the sides when the cart is in motion. The provision of a good cart is a fairly simple business. The transferring of the privy or cess pool contents to the cart without fouling the surrounding ground is a less easy matter, and it is more difficult with the privy than with the cess-pit. Equally difficult is it to transfer the contents of the

cart to the place designated for their reception without polluting the soil on the road.

An Urban Council in 1903.—A day or two ago I examined the appliances of a District Council in a place where a slight patchy prevalence of typhoid has been going on for some time, and has been quite fathomless as to its origin as far as the local sanitary authorities are concerned. The water supply is beyond reproach. At night I witnessed the mode of using one kind of cart, and next day inspected the vehicle. It was what is vulgarly known as a "tumbler," and consisted of an iron tub more or less in antero-posterior section shaped like the letter U. It had an iron lid covering the half and hinged on to a bar across the middle. Four ordinary two-gallon hand-buckets were dangling from a rod at the back. Sticking out of the tub was a sort of gigantic soup ladle for transferring the contents of privies and cess-pits to the buckets, or directly to the tub. Excrementitious matter was evident on most of the outside of the external posterior half of the cart, to say nothing of the buckets. The ladle is always foul and is carried fearlessly about.

A Modern Juggernaut.—This insanitary Juggernaut travels about the streets and the suburban lanes as well as through private grounds, dropping death-dealing germs wherever it goes from the ladle, the cart, and the buckets; the boots of the workmen in charge assisting in this lethal work.

The distance to which infective organisms may be carried indirectly by such means is incalculable. Motor

cars, waggons, carriages, cycles, horses, flocks of sheep, cows and pedestrian human beings are travelling along these roads daily. No wonder, then, that the first case of typhoid fever in a village is often a puzzle to the local doctor. In the summer the dried enteric germs are no doubt whirled about the roads in all directions, to the danger of the occupants of the neighbouring houses. Yet the Council responsible for these things is quite pleased with itself. It has buried its head in the sand and is not afraid. Meantime the innocent ratepayers bear the expense of these contrivances for reducing the population. In this case it would be much better if the Council did not worry people about their cess-pits, for the less frequently they are emptied the safer the people will be.

An Improved Cess-pit Cart.—But the Council has got some new pattern carts which have been in use along with the others. One is for emptying cess-pools. This cart is a large oblong iron box with a small circular opening at the top. As accessories there are (1) a hand-pump, (2) two lengths of hose which screw on to the pump after the fashion of fire-engine hose. The pump contains a residual small amount of sewage after use, and in removing the hose from the pump this runs to the ground along with some from the hose-pipes. The latter are wound round an axle on two wheels, and so trundled along with the ends open and dripping fæcal and urinary matter about.

But how is the cart emptied? Not by the pump and hose, but by an escape tube in one corner of the

floor. The hole which admits sewage into the tube is closed by a plug screwed down tightly and capable of rendering the cart water-tight if no rag or such-like substance intervenes. On raising this plug the contents of the cart splash out through a leather pipe about two feet in length. The plug, which is attached to a rod which can be worked by the driver of the cart, is then screwed down and the cart moves off with a certain amount of dribbling going on from the leather outlet tube. One cart had no leather tube left; it had been worn off and not renewed. If the contents of cess-pits are dangerous, in regard to specific infective disease, in the same way as privies and pails, these carts are a long way from perfection. For all that, they are a little improvement on the "tumbler" and, used by a working party of careful bacteriologists, might be fairly free from danger—as least as far as street defilement is concerned.[1]

A South African Horror.—But I saw a similar vehicle in a South African town noted for enteric fever, a place where the cemetery proved too small for the British victims of enteric during the late war. By way of showing how objects designed for a beneficent purpose may turn out the very reverse of beneficent in practice, I will describe the operations of this South African cart. The only differences between it and the one above mentioned were that (1) there was no pump or hose, as the cart was used for contents of pails which

[1] The carts bear the name of a well-known maker, and are thought to be of quite modern, improved type.

were emptied into the top opening by hand; (2) the plug for the exit hole, instead of screwing down, was pushed into the hole and the handle of the plug rod was caught in a notch to hold it steady. Owing to wear and tear the plug had become loose. This frightful object-lesson of the evils of sanitation in unenlightened hands was in the charge of two negroes. What presented itself to my senses when first I encountered the thing was a foul-smelling cart covered with fæces, and flies battening thereon. One negro handed up pails, which were upturned by the other, and the semi-fluid contents emptied on to the hole, most of the stuff going through and some on the level top. But the most awful thing was that the loose plug allowed a steady trickle of sewage from the cart; and so, enteric raging at the time, a trail of enteric excreta was being laid from house to house, street to street, &c., daily. I asked the man on the cart if he could not close the exit hole. He promptly seized the handle and jammed it down forcibly, with the result that the plug slipped out of the hole and in a twinkling several gallons of fresh excreta were on the ground. No privy of the old capacious pattern could cause more harm than the above-mentioned cart. For after all, the much-abused privy such as we see now in the grounds of old-fashioned farm-houses, was a real cess-pool in the shape of a large cavity below the surface of the ground. It may be said of it, as in the case of the cess-pool system proper, that it is in reality the much-vaunted septic tank on a modified scale, and with an insufficient amount

of water. It is an unpleasant place to sit in as a rule. It was so rarely emptied that it is very doubtful if enteric bacilli would survive (among the other organisms which flourish therein) from one clearing date to another, whereas this cart meandered round every day.

The Council's Soil Carts in relation to Food Supply. —Now, what becomes of the contents of the carts? They are usually taken out into the country and emptied on to the land, either directly, or after being accumulated and somewhat dried in tanks, holes in the ground or banked up earthy enclosures; in other cases they may be emptied into the sea. In the particular place referred to as possessing the tumbler they are taken to some small farms and market gardens just on the fringe of the suburbs, and there turned on to the ground. the agricultural community being willing to allow this provided there is nothing to pay. We get our spring onions and lettuce from the gardens—also a few very fine strawberries. We must take plenty of vinegar with our salad, and give up the plebeian habit of eating plain lettuce and onions with bread and butter—we must also avoid green sandwiches at picnics, &c.

(3) *Municipal Pails and Dry-Earth.* — As to the ways of a local sanitary authority (or contractor) with regard to the pail system, either with or without dry-earth: one way has been mentioned above—the carts described are used to empty pails into. In the Tropics the pails are generally washed, and very often this washing is done somewhere quite close to the closet, so that it constitutes a danger and a nuisance.

In Singapore and some other places the large (municipal pattern) pails are taken right away into the country, where they are emptied, washed and dried in the sun. Meantime a clean pail takes the place of the one removed, and is in its turn removed next day.

