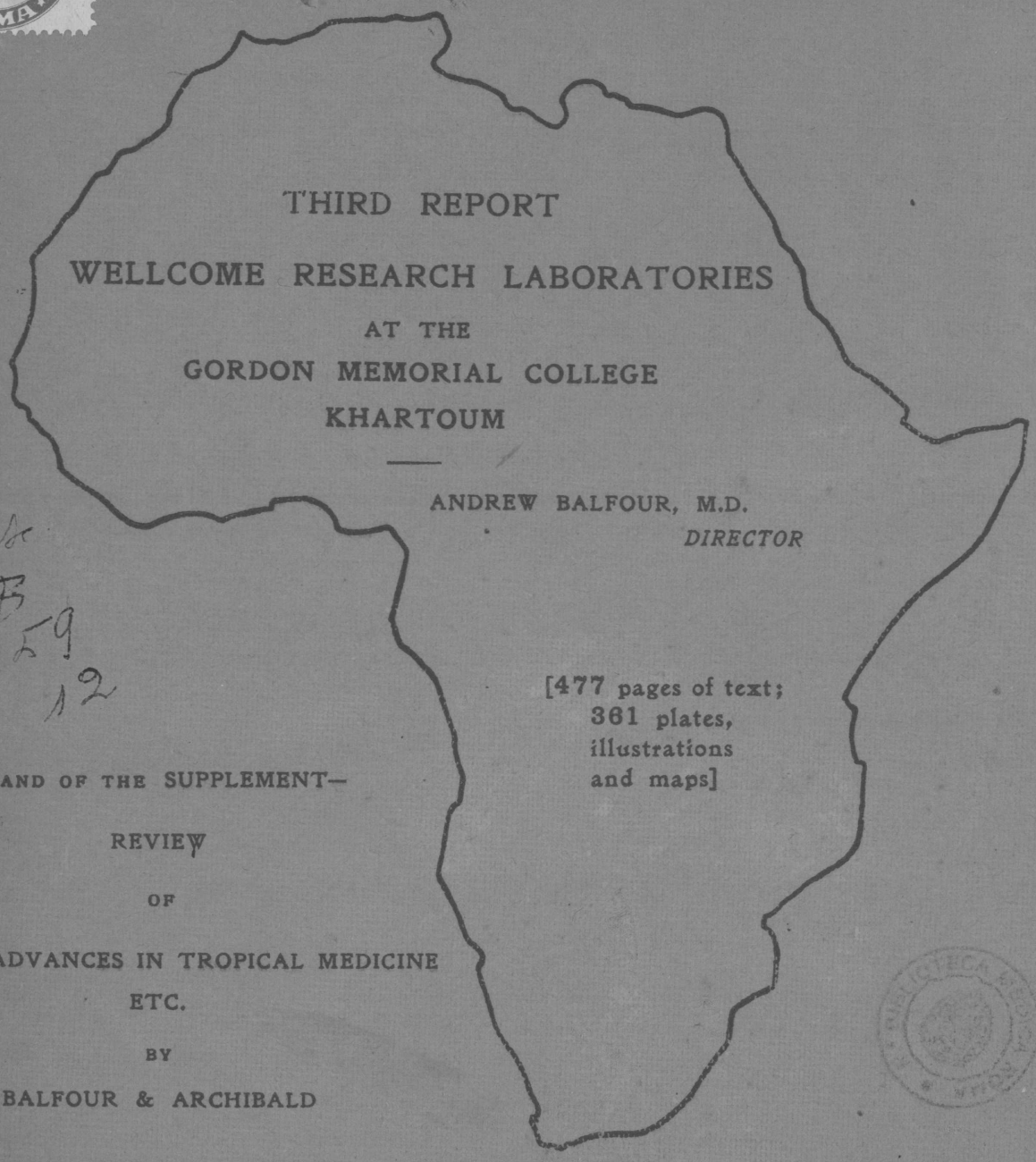

THIRD REPORT

WELLCOME RESEARCH LABORATORIES

AT THE

GORDON MEMORIAL COLLEGE

KHARTOUM

ANDREW BALFOUR, M.D.
DIRECTOR

[477 pages of text;
361 plates,
illustrations
and maps]

AND OF THE SUPPLEMENT—

REVIEW

OF

RECENT ADVANCES IN TROPICAL MEDICINE

ETC.

BY

BALFOUR & ARCHIBALD

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The great cost of production of these Reports, especially in their present voluminous dimensions, necessitates making a charge for them now and henceforth. The price fixed is as moderate as is consistent with the cost of publication, and any profit made will be devoted by the Sudan Department of Education to a special fund for future publications of the Laboratories

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L. BOUSFIELD, M.A., M.D., Egyptian Medical Service
S. L. CUMMINS, M.B., B.Ch., Egyptian Medical Service
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DOCTOR F. WERNER, The University, Vienna
BIMB. HASSAN EFF. ZEKI, Sudan Medical Dept. Med. Off., Gordon College, Khartoum

DR. D. W. WATERSTON and MR. D. J. VALLANCE have compiled and contributed Papers based on the notes and material collected by the late A. MACTIER PIRRIE, M.B., B.Sc., Carnegie Research Fellow in Anthropology for 1906-7

CAPT. HOWARD ENSOR, M.B., D.S.O., E.M.S., has furnished information regarding the question of Sleeping Sickness in the Bahr-El-Ghazal Province

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Egregio Signore,

Ci pregiamo informare la S.V. che siamo stati autorizzati dal Dipartimento dell' Istruzione del Governo del Sudan d'intraprendere in futuro la pubblicazione dei Rapporti dei Laboratori Wellcome per Ricerche al Gordon Memorial College, Kartum. Sono già stati previamente pubblicati due volumi che comprendono un periodo che va dalla fondazione di questi Laboratori nel 1903 fino al 1906. Il terzo rapporto è stato pubblicato al principio di quest' anno e porta avanti il lavoro fino al 1908.

Il Dipartimento dell' Istruzione del Sudan ha preso queste disposizioni per dare evasione al gran numero di domande che questi rapporti hanno creato fra i medici ed altri lavoratori scientifici interessati nelle ricerche tropicali. Pel passato fu emesso soltanto un numero limitato di copie che furono inviate gratis ai Dipartimenti Governativi, a vari medici, ad istituzioni sanitarie ed altre interessate, come pure a poche competenti autorità sui soggetti in essi trattati.

Il lavoro di questi Laboratori si è tanto esteso che l'ultimo Rapporto contiene circa 480 pagine in quarto di resoconti dettagliati di parecchi esperimenti e ricerche interessanti riferentesi principalmente alla Medicina Tropicale. Questo volume è profusamente illustrato ed include parecchie incisioni colorate di valore.

Simultaneamente col Terzo Rapporto, e come un Supplemento a questo, viene pubblicata una Rivista del progresso fatto nella Medicina Tropicale durante gli anni recenti, compilata dal Dott. Andrew Balfour, Direttore dei Laboratori, e dal Dott. R. G. Archibald.

Il gran costo di produzione di questi Rapporti, specialmente nelle loro dimensioni voluminose presenti, ha reso necessario il dar loro, da qui innanzi, un prezzo; questo è altrettanto moderato quanto consistente col costo della pubblicazione, e qualunque profitto che ne risultasse sarà, dal Dipartimento dell' Istruzione del Sudan, devoluto ad un fondo speciale per le future pubblicazioni dei Laboratori.

Si prega d'indirizzare a noi tutte le richieste per le pubblicazioni correnti e per le Ristampe del Primo e Secondo Rapporto dei Laboratori Wellcome per Ricerche in Kartum.

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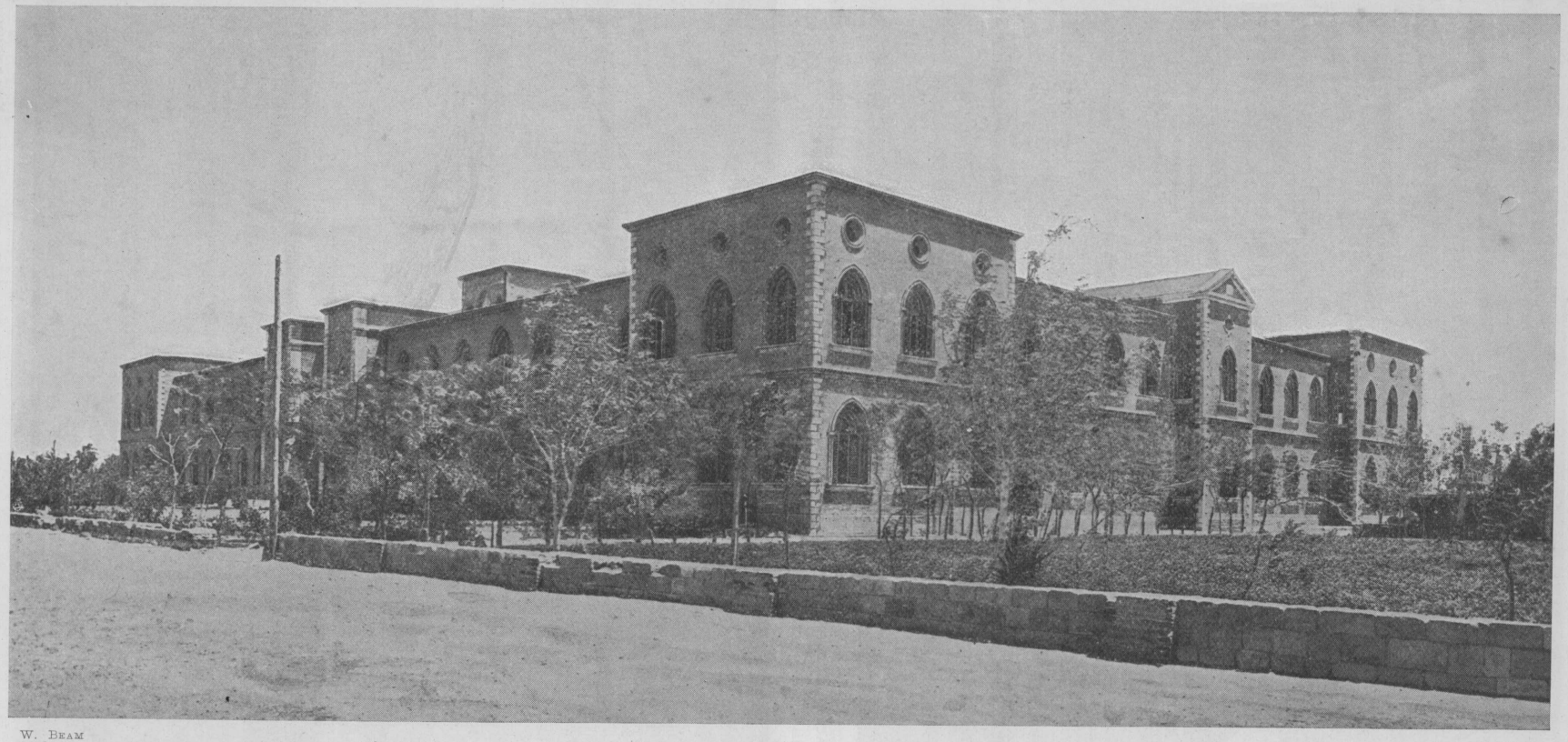
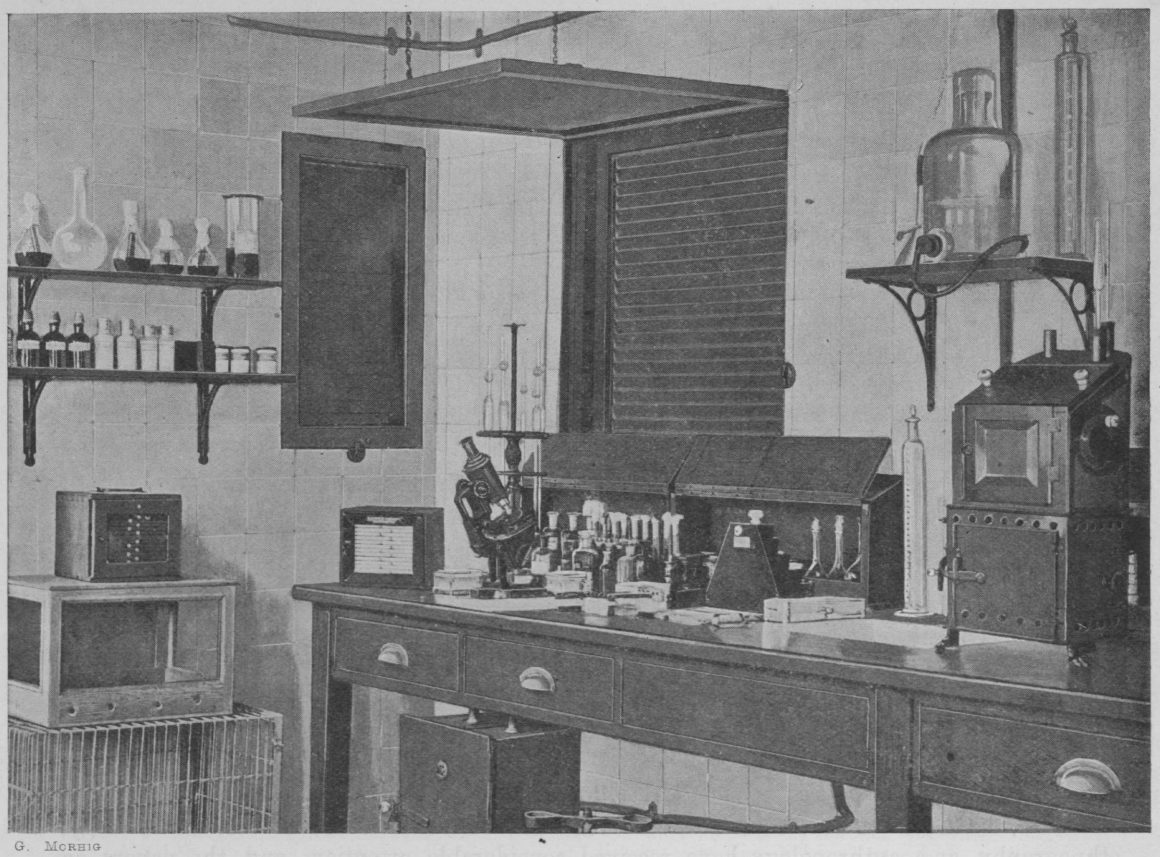


W. Beam

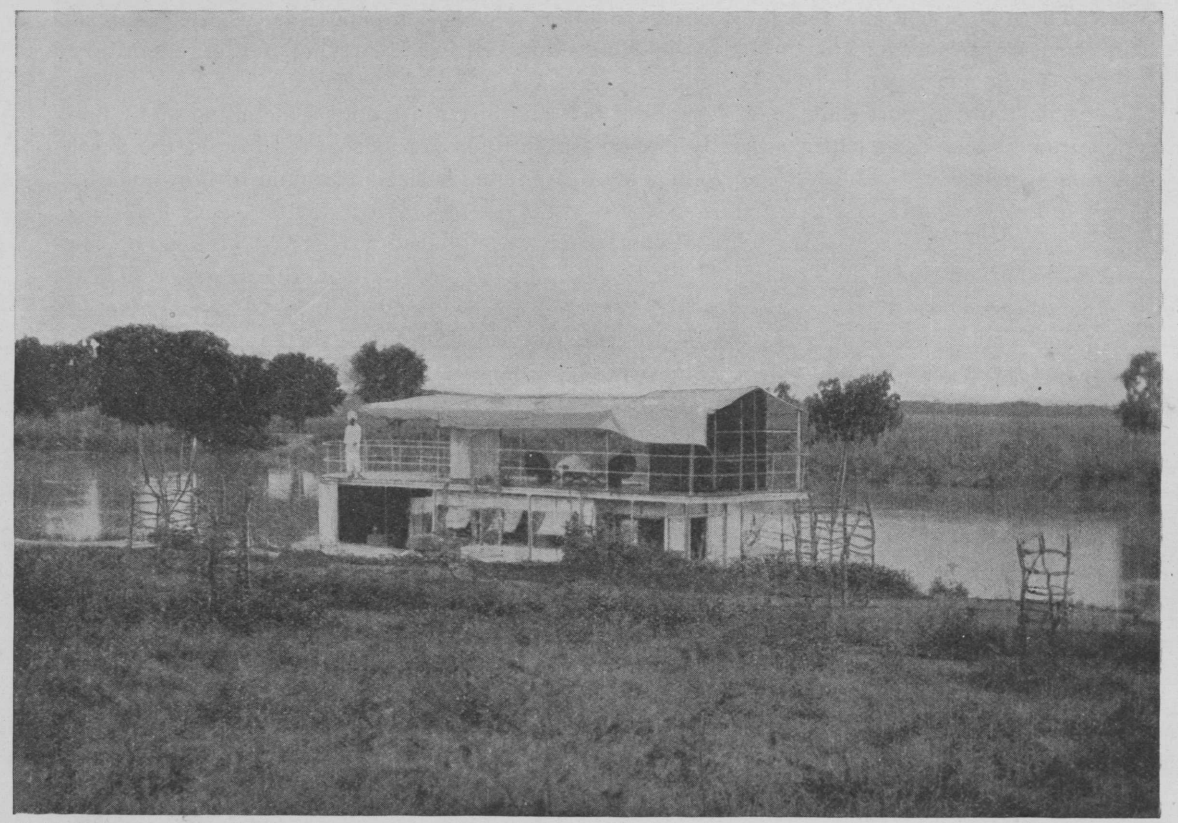
Fig. 2.—Gordon Memorial College, Khartoum

in which the Wellcome Research Laboratories are located



G. McRae

FIG. 32.—PART OF BACTERIOLOGICAL SECTION, FLOATING LABORATORY, LOOKING TOWARDS THE BOW



C. M. Wenyon

FIG. 1.—FLOATING LABORATORY AT WAU ON THE JUR RIVER
(Auxiliary to the Wellcome Research Laboratories, Khartoum)

PART I OF PROSPECTUS

THIRD REPORT

OF THE

WELLCOME RESEARCH LABORATORIES,

GORDON MEMORIAL COLLEGE, KHARTOUM

ANDREW BALFOUR, M.D., B.Sc., F.R.C.P. Edin., D.P.H. Camb., DIRECTOR

[Specimen of part of one of the 4 pages of CONTENTS of Third Report]

477 pages of text; 361 plates, illustrations and maps

Tabulated Summary of Illustrations

Coloured Plates	28
Reproductions of black and white drawings	51
Reproductions of Photographs	263
Maps and Plans	19
Total Number of Illustrations	361

Some Typical Examples of Plates, Illustrations and Maps

[*Specimen of one of the 27 pages of INDEX of Third Report*]

477 pages of text; 361 plates, illustrations and maps

Contributions by

Andrew Balfour, M.D., B.Sc., F.R.C.P. Edin., D.P.H. Camb., etc.

Director, Wellcome Research Laboratories, Khartoum

11 pages — **Introduction**

Issue of Laboratory Reports—The Third Report—Plan followed—Papers Contributed—Special Review—Sanitary Notes—The Chemical Work—Special Research on Gum Arabic—Entomological Work—Anthropological Work—Carnegie Research Fellows—Death of Dr. A. MacTier Pirrie—Compilation of his Report—The Floating Laboratory—Marine Floating Laboratory: a Suggestion—Report of Travelling Pathologist and Protozoologist—The Bacteriological Work—Notes on Research Work—Special Paper on Parasitic Worms—Appointment of Pathologist and Assistant Bacteriologist—Changes in the Staff—The Museum—Lack of Space—The Outlook—Special Grants—Foreign Help—The Therapeutic Garden—Recent Advances in Tropical Medicine—The International Sleeping Sickness Conference—Necessity of Progress—Acknowledgments—Note on Destructive Fire—Losses—Aid Rendered—Re-fitting—Acknowledgments.

8 pages, with illustrations — **Trypanosomiasis in the Anglo-Egyptian Sudan**

Use of Arsonates as Therapeutic Agents—Camel Trypanosomiasis: Morphology, *T. soudanense*—Cattle Trypanosomiasis of Kassala: Biting Flies, Symptoms, Post mortem appearances, Morphology, *T. cazalboui*—Trypanosomiasis of Mules: Two Types of Mule Disease, *T. pecaudi*, Value of Cultural Methods.

2 pages — **Hæmogregarine of the Jerboa**

Blood Counts—Experimental Work.

Hæmogregarine of Rhamphiophis Rubropunctatus

A Snake Parasite—Morphology—Free Forms.

1 page, illustrated — **Piroplasmosis in the Anglo-Egyptian Sudan**

Canine—Equine—Bovine—*P. bigeminum*—*P. mutans*.

