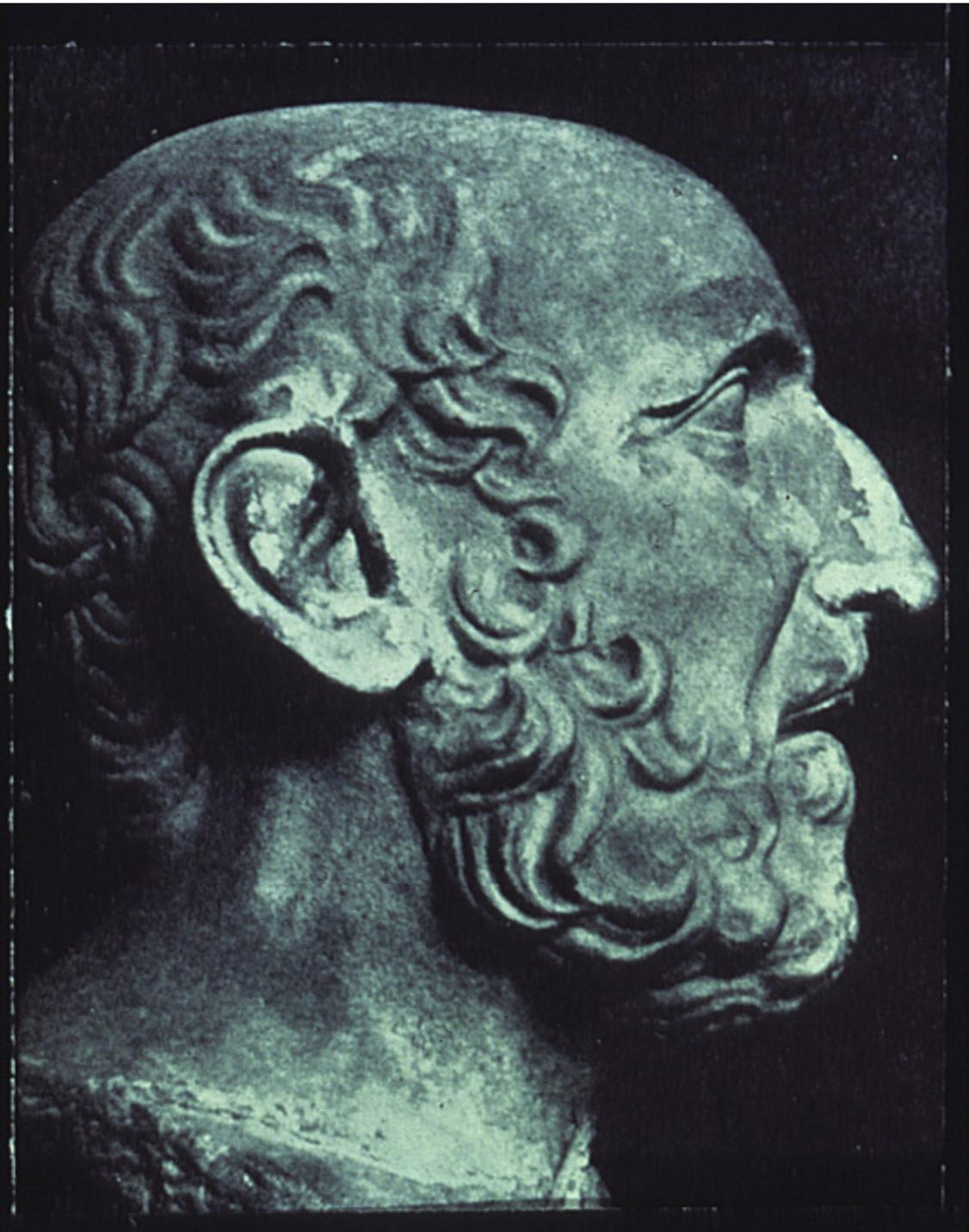


A History of Tropical Medicine

Dale C. Smith, PhD

Professor

Department of Medical History



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THE HEALTH OF THE ARMY - I

“IN REGARDS TO SPOTS TO PLACE A CAMP, SOLDIERS MUST NOT REMAIN FOR TOO LONG NEAR THE LOCATIONS OF UNHEALTHY MARSHES, NOR IN ARID SITUATIONS, NOR ON HILLS WITHOUT TENTS IN THE SUMMER.

THEY OUGHT NOT TO BEGIN THEIR MARCH TOO LATE IN THE DAY, LEST THEY CONTRACT DISEASE DUE TO THE SUN’S HEAT.

THE SOLDIER WHO MUST ENDURE COLD WITHOUT PROPER CLOTHING IS NOT IN A STATE TO HAVE GOOD HEALTH OR TO MARCH.’’

FL. VEGETIUS RENATUS
De Re Militari, 390 AD

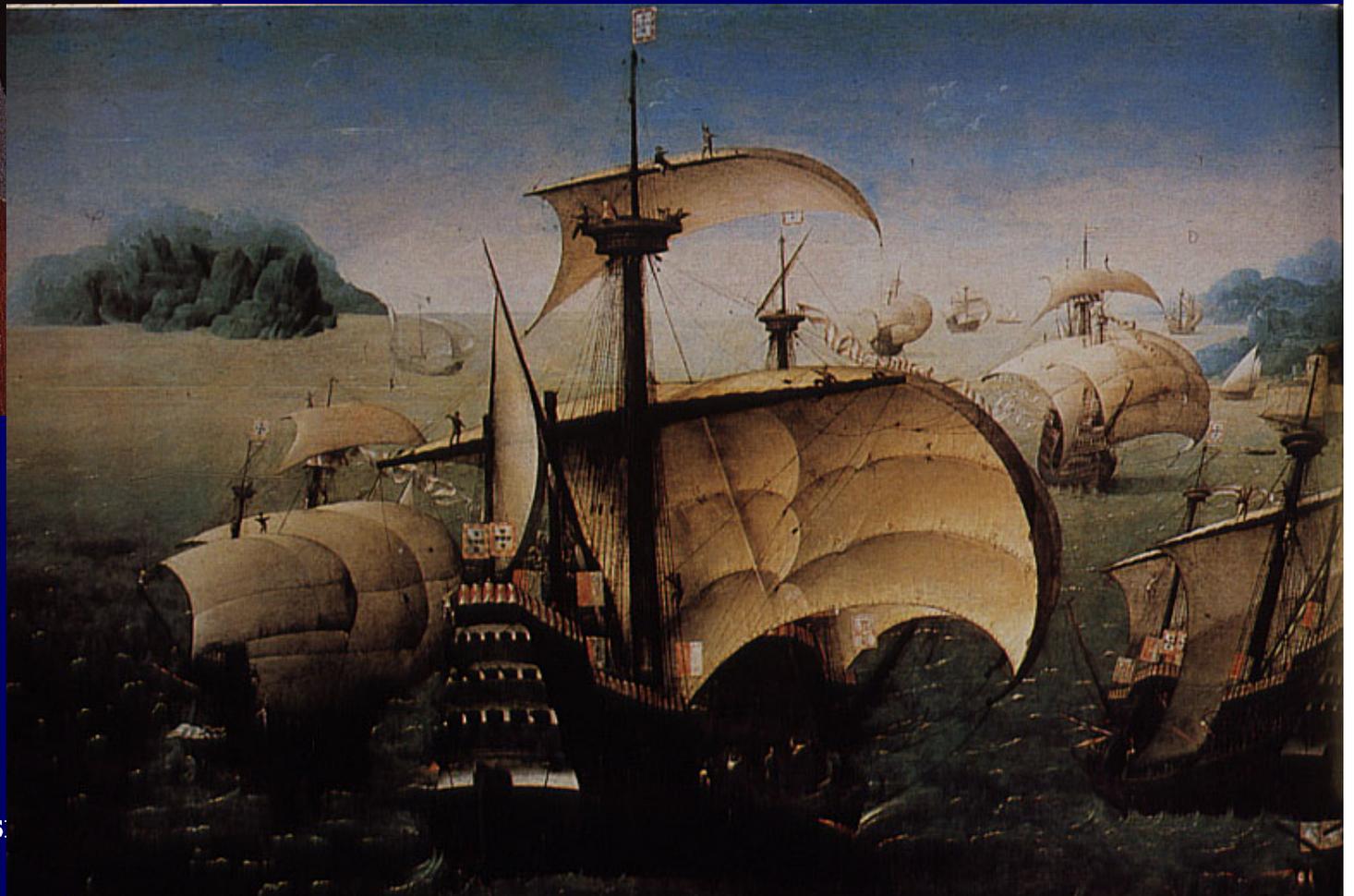
THE HEALTH OF THE ARMY - III

“THE UNREMITTING DILIGENCE OF THE GENERAL’S TRIBUNES, AS WIELDING THE HIGHEST AUTHORITY, WILL BE REQUIRED, SO THAT THEIR SICK COMRADES MAY BE RESTORED BY SEASONABLE ARTICLES OF FOOD AND BE CURED BY THE SKILL OF THE PHYSICIANS. FOR IT IS DIFFICULT TO MANAGE WITH THOSE WHO ARE AT THE SAME TIME OPPRESSED WITH THE EVILS OF DISEASE AND WAR”

FL. VEGETIUS RENATUS
De Re Militari, 390 AD



**Prince Henry,
the Navigator**





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e Lapideibus.

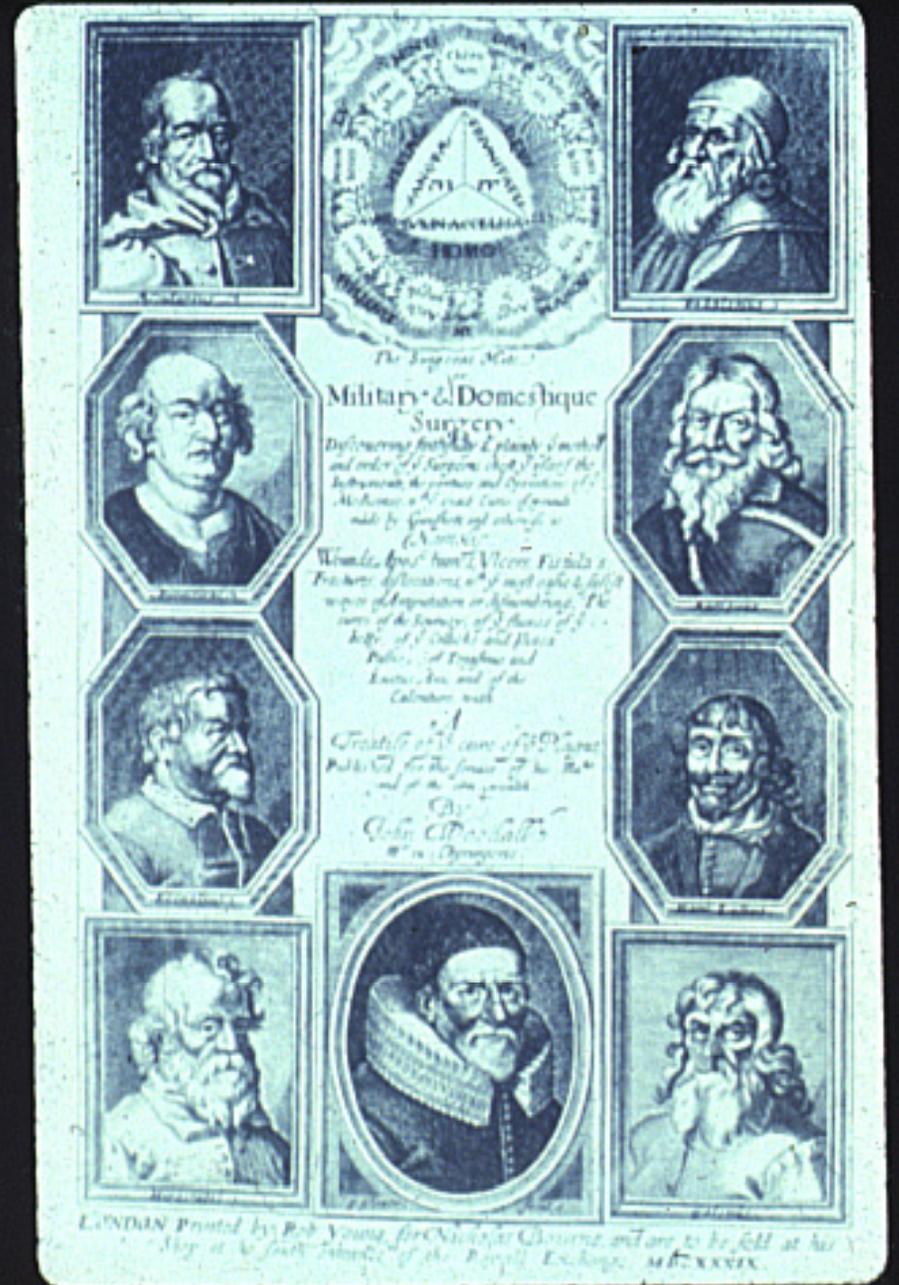
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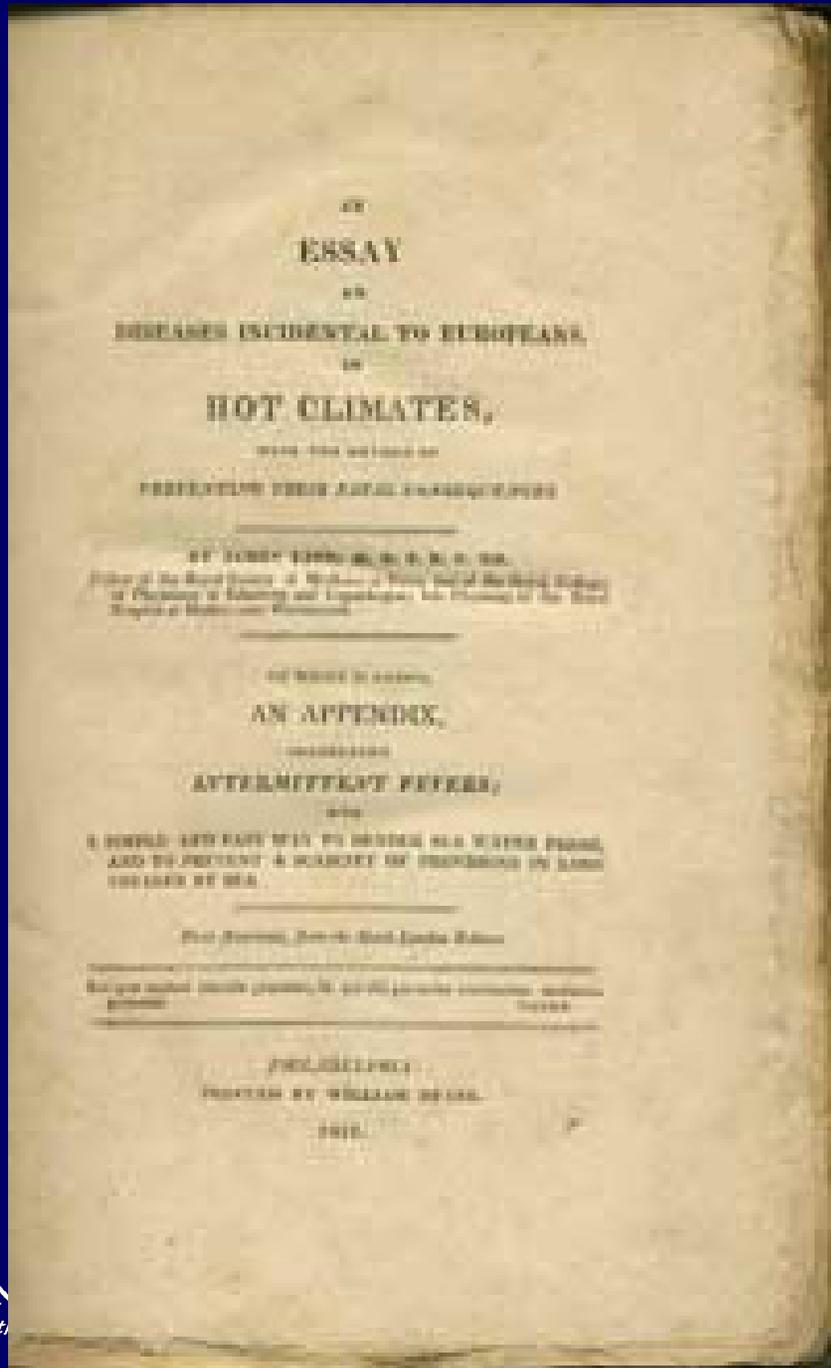


Agda z Sandariso. Usidous
Sagda est gemma prasini colo
ris apud caldeos. cuius tata vis





- Slow acceptance of bark
 - Religion
 - Lack of science
- Problems of natural variability
- Problem of diagnosis









METEOROLOGICAL REGISTER

FOR THE

YEARS 1822, 1823, 1824 & 1825,

FROM

OBSERVATIONS

MADE

BY THE SURGEONS OF THE ARMY.

AT THE

MILITARY POSTS OF THE UNITED STATES.

PREPARED UNDER THE DIRECTION OF

JOSEPH LOVELL, M. D.

SURGEON GENERAL OF THE UNITED STATES' ARMY.

WASHINGTON.

PRINTED BY EDWARD DE KRAFFT.

1826.



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PELLETIER & CAVENTOU
ROYAL DE FRANCE
INSTITUT EN 1820

LEVAILLANT 1827
INCORPORATION ET RECOMPENSE MEDICALE
DELONDRE 1854

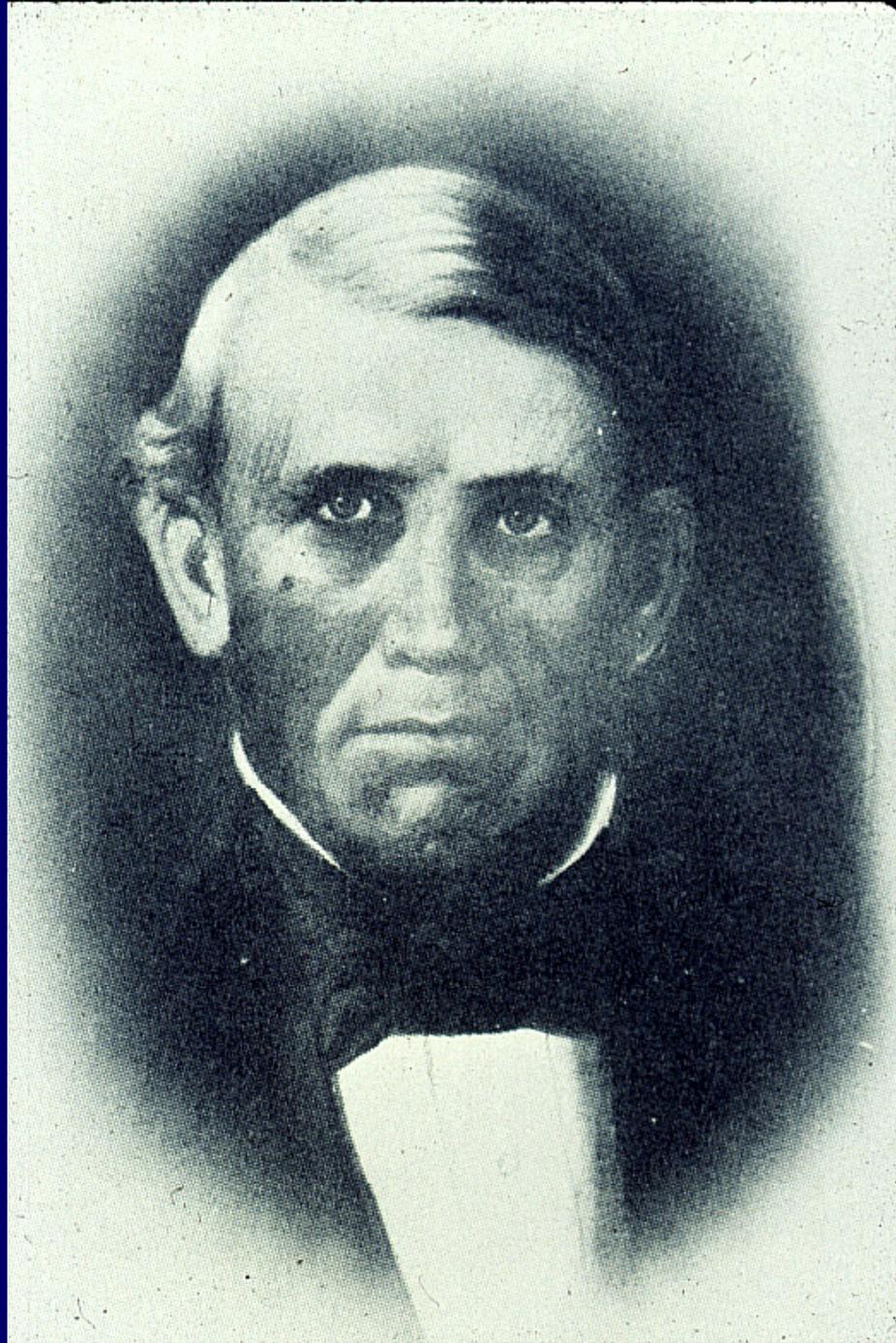
MÉDAILLES D'OR ET DE 1^{re} CLASSE, 1859-1855.

SULFATE de QUININE
DE
**Pelletier, Delondre
et Levailant**
1 Once Angl^{se}

ARMET DE LISLE et C^{ie}
SUCCESSIONS
PARIS, RUE MALHER, 18

SULFATE DE QUININE DES 5 CACHETS

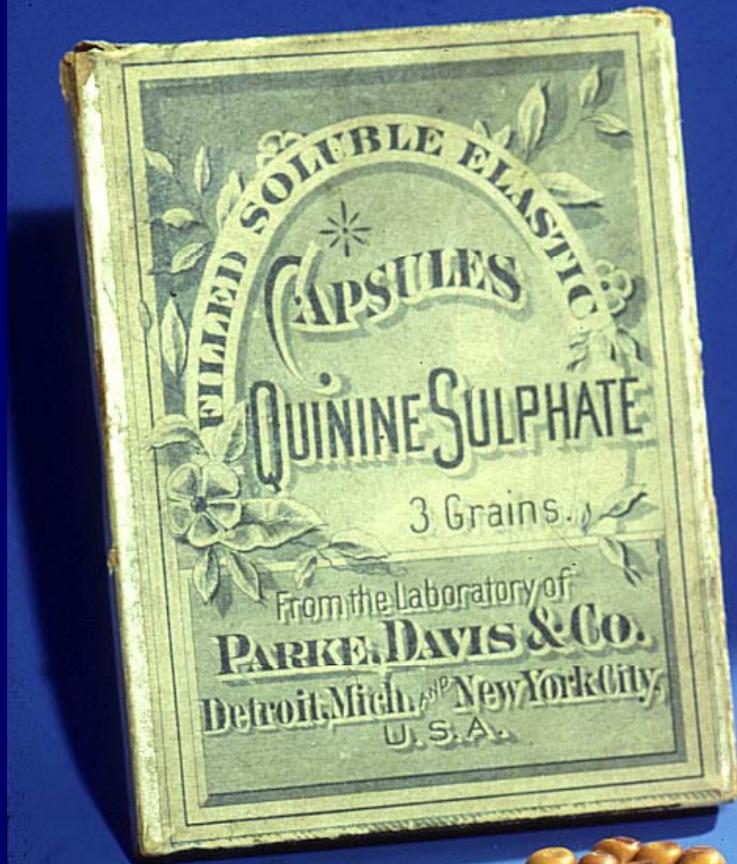
SULFATE DE QUININE DES 5 CACHETS



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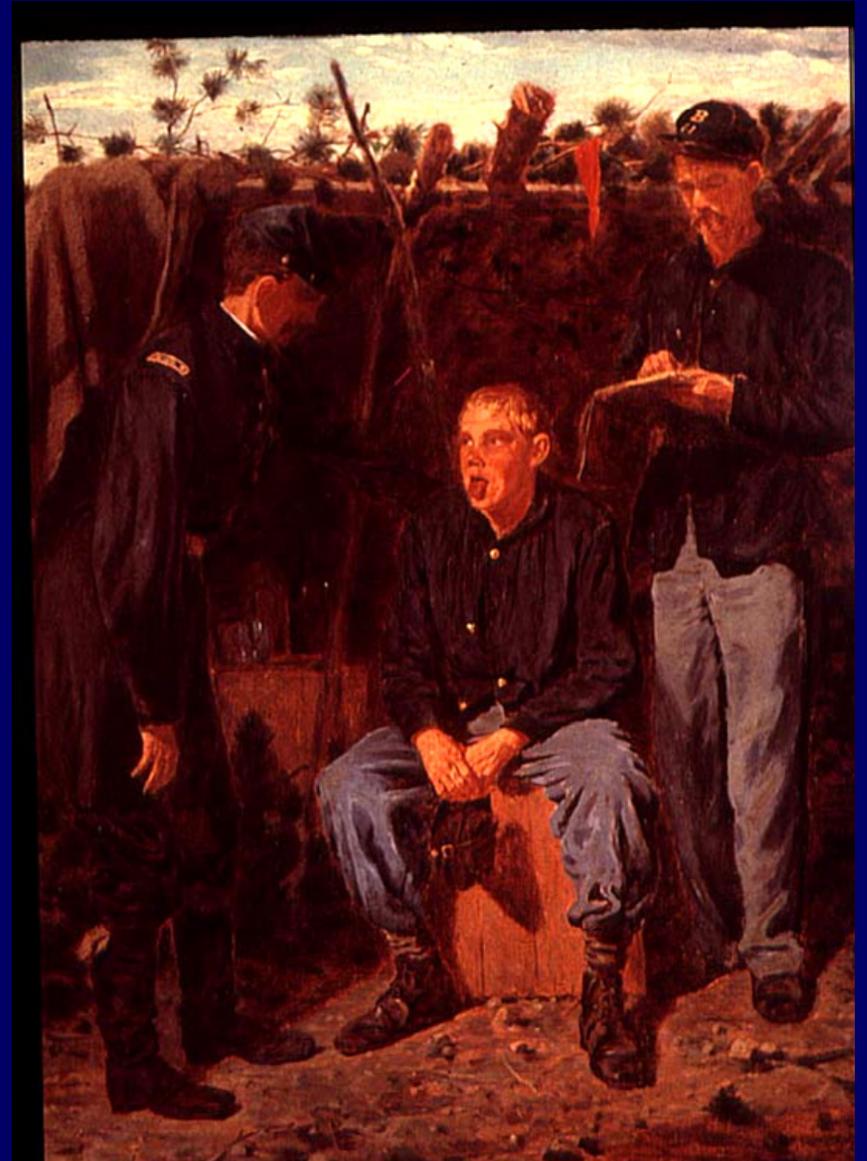
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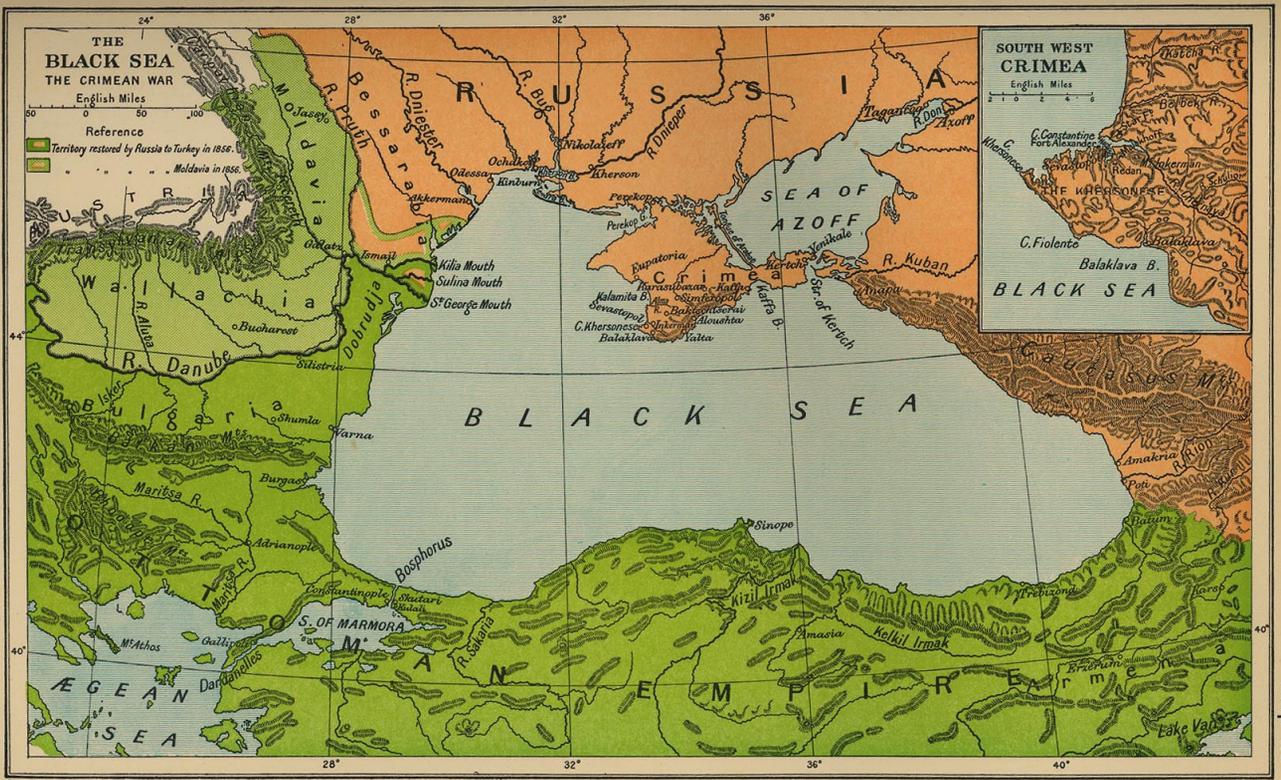


Civil War

USA 19 tons

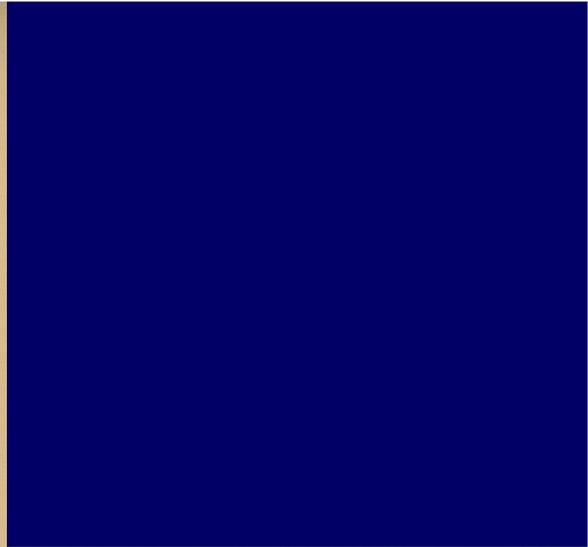
Prophylactic use?