The Commode.—But the better class of Europeans, and some of the Orientals,[1] in Indian, Malayan, and other Eastern stations, have an ordinary commode for each person. It is situated usually in the bath room, which is a brick- or cement-floored room in the basement, and has a drainage hole leading to the outer air; if upstairs, the bath-room has always a waterproof floor. The bathing places are thus prepared in order to allow for the Eastern system of bathing, by splashing hand buckets of water over yourself while you stand on the floor. This creates a temptation to the man who comes to empty the commode; the vessels containing urine are emptied by the same individual; he generally empties them on the floor of the bath room. The commode is supposed to be pretty well always empty; twice a day, as a rule, the man who has this job visits the bath room, and if necessary takes the commode pan away—generally behind the kitchen or stables—and empties it into a large iron pail. He washes the commode pan on the

[1] The Chinaman's favourite device in the way of a privy is mentioned on page 18, but he is gradually taking to our way of doing things in our colonies. See also page 29 as to the custom of the agricultural Chinese.

spot and defiles the ground in doing so. I have wandered from my subject—municipal pails.

Singapore Pails and the Chinese Gardener.—The municipal pail is supplied with a more or less closely fitting lid. In Singapore strings of Chinamen may be seen and smelt every morning pursuing their way into the country with these pails upon their shoulders. Bullock carts are also used, carrying a number of pails at one time standing on the cart-floor. The Chinese market gardeners, who have done so much for the comfort of life in Singapore, place great value on the pail-contents; they store the material in open pits in their gardens. They also store in the same place all the urine they can get hold of. The mixed product they distribute with scrupulous care on individual plants. At night (this time is selected because the sun in the day time would quickly dry up the manure) they may be found going along the rows of vegetables and, lighted on their way by a lantern, pouring small quantities of liquid manure from long-necked cans upon each individual plant. The results, from the gardener's point of view, are excellent. In a land which in the earlier days of the settlement suffered sadly for want of vegetables of any description, a plentiful supply of cheap green food can now be obtained.

Penang Pails and Enteric Fever.—In Penang, where, in common with the rest of the Straits Settlements, this plan prevails, a former acting Municipal Health Officer—Surg.-Major D. O'Sullivan, Army Medical Staff

—gave it as his opinion that an outbreak of enteric was due thereto. The soldiers in barracks were in the habit of buying largely, from one of these gardens, of greenstuff which they ate raw. The soldiers who came from India to Penang brought a case or two of enteric with them as a rule, and it was believed that the barrack latrine pails were taken to the same garden from which the greenstuff came. No other Europeans had enteric. In the following year I saw a Chinaman who (as the *post mortem* showed) had died of enteric, though treated for malaria. The local water supply was very good and brought from a distant hill. The catchment area was certainly not absolutely clear of inhabitants, but there was no one living on the banks, and cultivation was cut down as much as possible. The clear and sparkling water had some miles to go in mains before it reached the barracks and town. It is therefore quite possible that the M.O.H. was correct in his surmise. For, after all, it was only a surmise. Enteric was not looked upon as endemic in the country. To the best of my recollection there had been no case recorded for years in the pauper hospital—a very large institution. The *post mortem* in the case above alluded to—the Chinaman—was held at my suggestion, when I saw the man dying, that the case looked like enteric. It may therefore be supposed that there were other unrecognised cases about—in fact, a year or so later, the Hon. Dr. W. C. Brown came out to Penang with an outfit for making serum diagnosis, and soon after he

published a paper to the effect that he had discovered a good many cases which had not been diagnosed as typhoid before the serum test was applied. However, I, like the M.O.H., am merely surmising—for all these later cases may have been derived from the soldiers. Typhoid in barracks, too, had been known to occur from time to time before the period mentioned.

Sir Patrick Manson, who knows the Chinese better than I do, says these people use the excretal matter after it has fermented, rotted and, presumably, become less harmful. This may be so in a way, but I was under the impression that they kept adding to it—the gardening Chinaman, I thought, had no closet except the store-pit for himself, his labourers, and his family. Singapore was not a notably enteric place, though the soldiers had occasionally small outbreaks, just as in Penang. I am not aware that in Singapore it was ascribed to green food; it was, I think, supposed to have been imported by the regiments from India, and to have spread in some unknown way in barracks. I may say that in the matter of general cleanliness and sanitary arrangements, Penang barracks (now abandoned as an imperial station) were as clean as any I have seen, or as any barracks could be. Whether the gardeners were to blame or not there is no doubt that the direct transfer of pail contents to gardens is to be deprecated; the water in which the pails were washed might be used for the plants and would be as bad as the crude fæces. In leaving this question, I may say that from private sources I

gather that Singapore—which in my time was regarded as an exceptionally healthy place for a tropical station—has recently been visited by prevalence of enteric among European civilians.

Indian Dry-Earth Pails and Enteric.—In India some army outbreaks of enteric—*vide Army Medical Annual Reports*[1]—seemed almost certainly due to the blowing of dust, from a sort of dumping ground for earth closet pails, towards the barracks. No other cause could be found by the experts who investigated the outbreak. The cases occurred mostly on the side nearest to the aforementioned ground, and the numbers gradually decreased in proportion to the distance from it.

We see, then, that the pail system, with or without dry earth, when used intelligently by well-to-do people may be pleasing enough to the well-to-do as far as their own immediate surroundings are concerned. It is not free from grave dangers to the community owing to carelessness in the choice of a site for washing pails, and still more on account of the ways in which the contents are ultimately disposed of.

These dangers are perhaps more serious in the Tropics than in Europe, in consequence of the work having to be left to low-class natives, absolutely ignorant of the most rudimentary principles of hygiene; also in consequence of the greater prevalence of flies and dust-storms, and of the torrential rains which temporarily

[1] *Army Medical Annual Report*, 1898, &c. Eyre and Spottiswoode.

flood large areas of ground. In further illustration of what is said about the native scavenger, I give the following two accounts of what I have seen myself.

South African Railway Pails and Enteric.—At the stations on some of the South African railways pails are in use. Encamped near one of these stations in a small village, I rode round the surrounding ground. About thirty yards behind the station on the bare ground I found about a cartload of fæces, which had evidently been turned out of the station pails. This was at an early period of the campaign in the part of South Africa referred so that the practice was clearly not the result of the war. To screen the offensive heap a little from the public view it had been placed in a slightly depressed portion of the ground, and the first rain would wash the collection therefrom into the nearest water-course. The system, however, was all that could be wished for as far as the railway passenger could see. Some officers and soldiers who had that day sickened with fever, which ultimately proved to be enteric, spent the night and part of a day in the railway station waiting for a train to the base hospital.

