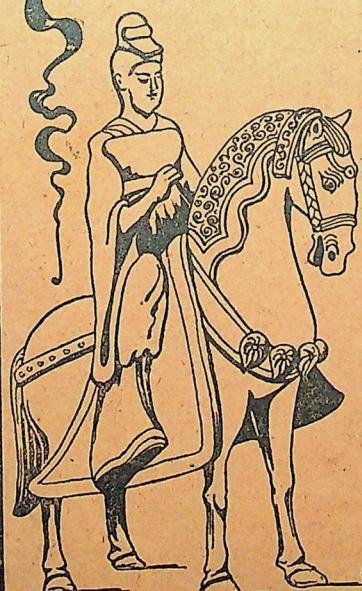


THE
CHINA JOURNAL
OF
SCIENCE & ARTS

EDITED BY

ARTHUR DE C. SOWERBY (SCIENCE)
JOHN C. FERGUSON, PH.D. (LITERATURE
& ARTS)



CONTENTS

Vol. II. MAY, 1924. No. 3.

Approaching Desert Conditions
in North China.

The Emperor Hui Tsung.

Birds in the Poetry of the
Chinese.

The Great Chinese Philosophers.

Explorations in China.

The Termites (White Ants) of
China.

What is Shamanism ?

Some Shansi Waters Chemically
Examined

Biological, Shooting, Fishing
and Scientific Notes.

Reviews, Societies, and
Educational Notes.

A. DE C. SOWERBY.

PRICE \$2 MEX.

Vi-Spring Mattress

The Standard of Bed Comfort

Whereon one may sleep, rest, roll and sleep again with ceaseless ecstasy.



The body of a full-size Vi-Spring Mattress contains more than 1,000 coppered-steel springs. Ventilators, protected by a fine wire gauze, prevent the entry of dust and allows a free circulation of air.

“Vi-Spring” Mattresses are the most healthy, comfortable and durable that it is possible to obtain.

ARTS & CRAFTS, LTD.

Bedding Manufacturers and Sole Selling Agents
for Vi-Spring Mattresses

SHANGHAI

“EVERY DROP DISTILLED”

THE
HALL-MARK
OF
PURITY



THE
HALL-MARK
OF
PURITY

AQUARIUS

SPARKLING MINERAL TABLE WATERS

MADE FROM

PURE DISTILLED WATER

BY

THE AQUARIUS CO.

CALDBECK, MACGREGOR & CO., LTD.
General Managers

Telephone Central 7216
(4 lines)

4 FOOCHOW ROAD
SHANGHAI

ROSE, DOWNS AND THOMPSON (Far East), LIMITED

29 CANTON ROAD, SHANGHAI.

Telegraphic

Address :

“ ROSEDOWNS
SHANGHAI ”

Works Established
at Hull, England,
1777

Telephones :

Central
3497-
5530

ENGINEERS AND MACHINERY
MERCHANTS.

Oldest and Largest Makers in the World of
OIL MILL MACHINERY

FOR THE TREATMENT OF ALL OIL-BEARING SEEDS AND NUTS AND FOR THE AFTER-TREATMENT OF OILS.

Sole Manufacturers of

**THE “KINGSTON” GRAB DREDGER
AND EXCAVATOR**

FOR ALL DREDGING PURPOSES—ASHORE
AND AFLOAT

General Machinery Importers and Sole Agents for many
Leading British Manufacturing Engineers.

IN STOCK :—CRUDE AND REFINED OIL ENGINES, STEAM ENGINES, PUMPS, SMALL TOOLS, SUPPLIES FOR OIL AND FLOUR MILLS, BELTING, BELT FASTENERS, CANVAS HOSE, SEWING AND KNITTING MACHINES, MACHINE TOOLS—LATHES, PLANING MACHINES, DRILLING MACHINES, ETC. PICKERING GOVERNORS, MILL GEARING AND POLISHED SHAFTING, WIRE ROPES, SAW MILL PLANT, MARINE OIL ENGINES, OIL FILTERS, GRINDING PLANTS, ETC. ETC.

Asia Development Co., Ltd.

司 公 業 建 洲 亞

Engineers and Contractors

SHANGHAI, CHINA

3 Canton Road, 6th floor

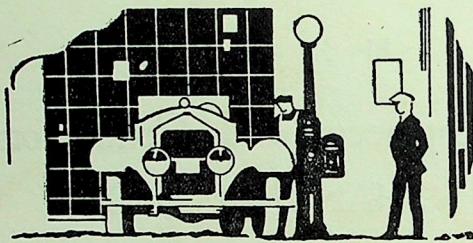
Tel. Central 6316

Telegraphic Address :
DVELOPASIA



Constructors of—

Railways, Port Developments, Electric Railways, Tramlines, Buildings, Industrial Plants, Power Plants, Waterworks, Bridges, Foundations and general developments of all kinds.

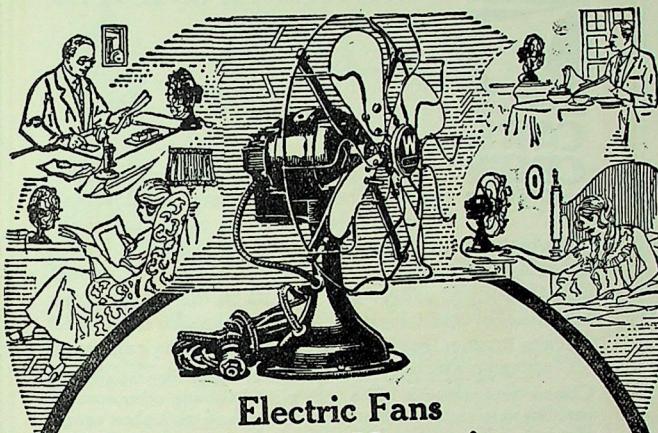


easy to get~
good to use

PRATT'S MOTOR SPIRITS



Standard Oil Co. of New York



Electric Fans A Boon to Humanity

THE electric fan is one of the appliances made possible by the perfection of the electric motor—the heart of the electric fan. Use them for the sick room or hospital to bring comfort to the suffering. Place them in the home to bring happiness by their balmy breezes. Put them in the Counting House to keep a cool stream of air in circulation. Set them in the works where they will bring comfort to an otherwise unbearable task. Wherever they are placed, they bring their message of what Electricity has accomplished to make life more comfortable.

*Large stocks of fans in all sizes, types and voltages,
for immediate shipment from our nearest office.*

Westinghouse Electric International Co.

Shanghai—Hankow—Hongkong—Tientsin



100



Westinghouse



MERCHANDISING IN CHINA

We maintain the largest organization in the Far East devoted exclusively to advertising and can offer the foreign manufacturer a service covering all branches of advertising and merchandising in all parts of China. Our staff of artists, copy writers and experts in the various lines, both foreign and Chinese, are able to handle in the most efficient manner, every detail of an advertising campaign.

NEWSPAPERS. The volume of advertising we place in Chinese newspapers is twice that placed by any other concern, enabling us to secure the best possible rates and the highest agency discounts. The cost including our service fee would be less than if you dealt direct with the newspapers.

OUTDOOR ADVERTISING. We maintain the only standardized outdoor advertising plant in China and offer the only guaranteed and protected poster and painted bulletin service. The largest and most successful advertisers in China are using this service.

PRINTING. We write or translate, illustrate and supervise the printing of all kinds of advertising material, posters, circulars, booklets, calendars, etc., which can be produced cheaper in China than other countries.

Our experience in helping dozens of manufacturers and importers to solve the problem of advertising in China enables us to give clients the benefit of this experience which is the experience of the most successful advertisers in the country.

If you will write us fully about your advertising problem in China we will be glad to send you a suggested program.

CARL CROW, INC.

Advertising & Merchandising Agents

Cable: "ONAPRESS" Shanghai
Bentley and Private Codes

6B-Kiangse Road
SHANGHAI, CHINA



PAGODA BRAND

CHINESE PURE SILK HOSIERY

The native product of a country whose climate will
only suffer the survival of the fittest fabrics

are

made strong to last long

But there is more to it than that. Strength without
symmetry will never appeal to people of elegance
and taste.

It is the combination, in the finest Chinese Silk, of
symmetry with strength that has made

PAGODA BRAND HOSIERY

the most popular brand on the market in China
and the criterion for hard-wearing quality throughout
the world

The China Cotton and Silk Works

ILBERT & CO., LTD., *General Managers*

1 CANTON ROAD, SHANGHAI

Through
the
U. S. A.



The
Premier
Railway
of
America

SAFETY—SPEED—SCENERY

Two hours less time to Chicago without change—Double tracking the mountain divisions with 130 pound rails (the heaviest ever laid) enables the Great Northern Railway to make

TWO HOURS FASTER TIME ACROSS THE CONTINENT

Brand new all-steel trains pulled by oil burning locomotives make traveling by the Great Northern the last word in comfort.

BETWEEN Vancouver, B.C.—Seattle—Tacoma—Portland and Eastern Cities—

TRAVEL AND SHIP **GREAT NORTHERN** SHANGHAI OFFICE:
ROUTE OF THE FAMOUS ORIENTAL LIMITED ROBERT DOLLAR BLDG.

LACTAGOL

To the mother wishing to protect her child from the danger of bottle feeding, LACTAGOL is a boon, as it renews and enriches her breast milk and at the same time greatly improves her general health owing to its pronounced natural tonic properties.

Obtainable at all Chemists

*Agents : MIDDLETON & CO., LTD.
SHANGHAI*

SPERMIN

The
Never Failing
PHYSICAL TONIC
REJUVENATING
HEALTH RESTORING

RECOMMENDED BY THE MEDICAL
PROFESSION

PRICE : \$3.00 per bottle

Obtainable from all leading Dispensaries

Sole Agents :

SINE COMPANY, LTD.

4 EZRA ROAD, SHANGHAI



NO one ever
gets tired of
Melachrinos —
their unfailing
quality is a con-
stant satisfaction.

ORIGINAL

MELACHRINO

"The One Cigarette Sold the World Over"

LACHAMP STUDIO OF THINGS
CHINESE
18 NANKING ROAD
CENTRAL BUILDING, SHANGHAI

Offers a selection of objets d'art that are distinguished by the patient handiwork of the ages. We have brasses and bronzes, old embroideries, amber, jade, lapis lazuli, amethyst and other beads of all descriptions: furniture, lampshades, old or new, of any design: handbags and other hand-made articles. At request we send to your hotel or home a selection for your inspection. We specialize in things Chinese.



LACHAMP STUDIO OF THINGS
CHINESE
18 NANKING ROAD
CENTRAL BUILDING, SHANGHAI

H. C. AUGUSTESEN
CHINA TRADE
ENGINEERING DEPARTMENT



TRADE MARK

Experienced Engineers on Hand for
Expert Advice and Information on
all Technical Questions.

A large Stock of Machinery carried
in Shanghai.

SHANGHAI

Showroom :

CORNER OF SZECHUEN & FOOCHOW ROADS

Telegraphic Address : "SAFEGUARD"

TOYO MURAKAMI

OBJETS D'ART AND CURIOS



Codes Used:

"BENTLEY"
A.B.C. 5th Ed.

TOYO MURAKAMI
PALACE HOTEL BUILDING
SHANGHAI
Telephone Central 2319

Cable Address:
"MURAKAMITO"
SHANGHAI

INTERNATIONAL BANKING CORPORATION

Capital and Surplus U.S. \$10,000,000

Owned by the National City Bank of New York.

Head Office:
60 WALL STREET, NEW YORK

London Office:
36 BISHOPSGATE, E.C.

BRANCHES

BARCELONA	MADRID
BATAVIA	MANILA
BOMBAY	PANAMA
CALCUTTA	PEKING
CANTON	RANGOON
CEBU	SAN FRANCISCO
COLON	SANTO DOMINGO
DAIREN	SHANGHAI
HANKOW	SINGAPORE
HARBIN	SOURABAYA
HONGKONG	TIENTSIN
KOBE	TOKIO
YOKOHAMA	

Commercial and Travellers' Letters of Credit, Bills of Exchange and Cable Transfers bought and sold. Current accounts and Savings Bank accounts opened and Fixed Deposits in local and foreign currencies taken at rates that may be ascertained on application to the Bank.

We are also able to offer our Customers the services of the Branches of the National City Bank of New York in the principal countries of Europe, South America and in the West Indies.

N. S. MARSHALL, *Manager.*

1A KIUKIANG ROAD, SHANGHAI.

HONGKONG AND SHANGHAI BANKING CORPORATION

CAPITAL : Authorized Capital \$50,000,000
 Issued and fully paid up \$20,000,000
 RESERVE FUND : Sterling £4,500,000
 " Silver \$24,500,000
 Reserve Liability of Proprietors \$20,000,000

Head Office : HONGKONG.

Court of Directors :

Hon. Mr. A. O. Lang, Chairman
 D. G. M. Bernard, Esq., Deputy Chairman
 A. H. Compton, Esq. J. A. Plummer, Esq.
 G. T. M. Edkins, Esq. N. L. Watson, Esq.
 Hon. Mr. P. H. Holyoak H. P. White, Esq.
 W. L. Pattenden, Esq.

Branches and Agencies :

Amoy	Dairen	Johore	Nagasaki	Singapore
Bangkok	Foochow	Kobe	New York	Sourabaya
Batavia	Haiphong	Kuala-	Peking	Sungei Patani
Bombay	Hamburg	Lumpur	Penang	Tientsin
Caleutta	Hankow	London	Rangoon	Tsingtao
Canton	Harbin	Lyons	Saigon	Vladivosfok
Chefoo	Iloilo	Malacca	S. Francisco	Yokohama
Colombo	Ipoh	Manila	Shanghai	

Credit Manager :

HON. MR. A. G. STEPHEN.

London Bankers :

The Westminster Bank, Ltd.

Shanghai Branch : 12 THE BUND. Sub-Agency : 9 BROADWAY.

Interest allowed on Current Accounts and on Fixed Deposit according to arrangement.

Local Bills Discounted.

Credits granted on approved securities and every description of banking and exchange business transacted.

Drafts granted on London and the chief commercial places in Europe, India, Australia, Africa, China, Japan and America.

Savings Banks Office :

Deposits of not less than \$1 will be received.

Not more than \$200 will be received during one month from any single Depositor.

Interest at the rate of 3½ per cent. per annum will be allowed upon the monthly minimum balance.

The maximum balance on which interest will be allowed is \$5,000.00.

Deposits may be withdrawn on Demand. Accounts will be kept either in Dollars or Taels, Local Currency, at the option of the Depositor.

Depositors will be presented with Pass Books, in which all transactions will be entered. Pass Books must be presented when paying in or withdrawing money.

Office Hours—10 a.m. to 3 p.m.; Saturday, 10 a.m. to 12 noon.

G. H. STITT, *Manager.*

大
通
銀
行



*If you have business
in the Far East—*

THE kind of a bank you need to help you is one
whose business is exclusively of the Far East—

A BANK whose name and reputation will win the
respect and confidence of your customers—a bank that
is versed in the methods of the East: that knows its
customs and markets—a bank that is your experienced
business counselor as well as your financial agent.

*Such a Bank is the
EQUITABLE EASTERN BANKING
CORPORATION*

ORGANIZED and managed by the officers and directors
of The Equitable Trust Company of New York, it
will give you the same prestige abroad and the same
personal service that distinguishes the parent organiza-
tion—with the added convenience of a separate bank
devoted exclusively to Oriental business.

*Call at our New York or Shanghai Offices,
and let us tell you how we can help you.*

**EQUITABLE EASTERN
BANKING CORPORATION**

37 WALL STREET, NEW YORK

Shanghai Office : 6 KIUKIANG ROAD

Capital, Surplus and Undivided Profits : U.S. \$2,850,000

Banque Belge pour l'Etranger S.A.

(Affiliated to the Société Générale de Belgique)

CAPITAL (subscribed) Frs. 100,000,000

(paid up) " 75,000,000

RESERVES " 24,000,000

Head Office: BRUSSELS

Branches and Agencies at:

LONDON, PARIS, NEW YORK, BUCHAREST, BRAILA, COLOGNE, CAIRO,
ALEXANDRIA, PEKING, SHANGHAI, TIENTSIN, HANKOW.

Allied Banks:

BANCO INTERNACIONAL DE INDUSTRIA Y COMERCIO, MADRID, with
Branches in SPAIN and MOROCCO.—WIENER BANK-VEREIN, VIENNA,
with Branches in AUSTRIA, HUNGARY, POLAND, RUMANIA, ITALY
(TYROL), and YUGO-SLAVIA.—ALLGEMEINER BOEHMISCHER BANK
VEREIN PRAGUE, with Branches in CZECHO-SLOVAKIA.—LANDES BANK
FUER BOSNIEN und HERCEGOVINA, SERAJEVO, with Branches in YUGO-
SLAVIA; S. A. BANQUE FRANCO-BELGE de BULGARIE, SOFIA.

Correspondents in all parts of the World

Every description of banking business transacted

A. DONNAY, Manager.

CAMMELL LAIRD & CO., LTD.

Controlling The Leeds Forge Co., Newlay Wheel Co., etc.

Birkenhead, Sheffield, Nottingham, Birmingham, Leeds, Penistone
and London.

PASSENGER, CARGO AND WARSHIPS

RAILWAY PASSENGER COACHES

FREIGHT AND COAL CARS

STEAM-DRIVEN RAIL COACHES

WHEELS, AXLES, SPRINGS

“NEWLAY” SOLID ROLLED STEEL RAILWAY WHEELS

Crucible and Alloy Steels, Files and Rasps

STEEL CASTINGS & FORGINGS

“FOX” { PRESSED STEEL TRUCKS
AND
CORRUGATED FURNACES

13 PEKING ROAD

SHANGHAI

J. A. WATTIE & CO., LTD.

Financial, General and Commission Agents

Head Office :

10 CANTON ROAD, SHANGHAI

(also at London and Sourabaya)

Secretaries or General Managers for :

Alma Estates, Limited

New Amherst Rubber Estate, Limited

Anglo-Dutch (Java) Plantations, Limited

Anglo-Java Estates, Limited

Batu Anam (Johore) Rubber Estates, Limited

Bukit Toh Alang Rubber Estate, Limited

Carlton, Limited

Chemor United Rubber Company, Limited

Chempedak Rubber and Gambier Estate, Limited

Cheng Rubber Estates, Limited

Java Consolidated Rubber and Coffee Estates, Limited

Kali Glidik Coffee Estates, Limited

Kroewoek Java Plantations, Limited

Repah Rubber and Tapioca Estate, Limited

See Kee Rubber Estates, Limited

Semambu Rubber Estate, Limited

Senawang Rubber Estates Company (1921), Limited

Shanghai Building and Investment Company, Limited

Shanghai Klebang Rubber Estate, Limited

Shanghai Seremban Rubber Estates, Limited

Tebong Rubber Estate, Limited

Ziangbe Rubber Company, Limited

Agents for :

The Scottish Union & National Insurance Co.

The Gresham Fire and Accident Insurance Society, Ltd.

INSURANCE

Personal Effects in China and Baggage whilst
Travelling.

The 'New China' Accident & Sickness Policy.
Fire, Marine, Motor Car, Burglary, Plate
Glass, Accident and Special Risk insurances
issued.

Prospectuses on Application

REASONABLE RATES — COMPRE-
HENSIVE COVER—PROMPT AND
LIBERAL SETTLEMENT OF CLAIMS

C. E. SPARKE

INSURANCE OFFICE

44 Kiangse Road, Shanghai

Agents : Excess Insurance Co., Ltd. of London

Whose Assets exceed £2,000,000

Voigtländer

CAMERAS

LENSSES

BINOCULARS & TELESCOPES

MICROSCOPES

To be had at all the prominent dealers all
over the world.

General Agents for China :

SCHERINGS LIMITED

SHANGHAI

26 Canton Road

Tel. Add. : "SATRAP."

With Agents in

Canton, Hongkong, Amoy, Hankow, Tsingtau,
Tsinanfu, Tientsin, Peking, Dairen,
Mukden and Harbin.

The name of

Voigtländer

Stands for Quality

THE
CHEE HSIN CEMENT
COMPANY, LIMITED

Telephone
No. 1309 S.
Tientsin

Telegraphic
Address:
"CEMENT"



Manufacturers
of
"Tangshan and Hupeh Portland Cement"

Used by all the large enterprises in China, Manila, and South Sea Islands in railway construction, mining and engineering works, by the Commission for the Improvement of the River System of Chihli, The Kailan Mining Administration, and all Municipalities in Tientsin. Standing Contracts made with all railways in Northern China using the Chee Hsin Cement exclusively.

Rotary Kilns.

Cement Mosaic Tiles, Roofing and Ridge Tiles in all colours and designs.

Cement Paving Tiles and Pipes, Concrete Poles, Stables and Cement Blocks, etc.

Clinker Tiles.

Roofing Tiles and Insulators, etc.

General Managers of
The Hua Kee Hupeh Cement Works
HUANGSHIHKONG, NEAR HANKOW.

BRITISH ELECTRICAL AND
ENGINEERING CO. (of China) LTD.

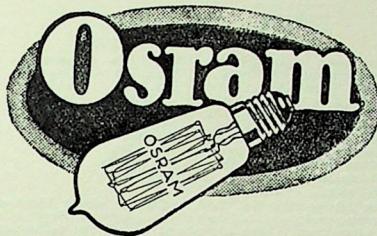
21 JINKEE ROAD, SHANGHAI

LIGHTING, PUMPING, POWER,
MILLS AND EQUIPMENT
TRANSMISSION.

Representing:

W. J. HENLEY'S TELEGRAPH WORKS CO., LTD.
MATHER & PLATT, LTD.
EVERSHED & VIGNOLES, LTD.
BRITISH ELECTRIC TRANSFORMER CO., LTD.
ERSKINE HEAP & CO., LTD.
BROOK HIRST & CO., LTD.
BRUCE PEEBLES & CO., LTD.
WHIPP & BOURNE, LTD.
C. A. PARSONS & CO., LTD.
MIRLEES BICKERTON & DAY, LTD.
NATIONAL GAS ENGINE CO., LTD.
LANCASHIRE DYNAMO & MOTOR CO., LTD.
GEO. KENT, LTD.
ELECTRIC CONTROL, LTD.

OSRAM



GASFILLED
AND
DRAWN WIRE
LAMPS
ECONOMICAL
AND
BRILLIANT

The General Electric Co. (of China) Ltd.

1 and 2 Ningpo Road, Shanghai

Telephone Central 1606 (3 Lines) Cablegrams: "GENLECTRIC"
(and at HONGKONG—HANKOW—TIENTSIN—DAIREN)

THE ASTOR HOUSE HOTEL, LIMITED

TIENTSIN

The leading Hotel in best position of town facing Victoria Park. Excellent table and service. Rooms with private bath or hot and cold running water. Reduced rates for prolonged stay. Hotel's own Orchestra plays daily from October to April.

Telegrams:

ASTOR TIENTSIN.

Management:

ERNEST LUTZ.

JARDINE, MATHESON & CO., LTD.
SHIPPING

Indo-China Steam Navigation Co., Ltd.

Head Office: HONGKONG

FLEET

OCEAN	COAST	RIVER
Nam Sang Chun Sang	Lee Sang	Yat Shing
Lai Sang Hop Sang	Foo Shing	Wo Sang
Fook Sang Kut Sang	King Sing	Wai Shing
Hin Sang Ho Sang	Kwong Sang	Tung Shing
Kwai Sang Hang Sang	Yu Sang	Yuen Sang
Chak Sang	Tu Sang	Sui Sang
Mau Sang	Lok Sang	Chip Shing
	Tai Sang	Cheong
	Ming Sang	Shing
	Wing Sang	Ting Sang
	E Sang	Fau Sang

The Indo-China Steam Navigation Co., Ltd., with the above Fleet of Freight and Passengersteamers; maintains a First-Class Passenger Service in certain trades and handles every description of freight on all the following routes:

OCEAN—Main Routes serving: India, Straits Settlements, Borneo, Philippine Islands, Hongkong, China and Japan. Freight and Passengers.

COAST—All Coast Ports of China.

RIVER—Fast superior Freight and Passenger service between Shanghai and all River Ports as far as Chungking (1,300 miles from Shanghai).

General Managers:

JARDINE, MATHESON & CO., LTD.

Telephone Central 241

27 THE BUND, SHANGHAI

Private Exchange to all departments.

JARDINE, MATHESON & CO., LTD.

INSURANCE DEPARTMENT

FIRE,

MARINE

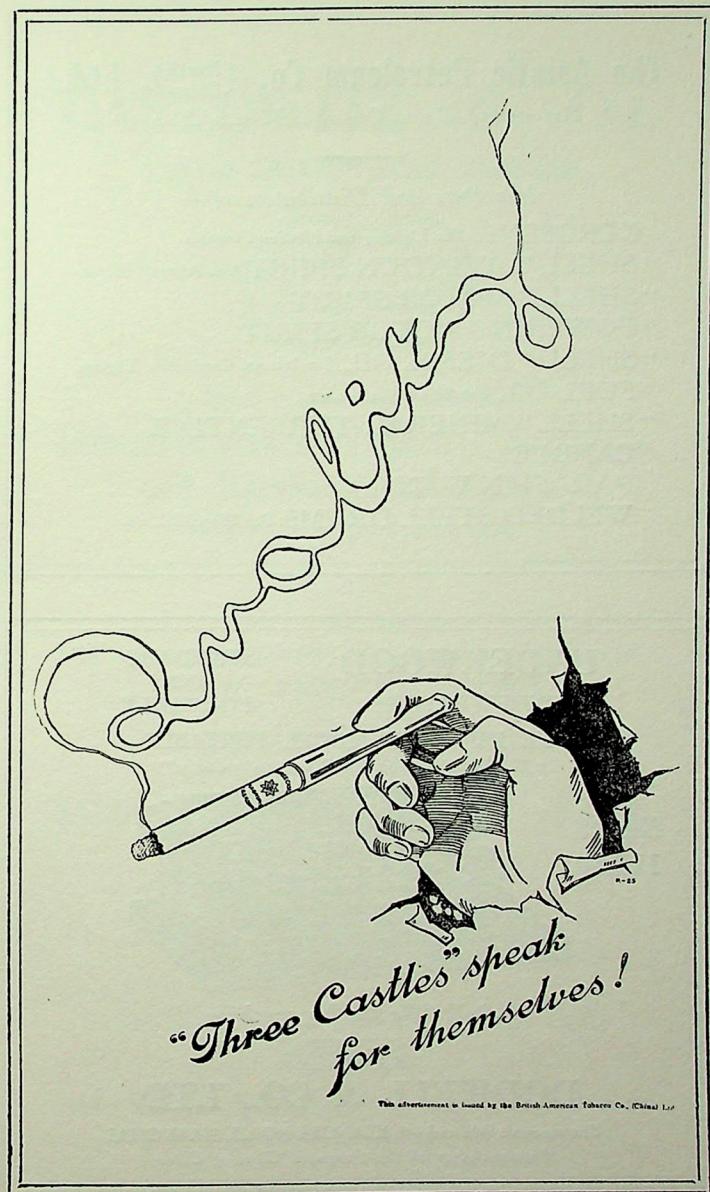
AND

MOTOR CAR

INSURANCE.

HONGKONG - SHANGHAI

and Agencies throughout CHINA



The Asiatic Petroleum Co. (North China), Ltd.

Represented all over Central and North China

Importers and Distributors of—

KEROSENE For Lighting and Heating Purposes
“SHELL” AVIATION SPIRIT For Aircraft Motors
“SHELL” MOTOR SPIRIT
“POWERIN” MOTOR SPIRIT
“SHELL” DIESEL OIL For Internal Combustion Engines
FUEL OIL For Ship’s Bunkers, etc.
“SHELL” MINERAL TURPENTINE
CANDLES
PARAFFIN WAX
WELDED STEEL DRUMS For Wood Oil, etc.

UNDERWOOD

TYPEWRITERS

STANDARD
AND
PORTABLE

THE IMPROVED MODEL PORTABLE

“The Machine You Will Eventually Carry”

Mex. \$
112.50



Built like the big machine

Sole Agents:

DODWELL & CO., LTD.

Showrooms: 44a and 44b KIANGSE ROAD, SHANGHAI

Represented in all the Principal Cities of China

CARLOWITZ & CO.

138-140 SZECHUEN ROAD, SHANGHAI



Head Office: HAMBURG

**General Importers, Exporters, Engineers
and Manufacturers' Agents.**

Established in China since 1846.

Branches also at
**TIENTSIN, HANKOW, HONGKONG, CANTON,
PEKING, TSINANFU, MUKDEN.**

Sole Agents in China for
SANDOZ CHEMICAL WORKS, BASLE
(SWITZERLAND)



*Aniline Dyes for Cotton, Wool, Silk,
Paper, etc.*

Cables Address: "CARLOWITZ" All Codes used

KELLY & WALSH, LTD.

SHANGHAI, HONGKONG, SINGAPORE, HANKOW

GEMS OF CHINESE LITERATURE, Translated by Prof. H. A. GILES. New Edition de Luxe. Revised and greatly enlarged. Quarto	...	...	...	...	\$10.00
GEMS OF CHINESE LITERATURE, PROSE AND VERSE. Translated by Prof. H. A. GILES. Popular edition, revised and enlarged. Two vols. in case	...	...	...	...	10.00
STRANGE STORIES FROM A CHINESE STUDIO. Translated and Annotated by Prof. H. A. GILES. Cheap edition, revised and enlarged	...	...	...	...	3.00
LETTERS OF A SHANGHAI GRIFFIN. By JAY DENBY. Third edition, Illustrated by H. W. G. HAYTER	...	...	...	...	3.50
"Intensely humorous."					
INDISCREET LETTERS FROM PEKING, By B. L. PUTNAM WEALE	...	...	...	...	5.00
The story of the memorable siege of the legations and the sack of a distressed capital in 1900.					
SHANGHAI, A Handbook for Travellers AND RESIDENTS to the Chief Objects of Interest in and Around the Foreign Settlements and the Native City, by the Rev. C. E. DARWENT, 2nd ed. Revised and enlarged and Illustrated, with map	...	...	...	...	3.00
THE CHINESE RAILWAY SYSTEM, by H. STRINGER, Resident Engineer, Peking-Mukden Railway....	...	...	...	...	5.00
Published by order of the Board of Communications of the Chinese Government.					
PEKING, A Historical and Intimate Description of its Chief Places of Interest, by JULIET BREDON. 2nd ed., revised with illustrations and maps	...	...	...	...	10.00
A SKETCH OF CHINESE HISTORY, Dr. F. L. HAWKS POTT	...	...	...	...	3.00
New edition, revised and brought up to date.					
SZECHWAN, ITS PRODUCTS, INDUSTRIES AND RESOURCES, by Sir ALEXANDER HOSIE. Two maps	...	...	...	...	6.00
CHINESE FAMILY AND COMMERCIAL LAW, by G. JAMIESON, M.A., C.M.G.	...	...	...	...	6.00
A HANDBOOK OF COMPANY LAW, Being the Hongkong Companies Ordinances Completely Indexed, with Full Text, Including The Orders in Council and the Winding Up Rule Compiled, with an Introduction by W. STARK TOLLER, British Vice-Consul, Deputy Registrar of Companies, Shanghai	...	...	...	...	10.00
THE ENCYCLOPÆDIA SINICA, by S. COULING, M.A. 2 Vols.					10.00
PROGRESSIVE EXERCISES in the CHINESE WRITTEN LANGUAGE, by T. L. BULLOCK. 3rd Edition, Revised by Prof. H. A. GILES	...	...	...	...	7.50
THE CHINESE LANGUAGE AND HOW TO LEARN IT, by Sir WALTER HILLIER. Vol. 2, 3rd ed. Revised.	...	...	...	...	6.00
THE HUNDRED BEST CHARACTERS, by H. A. GILES	...	...	...	...	1.00
THE SECOND HUNDRED BEST CHARACTERS, by H. A. GILES	...	...	...	...	1.00
CHINESE WITHOUT A TEACHER, by H. A. GILES	...	...	...	...	1.00

THE SHANGHAI CHEMICAL LABORATORY

Analytical and Consulting Chemists

20 NANKING ROAD, SHANGHAI

Telephone Central 2533

Every description of Commercial and Industrial Analysis, including foods and drugs, minerals, fuels, water, cements, China produce, etc.

IMPERIAL HOTEL TIENTSIN

Conveniently located within five minutes of the Railway station, close to the best foreign shops, banks and firms.

Steam heated throughout

Cuisine under personal supervision of the Manager.

Home Comforts.

Porter and Motorbus meet all trains.

A. MILDNER,
Manager.

Telegraphic Address:
HOTELIMP.

For many years with Kalee Hotel,
Shanghai.

TEXACO

ROOFING

Durable—Economical—Fire-resisting—Weatherproof



In Three Styles

SMOOTH SURFACED
SLATE SURFACED
AND
SLATE SURFACED SHINGLES

Three Colours:

Red, Blue-Black and Green

For use on all structures: Churches, Houses, Garages, Mills, Factories and Buildings of every sort.

TEXACO ROOFING AND SHINGLES have recently been laid on the following buildings: Allen Memorial Church, Shanghai General Hospital, Dah Fong Cotton Mill, Chekiang Road Theatre, several of the Shanghai Municipal Council's Rest-houses, Wing On Textile Mill, Maclean's Church at Sungkiang.

Prices, samples and specifications furnished upon request.



THE TEXAS COMPANY

Petroleum Products

Glen Line Building, 2 Peking Rd., Shanghai



Branch Offices at:

Dairen
Mukden
Harbin

Tientsin
Tsingtao
Hankow

Kiukiang
Nanking
Wuhu

Chinkiang
Hongkong
Canton

Swatow
Amoy
Foochow



FINE
FISHING
TACKLE

Specially adapted for use in
Chinese waters. Latest things in
Bass Lures

Sportman's Headquarters

Something for every hour in the open

SQUIRES BINGHAM Co.

SHANGHAI AND MANILA



ENGLAND'S MOST ECONOMICAL CAR

Both to buy and to run. First cost Tls. 1,300.00. Running costs Two Cents per mile. The car is fitted with 4 wheel brakes, 5 wire wheels and tyres and seats 3 in comfort.

For demonstration apply to

THE CENTRAL GARAGE CO.

9 HONGKONG ROAD, SHANGHAI

Tel. Ad. : "GARAGE"

'Phone C. 6002

EDWARD R. MORRISON

Sole Agent For

MAWDSLEY'S LIMITED

Manufacturing Electrical Engineers.

Dursley, Gloucestershire

MOTORS, DYNAMOS. ETC.