21 pages, with numerous illustrations — **Spirochætosis of Sudanese Fowls**

Historical—The Disease in Imported Fowls—The Endemic Disease—Symptoms—Morphology of the Spirochætes—Staining Methods—The Leucocytes—The "After Phase"—Endoglobular bodies in the fresh blood—Feeding Experiments—Cultural Experiments—Inoculation Experiments—Nature of the "After Phase"—Observations of Von Prowazek—Illustrative Cases—The Disease in Geese—Conclusion.

Routine Work

List of Examinations Performed.

1 page — **Miscellaneous Notes**

Halteridia—Trypanosomes and Big Game—Blood parasite of the Khartoum toad (*Bufo regularis*)

33 pages, with numerous illustrations — **Sanitary Notes, Khartoum**

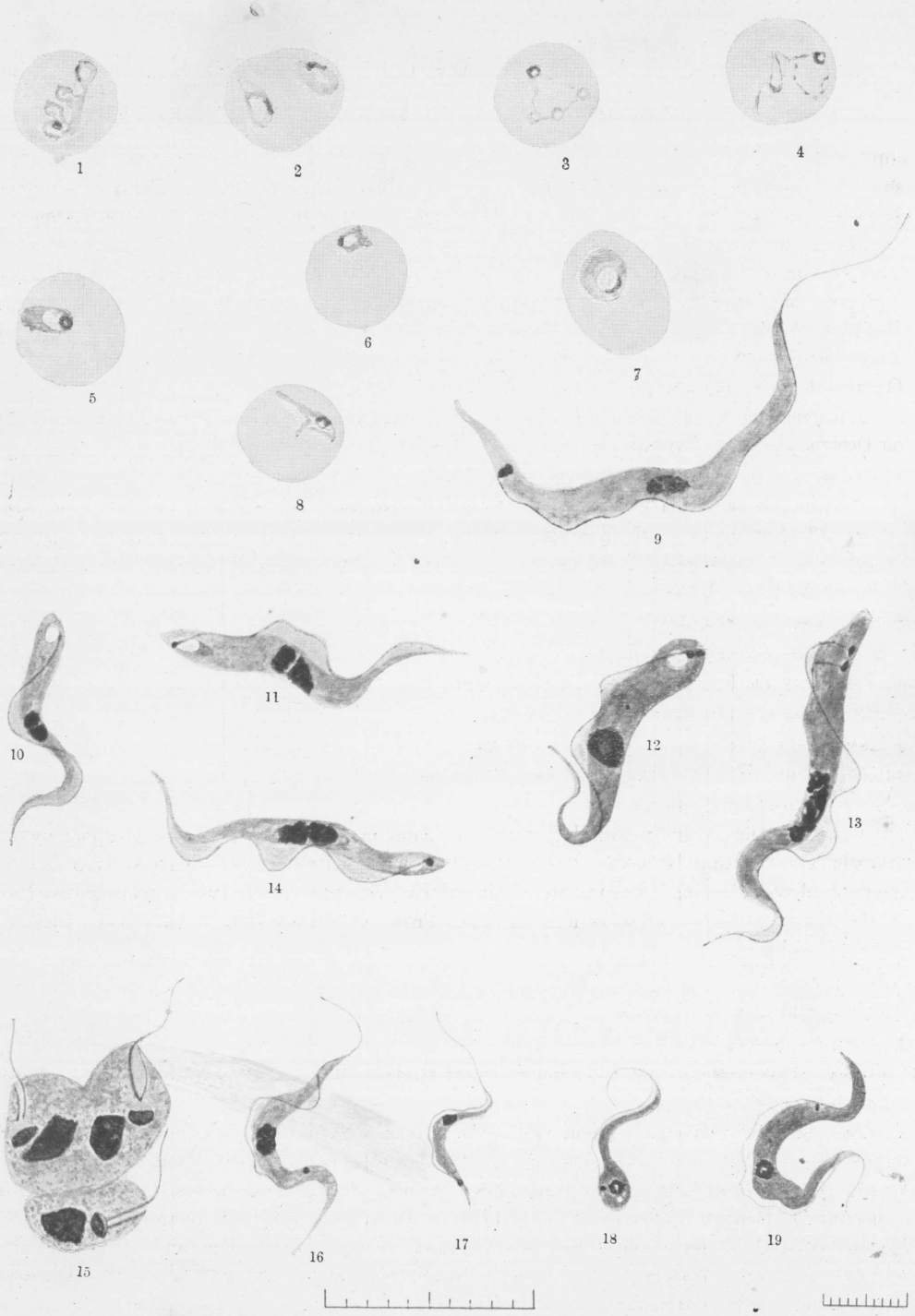
Historical—Site—Population—Meteorological Conditions—Mosquito Work—Clothing—Housing and House Construction—Dwelling-houses in the Tropics (McLean): Introduction, Site, Foundations, Walls, Roofs, Verandahs, Bath-rooms and Latrines, Servant's Quarters, Colours, General—Conservancy—Sewage Collection and Disposal: Advantages and Disadvantages of the New System—Waste Water Collection and Disposal—Refuse Collection and Disposal—Water Supply—Aërated Waters—Ice—Milk—Slaughter-house—Markets—Infectious Diseases—Disinfection—Vital Statistics—Infectious Diseases.

5 pages, illustrated with maps — **Sleeping Sickness and the Bahr-El-Ghazal Province**

Extracts from Captain Howard Ensor's Report to the Sudan Sleeping Sickness Commission (April, 1908).

Tsetse flies: Distribution, Habits of *Glossina palpalis*, Habits of *Glossina morsitans*, Food supply of *G. palpalis*, Conditions influencing the range of *G. palpalis*—The Existence, or otherwise, of Sleeping Sickness in the Bahr-El-Ghazal Province—The Probability, or otherwise, of Sleeping Sickness becoming prevalent in the Bahr-El-Ghazal Province—Preventive Measures.

PLATE X



C. M. WENYON

1–8. *Babesia avicularis*, n. sp.

1. Budding parasite
2. Pyriform parasites
3, 4. Amœboid forms
5, 6, 7. Ring forms of parasite
8. Amœboid form
9. *Trypanosoma avicularis*, n. sp.
10–14. Trypanosomes from blood of camels returning from the Bahr-El-Ghazal Province. Probably *Trypanosoma pecaudi*
15. Multiplication form of *T. lewisi* in blood of rat artificially infected. Shows very well the chromatic and achromatic part of the micronucleus, which appears to be enveloped by a delicate membrane, from the surface of which springs the flagellum
16. *Trypanosoma megadermæ*, n. sp., from the bat *Megaderma frons*
17–19. Various forms of *Trypanosoma acomys*, n. sp., of the spiny mouse
17. Prevailing type of trypanosome
18. Much altered form seen on several occasions
19. Large form only occasionally met with

[*Specimen Illustration from "Sanitary Notes," by the Director*]

THIRD REPORT—WELLCOME RESEARCH LABORATORIES, KHARTOUM

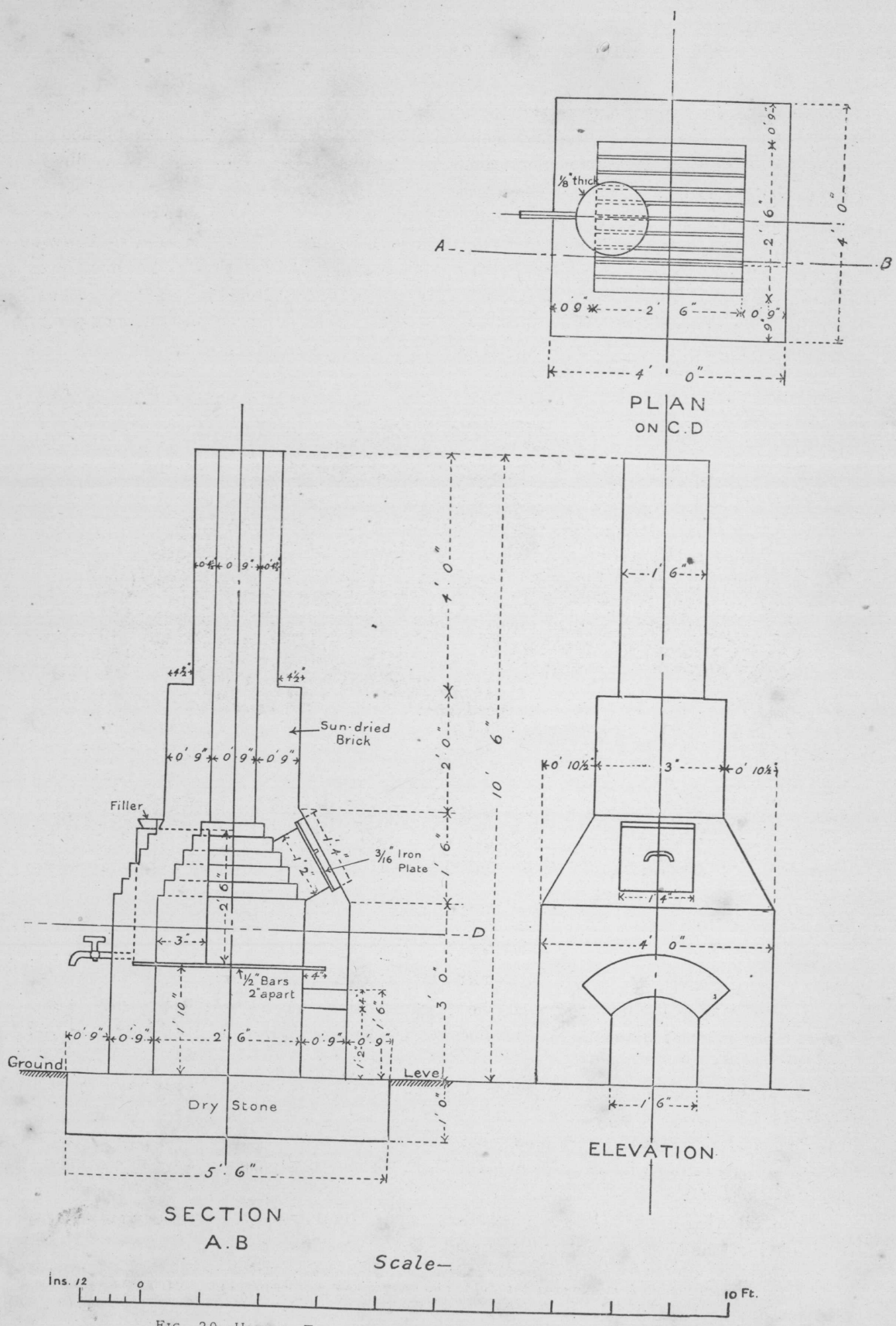


FIG. 20.—USEFUL TYPE OF INCINERATOR, MODIFIED AFTER MORRIS

(For further details, see pages 8 and 9 of this Prospectus)

Spirochætosis of Sudanese Fowls

By the Director

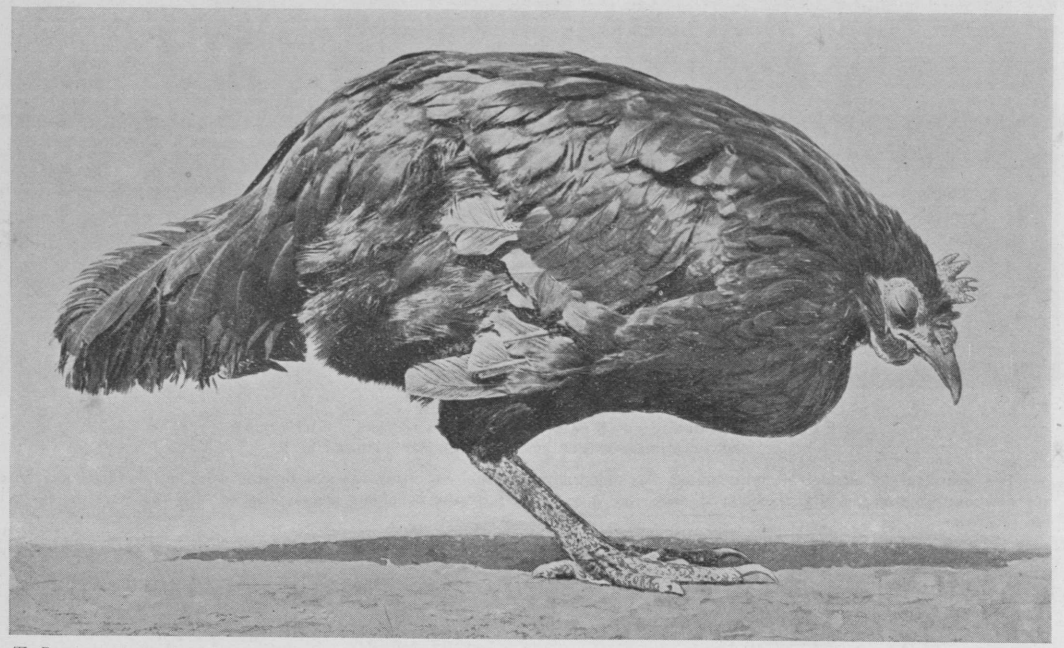
[*Specimen of Text and Illustrations*]

Historical

It will be convenient in the first instance briefly to review the work accomplished on what was originally termed Fowl Septicæmia, or Brazilian Septicæmia of Fowls, an illness due to the presence of *Spirillum* or *Spirochæta gallinarum*[1] in the blood of these birds.

The disease in Brazil

1. Marchoux and Salimbeni,[2] working in Brazil, were the first to describe the condition. They noted that special varieties of fowls were more apt to be attacked, and were more severely attacked, than the common species. They distinguished an acute and chronic form of the disease, the former characterised by wasting, somnolence, diarrhœa, ruffled feathers, anæmia, as evidenced by pallor of the comb, weakness, so that infected birds cannot perch, and towards the end are found lying helpless with their heads on the ground.



W Beam

Fig. 4.—Black Leghorn Hen suffering from Acute Spirochætosis

Sanitary Notes

By the Director

[*Specimen of Text*]

If well watched and controlled, he [the native inspector] does admirably, being remarkably quick at detecting the smallest larvæ; but he cannot be always trusted and must be supervised.

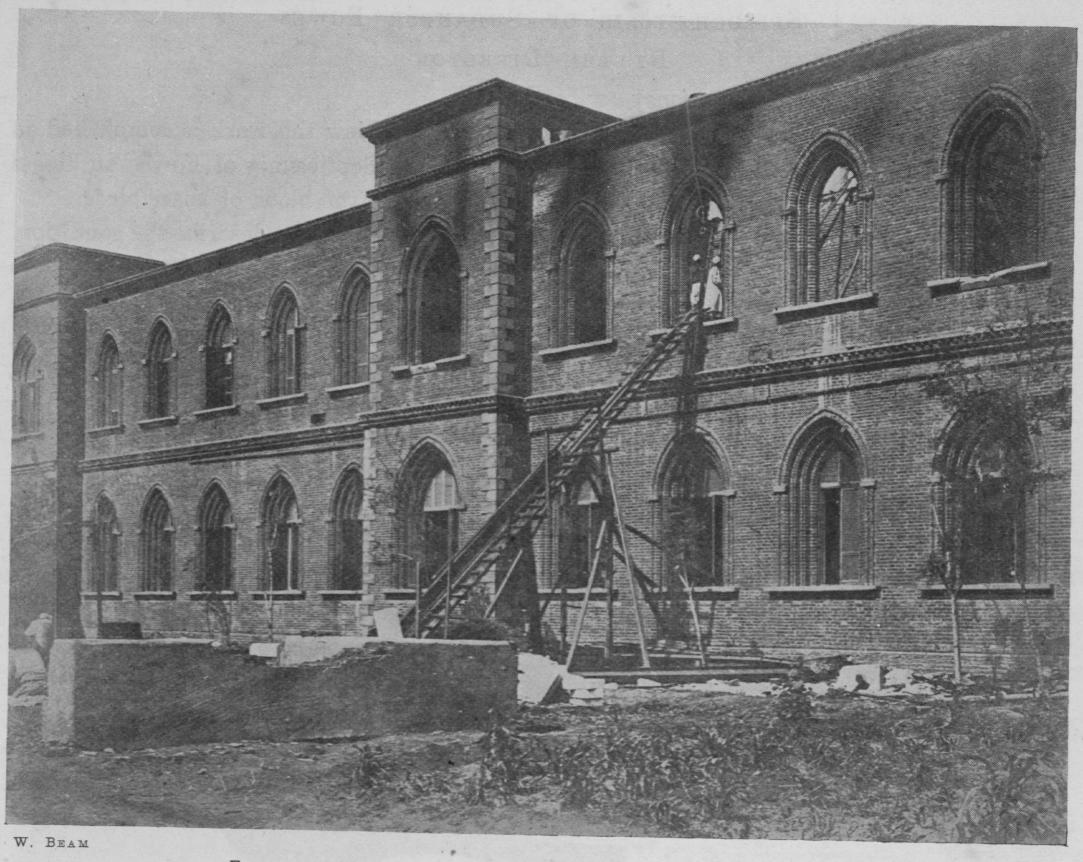
Derris as a larvicide

A few experiments have been made in order to test the value of *Derris uliginosa* as a larvicide. In carrying out these I had the assistance of Mr. King.

The roots of the plant were kindly supplied by Dr. Power, of the Wellcome Chemical Research Laboratories in London, but efforts to obtain other species of the plants from Kew Gardens failed.

The following are the details of the tests made. In all cases the water employed was that in which the larvæ were found, and controls were instituted:—

1. November 4th, 1906. Three half-grown larvæ of *Culex fatigans* placed at 1 p.m. in an emulsion consisting of 1 c.c. supernatant fluid from an alcoholic extract of Derris root (27 gm. in 50 c.c.) in 150 c.c. of water. The emulsion smelt strongly of the drug and was of an opaque colour.



W. Beam

Exterior Wellcome Research Laboratories, Khartoum
showing damage caused by the fire of May 11th, 1908.

The destruction of equipment and materials was practically complete, and many valuable records were lost. The Laboratories are now entirely refitted and re-equipped with the very latest scientific apparatus and appliances, and the work is again in full progress.

Contributions by Mr. W. H. McLean, Drs. R. G. Archibald, S. Lyle Cummins and L. Bousfield

5 pages, illustrated with plans

Dwelling-Houses in the Tropics. By W. H. McLean, A.G.T.C., assoc. m. inst. c.e., Lecturer on Civil Engineering, Gordon College, Khartoum, Municipal Engineer, Khartoum

Introduction—Site—Foundation—Walls—Roofs—Verandahs—Bath-room and latrine—Servants' quarters—Colours—General.

2 pages

Sleeping Sickness in Uganda. By R. G. Archibald, M.B., R.A.M.C., etc., Pathologist and Asst. Bacteriologist

Glossina palpalis in Uganda—Clothing—*Glossina palpalis* only one factor—Planting of cleared areas—Medicinal treatment—Serum therapy.

7 pages, illustrated

Kala-azar in the Anglo-Egyptian Sudan. By S. Lyle Cummins, M.B., B.Ch., B.A.O., R.U.I., R.A.M.C.

Historical—Notes on Cases—A Disease Centre—Distribution of Kala-azar in the Sudan—Rarity of the Disease in Egypt—House Infection—Diagnosis—Differential Diagnosis—Cases Detailed.

13 pages, illustrated

Observations on Kala-azar in Kassala Province. By L. Bousfield, M.A., M.D., M.R.C.S., L.R.C.P., R.A.M.C.

Number of Cases—Bed-bugs in Kassala Province—Historical Notes—Tables of Cases—Types of Parasites Observed—House Infection—Is Abyssinia to Blame?—Map of Kassala Province—Analysis of Cases—Death Rates—Duration of Illness—Clinical Features—Diagnosis—Differential Diagnosis—Treatment—Cases Detailed.

KALA-AZAR IN THE ANGLO-EGYPTIAN SUDAN

BY

S. LYLE CUMMINS, M.B., B.Ch., B.A.O., R.U.I., R.A.M.C.

[*Specimen of Text*]

Historical

Kala-azar has been known to exist in North Africa since Laveran described a case from Tunis[1] in 1904. In the same year Dr. Sheffield Neave[2] proved its existence in the Anglo-Egyptian Sudan, reporting the discovery of the Leishman-Donovan body in the spleen of a Sudanese boy, under treatment in Omdurman Hospital.

In August, 1904, Dr. L. Phillips[3] called attention to certain cases observed in Kasr-el-Ainey Hospital, which he considered to be kala-azar. Two of them had contracted their illness in Arabia, while two would appear to have acquired it in Egypt.