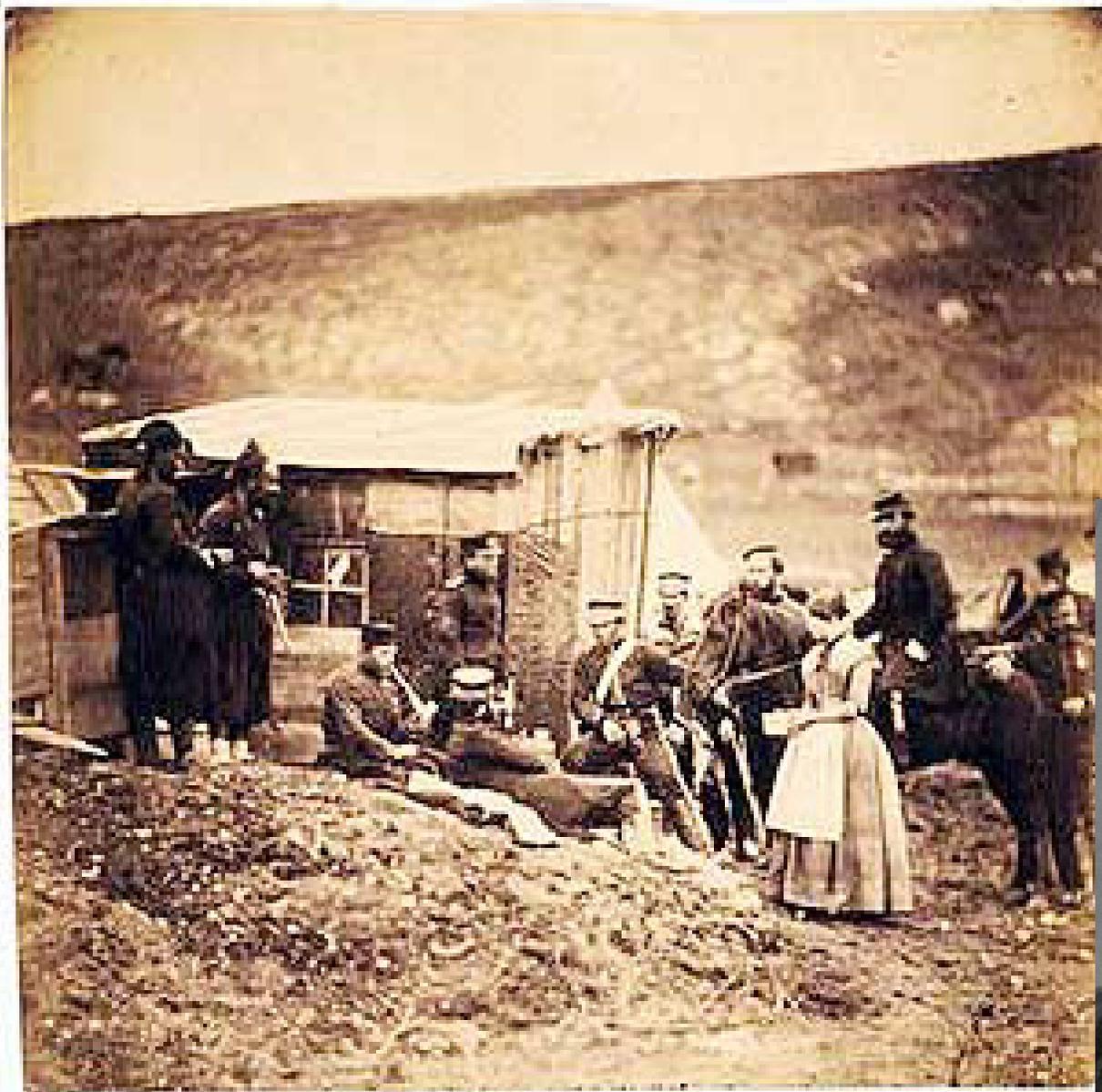


Cambridge University Press.

Stanford's Geog. Esab



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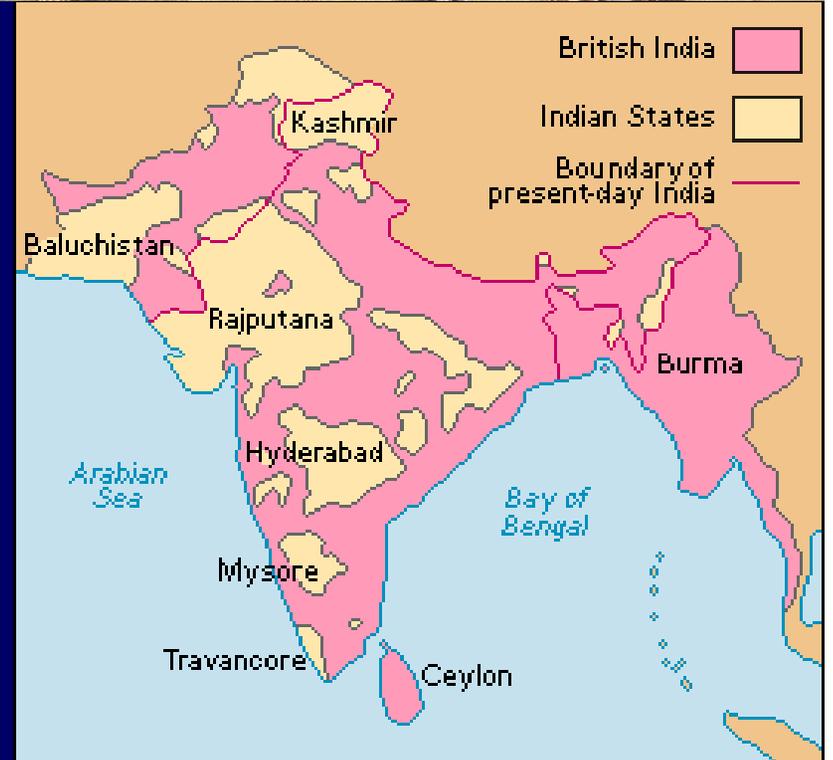
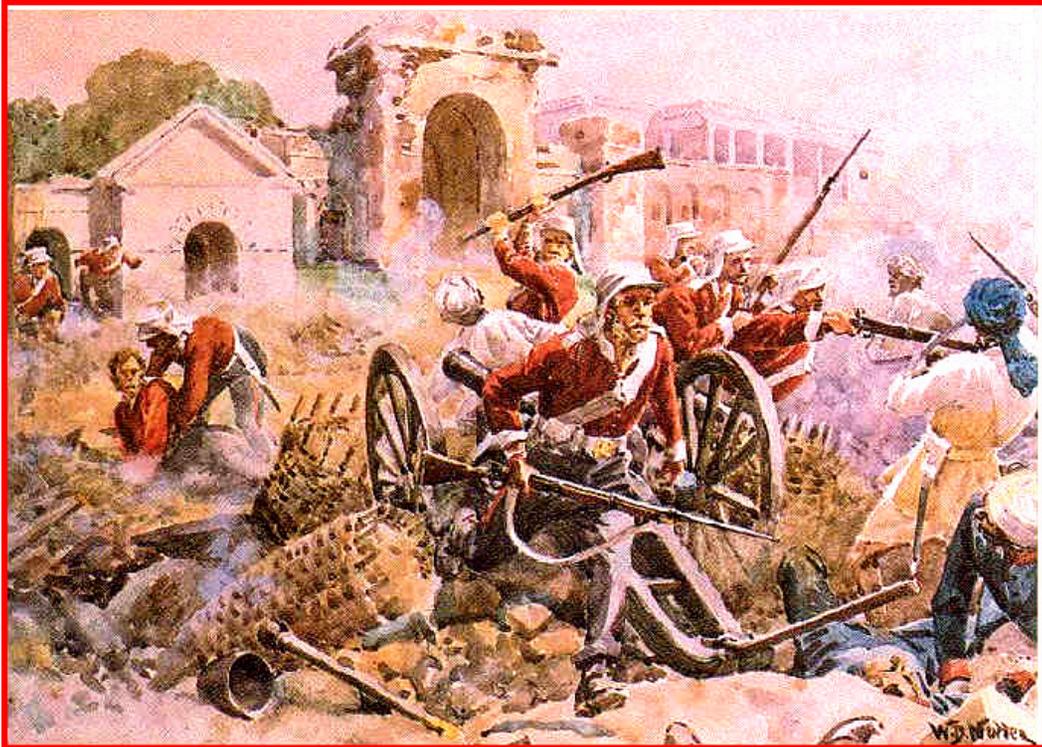
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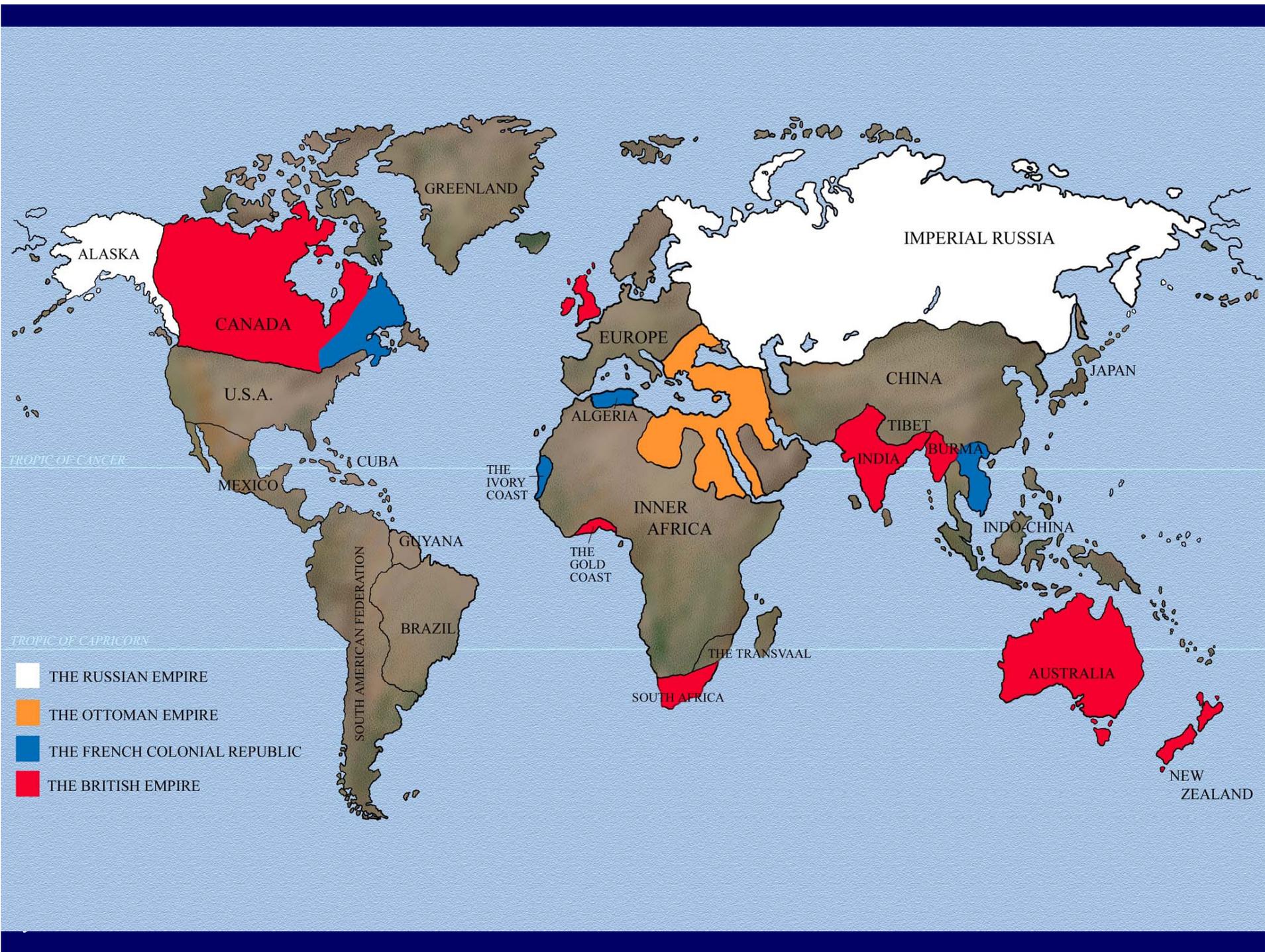




Netley Hospital



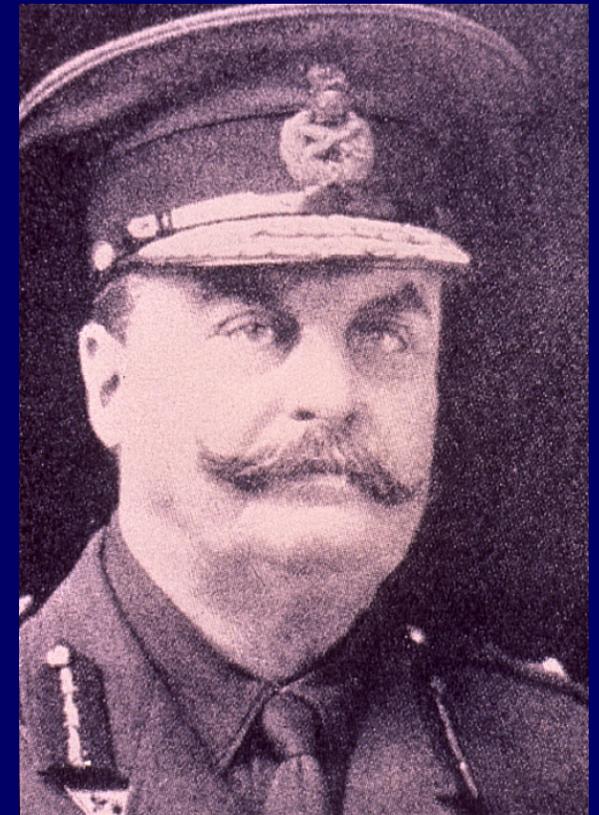








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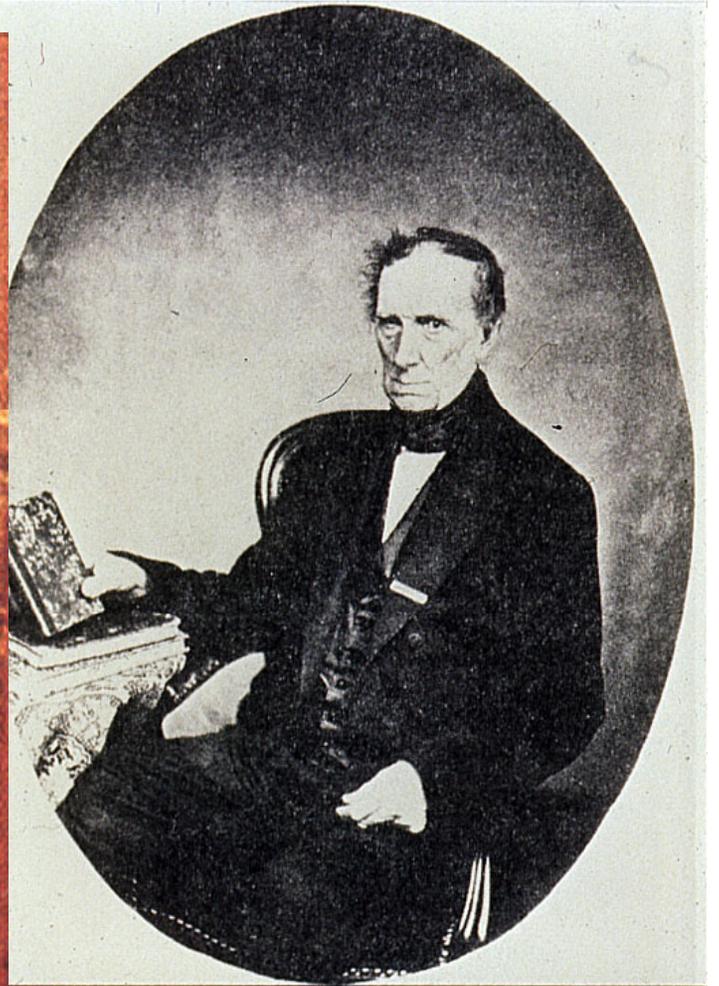
Mal aria (Ital.)

Bad air

Malarial fevers

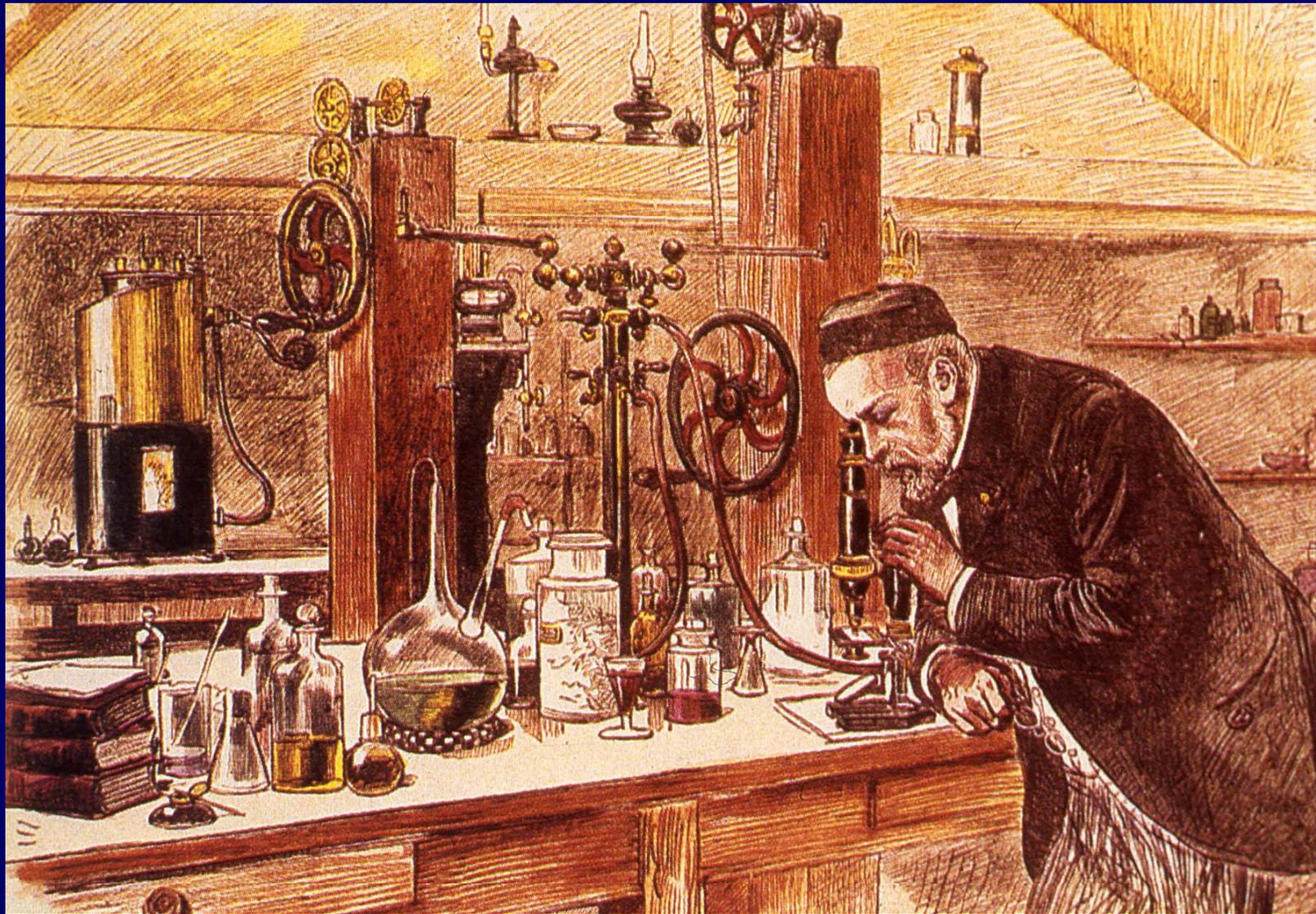
Malaria as Dx



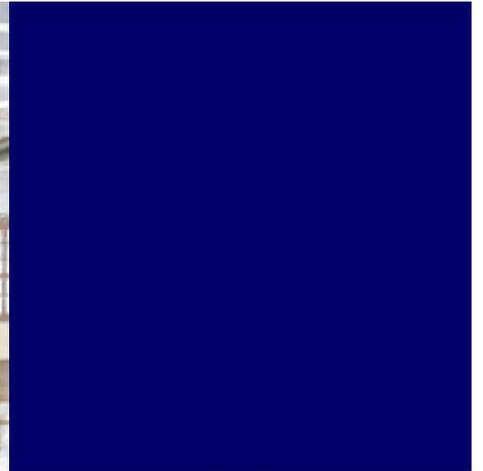
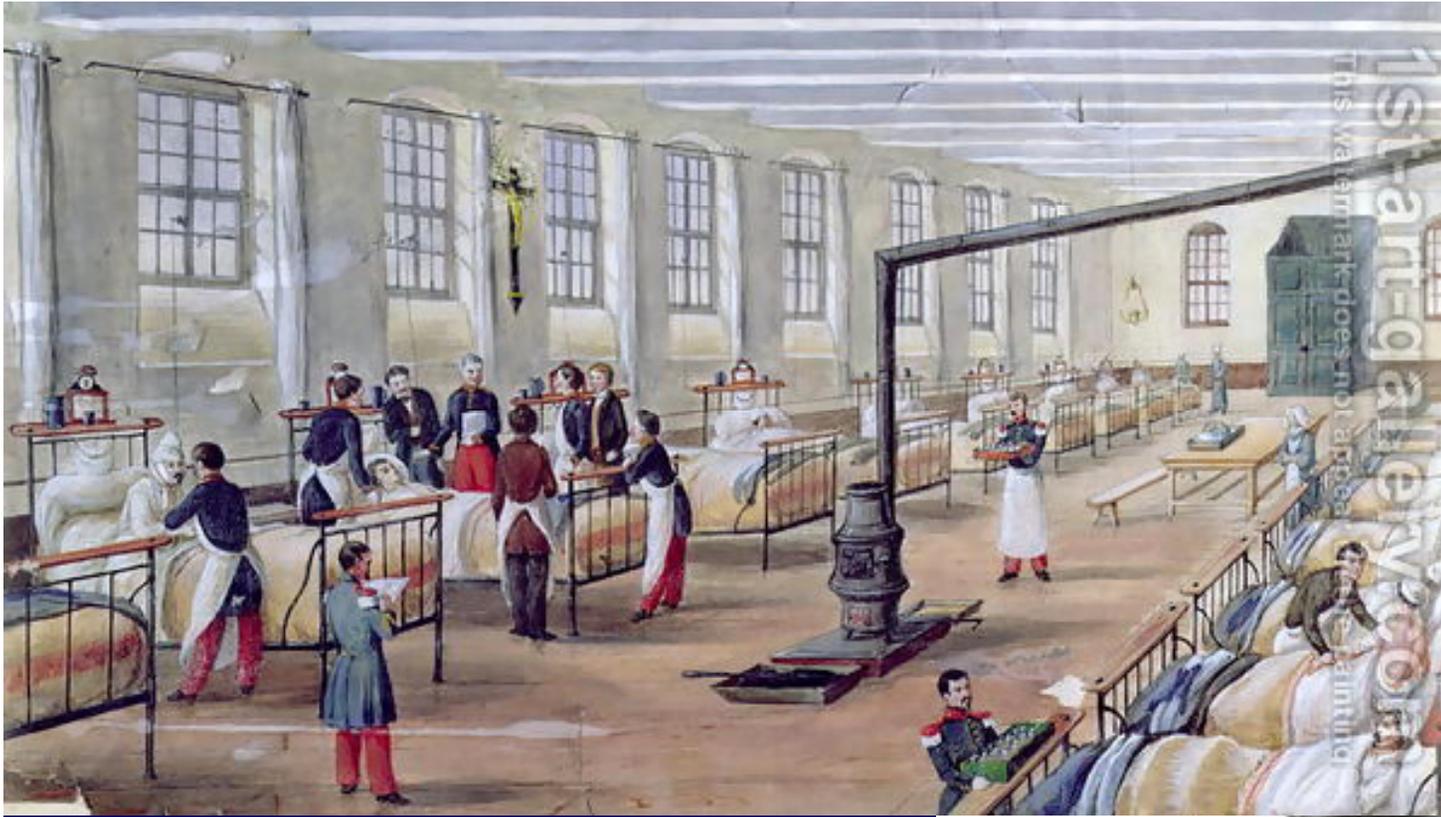




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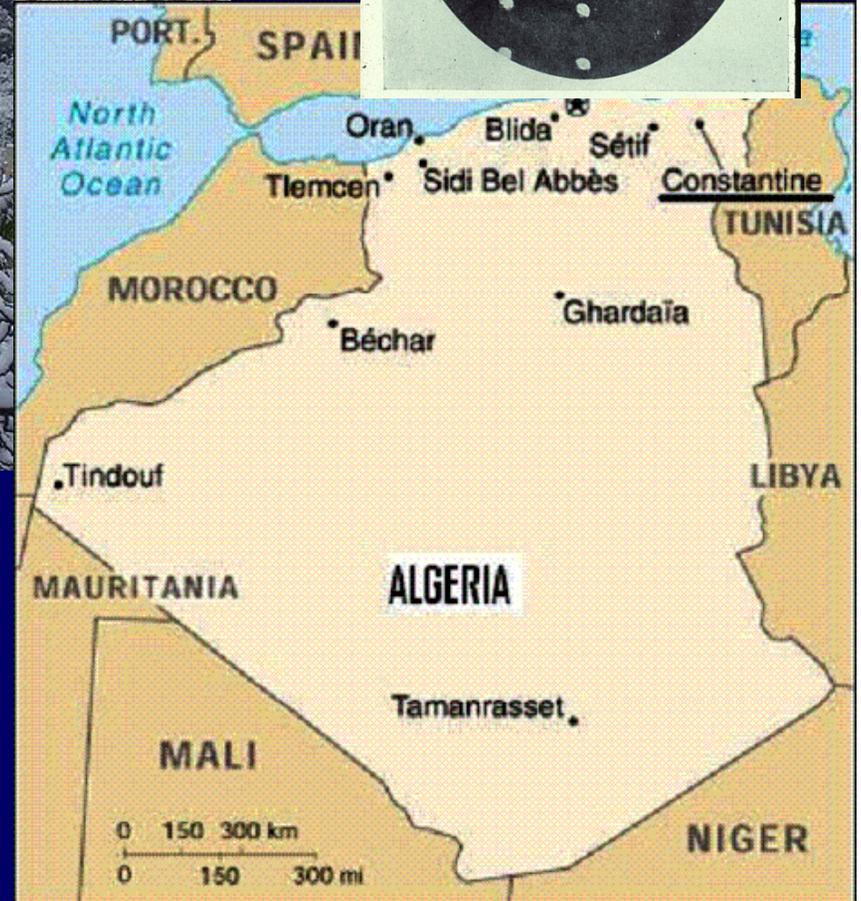
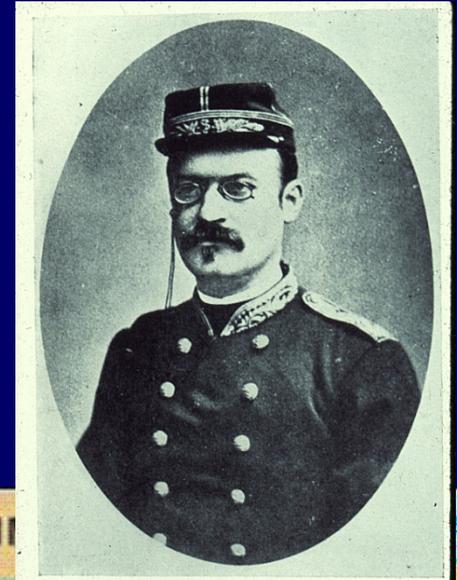
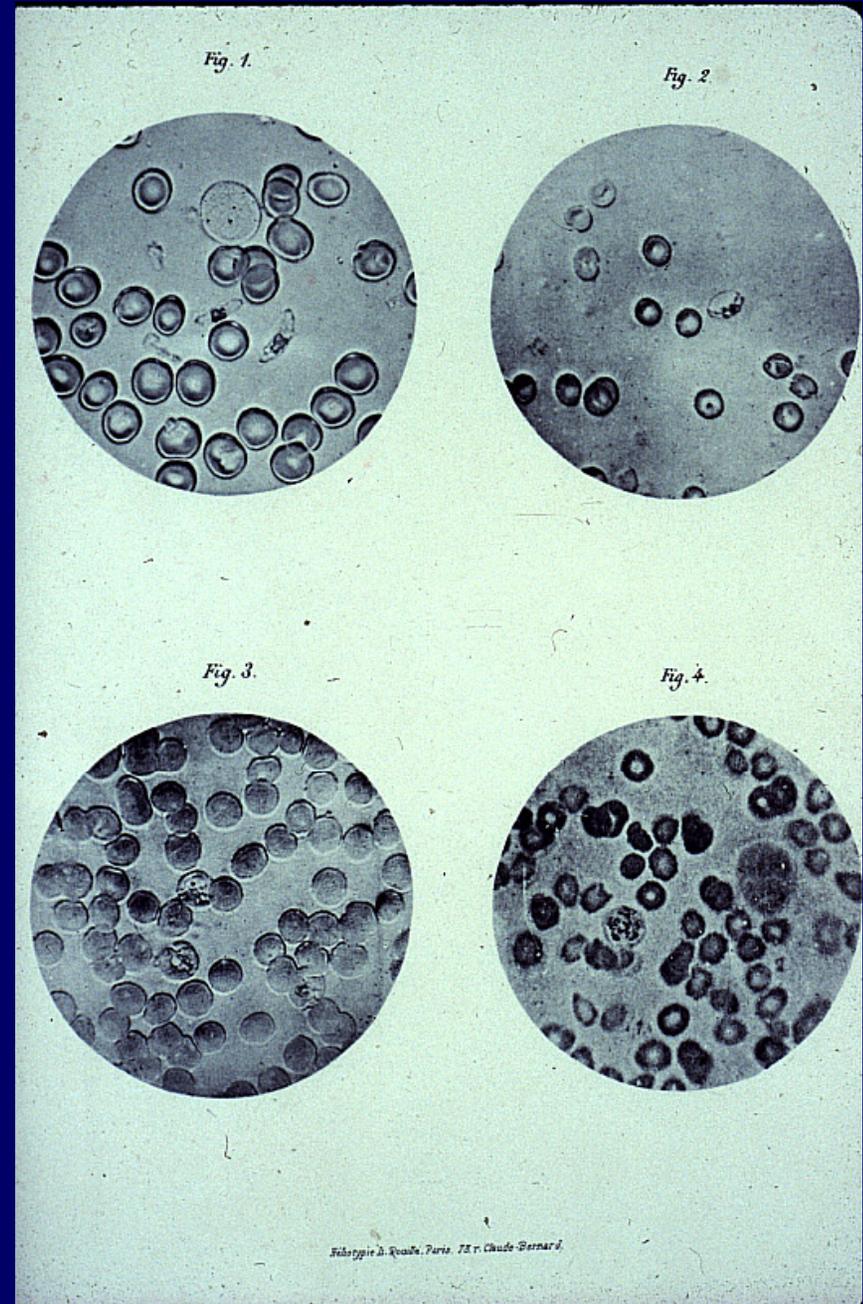
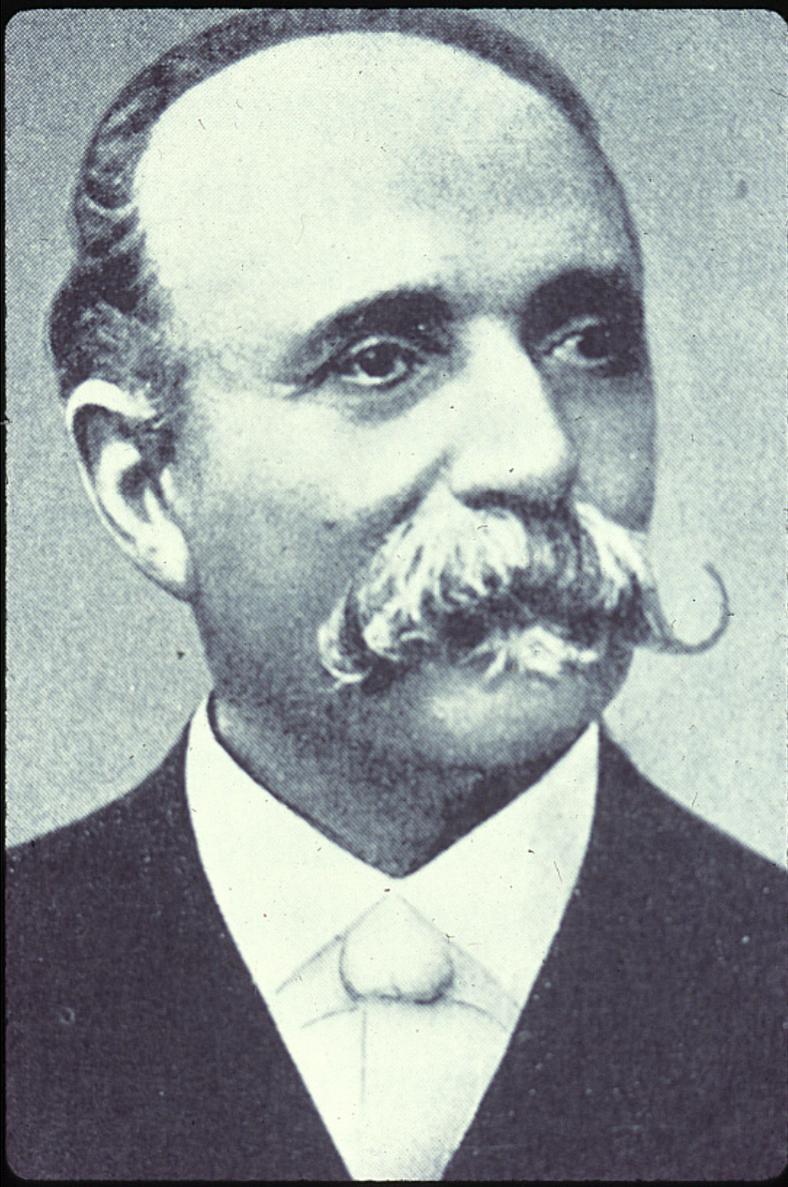
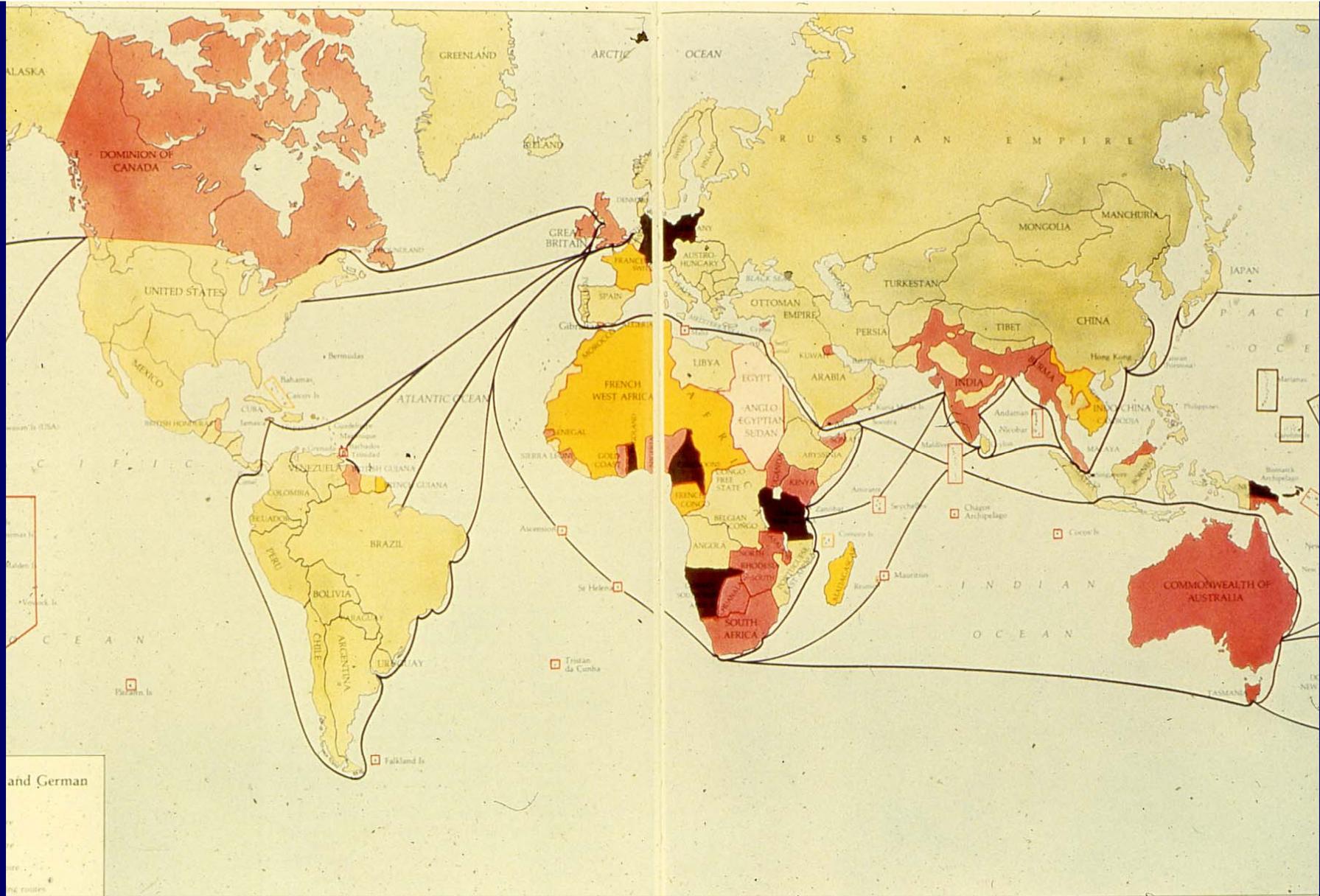