Sierra Leone Pails and Enteric Fever.—Again, in Sierra Leone, the contractor for emptying the pails from the military hospital—the work was performed under cover of the darkness—was found to have been for some time putting the contents of the pails into a neighbouring surface drain, which was rather deep, shaded by a culvert, and out of the way of pedestrians. It was not observed until the smell caused a special

search to be made. The man was paid, of course, for taking the stuff away out of the town. He had washed the pails on the ground near the drain. The drain ran only 200 yards underground from the culvert and then widened out into an open surface ditch, unlined by masonry, which traversed the most populous part of the town, and was frequently paddled in by ducks, goats, and children. Pedestrians washed their bare feet and hands in it. There was a case of enteric in the hospital a few weeks before the discovery was made. The contractor was warned and fined the maximum penalty—£5. A few weeks afterwards, attention being called to newly turned soil near the barracks, closer inspection revealed masses of maggots, flies in various spots, and streaks of fæces oozing up in some. The contractor had chosen shallow burial, very shallow indeed, as an alternative to the use of the drain. He was again fined and deprived of his contract, but this did not deter others from pursuing similar practices. (The sanitary inspector was an educated native.) Such things as the above occur as a rule rather than exceptionally in the Tropics, and this fatal disposition of the denizens of hot countries to shirk their work has to be reckoned with in schemes of drainage and sewerage.

(4) *The Complete Water System.*—Here we have large sewers converging into larger ones, and finally comes the main sewer, which varies from a foot or two in diameter to a brick and cement structure which is large enough to allow of a man walking in it. The size depends, of course, on the number of people whose

off-throw has to be dealt with, and on whether or no waste water, roof water and surface water have to enter the same system.

The remarks about the correct laying of house drains apply also to the main drains. A perfectly water-tight system is probably never attained to, but the openings may act sometimes as inlets to ground water, and at other times, especially if the drain is choked, as outlets. The main sewers or drains have to be ventilated, as most persons who have stood near a grated manhole in still weather, when the atmospheric pressure is low, are by this time painfully aware.

It is, however, in the method of disposing of the effluent sewage from the main that the chief interest of this system lies.

Excreta to the Waterways.—The simplest way of getting rid of the sewage, and that formerly adopted in most places, is to discharge it into a river or into the sea. This is merely a continuation of the habit of primitive peoples. In the earlier days of the world, when population was scanty, when there were no roads, and especially when there was much forest land, the sea and rivers were the chief highways, and people naturally settled either on the shore near an estuary or on the banks of rivers. They had an additional inducement in the necessity for water to drink. Rivers were also a source of food supply in the shape of fish. For the two latter reasons also, those who elected to live further inland, driven away perhaps by their enemies, found it convenient to settle on the smaller streams. Here

they got their drinking water up-stream, and having a certain amount of thought for themselves, fouled the watercourse mostly below the source of drinking water, but had not knowledge enough to be afraid of contamination of the water by people living further up-stream than themselves. So long as villages were few and far between little harm resulted on big and rapid rivers. The various living things, ranging from amœbæ to large fish, which feed on excrementitious matter, together with oxidation processes combined with free dilution, reduced danger to a minimum. The same course of events can be seen in practical application in uncivilised countries in the present day.

When population increased, however, river pollution became much more marked, and some waterways, like our own Thames, became to all intents and purposes mere sewers.

The Sewage Problem.—Scientific men in various professions are now seeking a solution of the problem of sewage disposal, with a view to reducing the nuisance and danger to health arising from the pouring of huge volumes of sewage into rivers and into the sea.

Oysters.—The discharge into the sea is of itself more of a nuisance than a direct danger to health. Oyster beds have been poisoned, however, and the oyster-eating portion of the community have suffered thereby: foci of disease by which non-oyster-eating people may be infected have been created.

Tidal Back-flow.—The tide is apt to throw back sewage on to the foreshore, and also to stop the effluent

pipe and so cause sewage and sewer gas to be forced through every weak spot in the chain, passing sometimes into houses.

River Pollution.—Still, the waterway is such a convenient means of removing waste matter that we are loth to cease to utilise it for this purpose, and the danger therefrom has been reduced in civilised countries by the almost universal construction of elaborate waterworks to bring pure water from a distance in pipes, thus rendering it unnecessary to drink the polluted river water.

Acts.—Since the passing of the Public Health Act of 1875 it has become illegal to pollute a watercourse with sewage in this country as far as new works are concerned. A further Act was passed in 1876—the Rivers Pollution Prevention Act dealing especially with pollution by trade effluents and refuse. The adoptive Act of 1890—Public Health Amendment Act—contains references to pollution of streams.

London Water.—In London the water has been obtained from the river above the chief places of pollution and filtered, so that waterborne disease direct from the river is believed to have been rare. Even under such a system the river might exert an influence on health. At Maidstone, for instance, where the river runs in the bottom of a valley, the sides of which are largely devoted to culture of fruit trees which are manured with London street and slaughter house refuse, the river is much polluted. The water main in part of its course is in the bed of the river, so that

given a flaw in the main, contamination of drinking water is possible.

Constitution of Waste Water.—The water used for washing men, animals, streets and all the water used in so many different ways in our town existence must be disposed of. Waters of this kind are not much less dangerous than the actual human excreta—in fact washing water contains a certain amount of excretal matter. The pollution of streets by animals, together with the prevalence of the habit of spitting and micturating in the streets, cause the surface drainage water to be in reality sewage. Professor Parkes said: "It would be a waste of economy to allow this water to pass off without applying the force which has been accumulated in it for another purpose." It might therefore, he thought, be let into the sewers to flush them. This will be referred to later on.

Sewage Purification.—A brief notice of the means adopted, with a view to purifying more or less the effluent sewage, will suffice for this article. The object of the methods is to render harmless the watery portion of the sewage, so that it may be fearlessly discharged into a watercourse, lake or open sea. It is obvious that the water must be allowed to run away somewhere, and there is no feasible way except letting it sooner or later reach some natural waterway.

The methods in use are tanks, precipitation tanks with or without the use of chemical precipitants, artificial filtration, land filtration and irrigation (land filtration and irrigation are terms applied to two kinds

of what are commonly known as sewage farms). An extension of the precipitation tank method is what is called the "septic tank" (this is combined usually with artificial filtration, sometimes named bacterial filtration).

In all the tanks the idea is to get rid of the more solid part of the sewage (not a very large proportion to the whole amount—some 2 or 3 lb. per ton is a high estimate).