Quality—Efficiency—Reliability

OFFICE

7 SOOCHOW ROAD

'Phone C. 776

THE CHINA JOURNAL OF SCIENCE & ARTS

[REGISTERED AT THE CHINESE POST OFFICE AS A NEWSPAPER]

VOL. II

MAY, 1924

No. 3

CONTENTS

	PAGE
APPROACHING DESERT CONDITIONS IN NORTH CHINA	
BY ARTHUR DE C. SOWERBY	199
THE EMPEROR HUI TSUNG	204
BY J. C. FERGUSON	
BIRDS IN THE POETRY OF THE CHINESE	210
BY L. C. ARLINGTON	
THE GREAT CHINESE PHILOSOPHERS	219
BY J. C. KEYTE	
THE K. C. WANG COLLECTION	224
BY	
REVIEWS	225
RECENT EXPLORATIONS IN CHINA AND NEIGHBOURING REGIONS	231
BY	
NATURALIST'S JOURNEYS IN HAINAN ISLAND	233
BY	
THE TRANS-ASIATIC PHOTO-SCIENTIFIC EXPEDITION	234
BY	
THE FLOWERY PAGODA	235
BY MAUDE HUBBARD BROWN	
THE MANDARIN FISH	236
BY ARTHUR DE C. SOWERBY	
MIGRATION NOTES	239
BY G. D. WILDER	
THE TERMITES (WHITE ANTS) OF CHINA WITH DESCRIPTIONS OF SIX NEW SPECIES	242
BY F. S. LIGHT	
SEXUAL DIMORPHISM AND LEAF VARIATION IN GINKGO	
BY W. M. PORTERFIELD	255
BY	
BILoba, L.	266
BY	
BIOLOGICAL NOTES AND REVIEWS	266
BY	
SHOOTING AND FISHING NOTES	272
BY	
WHAT IS SHAMANISM?	275
BY S. M. SHIROKOGOROFF	
SOME SHANSI WATERS CHEMICALLY EXAMINED BY E. T. NYSTRÖM	280
BY	
SCIENTIFIC NOTES AND REVIEWS	290
BY	
SOCIETIES AND INSTITUTIONS	293
BY	
EDUCATIONAL NOTES AND INTELLIGENCE	298
BY	

Editors :

{ ARTHUR DE C. SOWERBY, F.Z.S. (Science).
JOHN C. FERGUSON, PH. D. (Literature & Arts).

Assistant Editor and Manager : CLARICE S. MOISE, B.A.

Contributions of a suitable nature are invited and all MSS. not accepted for publication will be returned.

Books for review should be sent to the Editor as early as possible.

The subscription for the year (six issues) is \$10.00, Shanghai currency, or its equivalent. In the U.S.A. and Canada, Gold \$6.00; in Great Britain and Europe, 25/- Postage free.

Crossed cheques (Shanghai currency) or P. O. O. should be sent in payment of the annual subscription from Outports, Europe and America direct to the Manager.

Office : 102, The Ben Building, 25 Avenue Edward VII, Shanghai, China.

PRINTED BY THE NORTH-CHINA DAILY NEWS AND HERALD, LTD., FOR THE PROPRIETORS

[All Rights Reserved]

Classified Index of Advertisers

ADVERTISING AGENTS :			
Crow, Carl, Inc. ...	VI	DYES AND CHEMICALS :	
		Carlowitz & Co. ...	XXVII
ANALYTICAL CHEMISTS :		National Aniline and	
Shanghai Chemical Laboratory ...	XXIX	Chemical Co., Inc. ...	LI
ART AND CURIO DEALERS :		ELECTRICAL ENGINEERS AND CONTRACTORS :	
Lachamp, Madame (Things Chinese) ...	XI	British Electrical & Engineering Company of China, Ltd. ...	XXII
Murakami, Toyo ...	XIII	Callender's Cable & Construction Co., Ltd. ...	XXXIII
BANKS :		General Electric Co. ...	XXIII
Banque Belge pour l'Etranger ...	XVII	Westinghouse Electric International Co. ...	V
Equitable Eastern Banking Corporation ...	XVI	ENGINEERS AND CONTRACTORS :	
Hongkong & Shanghai Banking Corporation ...	XV	Asia Development Co., Ltd. ...	III
International Banking Corporation ...	XIV	ENGINEERS, MACHINERY MERCHANTS, SHIP-BUILDERS, ETC.:	
BOOKSELLERS AND AGENTS, ETC.:		Augustesen China Trade, H. C. ...	XII
Evans & Son, Ltd. ...	XLVII	Cammell Laird & Co., Ltd. ...	XVII
Kelly & Walsh, Ltd. ...	XXVIII	Rose, Downs & Thompson (Far East), Ltd. ...	II
Luzac & Company (London) ...	XLVI	FOOD PRODUCTS :	
Moore, Frederick (New York)—Books and Authors ...	XLVII	Cadbury Bros., Ltd. (Bournville Cocos) ...	LVIII
Probstchain & Co. (London) ...	XLIV	Lactogen (Nestlé & Anglo-Swiss Condensed Milk Co.) ...	Cover 4
CHOCOLATES :		Middleton & Co., Ltd. (Lactagol) ...	VIII
Nestlé & Anglo-Swiss Condensed Milk Co. (Nestlé's, Peter's Cailler's & Kohler's) ...	LII	FURNITURE MANUFACTURERS :	
CEMENT MANUFACTURERS :		Arts & Crafts, Ltd. ...	Cover 2
Chee Hsin Cement Co., Ltd. ...	XXI	GUN MANUFACTURERS :	
CHEMICAL IMPORTERS, DRUGGISTS, ETC.:		Vickers, Ltd. ...	LIX
China and Japan Trading Company, Ltd. ...	Cover 3	HOTELS :	
Gmehling & Co., G. ...	LV	Astor House Hotel, Ltd., Tientsin ...	XXIII
Melchers China Corporation (Sanatogen) ...	LIII	Imperial Hotel, Tientsin ...	XXIX
Richards & Co., Ltd. ...	XLI	IMPORTERS AND EXPORTERS, ETC.:	
Siber, Hegner & Company (Asthmolysin) ...	XXXVII	Hamilton, James, Ltd. (Maltoline) ...	XXXIV
Sine Co., Ltd. ...	IX	Morrison, Edward R. (Especially Metals) ...	XXXII
Slow & Co., Ltd. ...	XXXXV	Roxburgh (China), Ltd. ...	
The Young Leo Co. (Flyosan) ...	LII	Robert (See James Hamilton, Ltd. LVII)	
COAL :		Standard Products Co., Inc. (Eversharp Pencil) ...	VXL
Kailan Mining Administration (Coal, Coke, Firebricks) ...	LIV	Union Trading Corporation, Inc. ...	XLIX

(Continued on next page).

Classified Index of Advertisers (Contd.)

INSURANCE COMPANIES:

Jardine, Matheson & Co., Ltd.	...	...	...	xxiv
Sparke, C. E.	...	...	...	xix
Wattie & Co., Ltd., J. A.	...	...	...	xviii

MOTOR CARS:

Central Garage Co.	xxxii
--------------------	-----	-----	-----	-------

OIL COMPANIES:

Asiatic Petroleum Co. (North China), Ltd.	...	...	...	xxvi
Standard Oil Co. of New York	...	...	...	iv
Texas Co., The	...	...	...	xxx

PHOTOGRAPHY:

Mactavish & Co., Ltd.	...	...	...	xxxvi
Scherings, Ltd.	...	...	...	xx
United Dyes & Chemical Works, Ltd. (Agfa Photographic supplies)	...	...	...	xxxix

PUBLISHERS, PRINTERS, NEWSPAPERS, ETC.:

China Press, Inc.	...	...	...	lxii
Gow's Guide to Shanghai	...	...	...	xlvi
North-China Daily News & Herald Ltd.	...	...	...	xlii
Shanghai Times	...	...	...	xlviii
Tientsin Press, Ltd. (Pei-king and Tientsin Times)	...	...	...	xlv

PERIODICALS:

Asiatic Motor, The	...	...	...	xliii
China Illustrated Review, The	...	...	...	xliv
Far Eastern Review, The	...	...	...	xliii

RUBBER:

Hamilton, Ltd., James	...	...	...	lvii
Netherlands Gutta-Percha Co.	...	...	...	xxxvi

SILKS:

The China Cotton and Silk Works	vii
---------------------------------	-----	-----	-----	-----

SOAP MANUFACTURERS AND MERCHANTS:

China Soap & Candle Co., Ltd. (Crown Toilet Dainties)	...	...	...	xxxviii
Lever Bros. (China), Ltd. (Lux)	...	...	...	lx

SPORTING GOODS:

Squires, Bingham Co.	xxxii
----------------------	-----	-----	-----	-------

STEAMSHIP AND RAIL-WAY COMPANIES:

Admiral Oriental Line	...	...	...	lxii
Great Northern Railway	...	...	...	viii
Jardine, Matheson & Co. Kailan Mining Administra-	...	...	...	xxviii

TOBACCO:

British-American Tobacco Co. (China), Ltd. (Capstan Cigarettes)	...	...	...	xxv
Liggett & Myers Tobacco Co. (Chesterfield Cigarettes)	...	...	...	xl
Tobacco Products Corp. (Melachrino Cigarettes)	...	...	...	x

TRANSPORTATION AGENTS:

Commercial Express & Storage Co.	lvi
----------------------------------	-----	-----	-----	-----

TRAVEL AGENTS:

American Express	...	...	...	lvi
Cook & Son, Thomas	...	...	...	xxxiii

TYPEWRITERS:

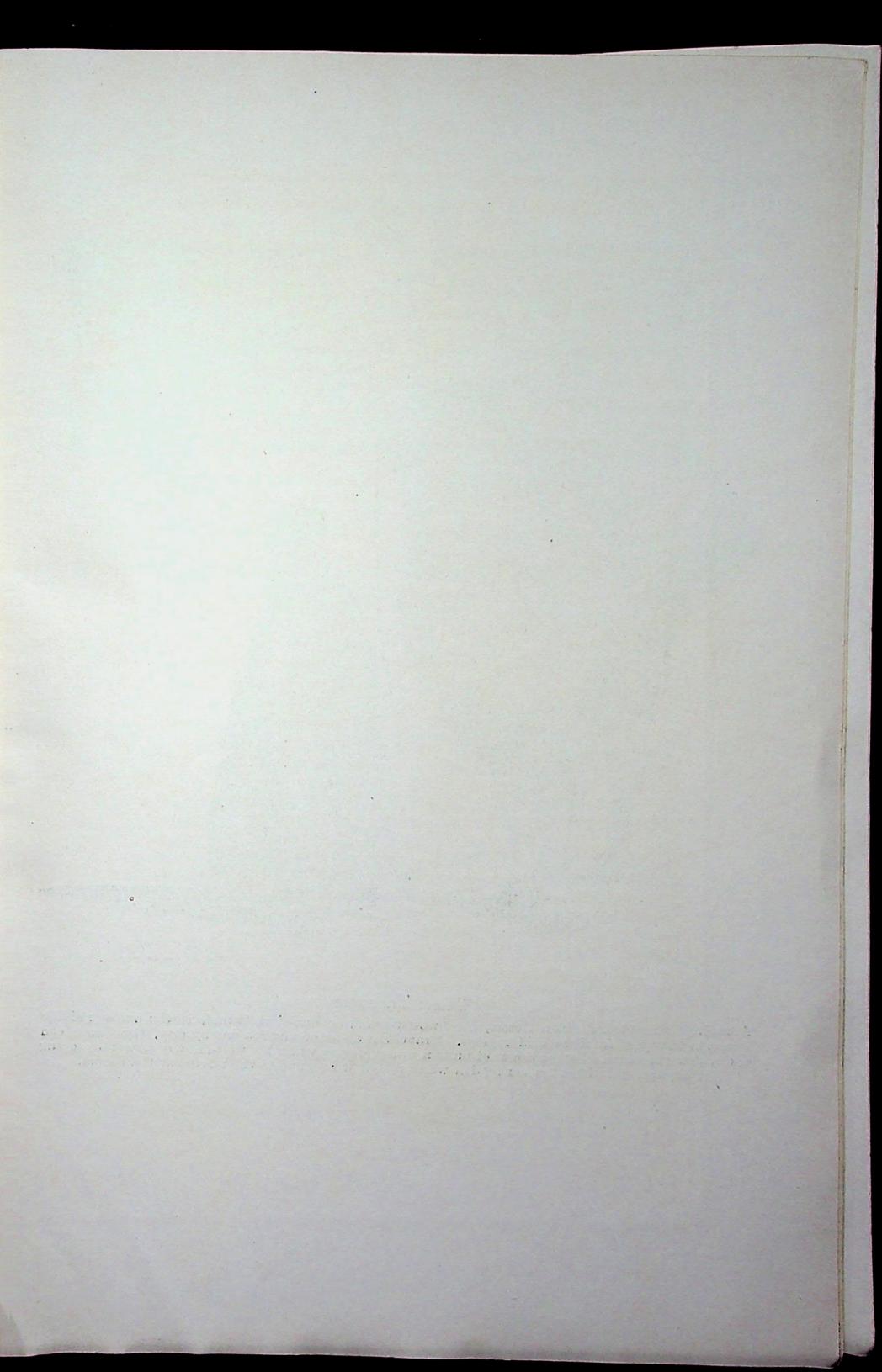
Anglo-Chinese Import & Export Co., Ltd. (Oliver)	...	...	...	xli
Dodge & Seymour (China), Ltd. (Corona)	...	...	...	xl
Dodwell & Co., Ltd. (Underwood)	...	...	...	xxvi

WINE MERCHANTS:

Caldbec, MacGregor & Co., Ltd.	...	...	...	i
Garner, Quelch & Co.	...	...	...	xxxviii

Readers of "The China Journal of Science and Arts" are specially requested to make enquiries of the above firms when contemplating making purchases of articles or commodities mentioned in the advertisements, and, if possible, to purchase from our advertisers.

Advertisers, Journal and Readers form a circle of mutual interdependence and co-operation. Do not break the circle.





Mary Erwin Camacho.

Desert Transport

A native of the Central Asian Desert, the Two-Humped, or Bactrian, Camel, is the most reliable means of transport in these arid regions. Travelling at night and feeding by day, the Camel can find sustenance where all other beasts of burden would starve, while its well-known power of going for days on end without either food or water render it immune to the terrors of the desert.



THE CHINA JOURNAL OF SCIENCE & ARTS

VOL. II

MAY, 1924

No. 3

APPROACHING DESERT CONDITIONS IN NORTH CHINA

BY

ARTHUR DE CARLE SOWERBY, F.R.G.S.

It is only a very short time, as time is reckoned geologically, since almost the whole of North China was either heavily forested or at least well wooded and fertile. Even in historical times there is ample evidence to show that the country boasted a far richer vegetation than it now possesses.

For instance, it is stated in the official archives of Shansi, that the mountains in the Ping-ting Chou district were heavily forested and such wild animals as bears, tigers and deer were to be met with.

Botanists and zoologists who have collected and explored in the country maintain that it is obvious from the present distribution of the Chinese flora and fauna that a mighty forest belt once extended from Indo-China in the south-west right across China in a great arc embracing all the eastern and coastal provinces up to and including Chihli, and continuing on into Manchuria and so linking up with the Siberian forest belt.

The older inhabitants of West Shansi state that within their memory that district contained many more trees and woods than it does now, pines, spruce and cypress being particularly plentiful.

Today the mountains of the Ping-ting Chou district are barren of even moderately heavy vegetation, except in a small area to the south of that town.

The great forest-belt has disappeared as far as North China is concerned, except for a small area in the Imperial hunting grounds north of

the Tung Ling (Eastern Tombs), a somewhat more extensive area in the Wei-chang, north of Peking and east of Lama Miao (Dolonor), another in what is called the Hsiao Wu-tai Shan to the west of Peking, the Hsi Ling, or Western Tombs, both on the Chihli border of Shansi, and certain forested areas in Western Shansi.

Even the forests of the last named district have shrunk considerably in extent and are now confined to the higher and more inaccessible mountain ranges.

Under these circumstances one naturally begins to enquire what is becoming of the North China vegetation, or what is the cause of its disappearance.

The first answer to these questions, and the most obvious, is that the Chinese people have been guilty of cutting away the vegetation, both large and small, for various purposes, without making any effort to replant the areas they have denuded, or in any way assisting nature in repairing the damage they have done.

This is undoubtedly and to a large extent one of the chief reasons for the barrenness of the greater part of North China. That it is bare any traveller in these parts will bear witness. One may travel in certain parts for hundreds of miles without seeing anything larger than a stunted willow or any small herbage thicker than the scantiest yellow grass, or thorn scrub. North Shansi, the loess country of North Shensi and Kansu, not to mention the stark and barren ranges of limestone and shale that divide Chihli from Shansi and extend across the northern portion of the former to within a few miles of Peking itself—all tell a terrible story of a wantonly destroyed vegetation.

The crying need of aforestation in this country has formed the topic of much discussion of late years, and China actually has a forestry department in Peking, though what it is doing one has yet to hear. One is inclined to think that all that is needed is the reforestation of all the barren areas and China will once more smile under an equitable climate and a fine fertility of soil.

Yet is this entirely so? Can we throw the whole blame of the barrenness of North China upon the people who cut away the timber and burned the scrub? Certainly not.

Terrible as it may seem, North China is faced with a far more serious menace than that caused by the wanton destruction of her vegetation; a menace with which she cannot hope to cope in the present state of the world's knowledge. *North China is actually being invaded by the desert conditions of Central Asia.* The terrible dessication that wiped out the cities of Chinese Turkestan, which Sir Aurel Stein has been so busy re-discovering and exploring, is assuredly and inexorably creeping upon North China, and in years to come, long enough after the present generation has passed into oblivion, this country will become a howling waste of sand and rugged wind-swept mountains, where, in the words of Scott,

"Nor tree, nor shrub, nor plant, nor flower,
Nor aught of vegetative power,
The weary eye may ken."

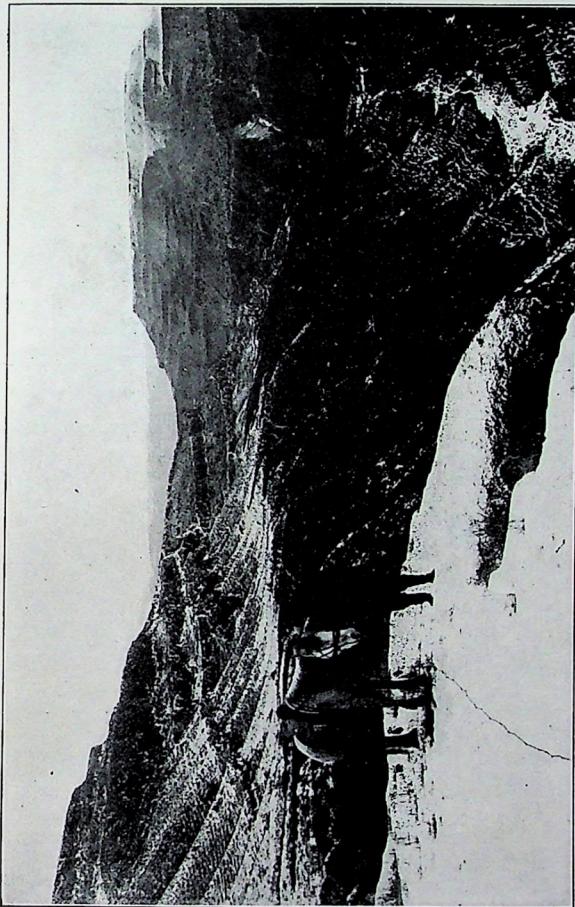
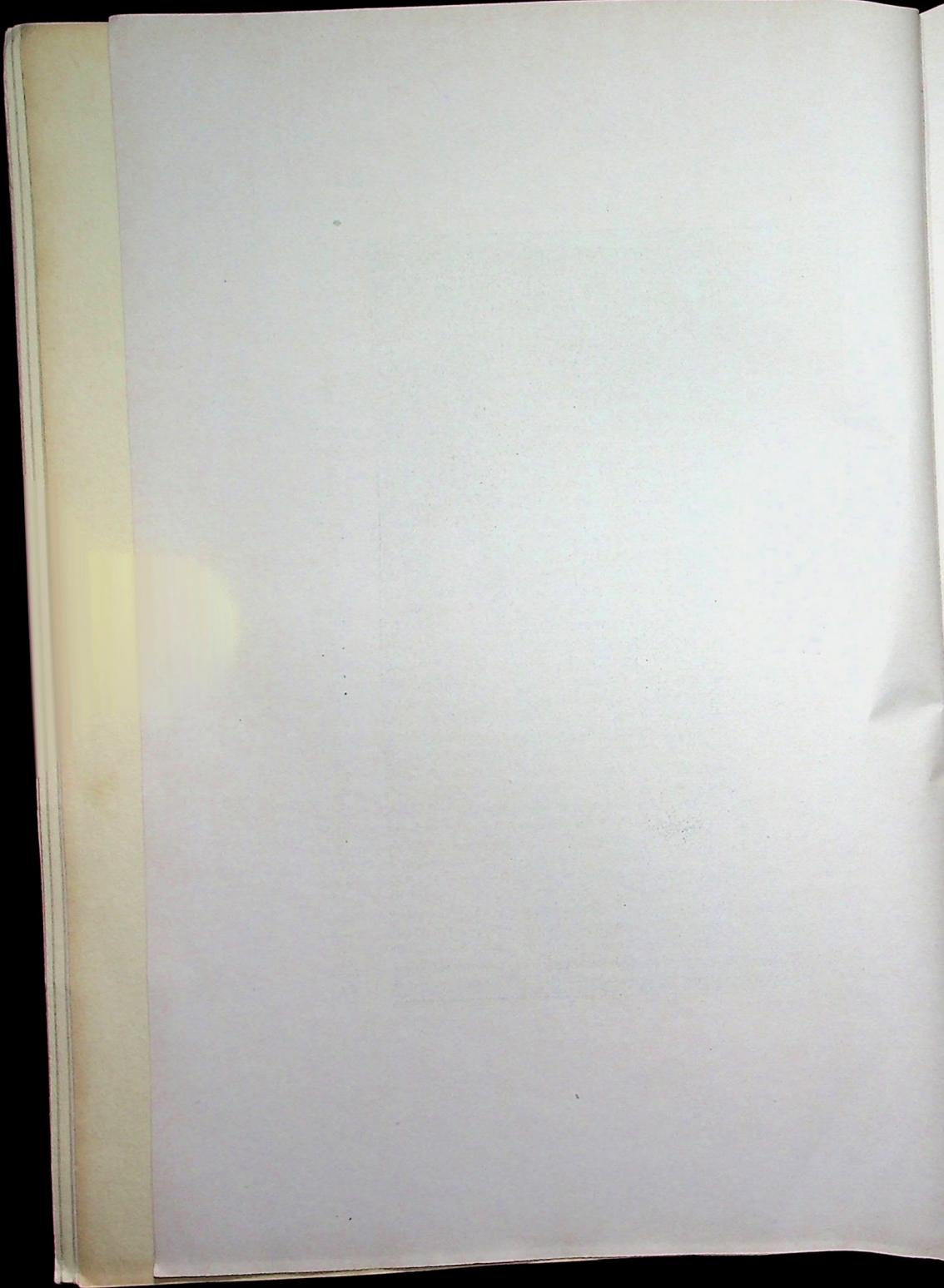


Photo: Clark Expedition.
A valley in the loess country of North Shensi showing lack of any but the scantiest vegetation. Course grass, a sort of sage-brush and thorn scrub are all that occur here.



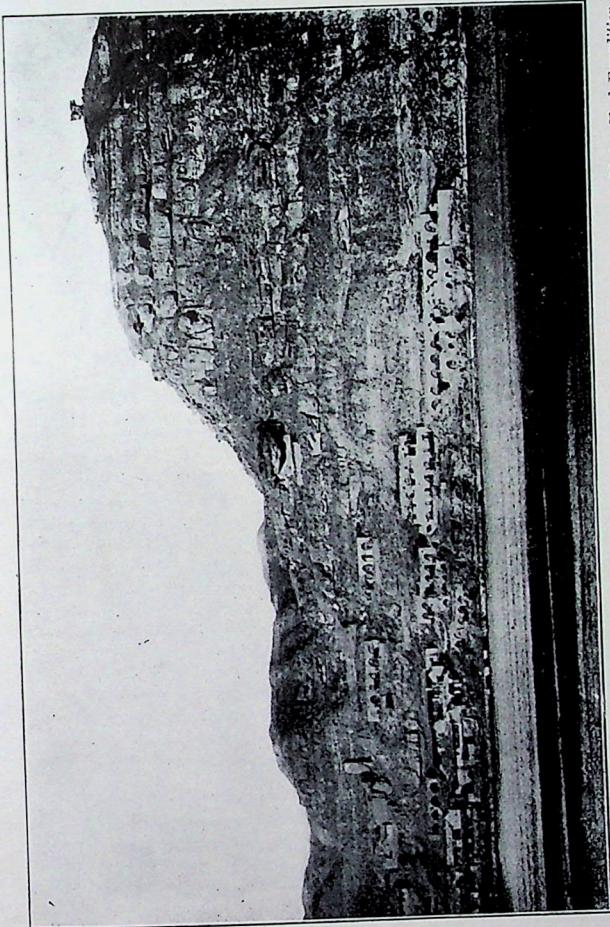
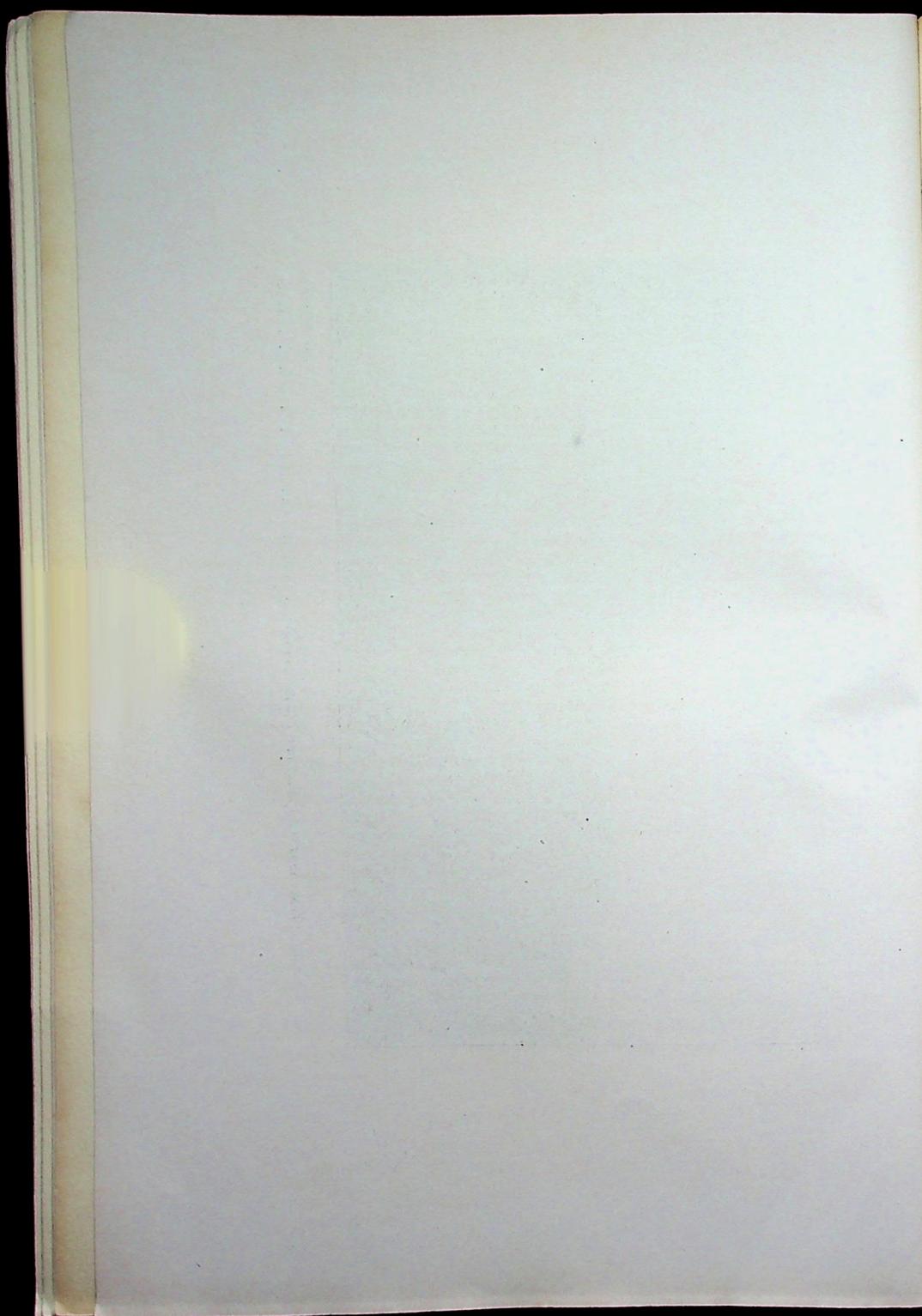


Photo: Clark Expedition.

On the Yellow River between Shensi and Shansi, showing the utter barrenness of the hills in these parts.



APPROACHING DESERT CONDITIONS IN NORTH CHINA

This is a bold and sweeping statement, and naturally the reader demands its justification, nor am I unprepared with evidence to back my claim.

It was while travelling in Shensi and Kansu along the borders of Mongolia that I was first struck by the fact that the desert was encroaching on neighbouring North China, and at once set about gathering data upon this phenomenon. Subsequently in my geological and meteorological notes in "Through Shén Kan" I first published my theory, which has since gained credence with and been endorsed by both geologists and botanists travelling in North China.

There is a very good example of what is taking place along the whole of the Sino-Mongolian border in the present condition of the city of Yu-lin Fu in North Shensi on the Ordos border. The very name Yu-lin Fu means the City of Elm Woods, and local tradition has it that the city was once surrounded by thick elm-woods. To-day a few straggling willows, planted and kept up by the local officials, is all the vegetation it boasts. An invading sea of sand from the Ordos Desert has encircled its walls and spread thirty miles further into China. It has only been the persistent industry of the local officials in clearing the accumulations of sand away from the walls that has prevented the inundation of the city, and a time is not far distant when all the efforts they can put forth will not hold back the masses of sand that are steadily moving toward China. An official in that city told me, that, according to the archives, there was once an extensive cypress wood to the north-west of Yu-lin Fu, of which not a vestige now remains, it having been completely buried by the oncoming sand.

Similar conditions prevail along the entire length of the Great Wall from its most western limit well into northern Chihli, though in northern Shansi and Chihli the invading sand has only reached the Wall in places.

While in Lan-chou Fu, the capital of Kansu, I learned from the missionaries that, within the memory of those amongst them who first went there, the northern bank of the Yellow River had changed from a fertile area to its present absolutely dessicated condition. Nor was there wanting evidence to show that even the southern bank and the once fertile valley and hills to the south were rapidly losing their fertility under the invading influences of desert conditions.

Recent palaeontological discoveries in Southern Mongolia show that at no very distant times conditions favourable to forests and a forest fauna prevailed at least in places. This is evidenced by the discovery of the remains of the beaver, an animal to which both woods and streams are necessary.

Archæology also lends its quota of evidence in the remains of old walls, similar to the Great Wall of China, which lie hundreds of miles to the north of the latter, and suggest that conditions in those long ago days allowed the culture of the Chinese, which, as is well known, is essentially that of an agricultural people, to extend far to the north of its present range.

It is well known that deserts move, particularly the more sandy ones. The loose sand must of a necessity move in the direction of the prevailing

winds. Now, since the prevailing wind throughout North China is undoubtedly from the north-west, in which direction lie the vast accumulations of sand of the Ordos and Gobi, it follows that China, unless some other counteracting agency intervenes, is doomed to be swallowed up.

The only possible agency that can check the oncoming sand is a damp climate. Thus we must turn to an examination of the meteorological conditions of North China to see if in them we can find any promise of a combative force against the threatening dessication.

Undoubtedly in times past the prevailing weather conditions have saved North China. There was once a long very dry era and that was when the enormous *loess* deposits of Kansu, North Shensi and North Shansi were laid ; but at that period the desert sands were a good deal further away than they are now, so that only the very finest particles were carried as far as North China, where they were deposited and remained undisturbed. Had there been any such thing as a damp climate at that period, the *loess* beds could never have been formed, for the rain would have carried the minute particles of silica away as fast as they were deposited.

After this long spell of drought, normal, or possibly even unusually wet, weather conditions prevailed for a period, and the *loess* and sand deposits were cut up and eroded to a considerable extent. But they were ultimately prevented from being completely carried away by the rapid respreading of a protective covering of vegetation.

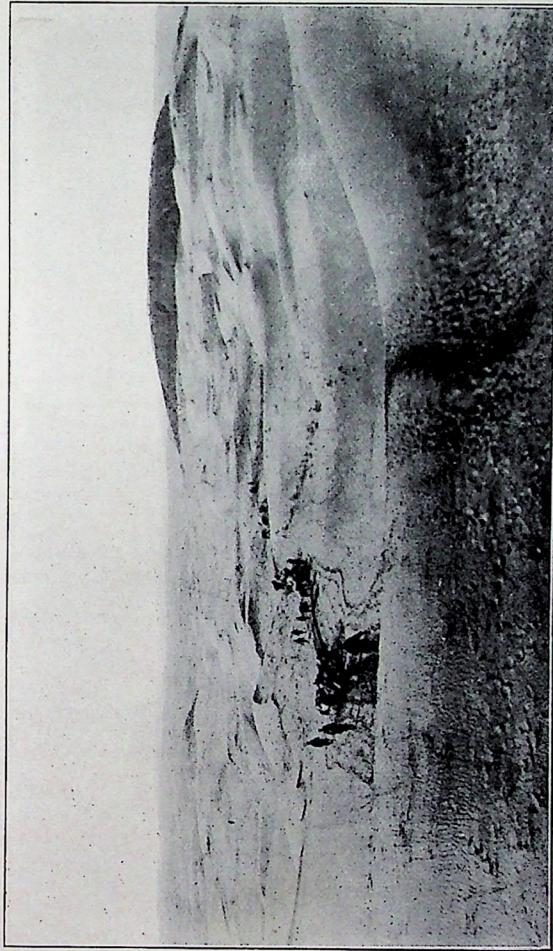
It must have been at that period that the great forest belt was at its best. These conditions, however, were not to last, and, apparently, the prevailing climate once more began to become drier.

The vast forests were attacked by drought and consequent fires, and the native human population, with the result that they began to dwindle away, and finally only various isolated forested areas, as already enumerated, were left.

Today there are not lacking signs that show that the climatic conditions are growing steadily more adverse. The winters appear to be getting colder, the springs are getting year by year more windy, the dust storms continuing every year later into the summer. The year 1916 was in many ways a record and the prevailing conditions point strongly to a spreading of the Mongolian climate over North China. The extremely low temperatures of the preceding winter extending as they did over a fortnight or more, followed by the cold and unusually windy spring ; the continuation of dust storms right into June ; the complete lack of rain throughout the spring and early summer, followed by a protracted period of intense heat with temperatures running over 100° F. in the shade for days on end, are all characteristic of the Central Asian deserts.