In 1906, Captain R. B. Black reported a case of splenomegaly with continued fever, from a village near the River Dinder; stating that it seemed to him to resemble kala-azar. Being without microscopic appliances of any kind, he was unable to settle the diagnosis. This case gains importance owing to the subsequent discovery of the disease in this neighbourhood.

First case of present series

The series of cases which are dealt with in the present article began with the post mortem discovery of the Leishman-Donovan body in the spleen of an Egyptian soldier, dying of a disease, diagnosed "malaria," in Abbassieh Hospital. Colonel Leishman, to whom I submitted my specimens, to put the matter beyond doubt, very kindly examined them and confirmed my observation.

OBSERVATIONS ON KALA-AZAR IN KASSALA PROVINCE

BY

L. BOUSFIELD, M.A., M.D. (CANTAB.), M.R.C.P., L.R.C.P. (LOND.), R.A.M.C

[*Section of Specimen Table*]

TABLE A. KALA-AZAR. (Parasite Found)

	Case I	Case II	Case III	Case IV
AGE AND SEX ...	♂ 23	♂ 25	♂ 25	♂ 26
NATIONALITY ...	Abyssinian	Egyptian	Abyssinian	Arab, Maria Tribe
DURATION OF ILLNESS	2 years, Autumn, '05 Died Nov. 6th, '07	3½ months, Oct. '07 Died Feb. 4th, '08	2½ years, Autumn, '05 Died Dec. 22nd, '07	8 months, Aug., '07 Died Mar. 24th, '08
VILLAGES AND TOWNS WHERE ILL (Name underlined where first ill)	Addayagi (Erithrea), Kassala, Golsa, Kassala, Debelweit, Kassala	Kassala	Azzein (Erithrea), Karkabel, Glodet, Kassala	Mafaza
TYPE OF FEVER ...	Temperature usually sub-normal. Occasional rises to 101° to 105° for 1 to 2 days	High fever 4 weeks, then 98° to 99° for 5 weeks — then higher fever, seldom coming to normal	Intermittent fever, followed by normal	High intermittent fever
TYPE OF PARASITES (Splenic Puncture)	Considerable numbers, mainly free. Long oval forms mainly	Few well-developed parasites	Well developed, none found in cells	Extremely few found. Pigment collection
PERIPHERAL BLOOD...	No malaria. No Leucocytosis. No parasites in white cells	No malaria. Leucopænia. No parasites in white cells	No malaria, Leucopænia, almost all mononuclears	No malaria. Leucopænia
LIVER	Not enlarged, apparently reduced in size	Enlarged. Two fingers' breadth below costal margin	Not enlarged	Enlarged 1½ inches below costal margin
SPLEEN	1 inch below umbilicus	1 inch below costal margin	1 inch below umbilicus. Tender	2 inches below costal margin
URINE...	Albumen Bile absent	Albumen absent Bile absent	Albumen trace Bile	Albumen Bile

[Specimen Illustrations from "Sanitary Notes," by the Director]

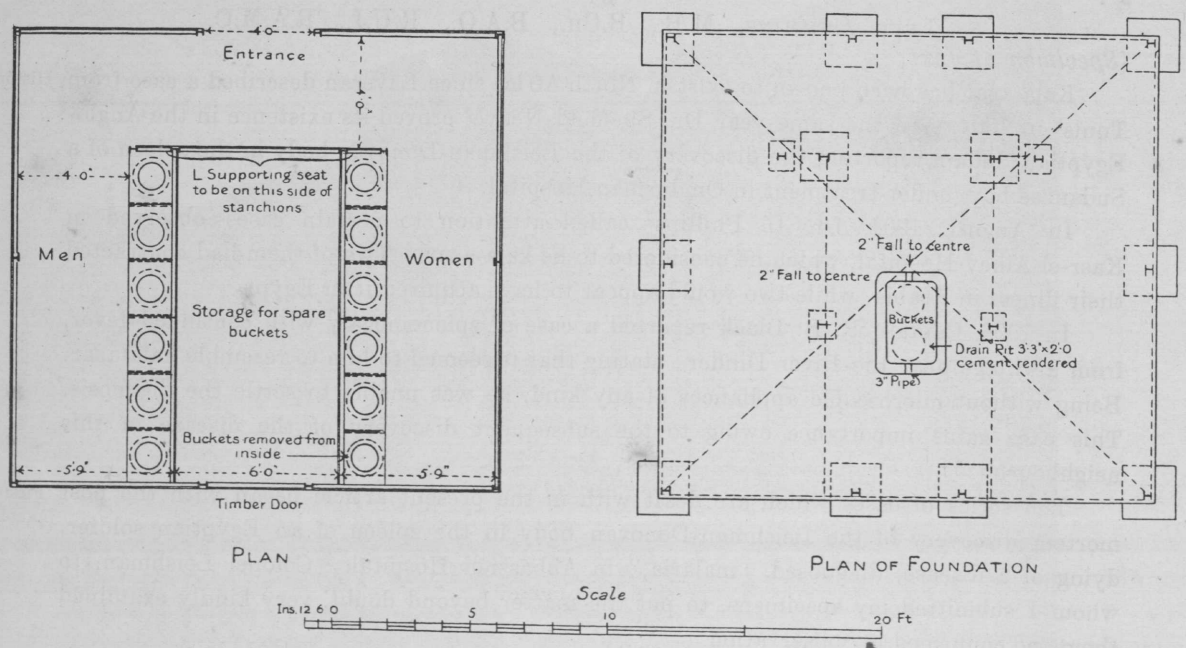


FIG. 21.—ELEVATION, SECTION AND PLANS OF PUBLIC LATRINE, KHARTOUM

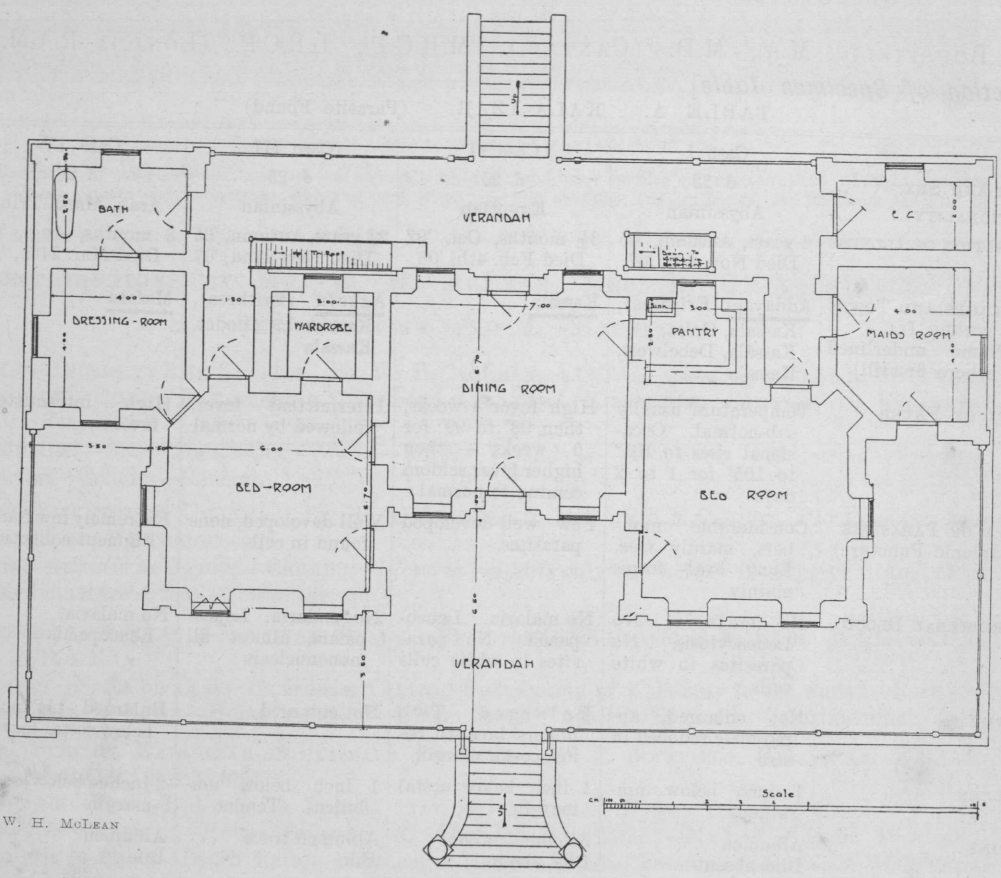


FIG. 14.—PLAN FOR DWELLING-HOUSES IN THE TROPICS

[Specimen of Maps]

THIRD REPORT—WELLCOME RESEARCH LABORATORIES, KHARTOUM

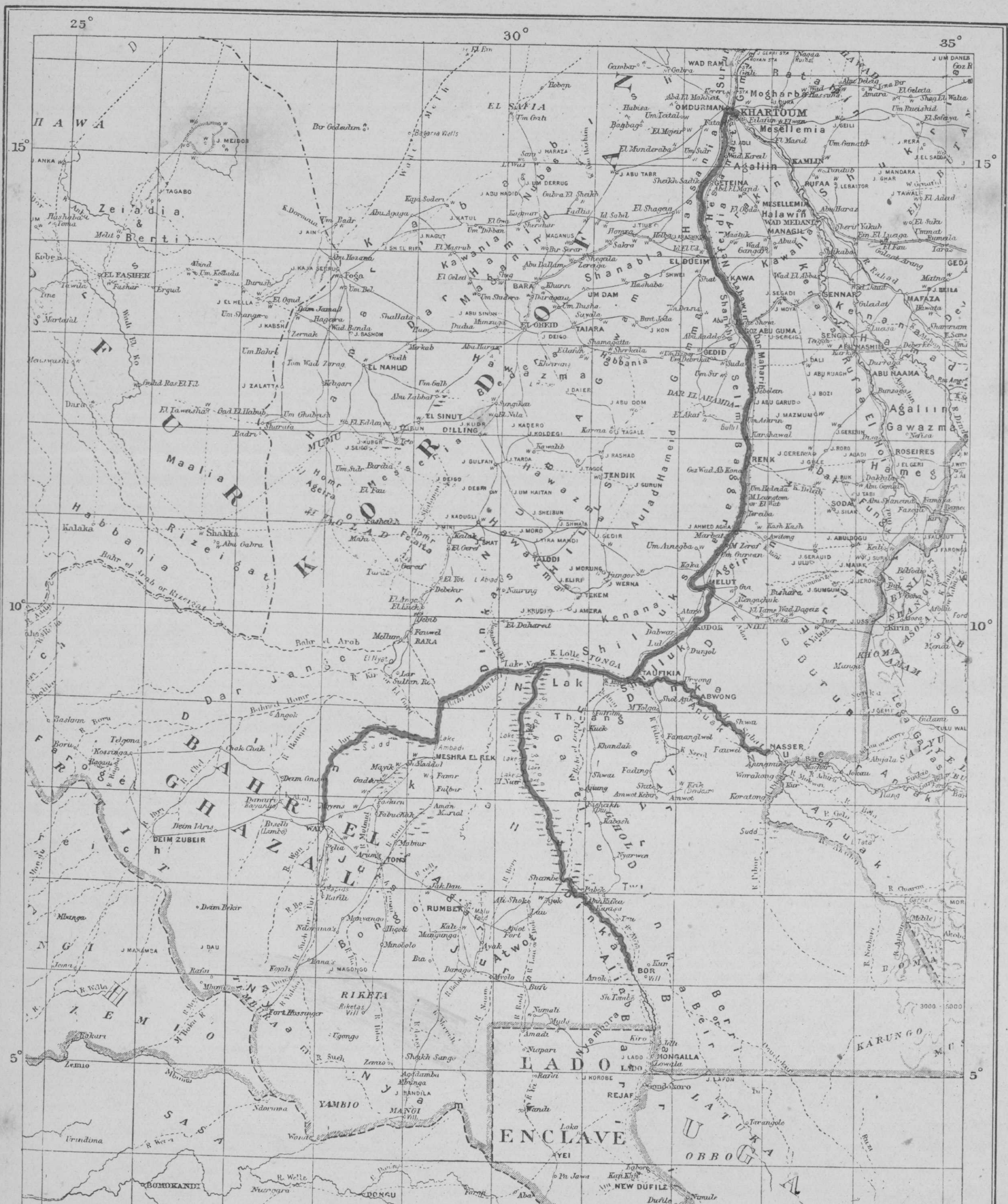
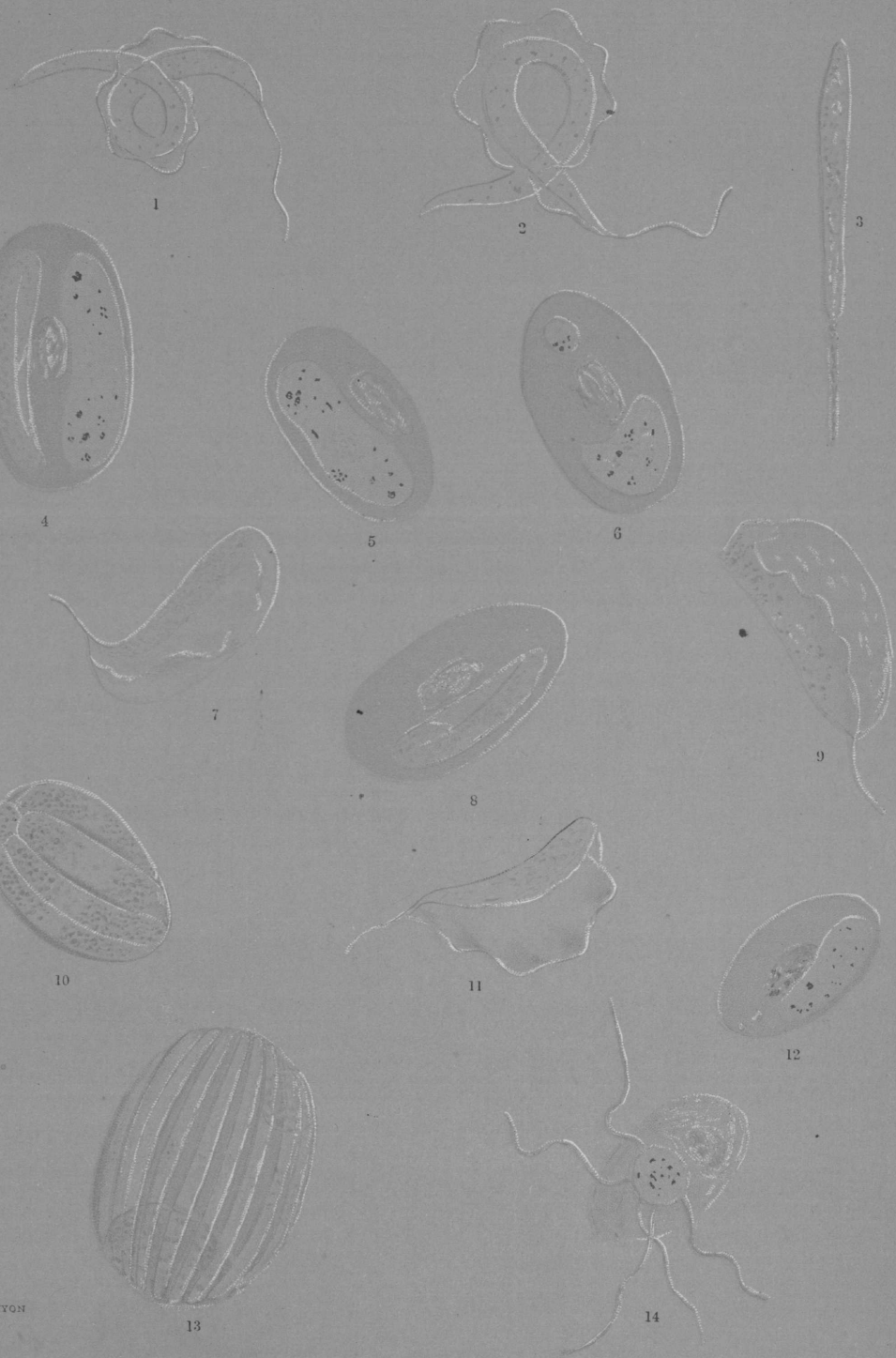


FIG. 28.—ROUTE TAKEN BY TRAVELLING PATHOLOGIST AND PROTOZOOLOGIST IN THE FLOATING LABORATORY, 1907-8
ROUTE INDICATED IN RED

[*Specimen Illustration*]

THIRD REPORT—WELLCOME RESEARCH LABORATORIES, KHARTOUM

PLATE XV



C. M. WENYON

DRAWINGS FROM LIFE OF VARIOUS PARASITES

1-6, 8. FROM BLOOD OF SPITTING COBRA (*Naja nigricollis*)

2. *Trypanosoma najæ*, n. sp. The characteristic spiral position of body is well shown
3. Hæmogregarine free in plasma leaving a trail of granules behind it as it progresses
4. Hæmogregarine and *Hæmocystidium* in same cell *Hæmocystidium najæ*, n. sp., adult gametocyte
6. Young forms of *Hæmocystidium* in red cell
8. Hæmogregarine in red cell

7, 9, 11. *Trypanosoma mabuiæ*, n. sp., OF *Mabuia quinquetæniata*

10, 13. CYSTS FROM LIVER OF *Mabuia quinquetæniata*

10. Result of schizogony of *Hæmogregarina gracilis*, n. sp.—macromerozoites
13. Schizogony into micromerozoites

12, 14. *Hæmoproteus agamæ*, n. sp.

12. Maturation of the female gametocyte
14. Formation of microgametes from male gametocyte

Report of Travelling Pathologist and Protozoologist of the Wellcome Research Laboratories

BY

C. M. Wenyon, M.B., B.S., B.Sc.

Protozoologist to the London School of Tropical Medicine

49 pages, with numerous illustrations, including valuable coloured plates

Introduction: The Floating Laboratory—Plan of Work—Details of Expedition—Return Journey—Acknowledgments.

Human Conditions—Dysentery: Work on *E. histolytica* and *E. coli;* Stages in the Development of *E. coli*—Malaria—Leprosy—Mycetoma—Ainhum—Prevalence of Syphilis—Remarkable Case of Eosinophilia—Dracontiasis: Technique employed in studying Embryos, Morphology of Embryos, Experiments with Cyclops.

Trypanosomiasis in Domestic Animals—Camels: *T. pecaudi* probably a Camel Trypanosome—Donkeys and Mules: Trypanosome concerned probably *T. pecaudi*, Tsetse Flies, *T. nanum*, of Cattle, Form with free Flagellum, Short Trypanosome of Mules probably *T. nanum*, *T. nanum* a distinct species—Treatment of Trypanosomiasis: Chromo-therapy, by 'Soamin' Trypanosomes (new species)—*T. numidæ*, *T. mabuiæ*, *T. varani*, *T. chamæleonis*, *T. najæ*, *T. avicularis*, *T. acomys*, *T. megadermæ*, *T. lewisi*—Trypanosomes in Fish and Toads.

Flagellates in Biting Flies—Tabanidæ: *Herpetomonas* in Seroot Flies, Rosettes of Herpetomonas—*Myzomyia nili*—*Glossina palpalis.*

Plasmodia—*Plasmodium mabuiæ*, n. sp.: in a Lizard, Morphology of Parasite.

Hæmoproteus: *Hæmoproteus agamæ*, n. sp.: in a Lizard, Appearances in the Fresh Blood, Gametocytes, Schizonts.

Halteridium: in Various Species of Birds.

Hæmocystidium—*Hæmcystidium najæ*, n. sp.: in Spitting-snakes, Appearance in Fresh and Stained Blood, no Schizonts Observed, Changes in the Infected Corpuscles.

Babesia—*Babesia avicularis*, n. sp.: Piroplasm of the Striped Mouse, Morphology of the Parasite.

Hæmogregarina—*Hæmogregarina gracilis*, n. sp.: Encysted and Free Forms, Schizogony Cycle in the Liver, Formation of Merozoites, Comparison with Hæmogregarine of Jerboa, An Asexual and a Sexual Cycle—Hæmogregarines in Snakes, Tortoise, Crocodile, Toads and Fresh-water Fish.

Leucocytozoa—*Leucocytozoon* of Guinea Fowl: Criticism of Recent Work, Appearances in the Fresh Blood, Movements of the Parasite, Escape of Parasite from Host-cell, Structure and Nature of the Spindle Bodies, The Host-cell, Gametocytes (Male and Female), No Asexual Multiplication Forms, Appearances in the Stained Blood, Nucleus of the Host-cell, Schaudinn's Erroneous Conclusions—*Leucocytozoon* in a Partridge.

Helminthes—Filariasis in Donkey, Human Filariasis—Nematodes in Mosquitoes—Bibliography.