The Simple Tank.—The tank is a large watertight pit—usually oblong—which the sewage enters at one end and passes through an opening at a high level the other end. There may be a series of tanks passing one into the other. The rate of flow in the tank is slow. The very heavy matters sink to the bottom of the tank; but there is very little heavy matter in sewage. The solids are mostly light, or become so as gases are formed in them by decomposition, and they collect as a scum on the surface while the water flows away. Periodically this scum (which may be several inches thick) and the deposit as well are removed, the water in the tank being run off. The solid is known as "sludge," and is used as manure—generally after it has been dried.

If a precipitant of lime, alum, iron, zinc, manganese or other chemical be added to the sewage a greater proportionate amount of solids is recovered and there is less top scum. Sometimes deep tanks, narrow at the bottom, are used; the precipitated sludge passes out by a pipe from the bottom of the tank into a special

receptacle, while the effluent water from the surface runs away at a higher level—this seems to be a ready method of separating the solids from the liquids.

If the sludge be used as manure, the objections in connection with cess-pools apply equally to this system, and as far as specific disease is concerned the effluent is probably as dangerous as if the solids had not been in great part taken out of it.

Filtration.—In filtration schemes the sewage is poured on to filter beds, and only the more watery part passed into the river or sea after passing through the filter. The filter consists of some feet of gravel and sand, small coal, coke, broken clinkers or something of the kind. The beds last for a long time owing to the action of bacteria in liquefying the solids.

As the old filtering material is not well suited for manure it is not likely to produce illness on that score, though if it be not destroyed in some way it is a possible source of disease, as will appear later on in a reference to experimental bacteriological examinations of filter sludge and effluent at Crossness by Clowes and Houston, working for the London County Council. The safest plan is to burn or subject to high temperature the old filtering material.

Sewage Farms.—Land filtration, irrigation, broad irrigation and sub-irrigation are varieties of sewage farms. In the first two the sewage is poured on to a small quantity of land, through which the watery portion sinks and then passes away. Vegetation of some sort is generally grown on the land, but that

is a secondary consideration. In broad irrigation the sewage is conducted over large areas of land specially devoted to the cultivation of crops. In sub-irrigation the sewage is distributed over the farm in loosely laid subsoil drainage pipes about a foot or so from the surface of the ground. Here, again, the disease-bearing sewage is poured on to the surface of the land, and, apart from the danger to the workers on the farm, it would seem possible that pathogenic organisms could be carried abroad by men and horses employed on or visiting the farms. The grass, vegetables, &c., might conceivably be the media of conveying bacteria from the farms to the outside population. The danger from this source would be diminished if vegetables intended to be eaten raw were not allowed to be cultivated on sewaged grounds. Italian rye grass is always said to grow best on these farms, but roots and cabbages are also grown. If we trace the history of a load of grass to its final destination, or the cabbage until it is finally washed in the same water, perhaps, as the radishes in the kitchen, we shall, if we have any experience of bacteriological work, be able to see many ways in which disease might be contracted from a sewage farm—and that with very little likelihood of its real origin being traced. The consensus of opinion, however, is that sewage farms do not constitute a danger to the public health. Nevertheless, Prof. Parkes mentions Dr. Clouston as having recorded an outbreak of asylum dysentery from this cause, and Dr. Letheby as having ascribed enteric fever at

Copley to a similar agency. But asylum dysentery is so frequently recorded where no sewage farm could be blamed, that it would require some strong proof to establish the certainty of the sewage farm influence in its etiology. The P.M.O., Aldershot (*Army Medical Department Annual Report*, No. 23, 1881), alluding to the North Camp sewage farm, which has always been so bitterly complained of as a nuisance, says, "No injurious results on the health have been traced to these smells." All the P.M.O.'s, however, have not been of the same opinion. There is no doubt, at all events, that the farms constitute an effluvial nuisance, and ought not to be near dwellings.

The Septic Tank.—The septic tank is similar to those already mentioned, but it is covered in to exclude light and air. This is to give the anaërobic sewage-liquefying bacteria a chance to increase and do their work. Having passed through the tank, the sewage is spread over filter beds as a rule, and the aërobic bacteria now have their turn. It is claimed that scarcely any scum or sediment is left in the tank, and that consequently it does not require cleaning out except at very long intervals—many years. A grit-chamber intercepts very heavy material before the sewage enters the tank. The sewage leaving the tank is said to be almost odourless. There is a certain amount of imagination about this. I know a septic tank establishment of one of the latest patterns in which the effluent smells very badly before it has passed through the filters. The construction manager says he cannot smell anything—he has got used to it, like a man who stays a long time in one of the old-fashioned country retiring houses. Meantime, people passing that way rush by with their handkerchiefs to their noses.

The Grit Chamber.—The contents of the grit chamber have to be dug out and disposed of; they may be presumed to be as dangerous as sludge, but the amount is not very large and could be roasted.

The Storm Water Difficulty.—There is one way in which most of these systems fail from time to time to do all that they are supposed to do. Storm water has to be provided for. How is this done? Provision is made for the overflow between the sewer outfall and the grit chamber; if small in amount the overflow may be accommodated in a special tank kept empty for the purpose. If the overflow comes quickly and in great volume it is run off into the same place as the clarified effluent, that is to say, the crude sewage goes into the waterway. This cannot happen very often in Britain if the system has been well planned and constructed. But we cannot condemn a system altogether because it fails occasionally; the greater part of the annual sewage flow is filtered all right. In the Tropics, however, the overflow would have to be let run wherever it could about twice a day during the "rains," so that the septic tank and filter would be useless for a good part of the year.

Filter Beds.—The filtering bed has to be cleaned, and at least the top layers renewed occasionally. The old material should be treated as before stated to render it harmless.

Worth of the Septic Tank.—That the septic tank and filtration combined reduce the solid matter to be let into the river, sea, or wherever the watery sewage is going, there can be no doubt. The filter without the septic tank will do the same. Whether the life of the filter used for sewage from a septic tank is sufficiently in excess of that of the filter used for crude sewage to compensate for the increased expense of building septic tanks I do not know. Dr. Geo. Reid, in his "Practical Sanitation," appears to favour filtering as the more wholesome process if the filtering medium is composed of large particles. In his own words, "At least equal success has been achieved by means of *large grain aërobic biological filters.*"

The Effluent not Safe.—The most important fact in connection with these fashionable sanitary inventions is that none of them have been shown to render the final effluent so free from pathogenic bacilli that it could be safely run into drinking water. It is not clear, therefore, that we are any better off than before. Withal it is probable that the effluent is sufficiently free from organic matter to make it likely that the bacteria in it would not increase and would themselves die out soon for want of food if the effluent were passed into pure water; but pure water is not common in rivers now-a-days, apart from sewage pollution.