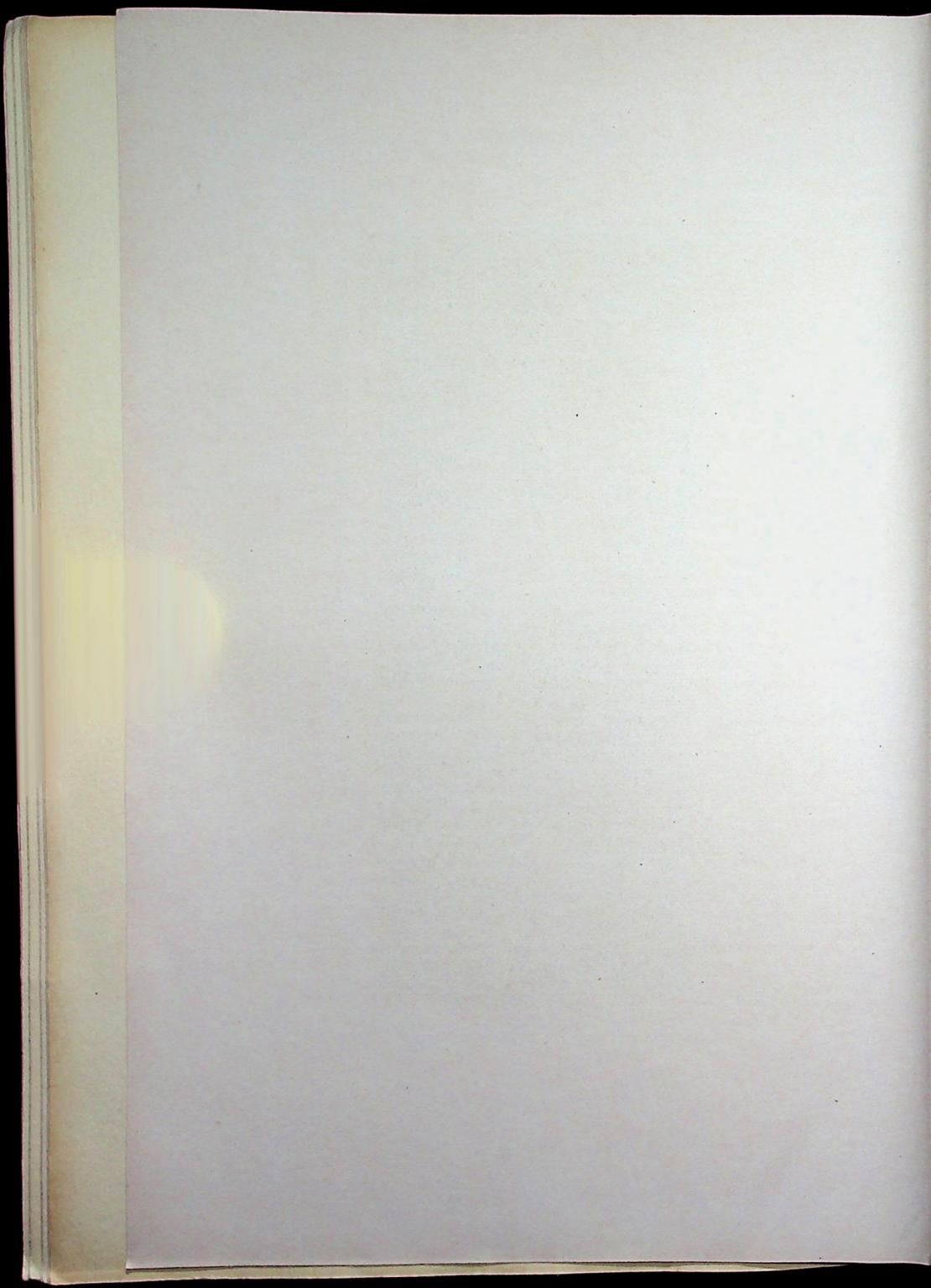
All Europeans who have resided in North China are unanimous in deplored the increasingly uncomfortable climatic conditions which have grown more noticeable and acute of late years.

Not only is North China being affected, but the influence of these new conditions has become more and more apparent as far south as the lower Yangtze. Residents of Chinkiang and Nanking have told me that twenty-five years ago such a thing as a dust storm had never been



From "Through Shen Kan" by courtesy of R. S. Clark and A. de C. Society.

A Sea of Sand which has invaded North Shensi from the Ordos Desert to the East of Yü-lin Fu.



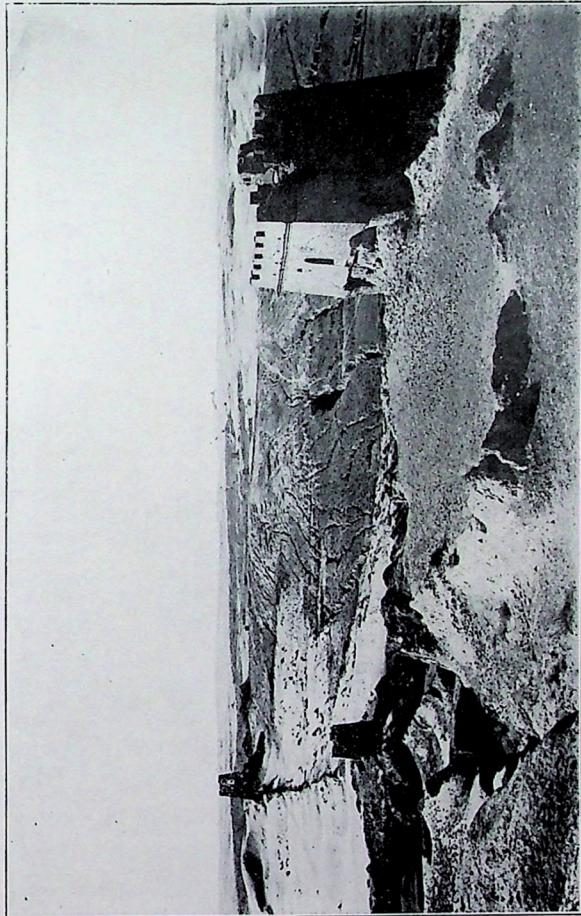
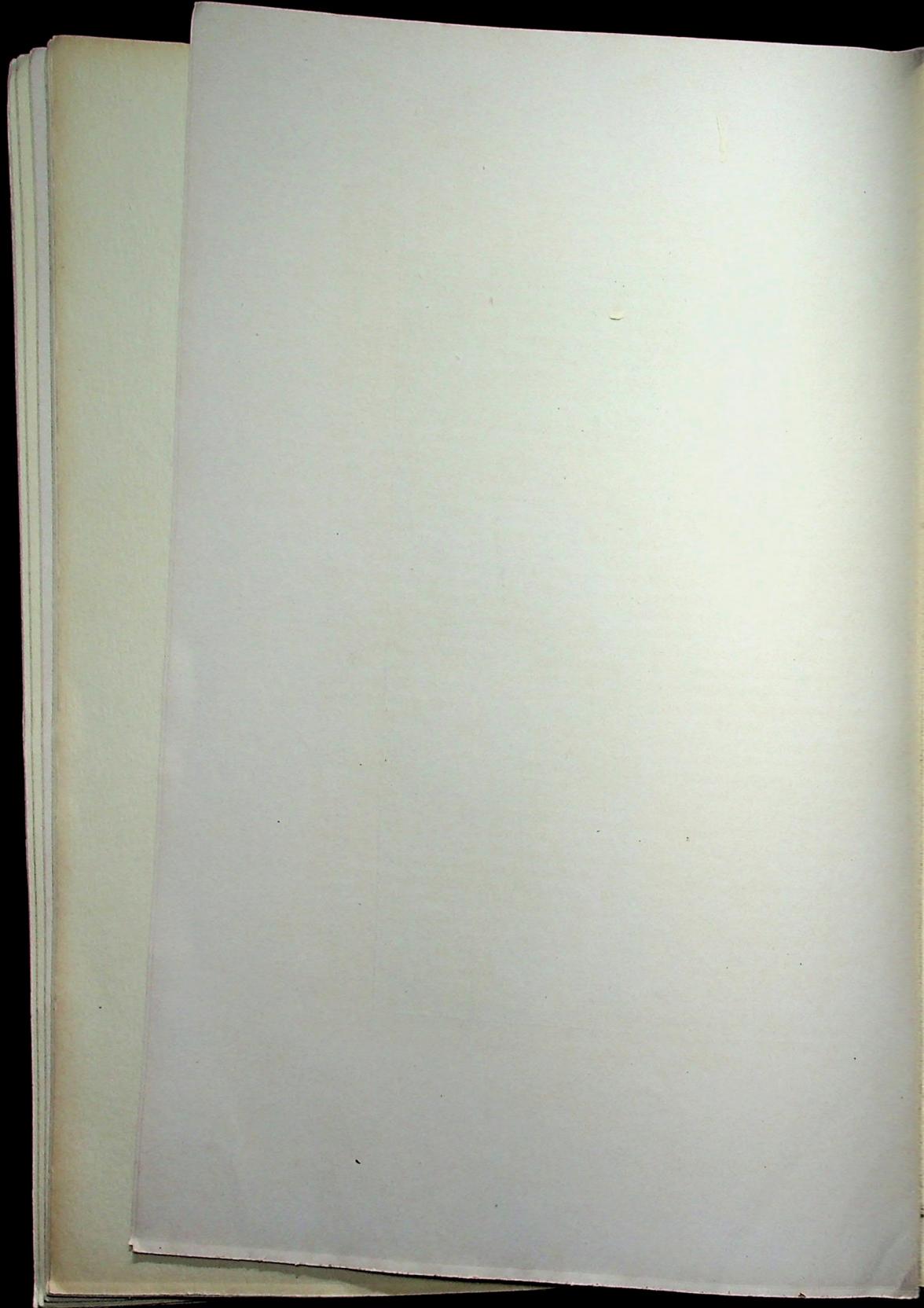


Photo: Clark Expedition

Sand from the Ordos Desert has here drifted across the Great Wall, which once marked its southern boundary, Yu-lin Fu district, North Shensi.



APPROACHING DESERT CONDITIONS IN NORTH CHINA

heard of ; but now they are of comparatively frequent occurrence : and the sand they bring down from the north is Gobi sand.

In other words the influence of the encroaching Gobi Desert is making itself felt even as far south as the Yangtze.

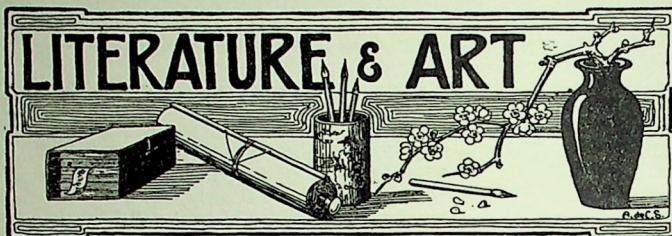
From these facts the reader will agree that the contention is justified that China is actually at the present time being invaded by desert conditions, and that unless some unforeseen climatic change takes place she is doomed to share the fate of the cities of Chinese Turkestan.

The effect in North China of these invading desert conditions is most marked and extremely serious. To it are directly due the protracted periods of drought and consequent famines which prevail from time to time. Indirectly the great floods that sweep the plains of Chihli, are also attributable to the same cause.

The hills and mountains, whence comes the water that goes to form the rivers, being denuded of their vegetation, are heavily eroded by the rains. The streams and rivers become charged with silt. This is deposited in the beds of the rivers when they slow down on the plains, so that, when the heavy summer rains come on, the banks cannot hold the excess of water, which breaks through and floods the surrounding country, often for thousands of square miles, causing enormous loss of property and widespread suffering to the people.

To counteract the invasion of North China by desert conditions, or, rather, to keep it back as long as possible, there are only two things humanly possible to be done, and these are (1) a wholesale planting of trees on all the bare mountain ranges, not merely in the coastal provinces, but right along the Mongolian border into Western Kansu, and (2) the careful conservation of all water supplies. Vigorous action along these lines might even stave off the disaster for ever, for there can be no doubt that the prevailing weather conditions whether damp or dry come round in cycles, though from the evidence at our command these periods appear to be too long in duration for man to count upon, as they must outlast a number of generations at the very least, and where in this country is one going to find men who will make any sacrifices or even have any thought for their posterity beyond the second or third generation ?

The influence of these approaching desert conditions on North China is deplorable ; but chiefly it is noticeable in regard to the trees. Conifers of all sorts have been the first to go, which have been followed by the oak, walnut and other valuable trees. Willows and poplars seem to be the only trees that can hold their own at all, and of these only the willow, and stunted trees at that, are to be found in many places.



THE EMPEROR HUI TSUNG, A.D. 1082-1135

BY

JOHN C. FERGUSON, PH. D.

The Emperor Hui Tsung was the eleventh son of the Emperor Shen Tsung, A. D. 1068-1085, and the younger brother of the Emperor Chê Tsung, 1085-1100, who was the sixth son of Shên Tsung. These three reigns of a father and his two sons must be considered together in order to obtain a clear idea of the stirring events which brought to a close the rule of the Sung dynasty over the whole of China with its capital at Pien Liang (modern Kaiféng), and forced a removal of the capital to Hangchow, with the resultant division of the empire among themselves in the south and the Khitan Tartars' Liao Dynasty and the Nüchén Tartars' Chin Dynasty in the north. During the period of these three reigns there was an incessant struggle between the reactionary and revolutionary parties, both of which had for their object the preservation of the empire. During the period there were many brilliant men, illustrious in art, literature and philosophy, but none of them were able to prevent these three degenerate sovereigns from coming under the domination of unscrupulous eunuchs. During the reign of Shên Tsung, the eunuch, Li Hsien, was promoted to supreme command of the armies on the north-western frontier; and again during the reign of Hui Tsung, another eunuch, T'ung Kuan, rose to the greatest power.

The whole period was rent asunder by the fierce discussions which centered around the revolutionary political theories of Wang An-shih. These were introduced during the reign of Shên Tsung. The country was in dire financial straits owing to the wars which were carried on against Hsi Hsia, the Turfan, the aborigines of the southwest and Cochin-China. The cost of these wars was enormous and entailed severe suffering among the people. Wang An-shih set himself to the task of improving the condition of the people, maintaining that the only way in which the increased expenditures of the Government could be met was to promote the general welfare. He proposed four great reforms, (1) state monopoly of commerce, (2) equality of taxation, (3) military organization and (4) con-

scripted labour for the state. In order to carry out his schemes he asked the Emperor Shên Tsung to appoint a special Council whose duty would be to inaugurate, develop and administer these four reforms which he had proposed. These reforms were strongly opposed by the two Sus, Su Shih and Su Chê, as well as by Han Ch'i and Ssü-ma Kuang during the reign of Shên Tsung. When the youthful Emperor Chê Tsung came to the throne, the government was administered under the regency of the Empress Kao, who favoured the reactionary party led by Ssü-ma Kuang, and did what she could to reverse the revolutionary measures of Wang An-shih. Bitter quarrels, however, broke out within the ranks of the Conservative party and it split into three factions. This disunion among the Conservatives caused the Emperor Chê Tsung to announce as soon as he took over the government from the regency, that he intended to carry out his father's policy of favouring the reforms of Wang An-shih. A long list of Conservatives was prepared, all of whom were proscribed.

In the reign of Hui Tsung these controversies continued. The party which favoured Wang's reforms became known during this reign as the Yüan Fu clique, because it was during the period of the reign of Chê Tsung when the title of the reign, *nien hao*, was Yüan Fu, that Wang's projects were favoured. The Conservative party became known as the Yüan Yu party, also for the reason that it was during the Yüan Yu period that Wang's policies were condemned. Hui Tsung, during the first year of his reign, A.D. 1101, had no authority and the government was in the hands of the Empress Dowager Hsiang who acted as regent, but when he began to exercise his powers as Emperor the following year, he recalled the revolutionary statesman, Ts'ai Ching, and proscribed the Conservative or Yüan Yu party. He erected a tablet, Tang Jén P'ai, at the gate of the Palace which was used by officials, and on it inscribed the names of 120 Conservative officials who were called Chien Tang, i.e., "infamous party." In this list was the name of the great historian Ssü-ma Kuang. Owing to the appearance of a comet four years later, this tablet was destroyed. During the reign of Hui Tsung the influence of Ts'ai Ching was greater than that of any other single person up to the time in 1124, when, becoming Prime Minister for the fourth time, he left everything to his profligate son, Ts'ai T'ao. The mismanagement of the affairs of the empire by Ts'ai Ching was such that he has passed into history as the chief of the six traitors—*liu tse chih shou*.

The Emperor was a man of amiable character but weak and prone to dissipation. He was easily influenced by any powerful man who could get his ear. The Prime Minister, Ts'ai Ching, humoured him and attempted to satisfy all his caprices; this was the secret of Ts'ai's power over him. One of the earliest instances of Ts'ai's strength was shown in the degradation of the Dowager Empress Mêng, widow of Chê Tsung, who was deprived of her title. As Hui Tsung became the successor of Chê Tsung he stood in the relation of son to Chê Tsung, and the degradation of the Empress Mêng was considered in the same light as if he had disgraced his own mother. This act, which has been generally condemned by historians, was brought about by the influence of Ts'ai Ching for his own political purposes.

Hui Tsung delighted in artistic and aesthetic surroundings, and his passion for these was played upon both by the Prime Minister Ts'ai Ching and by the eunuch T'ung Kuan. They succeeded in having Chu Mien appointed in charge of the Emperor's collections. Chu Mien had been secretary to Ts'ai Ching when the latter had been in charge of the Imperial factories at Soochow and Hangchow. Chu Mien collected rare things from all parts of the country, but especially from river provinces. The Sung dynasty record says that there was a long string of boats filled with curiosities on the river Huai bound for the Palace at Kaifēng. Chu Mien sent men all over the empire in search of rare stones, flowers and plants. In this he was assisted by the eunuch, T'ung Kuan. So great was the rapacity of these men that it is said people hid or destroyed any beautiful thing which they possessed rather than submit to the extortions practiced upon them by the agents of Chu Mien. Frequent additions were made to the palace buildings and these were elaborately decorated. At feasts the Emperor used cups made of jade, and all kinds of expensive silks and satins were freely employed not only for clothing but for decoration of the palaces.

Hui Tsung delighted in superstition, probably for the reason that those who preyed upon him excited his inordinate vanity. In 1104 an inspector of the Yellow River found a tortoise with two heads, and the Minister Ts'ai Ching declared that this was a favourable omen of the extension of the Imperial power. On another occasion a conjurer and astronomer, who was much favoured by the Emperor, pointed out the existence of spots on the sun. This greatly frightened the Emperor and decided him to dispense at the time with the services of Ts'ai Ching. Thus even the highest Minister of State was employed and dismissed in accordance with superstitious fears of the Emperor. In 1117 the Empress reported the descent of an angel in the Kun Hsing Pavilion and the Emperor publicly announced this as a fact in the presence of more than one hundred officers. In the fifth month of 1119 there were great floods from the Yellow River at Kaifēng. A servant boy saw a big dog reclining on a couch, but on closer examination the dog turned out to be a dragon. Soldiers of a neighbouring encampment killed and ate it, and, after a few days, torrential rains commenced which lasted for a week. The water outside the city wall reached the incredible depth of more than one hundred feet. The Emperor became alarmed and ordered that the sluices of the Wu-chang River should be opened. Li Kang, an ancient scholar acting as a censor, told the Emperor that Pien Liang had been the capital of China one hundred and fifty years without having experienced any such dreadful calamity, and said that this must be considered as a warning to the Emperor, who should allow free speech and follow the good advice given him by his ministers. For this remonstrance Li Kang was degraded to the rank of a magistrate. These instances which have been quoted are not isolated examples of the superstition current during this reign, but are characteristic and could be multiplied.

Hui Tsung was a firm believer in Taoism, or rather it should be said, in the magical arts of Taoism. In the ninth moon of 1113 he granted special titles to two men by the name of Wang, Wang Lao-chih and

Wang Tzü-hsi. Wang Lao-chih had been in his youth a junior clerk. He met a Taoist who gave him the herb of immortality, whereupon he abandoned his wife and children, built himself a straw hut and devoted his life to magical practice. The Emperor heard of him, brought him to the capital and asked the Prime Minister, Ts'ai Ching, to give him a lodging in his house. In a letter written by Wang, the Emperor found some words which he had previously used in speaking to two female attendants of the Palace. This caused the Emperor to announce his belief in the supernatural powers of Wang, and he was granted a high title. The other Wang, Wang Tzü-hsi, went into retirement on the Sung mountain where he received a mystic book from a deceased Taoist, Hsu Su. By the use of this book he could predict future events. Ts'ai Ching recommended him to the Emperor and he also was honoured with a high title. His promotion did not last long, for he treated the court eunuchs as if they were slaves and took advantage of his privileges as a guest of the Emperor, whereupon he was thrown into prison where he died. Another Taoist recluse, Lin Ling-su, was granted the title of Teacher of Spiritual Truth, *T'ung Chén Ta Ling*. He had been a Buddhist priest in his native city of Wen-chow, but having been ill-treated in the Monastery fled and became a Taoist priest. He was an expert in magical arts, and wandered through the country practicing them. After the death of the two Wangs, the Emperor made inquiries for a capable Taoist, and Lin was recommended to him. Lin made a most favourable impression upon the Emperor at his first audience. He said that there were nine heavens and told the Emperor that he, the Emperor, was now the incarnation of Shang Ti who ruled over the southern heaven. He said that Ts'ai Ching was the head of the eight hundred officials of the spirit world, and that T'ung Kuan and other living officials had high rank. He also gave a high place in this spirit world to the favourite concubine of the Emperor whose name was Liu. She was styled "The lovely lady of real peace." This ignorant adventurer had commanding influence with the Emperor for several years until a rival arose in the person of Wang Yün-Ch'én, who poisoned Lin to get him out of the way. Another example of the influence of the magical practices of the Taoists upon the mind of the Emperor was given in the fourth moon of 1117, when a patent, *chēl*, was conferred upon the Emperor giving him the title of Archbishop of Taoism, *Chiao Chu Tao Ch'in*. After receiving this the Emperor declared himself to be "the eldest son of the Supreme Being and prince of the great void." He urged the people to abandon the practices of Buddhists, whom he spoke of as "metal barbarians," *chin-ti*. This is one of the rare instances in Chinese history in which an Emperor allowed himself to be considered subject to the orders of any religion. When the Emperor in the eleventh moon, 1113, went in his royal car outside the south gate of the city to sacrifice to Heaven, he was accompanied by a crowd of Taoists. Suddenly he cried out that he saw towers and terraces heaped one on another in the clouds. One of the Ministers accompanying him said that he could see a boy and some Taoists waving flags and pennants. This caused the Emperor to issue a public announcement that he had seen a god descending from the heavens. In honour of this god he ordered that a temple should be erected and a record

made of this great event. The devotion of the Emperor to Taoism lasted until the close of his life. When he abdicated in favour of his son on account of the pressure of the Tartars, he took for himself the Taoist title of "Archbishop and retired Emperor," *Chiao Chu Tao Chün T'ai Shang Huang Ti*.

During his reign he changed the names and titles of Buddhist temples. He ordered that Buddha should not be addressed as Ta Fo, but should be known as the Great Intelligent Golden Immortal, *Ta Chioh Chin Hsien*. Priests were to use their surnames, and temples, *ssü*, were to be called palaces, *kung*. Buddhist priests were ordered to enter Taoist schools and follow Taoist rules. This order was carried out at the request of Lin Ling-su. Later in his reign the Emperor restored the tablets to the Buddhist temples and allowed priests to return to the use of their former ecclesiastical names. The fact is apparent, however, that throughout the reign of this Emperor everything possible was done to discourage Buddhism and to provide objects of reverence to take the place of the prohibited Buddhist saints. The Pearl Emperor, Yü Ti, was given the highest honours, and began to take in the minds of the people the place previously occupied by the Supreme Being, Shang Ti.

Palace ceremonies and entertainments were carried out at an enormous expense and in a most elaborate manner. Prime Minister Ts'ai Ching and his son Ts'ai T'ao provided all kinds of entertainment for the Emperor. Men and women in tights and often in sparse clothing were taken into the Palace to recite all the loose talk and songs of the streets. Three times during his reign the Emperor sought to introduce a new kind of music. In the ninth month of 1105 the rules for new music were issued and along with them nine new tripods were completed. The Emperor went into the Ta Ch'ing palace to receive congratulations on this great event, but unfortunately during the ceremony one of the tripods cracked when it was struck and this was considered a very bad omen. The new musical notation had taken its sounds from the nine tripods, and the breaking of one of them upset the plans for the introduction of this new scale. On another occasion Liu Ping, who had been appointed Minister of Music, introduced his friend, Wei Han-chin, to the Emperor. Wei had written a treatise of music in which he attacked the errors of ancient scholars concerning their ideas of notation. Wei proposed to use the Emperor's body as a standard of musical measurement. Wei was also skillful in necromancy and the black art, and combined his knowledge of music with explanations of supernatural events. The third attempt was made in 1113 when a band of female choristers was trained to produce the new type of music and when old tunes were strictly forbidden.

These facts which have been taken from the Sung Dynasty history, *Sung Shih*, reveal the true character of Hui Tsung. He was superstitious, weak, devoted to pleasure, a tool in the hands of scheming men, prodigal in the use of public money. These vices were offset to a certain extent by an aesthetic and artistic taste which caused him to encourage his Prime Minister, Ts'ai Ching, and the eunuch, T'ung Kuan, to collect all kinds of artistic things from all parts of the empire. It is doubtful

whether or not Hui Tsung himself had any artistic talent. Considering the corruption of the times and the servile flattery to which the Emperor was very susceptible, there can be no certainty that the paintings attributed to him were the product of his own hands. It is just as likely as not that the courtiers with whom Hui Tsung was surrounded attributed their own work to the Emperor in lieu of imperial favours, just as it is now known on contemporary authority that nearly all of the paintings of the late Empress Dowager were done by the court artist, Kuan. Hui Tsung may have had some small talent as a painter which was exaggerated by the false attribution of the work of others to him or he may have been the great artist which he is reputed to have been, but the falsity and deception of his period make it impossible to arrive at a definite decision. His own paintings and writings are included with those of others in the Hsiüan Ho collections, Hsüan Ho being the title of the last part of the reign of Hui Tsung.

During the reign of his son he was canonized as Hui Tsung, "admirable," but the official records of his reign give good reason for applying to him the contemptuous title which was bestowed upon him by the barbarian captors who carried him away to his death in northern wilds and called him Hun Tê Kung, "the besotted gentleman."

BIRDS IN THE POETRY OF THE CHINESE

BY

L. C. ARLINGTON.

Wordsworth holds, and with a deep philosophy, "that the language of birds is the expression of pleasure." Let those whose hearts are attuned to peace, in listening to this language, not forget the poet's moral:—

"I heard a thousand blended notes,
While in a grove I sate reclined,
In that sweet mood when pleasant thoughts
Bring sad thoughts to the mind."

Although the Chinese poets studied the habits and calls of their numerous and beautiful birds, none of them has written anything like Burns's "On hearing a thrush sing in a Morning Walk in January 1793," when he suffers us to see the 'sweet' thrush as it pipes on 'the leafless bough.' Nor have they ever produced such beautiful lines as the Ayrshire bard on the skylark:—

"The waken'd lav'rock warbling springs,
And climbs the early sky,
Winnowing blithe her dewy wings
In morning's rosy eye."

The most beautiful lines to the cuckoo I have ever seen are those of an unknown Chinese poet:—

同遊能遣興 "Delightful visitant! with thee
況值賞花期 I hail the time of flowers,
處處園亭裏 And hear the sound of voices sweet
頻聞好鳥啼 From birds among the bowers."

Compare this with Shelley's exquisite ode to the "Skylark":—

"Like a high-born maiden
In a palace tower,
Soothing her love-laden
Soul in secret hour
With music sweet as love, which overflows her bower."

One of the most familiar song birds in China is the Hua Mei 畫眉, South China thrush.* The poet describes its melody as "strong," and distinguishes it from that of the Pai Ling 白靈, or Mongolian lark, which is "clear"; the goldfinch's 紅花燕兒 which is "sweet"; and the linnet's 梅花雀 which is "mellow."

A bird frequently mentioned in poetry and immortalized in song and on porcelain is the oriole, or Yellow Bird 黃鸝, or 黃鳥. It is also

* *Trochalopteron canorum* (L.).—ED.

BIRDS IN THE POETRY OF THE CHINESE

mentioned in the Odes: "Oriole, with plumage bright. On these mulberries do not light." It has a partiality for the mulberry:

'Tis Spring. Through the groves the orioles dart
In their rapid and restles flight.
Their yellow wings flash, as upon the sprays
Of the mulberries they alight. (V. Allen's Chinese Poetry).

There are some forty references to birds in general. I have been tempted in the arrangement of the birds to begin with those mentioned in the Odes, because Confucius said that much may be learnt from references to birds in the Odes. And Confucius was right! As will be seen, these "references" are mostly allegorical or metaphorical allusions to "shady" doings of Princes and their consorts; "licentious" manners etc. The mallard or Mandarin duck* is one of the earliest of water-fowls mentioned in the Shih Ching, or "Classic of Poetry." 關雎鳩 "The mallards call to each other" refers to King Wén's marriage to *T'ai Ssü*—emblematical of conjugal harmony. "The flight of the oriole," 黃鳥于飛 is an allusion to King Wén's lady-love, *T'ai Ssü*, probably recalling delightful memories of dark fir woods "broken by the sudden clatter of the birds' wings" 維鵠有巢. "The turtle-dove dwells in the magpie's nest" 維鳩居之 suggests a pretty simile; the bride is happy in her husband's family. A rather curious metaphor is "Who says that a sparrow has no horn?" 誰謂雀無角 A woman was taken to court by a man for refusing to marry him. Her contention was that he had no legal right to make any such demand, and, in support of her contention, made use of the expression quoted, implying that the charge was groundless—the baseless fabric of a vision.

"The swallow's flight" 燕燕于飛 refers to the parting between Princess *Chiang* 姜, and 衛莊公's Secondary Consort. "The flight of the cock-pheasant" 雄雉于飛 expresses the regret of a wife on the departure of her lord to some distant place on official duty. "The shrill of the wild geese blend in unison" 離離鳴雁 is a satire on those couples who are unsuited to each other, from the belief that wild geese choose their own mates. "All ravens are black," 莫黑匪鳥, implies that all men are scoundrels! The wild swan 鴻 (the Chinese say that the 鴻 is larger than the 雁) is also mentioned in the Odes. "A fish-net was set, but a wild swan fell into it," 魚網之設鴻則離之, implies incest. Duke *Hsüan* 衛宣公 incestuously took his son's wife to be his concubine. Another line implying incest, is "How the quail rushes to fight for the possession of its hen," 鷄之奔奔. *Wei Hui Kung*'s 衛惠公 paternal cousin had illicit intercourse with Princess 宣姜, *Hui Kung*'s step-mother. Duke *Hsüan* first committed incest with his son's consort and afterwards ravished *Hsüan Chiang*: and the latter in her turn, formed an incestuous connexion with her stepson, *Huan*. "The fowls have

* The author confuses two distinct birds here. The mallard (*Anas boscas*) is the common wild duck; the Mandarin duck or teal bears the scientific name of *Aix galericulata*, and, apparently, is the species referred to in these passages.
—ED.

come home to roost" 鶩棲于埘 is a woman's lament on the prolonged absence of her husband; expressing the wish that he may come back to her like the fowls. "The bustard springs on whirring wings amongst the blooming heather" 肅肅鶴羽集于苞枮 refers to the hardships and uncertainties of official life. "Swift flies the sparrowhawk" 鶺彼晨風 is the lament of the wife that her lord is not with her, and expresses the hope that he may soon return. A meaning similar to the last is connected with the shrike; "In the seventh moon the shrike is heard, in the eighth moon spinning begins" 七月鳴鶲八月載績.

The owl gets more than a passing notice. Burns calls it the 'day detesting' owl because it shuns the light. The Chinese consider it fierce and cunning. "Oh owl! Oh owl! Since you have taken my young ones, don't destroy my nest" 鴟鴟既取我子, 無毀我室.

Having overthrown the last Emperor *Chou* of the *Shang* dynasty, King *Wu* sent his two brothers *Kuan Shu* 管叔 and *Ts'ai Shu* 翟叔 to take over charge of the former's territory. On the death of King *Wu*, his son was proclaimed King, with *Chou Kung* as Premier. The two brothers *Kuan Shu* and *Ts'ai Shu* then formed a conspiracy with *Chou's* son and started a rebellion. *Chou Kung* remained loyal and after three years' fighting suppressed the rebellion, when *Chou's* son and *Kuan Shu* were executed. The poem was written by Duke *Chou* to vindicate the action he had taken with the rebellion, which he claimed was for the benefit of the Empire. The whole is allegorical. The 'owl' refers to *Chou's* son; the 'children' to the two sons; and the 'nest' to the Empire.

There is also an ode to the crane because it can forecast rain. 鶴鳴于垤 "The white crane screams on the ant hill"—a sign of coming rain. The Chinese believe that the crane sits on the ant hill ready to eat the ants as they come up out of their holes when it rains. "The turtle-dove fluttering about finally settles on the sturdy oak," 翩翩者鴟載飛載下集于苞枮 refers sympathetically to the hardships of an official on a journey. The dove can find a resting place, but not he. Anyone who has travelled much in the interior of China, even at the present time, will appreciate these lines; more especially if travelling through parts of Honan, Shensi and Kansu.

"Rapid is the falcon's flight, which swoops to earth after climbing the zenith's height" 鶻彼飛隼, 其飛戾天, 亦集爰止. This line occurs in a poem describing an expedition against the tribes in the South by a general *Fang Shu* 方叔 in B. C. 825. The rapid flight and descent of the hawk illustrates the general's ability to command, manage and manoeuvre so huge a force (said to have been 300,000 men).

"The crane cries in the marsh; its voice is heard in the wilderness" 鶴鳴于九臯聲聞于野 signifies that true facts cannot be concealed. "Like a pheasant on the wing" 如翬斯飛 refers to finely decorated eaves on a building. "Look at the wagtail! Now flying, now singing" 鶡彼育令載飛載鳴 is a warning to the indolent to be as energetic and diligent as the bird referred to. "The finch flits about to peck the paddy in the fields" 交交桑扈, 壽塲啄粟, is an allusion to adverse circumstances. The finch lives on insects, but when these are scarce, it may resort to grain.

“The crows fly freely to their nests, while all men are safe at rest ; 'tis only I that am distrest.” 弁彼鶩斯，歸飛提提，民莫不穀，我獨于罹。 This piece was written by *Yi Ch'iu* 宜臼 the eldest son of King *Yu* because his birthright was taken from him. He was the rightful heir to the throne. The crows, they say, are hard parents, but the young ones are filially disposed.

“I am not an eagle or a kite with wings to soar to heaven” 匪匪鶻焉，翰飛戾天， alludes to circumstances we cannot escape from. “A pair of mallards (Mandarin ducks) sit upon the bridge ; their left wings folded up ; may our Prince's happiness last for ten thousand years” 鴛鴦在梁，戢其左翼，君子萬年，宜其遐福 is a hymn of praise sung by the Princes at a banquet in honour of the Emperor. As the mallards are at rest when their wings are folded, the allusion is to the Emperor's eternal repose and happiness.

“Dense is the forest on the plain ; many pheasants are foregathered there” 依彼平林，有集維鶴。 These lines were written at a banquet given in honour of the poet congratulating him on his marriage. The numerous guests attending the wedding and feast, are likened to the pheasants flocking to the forest.

“The stork is at the dam ; the crane is in the forest” 有鶩在梁，有鶴在林. These lines were written by *Shén Hou* 申后 the Empress of *Yu Wang*, who was superseded in her husband's affections by *Pao Ssü* 褒姒 his favorite concubine. The 鶩 is said to be an unclean feeder, sits on the dam to catch fish, while the unfortunate *Ho* 鶴 a clean feeder, does not venture near. The lines given typify the position of Queen *Shén* in relation to her rival *Pao Ssü*.

“Ducks and gulls are on the River Ching” 鳧鷺在涇. This is an allusion to the banquet to the Personators of the Dead ; where the Personators used to invoke a blessing on the King, of whom happiness and dignity are the fitting attributes. As the ducks and sea-gulls are enjoying themselves on the Ching River, so is the Personator of the Dead enjoying himself at the banquet. (Note. It was usual on the day after the greater festivals for the members of the family who had been chosen to be “Personators of the Dead” to be feasted at the ancestral temple.)

“Although loudly whirring their wings in rapid flight, the phoenix (male and female) eventually find a good resting place” 凤凰于飛，翩翩其羽，亦集爰止. refers to the men of ability and wisdom who surrounded the Emperor. China, in those days, as now, had her political and social upheavals and transformations ; when good men were scarce and the Sophists spread anarchy through the land.

“A flock of egrets light on the Western Pool ;
But a fairer sight to see, are the guests that flock to me”
振鷺于飛，于彼西臨，我客戾止，亦有斯容.