[*Specimen of Text of Dr. Wenyon's Report*]

Introduction

The Floating Laboratory

The idea of a floating laboratory which could be moved up and down the Nile and its tributaries having been conceived by the Director of the Wellcome Research Laboratories, Mr. Wellcome, who had already done so much for scientific investigation in the Sudan, fitted out with every requirement and convenience the two-decked barge built by the Sudan Government for this purpose. The large laboratory, with its two long benches, water taps and sinks, with water supply from a carbon filter on the upper deck, ample cupboard room for bottles and glass-ware, the incubators and ovens, the balances and centrifuge, and all other equipment, reminded one more of a laboratory at home than the accommodation one would expect to find on one of the upper tributaries of the Nile in some remote corner of the Sudan. Such a mode of conducting investigation is peculiarly suited to the upper reaches of the Nile

[*Specimen of Text of Dr. Wenyon's Report*]

Dracontiasis

Guinea Worm

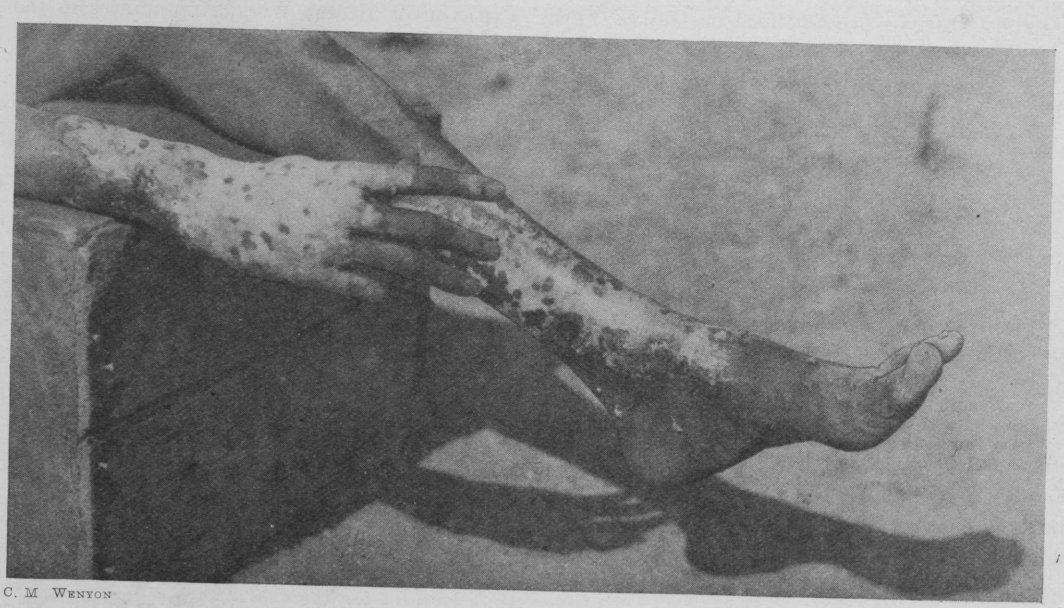
Plate IX., figs. 1–7

Guinea worm infection common at Wau

At Wau, in the Bahr-El-Ghazal Province, cases of guinea worm infection were common, and, owing to the kindness of Capt. M. G. Dill, then in charge of the Military Hospital, many cases of this disease were at my disposal, and I was able to conduct some experiments which confirm the results obtained by Dr. Leiper. Further, owing to a new method of fixation and staining, I was able to make out some new points in the anatomy of the guinea worm embryos. For the fixation of the embryos the following method was adopted. The active embryos from a guinea worm were placed in a test-tube containing about 1 c.c. of normal salt solution. The tube was then nearly filled with saturated solution of corrosive sublimate. This killed the embryos and fixed them in a few minutes. The contents of the tube were then centrifugalised for about a minute and the supernatant fluid removed. Distilled water was added, the tube gently shaken and again centrifugalised. By repeating this process four or five times nearly all the sublimate was removed. The tube was then filled with 70 per cent. alcohol to which a few drops of iodine solution were added. The tube was left standing upright, with the result that the embryos settled to the bottom. After five or six hours, the fluid was removed by means of a pipette and fresh 70 per cent. alcohol and iodine added. After this had acted for a similar period it was removed and 70 per cent. alcohol alone added. To this was added one drop of Delafield's hæmatoxylin and the tube put aside. By taking out a little of the sediment from time to time the progress of the staining could be watched. The staining of the embryos is slow, owing to the thick cuticle which covers them. It first commences in the region of the anus and of the gland-like organ which opens near the anterior end of the body. After about a week the whole embryo is stained, apparently by the stain gaining entrance by the natural apertures of the body. If

Technique employed in studying embryos

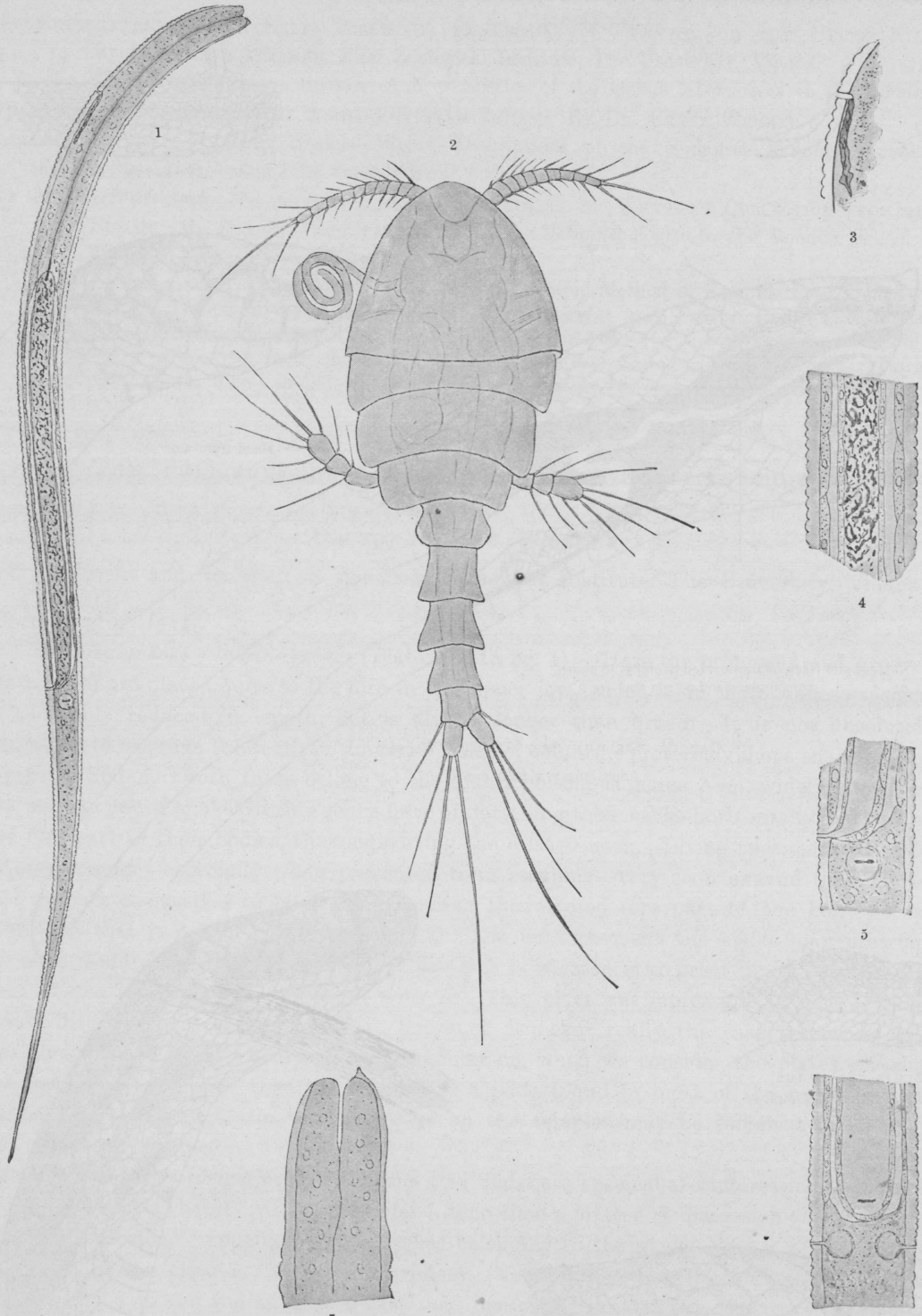
[*Specimen Illustration in Dr. Wenyon's Report*]



C. M. Wenyon

Fig. 36.—Leprosy Anæsthetic Patches

[*Specimen Illustration in Dr. Wenyon's Report*]

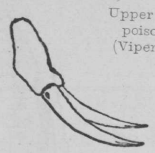


1. × *approx.* 300 *diam.*; 2. × *approx.* 85 *diam.*; 3–7. × *approx.* 1000 *diam.*

ANATOMY OF GUINEA WORM EMBRYO

1. General anatomy of guinea worm embryo
2. Cyclops showing entry of a guinea worm embryo on left
3. Organ opening on ventral surface near anterior end of body. Probably developing excretory system
4. View of middle region of body showing body and gut-wall and space between these
5. Side view at region of anus
6. Ventral view at region of anus
7. Anterior end of body

[*Specimen Illustrations in Dr. Franz Werner's Article*]



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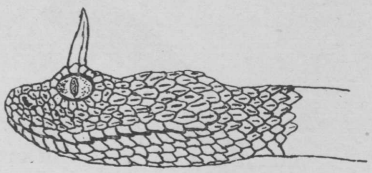
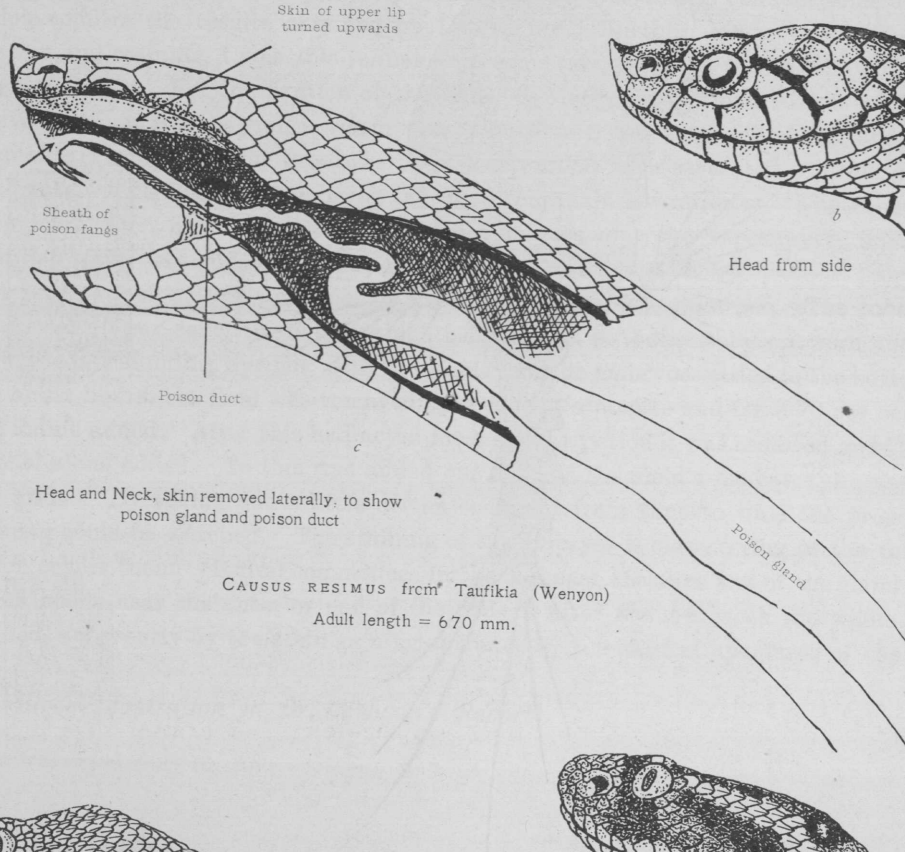


CERASTES CORNUTUS
Adult length = 720 mm.



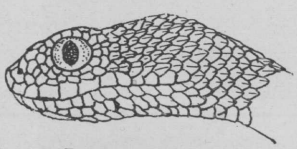
c

Head and Neck, skin removed laterally, to show
poison gland and poison duct

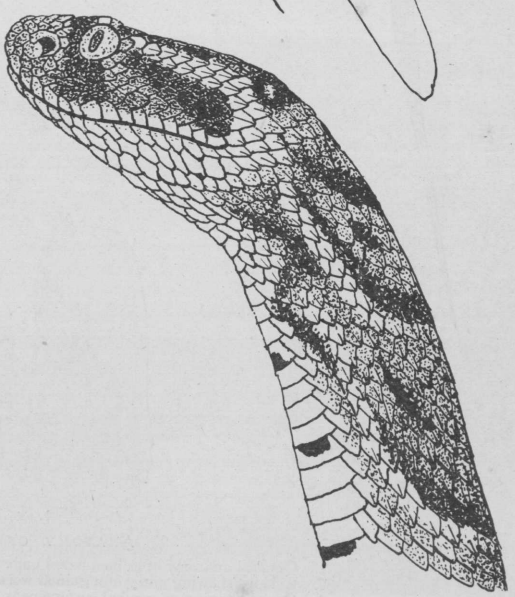
b

Head from side

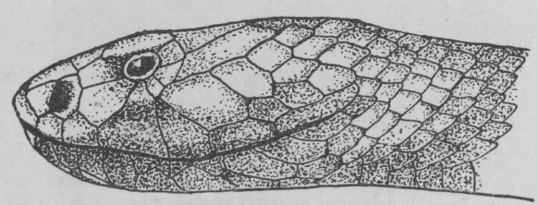
CAUSUS RESIMUS from Taufikia (Wenyon)
Adult length = 670 mm.



ECHIS CARINATUS
Adult length = 720 mm.



BITIS ARIETANS
Head from above and from side
Adult length = 1350 mm.



NAJA NIGRICOLLIS
Head, seen from side, from above and below
Adult length = 2400 mm.

Contributions by Drs. F. Werner and R. T. Leiper

The Poisonous Snakes of the Anglo-Egyptian Sudan

by

Doctor Franz Werner

Privatdocent and Assistant at the First Zoological Institute, The University, Vienna

[*Specimen of Text*]

Proteroglyphous colubrine snakes (Plate XVII., fig. 1). Here the prolonged and grooved teeth (two) are placed quite to the fore in the upper jaw, which is, in the Sudanese species, considerably reduced in length, but is always longer than broad. It is not absolutely necessary to examine the teeth in the two species of colubrine proteroglyphous snakes of the Egyptian Sudan. Both these belong to the highly poisonous genus *Naja*, widely known by the curious power snakes of this genus have of flattening their necks horizontally and raising the fore part of their bodies, thus supporting the dilated neck. Living specimens irritated in any manner—especially when prevented from escaping—very soon expand their hoods, and prepare themselves to bite, often bending the erected fore part of the body so far backward that it nearly rests on the back. The next moment the snake may protrude its head rapidly, and the energy with which this is effected is so great that a considerable part of the body may be projected with it. This gives an impression as if the snake would directly jump at the offender, but such is never really the case. How a *Naja* can be identified when killed will be seen later on, when we consider the plates covering the head. We shall see that the absence of a plate found in most of the non-venomous snakes and the configuration of the plates on the temples may be sufficient to identify this snake at a glance.

Spitting snakes

But the Najas (or at least one of the two Sudanese species) are interesting by reason of another curious habit. It has been for a long time a matter of discussion as to whether the often described "spitting" of the snakes belonging to the genus *Naja* is a fact or only a product of the phantasy of some travellers. Very rarely, the spitting seems to have been observed in the Indian *Naja tripudians*,[1] one of the best known snakes of our globe; and I do not remember that this habit has been recorded in connection with the other Asiatic species. Such reports as regards African Najas are, however, rather frequent, especially from West and South Africa, concerning in Western Africa probably *Naja nigricollis*, in South Africa the indigenous *Naja flava*, or the same species.

An Account of some Helminthes contained in Dr. C. M. Wenyon's Collection from the Sudan

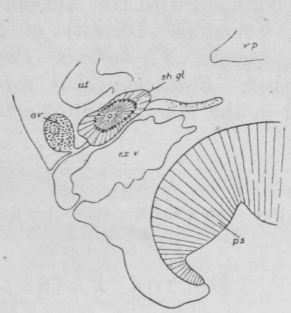
BY

Robert T. Leiper, M.B., F.Z.S.,

Helminthologist to the London School of Tropical Medicine

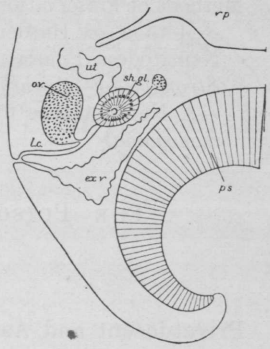
[*Specimen of Text and Illustrations*]

The collection of parasitic worms made by Dr. Wenyon during his stay in the southern parts of the Sudan was handed to me in most excellently preserved condition for further investigation and description. The number of individual species obtained by him is considerable. Some of them are known to science only in briefest outline; others are new, and in some instances present highly novel characteristics. An account of the Nematodes and Trematodes alone is given in this paper, which deals with them from the systematic standpoint rather than from that of species anatomy, to which the material so admirably lends itself. These restrictions have been imposed by the limited time available for the examination of the material and the amount of helminthological literature involved in the identification of forms but distantly related to one another.



Reduced

Fig. 45.—Longitudinal section of *G. gregarius*, showing disposition of female reproductive organs and excretory vesicle,
v. p. = ventral pouch
ex. v. = excretory vesicle
sh. gl. = shell gland



Reduced

Fig. 46.—Longitudinal section of *G. wenyoni*, showing disposition of female reproductive system and excretory vesicle.
p. s. = posterior sucker
ov. = ovary
ut. = uterus

The hosts of the ten varieties of Nematoda were Mule, Bat, Guinea fowl, Snake, Toad, and Garmot fish. The Trematoda were of four kinds, and were obtained from Waterbuck. Sheep and Marabou Stork. The Cestodes, contained in sixteen tubes, remain unexamined.

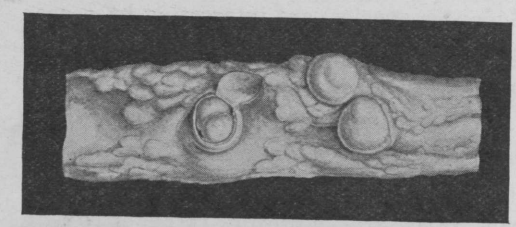
Preparatory Methods

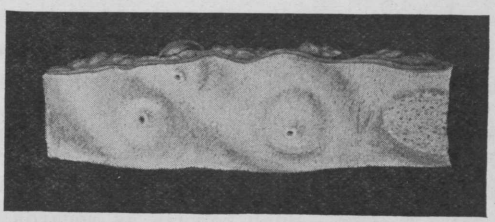
Methods of preservation

The great bulk of the helminthological material from abroad usually reaches England in a very poor state of preservation, owing to the use, by collectors, of methods that are quite inapplicable to these particular parasites, however excellent they may have proved themselves for general histological purposes.

It may not be out of place, therefore, to detail briefly the methods used, and the further treatment adopted, in the investigation of the helminthes that form the subject of this paper.