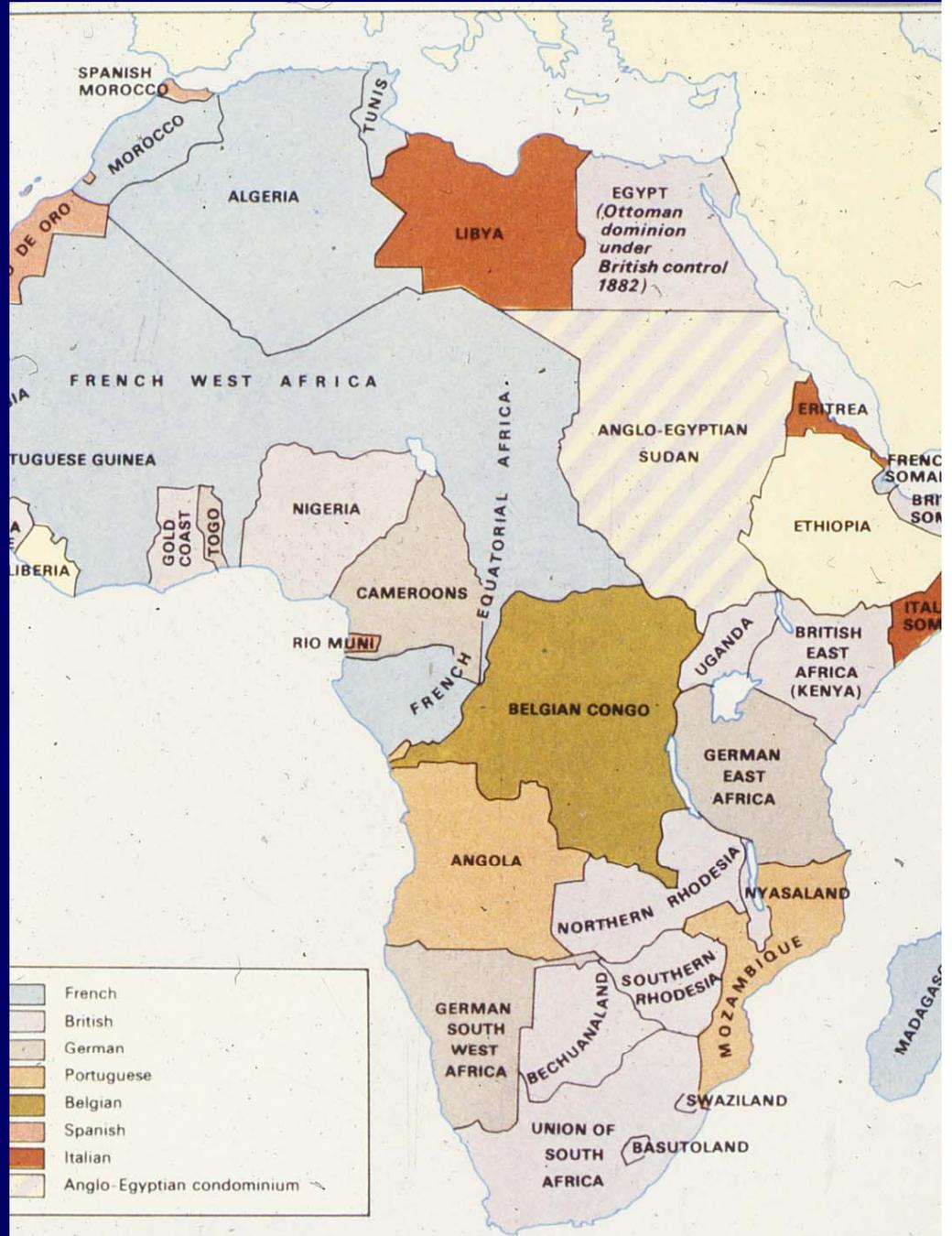
FIG. 3. PROF. LAVERAN AS A CAPTAIN WHEN HE MADE HIS DISCOVERY OF THE MALARIA PARASITE.

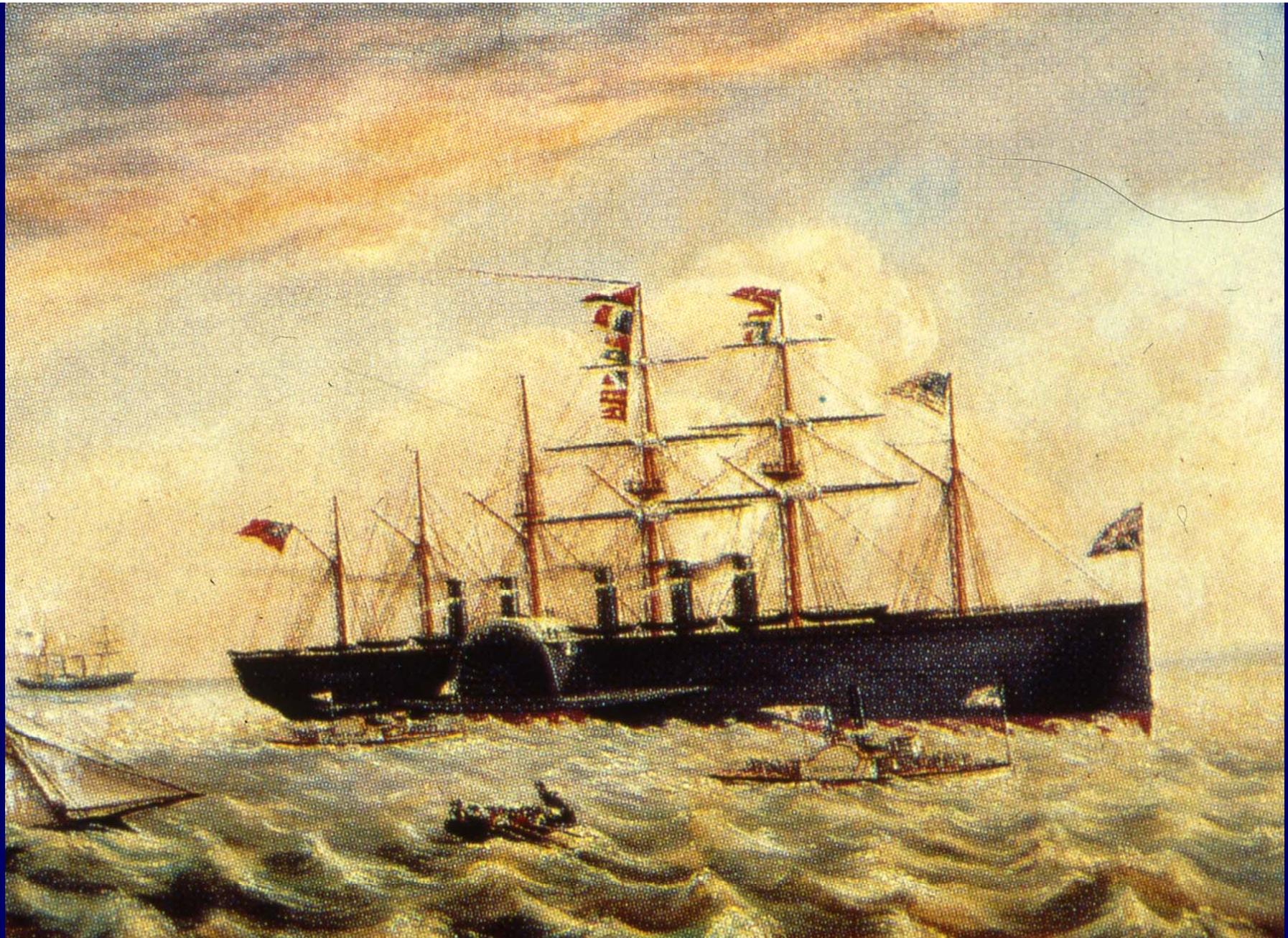


Histologie de Roule, Paris. 73 r. Claude-Bernard.







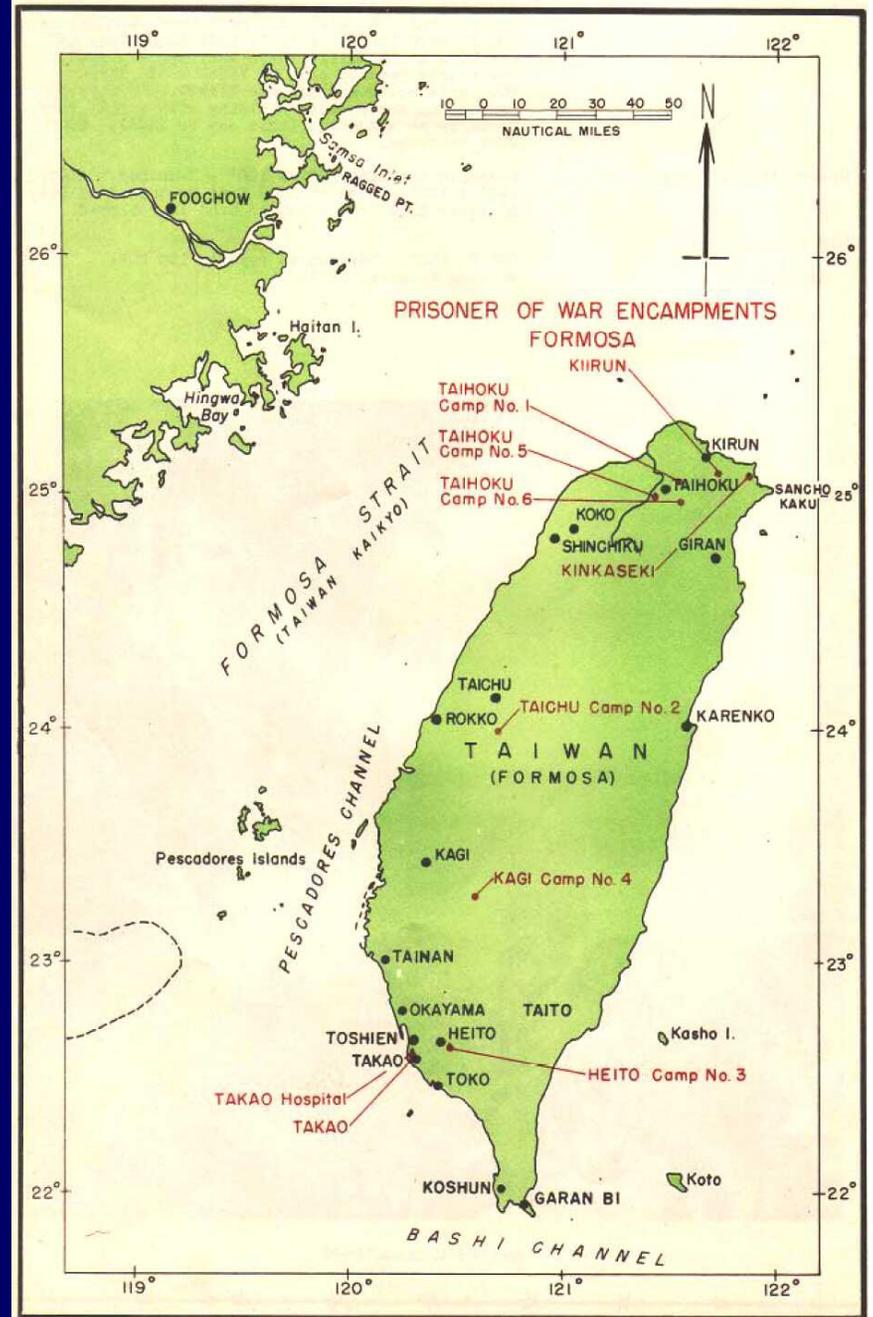


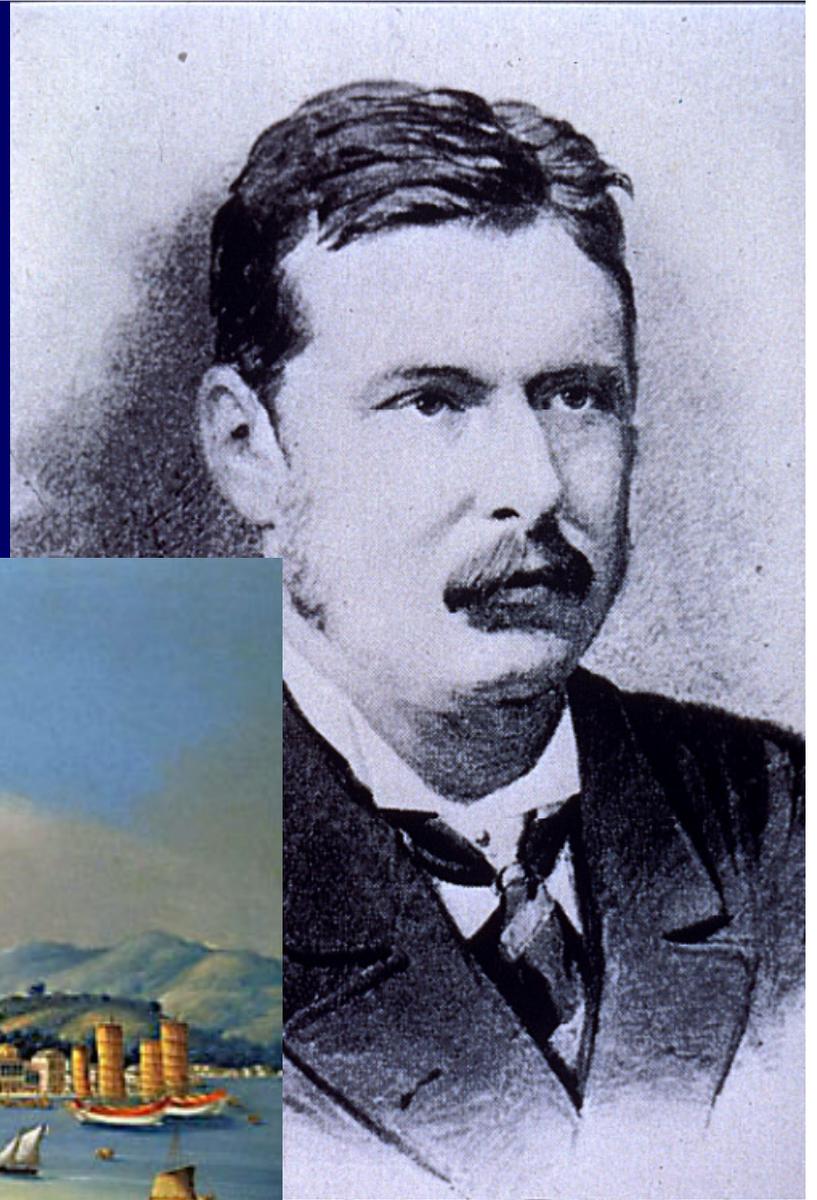
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FORMOSA

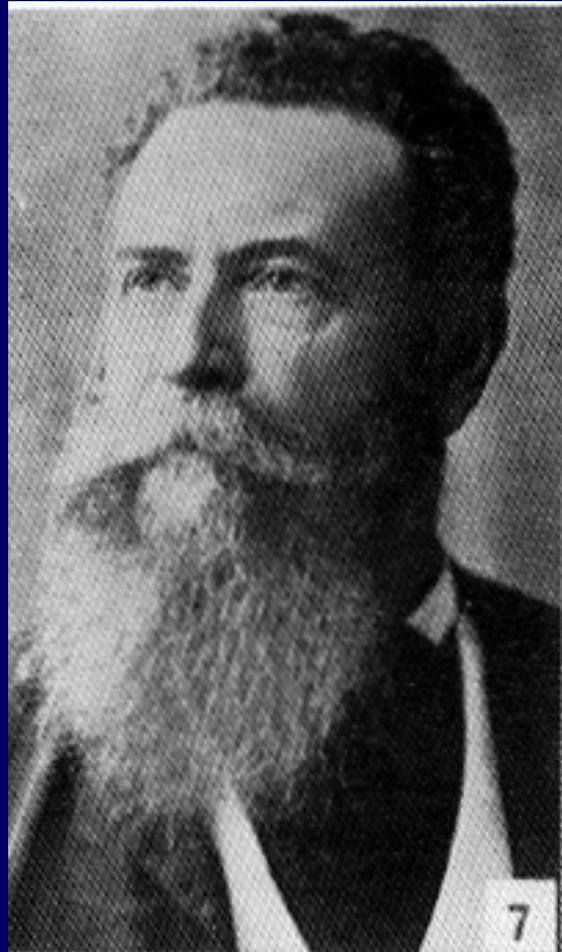






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Planché. 19.

Morceau de *Tenia* de la Seconde espece, lequel apres avoir commence' à sortir par l'extremite' opposée à la teste, et avoir esté rompu en dehors à sa sortie, est rentré dans le corps du malade, mais au bout d'un mois a reparu, ayant repoussé à l'endroit rompu que M^r Andry qui a chassé ce ver, et qui le conserve, avoit à dessein fait traverser d'une Soye à un peu au dessus de cet endroit B, afin que en cas que le ver vint à recroistre l'yeu pût lors qu'il sortiroit, se convaincre du fait. Il faut observer icy les deux ventres marquez. C. D. le ventre C. est emboité par ses deux extremités, et le ventre D. emboité par les deux *Tennis*. Ce qui est tres singulier, chaque ventre du *Tenia* estant regulierement emboité par une extremité dans celui qui le precede, et emboitant par l'autre celui qui le suit. Les deux endroits marquez E. F. sont encore tres dignes d'attention.



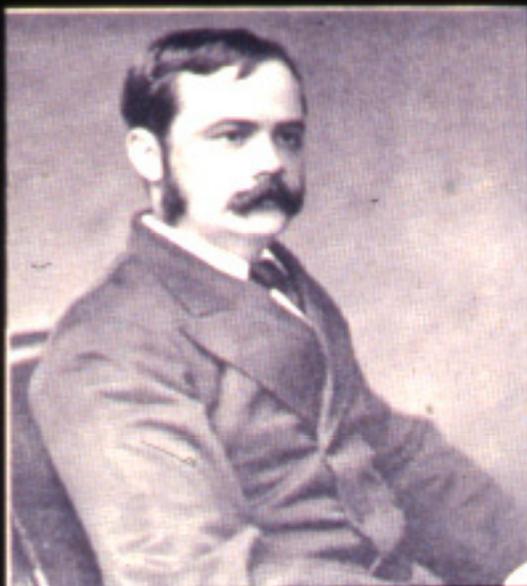
Nicolas Andry, 1741





“Some threadlike worms which were very thin at one end and blunt at the other. ... They were alive and were making very brisk, wavy motions. They had the diameter of a white blood corpuscle and their length exceeded that of the later, 60 or 70 times.

Otto Wucherer, 1866



Timothy Lewis

- March 1870 -- chylous urine
 - 15+ subsequent patients
- July 1872 -- nine worms, one slide patient lost
- Next patient, haematochyluria, confirm that evening
- *Filaria sanguinis hominis*



J. Steenstrup
*On Alternation
of Generations,*
1842

“I have laboured hard to find the parental form of the parasite, and am glad to tell you that I have now obtained five specimens of the worm, which are waiting to be forwarded by a trustworthy messenger.” J. Bancroft to T.S. Cobbald, April 1877



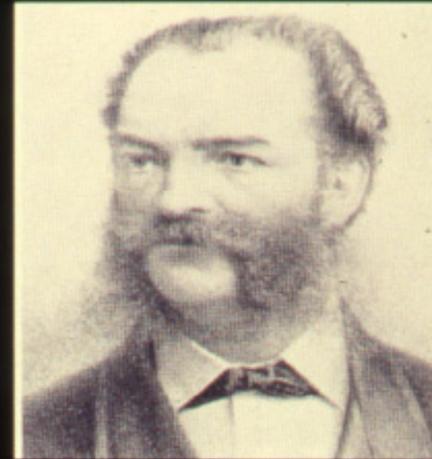
Lancet,
July 1877



Timothy Lewis

- 1877 mature filariae
- differentiated from dog *sp.* by sheath

“ ...the helminthologist of the future, when dealing with the discovery of this entozoon, will find himself obligated to bracket the names of four distinguished observers together... Wucherer, Lewis, Bancroft, and Manson.”



T.S. Cobbold, 1874

(Aug 10th 1877)

Wills brought me from Macquitos which he had
caught this morning in his mosquito net which was
covered with his blood. Examined them this morning
No. 1. Head capsules not distinct plenty of oil globules
in the oed degenerating head and several cylindrical bodies
of a pale grey colour situated on the surface. The head is



Many of myht have been embryos filariae drawn
from the mosquito

No 2. Head capsules also dissected: two heads
one of which had a distinct 10th pro movement of
the head half of body & the appearance of ciliary
curvature at mouth. The head distinct was at
the edge of fluid under slide to keep it from
drying attached

No 3. Head capsules distinct in both line
active filariae & in one of them 10 specimens - 5 in
a single field. Disposed from that in the mean
while in being perhaps more active - Tail not
well seen; anterior head large often very distinct
and no movement very apparent perhaps an oedema
of the developing. Double outline & indistinct
structure in little intersegment. Most distinct seen
in sketch. The yellow patch in center of body is

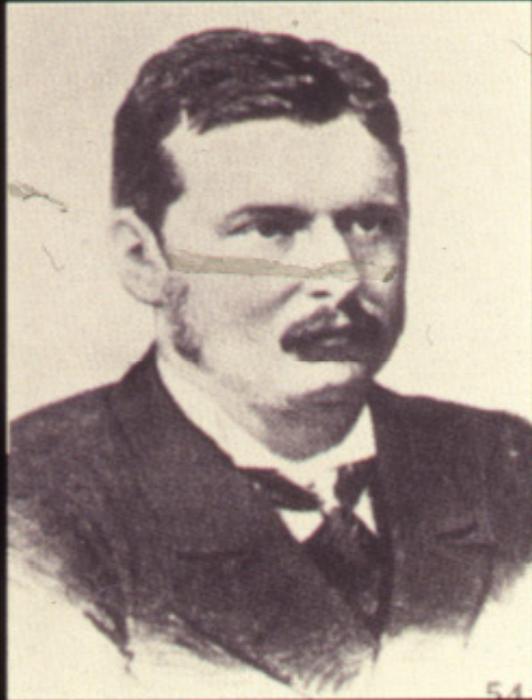
MANSON on MOSQUITOES -- 1870s



- Mosquito range = filariasis extent
- Life span too short
- Bite only once
- British Museum, no work, perhaps treatise on cockroaches will help.





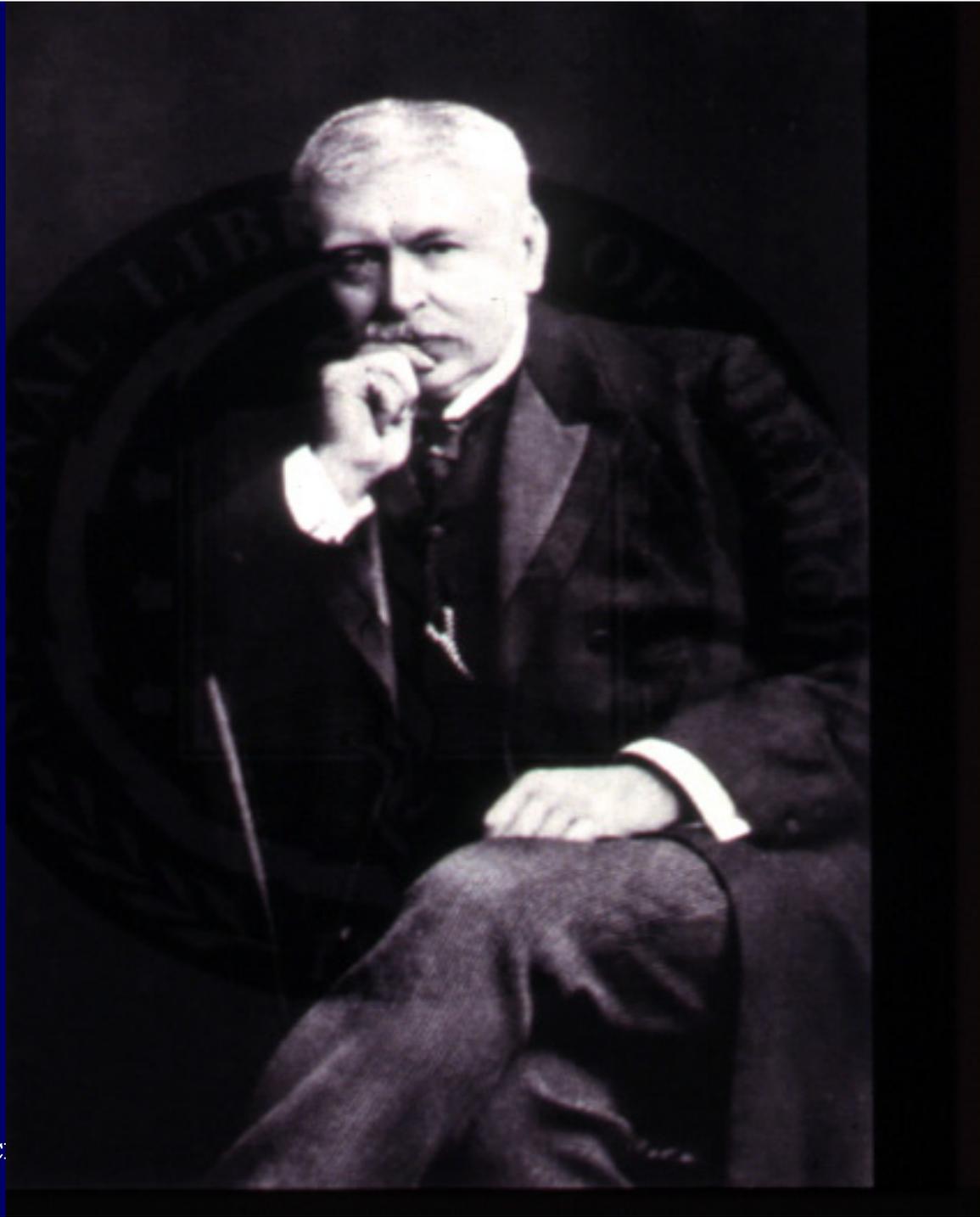


“There can be little doubt as to the subsequent history of the *Filaria*, or that, escaping into the water in which the mosquito died, it is through the medium of this fluid brought into contact with the tissues of man, and then either piercing the integuments, or what is more probable, being swallowed, it works through the alimentary canal to its final resting place. Arrived there its development is perfected, fecundation is effected, and finally the embryo filariae we meet within the blood are discharged.”