Crossness Experiments.—In the examination of coke beds at Barking and Crossness for the London County Council, tetanus, tubercle, colon, and many other bacilli were found in the slimy covering of pieces of

coke in the beds. Bacilli suspiciously resembling tubercle were also found in the effluent. In a general way "little or no real distinction could be made out between the cultures made from the crude sewage and those made from the effluents." Concerning the examination generally as set out in Table II. of the Report to County Council, it is stated, "This table also shows that the effluents from the Barking and Crossness precipitation tanks are no better, if, indeed, they are not worse, than average samples of the raw sewage."

From the above it may be gathered that the æsthetic advantages of filtration are decided, but that it has yet to be proved that any other benefit to the community accrues from the method.

Regarding water systems of sewerage generally, it is usual to point to improved health of towns due thereto but inasmuch as pure drinking water is supplied and other means taken at the same time as a rule, it is hard to say how much of the better state of health is due to altered drainage.

(5) *Waste Water Removal.*—From a municipal point of view, surface and slop water are sewage, and where a water system is in vogue slop water is almost invariably admitted into the house drains and so is the roof water. The practice varies with regard to surface water—a separate set of drains is frequently provided for it, partly because they have in many cases been made before the water system for sewage came in. Where the dry systems are in vogue there must be a water system for surface water. Probably in the Tropics the

whole of the surface water could not be admitted into the sewers; that is a question for engineers. As a matter of economy, it would seem desirable when inaugurating new works to admit all the water into one system. There are dangers in this, and in trying to do too much the whole plan may be spoilt—we may have sewage coming out of the drains if they are too full.[1] In most tropical places some provision has had already to be made for waste water, and as previously said, it usually consists of house and street surface drains, open, flowing into main channels, which are in some places open water-courses and in others sewers. On the whole I am inclined to the opinion that such a system is the best for the Tropics—that the arrangements for excreta should be distinct.

(6) *Refuse Disposal.*—Solid refuse can never be admitted to sewers. Refuse is apt to be a grave nuisance in the Tropics owing to its rapid putrefaction in the high temperature. The best system of removal is to have an iron pail for each house put out in the street every morning to be emptied by the municipal scavengers into their carts. The refuse can then be thrown into the sea if there be a suitable place, burned in destructors (a somewhat difficult matter on a large scale), or utilised in filling up selected hollow places, reclaiming land, &c. The pails ought to be supplied by the municipality, and should have lids which cannot be detached easily from the pail.

In reclamation work inland the position of the land

[1] I have seen sewage pouring out of street ventilators in England during a storm, and have read of similar occurrences.

with regard to sources of drinking water should be borne in mind. Reclaimed land often proves a valuable asset to the local government. It should not be covered by dwelling houses for about five years or more afterwards. The English law gives a minimum limit of three years; this is, however, often treated with little regard in towns where the latest Acts have not been adopted.

The ground on which refuse is emptied should, if possible, be prohibited to the public. In England it is customary to see numbers of adults and children grovelling in the refuse for rags, bones and other valuable material which may exist in town rubbish.

The local sanitary authority is apt to be more to blame than the people for the accumulation of refuse: It is common in eastern towns to see the public refuse bins almost covered up with excess of refuse, either because the number of bins supplied is insufficient or because they are not emptied often enough, or from a combination of these two causes. Anyway, the bin is generally productive of a foul-smelling nuisance, inasmuch as the door at the ground level for emptying by permits escape of fluid and even if the people do not put fluids into the bin the rain enters and emerges saturated with organic matter.

The System Chosen.—After this somewhat lengthy exposition of our present knowledge of drainage and sewerage systems,[1] the good and the bad working thereof, we come to the chief portion of the article, viz., "The Choice of a System Suitable for the Tropics."

[1] I have purposely left the pneumatic systems out of the discussion

THE SYSTEM CHOSEN FOR THE TROPICS.

Part III.

The System selected for the Tropics.—I take Freetown, Sierra Leone, for my example of a tropical town.

Freetown, its People, Climate and Diseases, also its Sanitary Condition.—The annual rainfall is about 165 inches, the highest monthly average being about 40 inches in August; but for half the year there is practically no rain. The maximum daily fall in 1898 was 4·40, but it is sometimes higher than this—such a daily amount, however, usually only occupies a small portion of the day in falling. The mean temperature is about 80, and a rise to 90 would be unusually high. Relative humidity, 74 per cent., average 84·5 in August. Tension of vapour, ·808.

The population of Freetown consists of two or three hundred Europeans and a large number of educated, English-speaking Sierra Leonians or Creoles (they themselves like to be called Creoles on the ground that, though of pure African descent, they are not natives of the colony; they are descendants of released slaves from America and other places whence our ships brought them). There are also in the city many Mahomedan negroes from the interior and a host of Pagan natives, Mendis, Timanis, Limbas, Susus, &c., from the immediate hinterland; of late years a sprinkling of Syrian pedlars has become permanently resident. The total population is between 30,000 and 40,000, living in a somewhat straggling town spread over a large area.

The chief diseases are: Malarial fever, diarrhœa, respiratory disorders, filariasis, unclassed fevers and leprosy. Small-pox, though prevalent in the hinterland, is uncommon in the vaccinated town community.[1]

Freetown Mortality.—The infantile mortality, as in most tropical towns, is high—appalling, the M.O.H. calls it—viz.; (1898), infants under 1 year, 376 per 1,000 births; children under 5 years, 120 per 1,000. The rate for England and Wales is, roughly, 150 and about 60 respectively for the above age groups. But some English towns have nearly as high rates as Freetown: Thus, Strand district of London in 1898, under 1 year, 226, under 5 years, 110. Liverpool, 219 and 114—taking male children only under 5, Liverpool rate was 121, which is more than Freetown. All the same, the mortality of 376 per 1,000 under 1 year is, as the M.O.H. says, "appalling,"

The death-rate at all ages was, roughly, 29 per 1,000 in 1897; deducting children under 5 it was 19 per 1,000. This is a high death-rate, but does not seem unduly so as tropical cities go—especially when we consider that being the only town of any magnitude in the country, it attracts all sorts of ne'er-do-

[1] Yellow fever, fatally epidemic in the old days, is now unknown in Sierra Leone, but is met with both up and down the coast of West Africa.

weels, cripples, lepers, and other nondescripts from miles and miles around. Take the following home rates for comparison: England and Wales, 1861-70, 22; Newcastle, 1871-80, 26; in Preston for same period, 28; St. George's-in-the-East, 1881-90, 26: evidently there are worse places than Freetown.