The subject of this poem is the King of *Chou*, to whose court have come descendants of the kings of *Hsia* and *Shang* to assist in the sacrificial ceremonies. The King dismisses them with these lines, expressive of his affection for them.

"At first, it seemed to be a tailor-bird ; but when it took flight it turned out to be an eagle." 肇允彼桃蟲, 拆飛維鳥. This is used in the sense of "trust not to appearance." The tailor-bird refers to *Wu Kêng* 武庚, the son of *Chou Hsin*, the last king of the *Shang* dynasty, who conspired with two of King *Ch'êng*'s uncles to overthrow the government and restore the *Shang*. This ode was written by King *Ch'êng* in allusion to the above-mentioned event. He had taken *Wu Kêng* to be a harmless tailor-bird, but he turned out to be a fierce eagle ! "The pelican is at the bridge, it does not wet its wings." 維鶴在梁, 不濡其翼 is a satire on the times, worthless and unscrupulous men being appointed to high posts, thereby disgracing the Court. "The cuckoo sits on the mulberry tree" 鴦鳩在桑, is an allusion to a perfect gentleman ; one who is dignified, stately grave, and strong in calmness and self-respect. "When the Spring days lengthen out the oriole's song is heard," 春日載陽, 有鳴倉庚. This poem, the Chinese say, reminds the women that it is time to pluck the mulberry leaves to feed the silk-worms.

"The cuckoo sings with a mournful air" 鴦鳩發哀音 refers to the approach of autumn. The cuckoo is the sweet messenger of Spring, the beauteous stranger of the grove ; the companion of spring.

A poem by *Yuan Chi* 阮籍 of the *Tsin* dynasty shows that the Chinese 2000 years ago were just as reluctant to leave their native land as they are at present. In this poem the swallow is compared to the wild goose ; the former though flying swiftly, does not go too far afield, and returns in summer ; while the wild goose roams abroad at its own sweet will.

"I would rather with the swallow fly,
Than with the wild goose hie ;
The latter roams the seven seas,
I, with the swallow prefer to return
To home and peace ! "

Another charming verse is to the swallow :

"Oh, could I fly, I'd fly with thee !
We'd make with joyful wing,
Our annual visit o'er the globe,
Companions of the spring.

An ode to the Thrush in captivity by *Ou Yang-hsiu* of the *Sung* dynasty runs :

"A thousand blended notes are warbled at thy ease ;
The hills are decked with flowers bright ;
The trees enjoy the summer breeze.
'Tis only thou, locked within thy golden bower,
Who knows the songs he sings are the echoes of his sorrow ! "

There is also an ode to wild geese by *Shên Yo* 沈約 of the 6th century which I have thought worth quoting :

"Tis spring. The wild geese disport about the placid pool ;
And dipping into the water they rustle the floating weeds.
Drawing in their snow-clad wings, they ripple the calm surface of
the water ;

Some, poised in mid-air, seem reluctant to descend ;
 While others flying about in disorder, try to form a column ;
 Then, finally forming in serried ranks,
 They depart for their native wilds."

Po Chiü 白居易, a poet of the *T'ang* dyansty, has a few lines describing the *Ch'in Chi Liao* 秦吉了, a bird I cannot trace, but said to resemble the parrot, and to be a native of the South.*

"The *Ch'in Chi Liao* comes from the South ;
 Its feathers are black and green ;
 Its neck is ringed all around in red ;
 Its ears are sharp, its mind alert ;
 And it has the 'gift of the gab,'
 For it can speak the tongue of every bird,
 Or any other living thing."

Evidently *Po Chiü-i* (together with many other Chinese) believed that certain birds had the command of language. And not only that, but certain men of olden times could converse with, and understand the language of, birds. See *New China Review*, Vol. 4. No. 2. p. 141.

A pretty sonnet to the oriole is by *Mei Jao-ch'en* 梅堯臣 of the *Sung* dynasty :

"With the sweetest of voices, the most charming to hear ;
 Your delicious notes vibrate again and again,
 As on the branches above you lightly flit,
 With wings of burnished gold,
 Your long pencilled eyebrows peep,
 Amid feathers dyed in darkest hue."

The lark (Pai-ling) is also known as the "Hundred tongues (Pai-she 百舌)." *Lin Chün-fu* (林君復) of the *Sung* dynasty has a couplet as follows :—

"What a pity that the lark is clothed in such dull feathers (gray),
 When it is such a specious songster ! "

This reminds me of what a lady once told me about a negro who had a fine tenor voice. "What a pity," she said, "that he has such a black skin ! "

Our Chinese poet was probably not the sweet singer that Burns was. The latter could not fail to be attracted by the lark or laverock. A maiden's heart, suddenly caused to go pit-a-pat, is said to jump like a laverock winging suddenly from the ground into the air. As it flies aloft "on dewy wing," it "wakes the merry morn." It springs "frael the dews o' the lawn." But its notes varied with the moods of the bard. Its song is full of "melting art," and Burns, whose loved one was treating him disdainfully, is sure that "nocht but love and sorrow join'd sic notes' o' wae could wauken."

Ou-Yang Hsiu of the *Sung* dynasty has left us a sonnet on singing birds, from which I have translated the following, more on account of two birds he mentions than for the beauty of his verse :—

"The budding twigs spread out their fan,

* Possibly referring to the Indian mynah.—ED.

To catch the balmy air ;
 While to the morn the feath'red sylvans sing,
 But alas ! Their thoughts I cannot measure.
 Taking advantage of the beautiful spring morning,
 I sleep a little longer by the south window.
 The lark long before the time, seems to urge the break of day.
 The beauty of the oriole is in its plumage,
 Its voice is like a baby's prattle.
 In the bamboo grove, the 'green bamboo shoot' * sings
 silently ;
 Hidden in the deep forest, only its note is heard.
 The pools and puddles in the fields are full of water ;
 The hoopoe cries "ku ku" as if urging the husbandman to his
 labours.
 'Tis only the 'T'i hu lu' † that light on the flowers ;
 Encouraging me to buy wine and pour out a libation before
 them."

I do not know if any of our own poets ever took sufficient interest in that "incorrigible terror" to old ladies, the parrot, as to deem it worthy of even a couplet. Burns, for instance, makes some thirty-eight references to birds in general, not counting woodland choirs, warblers and many others ; but the screeching parrot is conspicuous by its absence. And, as far as I know, there is only one ode to the parrot by a Chinese, that of *Liu Yü-hsi* (劉禹錫) of the *T'ang* dynasty, which runs as follows :—

"The tamed parrot's beak is tinged with red,
 It is meet that it should be confined in a beautiful mansion.
 Being of a witty nature, it delights in calling the servants ;
 Being clever, it soon learns to recognise its own master."

Even a Chinese poet can get no further than the parrot's brilliant plumage and cunning !

Nature covers all her works with a varnish of beauty, like the tender bloom that is breathed, as it were, on the surface of a peach or plum. Hence, the Chinese poet does not forget the humble cock.

"He has a red silken topknot festooned on the crown of his head ;
 And a natural flower'd dress that need not be shorn.
 Although he cannot be proclaimed a hero bold ;
 Yet his calls arouse the neighbourhood as he announces the
 morn."

Nothing appeals to the Chinese more than mountain scenery, as he gazes out of his study window, coupled with a view of a few boats at anchor in the stream in direct line of vision through the doorway, listening to the singing of the birds hidden in the trees, and enjoying a distant

* Ch'ing chu chün 青竹鈎 I have been unable to trace the
 † T'i hu lu 提葫蘆 English equivalents for these two
 birds.

The 'green bamboo shoot' might refer to *Hyla*, the little tree-frog or tree-toad, while the 'T'i hu lu' might well be one of the tits.—ED.

BIRDS IN THE POETRY OF THE CHINESE

view of the larger birds as they fly heavenwards. Such a scene is depicted in the following lines :—

“ A pair of orioles are calling from their retreat in the green willows ;
A flock of white egrets sail majestically towards the blue heavens.
From my study window is unfolded the Western Ridge,
Covered with the snows of a thousand autumns ;
While at my door lie at anchor craft from Tung Wu,*
Ten thousand *li* away.”

A warning to the Cicada.

“ Your haunt is in the deep and shady glen, living on wind and heaven’s dew,
Instead of in the fields feeding on rice and millet too.
Don’t trust too much to your seat on high when making your deafening noise,
But keep a sharp watch on the praying-mantis, who is ever on the spy ! ”

The praying-mantis is the deadly enemy of the cicada, hence the warning as given in this verse.

In the following verse the praying-mantis also gets a warning :—

“ Your neck indeed, my friend, looks strong ;
Armed with huge battle-axes you convey a fierce expression.
But do not presume on your arrogant ways and swallow up your kind ;
Be on your guard for the yellow bird, as he
May open his mouth and finish you ! ”

A warning to the Oriole or Mango-bird.

“ 金衣墨羽自躊躇 With golden coat and black-tipped wings, you delight in acrobatic feats ;
婉轉清歌高樹巔 As sweetly warbling your delicious notes, you rest on the highest trees.
貪捕螳螂忘隱慮 Greedy to catch the praying-mantis, you forget the hidden foe,
那知飛蟬暗離弦 Who knows but the fleet arrow has secretly been shot from its bow ? ”

Note.—Of course, the cicada and praying-mantis are not birds. They are simply given in order to match the sentiments expressed in the “ Warning to the Oriole.” The three verses, as can be readily seen, are apoglyphs, and are more or less related.

An ode to the Mandarin Duck by *Kao Ch’i* (高啟) of the *Ming* dynasty, showing, incidentally, the jealous disposition of the women of *Yüeh* (Chekiang).

* 東吳 (Kiangsu).

“兩兩蓮池上 Swimming in pairs on the water-lily pool,
 看如在錦機 They resemble those embroidered on the loom ;
 應知越女妒 Knowing the jealousy of the women of Yüeh,
 不敢近船飛 They dare not approach the boats
 (on board of which the women are).”

This is a bit of fine satire. The girls are jealous because the ducks have mates ; they, poor girls, have none !

In addition to the foregoing there are numerous references in Chinese poems and songs to farm-yard fowls, magpies, eagles, crows, sparrows, swallows, wild geese, pheasants, kingfishers, etc., but more than enough has been written, perhaps, to prove that the Chinese are lovers and keen observers of the birds. They give the salient points of each. They make us see each bird as they describe it, and convey the characteristic atmosphere of its own peculiar habitat and environment.

While from the foreign point of view the Chinese have never produced such sweet singers as Burns, Wordsworth, Shelly, Coleridge or Drayton, yet their greatness proves itself by the same truth of nature, and sustained power, though in a different way. Their action is not so crowded and weighty ; their sphere has more territories less fertile, but it has enchantments of its own which excess of thought would spoil, and not to recognize the beauty and greatness of these, treated as they treat them, is simply to be defective in sympathy. Every planet is not Saturn or Mars. There is also Venus and Mercury. There is one genius of the north, and another of the south. One of the east and one of the west, and there are others uniting them.

The birds in Chinese poetry, of which there are very many, have, so far, been given scant attention by translators. Waley in his “170 Poems,” gives only two : “Releasing a Migrant” and “The Red Cockatoo.” Giles in his “Chinese Poetry” has a line here and there on various birds, but has not a single sonnet. Fletcher in his “Gems” has only three : “The Geese Return,” “The Pair of Swallows” and “The Mocking Bird.” In “Fir Tablets” by Mrs. Ayscough and Amy Lowell, birds are conspicuous by their absence. Allen’s “Book of Chinese Poetry,” to whom the writer’s thanks are due for several of the notes given in this article, mentions most of the birds recorded in the Classics.

Probably the greatest stumbling-block is in the translation, the inherent beauty of the poem lying concealed in the original. To give one example out of many : *Tu Fu* (杜甫), a famous poet of the *T'ang* dynasty, has one on the lark, of which I give the literal translation only :

百舌來何處 重重祇報春
 知音兼衆語 整翮豈多身

“Whence comes the hundred tongues ?

Repeatedly only reports spring.

It knows sounds and all words ;

It claps its wings ; how many bodies has it ? ”—One.

THE GREAT CHINESE PHILOSOPHERS

BY

J. C. KEYTE.

(Continued from page 126).

One of the most valuable passages in the book * is the one dealing with the difficulty presented by the dualism to Chinese, as distinct from Western, thought. Broadly speaking to the Chinese thinker the dualism is one of Law and Matter. He is not concerned to deal with Mind as such but only with Mind as synonymous with Law ; law not in the Spencerian sense but law as righteousness. Law is for him always "Moral Law," and the order of the Universe is always an *ethical* order. If it be said that the Sung philosophers first put into *Li* all that they afterwards brought out of it, the answer is that the idea that *Li* could ever be other than "good" does not enter their universe. This is why the Platonic doctrine of ideas so often occurs in their writings ; it is because *Li* is so sufficient for bringing into actuality all potential good. "Void like the boundless desert but filled with innumerable forms like a dense forest." *Li* is not only inherent in each individual thing as the law of its being, it is there also as its ethical norm.

Dr. Bruce has resisted the temptation to work out from the Sung philosophers' material a system acceptable to the Western mind. Repeatedly when we are brought to the point at which we expect a final conclusion we are brought up short by some such reminder as "nevertheless the Sung philosophers do not accept. . . ." For example, when we have become accustomed to think of *Li* as the final synthesis we are informed that *Li* is the Nature imparted by the *Ming* (命) "The Decree of Heaven," whilst our difficulty is further enhanced by the reminder that the popular expression for "life" *hsing-ming* (性命) means "the life imparted by the Heavenly Decree" with the result that our peaceful progress along the path of the *Li* and the *Ch'i* (matter) is roughly disordered by a new *deus ex machina*—"The Decree of Heaven." In other words, Dr. Bruce though evidently clear in his own mind that there *is* a synthesis in the Sung philosophy—in fact his concluding chapter boldly enunciated it—is yet careful to supply to his readers the material from which a synthesis can be arrived at, rather than to press upon them that which he himself has found.

The discussion of the term *Ch'i* (氣) "Matter" naturally takes up a considerable portion of the book. In the main Dr. Bruce keeps to the term "Ether" as his translation. By the rotation of the *Ch'i* its two modes, Energy and Inertia (our old friends the *Yang* and the *Yin*) are produced, and following them we have the Five Agents, Wood, Fire,

* The Philosophy of Human Nature by Chu Hsi, translated by J. P. Bruce, M.A., D. Litt. (Lond.) Probsthai & Co. 36/-.

THE CHINA JOURNAL OF SCIENCE & ARTS

Metal, Water, Earth, at which stage, says Dr. Bruce, we are certainly approaching "matter." Yet for the primordial ether, for the "modes" and for the "agents" the one term "*Ch'i*" is used. So we have a threefold interpretation. Help comes by contrasting *Ch'i* with "chih" (the part which becomes solid matter) and with *Li* (law) that which gives direction to the *Ch'i*. Chu Hsi's comment upon the distinction drawn by his immediate predecessor in the Sung School—Chang Tsai—between *Li* and *Ch'i* is illuminating. "The Plenum of the Universe," says Chang Tsai, "is the substance of my being, and the Pilot of the Universe is my Nature." Chu Hsi in his comment on this passage says that the Plenum of the Universe is *Ch'i* and the Pilot of the Universe is *Li*; he further tells us that the *Ch'i* constitutes man's corporeity. Here we have the two elements *Ch'i* and *Li* in sharp antithesis, and, of the two, *Ch'i* is represented as filling all space and as constituting the substance of our physical existence. It is in fact the "plenum" of Western philosophers."

With Chu Hsi *Ch'i* is not simply "matter," nor is *Li* simply "spirit"; the former is that which is acted upon, the latter that which acts, but both may be spirit, though with the revolving of the *Ch'i* we find both "energy" and "inertia." It is interesting to remember how in the ordinary Chinese phrase for giving birth to anger "*sheng ch'i* (生氣) this mixture of matter and spirit meets us.

Nor will Chu Hsi consent to discuss *Li* apart from its vehicle (*ch'i*). If there were no ether *Li* would have nothing in which to inherit. *Li* is not conscious apart from its vehicle of manifestation, yet *Li* is perfectly pure, absolutely good. Associated with matter though it be *Li* is ethical in its activities. It is not the mere "fate" of the determinist. It is indeed difficult to think of it except in terms of personality since the *Li* which when passed through the spectrum of the Sung analysis is seen as Love, Righteousness, Reverence, Wisdom is surely essentially Mind? Moreover, reluctant though Chu Hsi is to commit himself, the Idealist conclusion slowly closes in: since though *Li* and *Ch'i* are to be thought of as co-existent and mutually dependent, yet they are not co-equal; "the one is subordinate to the other and is even derived from it."

Chu Hsi would not categorically admit that Law actually existed before Ether in the time sense, but he insists upon the ontological priority of Law as well as its precedence in dignity.

"If it be the case," said his questioner, "that when *Li* exists *Ch'i* also exists, does it not follow that there cannot be any precedence of one as compared with the other?" "As a matter of fact," he replied, "*Li* is antecedent, but we cannot say that to-day there is *Li* and to-morrow there will be *Ch'i*. Precedence, however, there certainly must be." Again the question is asked, "Does *Li* exist first or does *Ch'i*?" And again the reply is, "*Li* is never separate from *Ch'i*, but *Li* is incorporeal and *Ch'i* is corporeal; from the point of view of corporeity, therefore, how can it be otherwise than that there is priority?" And from this we reach to the true idealist position in "Wherever *Ch'i* accumulates," he says, "*Li* is inherent in it but *Li* is the ultimate ruler."

Here we agree with Dr. Bruce's conclusion, "the superiority of Law is not one of precedence merely, whether in time or in dignity. Matter is subordinate to Law."

How far the original diagram of the *Yi Ching* (易經) the *Canon of Changes* is able to bear the weight which Chou Tzü and his successors in the Sung School placed upon it must be left for the reader to decide. Though Dr. Bruce does not say anything so heretical we suspect him of feeling that it was a loss to Chinese thought that the Sung philosophers did not cut themselves free once for all from the *Yi Ching* tradition.

The real nature of the urge which compels the Sung philosophers in their investigations is seen when we come to their discussion of the Moral Order. The Finite Cosmos with its ceaseless round of change, its endless flux, is born of the Infinite, the ultimate cause beyond which thought itself cannot reach. The *Yang* and the *Yin* are the two ever-succeeding modes of this Infinite. By their interaction they produce the five agents, Water, Fire, Wood, Metal and Earth. These five agents (行) have to be distinguished from the literal substances known by these names. They are five Ethers which permeate every living thing. The excess or defect of any one of the ethers mars the perfection of the creature. As the five agents are in the material (*Ch'i*) world—and one has to warn the reader that "material" and "moral" are here used only as a mental aid and are not to be interpreted rigidly—so are the five cardinal virtues Love, Righteousness, Reverence, Wisdom and Sincerity in the moral world. Holding this theory in mind let the reader then try to grasp a further idea; that the four seasons, Spring, Summer, Autumn, and Winter are but the visible signs of the four ultimate principles of the Universe; Origin, Beauty (or Development), Utility and Potentiaity, *Yuan*, *Heng*, *Li* and *Cheng*. (元, 亨, 利, 貞). With five agents and four Principles there are endless possibilities, and when, in their company, we reach the *Cosmic Cycle* we are reminded of the Definitions, Axioms and Propositions of Spinoza. Such discussions in the hands of the certain thinkers of the period degenerated into sheer fatalism. "If there is an excess of the 'fire' element in a man, then he cannot be blamed for anger" One can easily imagine the reasoning. Chu Hsi lifts the whole discussion on to a different plane when he insists that deeper than any such individual difference is the fundamental Moral Law of the Universe. According to him the principle of inherent right (*Tao*) is present in all phenomena. And he goes further. Forced with conception of *Tao*, from which the Taoists had abstracted Love and Righteousness, he cries, "If we separate Moral Order from Love and Righteousness, we have no Moral Order at all. How without these (love and righteousness) can *Tao* be *Tao*?" Just as *Li* (Law) calls attention to the vein-like principles inherent in every individual thing, so does *Tao* express the fact that everything conforms to one Moral Law. If *Li* is compared to the innumerable trees in a dense forest, so is *Tao* compared to a vast trackless desert with its vision of the illimitable" (朱子全書 Bk 46 f. 16). *Li* and *Tao* come thus to be two terms referring to the same entity. But the question inevitably arises: "Though *Tao* is present everywhere, how are we to find it?" Simply, says Chu Hsi, by turning and looking within. But though he begins thus

to seek *Tao* in his own heart he goes on to find objectively, throughout the world, the same principles pervading the universe as constitute the law of his own being ; they are seen in the moral excellence of the sages ; they are written in the conscience of the most wicked of men. "Heaven, Earth and all things follow along the same ethical highway as man himself." From the fact that we ourselves possess the principles of Love, Righteousness, Reverence and Wisdom, we infer that others possess them also, and of all things in the universe there are none without these principles.

It is when we come to the detailed consideration of the Four Ultimates, Origin, Beauty, Utility and Potentiality—Ethical Principles constituting the Moral Order—that we realize our indebtedness to Dr. Bruce for the trail he has blazed for us. Only patient, loving care spent upon consideration of these passages could have enabled the author to give us so clear an exposition of so involved a subject. The reader has but to struggle for a time with Book 7 of Chu Hsi's *Human Nature*, even with the aid of Dr. Bruce's limpid translation, to realize the difficulty, and to be grateful for Chapter 7 in *Chu Hsi and His Masters*. In fact quite one third of the latter volume deals with the Sung Anthropology. Particularly illuminating are the passages on "The Nature—is it Good ?" In the discussion on "The Physical Nature" the biological, psychological and ethical strands combine with those of the distinctly religious. The Sung philosophers' conclusion is, "The objective, therefore, in the self culture of the earnest man is to restore the equilibrium. Every virtue must be balanced and so corrected by its opposite. . . . In this way the physical element will be transformed. Therefore, men should not fail to apply themselves to the work of purification. It is only when by self-culture a man overcomes the ethereal* element that he knows that this nature is all-comprehensive and has not perished." From the standpoint of revealed religion the silences of Chu Hsi are significant but not hostile. "The inadequacy of man's own unaided wisdom is recognized ; the means whereby victory is to be achieved is the Divine principle within reformed by the example of the sages. But, apart from this, there is no suggestion in Chu Hsi's philosophy of redemption from without, or, indeed, of the need of it. Man holds within himself all that is needed for his own redemption."

With the psychology of the chapter entitled "Mind" we cannot here deal. When to the figure "The Mind is the *enciente* of the Nature, containing within it the Nature Principles as a city wall contains within it the inhabitants of the city" already quoted, we add another frequent figure, "The Mind is like the seed-corn, the principle of life contained in it is the Nature, the putting forth of life on the part of the positive ether is Feeling," we are prepared for the finding of Chu Hsi's *Nature and the Feelings*. The union is union under one head, the mind being the agent by which man rules his body. Mind is the seat of unity and is the ruler in man's complex being. Mind is consciousness. Upon this Dr. Bruce

* The word is used in the sense adopted by Sir Oliver Lodge and is to be distinguished from "etheral."

THE GREAT CHINESE PHILOSOPHERS

remarks, " What is this but in effect to say that mind in man is the seat of personality ? Though the Chinese language loves not abstract terms and has no one word precisely answering to ' personality,' here surely is the idea." The discussion of Mind brings us to Chu Hsi's challenge of the Buddhist method. For the reader who delights in dialectic sword-play there is here plentiful entertainment provided.

From psychology we are led on in the regular way to Ethics. Here the whole treatment is lit up by the passage " Love, the Premier Virtue." For the personal idealist the closing chapters " Heaven " and " The Mind of the Universe " abound in interest. For Dr. Bruce they are evidently the justification of his patient labour. It is difficult to resist the conclusion that for the impartial reader the term 天 " Heaven " can no longer be used consistently in the impersonal sense, and one recalls the similar conclusion reached by Dr. Giles in his *Confucianism and Its Rivals*. Yet here again it is necessary to remind ourselves that the main concern of Chu Hsi is not so much the metaphysical as the moral ; it is not so much to prove Mind as the ultimate, as that such mind shall be ethical. He finds his peace in the declaration that the Vital Impulse, the Creative Force, whether in Man or in the Universe, is Love. " For Chu Hsi, too, the ever present problem is that of the One and the Many, and in his efforts to solve that problem he reached the same goal as the philosopher of the West. Not, indeed, by the same road, nor possibly with the same content of the word Love. But it is in Love and the principle of altruism, that he finds the true union of subject and object, of the ego and the universe, of the One and Many. He begins as most modern philosophers begin, with the constitution of his own being ; for what else is there that we really know ? He finds that not Intellect, as the nineteenth century Idealist found ; nor Will, as the present day Pragmatist finds ; but Love is the fundamental element in the Human Nature. He finds that man's faculties are gathered up in four elemental principles, Love, Righteousness, Reverence and Wisdom, which are but phases of the one principle, Love ; and that these principles are the law of his being. Love is the foundation of all goodness, the root of every virtue, the basis of that Moral Order which pervades all things. Love is the all-inclusive attribute of God Himself, the one imperishable and undying existence. LOVE IS ALL AND LOVE IS IN ALL ! "

THE K. C. WANG COLLECTION

No. 1. Kuei : Ceremonial plaques held in the hands by courtiers when confronting a Prince or Duke. (Length 7½ in.=19.02 c.m.). White jade with red stains, Chow dynasty (B.C. 1122 to 247).

2. Kuei : Shaped like an axehead and decorated. Same period as No. 1.

3. Small Kuei for outdoor use. Same period as Nos. 1 & 2.

4. Ku Pei : (Diam. 5½-in.=14.01 c.m.) Chow dynasty. Carved with fine grain pattern on both sides. White jade with dark red stains. On one side it has the appearance called sugar candy crystal. This Pei was a present of the Emperor Kienlung to his Prime Minister, Pan of Soochow, on the occasion of the latter's 70th birthday. It is carved on the edge with a verse of poetry of his Majesty's own composition in 28 words, and is dated the 2nd Moon of the Spring Quarter of the 12th Year of Kienlung (A.D. 1747). It also has two small royal seals on the under side.

5. Pei Chung : (Diam. 5½-in.=14.01 c.m.) Chow dynasty. White jade with red stains, also of the candy crystal appearance. For use in sacrificing to the Earth by Duchesses.

Nos. 4 and 5 were kept by the Pan family for over a century and a half. They are almost equal in size and closely resemble one another. Very rare and valuable.

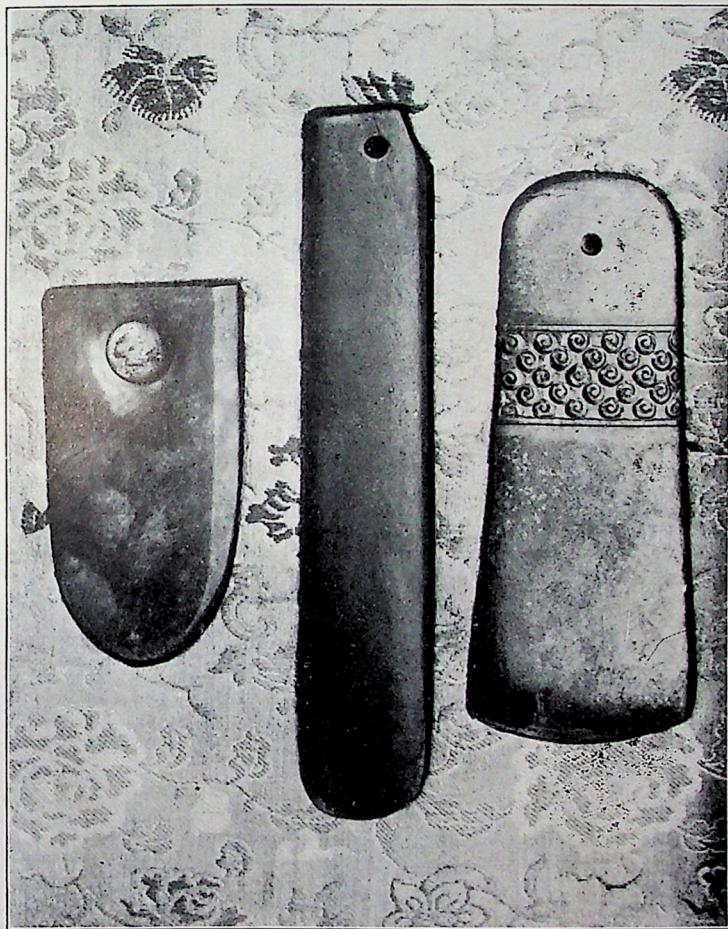
6. Kung Pei : (Diam. 9½-in.=23.71 c.m.) Chow dynasty. White jade with red spots large and small. One side deeply carved with two dragons and the other with grain carving of very beautiful appearance. Such large sized Pei are very rare. This specimen was owned by the Prime Minister Yuen, a famous collector of about 100 years ago.

7. Kung Pei : (Diam. 6½-in.=16.66 c.m.). Han dynasty (B.C. 206 to A.D. 264). White jade with red. Very fine carving. Both sides exactly the same. Ground slightly yellowish.

The above objects are in the collection of Mr. K. C. Wang, who is a well known collector of ancient Chinese relics and *objets d'art*. It is Mr. Wang's idea that an Archeological Section of "The China Society of Science and Arts" should be formed, with a view to retaining the best examples of ancient Chinese art in China, and to increase public interest generally in this branch of human knowledge and study. This should not be difficult, as most people are interested in relics of the dim past, and there must be a great many collectors of Chinese antiques in this country.

ANCIENT CHINESE JADES

(From the K. C. Wang Collection).

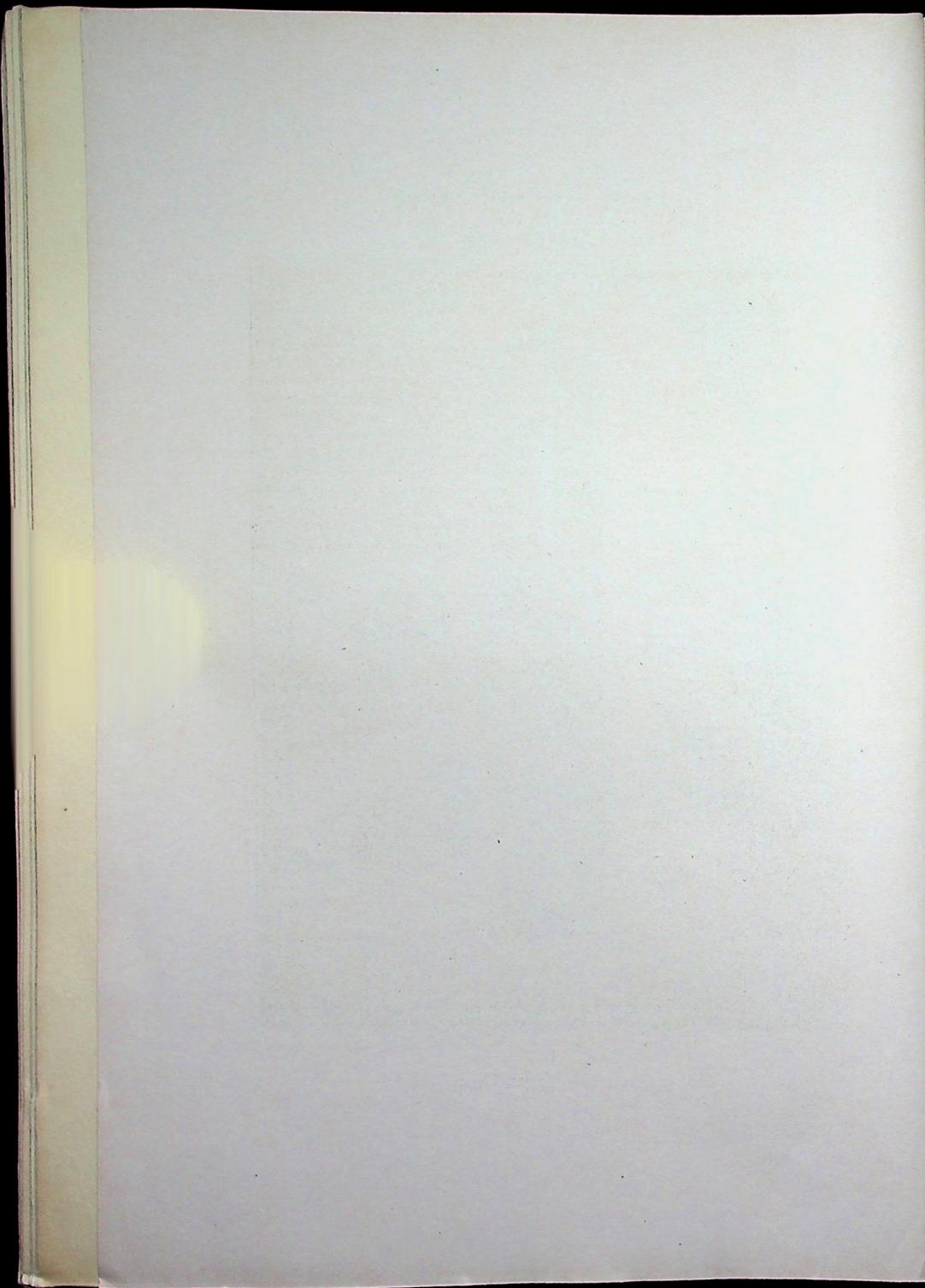


3

1

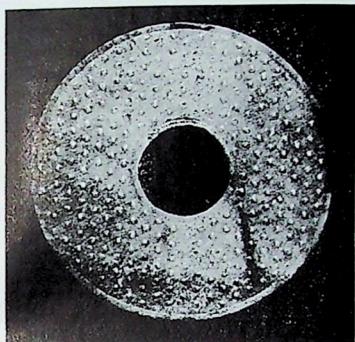
2

Kuei, or Ceremonial Plaques, Chow Dynasty.