[*Specimen—much reduced*]

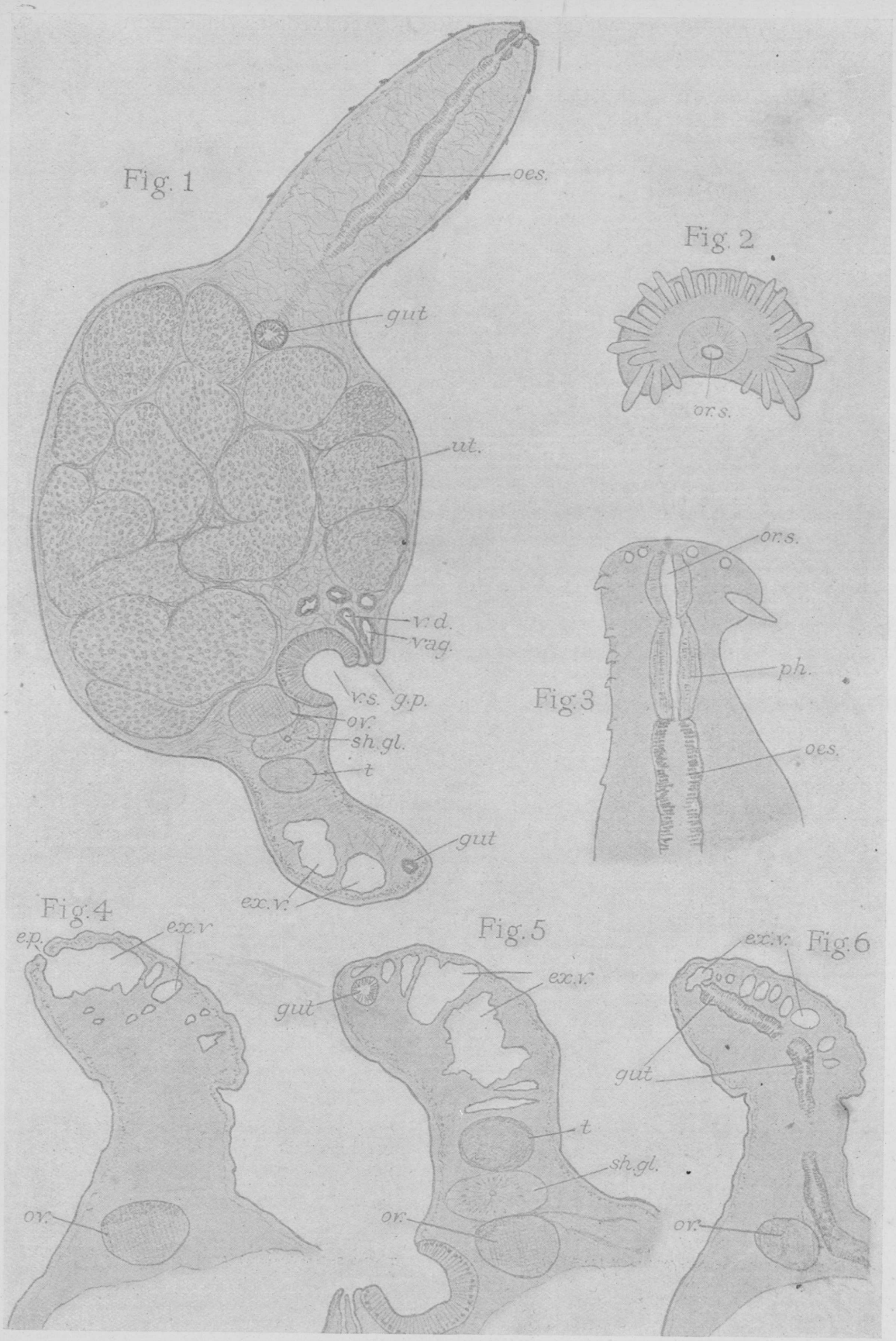




Balfouria monogama—Intestine of Marabou Stork, showing cysts of *Balfouria monogama*, n.g., n.sp.

1. Peritoneal surface, the cyst on the left side has been dissected to expose the contained worms

2 Mucous surface of gut showing pores leading into the tumours



R. T. LEIPER

ANATOMY OF BALFOURIA MONOGAMA

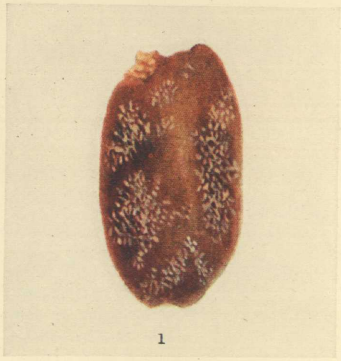
1. Median longit. section. Camera Lucida drawing
2. View of Mouth and surrounding Spines
3. Longit. sect. of anterior end of body showing pharynx and œsophagus
4, 5, 6. Longit. sect. appendicular portion. Camera Lucida drawings
4. Shows excretory vesicle and pore, and 5, the general disposition, of the organs in this region
6. The exit of the gut-branch into the excretory vesicle

e.p. = excretory pore ex.v. = excretory vesicle g.p. = genital pore oes. = œsophagus or.s. = oral sucker
ov. = ovary ph. = pharynx sh.gl. = shell gland t. = testis vag. = vagina v.s. = ventral sucker

[*Specimen of Coloured Plates*]

THIRD REPORT—WELLCOME RESEARCH LABORATORIES, KHARTOUM

PLATE XXVIII



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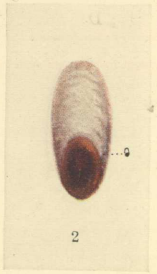

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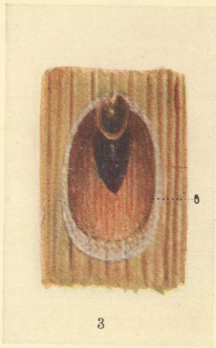

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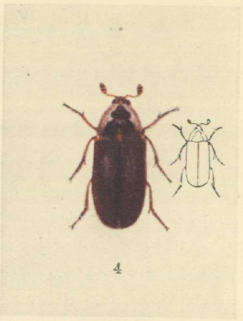

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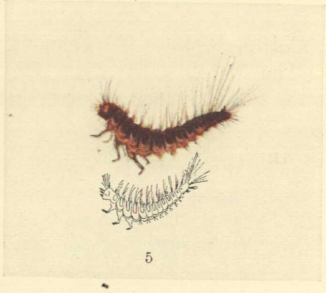

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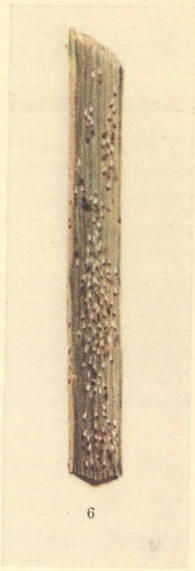

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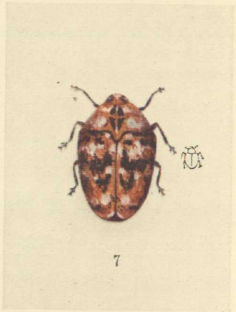

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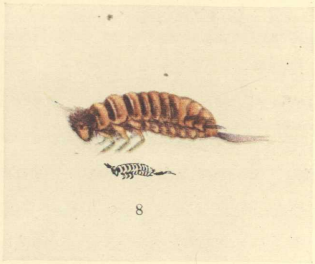

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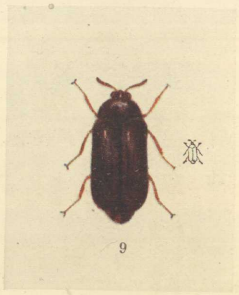

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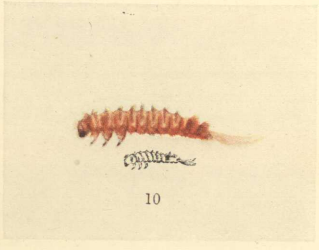

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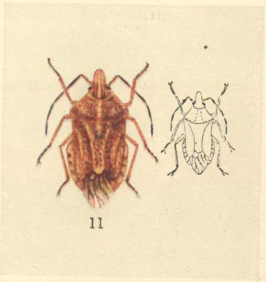


11

C. M. BEARD

1. The Date Scale, *Parlatoria (Websteriella) blanchardi*, Sarg. Tozz. on date
2. The Date Scale ♂ puparium
3. The Date Scale ♀ puparium
4. *Dermestes vulpinus*, adult
5. *Dermestes vulpinus*, larva
6. The Date Scale on date palm leaf
7. *Anthrenus vorax*, adult
8. *Anthrenus vorax*, larva. (This specimen had unfortunately been denuded of hair)
9. *Attogenus*, sp., adult
10. *Attogenus*, sp., larva
11. *Agonoscelus puberula*, Stal.

Illustrations are natural size unless otherwise indicated

Report on Economic Entomology

BY

Harold H. King

Economic Entomologist to the Wellcome Research Laboratories
Member of the Association of Economic Biologists

48 pages, with numerous illustrations, including many fine coloured plates

[Specimen of Text of Mr. King's Report on Economic Entomology]

Introduction

Itinerary

The first six months, following my arrival in Khartoum on 11th April, 1906, were occupied mainly in acquiring some knowledge of the language and agriculture of the country. During five days in May, I was engaged in investigating an attack of the berseem worm—the larvæ of *Caradrina exigua*—on lucerne at the cavalry forage farm at Shendi, and from the 14th to the 17th June was on the estate belonging to the Sudan Exploration Plantation Syndicate, Ltd., at Zeidab, locating the breeding place of the mosquitoes that had become a pest there.

A month, from the middle of July, was spent on the White Nile, and for a week in September I was assisting in carrying out a campaign against a swarm of locusts at Geili. Two-and-a-half months, from the 26th November, were occupied in making observations on insect pests in general, and the so-called Nimitti in particular, in Dongola Province.

On the 30th January, 1907, I was sent to Zeidab to ascertain the breeding-places of the mosquitoes that were said to be the cause of a serious outbreak of malaria on the Sudan Exploration Plantation Syndicate, Ltd., estate, and six weeks later went to Abu Hamed to make similar observations on the sandfly, known locally as "Kilteb."

On the 1st of April, I proceeded to Shendi, but the attack of "Asal" on dura, that had been the cause of my journey, was over when I arrived, so, having visited El Damer to suggest means with which to suppress the mosquitoes there, I returned to Khartoum, and ten days later was on my way to Kordofan.

Contribution by Mr. F. V. Theobald

New Mosquitoes from the Sudan, etc. By Frederick V. Theobald, M.A., Vice-President Association of Economic Biologists; Vice-Principal and Zoologist to the South-Eastern Agricultural College, Wye.

19 pages, with numerous illustrations, including fine coloured plates

Six New Species salt water Culex—List of Sudanese *culicidæ*—Synopsis of Sudanese *culicidæ*—Genus, *Mucidus*—*Mucidus sudanensis*, n. sp.—Genus, *Stegomyia*.—Genus, *Scutomyia*—Genus, *Theobaldia*—Genus, *Culex*.—*Culex salus*, n. sp.—Genus, *Mimeteculex* nov. gen.—*Mimeteculex kingii*, n. sp.—Genus, *Tæniorhynchus*—*Tæniorhynchus violaceus*, n. sp.—Genus *Mimomyia*—*Mimomyia circumtestacea*—Genus, *Uranotænia*—*Uranotænia pallidocephala*, n. sp.—*Uranotænia pallidocephala*, sub. sp.—*cærulea*, n. sub. sp.

[*Specimen of Text of Mr. Theobald's Article on New Mosquitoes from the Sudan, etc.*]

Six new species

Amongst the mosquitoes taken by Mr. H. King are six new species and a variety which may possibly be a distinct form.

The new species include a handsome *Mucidus* which comes near both the *Mucidus mucidus*, Karsch, and the *Mucidus africanus*, Theobald, and a *Tæniorhynchus* which is quite distinct and which is evidently a very brilliant species when alive, with metallic-violet and purple body.

A new genus *Mimeteculex* has had to be formed for one species (*M. kingii*) as I could not satisfactorily place it in any described group; the male being very marked on account of the unequal hind ungues, a character not known in any other male in this family. The *Mimomyia* (*M. circumtestacea*) is quite distinct from the other two known Sudanese species; from the series of it collected by Mr. King, the male genitalia of this genus have been figured.

Two *Uranotænia* have been taken, but they are so closely related that I have placed one only as a sub-species of the other, the difference mainly being one of colour; the type has a pale-scaled head, the sub-species a blue head, like *U. cæruleocephala*.

A salt-water culex

A salt-water culex is also new (*C. salus*) and *Stegomyia argenteopunctata*, Theobald, and *Scutomyia sugens*, Wiedemann, are recorded for the first time in this region. There are now forty-three species of *Culicidæ* known in the Sudan.

List of Sudanese Culicidæ[1]

1. *Anopheles wellcomei*, Theobald, Rep. Gord. Coll., No. 1, p. 64 (1904), and No. 2, p. 67 (1906).
2. *Myzomyia funesta*, Giles, Rep. Gord. Coll., No. 1, p. 68 (1904), and No. 2, p. 69 (1906).
3. *Myzomyia nili*, Theobald, Rep. Gord. Coll., No. 1, p. 66 (1904), and No. 2, p. 68 (1906).
4. *Pyretophorus costalis*, Loew, Rep. Gord. Coll., No. 1, p. 70 (1904).
5. *Myzorhynchus paludis*, Theobald, Rep. Gord. Coll., No. 1, p. 70 (1904), and No. 2, p. 69 (1906).
6. *Cellia pharœnsis*, Theobald, Rep. Gord. Coll., No. 1, p. 70 (1904).
7. *Cellia squamosa*, Theobald, Rep. Gord. Coll., No. 2, p. 69 (1906).
8. *Mucidus africanus*, Theobald, Rep. Gord. Coll., No. 1, p. 71 (1904).
9. *Mucidus sudanensis*, n. sp., Rep. Gord. Coll., No. 3.
10. *Stegomyia fasciata*, Fabricius, Rep. Gord. Coll., No. 1, p. 71 (1904).
11. *Stegomyia argenteopunctata*, Theobald, Rep. Gord. Coll., No. 3.
12. *Scutomyia sugens*, Wiedemann, Rep. Gord. Coll., No. 3.
13. *Quasistegomyia unilineata*, Theobald, Rep. Gord. Coll., No. 2, p. 70 (1906).
14. *Etorleptiomyia mediolineata*, Theobald, Rep. Gord. Coll., No. 1, p. 71 (1904).
15. *Theobaldia spathipalpis*, Rondani, Rep. Gord. Coll., No. 1, p. 73 (1904); No. 2, p. 71 (1906); and No. 3, p. 255 (1908).

[1] The references given here are only in connection with the Gordon College Reports.

[*Specimen of Classification of Mosquitoes—Mr. Theobald's Article on New Mosquitoes from the Sudan, etc.*]

B. PALPI LONG IN ♂, SHORT IN ♀ (*Culicinæ*)

γ DENSELY SCALY, RAGGED SPECIES

Wing-fringe with five pale spots ... ... *Mucidus africanus*, Theob.
Wing-fringe with eight pale spots ... ... *Mucidus sudanensis*, Theob.

γγ NOT DENSELY SCALY

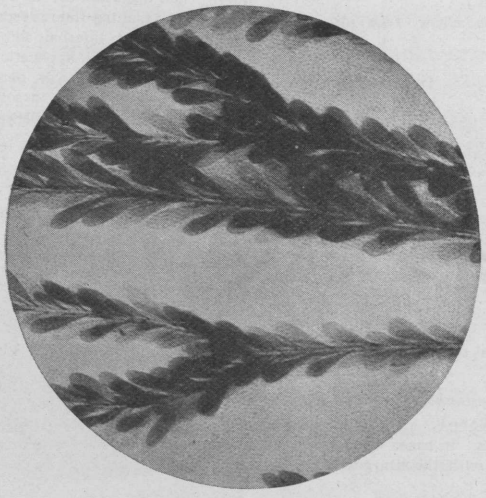
δ *Wing scales normal*
ε Wings spotted
Thorax with white lines ... ... *Theobaldia spathipalpis*, Rond.
εε Wings not spotted
ξ Proboscis banded
Legs apically and basally banded
Abdomen with small basal semi-circular patches and basal lateral spots *Culex hirsutipalpis*, Theob.
Abdomen with broad basal white bands ... ... *Culex salus*, Theob.
ξξ Proboscis unbanded
α Legs basally banded
Thorax with 6 silvery spots ... ... *Scutomyia sugens*, Wied.
Thorax with 2 median yellow and silvery curved lateral lines *Stegomyia fasciata*, Fab.
Thorax with narrow median white line and white spots *Quasistegomyia unilineata*, Theob.

αα LEGS UNBANDED

β THORAX ADORNED

Black, six white thoracic spots ... ... *Stegomyia argenteopunctata*, Theob.
Thorax golden-yellow-scaled at the sides .. *Banksiella luteolateralis*, Theob.
Thorax rich reddish-brown with five dull yellowish lines ... *Mimeteculex kingii*, Theob.

[*Specimens of the 27 Mosquito Illustrations—Mr. Theobald's Article on New Mosquitoes from the Sudan, etc.*]



WING SCALES OF NEW CULICIDÆ
1. Wing scales of *Mucidus sudanensis*, n. sp. (♀)

HEADS OF NEW CULICIDÆ
3. Head of *Mimomyia circumtestacea*, n. sp. (♂)

[*Specimens of the many Illustrations in Capt. Anderson's Article on Medical Practices and Superstitions amongst the People of Kordofan*]

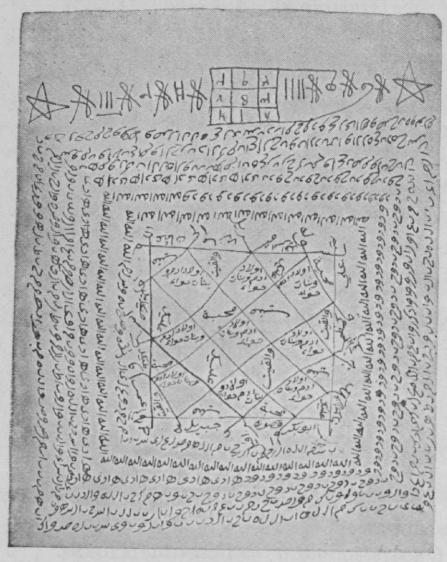


FIG. 62
Love "KETAB" or CHARM showing the construction of a "KHATIM"

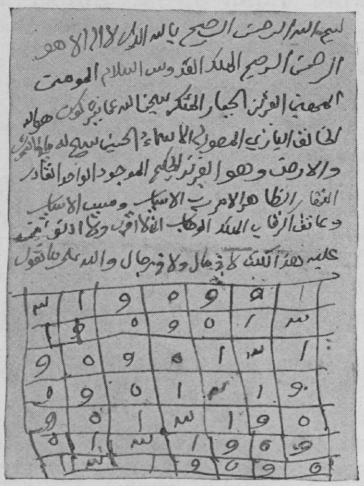


FIG. 67
ONE OF THE SEVEN WRITTEN CHARMS AGAINST THE POWER OF THE EVIL FAIRY OR WITCH UM EL SIBIAN.

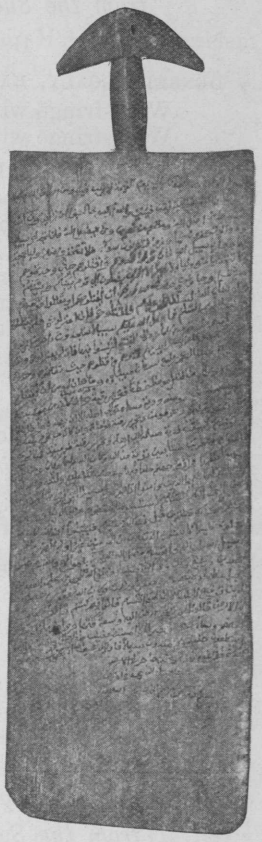


FIG. 65
LOHN (or writing board) on which Koranic phrases, mystic inscriptions, etc., are inscribed by FIKIS (holy men). The ink when dry is washed off, and the resulting fluid prescribed as medicine for internal administration and external application in cases of illness, local or general. This course of holy writ in solution constitutes, and is termed, EL MAHAIA.

FIG. 66
HOLY WATER. Water from the Prophet's Holy Well, ZAMZEN, at Mecca. Used in small quantities as a specific for all ills, and imported in metal flasks by pilgrims.

[*Specimen Inscription*]

PLATE XLI

CHARMS: KETAB, HEGAB, OR WARAGA AND ILLUSTRATIONS OF EACH

(*See pages* 284–290)

1. A charm against the evil eye and evil spirits, compiled by one of the physicians to the late MAHDI and presented to me by his son.
   The square case contains the KETAB or written charm; the small sack, a preparation of roots (composition unknown).
   This charm is designed to wear round the arm above the elbow. As also Nos. 2, 3 and 4.
2. Written. For desires to be fulfilled.
3. Written. Against the sting of scorpions.
4. Three written charms designed to cause impotence in others. One is buried in a neighbouring grave; the other two being secretly laid under the subject's bed.
5. Written. Against headache.
6. Written. Against toothache.
7. Written. Against headache.
8. A Love amulet. Four written charms, two worn on a level with the breasts; two on a level with the hips. Designed for suspension round the neck. As also Nos. 9 to 15.
9. "3 Papers." A love charm.
10. CHARM against the EVIL EYE. One case containing a written paper, the second some herb (?)
11. CHARM AGAINST REPTILES. One leather case containing KASIRASWIL root. The other containing a circular disc of WARAL skin (the Lizard IGUANA).
    Used as a prevention and cure against the attack of Reptiles. In cases of snake bite, the wound is "freshened" by being briskly rubbed with the lizard skin, and then cauterised with the charred end of the root.
12. Stones from the grave of a Holy man for protection from illness and evil, and to bring good luck.
13. CHARMS AGAINST SNAKE BITE. One written, the other a root (?). Designed to be worn round the neck.
14. Two written charms for love.
15. A false charm, made for a woman, very bulky and containing only wooden blocks instead of genuine charms.