Official Health Report, Freetown.—But the M.O.H., Dr. W. T. Prout, one of the most able men on the coast, and an authority on tropical disease questions, is concerned about it.[1] The following extracts from his report show how he accounts for such ill-health as does exist. "It will be seen that the most frequent causes of death are those attributed to fever (70) and the nervous system (61). Of the latter the majority are due to convulsions, and this is most probably caused by improper feeding." He is speaking of the children, of course. Another large portion of infantile deaths are attributed to "the general use of midwives, whose qualifications for this work are of the flimsiest description. . . . . ." So far insanitary conditions are not held to account for deaths; but coming to digestive disorders, he attributes the deaths therefrom to "general contamination of the soil, *and also to the character of the food*" (the italics are mine). Rheumatism is ascribed to "damp and ill-drained dwellings." He points out that there are no public urinals; and then comes to cesspits, of which he says there are

[1] "Sanitary Report of the City of Freetown," 1897-1898. W. T. Prout, M.B.Edin. (Lionel Hart and Co., Liverpool.)

30,000 people using them, and continues thus: "every day there is being deposited in the soil of a densely-populated town, and deposited under conditions which render excreta liable to the worst forms[1] of decomposition, about 42 cwt. of solid excreta."

Let me deal with the report from my own point of view, remarking incidentally that it shows how insanitary conditions remain unaltered year after year in reputedly unhealthy places in spite of the efforts of the medical officers to stir up the people to a sense of their shortcomings.

First let me say—and this fact is also pointed out by Dr. Prout—the so-called cesspits are mere holes in the ground, not deep, not properly covered, and liable very often to flooding by surface water; the wells are also mere unprotected holes in the ground. Moreover, and this is most important to note, they are deeper than the cesspits, which are generally only half a dozen yards away; a well, indeed, is generally within a dozen yards of two or three of these cesspits. In the dry weather the water level in the well is several feet below the level of the bottom of the cesspit. The wells being rarely protected by a coping, the surface water pours directly into them during tornado storms, when two or three inches of rain may fall in a few hours. The water must be very bad indeed. Now, on referring to Dr. Prout's report again,

[1] Exactly what is meant by the "worst" forms of decomposition I do not know.

I find that the healthiest portion of the town is that in which there is water in pipes from the hills—partly a town supply and partly an overflow from the Imperial military waterworks in the hills.

The surface drains mentioned in the report are intended to carry off rain water, but, as Dr. Prout says, "even for this they are often inadequate." They are more than inadequate, they are so badly arranged and constructed that the water will not flow. As far as health is concerned some streets would be better without them, inasmuch as they form breeding pools for Anopheles larvæ after the rains have ceased and the streets become dry.

The compounds of houses and the streets contain pools of mosquito larvæ during the rains, especially in the poorer and most crowded parts of the town, where bush natives, ignorant of town life, congregate in squalor and filth. The municipality cannot find fault with these people until it has provided proper street drains for the house drains to be run into.

The compounds of houses are usually covered with refuse, or there is a permanent heap in one corner (latterly a totally inadequate number of street bins have been supplied).

Where do most of the people and the children die? In the poor native quarters! There they crowd together in the most flimsy, dirty hovels, insufficiently fed, clothed and washed; infinitely worse off than in their native bush. Fever kills many children, directly and indirectly. The old, the sick and feeble are not

so well cared for as they would be in their native villages. Above all, the drinking water is vile in these parts of the town,[1] whereas in the country water is good and plentiful. Dr. Prout, in allusion to the high rate in one of these quarters, says: "Here the water supply is defective, cesspits abound, and there is considerable overcrowding," and he says much the same of all the unhealthy areas.

I fully expect that the death-rate will rapidly improve when the new water comes into general use and the wells are filled up, in spite of cesspits.

(I am bound to say here that the military death-rate, notwithstanding the good barracks, good food, good water, and pail closets, is relatively higher than the Freetown rate, the average being nearly 20 among adult males in the prime of life.[2] This rate includes West Indians, however, who suffer severely from malaria—almost as much as Europeans when they [the West Indians] first arrive in the country—and tubercle.[3] The 20, for instance, includes 6 per 1,000 for malaria and 5½ for consumption. Dysentery and diarrhœa are uncommon among soldiers in barracks in Freetown, and enteric is almost unknown.[4])

[1] The new water-works in course of construction under the superintendence of Mr. Maxwell Quill are very fine indeed, and on an elaborate scale. Pure water is to be brought from distant hills.

[2] The yearly average to 1898.

[3] Tubercle seems to have a special affinity for Europeanised or Americanised negroes.

[4] The case mentioned on page 54 was quite an isolated instance—see *Journal of Tropical Medicine*, Nov. 1, 1902.

A further improvement in the health of Freetown will take place when Dr. Prout's recommendation for "(1) the adoption of a system of subsoil drainage; (2) the construction of properly cemented surface drains, and (3) the compulsory paving and cementing of yards and surface drains leading from them" are carried out—the second would be of great value by itself.

The cesspools will cease to be so harmful in themselves after the improvements in water supply, &c. The emptying will be the chief danger.

Which, then, is the suitable method of dealing with the excreta in Freetown?

In Freetown, of all places, it is essential that any system to be of value should apply to the poorer natives as well as to the well-to-do; for in this city, though there are poor quarters there is not as yet a separate place for Europeans, as in eastern towns, nor for the better class of natives.[1] They are more or less jumbled up together. Any scheme adopted must therefore not be very expensive as far as householders are concerned—the natives could not afford it. The cost of a water-closet, for instance, would be more than the cost of the house in some cases; more than the landlord's whole capital. The actual outlay involved in fitting up works of the kind is greater than in England, as everything required must be imported from Europe.

[1] There is some prospect of a European quarter being built on a hill at Wilberforce, a few miles out of town, and the railway to this place has already been partly constructed.

From Report of the Medical Officer of Health, Freetown, 1897-8.

TABLE SHOWING THE METHODS OF SEWAGE REMOVAL IN THE CITY.

Wards	Number of Persons using Water[1] Closets	Number of Streets in each Ward	Description of W.C.			In what condition found when last visited		Number of Premises without Water Closets	Remarks
			Dry Earth System	Cesspits	Open Pits	Good	Bad		
									Districts:
Central	8,599	68	45	1,341	51	1,088	349	270	III., IV., V.
East ..	5,172	72	9	660	82	542	209	335	I. and II.
West ..	6,721	65	3	649	153	524	281	630	VI., VII., VIII.
Total	20,492+	205	57	2,650	286	2,154	839	1,235[2]	

It has been shown that no system is perfect, but that the water system comes nearest to perfection. Therefore I should like a water system if I can see any way in which it can be obtained for Freetown. In these difficult situations one is always inclined to compromise, therefore the temptation to save trouble by doing so must be resisted as long as possible.