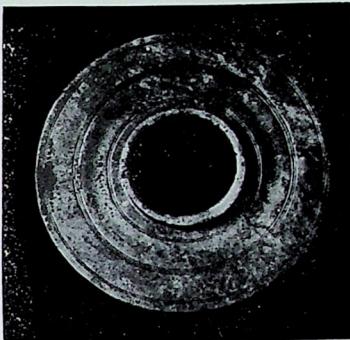


ANCIENT CHINESE JADES

(From the K. C. Wang Collection)



4
Ku Pei

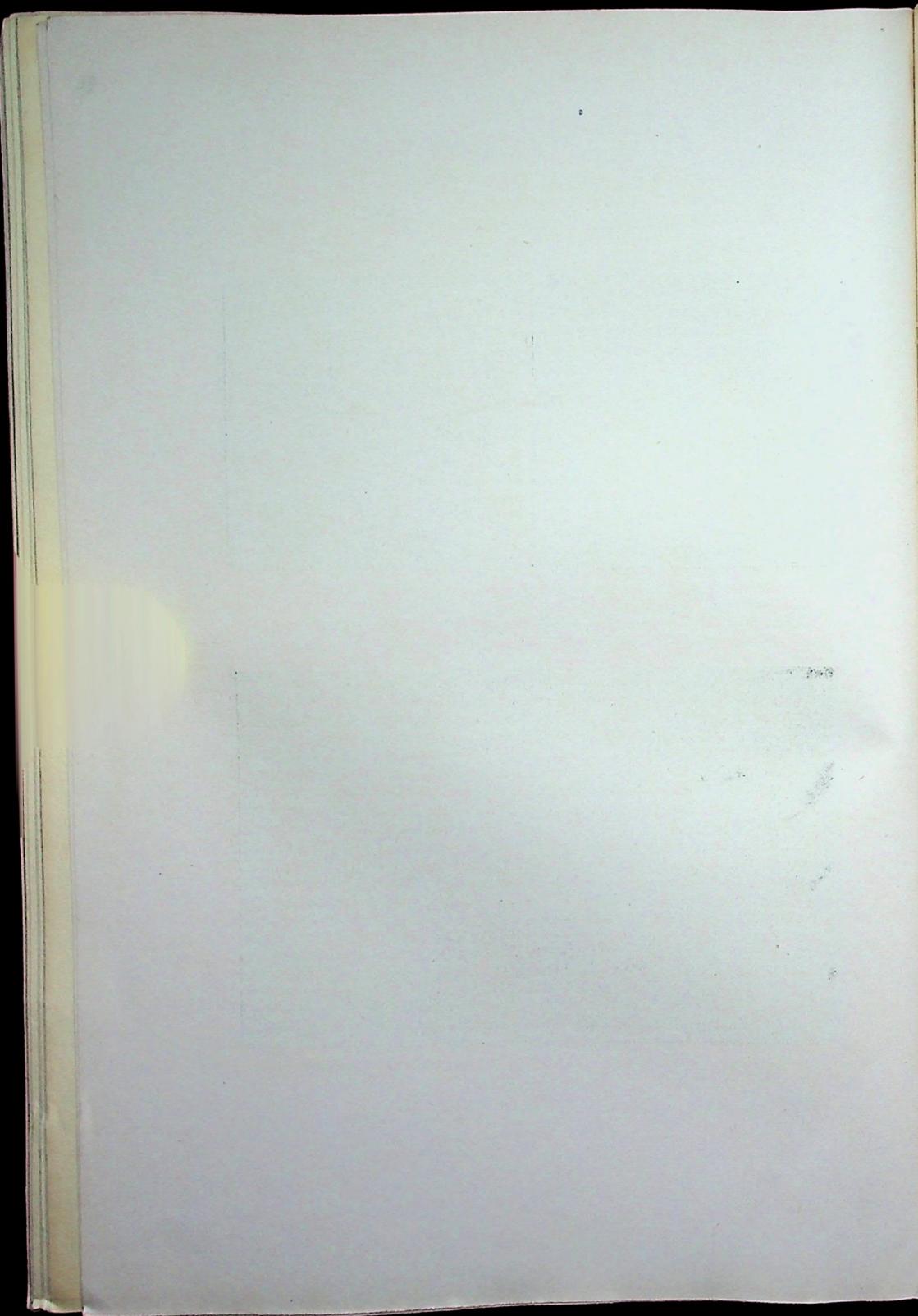


5
Pei Chung



6
Kung Pei

7



REVIEWS

CHINESE PAINTING, by Arthur Waley, London ; Ernest Benn, Limited ; 73/6 net.

Mr. Waley's scholarship has already been proved by his translation of Chinese poems and by serious articles in the *Burlington Magazine* in 1921, on the Chinese Philosophy of Art. His subsequent studies have carried him further along and he has developed the results into this book on Chinese Paintings. Nothing would have given the present reviewer more pleasure than to have been able to praise Mr. Waley's "Chinese Paintings" for he has shown commendable zeal in his studies. It, however, is so limited in scope as to be unfair, so sceptical as to be agnostic. It furnishes stones, while we have been clamouring for bread. From the title page it might be expected that this book would be devoted exclusively to considerations of Chinese paintings with such comments from associated arts as would tend to illuminate the central theme. In this one is disappointed for an examination of the contents shows that out of eighteen chapters only ten have headings which indicate that they are concerned solely with the paintings ; the other eight might equally as well have been found in any of the other books on Chinese art subjects published by the same firm as has published this book. Even the chapters whose headings might lead one to expect an exclusive study of pictorial art are found to contain much relating to broader topics.

Mr. Waley writes from the standpoint solely of what he has seen of Chinese paintings in Europe as is shown not only from the text but also from the plates. Only five of the illustrations are taken from things which remain in China, and of these only one, page 33, "Khotanese Horse and Groom" by Li Lung-mien, is a painting recognized by Chinese authorities as genuine. With the exception of "The Admonitions" by Ku K'ai-chih, and another painting, said to be by Li Lung-mien, in the collection of Mr. Stocley, Mr. Waley does not think highly of those he has seen, either as to their artistic qualities or their genuineness. On page 56 he suggests that many of the paintings now in European collections were forged at Soochow, and on page 6 and page 240 refers again to the forgeries perpetrated by the Ch'in family. Mr. Waley makes his statements concerning these forgeries on the strength of an opinion expressed by Ch'ien Yung, author of a book called Li Yüan Ts'ung Hua, and himself one of the most skilful forgers of handwriting ever known in China. Ch'ien Yung (i.e., Ch'ien Mei-hsi) could imitate perfectly the style of Wang Hsi-chih, Mi Fei, Huai Su, Lu Shih and other great calligraphists. Granted that Mr. Waley considers the pictures he has seen in European collections and in photographic reproductions from Japan to be either copies or forgeries, it is not apparent why he has written this book for it is evident that one cannot obtain correct opinions from such unreliable sources. Forgeries there have been in all ages, more indeed than many critics less frank than Mr. Waley are willing to acknowledge, but why go to all the trouble Mr. Waley has

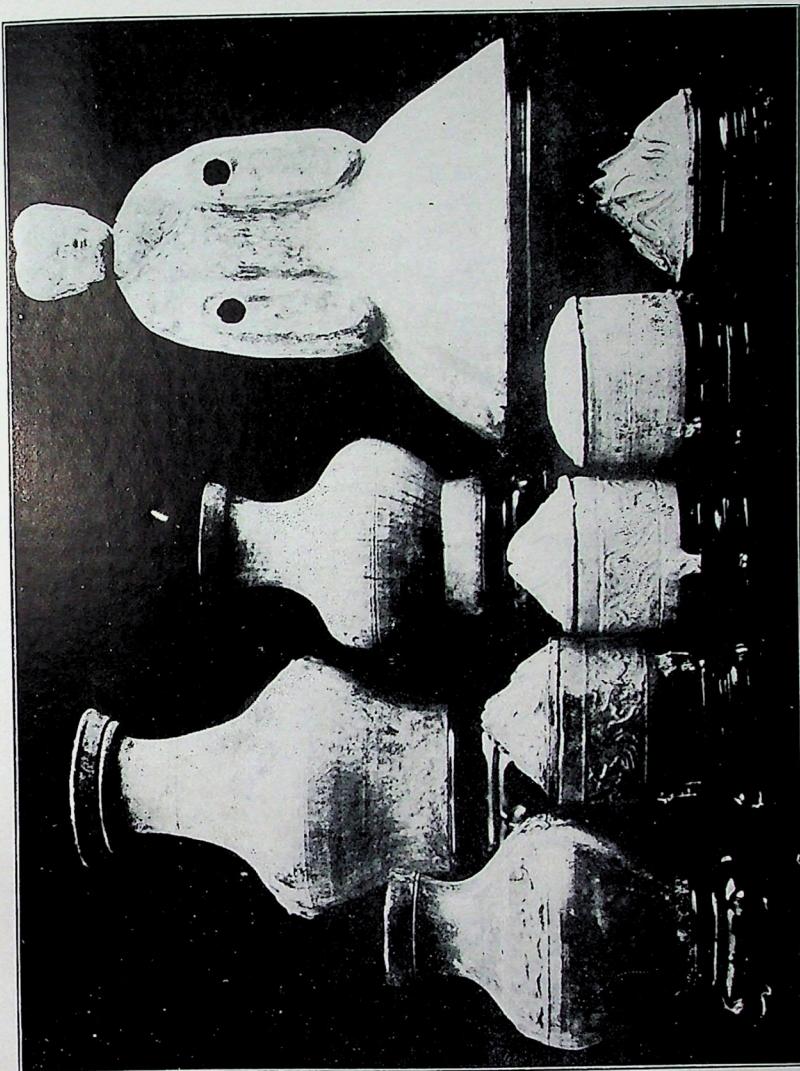
taken in preparing this large book if the only object it achieves is to warn a foolish public against buying spurious Chinese paintings ? The only way anyone can avoid the seductions of forgeries is by being familiar with the qualities of the genuine. Fortunately, there are many pictures in China, the records of which are clear and convincing, even though only a limited number have found their way to Japan or to the West. The Manchu collection brought together by the three illustrious Emperors K'ang Hsi, Yung Cheng and Ch'ien Lung contains a large number of genuine paintings considered by Chinese critics to be standards. Mr. Waley should have visited China and seen the pictures of private collectors and of the Manchu collection before giving his book to the world ; he should also have had a wider acquaintance with standard authorities.

The primal difficulty in approaching the subject as Mr. Waley has done is the danger of pitting his own opinion against that of Chinese critics. He has done this in several instances, once, notably, in discussing "The Drunken Priest" by Li Kung-lin. He says that An I-chou misunderstood this picture and gave it the incorrect name of "The Drunken Priest," whereas its correct name—according to Mr. Waley—should be "The Calligrapher, Huai-su." Considering that An I-chou had around him a group of distinguished scholars during a period when scholarship in China was at its zenith, and that he was the owner of many paintings which later passed into the Manchu collection, it naturally seems as if more credence should be attached to his opinion concerning a particular Chinese painting than to anything that Mr. Waley may write about it. Is it possible that the Chinese do not understand and are incapable of appreciating their own paintings and that it remains for Western scholars to estimate their genuineness and artistic value ? Unqualifiedly, no. Any correct interpretation of Chinese paintings must be based upon the generally accepted opinions of Chinese critics as found in their writings, and with a knowledge of such opinions the Western world can rest content. It may still retain many paintings which it likes, quite apart from the question as to whether the Chinese have liked them or considered them genuine, and in doing this the Western world will have its own justification, but it is not possible for Japan or the West to introduce new standards by which they insist those well-established in China shall be discarded and new ones set up.

Mr. Waley seems strangely distrustful of the opinions expressed by Chinese critics, and very ready, on the other hand, to accept without qualification all claims made from Japan. For instance, on page 158 he gives full credence to the story of the visit to China in 804, of the Japanese priest Kobo Daishi. He also makes the strange statement that on account of Chinese lack of interest in the budding romantic art of the 13th century academy "the Japanese were able to remove to their own country practically the whole output of the Zen monasteries and a large part of the work of romantic court landscape painters such as Ma Yuan and Hsia Kuei." This is fantastic, as is also what Mr. Waley has written of the two kinds of Zen paintings, page 227. It is ridiculous to classify the paintings of animals, birds, flowers and landscapes of the Southern Sung dynasty as attempts of the artist "to identify himself with the

ANCIENT POTTERY OF CHINA

(George Crofts Collection, Toronto.)



Pottery Vases, Figures and Hill Jars of the Han Period.

object depicted, to exterminate its inner Buddha," The Southern Sung emperors were undoubtedly fond of Buddhism, but there is absolutely no Chinese authority for suggesting that they allowed their religious spirit to dominate their delight in painting as painting. Mr. Waley further follows Japanese authorities in giving prominence to the work of Muchi and inventing in his honour what is called the Liu T'ung Temple school, whereas nothing is known of such a school by Chinese writers.

The writer has given prominence to the mural decorations of the Stein collection found at Tun-huang. The early stage of mural decorations painted by Ku K'ai-chih and Lu T'an-wei had a great influence upon subsequent pictorial art, but there is no authority for believing that the Tun-huang frescoes, whenever they may have been produced, had any such influence. They were situated at too great a distance from the centre of culture in China. We shall make no progress in our knowledge of Chinese paintings as long as we are so easily attracted from the straight and narrow path of patient investigation to the easier and more frequented road where we see only the things which have been brought by others to us. It would seem as if Mr. Waley had attempted to do in the field of Chinese pictorial art what Hobson did in that of pottery and porcelain where, following a period of sceptical declassing made necessary by reckless attributions, Hobson performed a great service to the Western world by restoring confidence based upon his thorough research into Chinese authorities. In this attempt Mr. Waley has carried the world no further than falling into line with the present unfortunate tendency of Western museums to consider all their Chinese paintings as declassed. I refer to this tendency as unfortunate, for, instead of a blind belief in what they have acquired or an unreasoned distrust, the obvious plan would be to stimulate the development of a type of scholarly curator whose knowledge of authorities and whose familiarity with existing specimens would warrant the expression of opinions upon the paintings now owned by museums. Such scholars cannot be produced by secluded studies in London, New York or Paris; they must be sent for a term of years to China where they can acquire a knowledge of the Chinese language and literature, consult with Chinese experts and see what China considers the best specimens of its own pictorial art.

CHINESE BIRTHDAY, WEDDING, FUNERAL, AND OTHER
CUSTOMS, by Mrs. J. G. Cormack. La Librairie Francaise,
Peking, 1923. Price \$3.00 Mex.

This unpretentious little book had its origin, as the author herself remarks in the "Foreword," in "papers prepared for and given before the 'Things Chinese' Society of Peking." At the request of friends these papers were expanded and added to and the result is a very readable account of certain Chinese customs. Both the form and treatment of the material are essentially popular. No attempt is made to discover or discuss the origin of the customs described. The information given has been avowedly collected from Chinese met in every day life in most

THE CHINA JOURNAL OF SCIENCE & ARTS

cases. While those scholars and students who wish to dig deep into the fascinating subject of Chinese life must still consult such serious classics as Doré's "Supéretions," Werner's "Chinese Sociology" and Comtois' "Politesse Chinoise," the average reader will find much interest, information and entertainment in Mrs. Cormack's little book. Globetrotters especially will be better able to understand and enjoy the funeral and wedding processions to be seen in Chinese city streets and the principal festivals of the Moon Calendar after reading her chatty chapters.

J. B. L.

THE RELIGIOUS AND SOCIAL PROBLEM OF THE ORIENT, by Masaharu Anesaki. New York : Macmillan : 1923. XI.

Professor Anesaki's little book has the merit of being inconclusive. To solve the social and religious problems of the Orient in seventy three pages could be the aim of only a superficial mind ; Dr. Anesaki has too profound an insight into the complex nature of these problems to commit himself to any such absurdly pleasant undertaking. His aim, instead, has been to give the reader some notion of the complexity of the situation produced by the impact of the West upon the East, and while making a few helpful suggestions, to show that there is no single solvent, and that with all the knowledge and goodwill we can muster the best we can do for some time will be to feel our way.

On certain aspects of the situation Dr. Anesaki is both convincing and conclusive. For one thing, the problem "is not a simple abstract matter of race or creed." Moreover, "though the stimuli responsible for the present changes proceed mostly from the Occident, the outcome will not be a mere Occidentalization of the East, nor simply a reaction against it, but a higher synthesis in some form between the old heritages and the new forces." The contrast between the temperaments of East and West is well drawn, and the effects, both good and bad, of western industry, science, and democracy upon the peoples of Asia are presented with both sympathy and impersonal justice. On page after page we come upon passages of keen analysis of the psychology of the situation, such, for example, as the following :

"The mechanical working of the mind, demanded by modern industry, together with the corresponding atmosphere in the worker's environment, cannot but injuriously affect the esthetic side of human nature. This is emphatically so in the Orient, because its peoples were long used to molding their lives with artistic taste and are now compelled to make a painful jump to a largely mechanistic life. This does not mean to say that the Oriental peoples are endowed with more and better esthetic sense than the Occidentals but the fact is that the Oriental life was formerly used to a more serene repose in esthetic enjoyment, and art or artistic sense made up an integral part of their life. In other words, art and life were closely linked together, and the people were almost unconsciously artistic. As I see it, this is not a question of natural endowment, but a matter largely of social structure and environment, which makes it

REVIEWS

easy to understand how explosively does the mechanism of the new industrial order affect their life and mentality . . . But the old paradise, whether of fools or sages, is passing. The people cannot go back. The question is whether or not the best of the inherited qualities can still be kept under the new regime . . . As a whole, science represents an analytic and experimental attitude of the mind, while the old culture of the Occident emphasized a synthetic mood of mind, chiefly expressed in belief, receptivity, contemplativeness. . . . Moreover, science in this sense is not a good friend of the religious spirit. A Japanese writer who combines in himself Tolstoi and St. Francis says: "We have been experimenting much, but have not experienced."

The last sentences quoted are significant, for Dr. Anesaki considers the religious problem the most fundamental of all. The religious situation is in part characterized by the contrast of the monotheism of Christianity with the pantheism of most eastern creeds. But this simple contrast, though of great importance, is only one aspect of the religious situation. Christianity and Buddhism have not only differences but similarities. On the whole Dr. Anesaki is convinced that the points of agreement are more fundamental than the contrasts. "There are strong grounds," he tell us, "for speaking of a closer approach or alliance, in a certain sense. Both religions are facing a common foe, in both idea and life, in the rise of materialism, which means the sway of commercialism and the spread of the exploiting spirit . . . How then, shutting their eyes to the dreadful use of unreligious and anti-religious forces, can either Buddhists or Christians spend time in controversies on pantheism and monotheism?"

But neither Christianity nor Buddhism nor both together, nor all the ancient faiths combined, can give a full account of the present religious situation in Asia. For all over the East new religious tendencies and new religions are springing up. The description of some of these fresh blossoms from the tree of the human spirit forms perhaps the most valuable part of Dr. Anesaki's work. The effect of them, is of course only to complicate still further the situation, and to make this little book the more delightful, and, quite properly, the more inconclusive.

J. B. P.

YANG KUEI-FEI, by Shu-Chiung (Mrs. Wu Lien-teh) Price \$3.00
Mex. 1923.

Readers of "The China Journal of Science and Arts" have already been regaled by the delightfully told story of China's most famous beauty, Yang Kuei-fei, the mistress of the Emperor Ming Huang of the Tang dynasty. Mrs. Wu Lien-teh, wife of the famous plague specialist of Manchuria, and a scholar of no mean order, has now published that story in book form, and we can strongly recommend it to the public as one of the best written and most fascinating books of the day. Mrs. Wu's account of the life of Kuei-fei is not a translation of any work already

THE CHINA JOURNAL OF SCIENCE & ARTS

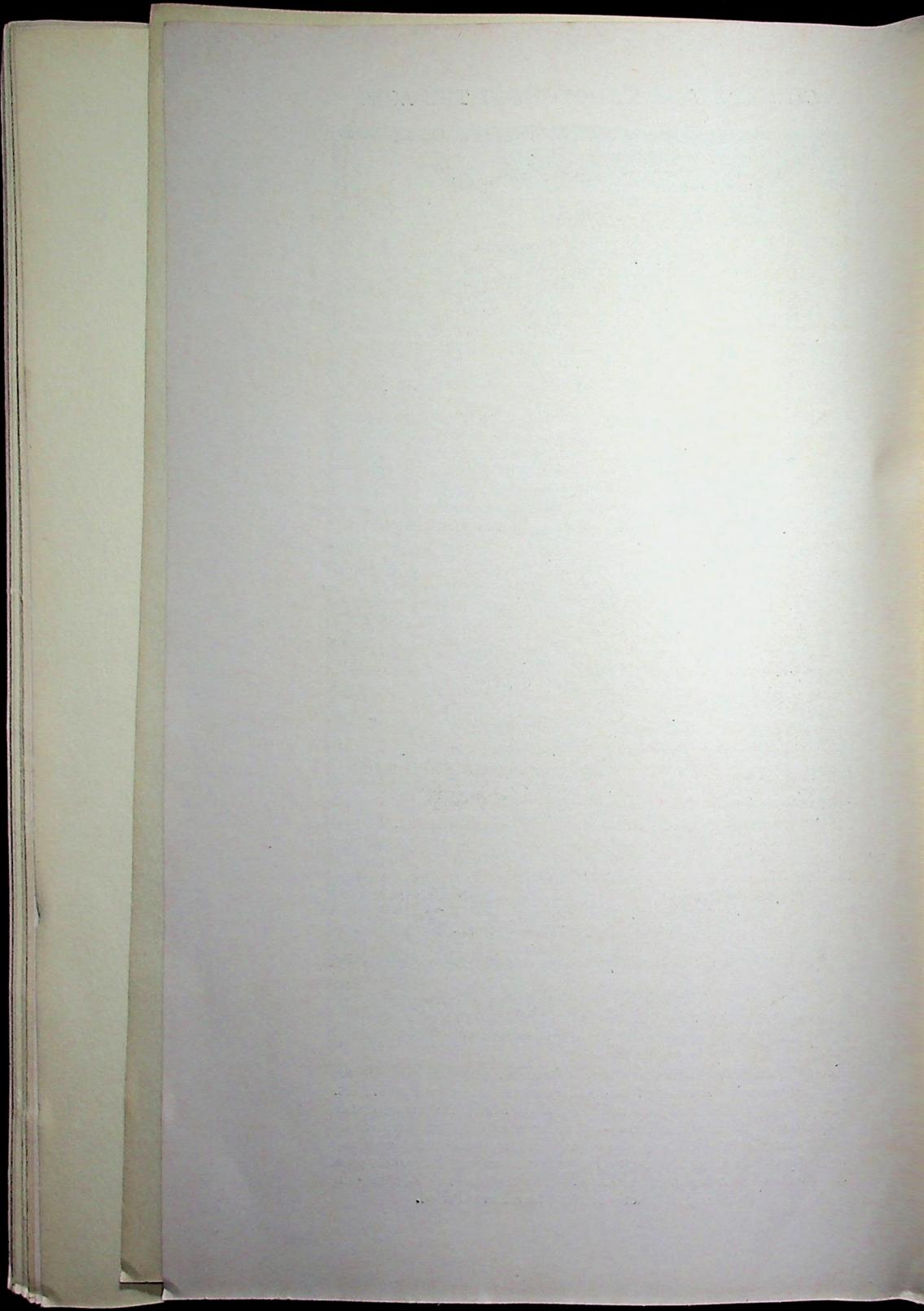
existing, but a completely new treatment of an old and popular subject, and, as such, is a distinct contribution to Western literature upon Chinese subjects. The main facts of the story are historical, but round them the authoress has woven a delightful fabric from her own bright imagination, and since the story is written from the view-point of a Chinese lady, whose knowledge of Chinese life and thought is not entirely modern, it is both convincing and refreshing. The book is well got up and beautifully illustrated and it is a pleasure to have it on one's shelves.

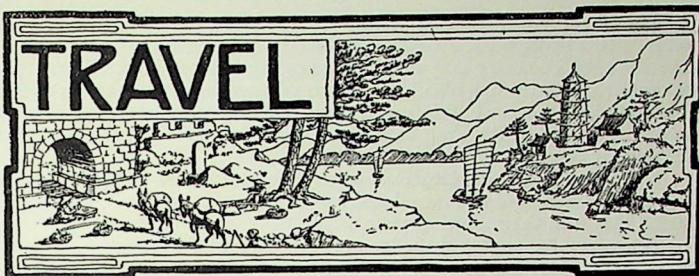
It may be purchased at the leading booksellers, or through the office of this journal at 102, The Ben Building, 25 Avenue Edward VII, Shanghai.

CHINESE ART THROUGHOUT THE AGES



Recently this magnificent rug was on exhibition in Shanghai. It was said to have come from the Manchu Palace, and was valued at \$12,000. The ground work is of real gold and silver braid, the ornamentation consisting of plush silk in high relief of the most beautiful pastel shades of dark and light blue and dark and light terra-cotta, the dark and light tones shading into each other and into white. The whole gives an effect of extraordinary richness. The rug measures 7-ft. by 4-ft. It is said to belong to the Chien Lung Period.





RECENT EXPLORATIONS IN CHINA AND NEIGHBOURING REGIONS

(Continued from page 132)

Amongst the most important explorations that have been carried out in recent years in China are those of the National Geological Survey of China, which were actually begun about the year 1914, though the Survey was originally inaugurated in 1911 at Nanking, during the regime of the Provisional Government that was founded there after the outbreak of the Revolution of that year. Subsequently the Survey was removed to Peking, where in due course it came under the Ministry of Agriculture and Forestry.

Mr. H. C. Chang was the first director of the Survey, but after it came under the Ministry of Agriculture and Forestry Dr. V. K. Ting was appointed chief director.

It was found that the Survey could not be carried out owing to the lack of "field" workers, and to remedy this a school for the training of surveying geologists was organized in September 1913 with Mr. Chang as director.

The school proved entirely successful, and in due course a number of trained geological surveyors were added to the institution, and some field work began in earnest.

Meanwhile Dr. J. G. Andersson had been engaged in 1914 by the Ministry of Agriculture and Commerce to act as its mining advisor, and from the beginning he worked in close co-operation with the Survey, becoming curator of the splendid Geological Museum that was founded in Peking, and giving valuable advice as to the carrying out of the actual surveys.

Three series of publications have been inaugurated in connection with the Survey, namely, *The Bulletin of the Geological Survey of China*, *The Memoirs of the Geological Survey of China*, and *Palaeontologia Sinica*, the last under the editorship of Dr. V. K. Ting and Dr. W. H. Wong. All three publications are in both English and Chinese, and are of the greatest value.

THE CHINA JOURNAL OF SCIENCE & ARTS

The Museum was opened in July 1922, and is in every way an up-to-date institution, where those interested in the geology and mineral resources of this country may obtain much valuable help and information. An excellent library has also been gathered together in a new fire-proof building, the funds for building and equipping which were raised through the direct appeal of Dr. Ting to a number of high officials, mine owners, and mining companies.

The actual field explorations were commenced in 1914, when Dr. Ting made a survey of the varied and valuable mineral deposits of Yunnan during that and the following year.

A systematic survey of the iron ore deposits of China was also begun in 1914. It was carried out by Dr. Andersson, already mentioned, Professor E. T. Nyström (now of Shansi University) and Dr. F. R. Tenggren, mining geologist to the Geological Survey of Sweden. The whole of the known iron ore deposits of the country were surveyed in the two succeeding years and during the years 1921 to 1923 Dr. Tenggren issued a full report of the work under the title "The Iron Ores and Iron Industry of China" in the *Memoirs of the Survey*.

The coal fields of the country were also surveyed and mapped, descriptive reports of some of these being published in the *Bulletin of the Survey*.

The geological mapping of the whole country has been undertaken, and, up to the present, the greater part of the provinces of Chihli, Shantung, Shansi, Honan and Kiangsu have been surveyed and mapped in.

In 1920, Dr. A. W. Grabau, an American palaeontologist of high qualifications, was engaged, and he at once began collecting and examining fossil remains to be found in the rocks of this country. He has paid special attention to the marine fossils, mainly of the coal-bearing formations, with very interesting results. The first issue of *Palaeontologia Sinica* was devoted to a monograph by him on the Ordovician Fossils, a most valuable contribution to the subject of Chinese palaeontology.

A search for the remains of ancient man in China was commenced by Dr. Andersson and his staff in 1919, which was rewarded in 1921 by the finding of two sites of particular interest. These were a cave deposit at Sha Kuo T'un in Fengtien Province, Manchuria, and a pre-historic settlement or village site at Yang Shao in Honan. Both of these were very carefully examined, and in the cave deposit at Sha Kuo, a large number of human bones were found. Considerable quantities of artifacts were also found, including chipped stone implements, polished stone implements, marble rings of extraordinary thinness, mussel shell rings, beads, buttons, stone discs, bone instruments, pottery and marine shells.

The finds made at the Yang Shao site consist of stone knives, adzes and other implements, bone and burnt clay rings or armlets, bone needles, slate arrowheads, and decorated pottery.

In close touch with the Geological Survey of China, extensive investigations upon the Cenozoic deposits of the country have been carried out by Dr. Andersson with private funds raised in Sweden, Dr. Otto Zdansky being employed to assist him in the field work, and it is to the untiring energy and enthusiasm of these two specialists that

RECENT EXPLORATIONS IN CHINA, ETC.

we owe a great deal of our present knowledge of these late geological deposits. The Eocene deposits of Yuan Chu Hsien in South Shansi, vertebrate deposits of Inner Mongolia, peat-bog deposits on the Peking plain, and many other interesting deposits in various parts of the country have been examined, resulting in a large number of rich finds, especially of vertebrate fossils. These have been reported upon by Dr. Andersson in the Memoirs of the Survey, in 1923, under the title Essays on the Cenozoic of Northern China.

At the present time Dr. Andersson and Dr. Zandsky are both engaged in a prolonged expedition in Kansu and West China, which should yield most valuable results.

These surveys have, of course, entailed an enormous amount of travel, and, one way or another, the greater part of China has been traversed. A record of the travels of the various parties employed in the work under review would prove of the greatest interest to geographers.

(To be continued).

NATURALISTS' JOURNEYS IN HAINAN ISLAND

In *The Journal of the Natural History Society of Siam*, Vol. VI. No. 2. (1923) Mr. Malcolm A. Smith publishes a very interesting account of his recent journey with Mrs. Smith through part of the Island of Hainan on a biological collecting tour. Landing at Hai-hao, early in January of last year, the party travelled up the Ding-an River to Ka-chek, thence continuing by boat up to Kap-hao and on by mountain path to the Five Finger Mountain. The travellers ascended this mountain to within about 200 meters of the summit, but failed to reach the latter owing to failing daylight and the necessity of returning to their base. Some interesting birds, beasts, reptiles and plants were seen, and good collections made, the explorers having with them two well trained native assistants.

In the previous two years, Mr. F. A. McClure, of Canton Christian College, had also visited Hainan Island, namely in September, 1921, and again in March, 1922, when he covered very much the same ground as that traversed by his successors, and was the first European to climb to the summit of the Five Finger Mountain, which has been estimated at an altitude of about 6,000-ft. above sea level. Mr. McClure made his visit in order to explore the flora of the island. He made a very good collection, which was reported upon in the *Lingnaam Agricultural Review*, Vol. I, No. 2, 1923, pp. 27-85, by G. W. Groff, Edward Ding and Elizabeth H. Groff.

Mr. McClure himself published an exceedingly interesting account of his expeditions in the same publication (Vol. I, No. 1, 1922, pp. 66-79) where, also, a sketch map of the island is given.

The interior of Hainan Island has always been a mysterious place, seldom visited by Europeans, and any information concerning it is of the greatest value and interest to geographers, biologists, and anthropol

THE CHINA JOURNAL OF SCIENCE & ARTS

The Museum was opened in July 1922, and is in every way an up-to-date institution, where those interested in the geology and mineral resources of this country may obtain much valuable help and information. An excellent library has also been gathered together in a new fire-proof building, the funds for building and equipping which were raised through the direct appeal of Dr. Ting to a number of high officials, mine owners, and mining companies.

The actual field explorations were commenced in 1914, when Dr. Ting made a survey of the varied and valuable mineral deposits of Yunnan during that and the following year.

A systematic survey of the iron ore deposits of China was also begun in 1914. It was carried out by Dr. Andersson, already mentioned, Professor E. T. Nyström (now of Shansi University) and Dr. F. R. Tegen-gren, mining geologist to the Geological Survey of Sweden. The whole of the known iron ore deposits of the country were surveyed in the two succeeding years and during the years 1921 to 1923 Dr. Tegengren issued a full report of the work under the title "The Iron Ores and Iron Industry of China" in the Memoirs of the Survey.

The coal fields of the country were also surveyed and mapped, descriptive reports of some of these being published in the Bulletin of the Survey.

The geological mapping of the whole country has been undertaken, and, up to the present, the greater part of the provinces of Chihli, Shantung, Shansi, Honan and Kiangsu have been surveyed and mapped in.

In 1920, Dr. A. W. Grabau, an American palaeontologist of high qualifications, was engaged, and he at once began collecting and examining fossil remains to be found in the rocks of this country. He has paid special attention to the marine fossils, mainly of the coal-bearing formations, with very interesting results. The first issue of *Palaeontology Sinica* was devoted to a monograph by him on the Ordovician Fossils, a most valuable contribution to the subject of Chinese palaeontology.

A search for the remains of ancient man in China was commenced by Dr. Andersson and his staff in 1919, which was rewarded in 1921 by the finding of two sites of particular interest. These were a cave deposit at Sha Kuo T'un in Fengtien Province, Manchuria, and a prehistoric settlement or village site at Yang Shao in Honan. Both of these were very carefully examined, and in the cave deposit at Sha Kuo, a large number of human bones were found. Considerable quantities of artifacts were also found, including chipped stone implements, polished stone implements, marble rings of extraordinary thinness, mussel shell rings, beads, buttons, stone discs, bone instruments, pottery and marine shells.

The finds made at the Yang Shao site consist of stone knives, adzes and other implements, bone and burnt clay rings or armlets, bone needles, slate arrowheads, and decorated pottery.

In close touch with the Geological Survey of China, extensive investigations upon the Cenozoic deposits of the country have been carried out by Dr. Andersson with private funds raised in Sweden, Dr. Otto Zdansky being employed to assist him in the field work, and it is to the untiring energy and enthusiasm of these two specialists that

RECENT EXPLORATIONS IN CHINA, ETC.

we owe a great deal of our present knowledge of these late geological deposits. The Eocene deposits of Yuan Chu Hsien in South Shansi, vertebrate deposits of Inner Mongolia, peat-bog deposits on the Peking plain, and many other interesting deposits in various parts of the country have been examined, resulting in a large number of rich finds, especially of vertebrate fossils. These have been reported upon by Dr. Andersson in the Memoirs of the Survey, in 1923, under the title *Essays on the Cenozoic of Northern China*.

At the present time Dr. Andersson and Dr. Zandsky are both engaged in a prolonged expedition in Kansu and West China, which should yield most valuable results.

These surveys have, of course, entailed an enormous amount of travel, and, one way or another, the greater part of China has been traversed. A record of the travels of the various parties employed in the work under review would prove of the greatest interest to geographers.

(*To be continued*).

NATURALISTS' JOURNEYS IN HAINAN ISLAND

In *The Journal of the Natural History Society of Siam*, Vol. VI. No. 2. (1923) Mr. Malcolm A. Smith publishes a very interesting account of his recent journey with Mrs. Smith through part of the Island of Hainan on a biological collecting tour. Landing at Hai-hao, early in January of last year, the party travelled up the Ding-an River to Ka-chek, thence continuing by boat up to Kap-hao and on by mountain path to the Five Finger Mountain. The travellers ascended this mountain to within about 200 meters of the summit, but failed to reach the latter owing to failing daylight and the necessity of returning to their base. Some interesting birds, beasts, reptiles and plants were seen, and good collections made, the explorers having with them two well trained native assistants.

In the previous two years, Mr. F. A. McClure, of Canton Christian College, had also visited Hainan Island, namely in September, 1921, and again in March, 1922, when he covered very much the same ground as that traversed by his successors, and was the first European to climb to the summit of the Five Finger Mountain, which has been estimated at an altitude of about 6,000-ft. above sea level. Mr. McClure made his visit in order to explore the flora of the island. He made a very good collection, which was reported upon in the *Lingnaam Agricultural Review*, Vol. I, No. 2, 1923, pp. 27-85, by G. W. Groff, Edward Ding and Elizabeth H. Groff.

Mr. McClure himself published an exceedingly interesting account of his expeditions in the same publication (Vol. I, No. 1, 1922, pp. 66-79) where, also, a sketch map of the island is given.

The interior of Hainan Island has always been a mysterious place, seldom visited by Europeans, and any information concerning it is of the greatest value and interest to geographers, biologists, and anthropologists.

ogists alike. The first European to cross the island was Mr. R. H. Douglas of the Chinese Customs Service. His journey was made many years ago, and since his time but little has been done in the way of investigating the interior of the island.

THE TRANS-ASIA PHOTO-SCIENTIFIC EXPEDITION

This expedition, whose object is to follow the supposed route of Marco Polo through Chinese Turkestan and Kashgar into India, taking cinematograph pictures and other photographs of scientific and geographical interest, as well as making biological collections, was organized during last winter, and word has at last come through that it is already on its way across the Ordos Desert on the first stage of the long journey.