“...the haematozoon which entered the mosquito a simple, structureless animal, left it, after passing through a series of highly interesting metamorphoses, much increased in size, possessing an alimentary canal, and being otherwise suited for an independent existence.” 1877

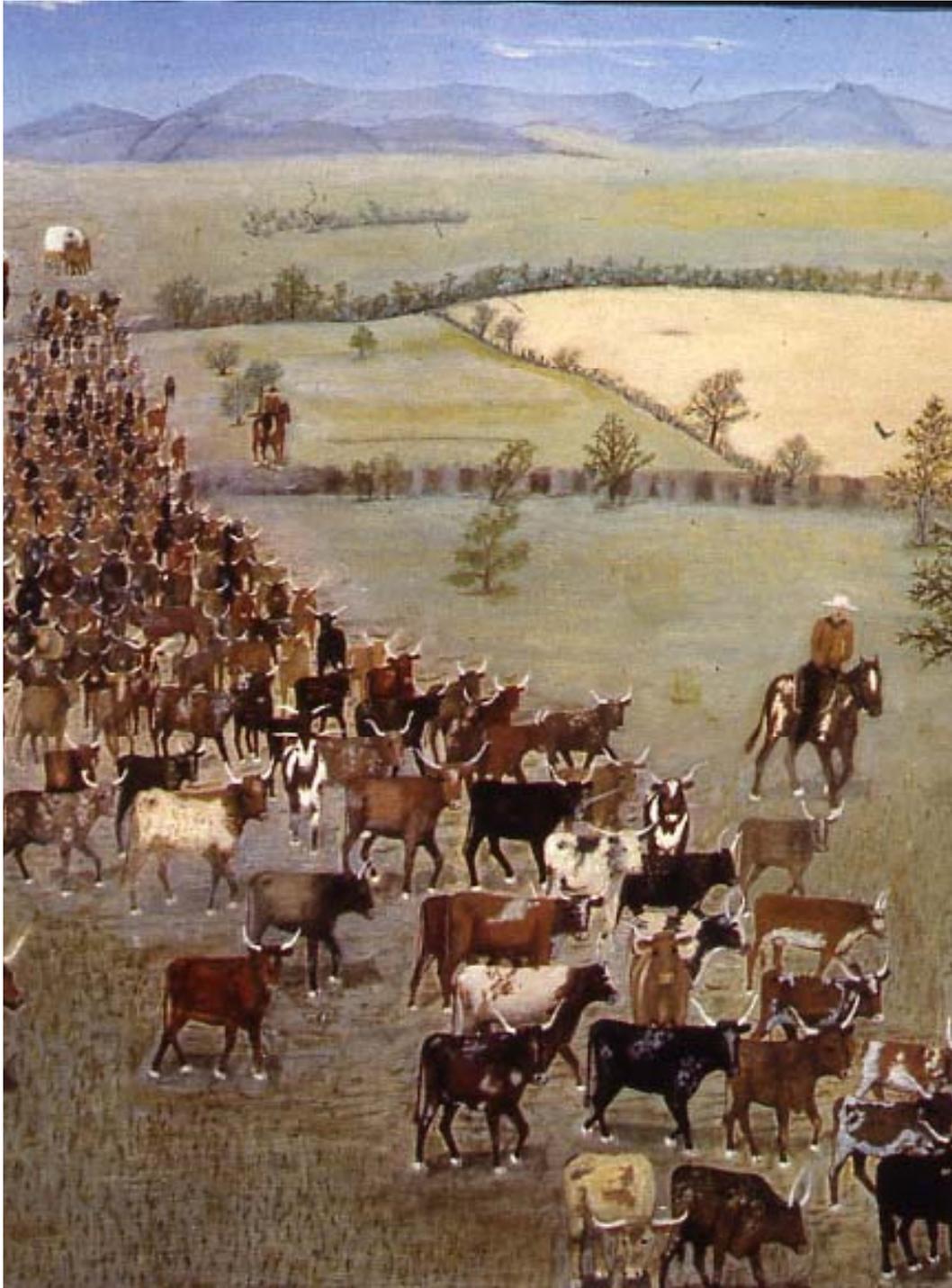




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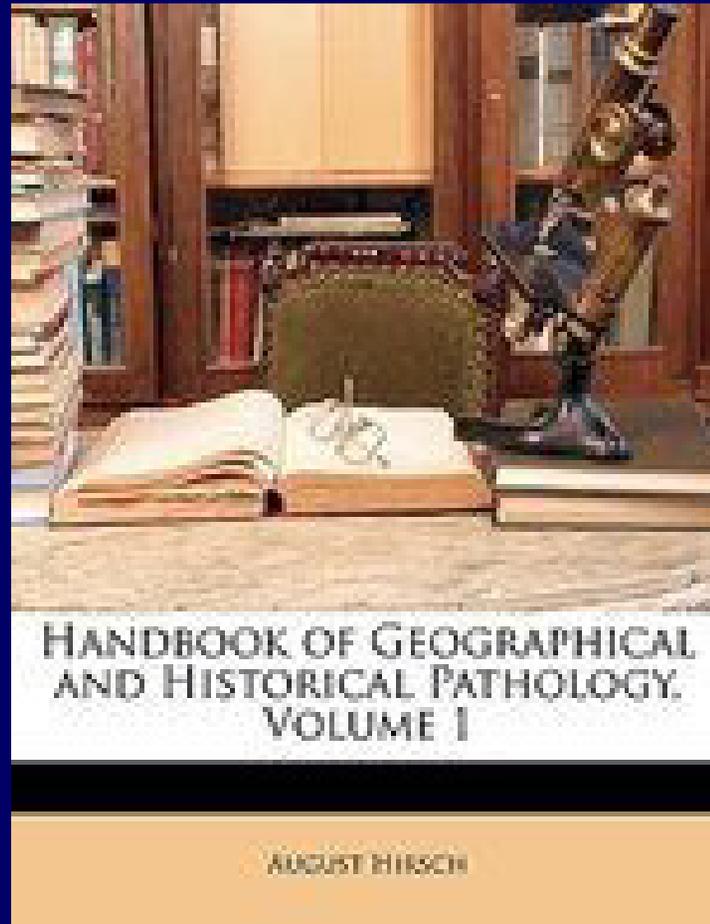


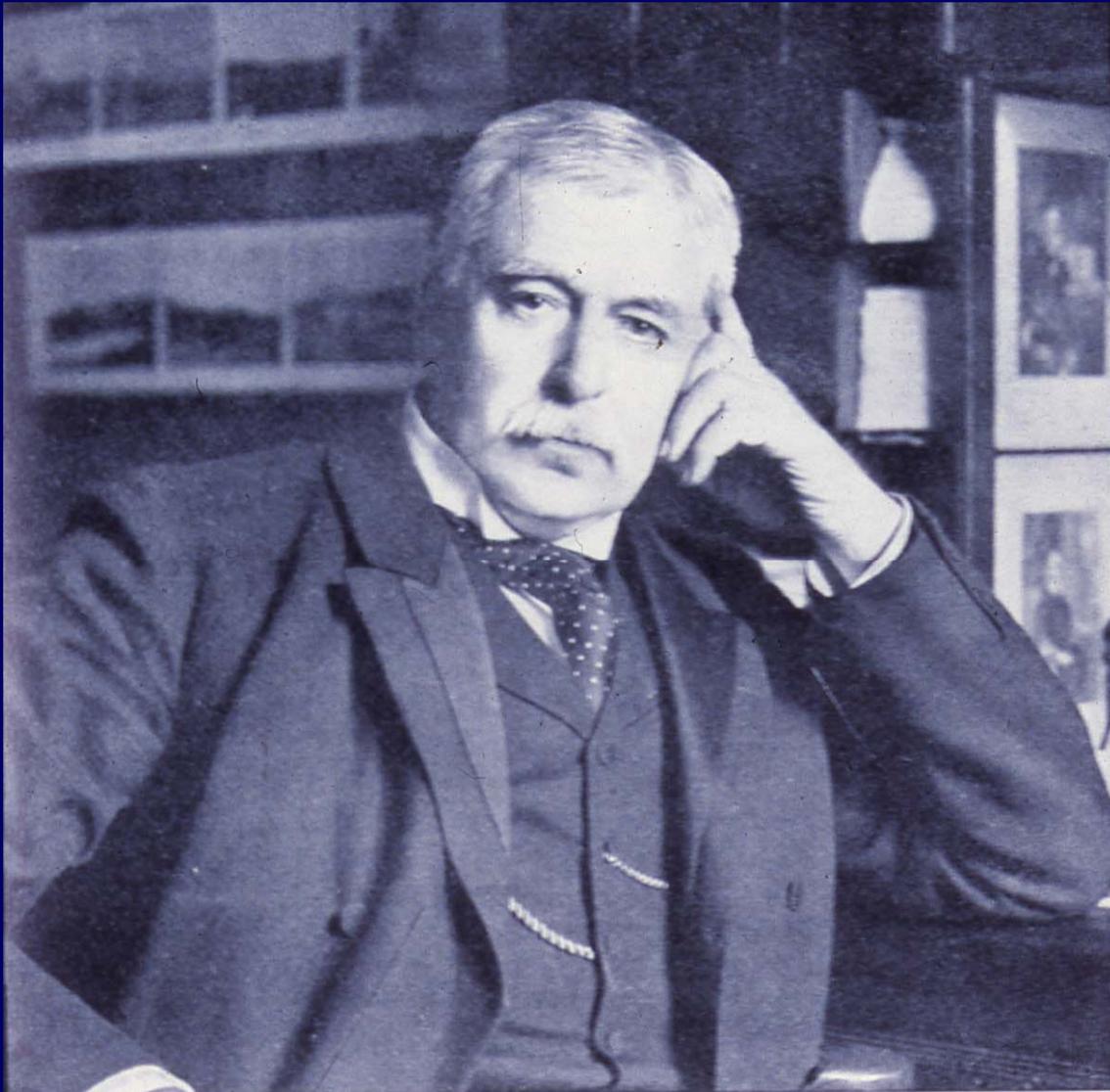
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SIR PATRICK MANSON.
1844—1922.

TROPICAL DISEASES

A Manual of the Diseases of Warm Climates

BY

PATRICK MANSON, M.D., LL.D. (ABERD.)

*Fellow of the Royal College of Physicians, London ;
Physician to the Seamen's Hospital Society, attached to the Branch
Hospital ; Lecturer on Tropical Diseases at St. George's
Hospital and Charing Cross Hospital Medical Schools ;
Medical Adviser to the Colonial Office and Crown
Agents for the Colonies*

WITH 88 ILLUSTRATIONS AND 2 COLOURED PLATES

CASSELL AND COMPANY, LIMITED

LONDON, PARIS, NEW YORK & MELBOURNE

1898

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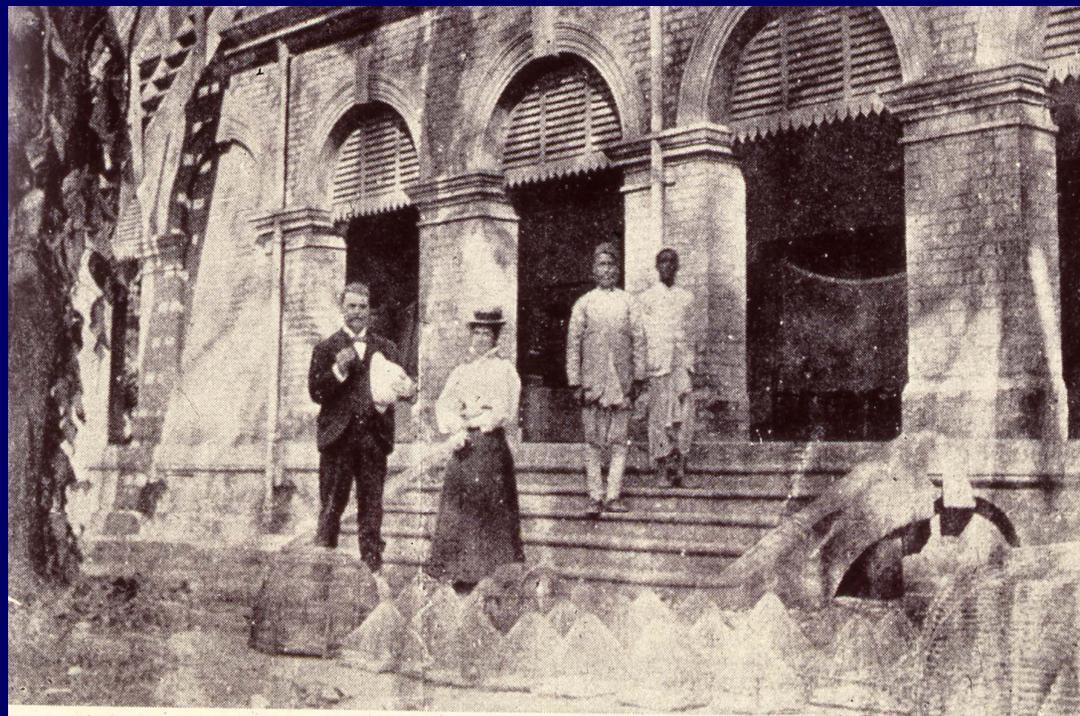
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LABORATORY AT CALCUTTA. SURGEON-MAJOR ROSS, MRS. ROSS, M
MED BUX, A LABORATORY ASSISTANT, AND BIRDS IN CAGES. 189



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4th August 1897

1) Insects of 16th (4th day) dead. Brown with white wings?
as usual. Some cells with adhesion fil granules? $\frac{1}{2}$ $\frac{1}{3}$ $\frac{1}{4}$
No pseudo. No filariae
Insects of 16th (4th day) dead. Small, muddled, black
Pseudomonas

2) Insects of 16th (4th day) living. Brown with white wings?
The stomach just under its outer surface contains
Some large cells with pigment (?) 9 numerous vacuoles



The pigment sometimes vacillate, is quite black like that of the
nuclei; 9 is not found outside these cells. In 8 it is arranged
circular. The vacuoles do not change position & the cells do not
move. The outline of the cell is generally straight, but in the small ones
it is slightly curved. About 12-15 μ - diameter.

This specimen imaged with $\frac{1}{2}\%$ formalin & sealed with Helly's

August
Large dead specimen. Pigmented bodies still present, but not
viable



all it's not moving

I show signs of a nucleus & nos 5 & 6 are distinctly more fleshy
than yesterday

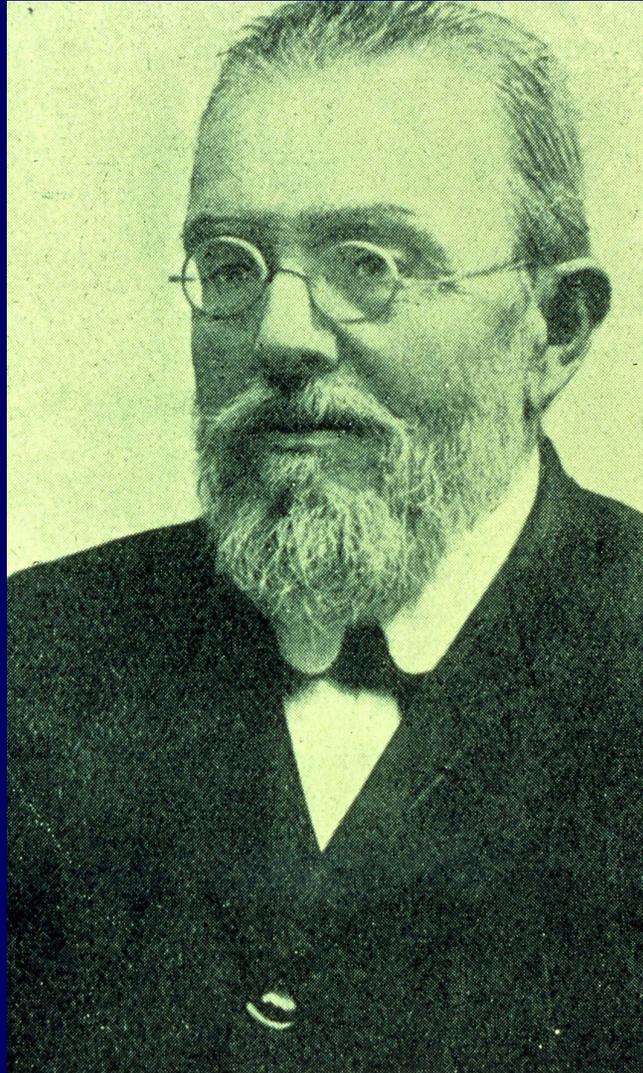
Insects of 16th (5th day) alive. Large, brown, white wings?
The same cells in stomach under superficial layer - surface
with layers & better defined



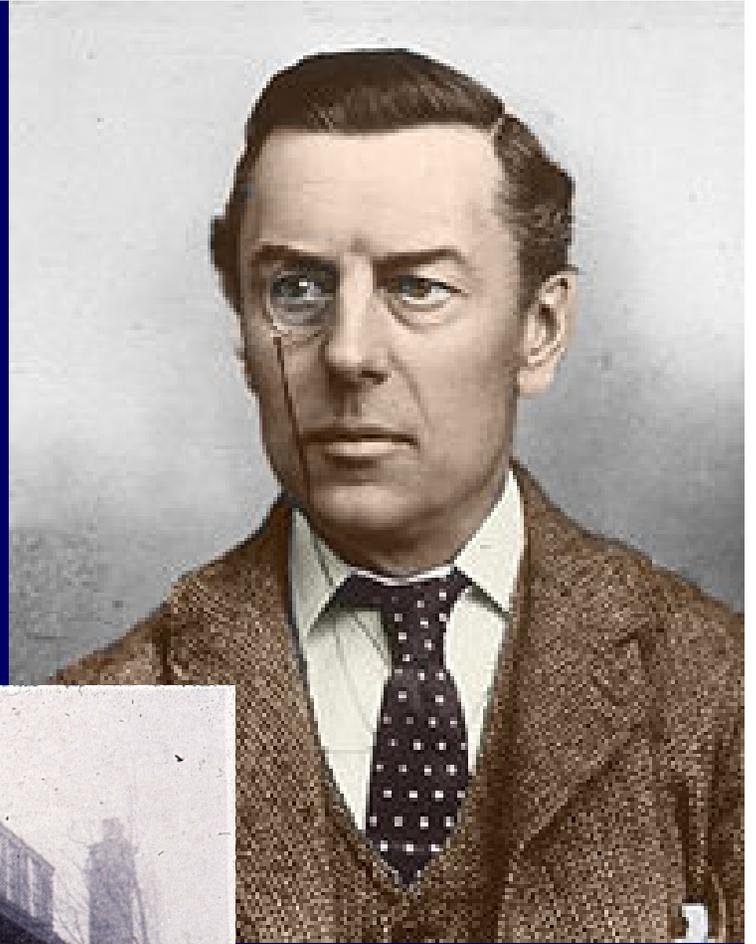
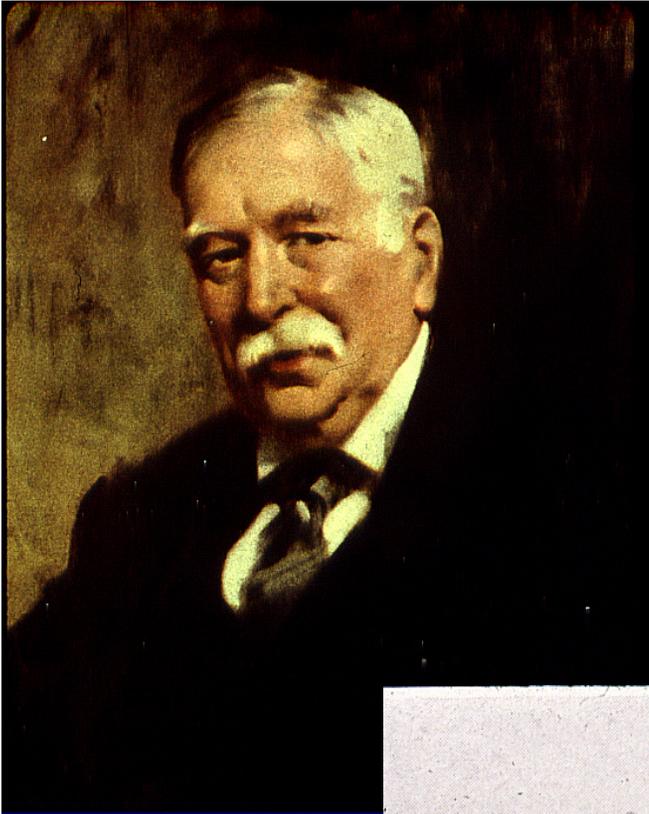
It vacillates in some. Largest about 20 μ in diam. Outline much thicker
than in straight. Child toward upper end



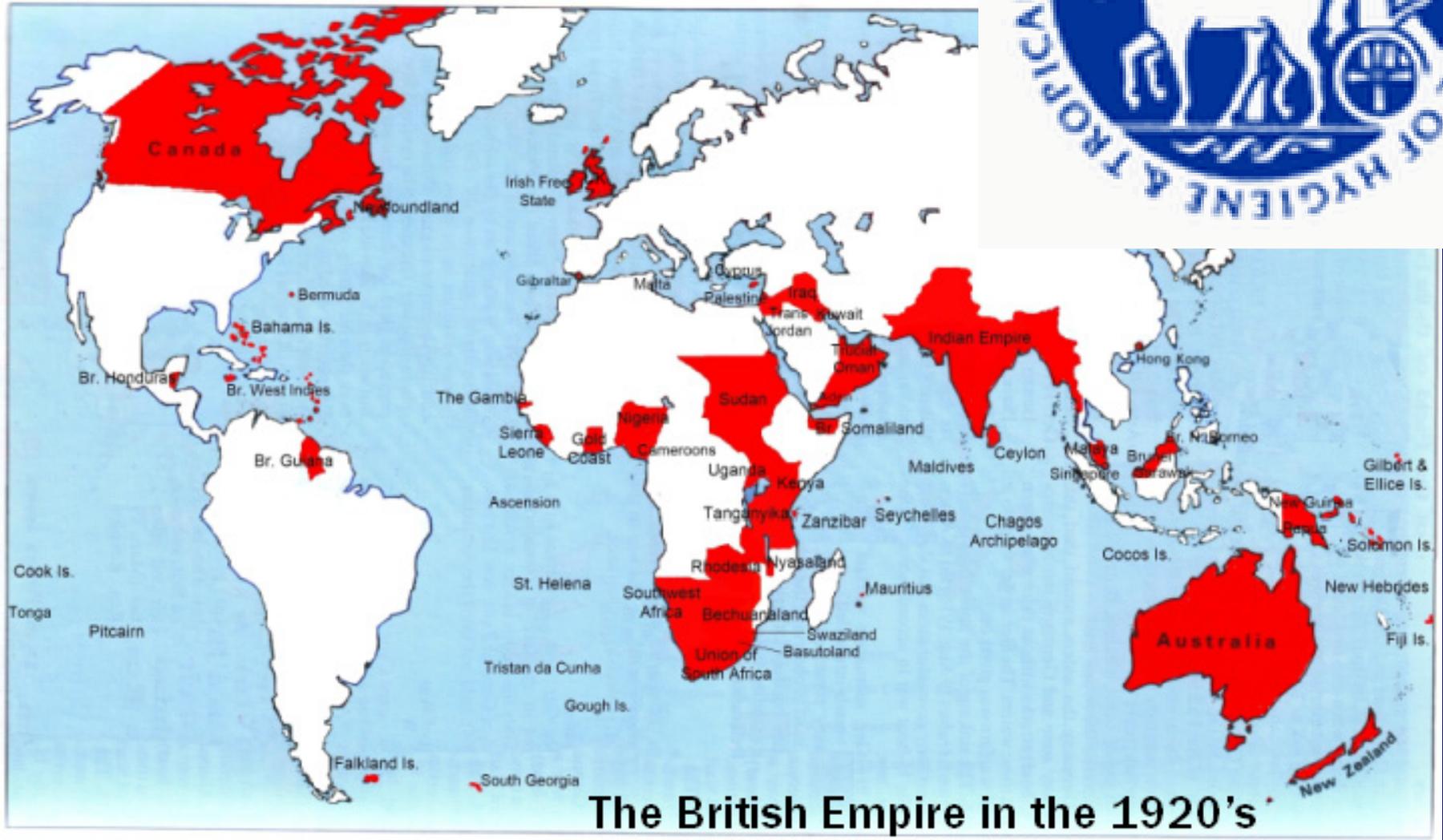
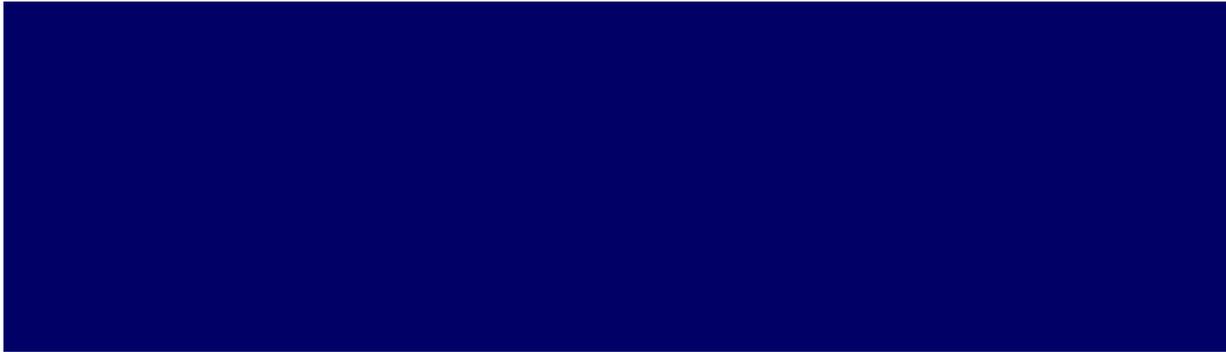
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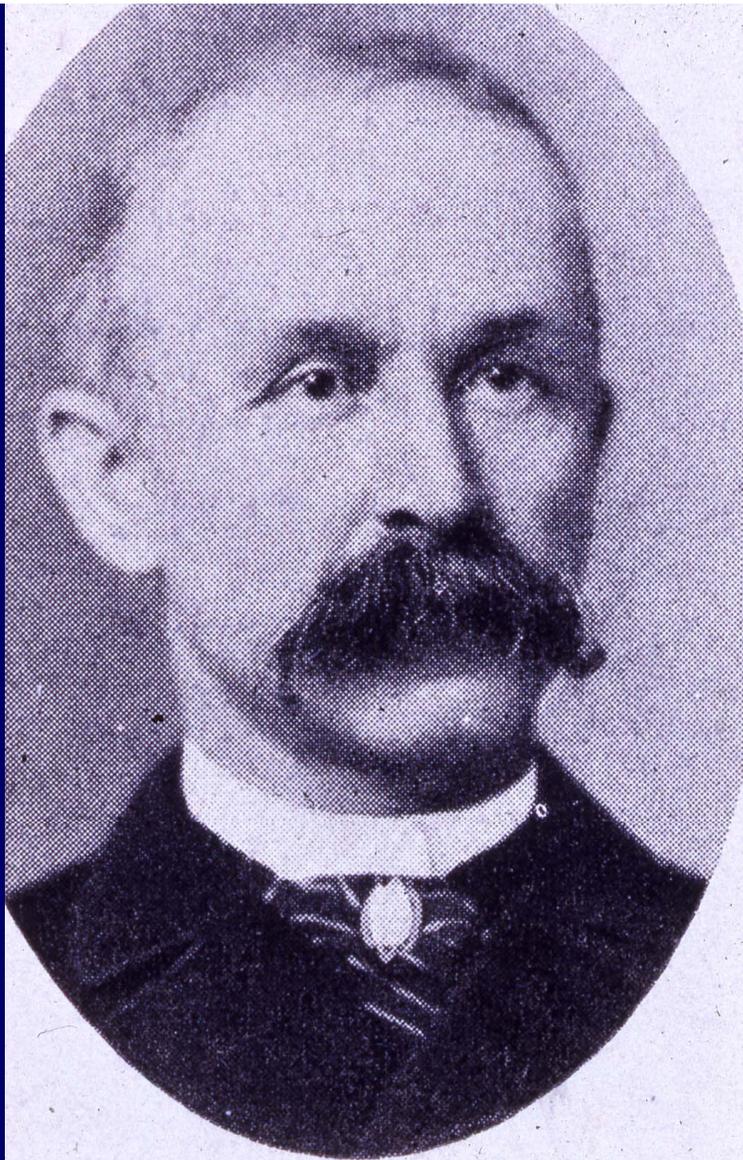


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1880

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A MANUAL
OF
BACTERIOLOGY

BY
GEORGE M. STERNBERG, M.D.
DEPUTY SURGEON-GENERAL U. S. ARMY

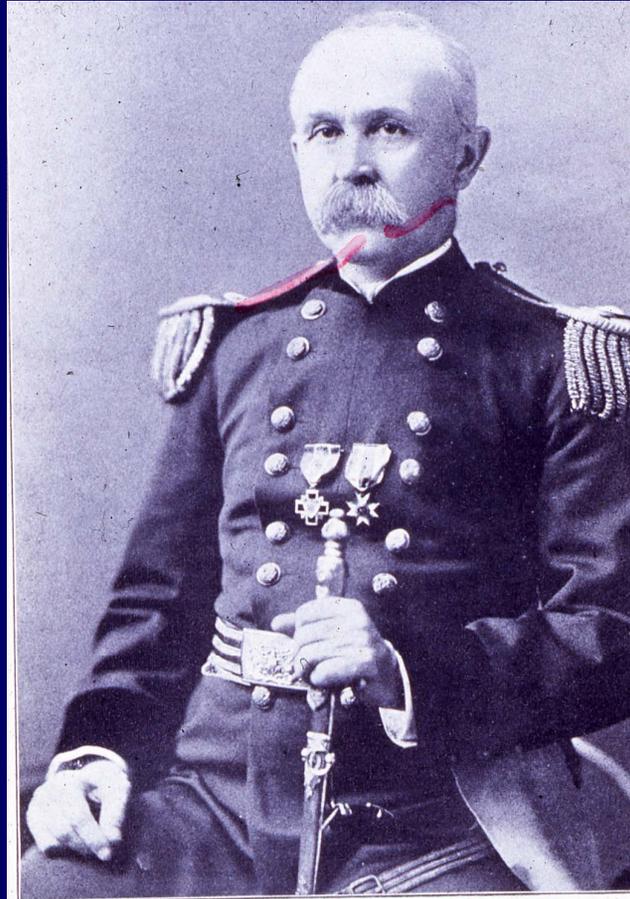
Director of the Hoagland Laboratory (Brooklyn, N. Y.); Honorary Member of the
Epidemiological Society of London, of the Royal Academy of Medicine of
Rome, of the Academy of Medicine of Rio de Janeiro, of the
American Academy of Medicine, etc., etc.

ILLUSTRATED BY HELIOTYPE AND CHROMO-LITHOGRAPHIC PLATES
AND
TWO HUNDRED AND SIXTY-EIGHT ENGRAVINGS



NEW YORK
WILLIAM WOOD & COMPANY

1892



Gen. W. Sternberg

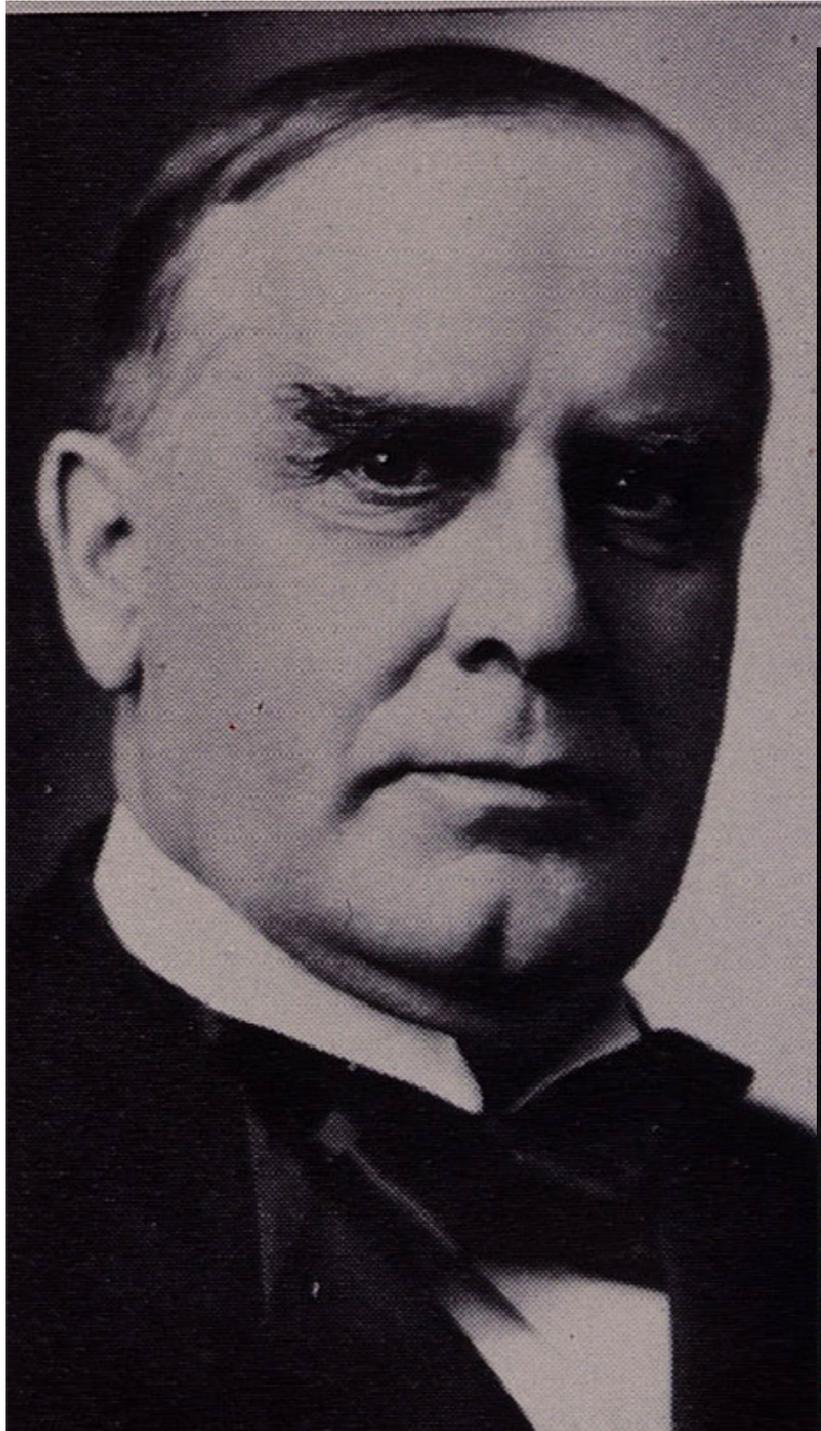


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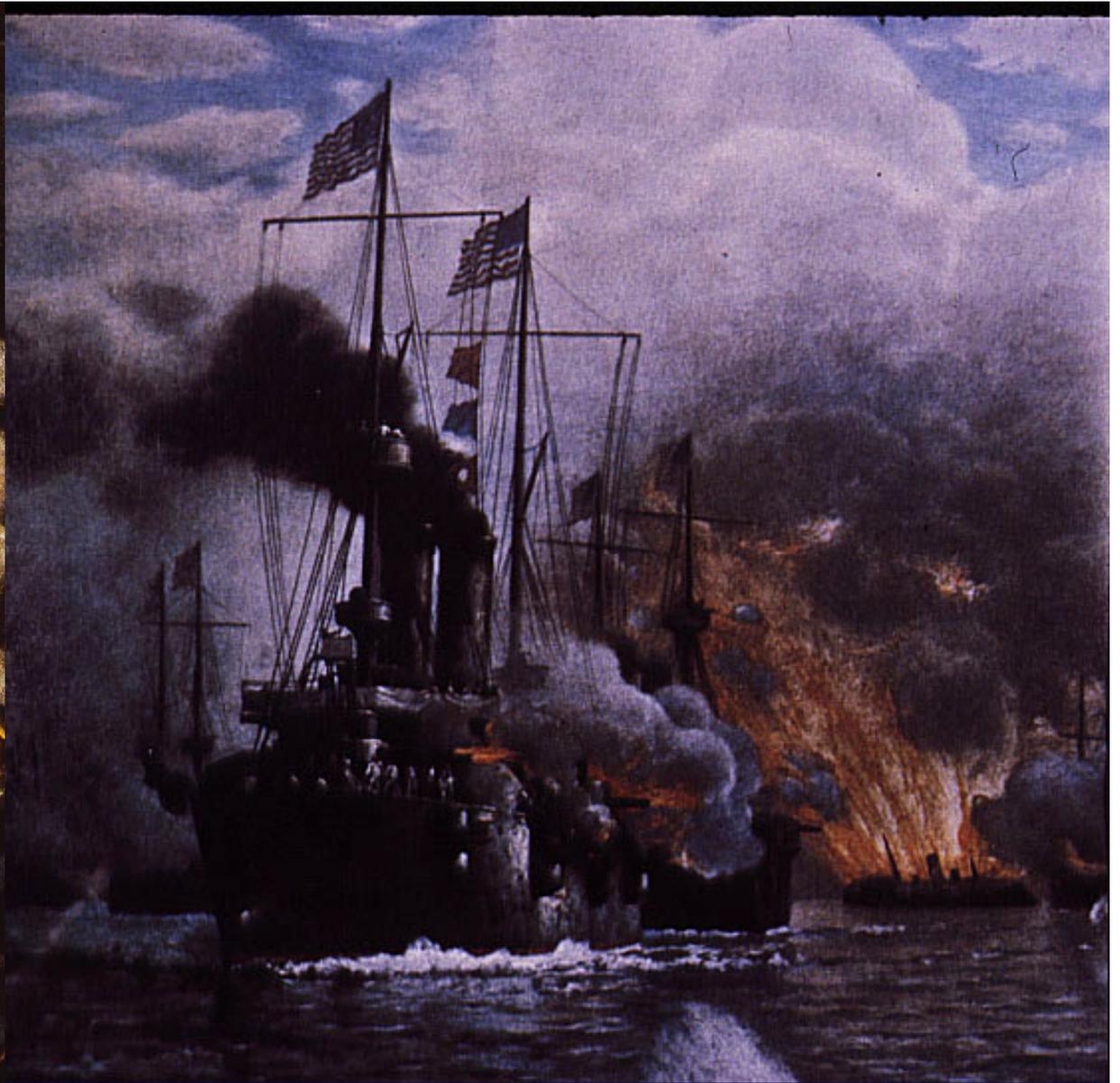


Records
of the
Army Medical School.
October 2nd 1893 to April 10th 1905.