Contributions by Bimbashi Effendi Zeki, Dr. L. Bousfield, Sir Rudolph Baron von Slatin Pasha and Dr. R. G. Anderson

[Specimen of Text of Bimbashi Effendi Zeki's Article on the Practice of Medicine and Surgery in the Sudan during the Rule of the Mahdi and the Khalifa]

Medical Practice

Medical practice

Some of the natives were clever at diagnosis, while the treatment of various diseases presents points of interest which will now be mentioned.

Respiratory diseases. Bronchitis and cough were treated with ground, torrified dura (millet), prepared like a decoction of coffee and termed "Galiya." The flowers of "*Karkade*" (*Hibiscus sabdariffa*, Linn.) were also employed. The plant grows abundantly in the Sudan and has purple flowers. From these an infusion was prepared which possesses a delicious taste. It was given hot and sweetened with sugar. The Sudanese believe "*Karkade*" to be one of the plants of Paradise. In pneumonia, venesection was practised. Headache and migraine were often treated by giving liquid tallow. This was drunk or poured up the nose, a funnel being used to facilitate administration. This, the method of El-Tasfeeh, possessed a great reputation.

Respiratory diseases

Fever. In ordinary febrile attacks massage was employed, a mixture of vinegar, henna and common salt being used as the lubricating agent, and, at the same time, a purgative in the shape of senna or tamarind was administered. Occasionally *El Karad*, the fruit of *El Sant* (*Acacia albida*, Wel.), was ground and placed in the patient's bed.

Fever

Chicken-pox (*El Burgum*) was lightly considered and treated by a senna purge and the application of mud to the vesicles. The patient was not allowed to have a bath until a week after the termination of the disease.

Chicken-pox

Smallpox. This disease was, and is, dreaded by the natives, especially the Arabs, who know and fear its sequelæ. When quarrelling amongst themselves, a common term of opprobrium is "infected with smallpox." On the appearance of the rash the patient was at once isolated, being removed to a place two miles distant from any populous neighbourhood. There he was placed in charge of an attendant who had previously had smallpox, and whose duty it was to give him onions, milk and native bread (*Medida*). Despite a considerable period of isolation, the disease was accustomed to spread owing to lack of vaccination. There was a severe epidemic in 1885, when Omdurman fell into the hands of the Dervishes. About twelve thousand people are known to have perished. But little attention was paid to cases of measles and typhus fever, the natives being very careless about them.

Smallpox

Medical Practices and Superstitions amongst the People of Kordofan

THEIR TREATMENT OF DISEASE AND THE CHIEF DRUGS, INSTRUMENTS AND APPLIANCES IN COMMON USE

BY

R. G. Anderson, M.R.C.S., L.R.C.P., R.A.M.C.

Bimbashi, Egyptian Medical Corps, S.M.O., Kordofan

43 pages, with numerous illustrations

Medical Superstitions: Introduction—Superstitious Atmosphere—The Hakim—The Fiki—The Evil Eye—Evil Spirits—Written Charms—Other Varieties of Charms—Stones as Charms—Mode of Wearing Charms—Routine Methods of Supernatural Cures—Prayer and Laying-on of hands—The Mystic Writing—The Spitting Cure—The Fire Cure—The Casting out of Devils—Sand-gazing.

Local Drugs: Drugs used in Fever, Exanthems, Chest Complaints, Leprosy, Gonorrhœa, Syphilis, Guinea Worm, Mental Diseases—Fumigation—Massage—Anointing—Midwifery—Significance of the Scalp-Lock.

Surgical Instruments: Wounds and Operations—Tribal Marking—Tattooing.

[*Specimen of Text of Capt. Anderson's Article on Medical Practices and Superstitions amongst the People of Kordofan*]

Medical Superstitions

Introduction

The superstitions of the native are so many, so varied, and, at times, so vague, that it is difficult, from a medical standpoint, to gain even a superficial acquaintance with them, the more so since the Arab is naturally loth to impart to an unbeliever the intimate knowledge which so closely concerns his own person and his religion. Again, too, the borderline between purely medical and general superstition is absolutely indefinite, and both are so intimately blended with religious rite that it is impossible to touch on one without encroaching on the other. In the following notes, therefore—which deal more particularly with the customs based on the religion of the Arab, Mawalid, and Falatah inhabitants of the larger towns rather than those of the more rural semi-Mohamedan Nuba, who has adopted along with his borrowed religion many of its superstitions, at the same time retaining those of his own—I fear there will be found much irrelevant matter, with often no more sound foundation for facts than the gossip of a people who exist in a perfect atmosphere of the supernatural.

Superstitious Atmosphere

This atmosphere, in which the dread of ever present evil, seen and unseen, emanating from man, ghost, and devil, is far from counter-balanced by their faith in a more distant deity and fanatic belief in the supreme power of holy writings, the which however seem to require for their efficiency the mysterious mutilations, arrangements and additions of holy men, often themselves illiterate and more often than not gross impostors. Such men do, indeed, occasionally combine the more worldly use of drugs with their spiritual cure. These drugs hold a very secondary place in their practice, however, falling more within the sphere of the ordinary Hakim, yet even in his methods this vein of superstition and fatalism is predominant.

Forms of cure

Propitious days are selected for the commencement of various cures, which are limited to a fixed period, resulting "An Sha'a Allah" in success or failure. There are defined courses, certain prayers, and a special attention to unnecessary minutiæ of diet, mode of life and regimen, whilst the mere strength, dose, and preparation of their specific, usually drastic, medicines are left largely to chance. Again, where the Hakim fails the Fiki[1] is called in, or, indeed, the two may join together to combat ills spiritual

The Hakim and the Fiki

[1] The Hakim may be regarded solely as a medical man having no dealings in the scriptural or supernatural—The Fiki, on the other hand, is a religious ascetic who encroaches on medicine only in prayer, occult charm, incantation and the like.

[*Specimen of Text of Capt. Anderson's Article on Medical Practices and Superstitions amongst the People of Kordofan*]

Surgical Instruments

The following are the more universally employed surgical instruments and appliances in Kordofan.

1. *El Saleeha.* A snare, simply constructed from a piece of dry dura (millet) stalk, about 6 inches to 9 inches long and a stout giraffe tail hair. One end of the hair is firmly bound to an extremity of the stalk, its free length being then looped back and passed through a perforation, traversing the stalk obliquely from the centre of its extremity to a point 1 or 2 inches lower down, where it emerges to be used as a tightening string. Snare

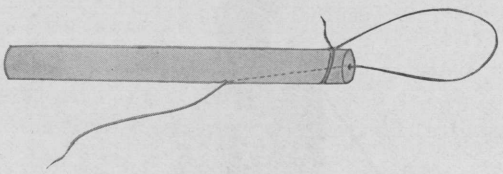


Fig. 80.—El Saleeha
For drawing forward the uvula prior to excision

[*Typical Illustrations selected from the many in Capt. Anderson's Article on Medical Practices and Superstitions amongst the People of Kordofan*]

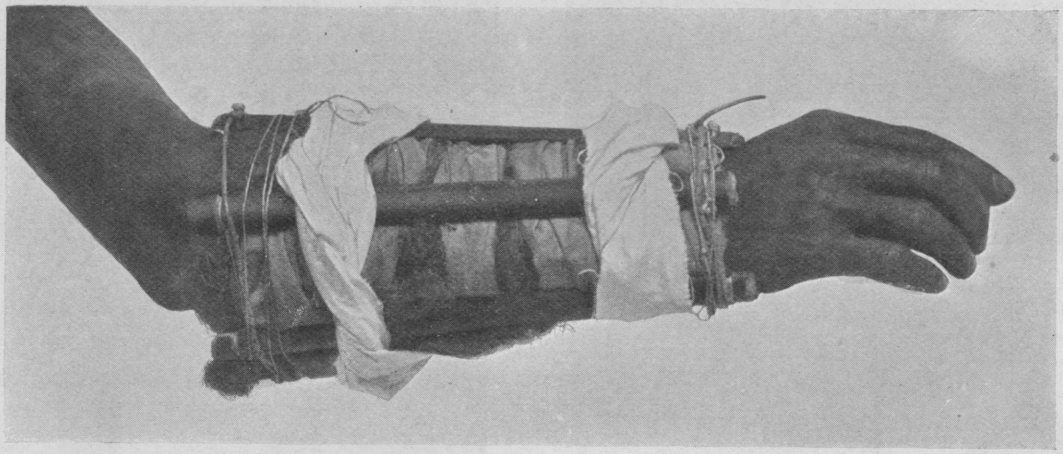


Fig. 94.—Native Sudanese splints applied to forearm

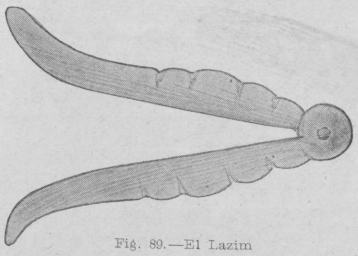
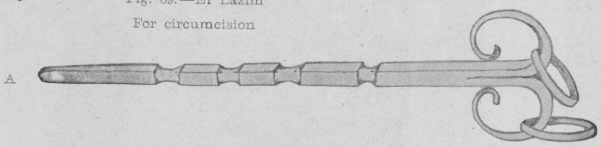


Fig. 89.—El Lazim
For circumcision

This article has many illustrations of native surgical instruments, operations, etc.



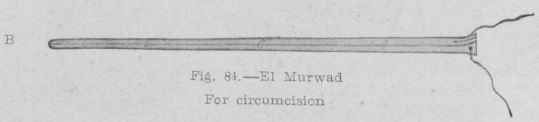


Fig. 84.—El Murwad
For circumcision

Fig. 93.—El Mihgam
Native Cupping Instrument

[Specimens (reduced) of 52 Anthropological Illustrations in Dr. Waterston's Report upon the Physical Characters of some of the Nilotic Negroid Tribes]

FIG. 125.—Young Dinka Beau

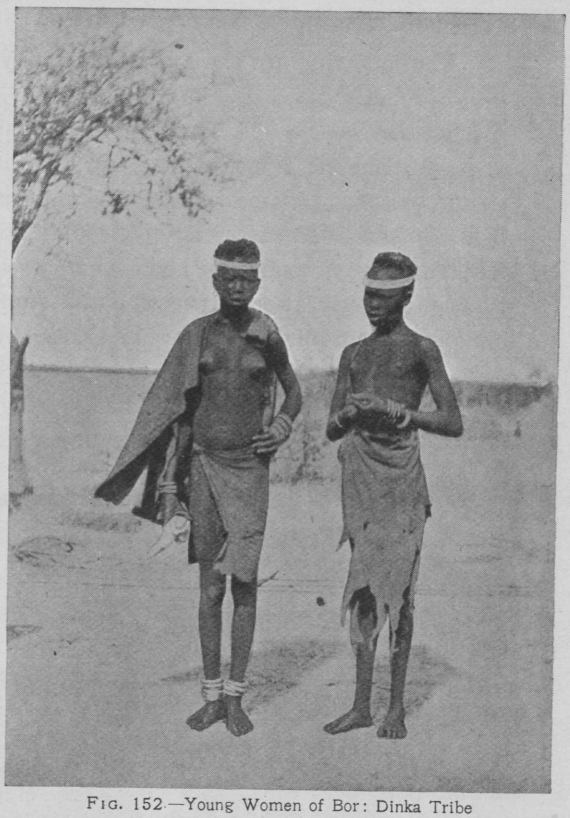
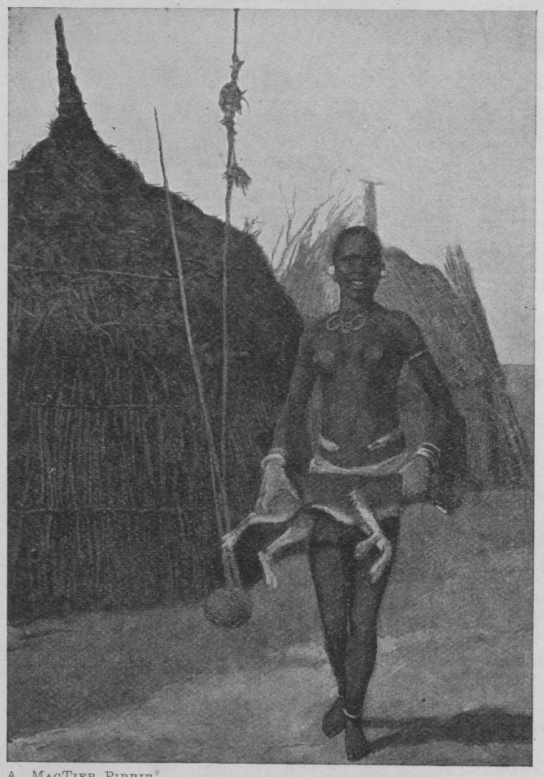


FIG. 152.—Young Women of Bor: Dinka Tribe



A. MACTIER PIRRIE

FIG. 113.—Burun Woman

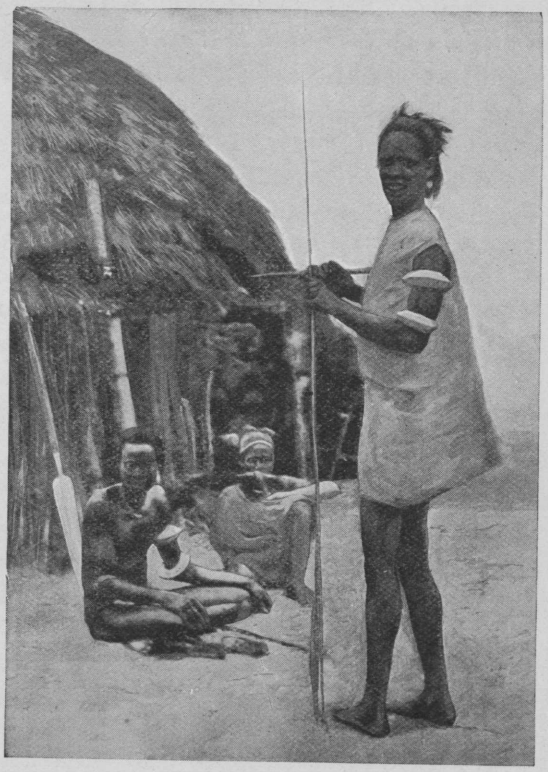


FIG. 114.—Shilluk

Contributions by Dr. D. Waterston and Mr. D. J. Vallance

Report upon the Physical Characters of some of the Nilotic Negroid Tribes. By David Waterston, M.A., M.D., Lecturer on Anatomy in the University of Edinburgh, From the Anthropological Laboratory of Edinburgh University. 53 pages, with numerous illustrations

Dr. Pirrie's Work—Account of Dr. Pirrie's Journeys—Burun country—Physical characters—Fertits—Table of measurements of Fertit tribe—Furawis—Gebelawis—Measurements of Gebelawis—Nubas—Bongos or Dohr—Nyam-nyams—Baris—Dinkas—Measurements of Dinka tribe—Nuers—Measurements of Nuer tribe—Shilluks—Measurements of Shilluks—Buruns—Measurements of Burun tribe—Notes on Customs, etc., of Buruns and other tribes—Furs—Abyssinians—Summary of general physical characters—Average of measurements and indices—Sudanese types.

Notes on Ethnographical Specimens collected by Dr. A. MacTier Pirrie. By D. J. Vallance, Curator, The Royal Scottish Museum, Edinburgh. 8 pages, with numerous illustrations

Representative collection of Burun objects—Shilluk head-dress—Comparison with Australian natives—Native method of cupping.

[Specimen of Text of Dr. Waterston's Report upon the Physical Characters of some of the Nilotic Negroid Tribes]

Introduction

The late Dr. MacTier Pirrie went out in the autumn of 1906 from Scotland to Egypt, in order to undertake Anthropological work among the tribes of the Sudan under Dr. Andrew Balfour. The late Dr. Pirrie

Dr. Pirrie's training in Anthropology had been acquired in the Anatomical department of the University of Edinburgh, and a Carnegie Research Fellowship in Anthropology was awarded to him for the proposed research in the Sudan.

Early in October, 1906, he arrived in Cairo, and, after spending a short time there in making preparations, he went on to Khartoum, where he arrived on the 18th October. In Khartoum he at once began anthropometric work by taking measurements of students in the Gordon College, of soldiers in some of the native regiments, and of some natives in the prison.

At the same time preparations were made for an expedition up the Nile to study the primitive indigenous tribes of the Sudan.

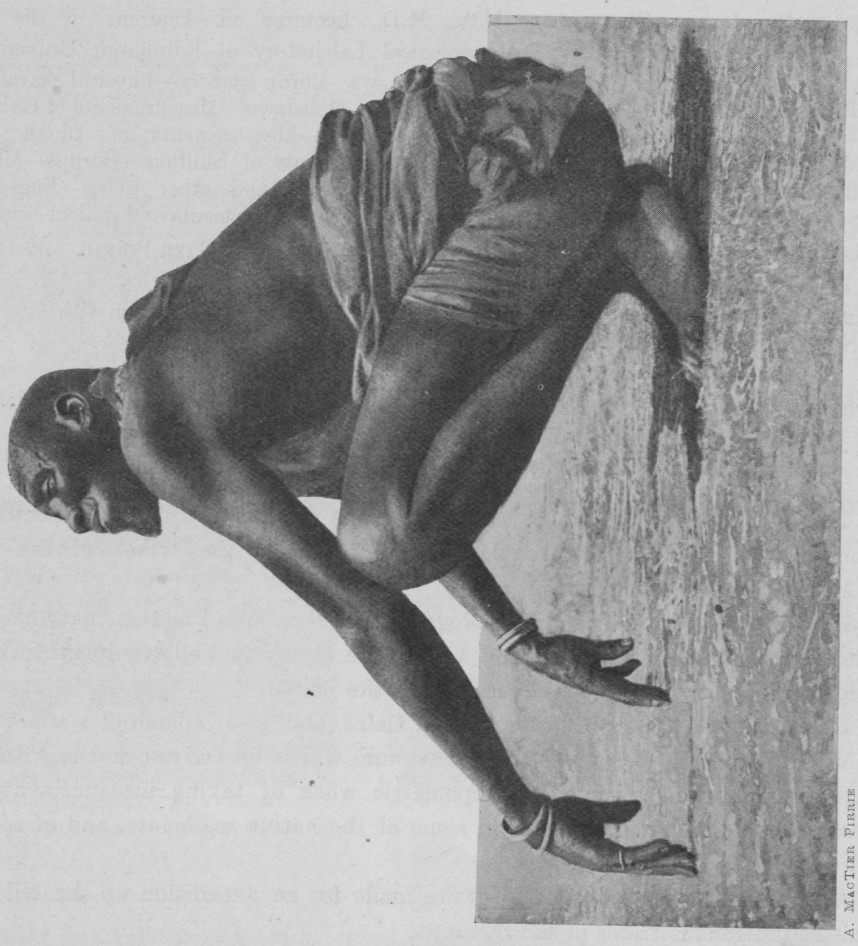
[This Article contains 7 Tables of Tribal Anthropological Measurements and Indices]

[Specimen (reduced) of the 52 Illustrations in Dr. Waterston's Report upon the Physical Characters of some of the Nilotic Negroid Tribes]

A. MacTier Pirrie

Fig. 103. Dr. MacTier Pirrie's Caravan

[Specimens (greatly reduced) of 52 Anthropological Illustrations in Dr. Waterston's Report upon the Physical Characters of some of the Nilotic Negroid Tribes]



A. MacTier Pirrie

Fig. 140.—Burun: Characteristic Sitting Posture

A. MacTier Pirrie

Fig. 56.—Burun, with peculiar Skin Affection, possibly Leprous

[Specimens of the 43 Illustrations of Types of Sudanese Natives in Dr. Waterston's Report upon the Physical Characters of some of the Nilotic Negroid Tribes]