[1] The word *water* might have been left out. There are no water closets properly so-called. Dr. Prout uses the term generically for all sorts of closets.

[2] The report deals with only a portion of the population apparently—there are more than 20,000—perhaps the balance is represented by the 1,235 premises without closets of any kind. There are six public latrines in the town, providing accommodation for only 26 persons. Dr. Prout estimates that 30,000 people in Freetown use the cesspits.

According to Dr. Prout's report the pail system is already in use in some houses, chiefly in the central ward, *i.e.*, where all the large stores and offices are. They are also used in barracks and by nearly all the European residents. There are only fifty-seven of these closets all told, exclusive of the barracks. The M.O.H. advises the general use of pails, provided by the municipality at the householders' expense. Coming to the question of emptying these pails, he is, however, confronted with the difficulty of getting this paid for, and he is driven to the conclusion, on the score of expense, that each householder must empty his pail (simple pails without absorbent material are recommended) into a cart. The pail is to have a lid and so is the cart —a trap-door lid to obviate the smell nuisance. The carts will be taken to certain localities at early morning hours to receive their burden which will then be placed in hoppers and towed out to sea; people living near the sea are to be allowed to empty their pails directly into the hoppers. If this plan be adopted it will, in my opinion, be a failure. As may be gathered from my remarks on pails generally, I consider it has grave sanitary defects in a tropical country under any circumstances. In addition I am convinced from my knowledge of the native that in the first place every effort will be made to escape the initial cost of a pail (it is not proposed to provide two), the pail will always be filthy, three parts of the pails will never be emptied, except when personally ordered and superintended by an official, another portion will not be emptied into

the carts but into the nearest hiding place. On the whole it will be infinitely more dangerous to the community than the cesspits are. The cesspit at least requires very little looking after by the individual using it. I have quoted Rideal on cesspits, Reid says much the same; these gentlemen echo the general opinion of sanitarians at home on the matter. It must be remembered though that they speak with regard to the conditions of life pertaining in England, where the community is rich and willing to pay heavy rates, where there exist all the means for constructing, in their greatest attainable perfection, the most modern scientific apparatus, and getting it looked after with some approach to conscientiousness on the part of the workmen. The cesspool is vaguely said to poison the air (so do sewer ventilators, more), but no bacteriologist will admit that pathogenic organisms float out of cesspools in the air. The most that can be said in that regard is that foul air is generally found to contain more bacteria and less oxygen than pure air, probably because foul air is created chiefly in places where the air is also still, as in towns, where houses screen off the wind. The preponderance of bacteria is most marked in inhabited ill-ventilated houses. The air of some sewers has been reported to be remarkably free from bacteria. Neither the cesspool nor the closet built over it need be ill-ventilated.[1]

[1] In making the above remarks, the writer does not wish to be thought unappreciative of the advantage to general health of a pure atmosphere, such as is found on hills and in the open country.

In the country districts in England cesspools have not been considered injurious to health except by polluting water, provided that they are not actually under the dwelling houses. They are still recommended by some sanitarians for use in the country at home. Yet, where crowded together they may have more serious influence on health; so may pails.

If a cesspool or privy is of such a character that it pollutes the surrounding surface soil then it *is* a danger probably, inasmuch as the soil would be likely to prove a habitat for pathogenic bacilli either from the original privy contents or from some other source. In this respect, then, some of the Freetown holes in the ground are gravely insanitary.

But there are cesspools and cesspools. I think I have shown clearly enough already that bad water-closets, bad drains and, above all, badly managed pails, menace the public health quite as seriously as do bad cesspools.

The initial expense connected with any new system of drainage or sanitation is great, both as to the municipality and the individual householder; therefore before rushing hastily into this expense it is well to think twice or several times. Is the new system going to last or will another be required before this one is well established?[1] The cesspits, some of which are,

[1] The M.O.H., Freetown, recommends the universal adoption of a pail system, either as described or as entirely in the hands of the municipality, but suggests that they should try it on part of the town if they do not like to make the plan general at once.

according to the M.O.H., "better built and in better condition" than others, are already in Freetown. There are also in use some earth closets. The town is very poor and will have to borrow through the Government for any extensive scheme. The municipality already finds it difficult enough to carry out what little it has to do in a sanitary way. The water system is undoubtedly the least objectionable of all the systems, especially from the æsthetic point of view, and Freetown will no doubt want to have it some day.

My proposal therefore is as follows:—

(1) That the municipality of Freetown nominally adopt the complete water system—the sewage to be discharged into the sea.

(2) That the people now using earth closets be allowed to continue to do so provided they are willing to pay for their being emptied in such a way as the municipality may direct.

(3) That the good cesspools be allowed to remain in use until gradually superseded by the water system; proviso as for earth closets.

(4) That the bad cesspools be done away with.

(5) That a plentiful provision of public latrines and urinals be provided in the poorer localities—some for men, some for women; special latrines for Mahomedans being provided if desirable.

(6) That private closets be prohibited entirely in the grounds of such native hovels in the town as are built on the naked earth.

(7) That stringent bye-laws be enacted to deal with

sanitary matters and that they be rigidly enforced by fines, &c.

The municipality will then select the place for the outfall, having regard to tides and the possible extension of the city. They should acquire enough ground at the outfall to allow of the construction of tanks and filters if at some later date these are found to be desirable. They will also have their system planned by the engineer so that future building operations may be undertaken with due regard thereto. When they are able to afford it they will begin their main sewer. The first water closets ought to be in place of the present and future public latrines—troughs being used instead of pans.[1] In this way they (the municipal authorities) will gradually advance till they arrive at the point where they can begin to order the inhabitants of particular streets or wards to adopt the new system.

In the meantime the water reservoirs must be constructed to provide for the closets—there is plenty of water in the hills, provided it be collected, to create good flushing.

Sanitation to be Taught in Schools.—The Government should be approached with a view to educating the new generation up to the change of sanitary method by making *sanitation a compulsory subject in the schools of the colony.*

[1] The number of public latrines and urinals will require to be increased (proportionately) as the water system is brought in. Private water closets for the low class natives should not be allowed.

As there will be a lapse of some (many) years before this system is evolved in all its completeness, the requirements of a good closet and cesspool should be laid down in the bye-laws and new buildings should not be passed, fit for occupation, until these requirements have been fulfilled, or a satisfactory earth closet provided.