First to Ninth Session, incl.







NIGHT SATURDAY'S 1,408,260 CIRCULATION.
 SPECIAL. NEW YORK JOURNAL

NO. 1,846-P. M. NEW YORK, MONDAY, MAY 5, 1901. PRICE ONE CENT

WAR

SURRENDERS! DEWEY'S FLEET TAKES MANILA.

THE SPANISH FLAGSHIP ON FIRE.



WASHINGTON GETS NEWS OF THE CITY'S FALL

WASHINGTON, MAY 2.—IT IS REPORTED THAT AMBASSADOR HAY THROUGH THE MEDIUM OF THE BRITISH FOREIGN OFFICE HAS SECURED NEWS OF THE SURRENDER OF MANILA, BUT CONFIRMATION OF THIS REPORT CANNOT BE MADE. THE STATE DEPARTMENT SAYS THAT IT HAS NOT RECEIVED OFFICIAL NOTICE AND SECY LONG OF THE NAVY IS ALSO WITHOUT DEFINITE NEWS.

When the cable service from Manila ceased the city was being bombarded. Official reports to Great Britain announce that the Spanish fleet at Manila was annihilated. Admiral Montijo admits that his fleet has been demolished. Madrid has been declared under martial law. Don Juan de Austria was blown up.

WHEN THIS
 CRUEL WAR
 IS OVER.



THE HOME COMING.

Dewey's squadron entered Manila Bay at night. Fighting began in early morning.

Spanish Admiral deserted his flagship, Maria Cristina, then on fire. Captain Cadarso, commander of Spanish flagship, was killed.

Besides fighting the enemy's only American forces sustained a hot fight from Spanish forts.

PRAYER OF THANKS IN THE SENATE

Resolved, That the Senate do pray for the success of the American arms in the Philippines.

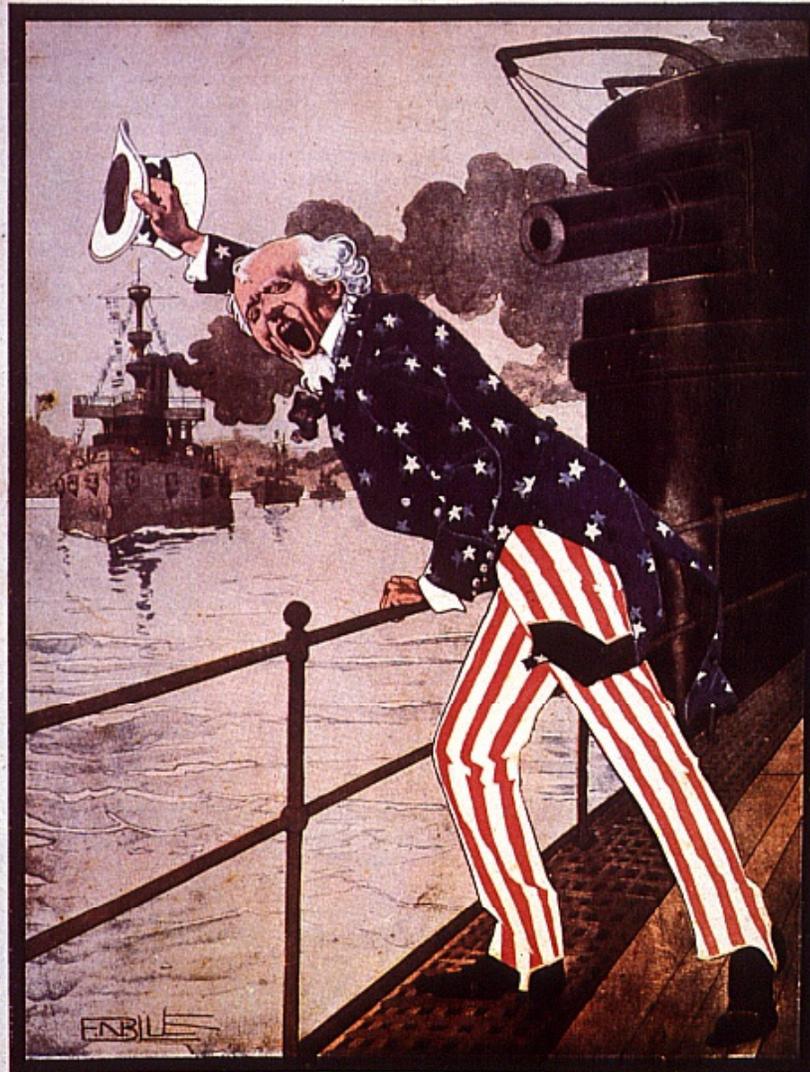
In the middle of the fight, the Spaniards say,





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— UNCLE SAM'S — PRICE 25c
LATEST GREATEST WAR
GREATEST SHORTEST
SUPERBLY ILLUSTRATED BY PHOTOGRAPHS AND DRAWINGS FROM LESLIE'S WEEKLY



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CALIFORNIA VOLUNTEERS AT THE PRESIDIO WAITING ORDERS TO DEPART FOR MANILA.



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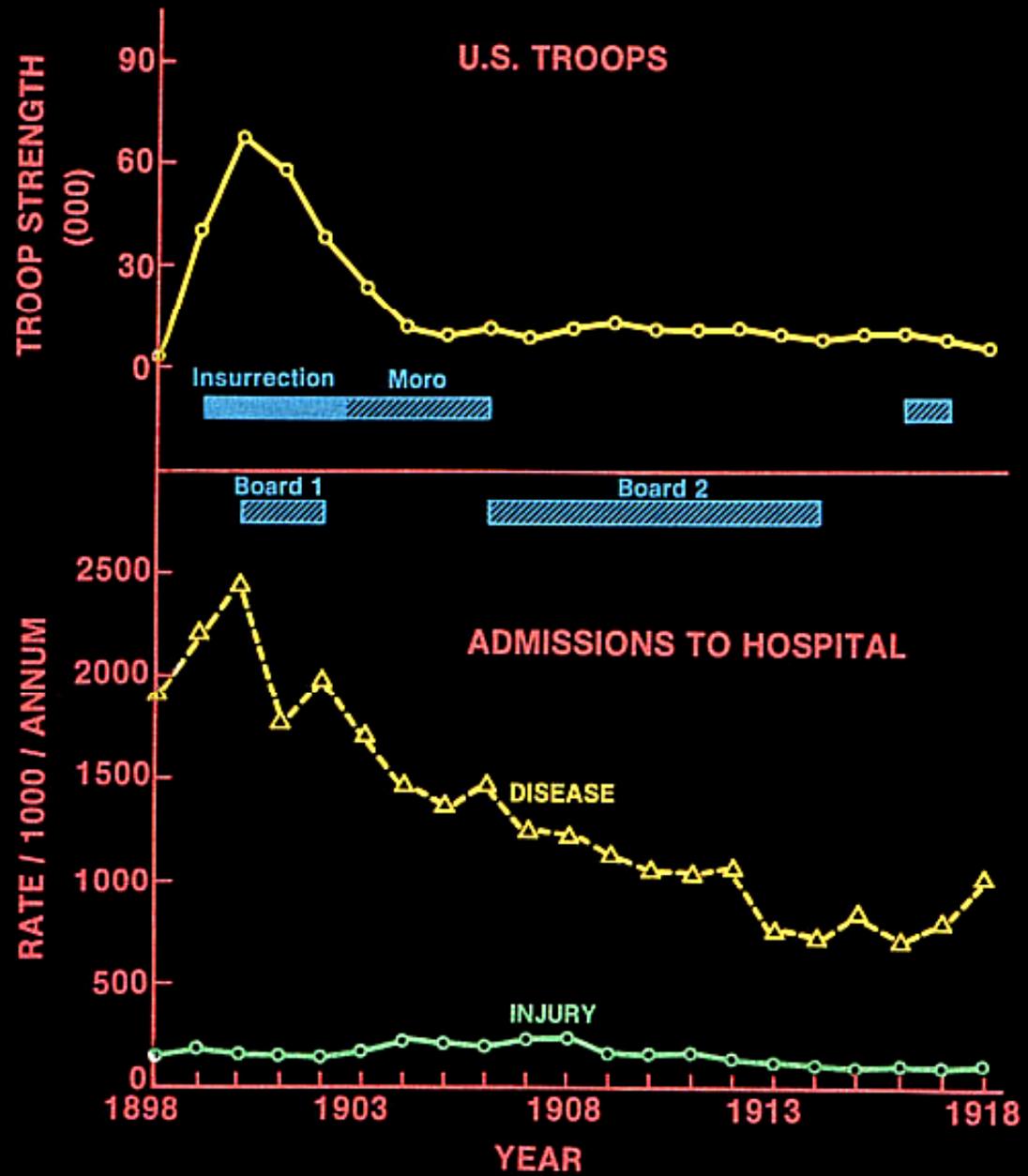
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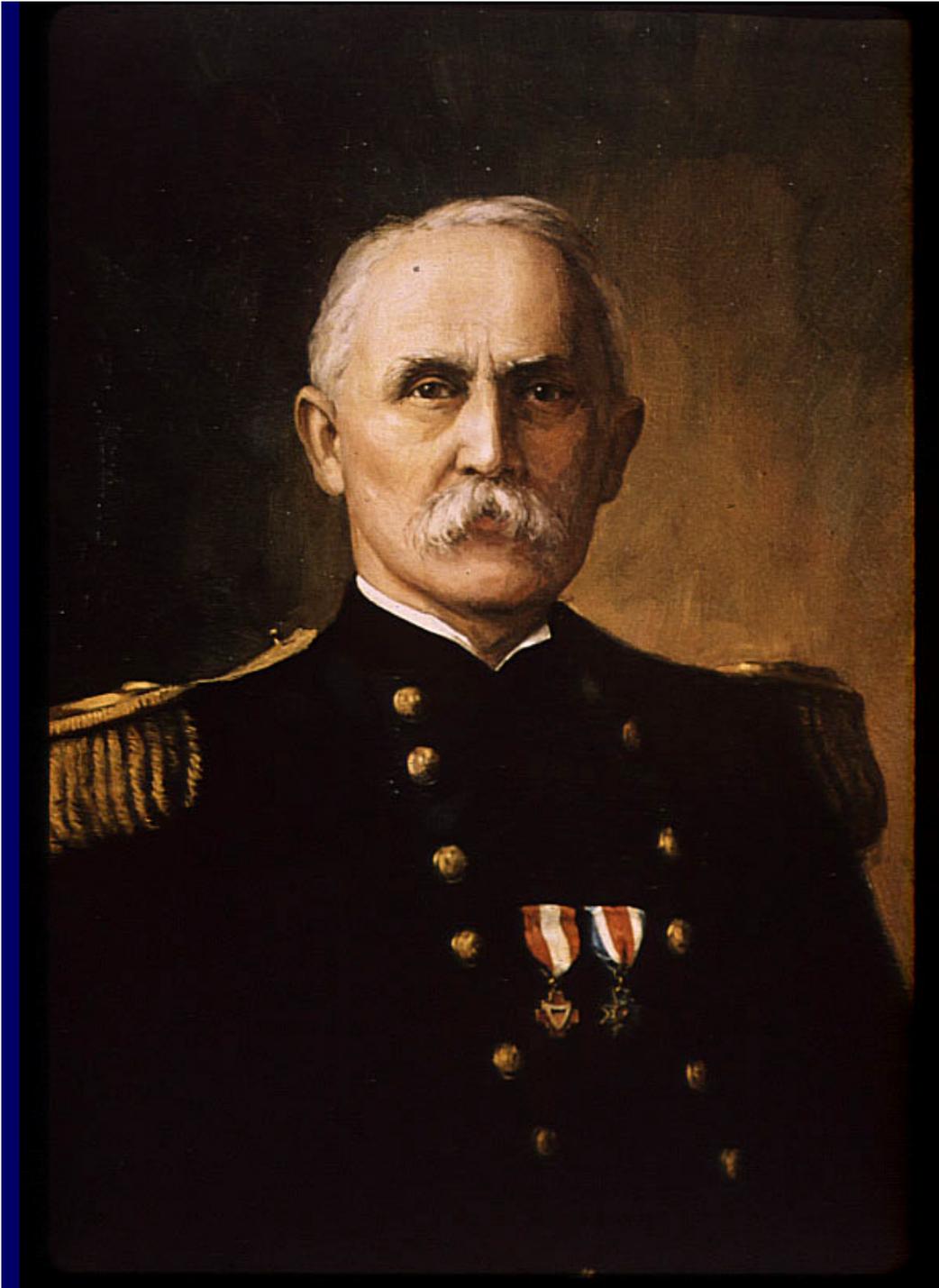




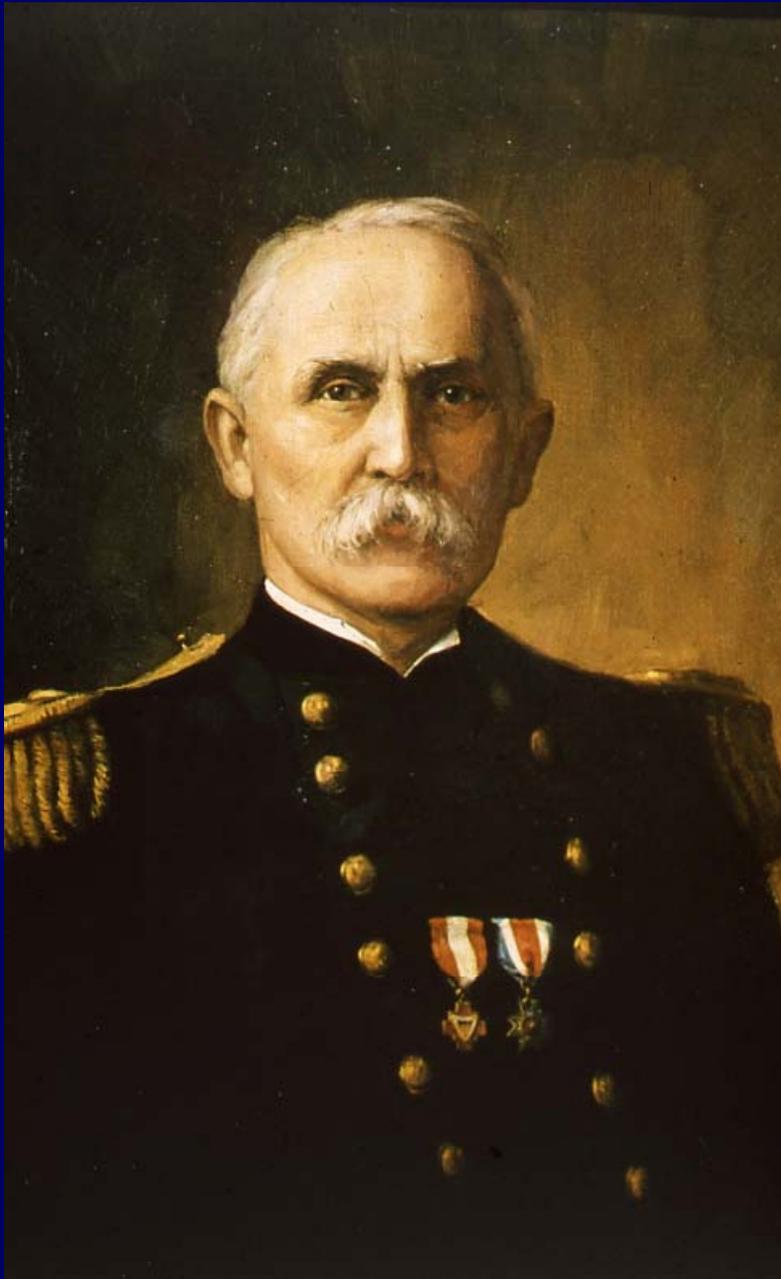


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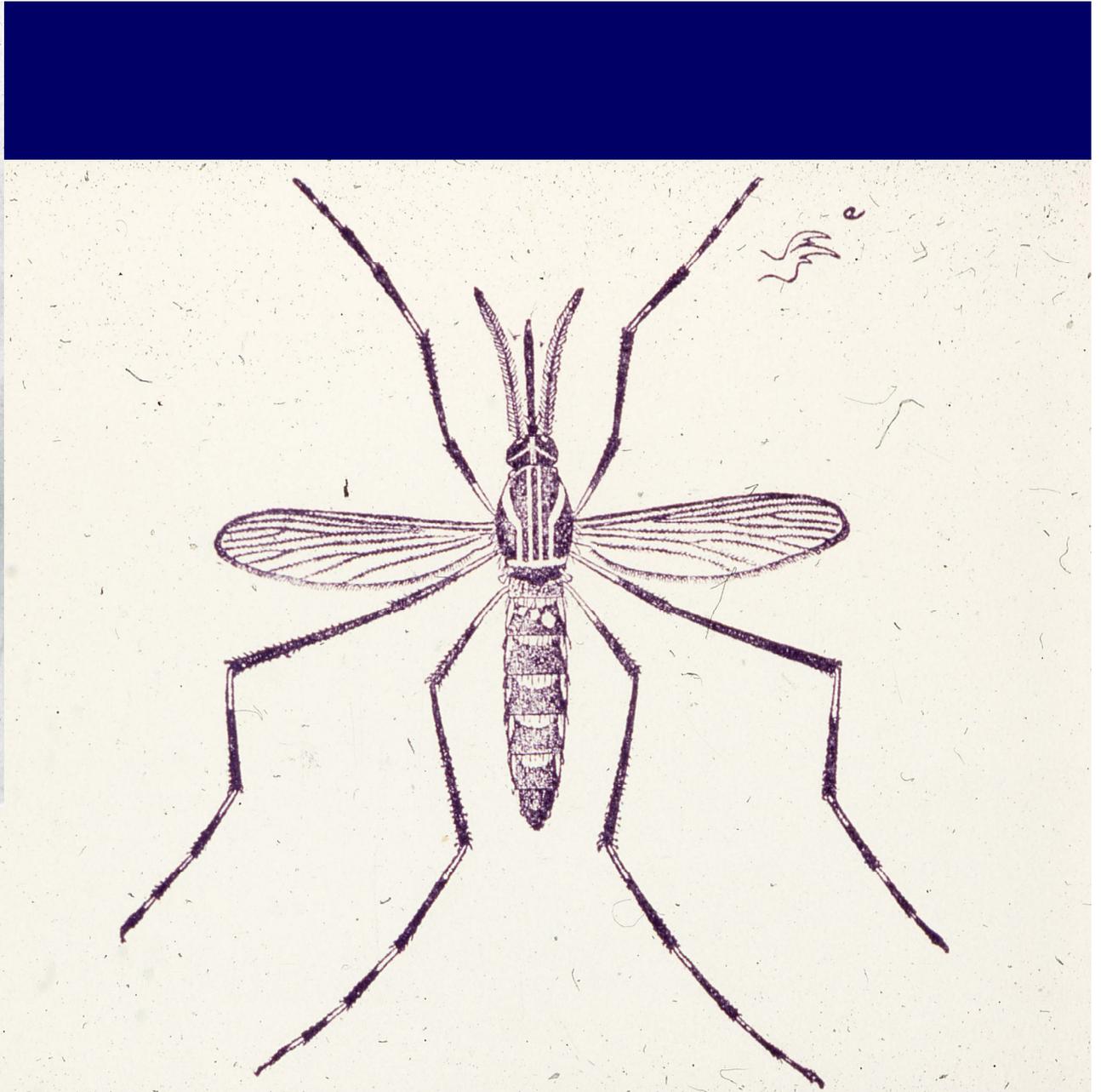
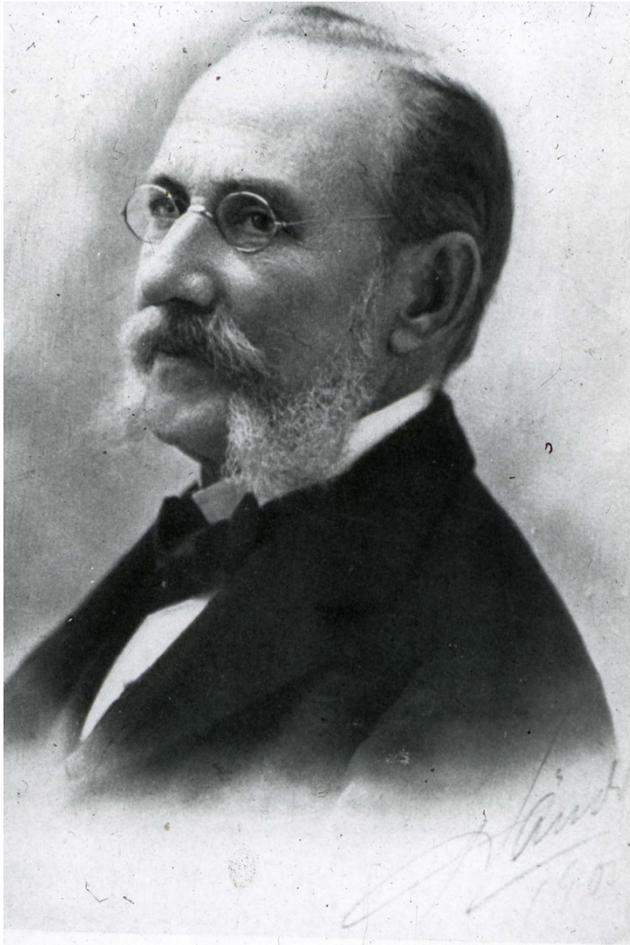




It is my
desire that
the medical
officers
detailed for
the study...



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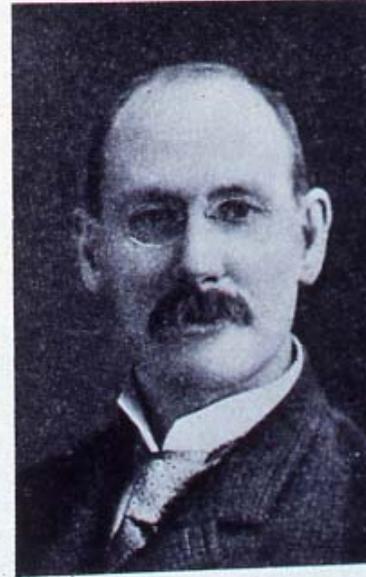
Doctor Walter Reed.



Doctor Aristides Agramonte.

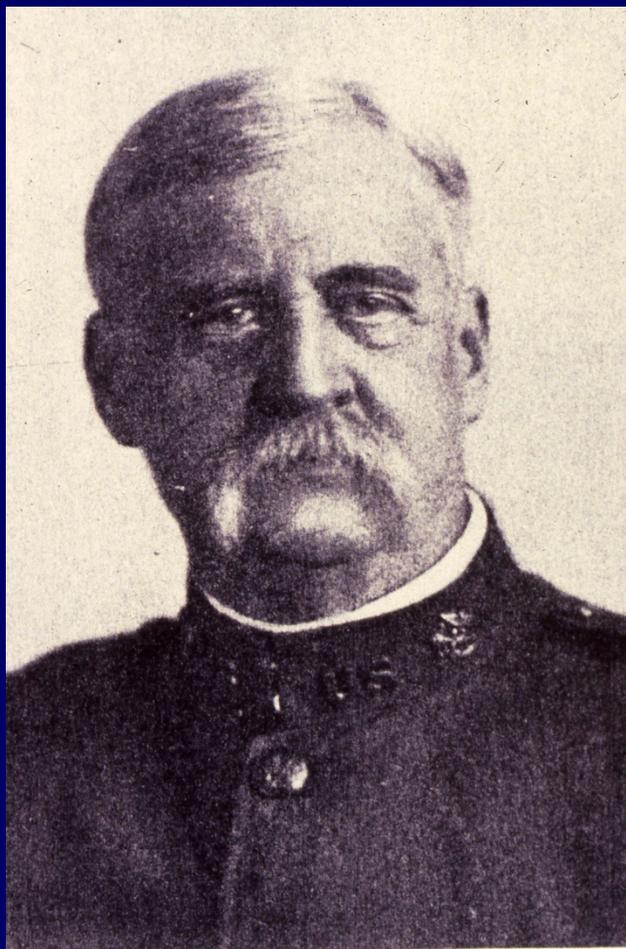


Doctor Jesse W. Lazear.



Doctor James Carroll.

The Army Yellow Fever Commission.



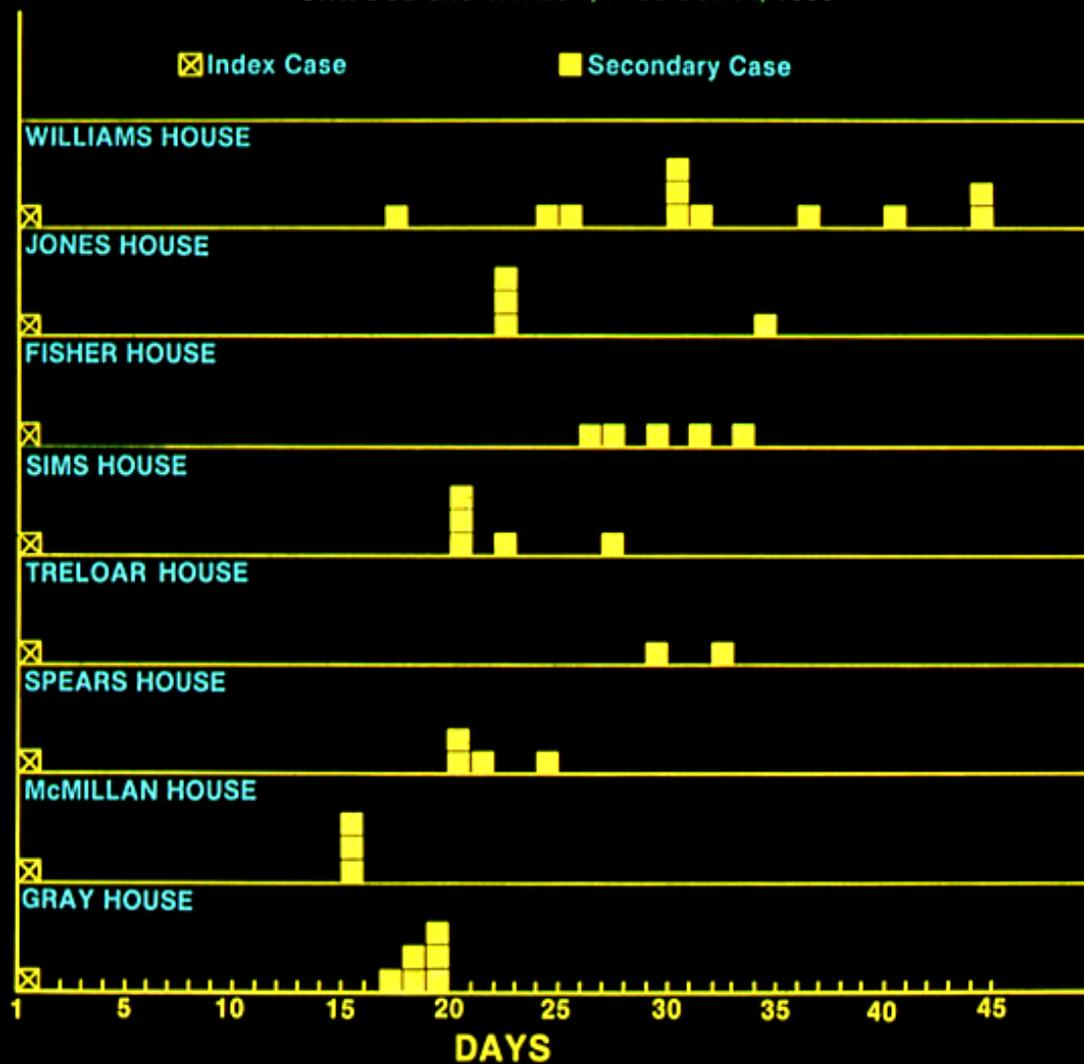
(From USPHS R

Dr. Henry R. Carter

<u>HOUSE NUMBER</u>	<u>INFECTING CASE</u>	<u>FIRST SEC.CASE</u>	<u>INTERVAL DAYS</u>	<u>SEC. CASES</u>	
				<u>NO.</u>	<u>DAYS</u>
1	AUG. 6	AUG. 23	11	6	3
2	AUG. 29	SEPT. 13	15	3	1
3	AUG. 29	SEPT. 13	20	4	5
6	AUG. 31	SEPT. 20	20	5	7
7	SEPT. 3	SEPT. 26	23	6	10
9	AUG. 31	SEPT. 22	22	4-5	13-28
10	SEPT. 4	SEPT. 20	16	2	2
15	SEPT. 2	SEPT. 22	21	1	—
16	AUG. 29	SEPT. 9	12	1	—