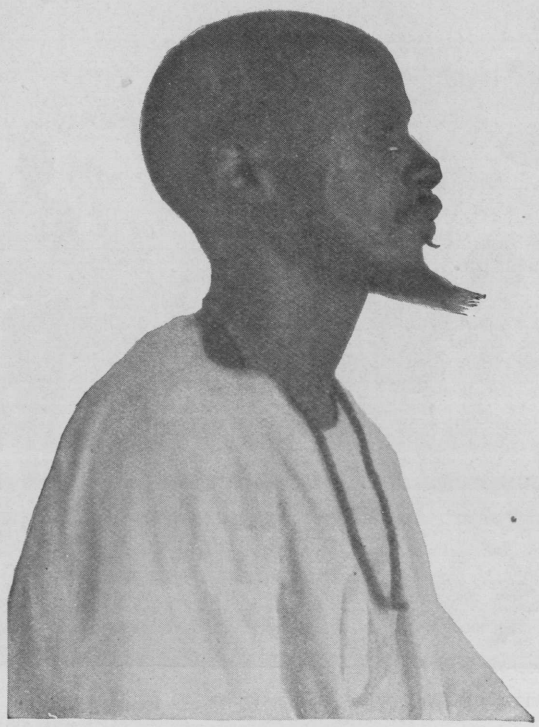


FIG. 179—Dongolawi

FIG. 166—Nyam-nyam

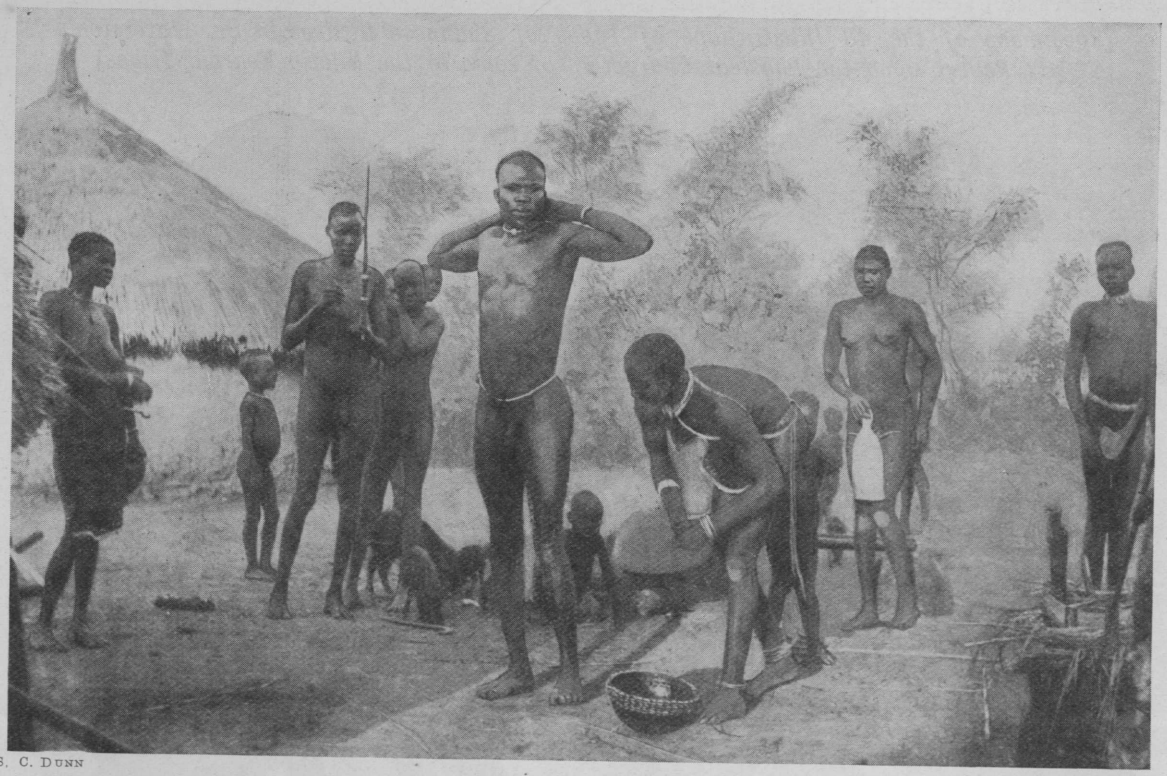
FIG. 159—Nuba

FIG. 170—Burun

A. MACTIER PIRRIE

SUDANESE TYPES

[Specimens of the 52 Illustrations in Dr. Waterston's Report upon the Physical Characters of some of the Nilotic Negroid Tribes]



S. C. Dunn

FIG. 141.—BURUN WOMAN ANOINTING HER HUSBAND WITH OIL AND RED OCHRE PRIOR TO A JOURNEY

A. MacTier Pirrie

FIG. 124.—DINKAS ON THE WHITE NILE SHOWING STORK-LIKE ATTITUDE

Notes on the Ethnographical Specimens collected by Dr. A. MacTier Pirrie

BY

D. J. Vallance

Curator, The Royal Scottish Museum, Edinburgh

[*Specimen of Text*]

Introduction

The illustrations shown in Plates XLIV.–XLVIII. have been prepared from the specimens collected by Dr. MacTier Pirrie while travelling on the route described by Dr. Waterston, and shown in Fig. 105. The objects, with few exceptions, are from three tribes—the Shilluks and the Dinkas, who occupy most of the land on the banks of the White Nile south of Melut, and the Buruns, whose country lies to the north of the River Sobat. A few objects are from the Nuer tribe living along and to the south of that river.

Nearly one-half of the collection comes from the Burun country, a district which has been so little explored that few specimens illustrating the habits and handicrafts of the people are to be found in ethnographical collections. The material for reference and comparison is, therefore, still limited, and some detailed information as to the habits and conditions of life of these people is to be desired. It will, however, be noticed that the Burun objects, gathered together by Dr. Pirrie, are fairly representative of the belongings of a native people. The specimens include weapons, dress, musical instruments, tobacco pipes, surgical and medical appliances, as well as a few objects of domestic use. The Burun arrows (Plate XLV., fig. 9), with their gourd sheath to protect the points, are notched to receive poison and probably also to allow of the point breaking off and remaining in the wound. [*Illustrations of 45 Ethnographical Specimens are given*]

[*Specimens of the Illustrations in Mr. Vallance's Notes on the Ethnographical Specimens collected by Dr. A. MacTier Pirrie*]

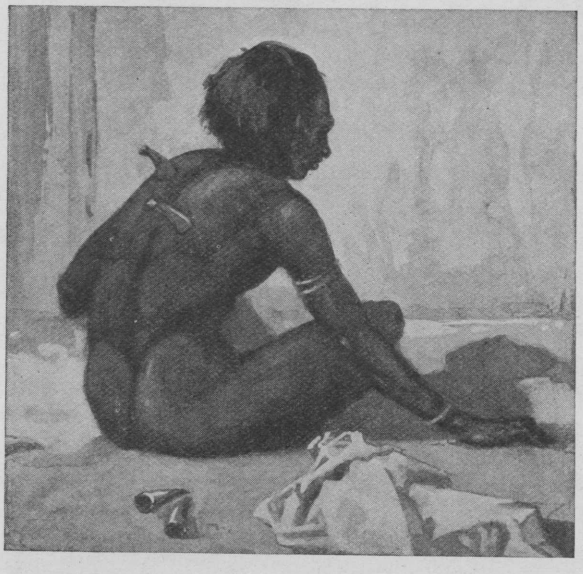
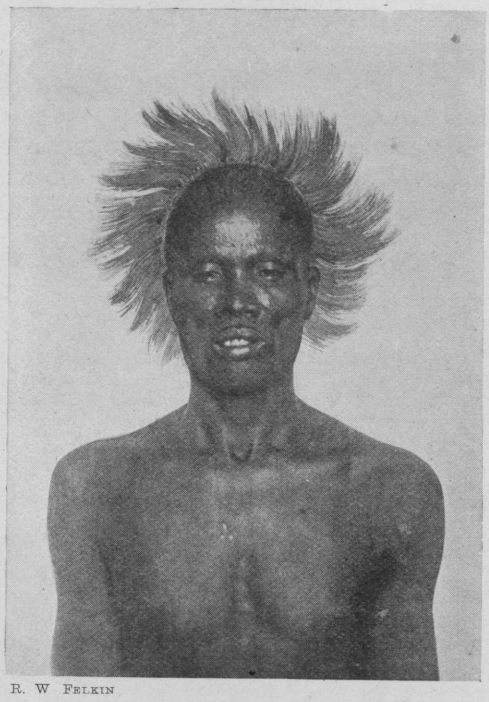


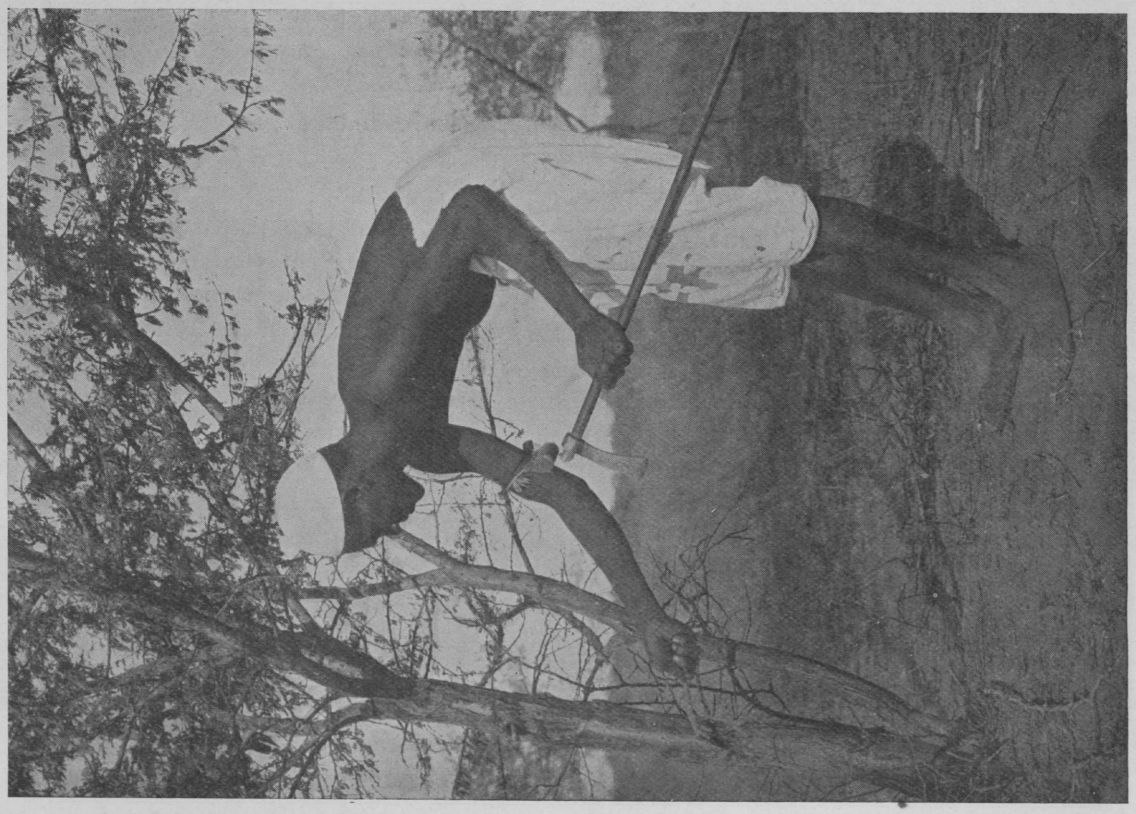
Fig. 200.—Native Method of Cupping



R. W Felkin

Fig. 198.—Shilluk wearing circular head-dress of Antelope's mane

[*Specimens (much reduced) of Illustrations in Dr. Beam's Report of the Chemical Section*]



W. Beam

Fig. 208.—Tapping the Tree

W. Beam

Fig. 206.—Exudation of Gum near point of Tapping

Report on the Chemical Section of the Wellcome Research Laboratories, Khartoum

by

Dr. W. Beam and Mr. E. S. Edie

Report on the Chemical Section. By William Beam, M.A., M.D., F.I.C., F.C.S., Chemist to the Wellcome Research Laboratories. 56 pages, with numerous illustrations

List of Analyses and Examinations—Special Research on Gum arabic.

Chemical Composition of Nile Waters: Tables showing Monthly Analyses from 1905 to 1907—Solid Matter in Suspension—Cause of Clarification—Examination of Water of White Nile Tributaries, including the Atbara River.

Laboratory Notes: Milk Supply of Khartoum—Poisonous Well Waters—Limestones and Lime. Gypsum Deposits, Red Sea Province—Waters from Deep Wells at Khartoum—The Detection of Well Pollution by the use of Fluoresceïn—Salt from the Lugwâré Country.

Chemical Composition of Some Sudan Grains: Methods of Examination—Analyses of Great Millet (Dura)—Comparisons with Indian Duras—Analyses of: Pigeon Pea, Chick Pea, Small Millet (Telebun), Barley, Lentils, Lupines, Rice, Bulrush Millet (Dukhn), Pea, Small Millet (Teff), Fenugreek and Wheat—Influence of Climatic Conditions and Soil on Nitrogenous Constituents—Analyses of Beans and Maize—Analyses of Oil Seeds, Earth Nuts, Safflower, Cotton, Castor Oil Seeds, Sesame, Native-made Sesame Cake.

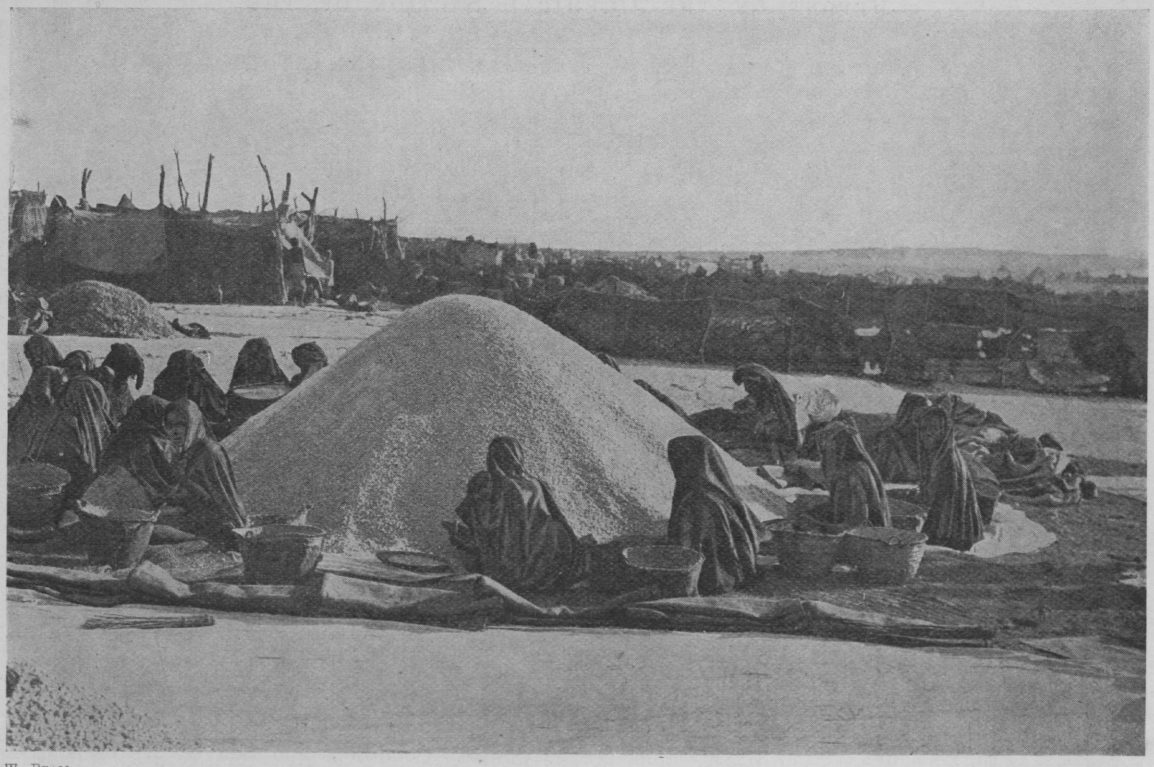
Some Sudan Fats and Oils: Heglig Fruit—Shea Butter—Zawa Oil—Ben Oil.

Sudan Gums: Hashab Gum from *Acacia verek*—Tapping Season—Method of Tapping—Origin of Gum—Conditions Affecting its Production: Soil—Analyses of Soils from Gum Districts—Moisture—Protection from Fire—Tapping—Yields of Gum under Various Conditions—Inoculation—Effect of Temperature—Season of Collection—Yields of Gum at Various Seasons from Small, Middle-sized and Large Trees—Yields from Different Styles of Tapping—Averages of Yields—Normal and Abnormal Viscosity—Alteration on Storage—Summary of Results. Commercial Grades of Sudan Gum: The Grading of Gums—Bleaching—Effect of Exposure to Sun—"Turkey" Gum and "Sorts"—Grades of Kordofan, Gedaref (Hashab) and Talh Gums—Talh Gum: from *Acacia seyal*, Form, Analysis, Analysis of Selected—Analysis of Gum of *Acacia arabica*—Kuk Gum from *Acacia verugea*—Analyses of Gums from *Acacia suma*, *Odina fructicosa*, *Combretum*, Sp., *Sterculia cineria*, *Sterculia tomentosa*—Determination of Viscosity of Gum Solutions: Torsion and Glass Viscosimeters, Strengths of Solutions employed—Terms in which Viscosity is best recorded.

Notes on the Chemistry of Sudan Gums. By E. S. Edie, M.A., B.Sc., Carnegie Research Fellow. 10 pages

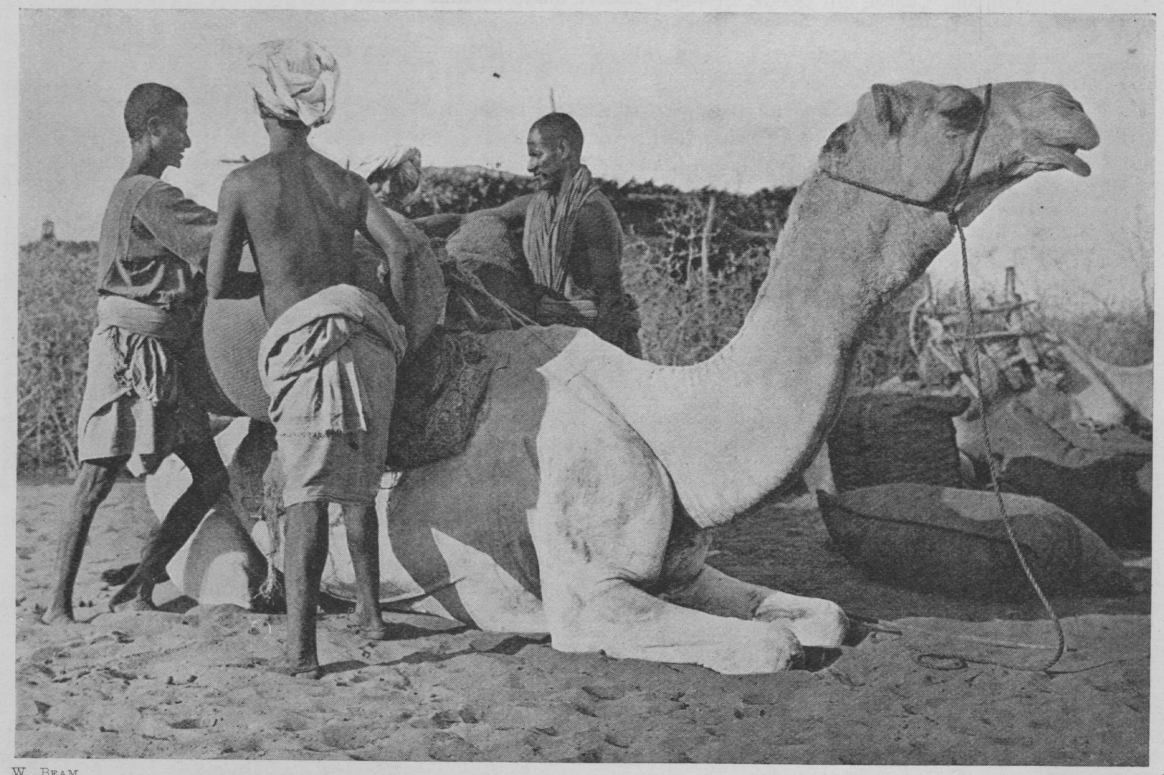
Introductory—Pentoses in Gums—Changes in Viscosity—Sugar in Gums. Examination of Hashab Gum: Organic Analyses of Various Samples—Calculation of the Glucoses—Pentoses and Hexoses—Optical Activity—Specific Rotation—Inorganic Constituents—Determination of Osmotic Pressure—Molecular Change—Examination of Talh Gum: Percentage of Sugars—Rotation—Ash—Osmotic Pressure—Examination of Sunt Gum: Rotation—Percentage of Sugars—Ash—Bacterial Origin of Gum: Gum Bacilli—Gum and Beetles—A Bipolar Bacterium in Hashab Gum.