The personnel consists of :

Mr. E. M. Lamb (Field Captain and director of photography)
Mrs. Corrinne Lamb (Assistant)
Mr. F. S. Tangier-Smith (Business Manager and naturalist)
Mr. Wong Hai-cheng (Native assistant biologist).

Mr. and Mrs. Lamb started from Peking early in February, and, after preparations in Kalgan, continued by train to Pao-tou Chen, stopping over for short side trips at Ta-Tung Fu and Kuei-hua Cheng, where they took pictures of local events and buildings. Mr. Tangier-Smith was detained in Peking owing to difficulties attached to securing passports and gun permits, finally joining his companions on February 23, at Pao-tou.

Here the members of the party got into touch with Father Van Praet, who was captured some time before by the same bandits that captured Dr. Gordon Thompson, General Pereira's companion, and who had recently been released by payment of a ransom. According to reports the priest's ransom included the enrollment in the Chinese army of one of the two Mongol bandit chieftains and 250 of his men, together with the payment of certain sums of money. The ransom for Father Van Praet's Chinese bodyguard was made in cigarettes. The priest reported witnessing over forty executions during his captivity as the bandits summarily killed the majority of their Chinese captives as being of no value to them.

Soon after Mr. Tangier-Smith's arrival at Pao-tou, the whole party left for Ning-hsia Fu by camel caravan, across the sandy wastes of the Ordos Desert, in the interior of which the Tomb of the great Mongol Emperor, Kublai Khan, is said to lie.

No further news of the expedition can be expected till Ning-hsia is reached.*

* As we go to press news reaches us that the expedition has reached Ning-hsia Fu safely, after a twenty-two days' journey from Pao-tou Chén. Its next stage is to Lan-chou Fu, the capital of Kansu.

PICTURESQUE CHINA, by Ernst Boerschmann, Fisher Unwin, Ltd.

Dealing with a journey through twelve provinces of China, this volume consists mainly of handsome illustrations in sepia from photographs taken by the author on his travels through the country. It purports to deal particularly with the architecture, landscape of China and the life of the people. It reveals the beauty of this ancient land as no other publication we have yet seen does. While many of the pictures are merely of landscape scenes, temple buildings, and the like, some are masterpieces of the photographic art, as, for instance, that on page 269 of a procession of monks ascending the steps and entering the grand auditorium of the T'ien T'ung Sze (Chekiang). The pictures of the Yangtze Gorges are also unusually good. This handsome book may be purchased at the store on Nanking Road of the Chinese-American Publishing Company who have submitted it to us for review.

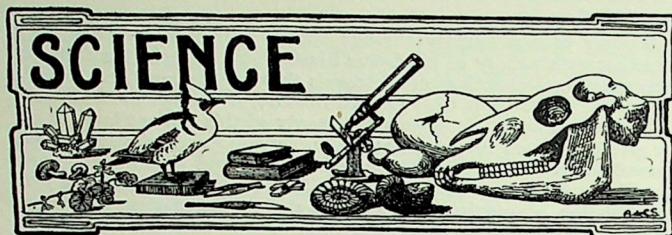
THE FLOWERY PAGODA

This is Cathay, that Marco Polo found,
The granite stones that pave this narrow street
Unhollowed still, by all the pulsing feet
That paced the centuries ; there comes no sound

Of Western wheels into this ancient place,
Where Buddha, bland, contemplative, aloof,
A dusty gilded image of reproach
On all uneasy change, stares into space.

When our rude Celtic fathers knew to build
Their Druid temple's rough similitude,
This storied structure, like a dream fulfilled
Was here, and here this ancient Buddha stood ;
Older is he than all our boasted years,
Wise with old folly, brave with conquered fears.

By MAUDE HUBBARD BROWN.



THE MANDARIN FISH

BY

ARTHUR DE C. SOWERBY, F.Z.S.

In the last issue of *The China Journal of Science and Arts* appears an article by Mr. L. W. Lorden on "Fishing in China" in which he deals with the delightful little fish called the knife fish. He suggests that those who have had experience with fish and fishing in this country should contribute further articles from time to time, in order to rouse interest in the sport and increase general knowledge in China regarding the fish-fauna of her rivers, streams and lakes.

Agreeing with this laudable object I have decided to write upon one of the most valuable and highly prized fresh-water fishes of China, and to show how it may become famous, not only for its gastronomic qualities, as it now is, but also as a sporting fish worthy of the attention of the European or American angler in this country.

The Mandarin fish is a member of the great bass family, *Serranidae*, and is not a perch (family *Percidae*) as supposed by so many. Its generic name *Siniperca*, meaning Chinese perch, and created by Gill in 1862, is, therefore, misleading. The species was originally described in 1855 under the name *Perca chua-tsi* on specimens from Peking by Basilewsky, who wrongly supposed it to be a perch. Basilewsky adopted the Chinese name *Chua-tze*, as its specific name, a procedure not uncommon amongst naturalists when describing new species. Its correct scientific name, therefore, is *Siniperca chua-tsi* (Basilewsky).

In appearance, it must be admitted, the Mandarin fish is not unlike a perch, but a closer examination reveals many points of difference. The body is deeper; the back higher, sloping more sharply from the head to the dorsal fin. The lower jaw protrudes in an aggressive manner, the mouth being very large and armed with sharp strong teeth. The scales are small, so small that at a short distance the fish has the smooth appearance of a scaleless form. In colour our species is of a rich olive-yellow-green, fading to pale yellowish white on the under parts. A dark band of rich brown or brown-black passes through the eye from the snout up

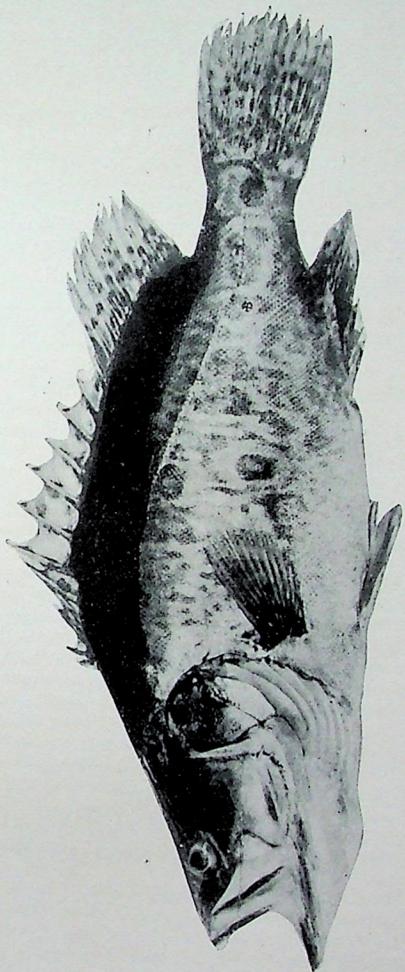
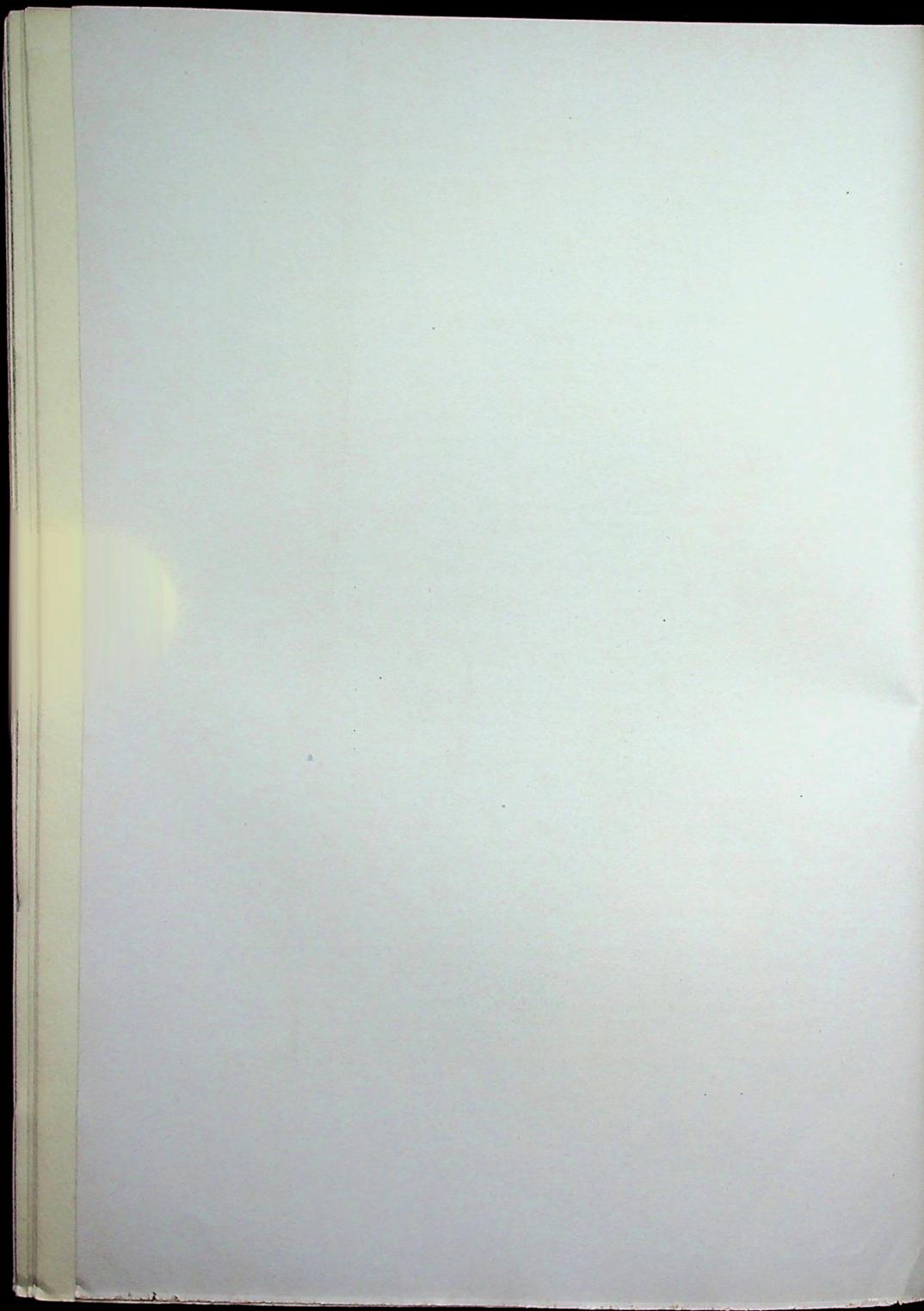


Photo by S. F. Lee

The Mandarin Fish (*Syniperca chuatsi*, Basilewsky).



THE MANDARIN FISH

the side of the head to the back; while broad, irregular, sometimes broken bands or irregular patches of the same colour extend transversely across the body on either side. The dorsal and caudal fins are spotted with round dots of the same colour.

The fin and scale formula given by Dr. L. Berg in his book "Ichthyologia Amurensis" is as follows:

D XII	13—14	A III	9—10	1.1.	108—120	Squ.	150	28—30
							75—85	

In plain English this means that the dorsal fin has twelve spiny rays and from thirteen to fifteen soft rays, the anal fin three spiny and from nine to ten soft rays: there are 108 to 120 pores along the lateral line, 150 scales in a lateral line from head to tail fin, and twenty-eight to thirty in a perpendicular row above and seventy-five to eighty-five below the lateral line.

The three spiny rays of the anal fin are very strong and sharp and are characteristic of the basses.

There are spines on the gill-plates, also characteristic of the basses. With these, the anal spines and the spiny rays of the dorsal fin the Mandarin fish is well armed, and should be handled very carefully, especially as they are to a certain extent poisonous, and wounds inflicted by them are very painful.

The species reaches a large size, specimens of 10 or 12-lbs. being not uncommon.

So much for the general description of our fish. That it is suitable as a fish for angling admits of little discussion, though whether it is a sporting fish in the fullest sense of the word remains to be proved. The points in its favour are that it is universally distributed all over East China from the extreme south northward as far as the Amur river in Manchuria and throughout Central China, where it is to be found in all the rivers, creeks, lakes and even marshes. It breeds in the creeks, smaller streams, lakes and marshes, where it deposits its spawn amongst the thick weeds. Spawning takes place in the spring.

The second point in its favour is that it is a voracious fish, feeding upon other fish, shrimps and prawns, and may be taken with a live bait consisting of a small fish or large prawn. As far as I know no attempt has been made to take it with a spinner or with the fly, though great success has been met with in this direction with its near relative, the Japanese sea-bass (*Lateolabrax japonica*). Here, then, is a line of investigation for the local brotherhood of the rod and line.

The only doubtful thing about the Mandarin fish as a sporting species is whether it is not too sluggish, my observations tending to show that it is not nearly as active a fighter as its American cousin, the black bass.

A very closely related species is also found in the rivers, creeks and lakes of China, namely a species that enjoys the scientific name of *Siniperca scherzeri*. It is usually confused with the Mandarin fish, which it resembles in general appearance, but from which it differs in being of a

richer, more bronzy colour, in having irregular, more closely set and more definite blotches and patches instead of bars on the sides, and in being less deep in the body.

I enjoyed excellent sport with this fish while on the Yalu River, Manchuria, early one summer. The bait used consisted of fresh earth worms, and the fish fought well. The species was described from the Yangtze.

The Japanese sea-bass also ascends rivers in China, and may be found in all the creeks that intersect the province of Kiangsu. It is of a beautiful silvery colour spotted with black, and is longer and less deep in the body than either of the foregoing.

Recently, splendid sport has been had in Pei-tai Ho, a seaside resort in North China, taking this fish with the fly; and I am convinced that there are great possibilities along the same line with the other two species mentioned here.

MIGRATION NOTES

BY

G. D. WILDER.

THE CUCKOO SHRIKE, JAPANESE PYGMY WOODPECKER, MONGOLIAN SONGTHRUSH AND LONG-BILLED RING PLOVER.

Through the kindness of Père Courtois of Sikawei in identifying some birds that are not found in Hartert's and Dresser's works on the palaearctic birds of the world, as well as some that were overlooked, I am able now to report on some interesting species from the Peking region. The first of these is a female specimen of the Cuckoo Shrike, *Campophaga melanochista melanoptera* (Rüpp.). It was shot at the Western tombs last July while skulking in the thick foliage of huge "small leaf poplars," to translate the Chinese name. Some men in a high-walled compound near by said that a brood had been raised inside and these were the first they had ever seen. Other bird experts to whom the specimen was shown declared it to be new to them. It is the first record from the province so far as we can tell by reference to David, Swinhoe, Mollendorff, and La Touche. The bird is much the size and the dark slate colour of the catbird of the United States, but more slender of body, having a long graduated tail with white tips to the shorter tail feathers, and with black wings marked on the middle of the inner vanes of the primaries with white, seen only when the wing is spread. It has the notched bill with sparse bristles at its base of the shrikes and drongos.

A Chinese collector and friend of mine had told me of having seen a pygmy woodpecker at the Eastern tombs that was smaller than the one we see near Peking in the Western Hills. I paid little attention, thinking that he must be mistaken in calling it a different variety, but he insisted that it was also somewhat different in marking. He finally brought me a fine male specimen, and, sure enough, it had a pure white throat surrounded by dusky brown under parts, and the back was clear black with horizontal white lines, quite different from the massed white and black on the back and wings of the common pygmy woodpecker, *Yungipicus pygmaeus semicoronatus* (Licht.). The lower surface of the tail also was barred white and black, as opposed to our pygmy's solid colours of white for the shorter and black for the longest of the tail feathers. The bird turned out to be *Dryobates kizuki seebohmi* (Hargitt), or the Japanese pygmy woodpecker. Père Courtois believes this to be the first record for China.

The same taxidermist brought me a ragged specimen of *Pitta nymph*, Tem. and Schl., which was said to have been taken in the reed beds near Peking. However, it is more likely that it was a cage bird, or had escaped from captivity, as its nearest habitat seems to be Anhui so far as is known. Its size and turquoise blue colours on rump and wings

would almost deceive one into calling it a turquoise kingfisher if seen in the open.

Another rare bird of which I have only immature specimens, one bought in the Peking market, the other captured when just able to fly on Pe Hua Shan last summer, is the Mongolian song thrush, *Turdus auritus*, Vossenau. Its breeding in these Western Mountains is a matter of interest.

Late in January the writer spent a few days in P'ing Ku Hsien, a place where the plain penetrates the mountains at the sources of a considerable river, whose waters are so warm that even in cold seasons they do not freeze for some miles and this year not for more than ten miles at least. Many years ago it was a favourite hunting ground and always a surprise in the varieties of supposedly warm-weather birds that spend the winter there. We found that of late years the birds are far fewer in numbers as well as in varieties. This may be due partly to the hunters having been more diligent, and also to the development of the industry of raising great flocks of Peking ducks in those fine clear pools and streams where the watercresses and weeds that ducks delight in grow so abundantly. We used to find several species of edible ducks giving good sport, as mallards, green-winged teal, etc., where now only goosanders and sheldrakes are to be found and of these there were seen at the time of our visit but nine of the former and five of the latter spending the winter where there used to be many flocks of several tens. Ten miles down stream, however, we found the haunts of about 100 sheldrakes and still farther away those of a similar sized flock of the bean goose. This last winters here, only when the larger rivers keep free from ice in places. It does not frequent the small clear streams near the hills.

Of wading birds there were a goodly number of grey herons, a few ibis-billed oyster-catcher (*Ibidorhynchus struthersii*), green sandpipers (*Totanus ochropus*), and the long-billed ring plover (*Aegialitis placida*, Gray). This last is my first record, though I have seen these large ring plovers two or three times before in the winter, and suspected that they were different from the little ring plover which is common during the migrations.

Another rare bird that has come this winter is the bearded reedling (*Panurus biarmicus russicus* Brehm). A single specimen of *Passer rutilans*, the russet sparrow, was found in the market late in January, the first I have ever secured.

In the middle of February I had a few days at the town of Lou Ts'un, at the base of the mountains in Lai Shui Hsien, near the Western Tombs. It happened to be a time of unusual cold with a slight fall of snow, so that on two mornings I had the unusual pleasure of a tramp over fields of sparkling snow that creaked and crunched under foot with the frost. The town is surrounded with rugged hills, two or three miles distant on three sides, and a clear stream on the fourth side; the very fertile plain is dotted here and there with thick groves of cedar and pine surrounding the tombs of princes and their concubines. To the historical interest of the place there is much of ornithological interest added. For the first time I found the winter haunts of the pretty little mealy redpoll, *Acanthis linaria linaria* (L.), in the scattered apricots and willows on the outskirts of the villages.

MIGRATION NOTES

On approaching the shady side of a dark, cold, apparently deserted cedar grove, I was delighted to see a flock of rose finches (*Carpodacus roseus*, Pall) rise from the grass on the sunny sheltered east side of the high wall. The leading males perched on the tips of the snow-covered cedar boughs, where the brilliant morning sun displayed the rose-silver frontlet and throat and beautiful rose coloured rump characteristic of the male in this species. A few steps further to the sunny side of the grove aroused a multitude of bird friends. A large flock of bramblings circled overhead, displaying their white breasts, then filling the bare branches of a big willow, where they settled. Among them was one solitary Japanese hawfinch, *Coccothraustes coccothraustes japonicus*, T and S. A gentle tapping like that of the woodpeckers proved to be the Pekingese chickadee, and soon I found the trees alive with this and the Japanese chickadee, both species singing and playing in the cedars and willows in the greatest glee. The pied, pygmy and green woodpeckers were all hard at work digging their breakfasts from the bark of the trees. A few turtle doves, *Streptopelia orientalis orientalis* (Latham), sunning themselves in the bare trees, took refuge in the recesses of the grove as I approached. A sparrow hawk, *Accipiter nisus*, came along as though considering this a likely place to find a meal. A kite and a buzzard circled high overhead. Later I saw nuthatches, *Sitta villosa*, Naumann's thrushes, azure winged magpies, skylarks, hoopoes, white necked crows, rooks, jackdaws, yellow-throated buntings, rustic buntings, Japanese wrens and water pipits (*Anthus spinolella blakistoni*, T. and S.) feeding along the ice edges and appropriately called "ice chicken" by the Chinese—all these wintering in the vicinity. Just to complete the list of my winter birds let me mention the golden eye duck, the crested lark, Elwes' shore lark, two kinds of meadow bunting, hedge sparrow or *Accentor montanellus*, rock grouse* and bustard. To include the market birds would add a number of others, but the railways are bringing in mallards, pintails and other game birds from both south and north so far that it is impossible to be at all sure of the locality from which they come.

A female Daurian redstart, has been loafing around the shrubbery in our Peking compound for a few days, since February 20 in fact, often sitting erect low down near the ground with tail shivering as though with cold. It is hard to say whether she has been here all winter, which is quite possible, or whether she is one of the first comers from the south in the Spring migration.

*?Pucras pheasant, or koklas (*Pucrasia darwini*), which frequents the mountains in the Eastern Tombs (Tung Ling) area.—ED.

THE TERMITES (WHITE ANTS) OF CHINA
WITH DESCRIPTIONS OF SIX NEW SPECIES

BY

S. F. LIGHT.

(From the Laboratory of Zoology, University of Amoy, Amoy, China)

(Continued from page 142).

FAMILY TERMITIDAE

MACROTERMES BARNEYI SP. NOV.

COLLECTIONS EXAMINED

Number	Locality in my collection	Collector	Date	Castes	Habitat, etc.
Hg 7	Hongkong University	Barney	1-IX, '22	S.S., L.W., S.W.	From earthen runs at a bank, showing no connection with a tree.
Hg 8	"	"	6-X, '22	L.S., S.S., L.W. S.W.	From a thick earthen run up the trunk of a camphor tree and amongst the dry bark.
Hg 9	"	"	7-X, '22	S.S., L.W., S.W.	From a large patch of earth on tree trunk.
Hg 10	"	"	16-X, '22	L.S., S.S., L.W. S.W.	From thick runs on a young tree (<i>Mallotus</i>).
Hg 11	"	"	10-X, '22	S.S.	From an irregular net- work of narrow runs on bark of camphor tree.
Hg 13	"	"	18-X, '22	L.W., S.W.	From a very short run emerging from a hole in a path and ending in a little mass of pine need- les, etc., lying on ground.
Hg 14 Type	"	"	23-X, '22	L.S., S.S., L.W. S.S.	From a run on a camphor tree.
Hg 15	"	"	25-X, '22	S.S., L.W., S.W.	From a patch of earth and several runs on a camphor tree.
Hg 16	"	"	25-X, '22	S.S., L.W.	From a long run as- cending a tree.
Hg 22	Hongkong University	"	14-IV, '23		
C 14	Amoy Harbour	Light	16-IV, '23	A.	
C 25	Near Kuliang, in the moun- tains near Foo- chow, 2,000-ft.	Light & Kellogg	4-VIII, '23	L.S., S.S. & L.W., S.W.	Floating alive on the outgoing tide at 7 a.m. In the same <i>Myrica</i> stump from which were taken <i>Coptotermes for-</i> <i>mosanus</i> , <i>Reticulitermes</i> <i>fukienensis</i> , and <i>Termes</i> <i>formosanus</i> .

L.S.=large soldier, S.S.=small soldier, L.W.=large worker, S.W.=small worker.

THE TERMITES (WHITE ANTS) OF CHINA

DIAGNOSIS

Imago.—Antennae, legs, and abdominal terga a dark smoky olive green to smoky dark brown; wing membrane light; costal venation distally yellow, proximally smoky brown; costal stripe distinct, deep yellow; ocellus separated from the eye by less than its width; antennal segments III and II subequal, IV and V smaller and subequal; median vein of wing branched in distal one-third of wing; body length with wings, 25 to 28 mm; head width 2.25 mm; pronotum 2.35 mm wide and 1.26 mm long.

DESCRIPTIONS

Imago.—The head and posterior regions of the mesonotum and metanotum are dark brown with a reddish tinge, the antennae, with exception of the two basal segments, and the abdominal tergites are a smoky black-brown to dark smoky olive-green. The palpi, the two basal segments of the antennae, the legs, the T-spot and shoulder spots of the pronotum and the anterior regions of the mesonotum and metanotum are yellow. The wing membrane is a light whitish yellow and evenly haired. The costal venation is yellow in the distal region of the wing and darkens to a dark smoky-brown in the proximal region. The costal stripe is distinct, deep yellow in colour. The clypeus is swollen, the ocellus separated from the eye by less than its width and the fontanel is not surrounded by a light area. Segments III and II of the antennae are, as a rule, subequal and longer than IV or V which are usually subequal. There seems to be considerable variation in these segments, III often being longer than II and *vice versa* while V is often much shorter than IV.

The pronotum is nearly semicircular in outline, weakly emarginate behind, broadly but shallowly concave in front, with the central portion of the anterior border elevated. The cubitus has about 9 branches, one or more of which are subdivided and the median has several branches in the outer one-third of the wing.

Measurements of the Alate Imago of *Macrotermes barneyi* sp. nov.

Length with wings	25.00-28.00
Length without wings	12.00-14.00
Head length	
To clypeo-frontal suture	1.44
To labral suture	1.80
To tip of labrum	2.07
To tip of mandibles	2.25
Head width (with eyes)	2.25
Length of ocellus	0.30
Width of ocellus	0.150
Distance of ocellus from eye	0.140
Pronotum width	2.30-2.35
Pronotum length	1.26

Large Soldier.—The head is yellow with a reddish brown tinge, the mandibles are black, and the antennae, the palpi, the anterior and posterior regions of the pronotum, the posterior regions of the mesonotum

and metanotum and the abdominal tergites are a pale smoky black-brown. The submentum is red-brown, the legs yellow and the underside of the thorax and abdomen a light yellow-brown.

The head is large, massive in appearance, broad, with a straight posterior margin and convex lateral margins. It is broadest at the middle and is not narrowed noticeably in front except beyond the posterior margins of the antennal fossae. The sides are rounded, the dorsal surface comparatively flat sloping gently downward in front from a point somewhat in front of the fontanel. The fontanel which is located considerably in front of the centre of the head (fontanel index., 0.79¹¹), is very small, bordered in black and with an irregular smoky-black area running forward from it to the level of the antennae.

The antennal fossa is deep, the ventral carina heavily chitinized. A small hyaline eyespot is located just ventral to the posterior end of the ventral carina, behind and below the antenna. The antennae have 17 segments, I and II a light yellow brown, the others darker, smoky; III is longer than II, IV or V, which are equal; VI and succeeding segments are as long as III or longer.

The pronotum is saddle-shaped, deeply emarginate behind; the lateral margins recede rapidly from a region of maximum width near the anterior end of the sclerite and round insensibly into the narrow bilobed posterior margin. Anteriorly the lateral margin rounds sharply into the anterior margin which runs almost directly mediad for a short distance to curve sharply forward and upward into the margin of the uplifted two-lobed anterior region.

The mesonotum is considerably narrower than the pronotum or metanotum, shorter than the pronotum and longer than the metanotum and posteriorly bilobed. The metanotum is short, a slender transverse oval in shape, with straight posterior margin. The lateral angle of the mesonotum is sharp in dorsal view, that of the metanotum disguised by the upcurved position of the lateral margin of the sclerite.

The head shows a few widely scattered, slender, upright hairs, the postclypeus a pair of bristle-like hairs on either side of the middle, one of each pair on the margin, the other somewhat posterior and mediad. The labrum bears a row of spiny hairs along its margins, the pronotum scattered smaller hairs and a pair of large spine-like hairs marking each lateral angle. The abdominal tergites show numerous long bristle-like hairs and the legs, particularly the tibiae and tarsi, bear many reddish spine-like hairs.

The mandibles are short and slight in proportion to the size of the head, the right with a smooth cutting surface that of the left distinctly serrate.

*Measurements of the Large Soldier of *Macrotermes barneyi* sp. nov.*

Length of body with head	7.5	to 8.2
Width of abdomen	2.15	

11. The "fontanel index" is derived by dividing the distance from the fontanel to the labral suture by the distance from the posterior margin to the fontanel. If less than 1.0 the fontanel is "in front of the centre of the head."

THE TERMITES (WHITE ANTS) OF CHINA

Length of head with mandibles	5.2	to 5.3
Length of head without mandibles	4.0	
Width of head	2.97	to 3.1
Length of pronotum ¹²	1.08	
Width of pronotum	2.07	
Length of mesonotum	0.648	
Width of mesonotum	1.22	
Length of metanotum	0.54	
Width of metanotum	1.80	
Length of left mandible	2.0	
Length of antennae	3.7	
Length of labrum	0.92	
Width of labrum	0.64	
Length of labrum without apical region	0.64	
Width of hyaline apical region of labrum	0.28	
Maximum width of submentum	0.82	
Minimum width of submentum	0.615	
Diameter of fontanel	0.02	
Fontanel index (see footnote 11)	0.79	

Small Soldier.—The small soldier is much smaller in every way than the large soldier and its colour is lighter. The sides of the head are more convex and converge more anteriorly and the head is more vaulted. The labrum and the mandibles are more slender and longer in proportion; the fontanelle is near the centre of the head¹³ and the abdomen narrower and less flattened. The postclypeus and anteclypeus are long; the mandibles are red to red-black, long, very slender, much straighter than those of the large soldier and with considerably great upcurve. The labrum is much longer in proportion, tapering from a maximum width not far from its base to a rather long, sharp tip. The hyaline apical portion is more elongate and is medially overlain by the labrum proper for half its length. The antennae are longer in proportion, longer than the head. The submentum is broader in proportion to the width of the head and even less narrowed than in the large soldier.

Measurements of the Small Soldier of *Macrotermes barneyi* sp. nov.

Length of body with head	5 to 6.5
Length of head with mandibles	(a) 3.42 (b) 3.24 (c) 3.16 ¹⁴
Length of head without mandibles	2.0 to 2.3
Length of head to inner mandibular articulation	1.9
Width of head	1.65 to 1.75
Length of pronotum	0.675 to 1.75
Width of pronotum	1.17

12 I measure the pronotum length in the midline, i.e., the minimum length measured in position. Since the anterior region is elevated the dissected flattened pronotum would be considerably longer.

13 This is more apparent than real and is due to a great extent to the much longer post- and anteclypeus.

14 (a) With mandibles opened and pointing straight forward.

(b) With mandibles closed and crossed. (c) With mandibles opened wide.

Length of mesontotum	..	..	..	..	0.41
Width of mesonotum	..	..	..	..	0.88
Length of metanotum	..	..	..	..	0.315
Width of metanotum	..	..	..	..	1.08
Length of left mandible	..	..	..	..	1.48
Length of antennae	..	..	..	..	2.16
Length of labrum	..	..	..	..	0.69
Length of labrum without apical region	..	..	..	..	0.59
Width of labrum	..	..	..	..	0.37
Length of apical region	..	..	..	..	0.18
Width of apical region	..	..	..	..	0.14
Maximum width of submentum	..	..	..	..	0.49
Minimum width of submentum	..	..	..	..	0.45
Fontanel index	..	..	..	..	1.0 (see footnote 13).

Large Worker.—The head is reddish brown above shading into yellow on the sides and below. The thoracic region is a light yellow-brown, the abdomen and legs light yellow to white and the antennae yellow proximally and distally a distinctive smoky black-brown.

The head is large and held at nearly a right angle to the long axis of the body, the thorax is narrowed and sunken and the abdomen rises with a gradual curve from the metanotum to a maximum height at its middle and falls with a similar curve to its posterior end, the whole giving the dorsal profile of the animal the form of a weak S-curve.

The head is low, flatly domed above, the frons flatly declivitous to the much swollen clypeus. Both postclypeus and anteclypeus are swollen, much higher than the labrum. The small hyaline eyespot is obliquely elongated and placed just behind the posterior margin of the antennal fossa. The fontanel, small for the genus, is placed behind the centre of head, i.e., behind the centre of a line joining the centre of the clypeofrontal suture with the centre of the posterior margin. In front of it and about a quarter of its distance from the clypeofrontal suture is a small irregular white spot and slightly posterior to a line from the fontanel to the antenna of either side and about halfway between the fontanel and the antenna is a long, narrow, obliquely placed white spot.

The antennae have 17 segments, rarely 18. When 17, III is about as long as II or V and V is shorter than IV or VI; when 18, III has divided making III and IV very short and VI is shorter than V or VII. The two arrangements may be homologized as follows:

1	2	3	4	3	6	7	8	9	10	11	12	13	14	15	16	17	18
I	II	III	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1
I	II	III & 15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	(17, , ,)

The pronotum has bilobed anterior and posterior margins; the notches separating the anterior elevated region from the lateral portions of the anterior are distinct and are continued inward as oblique brown lines on the surface of the pronotum. The mesonotum and metanotum have the same relations to one another and to the pronotum as in the soldier.

THE TERMITES (WHITE ANTS) OF CHINA

Measurements of the Large Worker of *Macrotermes barneyi* sp. nov.

Body length	..	..	..	..	5.0 to 6.0
Head length	..	..	..	..	2.38
Head length to clypeo-frontal suture	..	..	..	..	2.31
Head width	..	..	..	..	2.00
Diameter of fontanelle	..	..	..	..	0.12 (transverse), 0.11 (longitudinal)
Length of pronotum	..	..	..	..	0.56
Width of pronotum	..	..	..	..	1.08
Fontanelle to posterior margin	..	..	..	..	0.65
Fontanelle to clypeo-frontal suture	..	..	..	..	0.69

Small Worker.—Much smaller than the large worker and somewhat lighter in colour; the clypeus is more swollen and the fontanel proportionately much wider, and shorter. The antennae have 17 segments; II is much larger than III or V which are equal and are smaller than IV and VI.

Measurements of Small Worker of *Macrotermes barneyi* sp. nov.

Body length	..	..	..	..	4.0 to 4.0
Length of head to clypeofrontal suture	..	..	..	..	1.1
Length of head to tip of labrum	..	..	..	..	1.67
Width of head	..	..	..	..	1.31
Transverse diameter of fontanel	..	..	..	..	0.09
Longitudinal diameter of fontanel	..	..	..	..	0.07
Width of pronotum	..	..	..	..	0.83
Length of pronotum	..	..	..	..	0.63

*Systematic Positions.*¹⁵—This splendid species is quite distinct from the other species of the genus known from the oriental region. I shall confine this discussion to the characters of the large soldier. From the *carbonarius* group (*M. carbonarius* Hagen and *M. estherae* Desneux) its smaller size, the presence of numerous hairs on the abdominal tergites, the short broad abdomen and its head shape differentiate it. From *M. malaccensis* Haviland its shorter mandibles and its head shape clearly distinguish it. From the *gilvus* group (*M. gilvus* (Hagen) Holmgren, *M. singaporenensis* Oshima, the one or more species found in the Philippines, and *M. azarelii* Wasmann), which it seems to approach in its head shape, it differs in the size and shape of the thoracic nota, in the presence of numerous hairs on the abdominal tergites, etc.

In size and in the relative size of the head and thoracic nota it would seem to be most closely related to *M. azarelii* Wasmann, of Burmah, but more data than are given in the meagre description of Holmgren (1913) and a study of the adult of the new species will be necessary before we can determine whether there is any real affinity between the two species.

Biology and Distribution.—The presence of termites of this genus in Hongkong is unexpected since they have not been known, hitherto, from any oriental region north of the Philippine Islands or Siam on the main-

15 This will be more fully discussed in a later note.

land. It is true that we know nothing of the termite fauna of China to the south of Hongkong except the data given in this paper concerning Hainan termites. Nor do we know much of the termites of French Indo-China. It seems probable, therefore, that further collecting will show this species to be found on the mainland in southern Kwangtung and perhaps Yun-nan. It seems strange in this connection that no termite of this species or genus was found on Hainan where their presence in Hongkong would certainly make them expected. This adds another to the interesting question concerning termite distribution awaiting solution by the collector in South China.