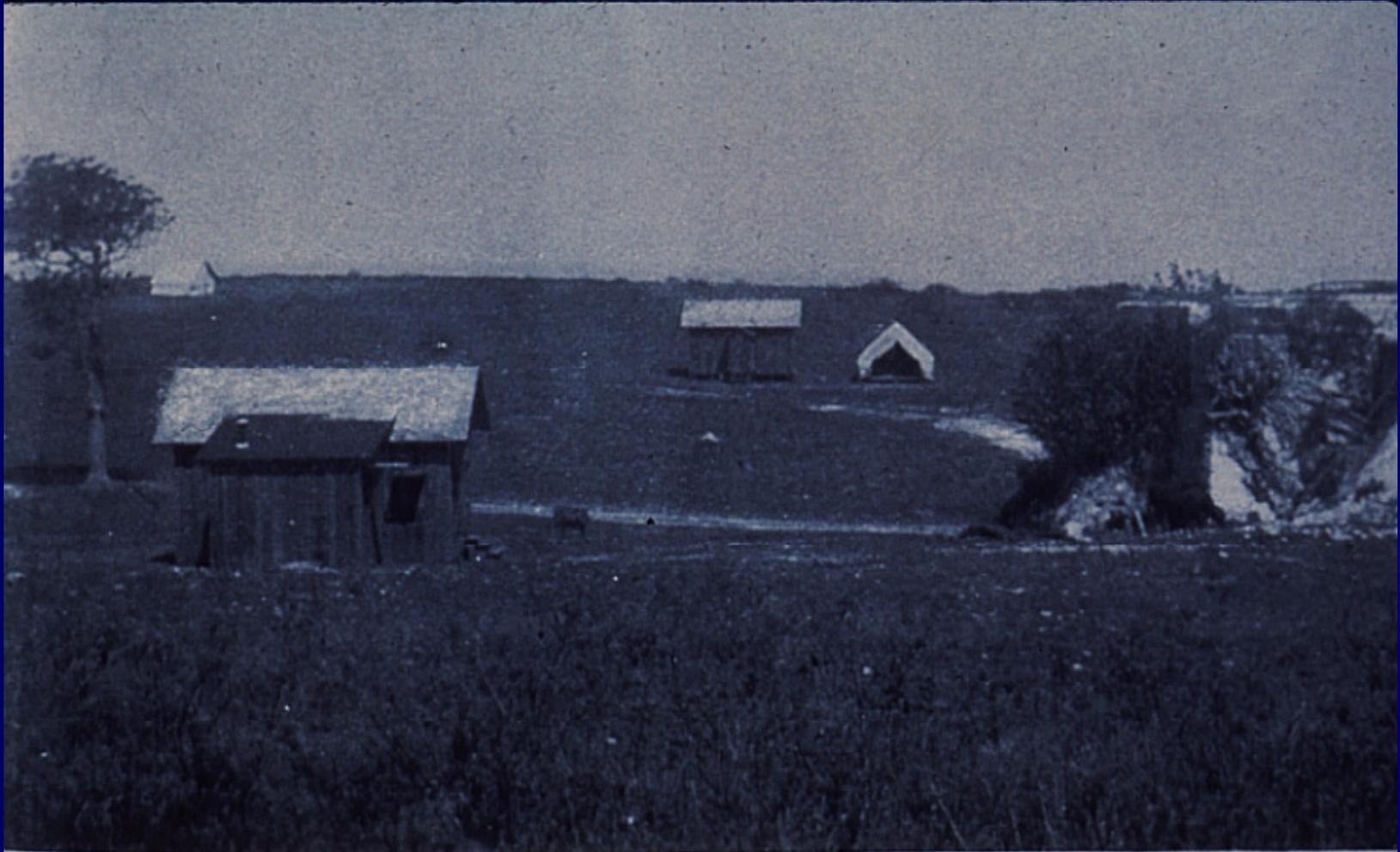
YELLOW FEVER

ORWOOD and TAYLOR, MISSISSIPPI, 1898





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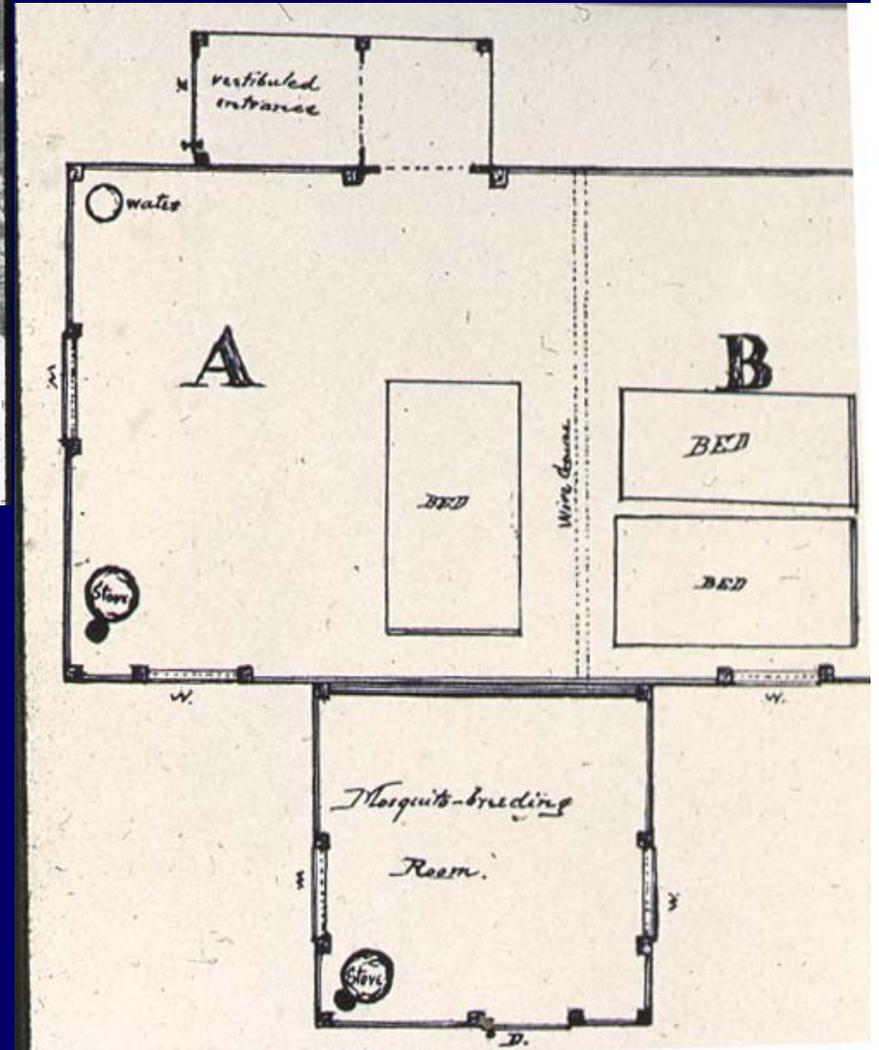


"INFECTED BEDDING BUILDING" AND "MOSQUITO BUILDING," CAMP LAZEAR, NEAR



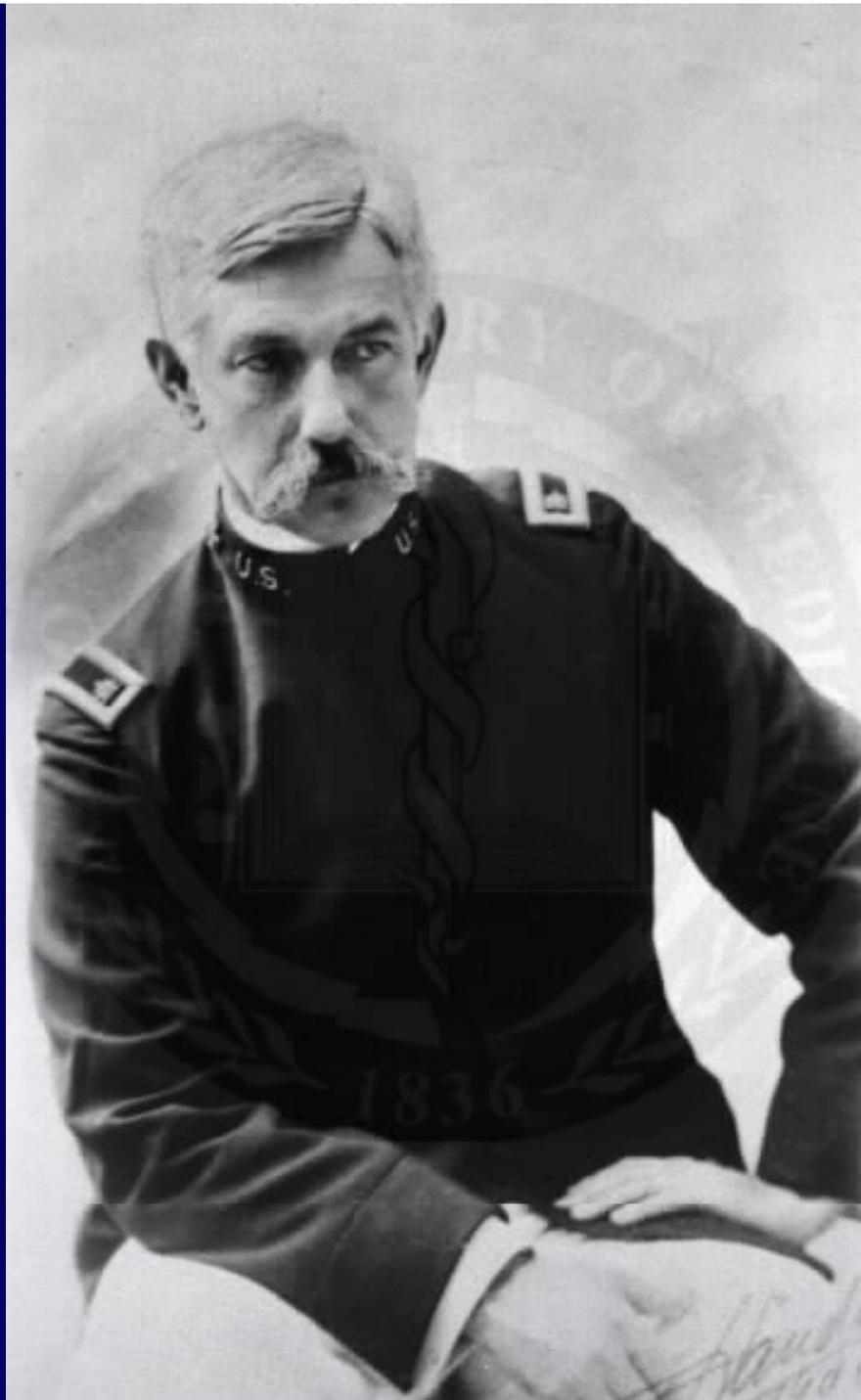
CAMP LAZEAR

Building where the experiments were made which proved that yellow fever is not transmitted by means of infected clothing (fomites)





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Panama Canal

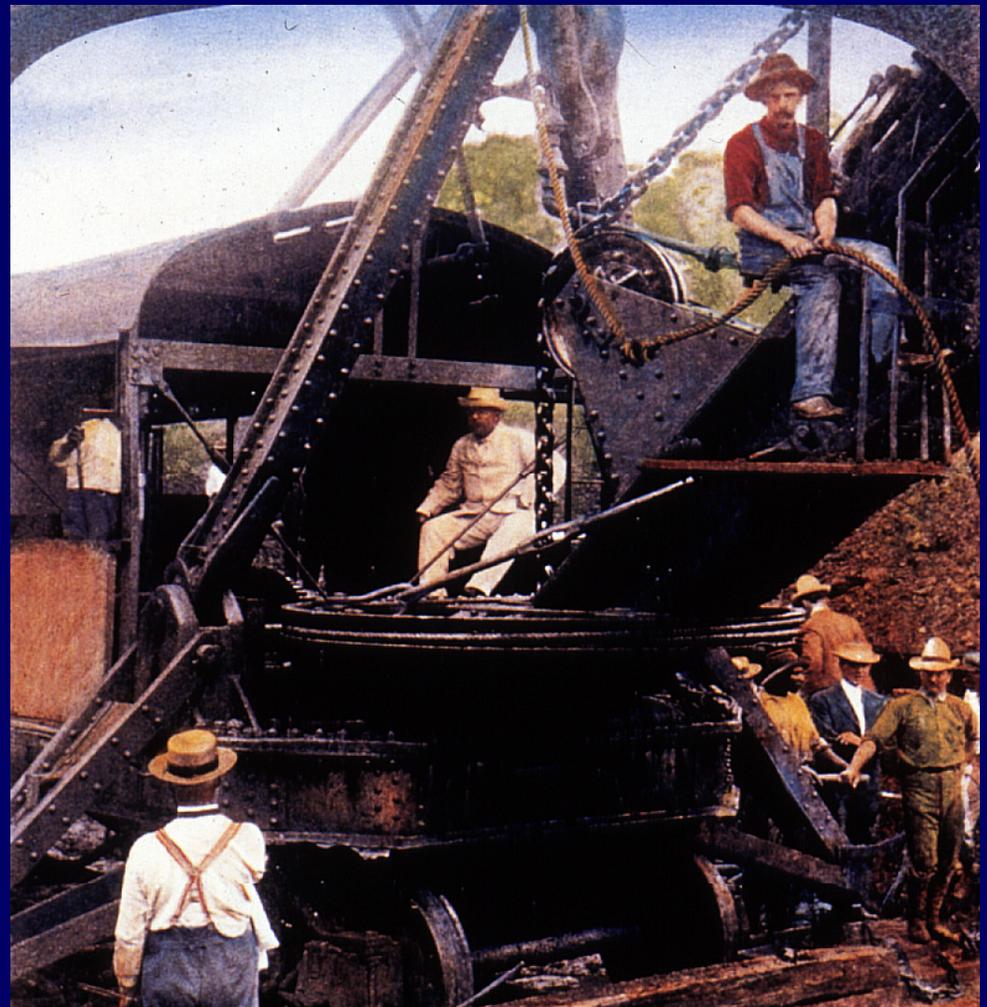
1904-1914

Previous problem
of yellow fever

Malaria 2nd but
debilitating

Permanent impact

Training





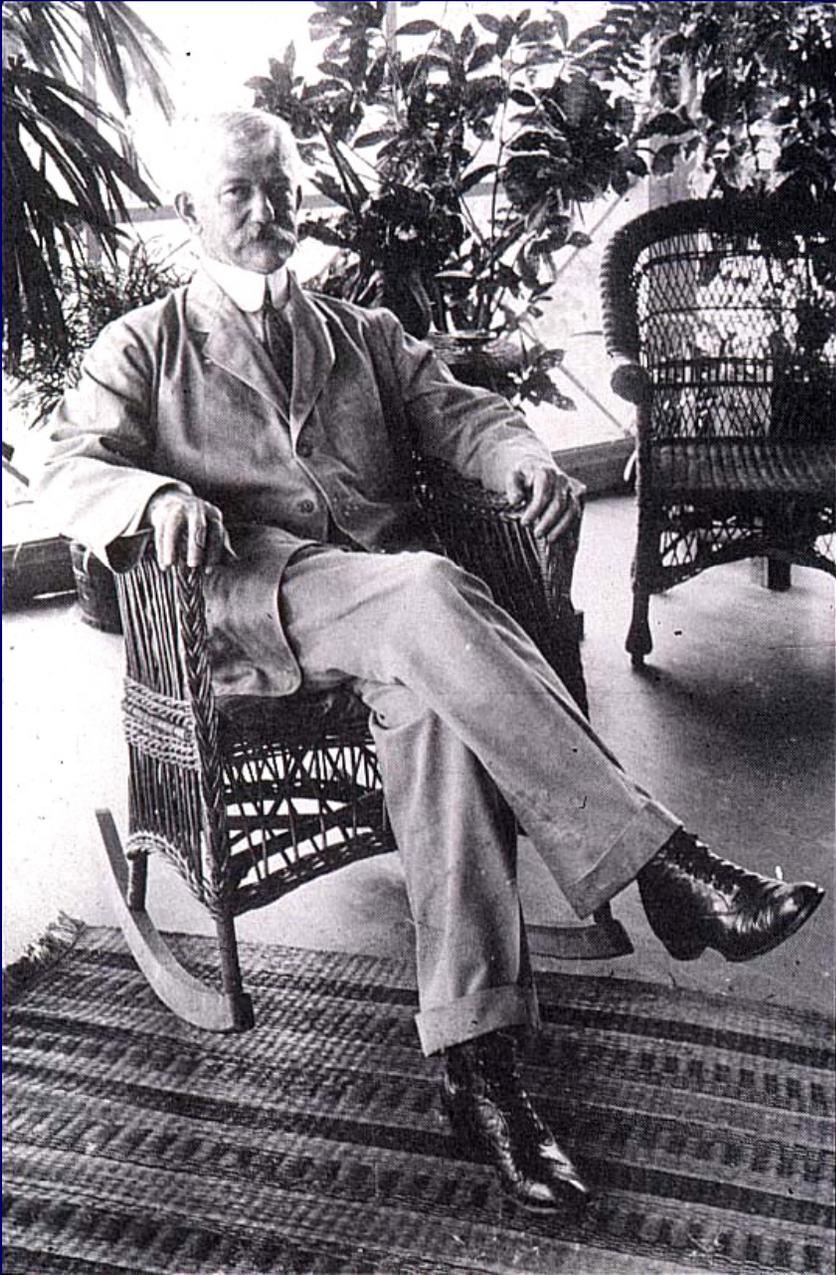
Gen. Gorgas at time of construction, P. C.



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Vector Control

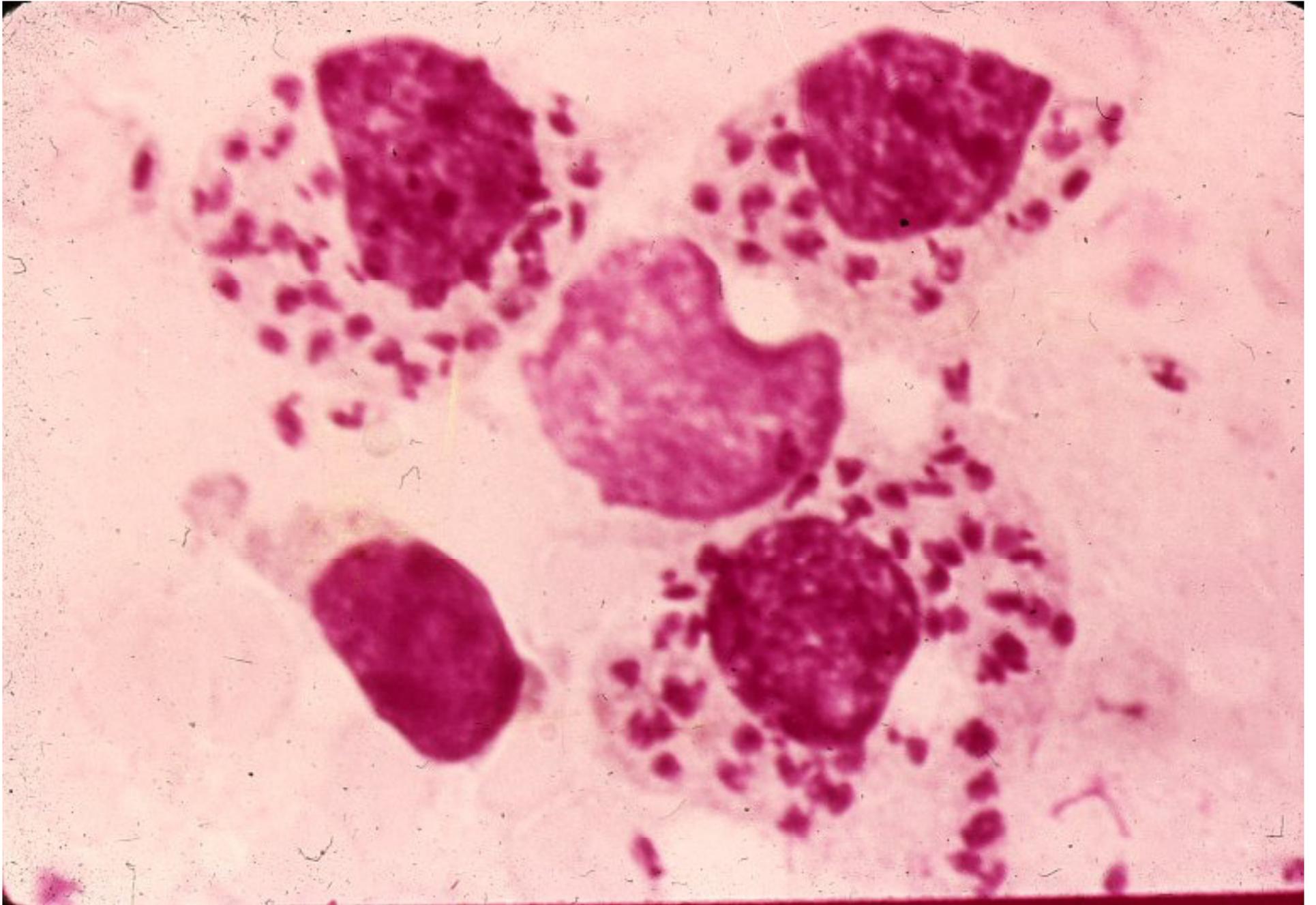






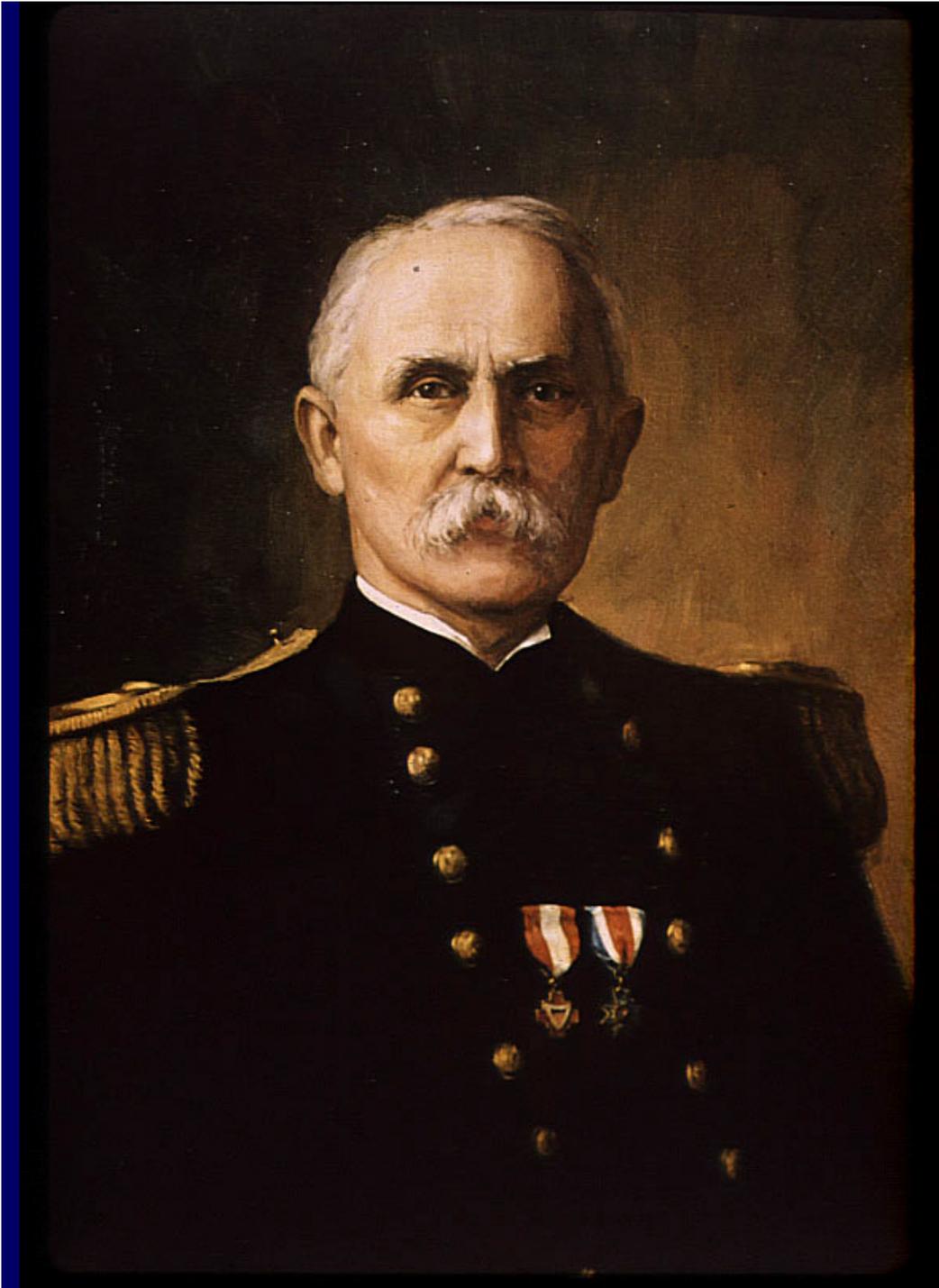
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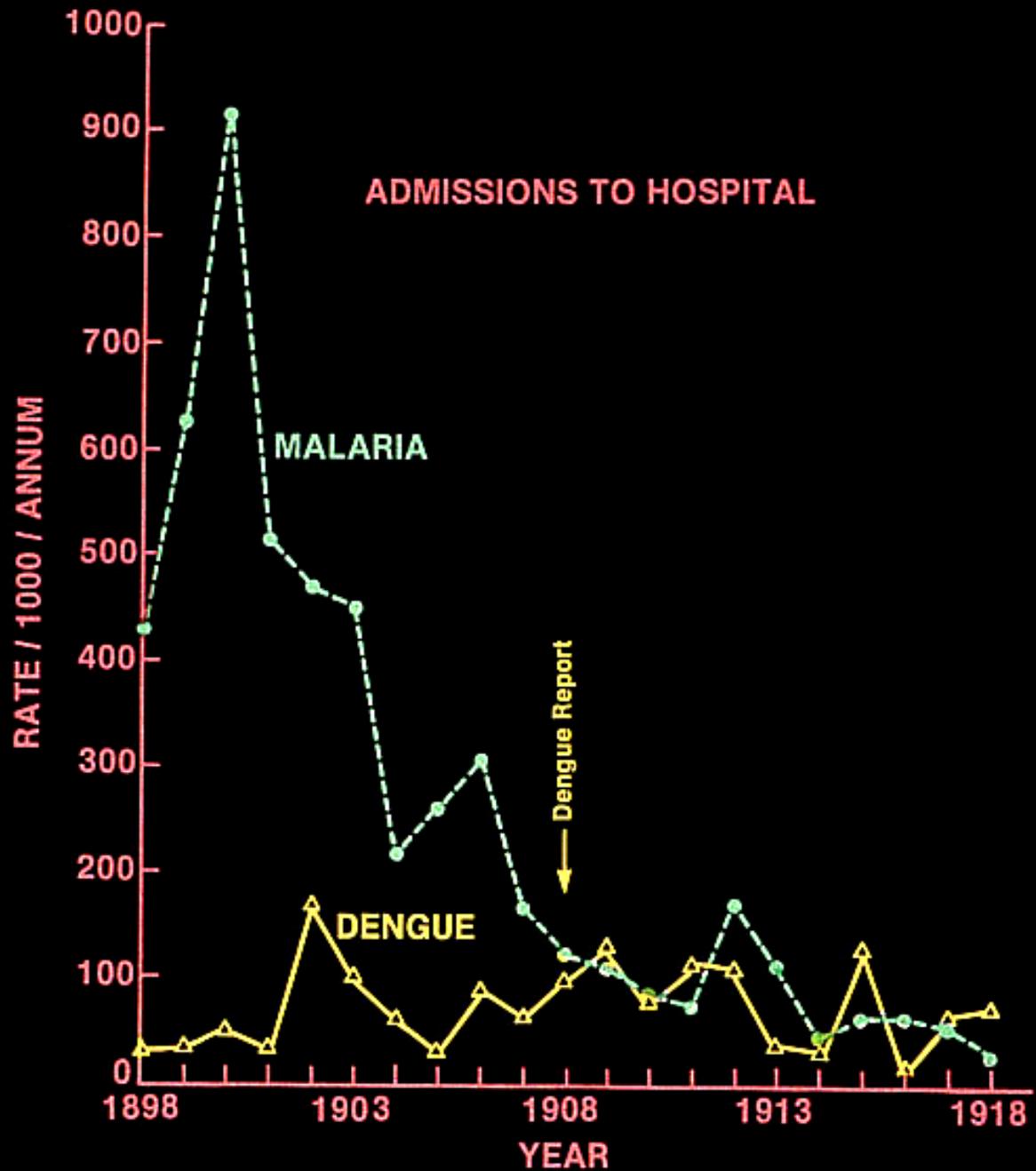


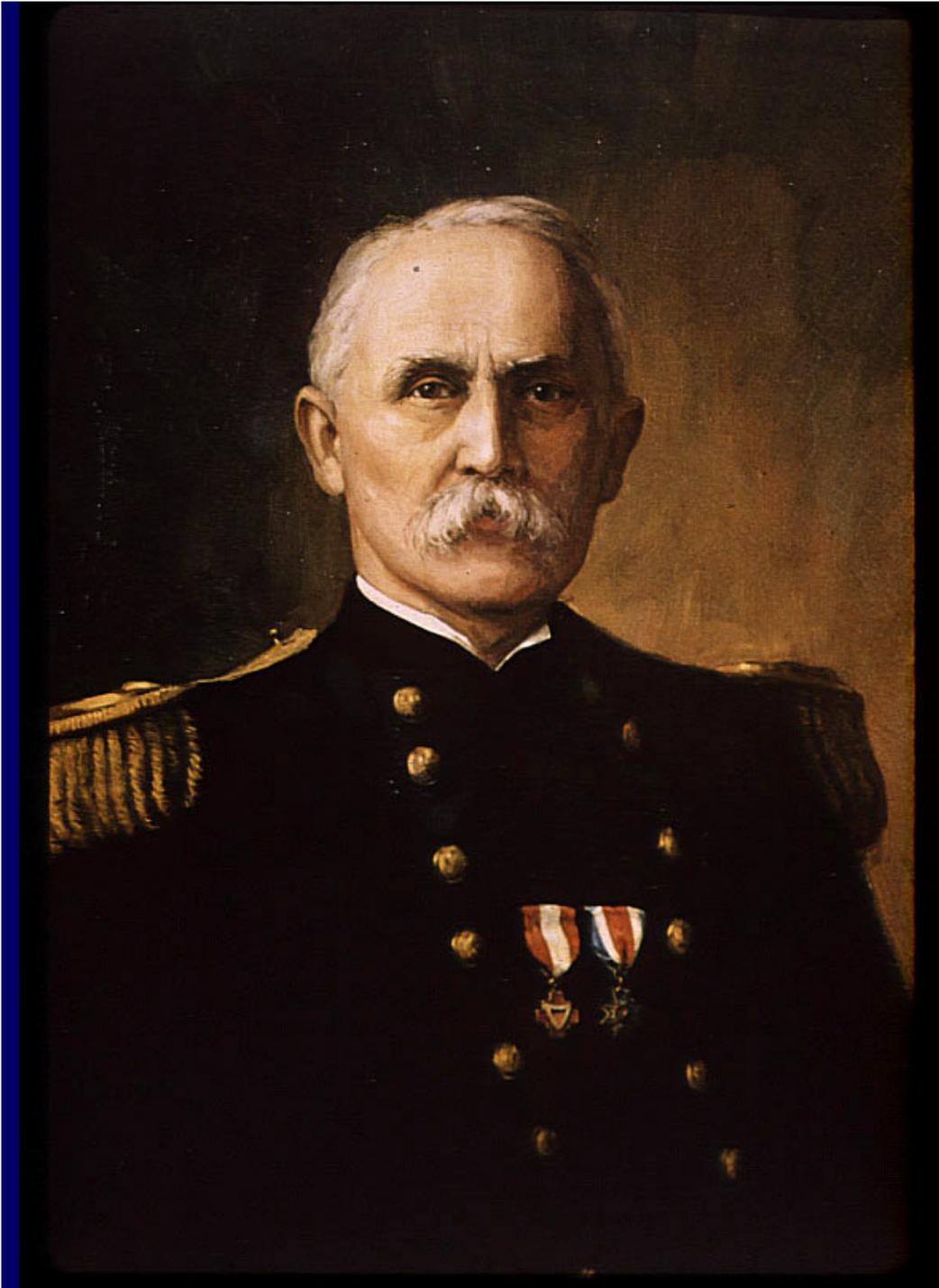


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It is my
desire that
the medical
officers
detailed for
the study...





“Special
attention
should be
given to...”



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THE PARASITIC AMŒBÆ OF MAN

BY

CHARLES F. CRAIG, M.D.