[Specimens (reduced) of the Illustrations in Dr. Beam's Report on the Chemical Section]



W. Beam

Fig. 214.—Gum Picking, Omdurman



W. Beam

Fig. 212.—Loading Gum on Camels for Transport to the River

[*Specimen of Text of Dr. Beam's Report on the Chemical Section*]

SUDAN GUMS

Sudan gums

The principal gum exported by the Sudan is that from the *Acacia verek*, which is found chiefly in the Kordofan Province, though more or less extensive forests of the tree exist in the Gezira district (the land lying between the Blue and White Niles) and near Gedaref. The tree is known locally as the "hashab," and is said to be identical with the *Acacia senegal* from which Senegal gum is derived.

Hashab gum from *Acacia verek*

Since the Report of 1906 was published, one has had an opportunity to visit the Kordofan gum forests and make a few observations as to the methods of working carried out by the natives. These differ in certain particulars from those noted by Muriel,[1] and a few notes on the subject may not be out of place.

Visit to Kordofan gum forests

There is perhaps no industry more poorly paid than gum collection, as at present carried out. For this reason, the collector, who is above all an agriculturist, makes the work of gum collection a secondary matter, and directs his attention primarily to the cultivation and harvesting of his crops—dukhn, sesame, dura, etc.

[*Specimen of Text of Dr. Beam's Report on the Chemical Section*]

The following analyses of samples collected by Mr. Walsh, of the Sudan Irrigation Department, at a later season of the previous year (December, 1905), show a higher proportion of dissolved solids. The water was not seen until its arrival in Khartoum, so that the observations as to the appearance and behaviour of the water could not be made so satisfactorily as in the case of those recorded above.

ANALYSES OF WATER FROM WHITE NILE IN SUDD REGION
COLLECTED IN DECEMBER

White Nile water from the Sudd Region collected in December

Number...	307	308	309	310	311	312
Point of collection	Bor	Between Kenissa and Ghabe Shambe	Hillet Nuer	Down stream of Lake No	Between Taufikia and mouth of Sobat River	Kodok
Condition of water when sample arrived at Khartoum	Slightly opalescent. Faintly coloured. Slight sediment	Clear Brownish. Slight sediment	Clear. Darker than No. 308. Dark brown sediment	Clear. Darker than 309. Dark brown sediment	Clear. Lighter in colour than No. 310. Slight sediment	Clear. Lighter in colour than No. 311. Slight sediment
Oxygen absorbed in 10 minutes at 100° C.	4·40	4·64	5·52	6·08	5·36	5·56
Chlorides (Cl)	7·74	7·18	7·50	8·88	3·59	5·48
Sulphates (SO_4)	1·12	none	none	none	none	none
Carbonates (CO_3)	58·56	59·93	67·46	74·96	55·41	49·47
Calcium (Ca)	9·74	9·74	9·34	10·53	9·74	10·18
Magnesium (Mg)	4·41	4·54	3·61	4·28	3·49	3·85
Sodium (Na)	24·32	25·83	35·59	30·29	12·70	23·45
Potassium (K)	13·21	15·30	17·39	17·56	7·48	11·21

[1] "Report on the Forests of the Sudan," C. E. Muriel, 1901.

[Specimen of Text of Dr. Beam's Report on the Chemical Section]

Sudan fats and oils

Some Sudan Fats and Oils

BALANITES ÆGYPTIACA. Heglig—*Arab*

The fruit of this tree is bitter-sweet and is eaten by the natives. It is of about the size and general appearance of a dried date and consists of a thin brittle shell enclosing a mass of gummy consistence surrounding and firmly adherent to the stone. The latter is very hard and tough and contains an oily kernel. The average weight of the fruit is about 7·5 grammes.

Heglig fruit

The proportion	of outer shell	=	18·95	per cent. of the fruit
,, ,,	of dry pulp	=	30·58	,, ,,
,, ,,	of nut	=	50·47	,, ,,
,, ,,	of kernel	=	9·5	,, ,,
,, ,,	of oil	=	4·14	per cent. of the fruit
			8·21	,, ,, nut
			43·57	,, ,, kernel

The oil is highly prized by the natives and would be extracted on a much larger scale were it not for the very great difficulty which is experienced in separating the kernel from the tough, hard nut.

[Specimen of Text of Mr. E. S. Edie's Article on the Chemistry of Sudan Gums]

The Bacterial Origin of Gum

Under the above title, Greig Smith[1] first published an account of researches conducted by him on the gum from *Acacia penninervis*, from twigs of which he isolated two kinds of bacteria. The prevalent type, which he calls *Bact. acaciæ*, produced, when grown on artificial media, a slime from which a gum of the arabin-galactan class was obtained by suitable treatment. This work has been described in great detail in subsequent papers by Greig Smith, who found that "gum-flux" in other species of trees could be accounted for by bacterial action also, and his results appear conclusive. Ruhland,[2] however, questions Greig Smith's view of the bacterial origin of gum, though he found that *Bacillus spongiosus*, isolated from diseased cherry trees, produced, when grown in artificial media, a slime from which a gum was isolated. This gum he found only to yield arabinose on hydrolysis, while the gum from cherry trees inoculated with the bacillus yielded a mixture of arabinose and galactose. In a later paper, Ruhland[3] discusses the formation of gum by the action of the oxygen of the air on a substance in the sap which might be called a reduced "gum-base."

Gum bacilli

Fig. 218.—Bacterium isolated from gum-bearing branch of *Acacia verek*, grown on saccharose potato agar *Löffler's blue* × 1000 *diam.*

[1] *Proc. Linn. Soc. of N.S.W.*, 1902, Part III., September 24th.

[2] *Ber. deutsch. botan. Ges.*, 1906, XXIV., 393. [3] *Ibid.*, 1907, XXV., 302.

PART II OF PROSPECTUS

REVIEW OF SOME OF THE RECENT ADVANCES IN TROPICAL MEDICINE

HYGIENE AND TROPICAL VETERINARY SCIENCE, WITH SPECIAL REFERENCE TO THEIR POSSIBLE BEARING ON MEDICAL, SANITARY AND VETERINARY WORK IN THE ANGLO-EGYPTIAN SUDAN

BY BALFOUR AND ARCHIBALD

BEING A **SUPPLEMENT TO THE THIRD REPORT** OF THE

WELLCOME RESEARCH LABORATORIES

PREFATORY NOTE TO THE REVIEW

IT is a difficult matter for medical and veterinary officers stationed in the Sudan, especially those who happen to be in out-stations or who have to travel frequently, to keep in touch with current literature. This Review is intended to help them in some measure, to serve as a guide to new books and papers, and to present in a small compass the most important recent discoveries on the subjects indicated. It is also intended to indicate in what directions our knowledge as regards Tropical and Veterinary Medicine, Bacteriology and Hygiene is deficient in the Sudan, and it is hoped that it will thus stimulate research and lead to the acquisition of useful information. References are given so that those who wish to go more fully into any special subject may be able to obtain the original book or paper. Every care has been taken to render these as correctly as possible. No attempt has been made to produce a text-book, and for the most part the references have been confined to sound practical papers likely to be helpful, but the scientific aspect of certain questions has been considered for the reasons stated above.

While in the main intended for medical and veterinary officers in the Sudan, many of whom have rendered the Laboratories valuable assistance, it is hoped that workers in other tropical countries, where the conditions are similar to those obtaining in the Sudan, may find this Review of service. It is possible that it may also appeal to the students of Tropical Medicine in temperate climates, especially such as may be preparing for special examinations.

At the same time, it is to be regarded as supplementary to the Third Report of the Wellcome Research Laboratories, and hence the range of subjects dealt with is, of necessity, limited.

CONTENTS OF THE REVIEW

(Total 251 pages)

[*Specimen of one of the 13 pages of Index*]

INDEX OF THE REVIEW

Total 251 pages Review

[Specimen of one of the 251 pages of the Review—Tropical Medicine, etc.]

of the chief difficulties in diagnosis is when liver abscess stimulates disease of the right lung or pleura or when it is complicated with effusion into the pleura. Pleural infection readily occurs, infective matter spreading by way of the lymphatics. Liver Abscess—*continued*

Bousfield[1] has recorded from Kassala a case of liver abscess, in the pus from which, taken soon after operation, a diplococcus was found simulating the gonococcus in appearance and staining reaction.

Liver abscess is by no means uncommon in the Sudan. I am unable to give an opinion as regards its relationship to dysentery, but I have recorded a case[2] of some interest in which the *Entamœba dysenteriæ* was found. I know now, however, that I was wrong in attributing the fatal termination of this case to shock. It was undoubtedly in the main an instance of delayed chloroform poisoning dependent on the state of the liver, and I only make mention of it here as a warning regarding routine administration of chloroform in cases of operation for liver abscess, or at least such administration combined with the usual preliminary starvation.

Reference to this important matter will be found in a paper by Stiles and McDonald,[3] which gives the bibliography, and in an article by Hunter,[4] who states that evil effects may in all probability be completely prevented if, instead of withholding food, particular care be taken that the patient be given a very nutritious and easily digestible meal, well sweetened, two or three hours before the operation.

Malaria. It seems advisable to classify the various papers for review as far as possible, though some dealing with several or many aspects of the disease cannot be placed in any one group. First then we may consider papers relating to the morphology or life-cycle of the parasite:—

A question to which a good deal of attention has been directed, both by Ewing[5] and by Craig,[6] is that of so-called intra-corpuscular conjugation. While, so far as I can ascertain, Craig's views on the subject have not been generally accepted, and while Cropper[7] has recently shown that when double or treble infection occurs each parasite seems to go on to full development (he found three præsegmenting forms in one cell), still Craig's latest paper on latent and recurrent malarial infection is both able and interesting, and it seems worth while to record some of his opinions. His definitions may be given:—

By latent malarial infection is meant one in which the plasmodia of malaria may be demonstrated to be present in the blood of an individual, but in which no clinical symptoms of the disease of sufficient gravity to attract attention are to be observed. The term should not be confined to those instances in which no symptoms of malaria have ever been present, for, if the parasites be present in the blood in recurrent cases, between the attacks, the disease is as truly latent as it may be before the initial one.

By recurrences are meant the appearance of symptoms due to the same group of parasites that caused the original infection and not a re-infection by another group.

By intra-corpuscular conjugation is meant the complete and permanent union of the protoplasm and nucleus of two young amebula *(sic)* within the erythrocyte. It is absolutely necessary to the maintenance of malarial infection in man, and in these instances in which it does not occur, the plasmodia undergo a sexual sporulation for a limited time and then perish, thus leading to spontaneous recovery. It is present most typically in those cases in which the clinical symptoms are most severe, and is present in all the varieties of malarial infection, although most easily observed in the estivo-autumnal infections.

His conclusions regarding its significance are as follows:—

1. Intra-corpuscular conjugation is the chief cause of the maintenance of malarial infection.

2. It maintains malarial infection by producing a resting, or *zygote*, stage of the plasmodia, within the human body, which is resistant to quinine and other injurious influences.

3. It is the cause of latency and recurrences of malarial infection, the *zygote* stage remaining dormant or "latent" until conditions are favourable, when it gives birth to several young plasmodia, thus causing a recurrence of the infection.

[1] Bousfield, L. (January, 1908), "A case of Liver Abscess due to a Diplococcus Similar in Appearance and Staining Reaction to the Gonococcus." *Journal of the Royal Army Medical Corps*, p. 80, Vol. X., No. 1.

[2] Balfour, A. (November 21st, 1903), "A Case of Multiple Liver Abscess." *Lancet*, p. 1425, Vol. II.

[3] Stiles, H. J., and McDonald, S. (August, 1904), "Delayed Chloroform Poisoning." *Scottish Medical and Surgical Journal*, Vol. XV., No. 2.

[4] Hunter, W. (April 4th, 1908), "Delayed Chloroform Poisoning: Its Nature and Prevention." *Lancet*, p. 993, Vol. I.

[5] Ewing, J. (1904), "Clinical Pathology of the Blood."

[6] Craig, C. F. (June, 1906), "Observations upon Malaria: Latent Infection in Natives of the Philippine Islands—Intra-corpuscular Conjugation." *Philippine Journal of Science*, p. 525, Vol. I., and (Jan. 1st, 1907) *Journal of Infectious Diseases*, Chicago.

[7] Cropper, J. (March 16th, 1908), "Phenomenal Abundance of Parasites in the Peripheral Circulation of a Fatal Case of Pernicious Malaria." *Journal of Tropical Medicine and Hygiene*, p. 91.

[*Specimen of one of the 251 pages of the Review—Tropical Medicine, etc.*]

Skin Diseases— *continued*

maintained by the continued irritation of excessive perspiration. The disease is limited to those parts of the skin containing sebaceous follicles. His treatment consists in oily applications to the body-surface and the wearing of cotton next the skin.

Wellman[1] has described a severe, chronic pemphigoid disease of West Africa associated with the presence of a diplococcus, and Clegg and Wherry,[2] dealing with the etiology of *Pemphigus contagiosus* in the Tropics, summarise their findings and conclusions as follows:—

1. From cases of *Pemphigus neonatorum* and one case of *Pemphigus contagiosus* in an adult, micrococci similar to those described by Almquist were isolated.

2. Although occurring as well-defined kidney-shaped diplococci in the contents of the vesicles, the organism may, on superficial examination of cultures, be confounded with *Staphylococcus pyogenes aureus*. Our cultures did not produce indol in broth, and the diplococcus arrangement was reproduced in milk, or, better, in serum broth cultures.

3. A single human inoculation experiment with this organism produced typical but abortive vesicles. The essentially superficial nature of the inflammatory process set up in the human skin—resulting in the exudation of serum and leucocytes, and the formation of vesicles and the absence of any tendency to penetrate into the deeper tissues—certainly differentiate this micrococcus from the ordinary pyogenic cocci.

4. We believe it advisable to call the disease *Pemphigus contagiosus*, whether occurring in children or adults, and the etiological factor would then best be termed *Micrococcus pemphigi contagiosi*.

5. Cases of typical *Impetigo contagiosa* should be examined along similar lines, as the disease described under this name is possibly due to the same micro-organism.

Sleeping Sickness. Considering, in the first place, methods of spread, one finds that in the latest report[3] of the Liverpool Expedition to Rhodesia, mention is made of work in Uganda, where successful transmission experiments were made with *Glossina fusca*. It is possible also that *G. morsitans*, *G. pallidipes* and *G. longipalpis* are also implicated, though in this connection one would quote Neave,[4] who in Northern Rhodesia found a place which had become infected both as regards *G. palpalis* and man from a locality 150 to 200 miles distant. Tracing the route of caravans back to this locality, he found the intervening country infested with *G. morsitans* but no *G. palpalis* and no sleeping sickness existed. Hence he thinks *G. morsitans* should be considered not guilty until the contrary is proved.

At present it would appear that not only tsetses but all biting-flies must be considered as possible carriers. Thus in the French Congo, Martin Lebœuf and Rubaud[5] have noted how young children are often affected, and think that certain "domestic" insects, such as mosquitoes of the genera *Stegomyia* and *Mansonia* may be to blame. This, however, requires confirmation. In Rhodesia all the work goes to show that the transmission is mechanical.

Koch,[6] as a result of work in Uganda and German East Africa, is of opinion that though it may be possible to infect *G. fusca* and *G. pallidipes* with the trypanosome, this must occur so rarely under natural conditions that they may be disregarded as conveyers of the trypanosomes. The same may be said of *G. morsitans*, which, he thinks, attacks man very exceptionally. This is contrary to the experience of most observers, and certainly, in the Bahr-El-Ghazal, *G. morsitans* is a pest to man and animals alike.

Koch also notes that though dogs and monkeys are known to have become naturally infected, the occurrence is so rare and the animals have died so quickly after infection that practically they may be disregarded as reservoirs of the disease.

He has further drawn attention to the probability of the disease being communicated by coitus. Thus, of 26 women in the German segregation camp, where there was a total of 425 cases, 7 had never been in sleeping sickness regions. It would seem that they

---

[1] Wellman, F. C. (August 1st, 1907), "Description of a Diplococcus found in the lesions of a severe, chronic pemphigoid Disease in West Africa." *Journal of Tropical Medicine and Hygiene*, Vol. X.

[2] Clegg, M. E., and Wherry, W. B. (March 2nd, 1906), "The Etiology of Pemphigus Contagiosus in the Tropics." *Journal of Infectious Diseases*, Vol. III. Chicago.

[3] Reviewed in *Lancet*, April 11th, 1908, p. 1110, Vol. I. 1908.

[4] Neave, S. (April 25th, 1908), "Distribution of Glossina." *British Medical Journal*, Vol. I. 1908.

[5] Martin, G., Lebœuf and Rubaud (March 11th, 1908), "Epidémies de maladie du sommeil au Congo Français." *Bull. Soc. Path. Exot.*, Vol. I.

[6] Koch, R. (November 14th, 1907). *Deut. Med. Woch.*, p. 1889. Quoted in *Lancet*, 30th November, 1907, p. 1578.

Journal of the Royal Institute of Public Health, December, 1907, p. 751.

Journal of Tropical Medicine and Hygiene, February 15th, 1908, p. 68.

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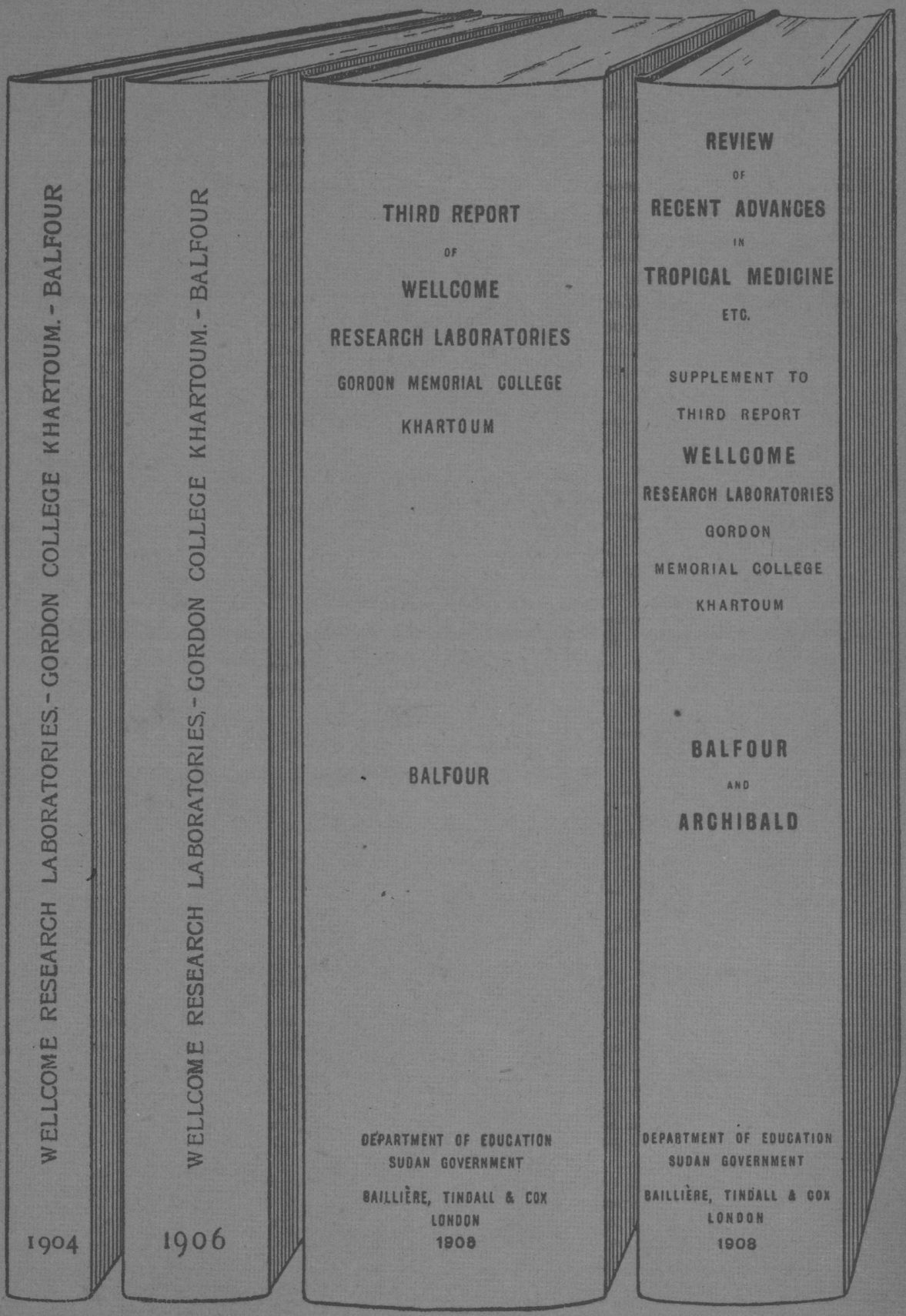

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