The species of this genus construct elaborate "fungus gardens" of comminuted wood on which they grow a fungus used to feed the young. As a rule also, they build conspicuous mounds of earth with a highly elaborated system of chambers containing fungus gardens, passage ways, storage chambers, etc., and a royal chamber in which are imprisoned the relatively enormous queen or queens and king of kings. Such mounds, produced by the species of this genus, form a conspicuous feature of the landscape in the Philippines, Malaya generally and probably in other parts of the tropical oriental region. Nothing is known of the biology of the Chinese species except Prof. Barney's collection notes given above.¹⁶ That they do not build such mounds in the northern part of their range at least seems probable since it is unlikely that such conspicuous structures would have escaped study and comment.

TERMES FORMOSANUS Shiraki

Termes formosana Shiraki, 1909.

Termes vulgaris Shiraki, 1909 *et al.*

Termes (Termes) vulgaris Oshima, 1909, 1910

Odontotermes formosanus Holmgren, 1912

Odontotermes (Cyclotermes) formosanus Holmgren, 1912, 1913

Odontotermes (Cyclotermes) formosana Oshima, 1913.

Odontotermes (Cyclotermes) formosanus Oshima, 1919.

? *Odontotermes sinensis* Holmgren 1913.

CHINESE COLLECTIONS EXAMINED.

No. (My Coll.)	Locality	Collector	Date	Castes	Habitat, etc.
Hg 3	Hainan, between Tun-gan and Ouidioc	Light	VII, '22	S. W.	Dead portion of shrub along trail, open country.
Hg 4	Hongkong	Barney	VII, '22	W.	Fallen wasp nest.
Hg 12	Hongkong University Grounds	"	16-X, '22	S. W.	From under an immense patch of clay entirely sheathing a tree.

16 Since writing the above the species has been found on the Fukien mainland in the mountains back of Foochow (collection C 25). The fungus gardens were found and will be described in a later paper together with additional biological data concerning other Chinese termites.

THE TERMITES (WHITE ANTS) OF CHINA

No. (My Coll.)	Locality	Collector	Date	Castes	Habitat, etc.
Hg 17	University Grounds	Barney	25-X, '22	S. W.	From pieces of pine bark on ground.
Hg 18	University Grounds	"	16-X, '22	W.	Runways on a tree
Hg 19	University Grounds	"	10-X, '22	S. W.	Irregular network of small runways on camphor tree.
3 5	Amoy, Kulangsu Is.	Ben. E. Chiu	2-V, '22	A.	Lights in evening.
O 7	Amoy, at University	Light	8-V, '22	A.	"
C 8	Amoy, Kulangsu Is.	"	12-IV, '22	S. W.	Attacking Oregon pine boards on ground. Several destroyed.
O 11	Kwangtung Prov., West River, Ting Wu Shan Monastery	Barney	28-VIII, '22	W.	Attacking a fallen branch in company with <i>Coptotermes formosanus</i> . In branch was <i>Kalotermes sinensis</i> and <i>Cryptotermes</i> sp.
C 12	Amoy, near University	T'ang Wangwang	5-X, '22	S. W.	
C 13	Amoy, near the University	Light	V, '22		
C 16	Kulangsu, Amoy	Dr. Lim Boon Keng	9-IV, '23	S. W.	Considerably smaller than other colonies.
C 17	Canton, Canton Christian College	Campbell	IV, '23	W.	
C 18	Amoy	Kenzo Okamoto	1-IV, '23	W.	
C 19	Kulangsu, Amoy	Ah Li	1-VI, '23	W.	Flight at dusk.
C 23	Muiwha, on coast near Foochow	Light	28-VII, '23	S. W.	In same tree with <i>Reticulitermes fukienensis</i> .
C 27	Near Kuliang, in the mountains back of Foochow, 2,000-ft.	Light and Kellogg	4-VIII, '23	S. W.	In <i>Myrica</i> stump together with <i>Coptotermes formosanus</i> , <i>Reticulitermes fukienensis</i> and <i>Macrotermes barneyi</i> .
C 28	Baekliang, in the mountains back of Foochow, 1,200-ft	Light	10-VIII, '23	S. L.W. S. W.	From large fungus gardens, 18 inches underground in a large smooth walled chamber, 1 foot square and 4 inches high. Fungus garden a dirty grey brown.

DIAGNOSIS.

Imago.—Large, 28 to 30 mm long with the wings; head 2.5 to 2.7 mm wide and 2.1 to 2.4 mm long to labral suture. Dark in colour, head and wings a brown-black, body somewhat lighter; thickly haired. Ocelli

small, separated from the eyes by at least their short diameter; antennae of 19 segments, II much longer than III, III as long as IV, V shortest. Pronotum 2.25 to 2.50 mm wide and 1.1 to 1.2 mm long, slightly notched in centre of anterior and posterior margins, lateral margins converging strongly behind, coloured like the head but with a yellow T-shaped mark.

Soldier.—Head contracted but little in front with a nearly straight posterior margin, 1.2 to 1.4 mm wide and 1.5 to 1.77 mm long without the mandibles. Both mandibles bent in somewhat from near the middle; tooth of left mandible in outer half of mandible; tooth of right mandible small but distinct, at same level as tooth of left mandible. Antennae with 15 to 17 segments, yellow throughout, not darkened distally. Pronotum about 0.8 mm wide.

To this species I have referred all collections of the common *Termites* species of the China Coast. With one exception the soldiers of the colonies examined were if anything more robust than the average for the Formosan species but fell well within the size range given by Hozawa (1915). The exception, collection C 16, from Kulangsu, has soldiers and workers which fall below the size range of Hozawa but in the absence of any other morphological characters and with only soldiers and workers at hand it seems wiser to consider this a nanitic colony of *T. formosanus* although more complete collections may show them to represent the soldiers and workers of some species or variety as yet undescribed.

This species is ordinarily to be found attacking dead wood although it does some damage to stored lumber if near the ground and to posts, telephone poles, etc. I have found no instance of its attacking buildings.

In 1913 Holmgren erected the new species, *Odontotermes sinensis* to which he apparently allots all the Chinese *Termites* (*Odontotermes*) material to which he had access, which he had formerly placed under *Odontotermes formosanus* (1912). He seems to have had only adult material and as I learn from a recent letter from him, only dried specimens. He bases his separation on the lighter colour and smaller size of the Chinese specimens. It seems highly probable that these two characters are due to some extent to the dried condition of the material while that on which *Termites formosanus* is based has been mostly preserved in alcohol. Speaking of *T. formosanus* he says (1913) "Stcht *O. sinensis* sehr nahe und ist vielleicht nur eine Rasse dieser Art." In his recent letter he agrees that it would be better to consider the common Chinese *Termites* species as co-specific with the *T. formosanus* of Formosa.

An alate adult from Cheung Chau Island collected by Mr. A. S. Campbell, of the Canton Christian College, in May 1923, and one from Kachek, Hainan, collected by Miss K. L. Schaeffer, fall below the range for *T. formosanus* and may represent the adult form of *T. hainanensis* or some species as yet undescribed.

The fungus gardens of this species were collected during the summer (collection C 28) and will be described in a later paper on the biology of Chinese termites.

THE TERMITES (WHITE ANTS) OF CHINA

TERMES HAINANENSIS SP. NOV.

COLLECTIONS EXAMINED.

No. (My Coll.)	Locality	Collector	Date	Castes	Habitat, etc.
H 1	Kachek, Hainan	Light	VIII, '22	S. L.W. S.W.	
H 2	" "	Dr. F. R. Whelby	"	"	Attacking the underside of hard-wood planks lying on the ground
H 4	" "	Light	"	"	<i>Types.</i>
H 5	" "	"	"	"	
H 9	" "	Miss K. L.	"	S.	
H 12	" "	Schaeffer	"		

DIAGNOSIS.

Imago.—Unknown.

Soldier.—Head with rounded posterior and lateral margins, sides converging, about 1.0 mm in width and 1.1 mm in length without the mandibles; submentum half as wide as the head, strongly convex at centre. Blade of right mandible nearly straight, left somewhat bent in from middle of blade; tooth of left mandible in outer one-third of the blade, directed somewhat anteriorly; tooth of right mandible rudimentary more proximal than the tooth of left mandible. Antennae not darkened distally, with 15 or 16 segments.

Large Worker.—Head considerably larger than that of soldier, 1.45 mm wide by 1.62 mm long. Antennae of 17 segments, III shortest.

Small Worker.—Much smaller than large worker, head 0.82 mm wide by 0.96 mm long. Antennae of 16 segments, IV shortest.

DESCRIPTIONS.

Imago.—Unknown.

Soldier.—The head is bright yellow with a brownish tinge.¹⁷ The mandibles are a deep red-black with yellowish red basal regions. The remainder of the body is a pale yellowish white with numerous dead white spots; in the abdomen are darker areas due to the colour of the internal organs seen through the transparent body wall.

The head is broad ovate with rounded posterior and lateral margins, converging distinctly in front, widest near the posterior end. The sides and posterior surface are rounded, the dorsal region flatly vaulted and the frons gently declivitous. The fontanel is extremely minute, only to be made out with considerable magnification. The submentum is large and prominent. In profile it is seen to be strongly convex, highest in the centre and sloping in all directions to the margin. Its posterior border is somewhat concave, the anterior border nearly straight.

¹⁷ In alcoholic collections of this as of other species of the genus *Termites*, some soldiers show dark reddish brown heads, a change of colour due to the action of the alcohol.

The blades of the mandibles are bent outward from their point of junction with the base giving them proximally a distinctly concave outer margin. They are slightly depressed at the middle beyond which they have a distinct upcurve. The tips are distinctly and rather abruptly incurved. The lateral margin of the blade of the left mandible is somewhat convex near its middle beyond which the mandible is bent inward. The inner margin bears a broad irregular basal projection beyond which the mandible bends outward as mentioned above. On the cutting edge a shelf-like projection masks this bending of the mandible proper. This shelf ends abruptly in the outer 1/3 of the blade and its upper and outer portion projects medially and anteriorly. The end of this shelf and its projection constitute the "tooth of the left mandible" characteristic of this group of species of the genus *Termites*. A broad shallow notch separates the basal projection from the shelf. The blade of the right mandible is nearly straight, the basal projection is somewhat smaller and the tooth is rudimentary, more proximal and without the shelf which characterizes that of the left mandible. Beyond the tooth the inner edge of the left mandible is distinctly concave while the cutting edge of right mandible is nearly straight. The right mandible is narrower, proximal to the tooth, than is the left and broader distally.

The postclypeus is not clearly demarcated, the anteclypeus short and broad, broader than the labrum. The labrum is rather long, tongue-shaped, its sides converging from its base to a narrow rounded tip. The dorsal rim of the antennal foveola is somewhat produced and it, the dorsal antennal carina and the inner mandibular articulation have a reddish brown colour.

The antennae are rather stout with broad articulations and consist of 15 or 16 segments. When of 16 segments, IV is smallest, when 15, III is smallest and IV often shows signs of division, is very large and the terminal segment is next largest, distinctly ovate and with a pointed tip.

ANTENNAL FORMULAE.

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
I	II	III	13	12	11	10	9	8	7	6	5	4	3	2	1 (16 segts)
I	II	III	13	12	11 & 10	9	8	7	6	5	4	3	2	1	(15 segts)
I	II	III	13 & 12	11	10	9	8	7	6	5	4	3	2	1	

The pronotum is broader than long, its sides receding into the narrow, concave posterior margin. The anterior elevated region is broad at its base but narrows rapidly to the small, bilobed anterior margin. It is not set off by notches in the margin but by broad, deep grooves on the surface of the pronotum.

Workers of two sizes.

Large Workers.—The head is considerably larger than that of the soldier, averaging 1.45 mm in width and 1.62 mm in length. Behind the level of the mandibular articulations it is quadrate in shape. The lateral margins are straight, and the postero-lateral corners round

THE TERMITES (WHITE ANTS) OF CHINA

broadly into the curved posterior margin. There is a slight bulge below the antennae making this the broadest region of the head.

The fontanel is very small and inconspicuous. The head is light yellow the dorsal and ventral mandibular articulations marked by red spots and the outer portions of the mandibles black to red. The antennae of 17 segments are placed high on the head, the 3rd segment being the shortest. They are more slender and more loosely jointed than in the soldier.

The postclypeus is somewhat swollen with a distinct longitudinal suture. It is somewhat narrowed in the midline, tapering to rather narrow lateral ends; 0.5 mm wide by 0.20 mm long. The anteclypeus is hyaline, longest in the middle and tapering to narrow lateral ends; about half as long as the postclypeus. It is lower than the postclypeus but somewhat swollen.

The labrum is about as long as wide, 0.48 by 0.48 mm; the submentum is vaulted. The pronotum is 0.6 mm broad by 0.36 mm long, the antero-lateral corners narrow and projecting.

Small Worker.—The small worker is considerably smaller and lighter in colour. The head is about 0.82 mm wide and 0.96 mm long. The antennae are of 16 segments of which the 4th is the shortest. The antennae of large and small workers homologize as follows:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
I	II	III	& 14	13	12	11	10	9	8	7	6	5	4	3	2	1
I	II															(Small worker)

I II III 14 13 12 11 10 9 8 7 6 5 4 3 2 1 (Large worker)

Systematic Position.—This species falls into what we may designate as the *formosanus* group of oriental *Termites* species characterized by the distal position of the tooth of the left mandible. To this group would seem to belong, *Termites escherichi* and *T. serawakensis*, besides *T. formosanus* and the present species. Holmgren's separation in his key (1913) of *T. serawakensis* from the other two species on the basis of a difference of one in the number of antennal segments seems a doubtful one in view of the fact of the variability of the number of these segments as exemplified by the present species which has either 15 or 16 segments. From the *obesus* group, the only closely related oriental species of *Termites*, the species of the *formosanus* group are sufficiently differentiated among other points by the fact that the antennae are not noticeably darkened distally as is true of the *obesus* group.

From *T. formosanus*, with which it is co-regional, *T. hainanensis* differs distinctly in the considerably smaller size of all its castes known (the imago is unknown), in the greater curvature of the sides and posterior margin of the head in the soldier, in the somewhat more massive mandibles and the much straighter right mandible, in having 15 or 16 segments in the antennae instead of 16 or 17 as in *T. formosanus* as also in numerous other details.

From both *T. escherichi* and *T. sarawakensis* it differs in having two worker castes. The workers of these two species are said to be of a single caste and have a size intermediate between the two castes of *T. hainanensis*. This size difference I have been able to verify for *T. sara-*

wakensis on autotype material included in a large collection of oriental termite species kindly given me by Dr. Holmgren. The collection unfortunately contains no soldiers of *T. sarawakensis* but a comparison with the original description and figure bring out several differences. The rudimentary tooth of the right mandible is considerably proximal to the tooth of the left mandible in *T. hainanensis* and the head is much more parallel-sided, and less contracted anteriorly in *T. sarawakensis* than in *T. hainanensis* and the right mandible is more bent.

The great geographical gap would make it almost certain that *T. escherichi* (of Ceylon) and *T. hainanensis* are separate species did we not have the single worker caste of *T. escherichi*, intermediate in size between the large and smaller workers of *T. hainanensis* to separate them. Further a comparison of the soldiers of *T. hainanensis* with the description of *T. escherichi* shows the head of the latter to be but little contracted anteriorly, the mandibles, particularly the right, to be more curved and the pronotum broader in proportion with its anterior margin less strongly emarginate.

Distribution and Biology.—This species was taken only at Kachek in the southeastern part of Hainan but more complete collections will no doubt show it to be widespread in Hainan if not on the Kwangtung mainland.

The species of the genus *Termites* are fungus-growers and in some cases mound-builders. Excavations of the nests of this species will no doubt produce the "fungus-gardens" on which is raised the fungus used as food for the young. That they build mounds seems very improbable.

This species, like *T. formosanus*, will destroy wood lying on the ground but apparently seldom if ever attacks buildings.

(To be continued).

SEXUAL DIMORPHISM AND LEAF VARIATION IN GINKGO BILOBA, L.

BY
W. M. PORTERFIELD.

Some time ago there appeared in *Torreya*, one of the Torrey Botanical Club publications, an article on Sexual Dimorphism and variation in *Ginkgo biloba*, L.* Mr. Grier in this paper has attempted to show by a statistical investigation of the lobing characteristic of the leaves that maleness and femaleness in the *Ginkgo* manifests itself in the vegetative part of the body by the relative proportion of lobed to unlobed leaves. Out of 535 leaves taken from a staminate tree 60% showed true lobing, while out of 645 leaves from a pistillate tree only 13% showed lobing. It has been mentioned also that only staminate trees retain their conical shape, while the limbs of pistillate trees exhibit a tendency to shoot upward as in figure 21.B. (page 259).

With respect to the apparent results which Mr. Grier obtained, we can only say that they were interesting but in no sense convincing. The paper served to bring up the question, but the report of the investigation showed that the problem had been only lightly touched upon, as 535 leaves from one tree and 645 from another do not provide enough material from which the statistical investigator may draw conclusions. Moreover, more than one tree of each sex ought to have been investigated. The question of sexual dimorphism in the direction of branching is only as yet a suspicion. The writer in this paper has reinvestigated these questions and will endeavor to set forth the facts that he has accumulated with no definite intention of establishing absolutely the fact of sexual dimorphism one way or the other.

The Problem.

In the first place there must be at hand several trees, the sexes of which have been definitely established by previous observations. On the grounds of St. John's University there are several mature trees whose sexes have long been known, the fruiting trees especially, since the Chinese collect the fruits for the seeds which they roast and eat. Three trees of each sex in different parts of the grounds were selected for observation. The task now was to study them closely with respect to the two characters mentioned above, lobing of the leaves and direction of limbs. In order to establish sexual dimorphism in these characters, all other causes but the inherent one of sex must be eliminated. If our results can be shown not to be referable to environment, physiological "need," or age, our hypothesis may stand as a fact.

* Grier: Sexual Dimorphism and Variation in *Ginkgo biloba*, L. *Torreya*. Vol. 17, no. 12, p. 225. December, 1917.

The investigation of leaf-lobing must necessarily be a statistical one. Branch by branch several samples must be taken from each tree, the leaves counted, and the proportion of lobed ones found for trees of each sex. It is important that these results be kept separate for each tree, because any curious or odd inconsistency in the figures will have to be explained before they can be lumped together as being representative of that tree or that sex. But what constitutes true lobing? When this has been established, the rest of the operations are only mechanical until the time comes for comparing results and looking for causal explanations.

With regard to branching more than three trees of each sex are necessary for observation and comparison. This paper gives the descriptive facts for the six trees under observation only, and physiological causes may be assigned to account for their differences in this respect.

Leaf Variation.

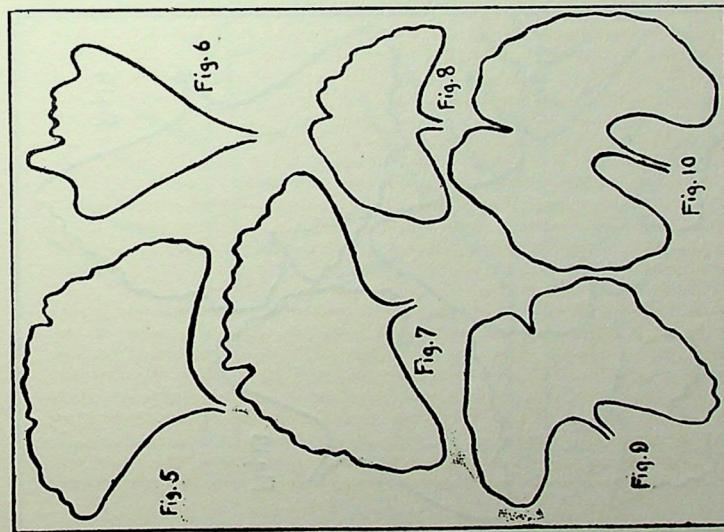
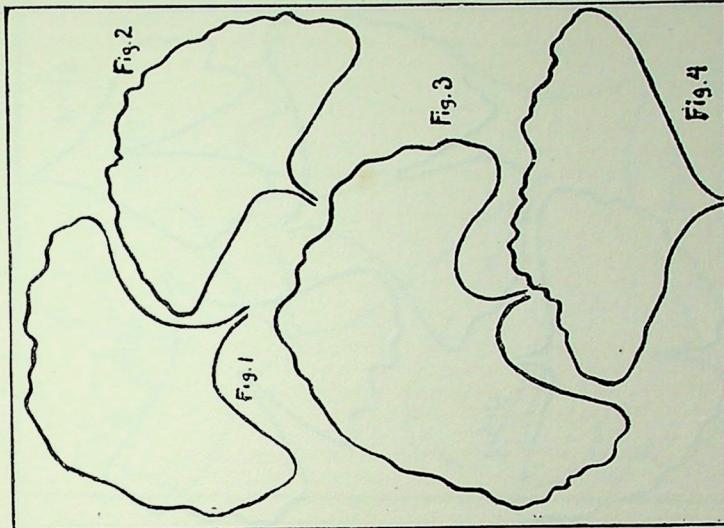
Work was begun in July before the typhoons commenced to divest the trees of their leaves. The trees were first divided into two groups according to sex; then in each group the individual trees were designated by letters and the separate branches numbered 1,2,3, etc. in the order of handling (Table I).

The chief point was to determine first what constituted lobing. As it was not thought necessary to go into a detailed investigation of this problem and as the only need was of a common basis for comparison, an arbitrary standard was made. Any leaf with a cleft of 5 mm. or deeper was considered lobed. Notwithstanding, an accurate record was kept of obviously entire leaves, those with a 3 mm. cleft, those cleft 5 mm., and those cleft 7 mm. or more. By comparing the figured leaf outlines which are natural size it will be seen that there is a great deal of variation in the margin of the leaf as well as in the lobing. The distal margin varies from entire (fig. 1) and undulate (fig. 3) through sinuate (fig. 6) and scalloped (fig. 12) to those which have a slightly deeper sinus near the center of the margin (fig. 9). Are the latter lobed or is the sinus only a part of a variable margin? Only a careful study of the leaf anatomy and the orientation of the fibro-vascular bundles will reveal this. Because of the intergradation between the variable margin and the 3 mm. lobe, and the difficulty in distinguishing the exact point at which true lobing begins, it was decided that there would be less doubt if 5 mm. were made the standard minimum cleft. The total record of the assortment may be found in Table I.

From the pistillate trees altogether ten branches were taken aggregating 2469 leaves, and from the staminate trees eleven branches aggregating 2921 leaves. Of the former 649 or 26.2% showed lobing; of the latter 762 or 26.0%. Not a great difference between the two, in fact almost negligible. These percentages do not agree with Mr. Grier's. No discrimination was shown in the selection of branches and we think that a sufficient quantity of leaves was examined to warrant our drawing fairly accurate conclusions.

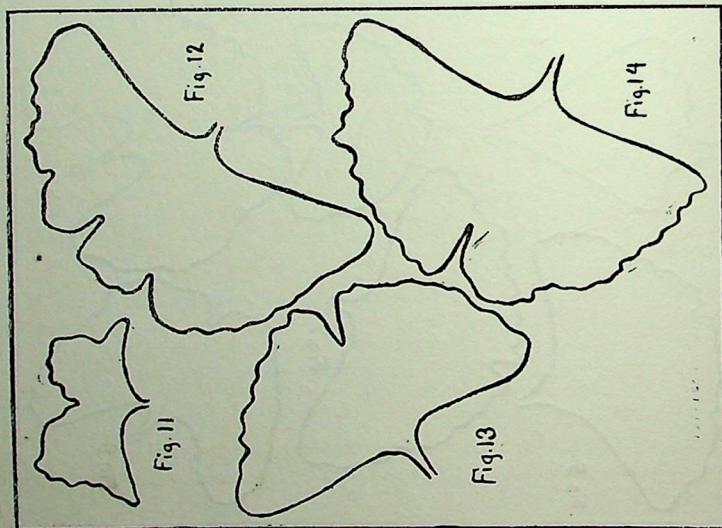
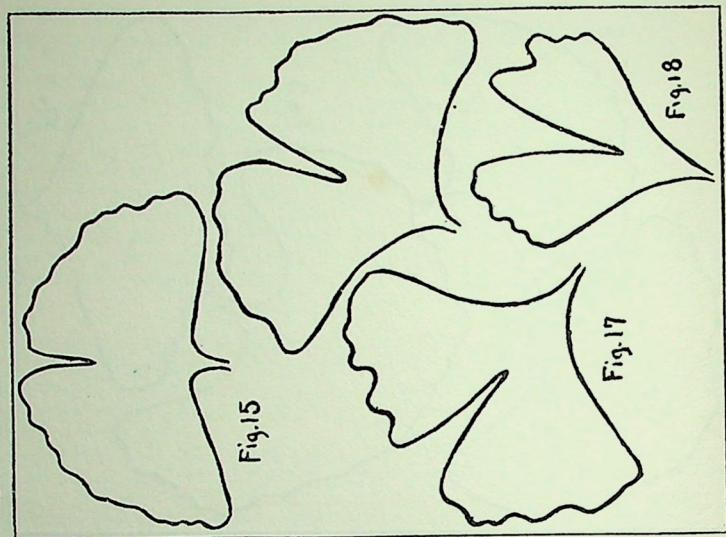
Regarding the manifestation of sex in the direction of the limbs and general shape of the crown, it is not thought likely that there is any re-

Leaf Variation in *Ginkgo biloba*, L.



The twenty figures here given illustrate the intergradations between the entire leaf to the two- and even four-lobed leaf. The figures are about half natural size.

Leaf Variation in *Ginkgo biloba*, L.



Leaf Variation in *Ginkgo biloba*, L.

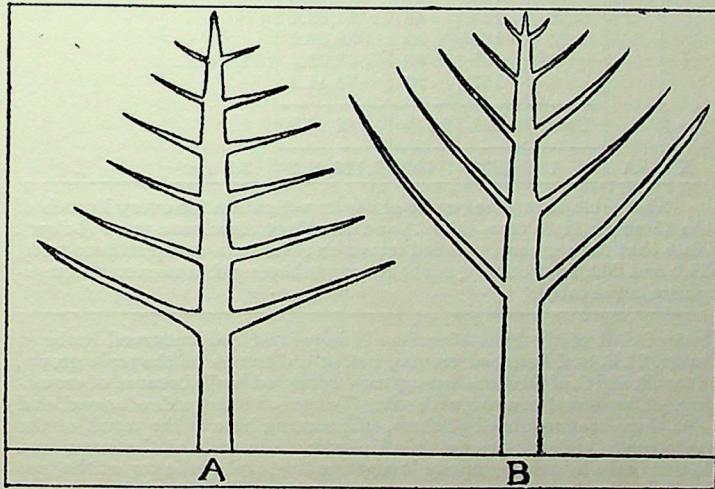
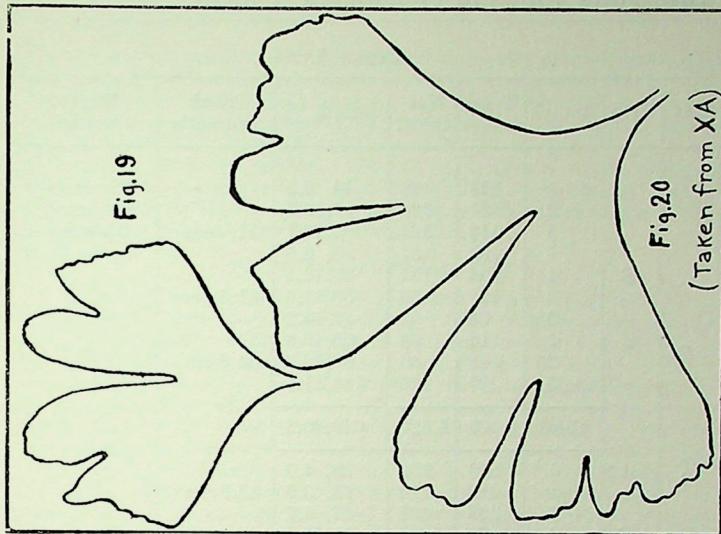


Fig. 21.

The two types of branching in *Ginkgo biloba*, L., suspected of being an indication of sex difference.

THE CHINA JOURNAL OF SCIENCE & ARTS

TABLE I.

Sex	Tree	Branch	Total leaves	Not lobed	Lobed, %	Trunk Diameter	Direct. Limbs
♀	A	1	473	429	44, 9.3	41 cm	(Crown, flattened) Upward as in fig. 21.B.
		2	521	424	97,18.6		
		3	416	324	92,22.1		
		4	163	157	6, 3.6		
	B	1	204	109	95,46.5	41.5 cm	,,
		2	111	76	35,31.5		
		3	95	52	43,45.2		
	C	1	118	63	55,46.6	44.6 cm	,,
		2	148	80	68,45.9		
		3	220	106	114,51.8		
		Total	2,469	1,820	649,26.2		
♂	A	1	815	782	33, 4.0	45.9 cm	,,
		2	458	440	18, 3.9		
		3	466	439	27, 5.7		
		1	78	33	45,57.6	32 cm	(Crown, Conical) Outward as in fig. 21.A.
		2	70	28	42,60.0		
		3	257	82	175,68.0		
		4	198	32	166,83.8		
	C	1	129	78	51,39.4	43.5 cm	,,
		2	174	86	88,50.5		
		3	109	66	43,39.4		
		4	167	93	74,44.3		
		Total	2,921	2,159	762,26.0		
X	A	1	1,233	109	1,124,91.2	3.8 cm	,,

This table shows the results of the investigation for every branch of the three pistillate trees (above) and the three staminate trees (below). Note that the per cent. of lobed leaves on staminate and pistillate trees, 26.0 and 26.2 respectively, is about equal showing that no sexual dimorphism is indicated.

lation. All of the female trees as it happened had upturned limbs as in fig. 21.B. and flattened crowns, but so did tree A of the male group. Trees B. and C. of the female group have upturned limbs because of crowding. They stand in a row with other Ginkgos on either side of a road, and also there are trees back of them. Upturning here is the result of the heliotropic tendency present in all plants. The ends of the lower and longer limbs by turning up are brought to the level of the top of the tree and give the flattened appearance to the crown. Tree A. of this group is

SEXUAL DIMORPHISM AND LEAF VARIATION, ETC.

the only one that might be suspected, because there is not the same degree of crowding. Since the grounds are quite old, it is possible that some of the Cryptomerias which had been cut off this spot crowded the Ginkgo when it was young. There is further evidence for this in the fact that all the lower limbs have long ago disappeared, the lowest now being perhaps eight meters from the ground. The two male trees B. and C. preserve a fairly conical crown (fig. 21.A.), for there is little crowding and they are younger than the others. As yet the evidence to establish sexual dimorphism in the Ginkgo is insufficient, if not negative.

Age in Relation to Leaf Lobing.

Having possibly eliminated sex as a causal factor in leaf variation of the Ginkgo, it now becomes necessary to review possible causes derived from environment. All plants exhibit heliotropism, that is, tendency to bring their floral organs into the most favourable relations with the light. On the one hand, there is the danger of excessive transpiration from too great illumination; on the other, there is the danger of not having enough light. Parts of the same tree may come under both categories. But the plant is able in various ways to cope with the situation by adaptation. The leaves on the outermost parts of the tree are the ones most exposed, while those lower down on the lowest limbs are very much shaded. By lobing the exposed surface of the leaf is reduced and therefore there is less transpiration. Furthermore the clefts in the upper leaves allow the sun light to pass below to the leaves less favourably situated. If lobation is directly or indirectly effected by the sun light, we should expect all leaves on the ends of the upper exposed branches to be lobed and all the lower ones because of diffuse light to be entire. In the Ginkgo this did not appear to be the case. Lobed leaves were found to be as frequent in the lower and less lighted parts of the tree as they were in the upper and more exposed parts.

Lobing is not the result of excessive illumination only nor of any other one cause, but is the result of a combination of factors working together. Excessive light and wind accelerate transpiration which in turn inhibits the normal performance of leaf functions. The vitality of the leaf is lowered by reason of the decreased water content and food supply. In young leaves this is a matter of importance. It has been suggested that the lobed leaf represents a sort of skeleton, which under favourable vegetative conditions may become filled out into an entire leaf. This view perhaps is supported by the fact that various leaves (as in *Ricinus*) are *more divided in youth than at maturity*, the regions between the principal veins developing last*. The chief veins of the Ginkgo leaf pass along the proximal margin, the two sides of the "fan," and run along together down the petiole. Into these main divisions descend the smaller (more or less parallel veins of the leaf-blade. The center of the leaf is, therefore, the farthest from the chief veins and possibly the last region to be developed. Hence it is the most likely place for the cleft

* Coulter, Barnes & Cowles: Text Book of Botany, Vol. II, Ecology, p. 605.
American Book Co., 1911.

to be found. If then these lobed leaves while young were exposed to higher transpiration or to decreased food supply, they probably would remain according to the above suggestion in the more lobate condition.

If defective nutrition is the main cause of the production of lobate leaves, and if exposure and transpiration are determining factors in this, it would seem that, in the case of *Ginkgo biloba*, L., environmental conditions also had but little effect, inasmuch as leaves taken from protected and shaded regions of the tree were as likely to be lobed as those taken from more exposed regions. We must look elsewhere for causes. There is further evidence against the nutrition idea which it might be well to state before passing on. If one is consistent, one would have to assume according to this theory that in dioecious trees there would be some sexual dimorphism manifest based on differences in nutrition and food storage. In the Mulberries (*Morus*) early in the year the leaves of the staminate tree may be larger or more entire than are those of the pistillate tree, because in the latter the food otherwise available for leaf construction is utilized [see next page] in fruit development. Mr. Grier found the percentage of lobed leaves greater in the case of the male Ginkgo—just the opposite of the Mulberry; while the writer found no appreciable difference between the sexes.

Individually, with the exception of those on spring shoots, all leaves of the Ginkgo are of the same age, and during ontogenesis no changes of shape to the extent of lobing have been observed. They push forth simultaneously in whorl-like clusters every spring at the ends of special lateral foliage branches which grow in length from year to year by the width only of a leaf scar. The number of leaves in these clusters depends on the age of that part of the branch. On spring shoots there are no lateral leaf branches, only single leaves, but on the second and third year sections of the limb the lateral foliar branches have started and from two to four leaves appear in a cluster. It is not a universal rule that the ends of every branch every year produce spring shoots, but it is possible for any lateral foliar branch in any year to become the progenitor of a shoot. Thus it happens that one finds spring shoots developing from the sides of relatively old branches, and, what is more significant, one finds on them a high percentage of lobed leaves.

The statement that "various leaves are more divided in youth than at maturity," though shown to be not applicable to Ginkgo leaves the way it stands, might be extended to mean that leaves from more youthful parts of a branch are more divided than those from more mature sections. In this enlarged aspect of the statement there is more ground for dealing with the problem of lobation in Ginkgo leaves. As the operations described in the first part of this paper were proceeding it became more and more evident that lobate leaves were exceedingly common on the younger branches, especially on the spring shoots. The idea was tested out. A special collection of ten spring shoots from one tree of each sex was made and the observations were incorporated for comparison in tables II and III with those already recorded in table I. The same symbols and numbers were used to designate sex, tree, and branches. A glance at table II will immediately reveal the fact upon comparison of the records for lobed

SEXUAL DIMORPHISM AND LEAF VARIATION, ETC.

leaves on older branches with those for lobed leaves on spring shoots that the proportion of the latter is six times greater than that of the former. On ♀A were recorded 1573 leaves of which 239, or 15.1%, were lobed, a little more than half that for the whole pistillate group. The ten spring shoots from the same tree aggregated 205 leaves of which 172, or 83.9%, were lobed. It is significant that in every case the few entire leaves were without exception found at the base or oldest part of the shoot. The same general facts are brought out in observations of ♂C (table III). Although the spring shoots average much smaller because the tree had been girt about with a telephone-pole guy cable and was therefore less vigorous perhaps the same general facts are displayed. The percentage of lobed leaves is 44.2 in a collection of 579 leaves, while of the 119 leaves collected from the spring shoots 82, or 68.8% are lobed.