Such existing cesspools as are allowed to remain, and the closets over them, should be improved to conform in a modified way to the requirements for new cesspools and closets.

As soon as the new water supply from the hills is established all wells should be filled up and householders be made to adopt the new water, either from the public fountains or by laying on to their houses at their own expense.

Particular care should be taken to see that condemned closets are actually demolished and the pit filled in. At the present time, or, at any rate, not long ago, there were many disused pits open to rain, &c., in the grounds around low class Freetown houses.

The emptying of pails and pools should be undertaken by the municipality—the latter not at stated intervals, but as required. The contents should not be used as manure, but thrown into the sea or destroyed in some way. The best way to clean a pail after it has been emptied is to put it into boiling water, handle and all, otherwise the interchange of pails may be a means of conveying infectious disease from one house to another. The carts in which the pails are carried should be

washed all over with strong disinfectant solution daily. A pump fixed to the cart will probably be found the cheapest, and on the whole safest, method of emptying cesspools not provided with fixed pumps—the risk of infecting the ground by the hose pipe which passes into the pool must be run, but it may be diminished if the pipe is never severed from the cart and the free end hooked on to the opening in the cart as soon as the pool is emptied and before the cart moves off.

Slops and Waste Water.—As the M.O.H. says, "there is practically *no system of drainage* in Freetown" now. "A thorough survey of the town by a competent engineer is required, with a view of putting the surface drains in proper repair, rearranging them so as to provide better outlets, and increasing the fall where it is practicable."

I have detailed a system of house and surface drainage —slops should eventually be taken into the sewage system, but the surface water will take it along in the meantime. This combined waste water should run along from house gutters to properly made drains with a sufficient fall in the streets, the whole converging into a few main channels, which open into the sea at the points of natural outfall of the water, as denoted by the mouths of the streams which now run into the sea. These drains to be flushed out occasionally from the water main in the dry season, and to be kept free from obstruction by removing or sweeping along the solid contents as often as required. Gutters and drains may be of brick, cement, pebbles or stone, so long as the

channel is kept patent, though cement is to be preferred where it can be afforded. Intercepting pits for solids are not desirable in hot countries. If anything of the kind is used it ought to be in the form of a grating —such a grating, however, would probably prove more of a nuisance than a benefit by getting blocked.

Refuse.—Refuse should be put out in iron pails at an early hour, as before described, and either taken away to be shot into the sea, burnt, or utilised for filling up suitable waste and hollow spaces of ground. The public not to be allowed access to such ground, and no building to be allowed thereon for five years. The public bins, such as there are, to remain also in use for the present, for the new order of things will take time to perfect even after the necessary large amount of money to start it has been obtained.

Other Cities and Towns.—This is all I have to say as far as Freetown is concerned.

The principles set forth will hold good for other places—modifications being made by those who know the local conditions better than I do.

Wherever a water system of sewerage is feasible, it should be undertaken—there are few places, capable of supporting a town, where water cannot be obtained. Where towns are inland, the question of effluent disposal will be the most important. If there is a convenient river of good size I should let the sewage go into the river, and obtain drinking water elsewhere or by filtration from above the outfall. The effluent, even if filtered, will eventually get to the river, so that there would

seem to be no help for us in this matter. If we are in a position to filter the sewage so much the better for the towns further down the streams, perhaps, but even this is problematical.

In places where water is so scarce that we cannot do any of the above-mentioned things, there is nothing for it but pails or privies or privy cesspools. My views on these have been given. I regard the pail as the most dangerous of the three in the Tropics. One or other of the systems will be already in vogue in the town, perhaps both. Whichever it be I should recommend that it may be made as perfect as possible, and for new houses the most up-to-date cesspools provided, along with the latest and best appliances for emptying them.

In conclusion, I would repeat that no system is perfect—that the efficient carrying out of any system s better than running hither and thither in search of the theoretically good. A good sanitary officer (if possible, he should have no other work to do), with plenty of good subordinates and a broad-minded municipal council to deal with, will be able to make something out of any system. I may add that I consider a municipal engineer with a special knowledge of sanitary engineering a desirable adjunct to the Health Department.

INDEX.

RAMC 404

COMMANDING OFFICERS (WITH DSO) CAMBRIDGE HOSPITAL 1879-1959

Date Assumed Command	Name and Decorations
	24/3/1905 Surrey. Died Weybridge
1893	Bde Surg, Lt Col H. W. A. MACKINNON, DSO. L.G. 8/12/1896
1908	Lt Col H. N. THOMPSON, DSO. Major General H.N. Thompson Died BACK 1919
1914	Colonel M. P. HOLT, DSO. major General. Sir M.P. Holt.
1919	Lt Col H. C. R. HIME, DSO. L.G. 1/1/17.
1922	Lt Col J. J. W. PRESCOTT, DSO, OBE. L.G 19/4/1901
1926	Colonel F. S. IRVINE, CMG, DSO. ~~L.G 27/9/1901~~
1927	Lt Col P. DAVIDSON, CMG, DSO. L.G 27/9/1901
1929	Lt Col ~~E. VAYLEN~~ E.V. AYLEN., DSO.
1930	Lt Col O. IEVERS, DSO.
1931	Lt Col A. E. S. IRVINE, DSO.
1936	Colonel T. H. SCOTT, DSO, MC.
1939	Colonel C. M. DREW, DSO.
1959	Colonel P. L. E. WOOD, DSO, MBE.

268 (2)
135 (1)

THE WELLCOME INSTITUTE FOR THE HISTORY OF MEDICINE

183 Euston Road, London NW1 2BP
Telephone: 01. 387 4477

This is a very interesting tract written in verse trying to persuade people not to slaughter oxen and show mercy to them. The tract was sponsored by a group of disciples & a Master Monk in Bing Cheng (檳城), also written as 檳城 or 槟城, i.e. the George Town in Malaysia, where until the nineteen fifties half of the population was Chinese. The tract was probably printed in the early 19th century as judging by the condition of the paper used and the style of the writing and printing.

Professor Ma Kanwen

404

Flight in Maurice Farman's Biplane

British mourners at Versailles 11th November 1930.

F. S. Mattig a petit discours to an invisible crowd


IVY.
DAUGHTER OF
COLONEL F. SMITH. R.A.M.C.
BORN 1ST JUNE 1887.
DIED 8TH JANUARY 1912.

At Calcutta.

REDMOND HAMILTON SMITH, (grandson of COL SMITH) (and now M.B. F.R.C.S) Secretary of St Mary's Hospital Students' Union, with the Royal Family at a performance of the MIKADO.