CAPTAIN, MEDICAL CORPS, UNITED STATES ARMY

FROM THE BACTERIOLOGICAL LABORATORY OF THE ARMY MEDICAL SCHOOL, WASHINGTON, D. C., AND THE ROCKEFELLER INSTITUTE FOR MEDICAL RESEARCH
NEW YORK CITY

*Published with the Authority of the Surgeon General
of the United States Army*

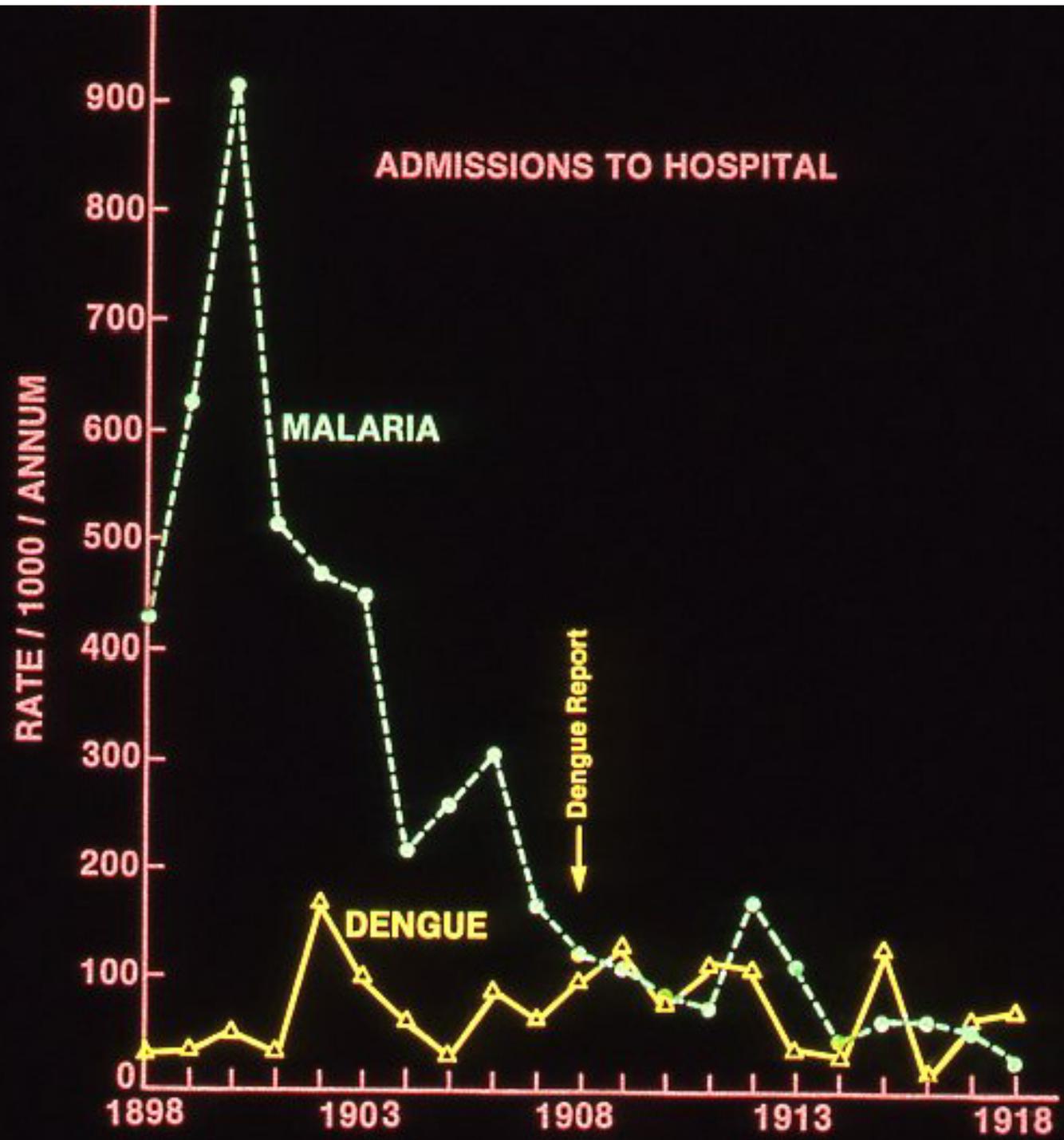


PHILADELPHIA & LONDON
J. B. LIPPINCOTT COMPANY

1911

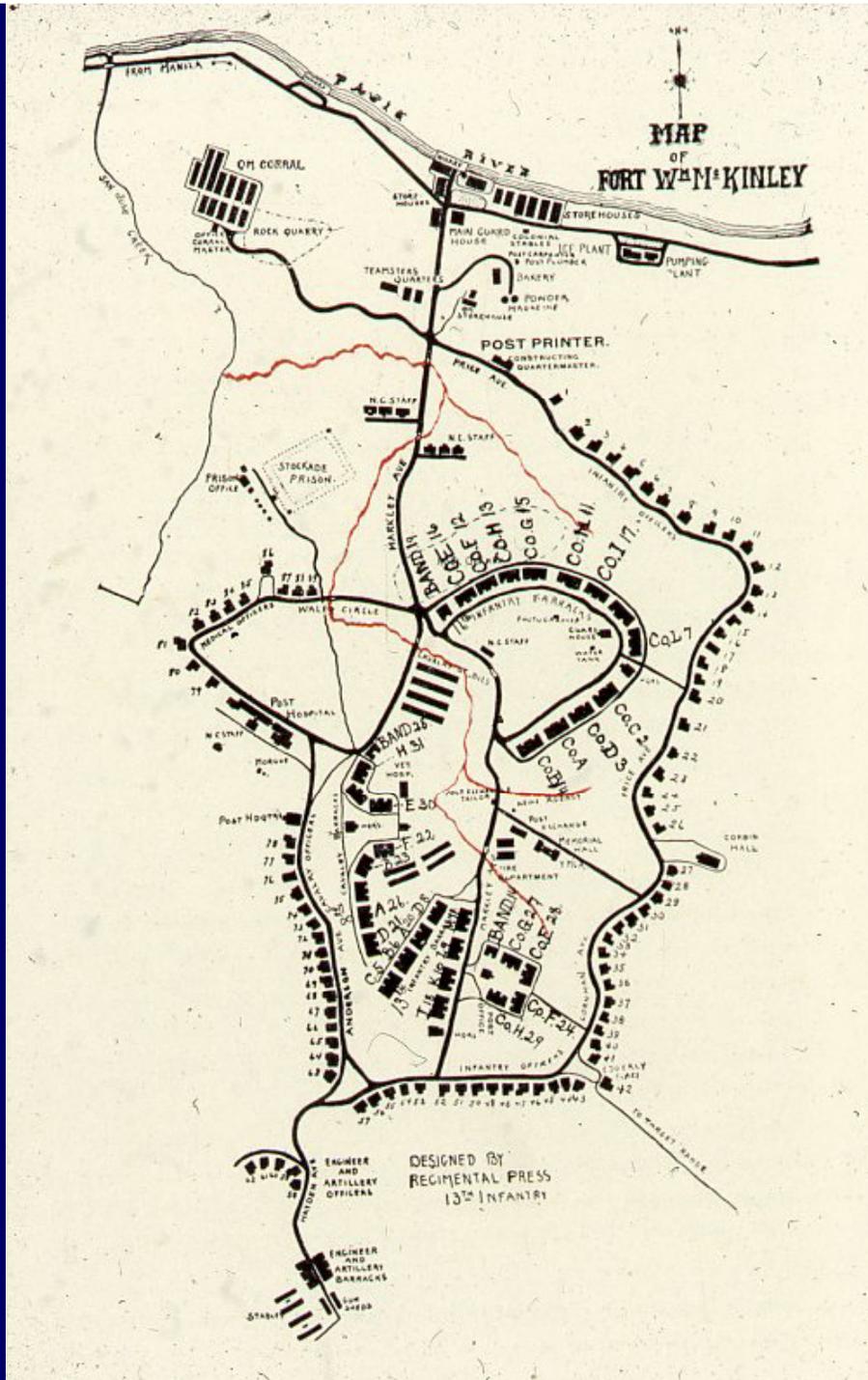


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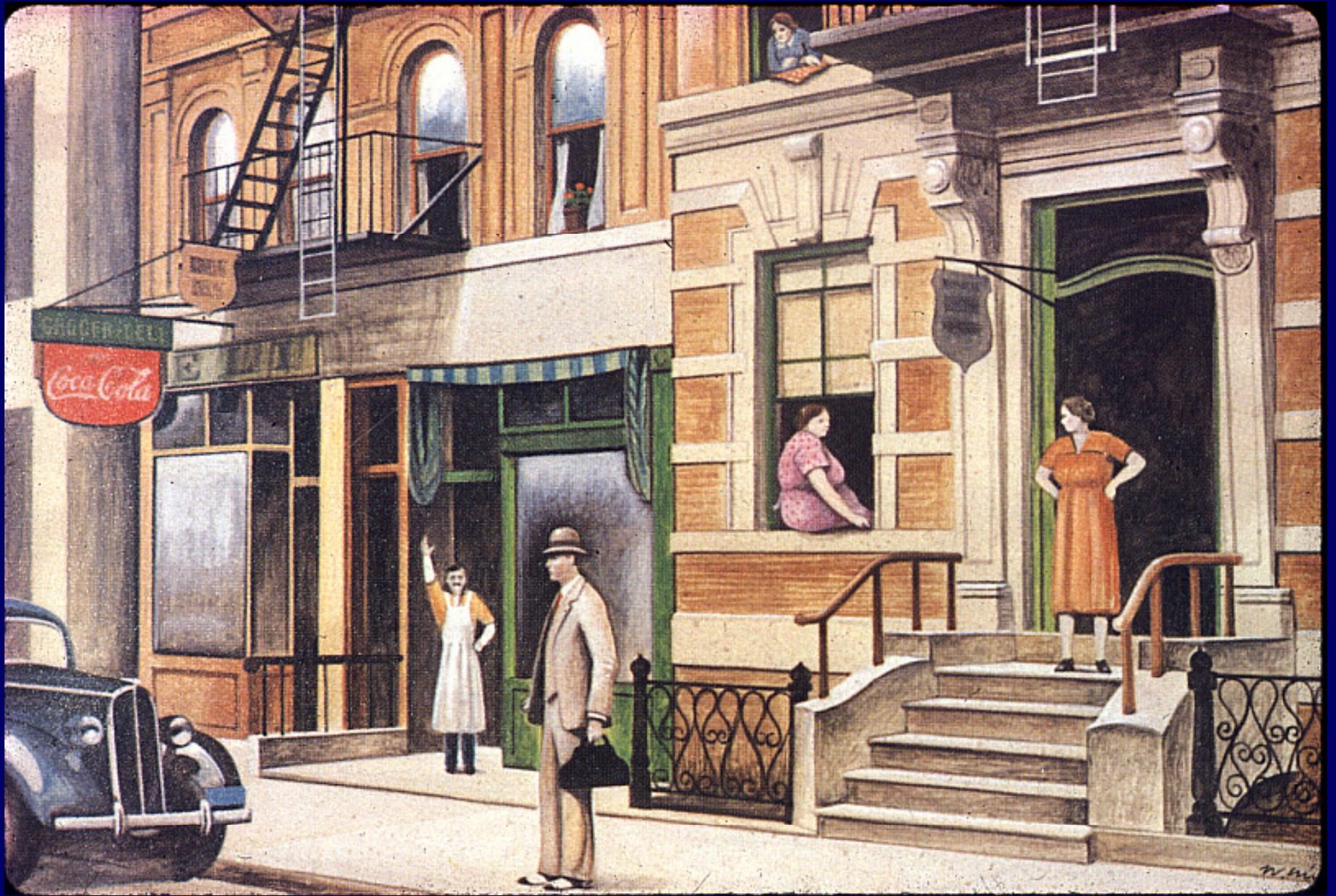
EXPERIMENTAL INVESTIGATIONS REGARDING THE ETIOLOGY OF DENGUE FEVER, WITH A GENERAL CONSIDERATION OF THE DISEASE.¹

By P. M. ASHBURN and CHARLES F. CRAIG.²

(From the Laboratory of the United States Army Board for the Study of Tropical Diseases, Division Hospital, Manila, P. I., and the Biological Laboratory of the Bureau of Science.)



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Latin and others.

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Bananas

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 and every voyage, every port, every coast of the
 Great White Fleet through the Golden Caribbean
 has the romance of buried treasure, pirate ships
 and deeds of adventure—romantic age.
 Today health and happiness are the treasure
 sought on the Spanish Main and Great White
 Fleet Ships both especially for tropical travel bear
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 pleasures of the Spanish
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 and Cruise Guide
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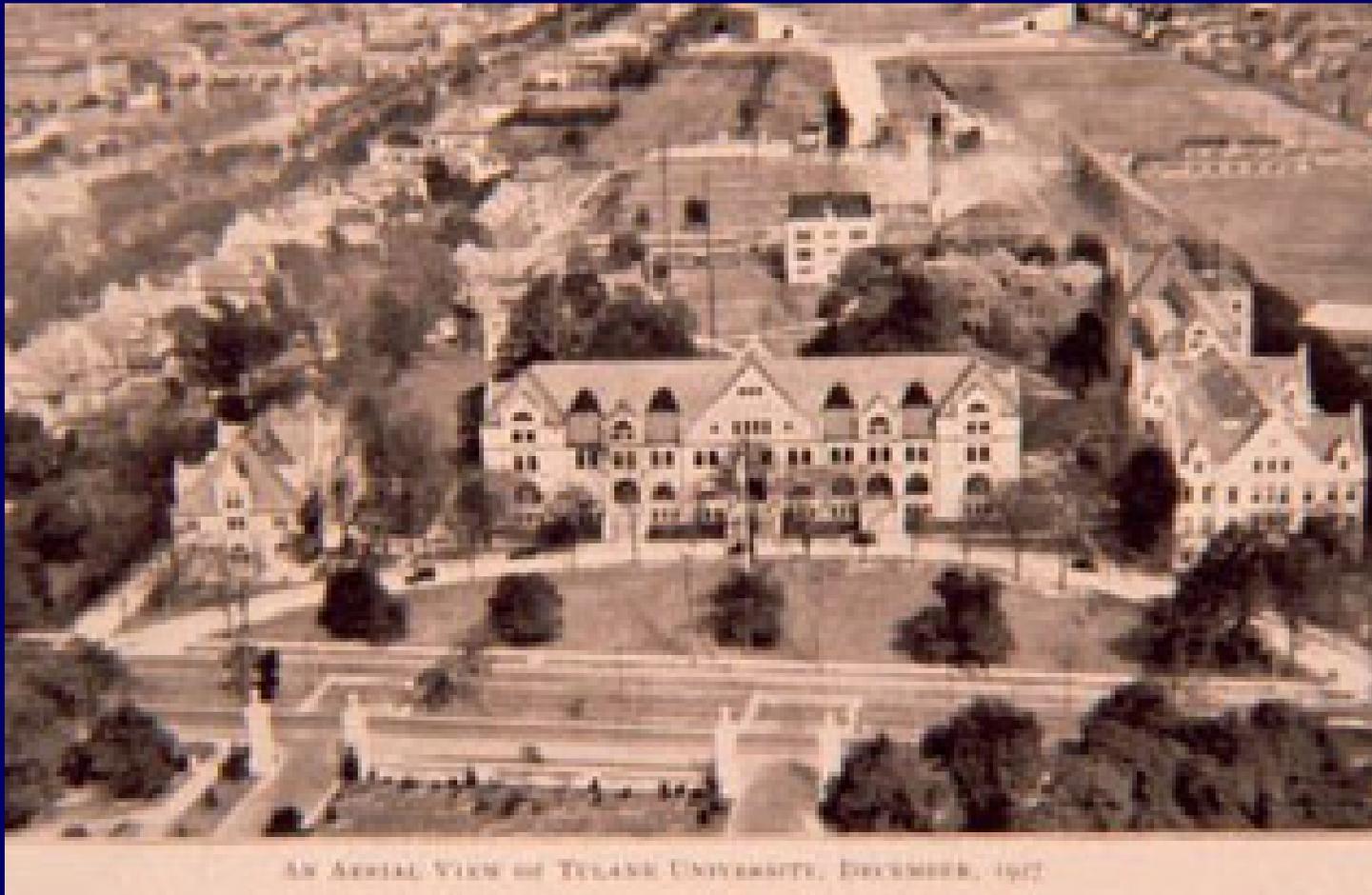
Bananas

United Fruit Co

UNITED FRUIT COMPANY STEAMSHIP SERVICE



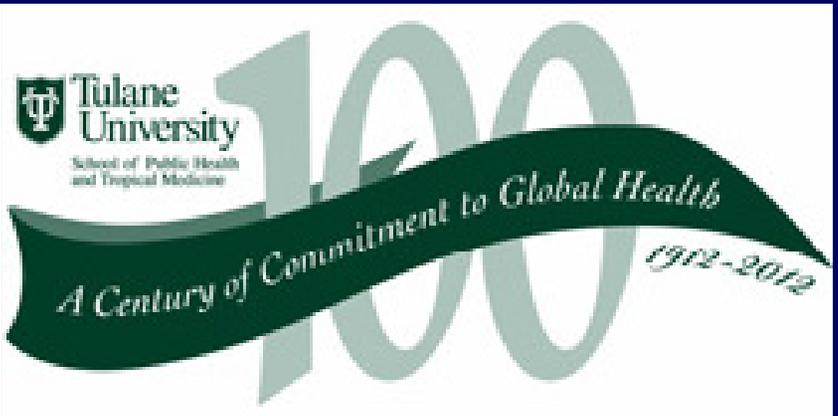
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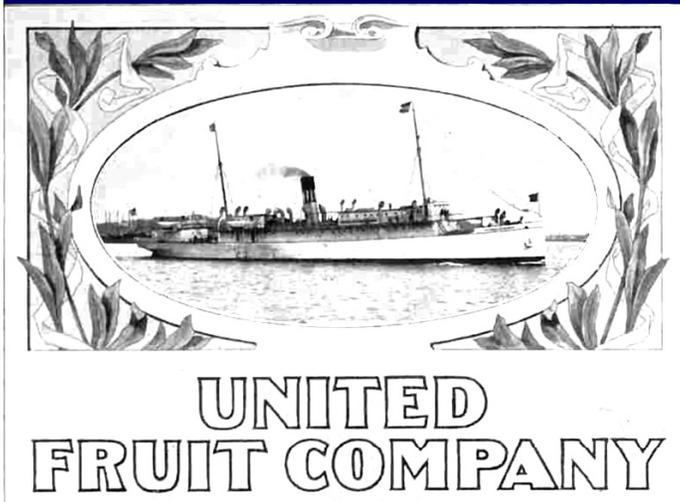
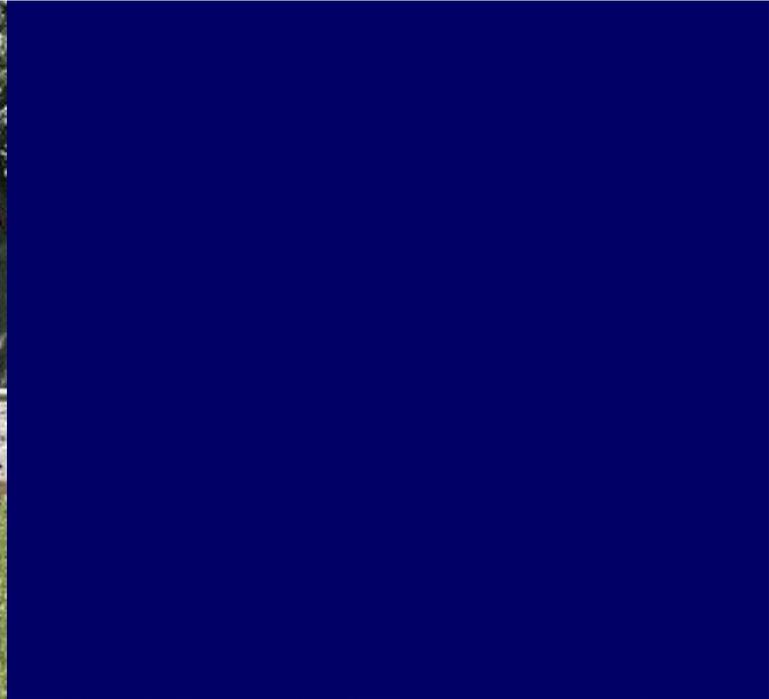


**Tulane
University**

**School of Public Health
and Tropical Medicine**

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WAR WITH GERMANY



BAKER ASKS AN ARMY OF 1,200,000

House Bill for Selective Conscription of 1,200,000 from 18 to 25. Cost to Set at \$7,500,000,000

Gibbons Prays God May Guide Nation in War

Prayer for the nation's success in the coming conflict.

THREE BILLION AND A HALF IN WAR BUDGET

House bill for war budget of \$3,500,000,000 for the army.

FOUR GERMAN SHIPS TOWED TO CITY PIER

Four German ships towed to city pier by the navy.

Americans in Belgium May Be Interned

American citizens in Belgium may be interned.

CARRANZA'S TROOPS MASS UPON BORDER

Carranza's troops mass upon the border.

Austria and Turkey Hope to Stay Neutral

Austria and Turkey hope to stay neutral.

HOUSE BACKS UP WILSON, 373 TO 56

House backs up Wilson, 373 to 56.

GERMANS TWIST WILSON SPEECH

Reference to Wilson's speech and German interpretation.

MAY TO TOTAL 197,000 MEN

Army to total 197,000 men by May.

NO BREAK WITH AUSTRIA NOW

No break with Austria now.

Reveals Plot for U-Boats in Mexico

Reveals plot for U-boats in Mexico.

La Fayette and Shaw Wounded in Killage

La Fayette and Shaw wounded in killage.

Van Beverend New Minister in Sweden

Van Beverend new minister in Sweden.

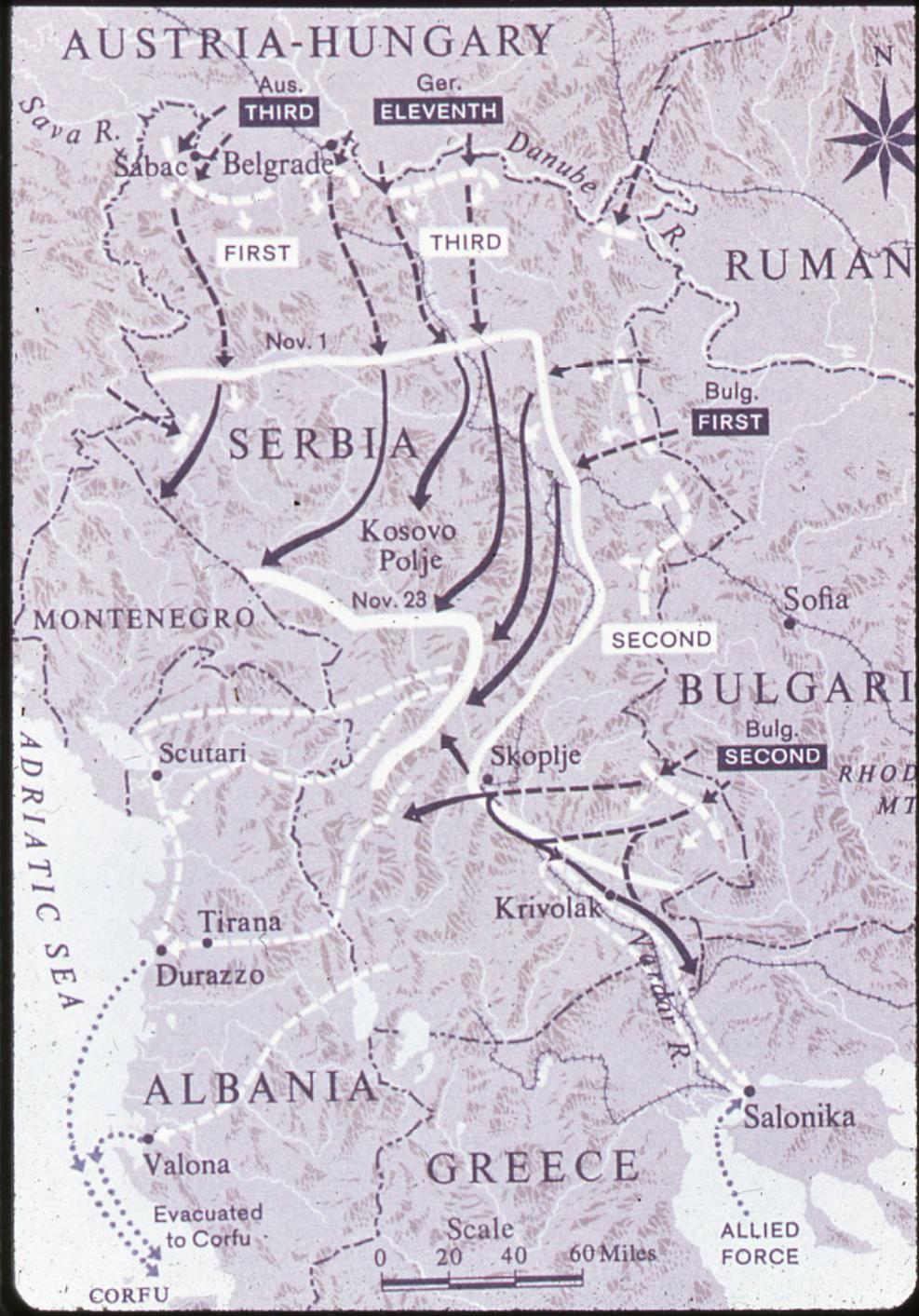
THE WEATHER

Weather forecast for the day.

GERMANY

News from Germany.

Before You Buy Anything
A small advertisement or notice.



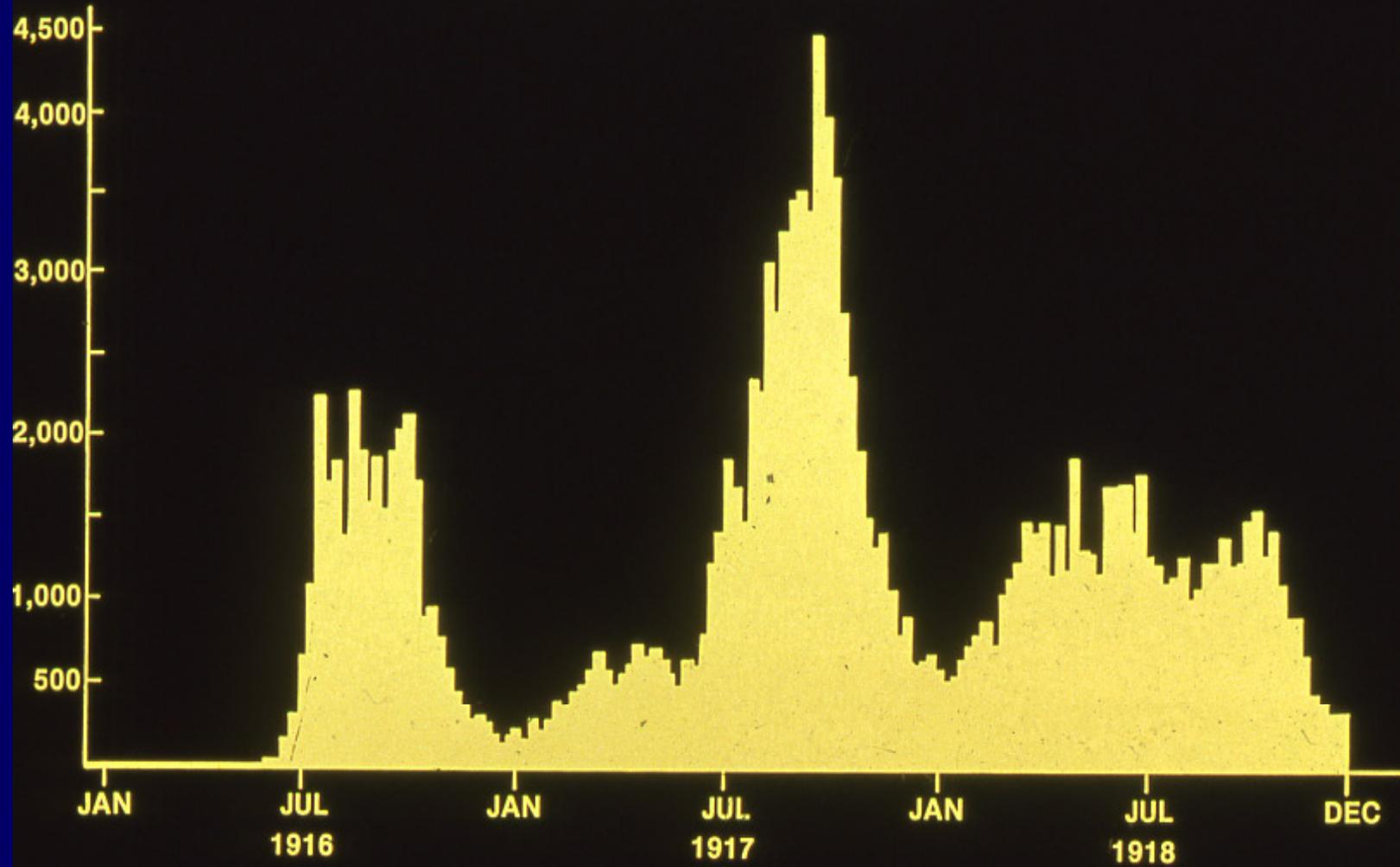


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WEEKLY INCIDENCE OF MALARIA—BRITISH SALONIKA FORCE
JANUARY 1916 TO DECEMBER 1918







MALARIA IN THE UNITED STATES

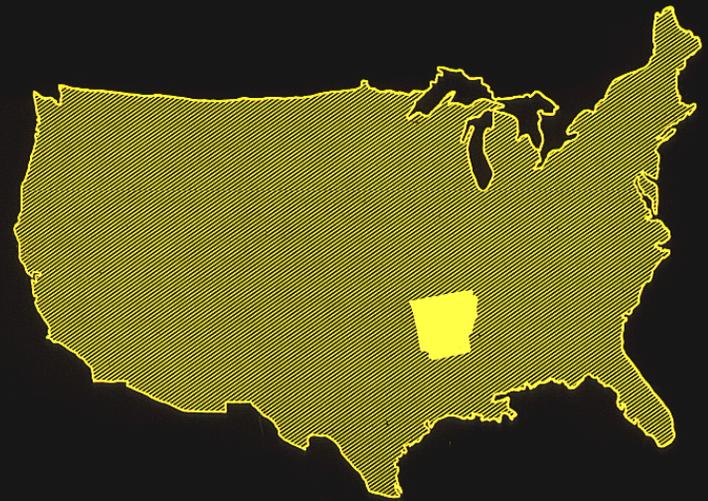
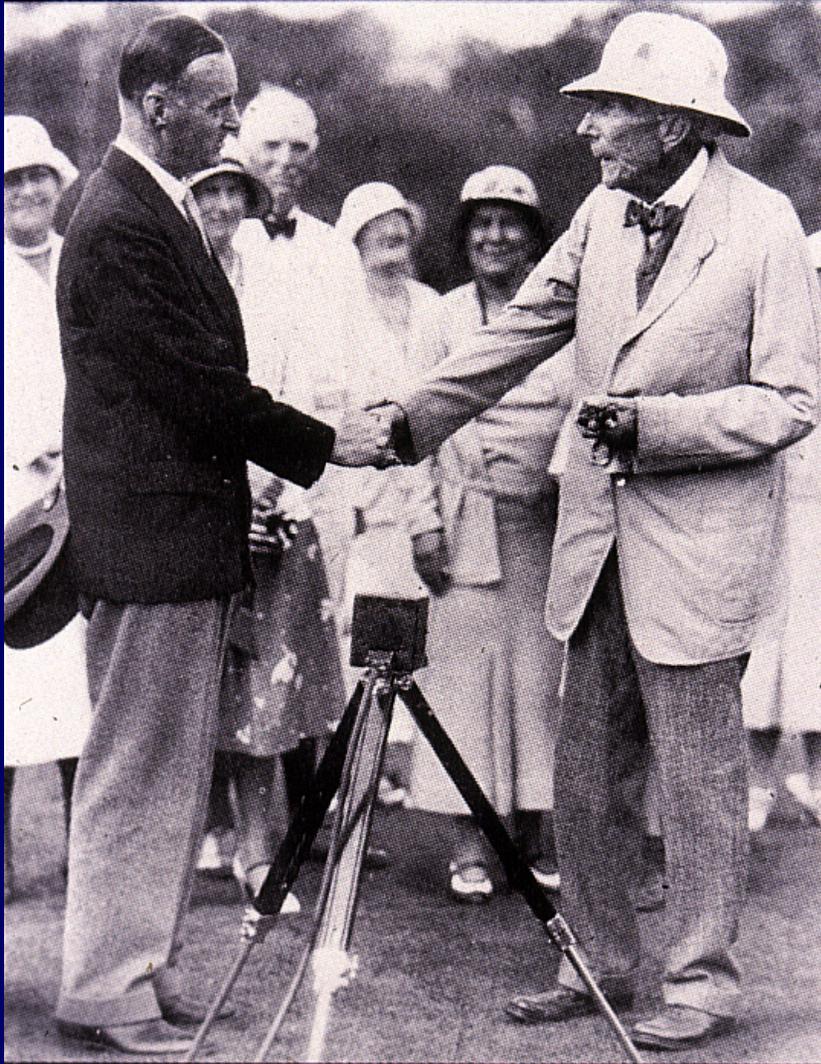
SEVERE SERIOUS LESS SERIOUS SPORADIC

QUININE... Prescribed in grains, produced in tons.

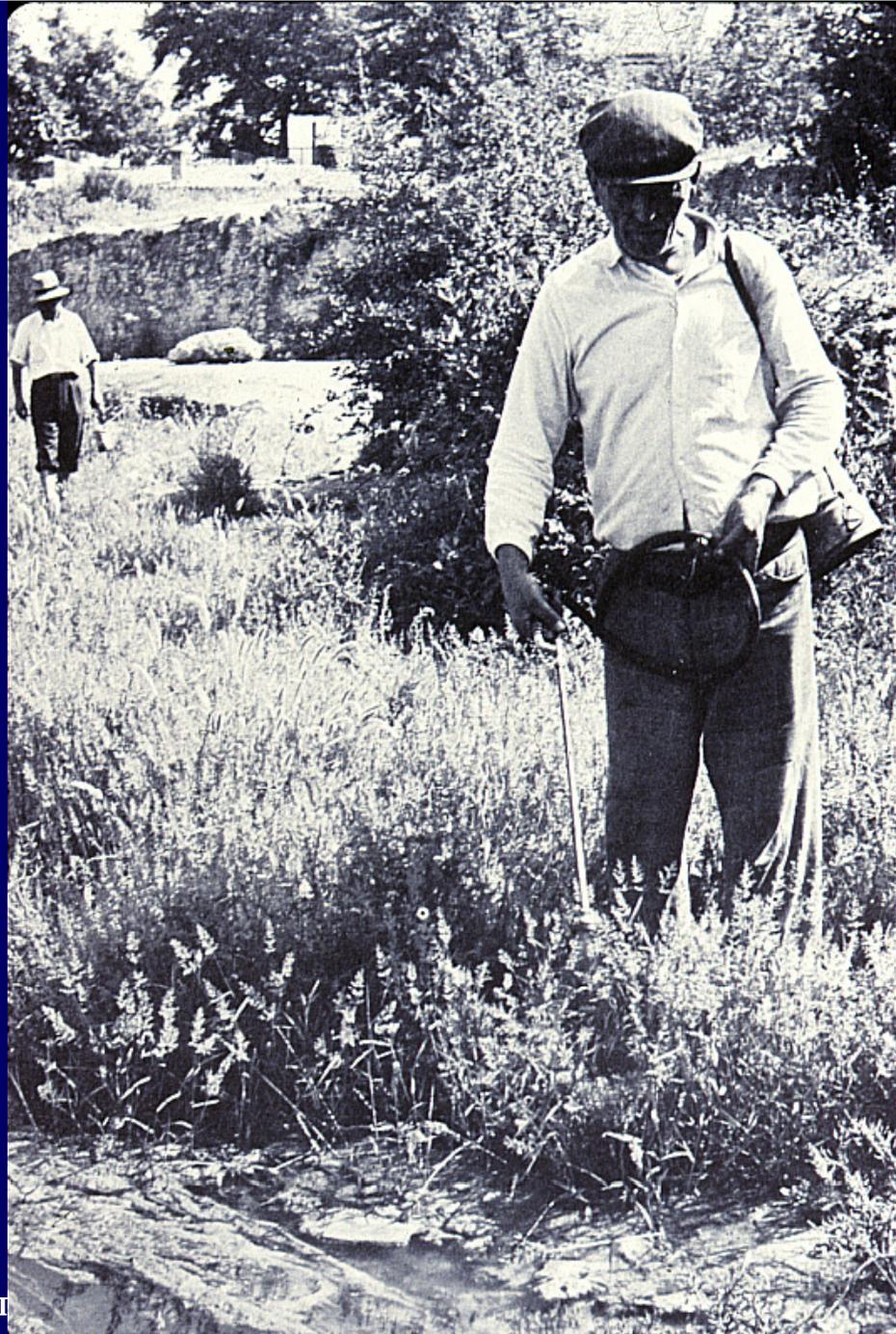
CINCHONA... Quinine comes from the bark of a Cinchona tree, a native of South America, but best grown in Java.

MALARIA... Quinine is a world-wide remedy for malaria. For the correct dosage see your doctor or health officer.

ANOPHELES MOSQUITO
CARRIER OF MALARIA



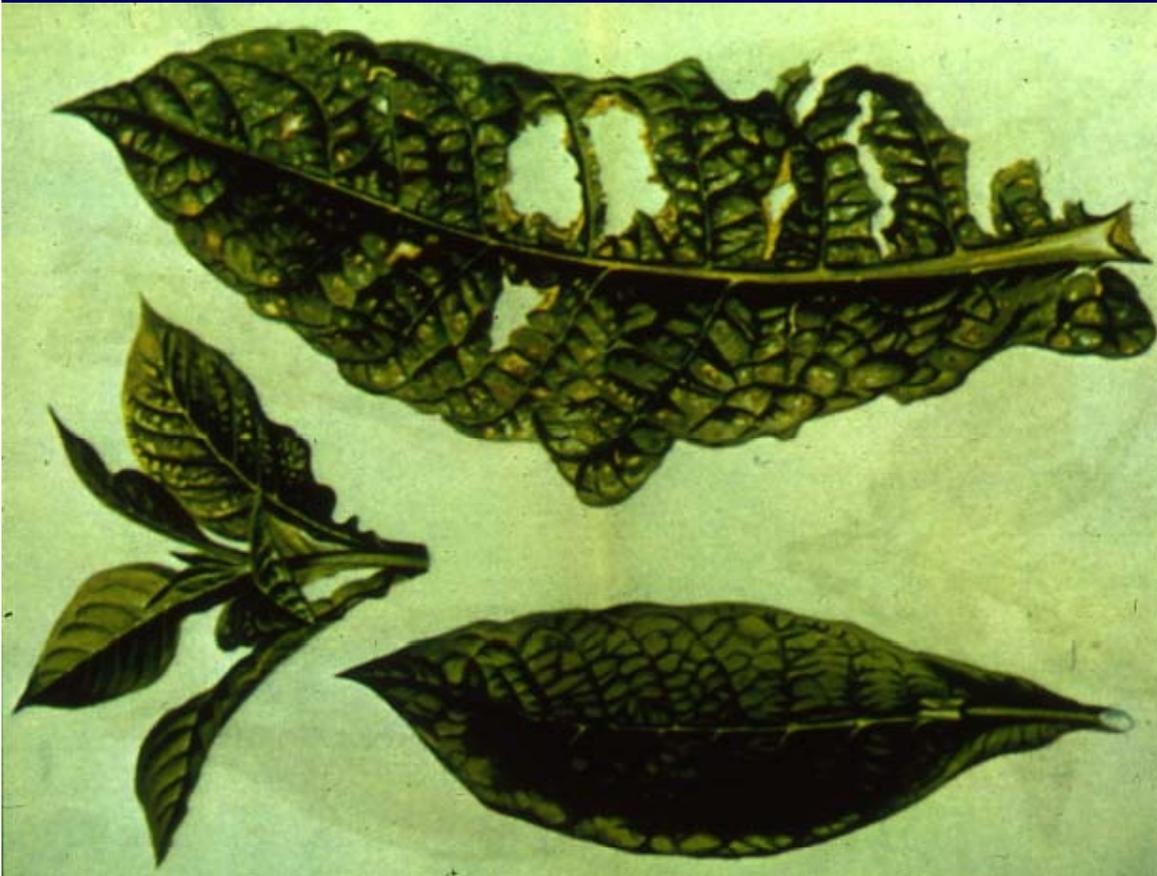
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Global Epidemiology

A GEOGRAPHY OF DISEASE AND SANITATION

By

JAMES STEVENS SIMMONS, B.S., M.D., Ph.D., Dr. P.H., Sc.D. (Hort.)

Regimental General, United States Army; Chief, Preventive Medicine Service, Office of The Surgeon General, United States Army; Member, National Research Council and Committee on Medical Research, G.I.R.D.; Lecturer, Department of Preventive Medicine, Johns Hopkins University Medical School; Lecturer in Public Health, Yale University School of Medicine; Professional Lecturer in Preventive Medicine, George Washington University Medical School; Member, Visiting Committee, Harvard School of Public Health; Lecturer in Tropical Medicine, Army Medical School

TOM F. WHAYNE, A.B., M.D.

Lieutenant Colonel, M.C., A.T.S.; Formerly Director, Medical Intelligence Division, Preventive Medicine Service, Office of The Surgeon General, United States Army

GAYLORD WEST ANDERSON, A.B., M.D., Dr. P.H.

Lieutenant Colonel, M.C., A.T.S.; Director, Medical Intelligence Division, Preventive Medicine Service, Office of The Surgeon General, United States Army; Director, School of Public Health, University of Minnesota

HAROLD MACLACHLAN HORACK, B.S., M.D.

Major, M.C., A.T.S.; Chief, Dissemination Branch, Medical Intelligence Division, Preventive Medicine Service, Office of The Surgeon General, United States Army; Instructor in Medicine, Duke University School of Medicine

AND COLLABORATORS



VOLUME ONE

PART ONE: *India and the Far East*

PART TWO: *The Pacific Area*

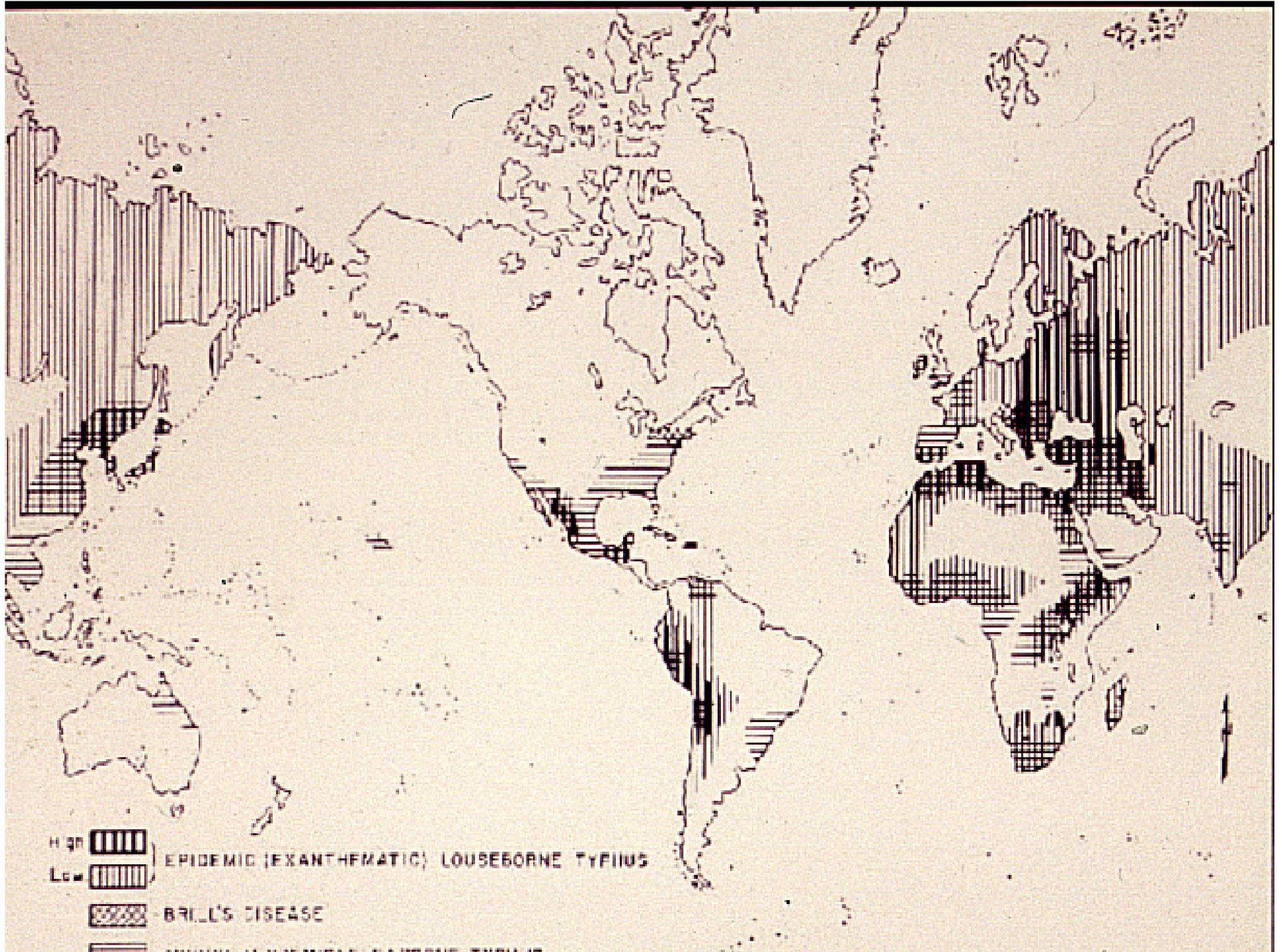


Philadelphia

London

Montreal

J. B. LIPPINCOTT COMPANY



High
Low

EPIDEMIC (EXANTHEMATIC) LOUSEBORNE TYPHUS

BRILL'S DISEASE

ANOTHER DISEASE





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MALARIA

SICK LIST HOSPITAL

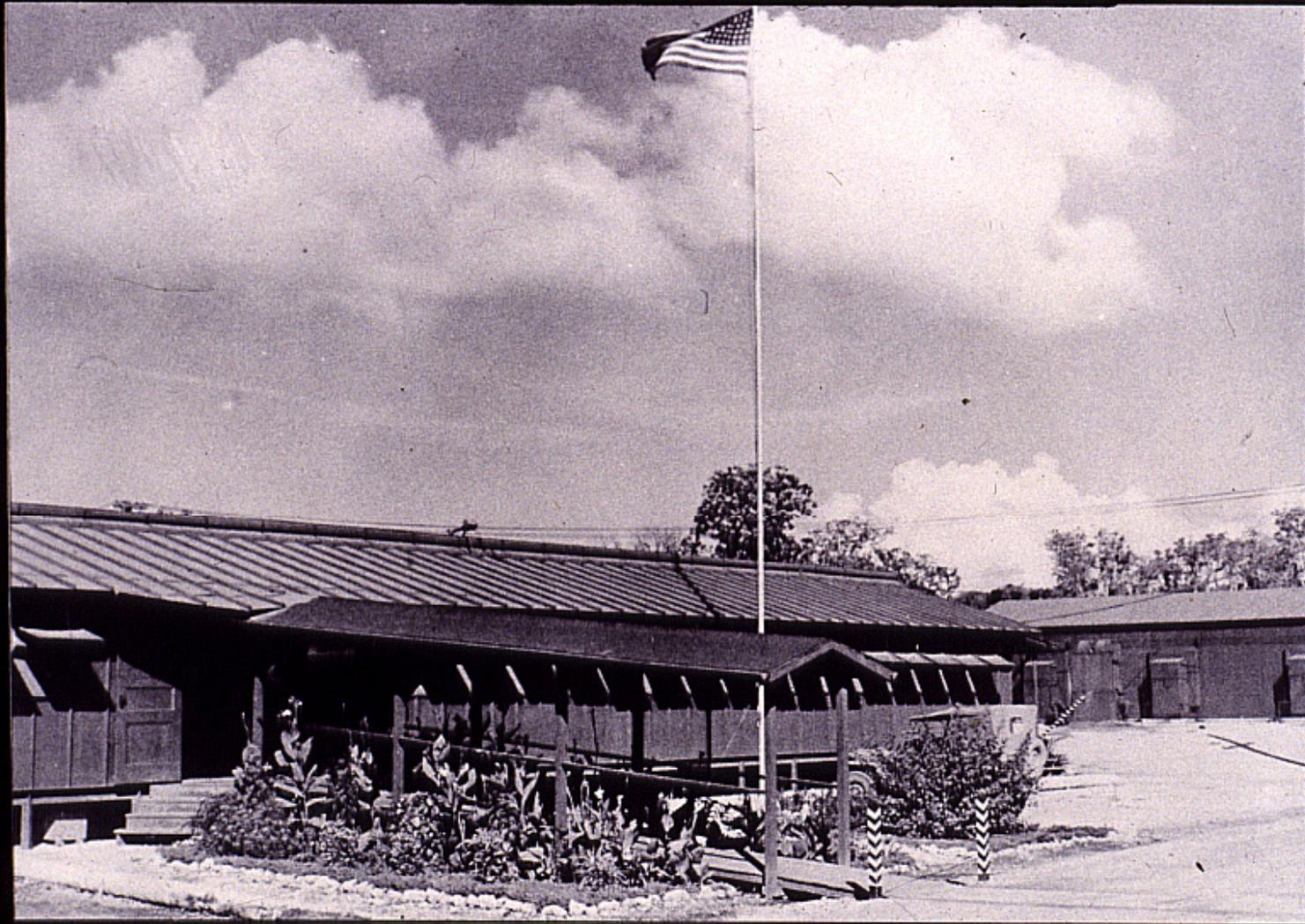
August	900	22
September	1724	239
October	2630	1941
November	2413	3212



MALARIA

USMC-USN CASES: 1942-1945

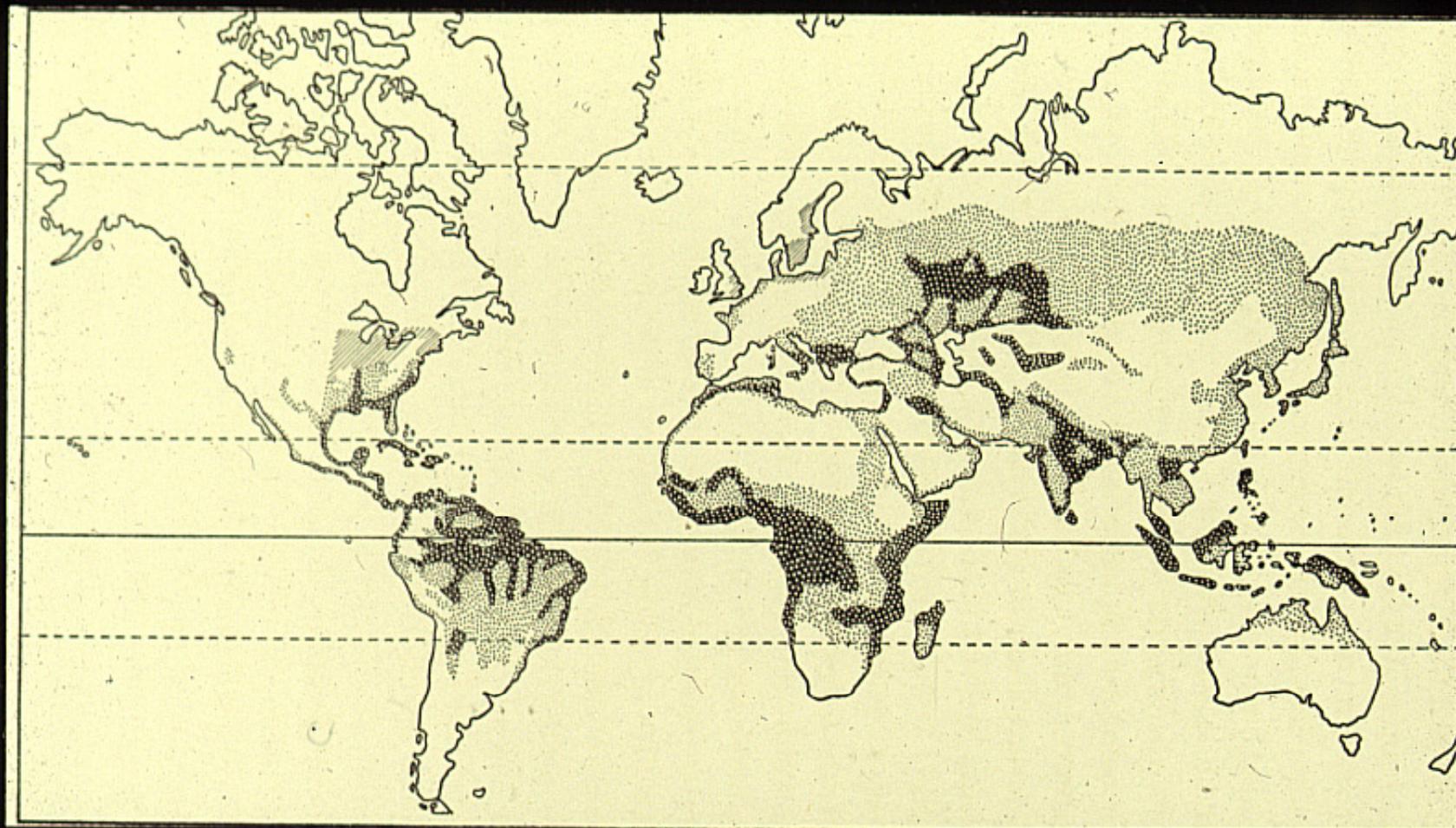
New Cases	113,774
Relapse Cases	<u>89,507</u>
TOTAL CASES	203,281
Percent Relapsed	78.6
Percent Total to Duty	94.0



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MALARIA WARNING!

ANYONE CAN GET MALARIA IN THESE COUNTRIES, EVEN ON A STOPOVER.

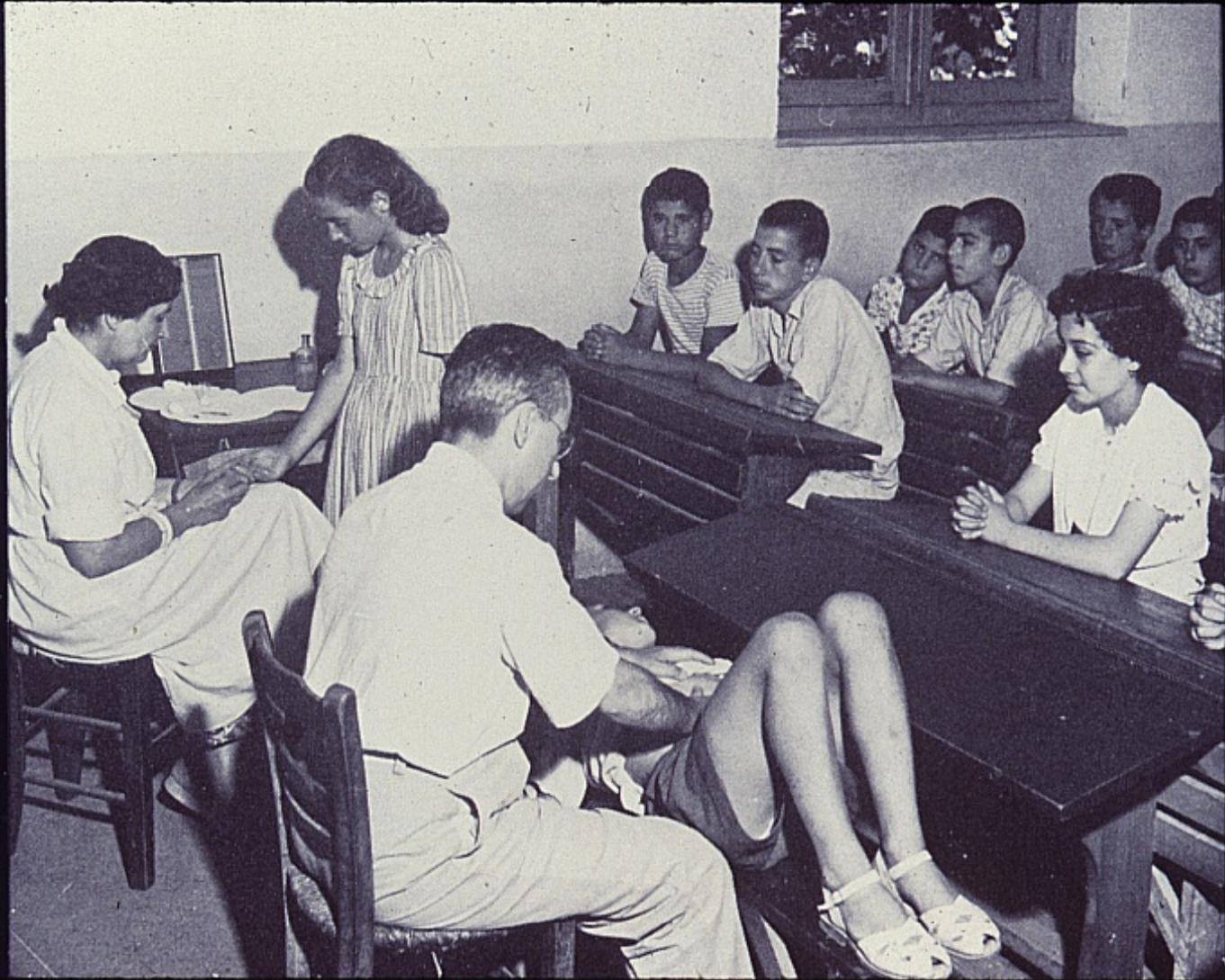


NATURAL IMMUNITY IS SOON LOST AND CHILDREN BORN IN BRITAIN HAVE NONE AT ALL.

Afghanistan Algeria Angola Argentina Bahrain Bangladesh Belize Benin Bhutan
Bolivia Botswana Brazil Burma Burundi Cameroon Cape Verde
Central African Republic Chad China Colombia Comoros Congo Costa Rica
Djibouti Dominican Republic East Timor Ecuador Egypt El Salvador
Equatorial Guinea Ethiopia Gabon Gambia Ghana Guatemala Guiana (French)
Guinea Guinea-Bissau Guyana Haiti Honduras India Indonesia Iran Iraq
Ivory Coast Jordan Kampuchea Kenya Korea (South) Laos (Lao) Liberia Libya
Madagascar Malawi Malaysia Maldives Mali Mauritania Mauritius Mexico
Morocco Mozambique Namibia Nepal Nicaragua Niger Nigeria Oman Pakistan
Panama Papua New Guinea Paraguay Peru Philippines Qatar Rwanda
São Tomé and Príncipe Saudi Arabia Senegal Sierra Leone Solomon Islands
Somalia South Africa Sri Lanka Sudan Surinam Swaziland Syria Tanzania
Thailand Togo Turkey Uganda United Arab Emirates Upper Volta
Vanuatu (Formerly New Hebrides) Venezuela Vietnam Yemen, Arab Republic (North)
Yemen, Democratic Republic (South) Zaire Zambia Zimbabwe

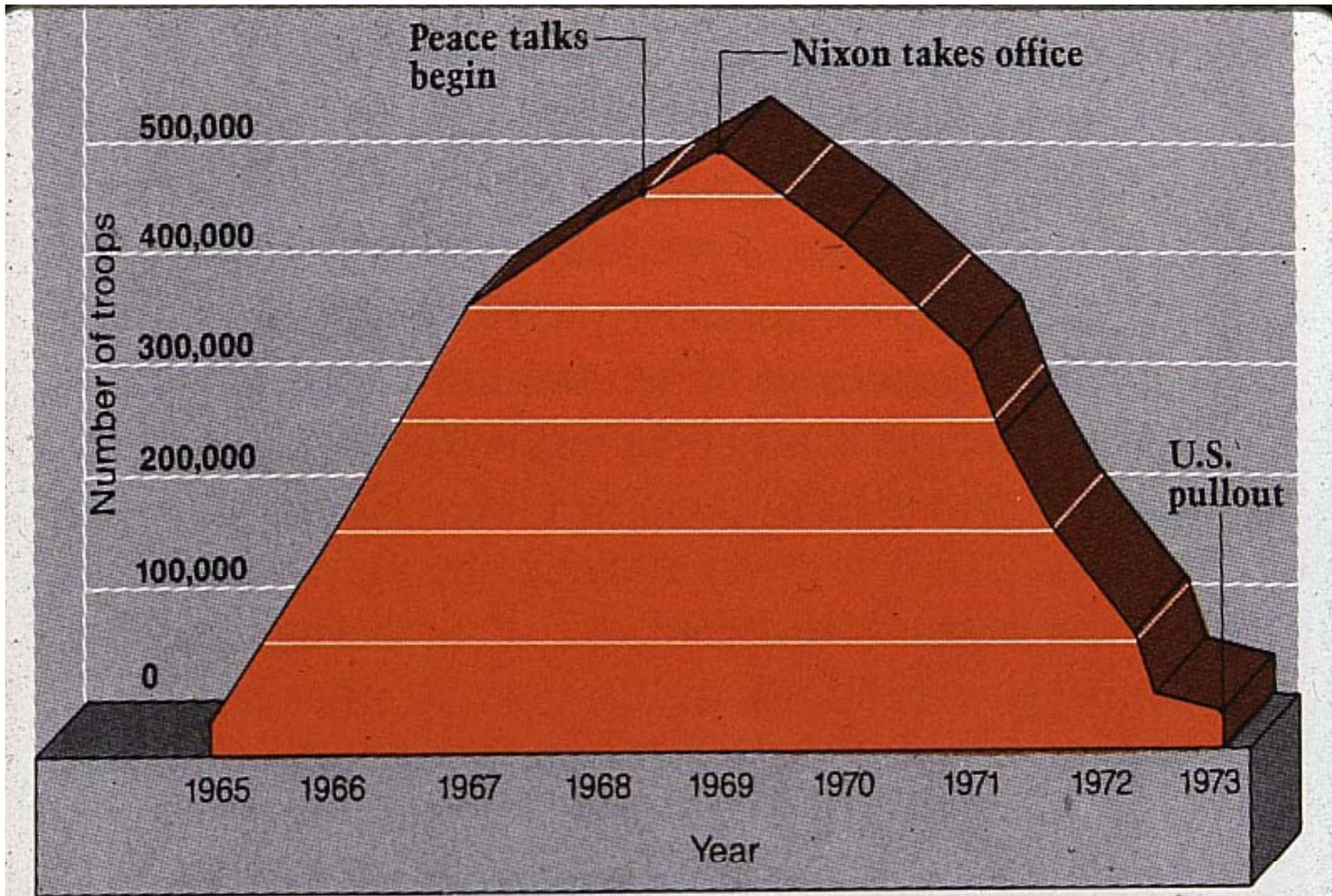


PROTECT YOURSELF BY TAKING ANTI-MALARIAL TABLETS BEFORE, DURING AND AFTER YOUR VISIT.









U.S. Troops in Vietnam, 1965-1973

VIETNAM – 1965

CASUALTY TYPE	NO. PATIENTS			
	<u>OCT</u>	<u>NOV</u>	<u>DEC</u>	<u>TOTAL</u>
WOUNDED	55	570	87	712
MALARIA	164	408	154	726
F.U.O.	248	206	350	804
ALL OTHER DIS.	99	229	268	596

WOUNDED – 712

DISEASE – 2126



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Headquarters and Medical Department Professional
Service Schools Building, Army Medical Center
Washington, D. C.



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Rationale for Development of a Synthetic Vaccine Against *Plasmodium falciparum* Malaria

Abstract. *Protective immunity against malaria can be obtained by vaccination with irradiated sporozoites. The protective antigens known as circumsporozoite (CS) proteins, are polypeptides that cover the surface membrane of the parasite. The CS proteins contain species-specific immunodominant epitopes formed by tandem repeated sequences of amino acids. Here it is shown that the dominant epitope of Plasmodium falciparum is contained in the synthetic dodecapeptide Asn-Ala-Asn-Pro-Asn-Ala-Asn-Pro-Asn-Ala-Asn-Pro or (NANP)₃. Monoclonal antibodies and most or all polyclonal human antibodies to the sporozoites react with (NANP)₃, and polyclonal antibodies raised against the synthetic peptide (NANP)₃ react with the surface of the parasite and neutralize its infectivity. Since (NANP)₃ repeats are present in CS proteins of P. falciparum from many parts of the world, this epitope is a logical target for vaccine development.*



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Failed Safeguards

Are Blamed

For Marines'

Malaria Outbreak

SEPTEMBER 10, 2003

The Washington Post

LIBERIA-2003

157 US Marines Ashore:10-14 Days

<u>ITEM</u>	<u>%COMPLIANCE</u>
• Permethrin Treated Uniforms	12
• Weekly Mefloquine	5
• Insect Repellent	27
• Bed Nets	0

Falciparum Malaria-69 cases

Malaria Outbreak Blamed on Troops

SATURDAY, OCTOBER 18, 2003