Small differences in the diameters of the tree trunks as recorded in table I are not necessarily indications of corresponding differences in age. Though slightly smaller in trunk diameter ♀A is an older tree than ♂C and has a lower percentage of lobate leaves, a fact which is entirely consistent with the age hypothesis. Not only are the leaves of younger parts of a branch, limb, or tree more divided than those of older parts, but those of younger *trees* are more divided than those of older ones. In table I look at the figures for ♂B. This is the youngest mature tree.

TABLE II.

Sex	Tree	Branch	Length	Total leaves	Not lobed	Lobed, %	Branchlets	
							Large	Small
♀	A	(older)	1	145 cm	473	429	44, 9.3	4
			2	132 "	521	424	97, 18.6	2
			3	117 "	416	324	92, 22.1	1
			4	48 "	163	157	6, 3.6	1
		(Spring shoots)	Total	1,573	1,334	239, 15.1	8	14
			1	53 cm	24	6	18	
			2	21	15	4	11	
			3	40	22	4	18	
			4	42	21	4	17	
			5	34	19	3	16	
			6	40	16	1	15	
			7	26	16	2	14	
			8	50	24	1	23	
			9	42	25	8	17	
			10	58	23	0	23	
			Total	205	33	172 83.9		

TABLE III.

Sex	Tree	Branch	Length	Total leaves	Not lobed	Lobed, %	Branchlets	
							Large	Small
♂	C	(older)	154 cm	129	78	51,39.4	0	0
			146 "	174	86	88,50.5	2	0
			144 "	109	66	43,39.4	0	0
			142 "	167	93	74,44.3	0	1
		(Spring shoots)	Total	579	323	265,44.2	2	1
			22 cm	11	4	7		
			22	10	2	8		
			19	12	5	7		
			20	13	5	8		
			23	11	2	9		
			21	10	3	7		
			20.5	14	5	9		
			21	12	4	8		
			21.5	12	2	10		
			20.5	14	5	9		
				Total	119	37	82,68.8	

Tables II and III are extractions from table I, one pistillate and one staminate tree, to which are added the figures for spring shoots for purposes of comparison. Notice the difference in lobation of branch leaves and spring-shoot leaves. Compare with XA of table I.

Out of a total of 603 leaves examined, 428 of them are lobed. 70.9% is a little larger than the 68.8% for spring shoots on ♂ C. Still more convincing is the record at the bottom of table I. This is of a young Ginkgo six years old, all the leaves of which were examined. The sex is unknown, a fact which now is unimportant. This little tree stands 2.54 meters high, has a trunk diameter of 38 mm, has 10 branches of which 5 are compound, and altogether 1233 leaves. Of these only 109 are *not* lobed. 91.2% are lobed. This to the writer's mind is the most convincing evidence that lobing of the leaf in *Ginkgo biloba*, L. is associated in some way with the age of the leaf source, whether branch or ultimate protoplasm.

Summary of Observations and Conclusions.

- 1.—An effort was first made to check previous observations on differences in number of lobed leaves as an indication of sexual dimorphism in *Ginkgo biloba*, L.

SEXUAL DIMORPHISM AND LEAF VARIATION, ETC.

- 2.—A statistical investigation of three staminate and three pistillate trees gave negative results. The proportion of lobed to unlobed leaves was found to be almost exactly the same for both sexes. (see table I).
- 3.—An inquiry into the causes of lobing, if sex was *not* to be considered a factor, showed that though nutrition is a probable cause of leaf lobing, in the Ginkgo this was considered to be a very distant and indirect cause if one at all.
- 4.—The writer sought to establish evidence of the fact that age is a potent influence in determining the amount of lobing; that young parts of the tree and young trees exhibit lobation of the leaves to a far greater degree than do older parts and older trees. (Tables II and III).

BIOLOGICAL NOTES AND REVIEWS

WORLD'S AUTHORITY ON FLEAS: Few people in China, and, indeed, outside scientific circles in any country, who know the name of Rothschild, would connect it with anything so mundane as the flea. Yet, by the death of Mr. Nathaniel Charles Rothschild, youngest son of the first Lord Rothschild, on October 12, 1923, the world lost its greatest authority on the *Siphonaptera*, the order to which fleas belong.

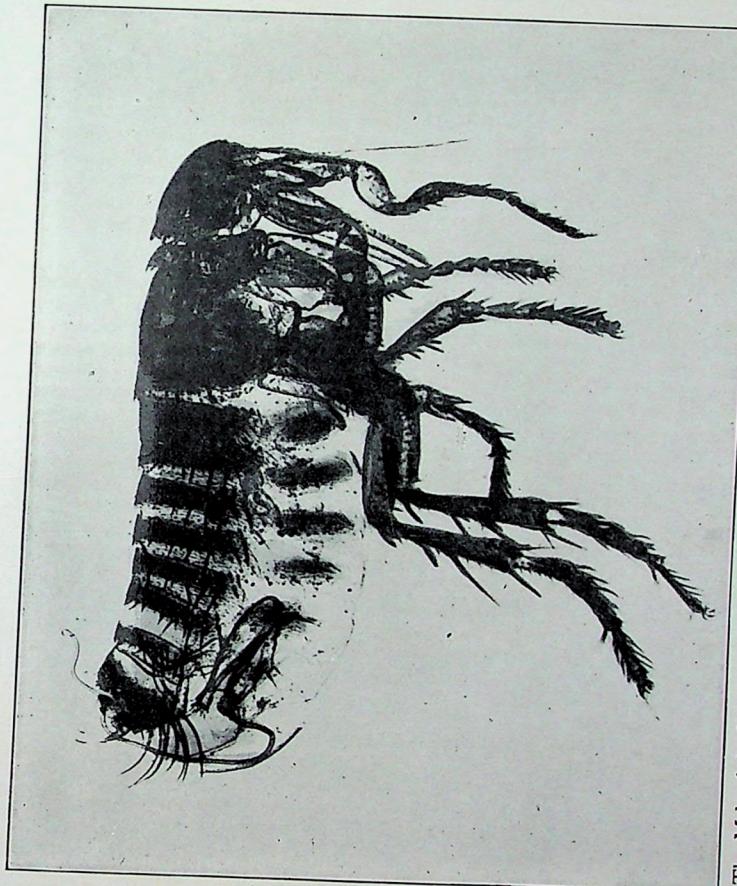
The discovery that the rat flea is the transmitter of the bubonic plague from rat to man placed the fleas as a group in a new and very important light. The subject caught the interest of the young business man (Rothschild was a partner in the firm of Messrs. N. M. Rothschild), who published his first paper describing two new species of British flea at the age of twenty in the year 1897.

From that time on he has published an enormous number of papers, either by himself or collaborating with Dr. K. Jordan, upon fleas from all over the world, describing a great many new species, and, at the same time building up an extraordinarily fine collection of fleas and other ectoparasites. This he presented to the British Museum (Natural History) in 1913, on the condition that it should remain in his possession till his death.

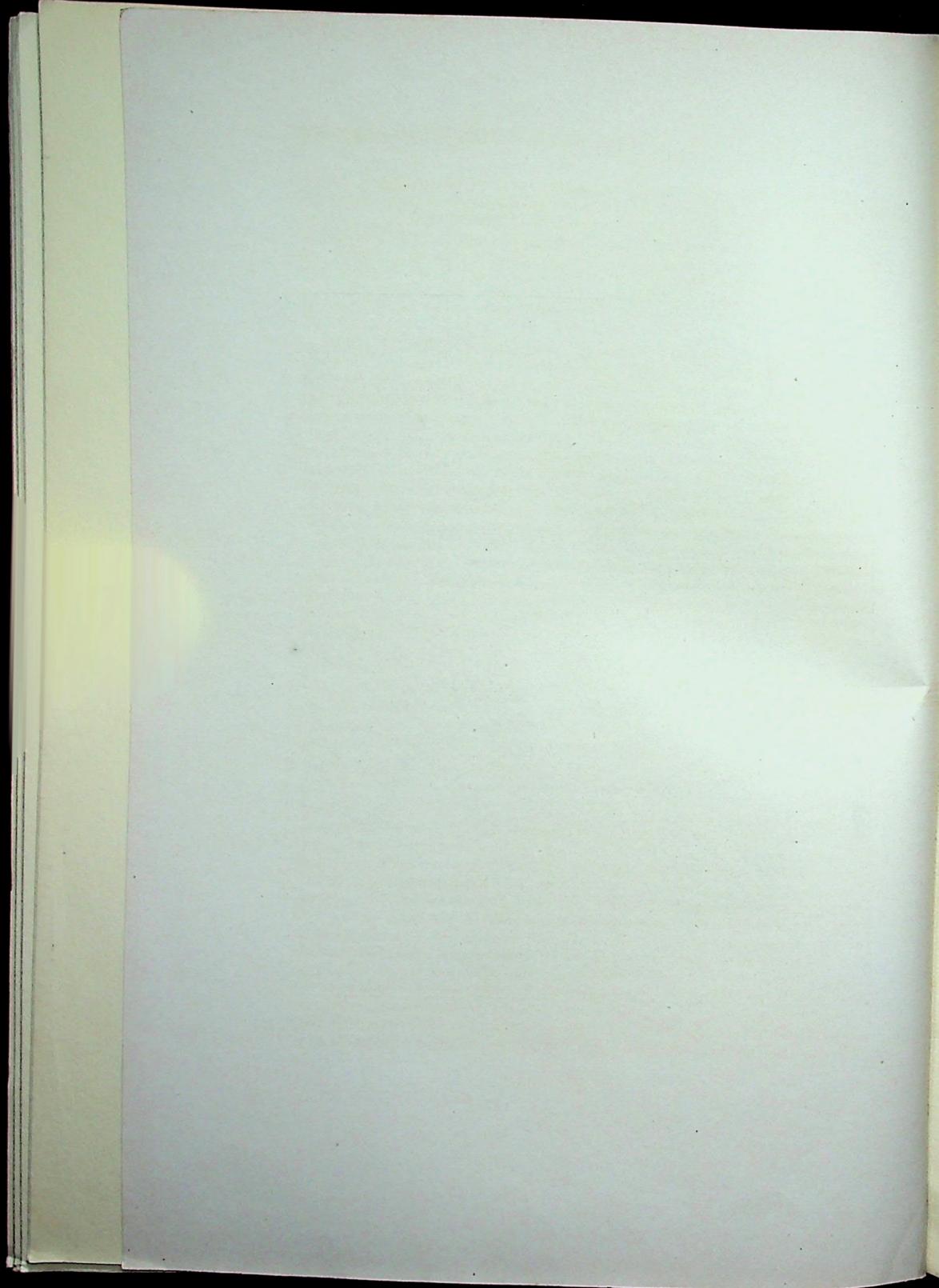
He also provided a fund consisting of £10,000, the interest on which is for the maintenance of the collection in the Natural History Museum at South Kensington, where it is to be housed as soon as the catalogue of the specimens it contains has been completed by Dr. Jordan, who probably succeeds Mr. Rothschild as the world's greatest authority on fleas. The catalogue is to have illustrated descriptions of every species contained in the collection, and when published should prove a most valuable work.

The Rothschild collection contains some 43,550 specimens, some mounted on slides, others preserved in alcohol. These represent some 600 or so species from all over the world.

Some years ago, while on the Clark Expedition into West China, the writer captured some small black fleas that were infesting a roedeer that he shot. At the same time some peculiar maggot-like creatures were taken from the nostrils of the deer. These and the fleas were placed in small bottles of preservative and handed over to Captain (now Colonel) H. E. M. Douglas, R.A.M.C., V.C., D.S.O., C.M.G., etc., who was acting as physician to the expedition and undertook to make an entomological collection. Later when the expedition was over the collection made by Col. Douglas was handed over to the British Museum, where various experts reported upon the different groups of insects represented. The fleas were passed over to Mr. Rothschild who prepared a paper upon them describing three new species. This was embodied in "Through Shén Kan," the book that was published upon the expedition.



The Male of the Jigger Flea (*Vermipsylla dorcadia*, Rothschild) found on Roedeer on the Clark^z Expedition in Shensi.



BIOLOGICAL NOTES AND REVIEWS

The most interesting species turned out to be the little black flea from the roedeer, for it was found that the maggot-like creatures taken from the nostrils of the deer were enormously distended females of the same species; which turned out to be a species of jigger-flea and was named *Vermipsylla dorcadia*. The accompanying illustration is from a photograph of one of the male specimens mounted on a slide, and now, presumably in the Rothschild collection.

DINOSAURS' EGGS: Some of the specimens of dinosaurs' eggs discovered by the Third Asiatic Expedition of the American Museum of Natural History last summer in Mongolia are being offered for sale at £400 apiece, the proceeds to go toward supporting further explorations to be undertaken in 1925. These eggs have been much commented upon, and we have been asked frequently how such fragile things as eggs can have been preserved and in what condition they are now in. The uninitiated reader must understand that when geologists speak of finding specimens of this or that animal, or plant, they are referring to the fossil remains, and do not as a rule mean the actual remains of the creature or plant that in most cases lived millions of years ago. In the formation of a fossil of any animal or plant the original gets buried or entombed in some way in sand, mud, or clay, frequently under water. The harder tissues are preserved long enough to form a mold, sometimes only an imprint, which subsequently becomes filled with some mineral substance, silica, lime or it may be the same clay or sand which entombed the original, and it is either this cast, so to speak, or the mold itself which constitutes the fossil. Thus in the case of the Mongolian dinosaur's eggs, it is not the original eggs that have been found but a "natural cast" of the originals in some stony substance, from which, however, the original form and texture may be accurately gauged.

BUTTERFLY LORE: by H. Eltringham, Oxford University Press, 1923.

This delightful little book, as its name suggests, deals with the lore of butterflies and moths. It reveals all the life histories from the eggs to the perfect insects of a number of members of the great order *Lepidoptera*, and when the reader puts it down he finds that he has learned a great deal that is not only new to him, but that is well worth knowing. Caterpillars, their anatomy, their hairs and stings, their food and habits, their remarkable forms make a fascinating chapter, followed by another on chrysalids and cocoons. The structure and senses of adult butterflies and moths is next dealt with, followed by a chapter on the remarkable relationship that exists between certain butterflies and ants; a subject upon which entomologists have been working of late. It may not be known to some of our readers that the caterpillars of certain species of butterflies, notably the so-called "Blue" butterflies, are taken by ants and nurtured in their nests underground for the sake of a sweet honey-

THE CHINA JOURNAL OF SCIENCE & ARTS

like fluid that is exuded from glands in their backs. The caterpillars in turn feed upon the larvae of the ants, and so survive in warmth and comfort till the following spring. This is a truly remarkable state of affairs, and would almost seem against nature: surely the ants are paying a long price for the pleasure of a few drops of honey!

The last chapter deals with concealment, mimicry, and polymorphism, subjects which may be studied instructively in the *Lepidoptera*. The book is illustrated with one coloured plate of British butterflies and cuts in the text.

NEW FORMS OF ANIMALS RECENTLY DESCRIBED FROM CHINA AND THE NEIGHBOURING REGIONS

MAMMALS.

In a paper by Glover M. Allen in the *American Museum Novitates*, No. 85, August 29, 1923, the following new forms of bat are described from the collections made by Mr. Roy C. Andrews in China.

1. *Rhinolophus blythii calidus*, Op. cit. pp. 1 & 2.
Type from Yenping, Fukien Province, China.
2. *Rhinolophus episcopus*, Op. cit. pp. 2 & 3.
Type from Wanhsien, Szechuan Province, China.
3. *Rhinolophus episcopus caldwelli*, Op. cit. p. 3.
Type from Yuki, Fukien Province, China.
4. *Rhinolophus rex*, Op. cit. pp. 3 & 4.
Type from Wanhsien, Szechuan Province, China.
5. *Myotis chinensis luctuosus*, Op. cit. p. 5.
Type from Wanhsien, Szechuan Province, China.
6. *Myotis frater*, Op. cit. p. 6.
Type from Yenping, Fukien Province, China.
7. *Nyctalus velutinus*, Op. cit. p. 7.
Type from Futsing, Fukien Province, China.
8. *Miniopterus schreibersi paripes*, Op. cit. pp. 7 & 8.
Type from Yenping, Fukien Province, China.
9. *Capricornis osborni*, Andrews, Am. Mus. Novitates, No. 6.
March 24, 1923.
Type from Huiyao, 20 miles from Teng-yueh, Yunnan.

BIRDS.

Pycnonotus hoyi, Riley, Proc. Biol. Soc. of Wash., Vol. 36. pp. 193 & 4, 1923.
Type from Yochow, Hunan Province, China, collected by and named after the late Charles M. Hoy.

BIOLOGICAL NOTES AND REVIEWS

REPTILES.

In *The Journal of the Natural History Society of Siam*, Vol. VI, No. 2, October 31, 1923, the following new reptiles are described by Mr. Malcolm A. Smith, F.Z.S., in a paper entitled "On a Collection of Reptiles and Batrachians from the Island of Hainan."

1. *Gekko similignum*, Op. cit. pp. 198-9.
Type from Ang-mao, alt. 600 m. near the Five Finger Mountain, Hainan.
2. *Achalinus meridianus*, Op. Cit., pp. 200-1.
Type from Nam-kao, alt. 300 m., Hainan.
3. *Amblycephalus carinatus hainanus*, Op. cit., p. 204.
Type from the Five Finger Mountain, alt. 1,300 m., Hainan.

AMPHIBIANS.

In the same paper the following new amphibians are described :—

1. *Rana (Hylarana) spinulosa*, Op. cit. pp. 207-8.
Type from Tun-fao, Ka-chek River, alt. 200 m., Hainan.
2. *Micrixalus torrentis*, Op. cit., pp. 209-11.
Type from the Five Finger Mountain Alt. 1,000 m., Hainan

FISHES.

1. *Lefua andrewsi*, Fowler, American Museum Novitates.
No. 38, May 25, 1922.
Type from Shin Lung Shan, Eastern Tombs, Chihli, China.
2. *Chela nicholsi*, Fowler, American Museum Novitates.
No. 83, July 25, 1923.
Type from Ningkuo, Anhwei, China.

INVERTEBRATES.

INSECTA : Hymenoptera : Formicidae.

In a paper by William Morton Wheeler in the *American Museum Novitates*, No. 69, April 20, 1923, on ants collected by Professors S. F. Light and A. P. Jacot, a number of new forms are described, namely:

1. *Solenopsis jacoti*, Op. cit. p. 2.
From Tsingtao, Shantung, China.
2. *Solenopsis jacoti pekingensis*, Op. cit. pp. 2 & 3.
From Ch'ao Yang An, Western Hills, Peking.
3. *Tetramorium cuspitum simileve*, var. *jacoti*, Op. cit. p. 3.
From Tartar City, Peking, China.

4. *Formic rufibarbis orientalis*, Op. cit. p. 4.
From sand flats west of Nu Ku Kow, Kiachou Bay, Tsingtao,
Shantung, China.

5. *Formica (Proformica) jacoti*, Op. cit. 4 & 5.
From Ch'ao Yang An, Western Hills, Peking, China.

GIANT PANDA AND WILD DOGS ON THE TIBETAN BORDER: We have received the following interesting letter from Mr. J. Huston Edgar, who is stationed at Tatsienlu in Szechuan:—

"I am very much interested in the Giant Panda. Many years ago—1903—I was in a region on the Ta Kin (Upper Tung R.) just opposite the most extreme point of the Mou Ping Principality. It was one of the most sequestered regions in the marches and a likely place for survivals. The natives there spoke of an animal which they classed with bears, naming several kinds of these creatures apart from the above exceptional specimen, which otherwise might have been a grizzly.

"Then, again, in 1916, when about half way between Batang and Derge, and in wild country not far from the Kin Sha, I saw an animal asleep in the forks of a high oak tree which has puzzled me ever since. It was very large, seemed quite white, and was curled up in a great ball very much after the manner of cats. It was unknown, and a source of wonder, to my Tibetans. As I was unarmed I did not approach nearer than one hundred yards, and a fierce thunderstorm finally sent us hurrying on to a farmhouse near the limit of settled population. The country around was wild, and the forests very dense. Were the animals in each case Pandas? Judging by Mee's print in the Children's Encyclopedia, Vol. 2, p. 789, a Panda could curl up so as to give the impression obtained by me.

"Another point please. In good Chinese dictionaries, we have mention made of a Tibetan Lion under the character 'Swan' 獅. Is this animal mythical, or is it the Giant Panda? The Tibetan word for 'lion' is 'Seng ga' and no doubt is from the Sanscrit. Both 'Swan' and 'Sze tze' also may be further corruptions.

"Again in Mee's Children's Encyclopedia, Vol. I, p. 541, there is a picture of a 'Scarce wild Dog of Tibet.' Can you or any of your readers give me any information about such a dog? I saw one for the first time about two months ago, and although it corresponded exactly with Mee's print, the animal was doing sentry duty with a Kanze caravan.

"But about 20 years ago, Litang (14,000 feet above sea level) had hundreds of wild dogs infesting the environs. They were, no doubt, attracted by the abundant refuse of enormous abattoirs in the vicinity. But they seemed to be mongrel types from domesticated dogs, and in no case do I remember any one of them being particularly like the Kanze specimen. But at that time the Lames were using these uncanny brutes as a lever to hasten my departure from the town. In 1907 no dogs were to be seen in the day time, but at night packs would swoop down on the city and skurry along from house to house over the flat roofs of the Litang

BIOLOGICAL NOTES AND REVIEWS

hovels, giving the impression of a small tornado in a wanton mood. In 1911, when last in Litang, the wild dogs seemed to have disappeared."

The animals referred to might well have been specimens of the giant panda (*Ailuropus melanoleucus*), though a large bear, related to the brown bears and known to science under the name *Ursus lagomyiarius* Sewerzow, occurs in these parts. It is characterized, amongst other things, by having a whitish band across the shoulders, and has been mistaken for the panda by travellers and sportsmen in these parts.

The writer of these notes, while in the Tai-pei Shan district of South western Shensi, received reports of a creature that could have been nothing else but a panda.

The animal referred to in Chinese dictionaries is undoubtedly mythical.

The wild dog, *Cyon alpinus*, is known to occur on the Tibetan border. It is a truly wild animal, and must not be confused with domestic, and semi-domestic, or even feral, dogs, which, however, may closely resemble it in appearance.

MOSQUITO FISH IN SHANGHAI.—As we go to press, news comes in that the artificial pond in Wayside Park has been found by the officers of the Municipal Health Department to be full of the little fish that has been used so successfully in various parts of the world in combating the mosquito pest. Acting on the advice and in consultation with Mr. A. de C. Sowerby, this department is carrying out experiments with a view to stocking all stagnant bodies of water in and round Shanghai with these fish in the hopes of killing off the mosquitoes that breed so freely in these parts. Some specimens of the little fish had been secured from the U. S. Consulate pond, where Mr. E. S. Cunningham had successfully started a colony, and it was hoped to start a fish-farm, from which it would have been possible to stock other ponds. The discovery in the pond in Wayside Park not only means that the Health Department has a good reserve supply of fish to draw from, but also that the fish, though of tropical or sub-tropical origin, can breed here successfully.

SHOOTING AND FISHING NOTES.

SHOOTING IN THE TIENSIN DISTRICT.

Tientsin sportsmen appear to have had a more interesting time this spring, and incoming reports are reminiscent of the good old days we used to enjoy in that district.

Our Tientsin correspondent writes as follows :

"The spring season opened splendidly with an inrush of geese in far larger numbers than have been seen for about thirteen years. Bags have been rather on the small side owing to scarcity of cover. Ducks are also in large numbers, the quantity of Baikal teal and pintails being remarkable. Owing to the difficulty of approach and lack of cover, bags have not been large, the best so far recorded being 37 birds to one gun for the week end. A party of sportsmen from Dai Nippon were fortunate in bagging seven swan in the vicinity of Huai Lai on the Peking-Kalgan railway. They also secured a bag of thirty odd geese over three days shooting. The country in parts promises to yield good snipe grounds for the late spring and several men have their "Shikarris" or "Snipeys" scouring the country for likely spots.

"Mr. E. K. Lowry has returned from W. Shansi having had good sport with pig and deer; but, unfortunately for him, he had to leave his trophies in charge of his servant to bring back by slow train, as they were prevented from bringing them back by the mail. The tusks and bristles of the boar and the horns (in velvet) of the deer, were pilfered by soldiers travelling on the train.

"A party of U. S. Army men from the 15th Infantry hunting in the same district secured five deer, and one of the party had a shot at a leopard and wounded it, but failed to bag it after hours of tracking. Hard luck ! but when one persists in using 30/30s and such like pop-guns, it is quite understandable."

SHANGHAI DISTRICT.

The snipe season is in full swing, and one hears of good bags being made. The birds came in with a rush about the end of March, but were at first excessively wild. One ardent sportsman, however, bagged 17 couple during the last week end in the month. He reported that the birds were all large, very strong on the wing, and in fairly good condition.

This opens up an interesting phase of bird life. It has been found that migrating birds of a given species are apt to vary in size and weight according to the particular period of the migrating season at which they appear in a given locality. That is to say, early in the season at, let us say, Tientsin, the snipe of the common species may be larger than those appearing in the middle or at the end of the season. The reason for this is that there are what may be called clans, or tribes, within the species, and the birds that breed in one area migrate at a different period from that at which birds that breed in another migrate. The members of one of

SHOOTING AND FISHING NOTES

these clans vary slightly in size and, possibly, other characters from those of another.

SNIPE BAGS.

The following noteworthy bags of snipe have been made this spring : April 4th to 6th, in the Henli district, one gun secured 50 couple. All winter birds.

April 5th and the morning of the 6th, in the Soochow district, towards the Great Lake, two guns, $32\frac{1}{2}$ couple. All winter birds.

April 13th, in the Nanking district, in three hours, four guns bagged 105 couple. All winter birds.

April 13th. Near Minghong, one gun, 20 couple, mostly pintail.

In the Hongkew market on the same date the writer saw specimens of Swinhoe's snipe, or the greater spring snipe (*Gallinago megala* Sw.). These may be recognized by the outer tail feathers, which are narrower than in the common, or winter, snipe, but less narrow than in the pintail, or lesser spring snipe (*G. stenura*). There are twenty feathers in the tail ; twenty-six in that of the pintail ; and only fourteen in that of the winter snipe. The under surface of the wing of Swinhoe's snipe is very closely barred with dusky-grey markings ; less so in the pintail and much less so in the winter snipe.

Shooting over the Easter holidays was not very good. The weather was fine and warm, and, apparently, most of the winter birds had gone north, while the spring birds had not yet appeared in any considerable numbers.

FISHING.

The second week in April saw the finny inhabitants of the rivers and creeks in the Hangchow, Shanghai, Soochow and Nanking areas in their full spring activity. This appears to have followed the bright, warm weather that set in early in the month.

It was observed by up-country week-end parties that there were very few signs of activity amongst the fish as late as the last week in March, though an occasional rise to a fly might be noted, and one or two ardent anglers secured a few knife-fish after patiently whipping the water for an hour or so.

Notably was this the case in the pond belonging to the Shanghai Anglers' Club, or whatever the small, closed corporation of devotees to the sport here in Shanghai calls itself. So far, no news has come in that any of the Mandarin fish turned loose in this pond last year have been taken, but we must give the members of the club time to discover just what is the best way to catch these handsome fish.

By the end of the first week in April, fish of several kinds might be seen and taken, but they were still far from plentiful. It was not until the middle of the month that the fish were really active. A close observer of such matters at Henli informs us that many species of fish were found spawning in the creeks there on the 12th and 13th. He specially noted serpent-heads, bitterlings, breams and knife-fish.

Four serpent-heads of about a foot in length were found in a small, closed-in pond, in which, at the end of last summer, there were no fish of any kind. This reminds us of the experience of Mr. Lorden, whose article on the knife-fish appeared in our March number. Mr. Lorden had a large pond excavated in the grounds of his home in Shanghai, and stocked it with knife-fish, goldfish and a few catfish. He noticed that in the second year of the pond's existence, the fish were disappearing. By the middle of the summer all the fish had vanished. It was decided to drain the pond, a somewhat costly undertaking, but when it was done, four large serpent-heads, weighing 3 or 4 pounds each, were taken out.

The serpent-heads seen at Henli were spawning, and it is interesting to note that they showed much more vivid colouring than usual, while the posterior part of the dorsal fin in each case was suffused with red.

Knife-fish were very active, readily taking the fly. Culters also were plentiful.

Visits to the Hongkew fish market early in April also revealed the fact that many species of fresh-water fish were in a gravid state. Notably was this the case with bitterlings, the long ovipositors of the females being full of ripe eggs. The spawning habits of this little fish are particularly interesting, since they show a remarkable case of mutual co-operation between two totally different forms of animal life. The female bitterling hunts about until she finds a live mussel buried in the mud with only its siphons exposed. Inserting her ovipositor between the open valves of the shell, she lays her eggs in the gills of the mussel, where they remain until the young hatch out, a safe retreat being thus provided for both eggs and young until the latter are old enough to get out into the water and fend for themselves. Meanwhile, some of the minute young of the mussel, which have been lying in wait for just this opportunity, have fastened their hooks in the ovipositor of the fish. Here they set up a little irritation, which causes a sort of cyst to form round them, in which they are carried about and finally dropped in the mud well away from the parent. In this way, successful distribution is assured.

Some very good fly fishing for rainbow carp was enjoyed by one party at Hangchow over the Easter holidays. The fish were active and fought well. Besides rainbow carp, culters and knife fish were very plentiful. Several kinds of fly were used with success, amongst others being Wickham's Fancy, Housefly, Red Midge, Black Palmer and Cairn's Fancy.

WHAT IS SHAMANISM ?

BY

S. M. SHIROKOGOROFF.

(Read before the Quest Society, February 18, 1924)

I have been asked to discuss this evening one of the most complicated problems of ethnography, namely that of Shamanism. If you ask me if it is a religion, I am obliged to say that it is not a religion in the proper sense of the word, because it can exist parallel with other religions, such as Buddhism, Taoism and Christianity. If you ask me if it is a philosophy, I must answer, it is not a philosophy, because it has as its principal purpose, a purely practical intervention into psychic and nervous maladies. If you ask me if it is a medical method, I shall not be so categoric, yet it functions also as a religion and a philosophical system.

You can see from this that Shamanism is one of the more complicated manifestations of the human attempts to solve the problem of man's psychic life.

To the best of my ability I shall try to give some idea of Shamanism as it seems to me to exist and to be explainable.

Shamanism at its basis is a belief in spirits. In my study "General Theory of Shamanism among the Tungus," published in Russian (the translation of the conclusion of this study is published in the last volume of the Journal of N.C.B.R.A.S.), I have formulated this belief as follows: "The spirits are immaterial. They cannot be seen, but they can, by their presence, influence in various ways physical bodies, and can produce different sounds and noises. They possess all the psychic and mental capacities of man, including the sense of temperature, hunger, excitation, fear, irritation and thankfulness, so that all human qualities are characteristic of the spirits. The difference consists in the impossibility for man to conceive the spirits directly—by sight, touch, smell or taste. The spirit can enter and can be introduced by man into physical bodies and by certain physical and moral methods can be expelled, which facts open the possibility to man of entering into direct relations with the spirits. From this can also be understood the existence of idols, images and different symbols. According to a Tungus, these are 'seats for spirits just as chairs are seats for guests.' The spirit assumes physical bodies not physically but by assuming the spiritual substance of those bodies. Therefore the physical objects, as for example, meat, beautiful objects and so on, that they sacrifice are not taken by the spirits physically but left intact. Objects which can be smelled are best assumed by the spirits. From this it can also be deduced that, according to this theory, all things, besides their physical bodies, have also a kind of immaterial substance, which is similar to the immaterial substance of spirits. (Something like the soul of things). The division of the spirits into the categories of malevolent and benevolent spirits in the Tungus mind does

not exist. Every spirit can be malevolent or benevolent—all depends on the capacity of man, and a man can make the same spirit very useful and benevolent for himself and malevolent to other people. However, a man does not know all the spirits, so that he is always surrounded by a crowd of unknown spirits, whose malevolent actions can manifest themselves at any given moment."

It cannot be stated that this theory is a good one to assure psychic equilibrium. This theory tries to explain all facts whose understanding is beyond the positive knowledge of any given people. If the theory of spirits is adopted the understanding of all new, unknown phenomena such as spirits' activity is very easy. Therefore, all natural phenomena, such as thunder, rain, changing of seasons and so on, are explained by this theory. Moreover, all psychic and nervous maladies, as well as some physical maladies, are explained by the same theory. All phenomena of social life, as for example, the institution of marriage and different customs, are also explained as the result of spirits' influence and will. But do not think that the mind of the most civilized peoples is free from this primitive theory. Many phenomena of social, economic and psychic life are explained even to-day by the mystic influence of "ideas," "scientific rules, laws and principles, which, as well as the spirits' theory, are very often quite erroneous but satisfactory for us. From this standpoint there is no difference in the quality but only in the quantity of our knowledge, and our high religions, some sciences and philosophical systems are only different phases of the development of the animistic method of thinking or mode of thought, which considers the world to exist not in the human mind but objectively. It is quite natural that with the growing of our knowledge the number of facts explainable as spirits' activity becomes more and more limited. If a primitive mind is satisfied with an explanation of all natural phenomena as spirits' activity, the mind a little advanced in knowledge finds and recognizes some physical explanations of such phenomena as rain, thunder and magnetism, but it cannot yet overcome the difficulty of understanding social and psychic phenomena. It can be called to mind that in all strata of the social scale the search for some mystic explanation of social and psychic phenomena has continued even down to the present time, and here I maynote that there is some reason for doing so, because, if the people believe in the existence of spirits and mystic powers, they do exist—in our minds—while their objective existence neither in time nor in space can be proved. It is thus clear why the search for spirits is fashionable even to-day. This is a search for a mode of thought. There are, of course, many phenomena which cannot be explained by our positive science and there are some people who cannot put the limit of their wish to conceive the unconceivable for some given state of knowledge. This somewhat lengthy explanation is necessary in order to connect the so-called animistic theory with the present state of our knowledge and thought, and to introduce this audience to the shamanist theory.

If the spirits and things are not simple, the human soul is a yet more complicated phenomenon. According to the Tungus it is a complex of three souls.

WHAT IS SHAMANISM ?

First : the soul that is possessed by every living being—man and animal—and that leaves the body when the being dies. In other words it is *the life*. It is given by a spirit whose function is close to that of the God—Creator of Life. This soul preserves its place close to the dead for a long time. It has no great importance, but certain very significant manifestations during life.

Second : the soul that can leave the body for a short time and can move very easily to some distance. When the person is sleeping this soul is out and sometimes it can visit other places and enter into direct relations with other souls and spirits. It seems to be close to our idea of thought, but it includes also the idea of some psychic element.

Third : the soul that gives the capacity of creating posterity. It is also given by a spirit who is charged with the supervision of the re-creation of all human and animal species. After death it leaves the body immediately.

After death the first soul—life-soul—is gone forever, and is destroyed altogether. The second soul—thought-soul—is not destroyed and continues its existence among other spirits who densely populate the Earth, Heavens and Under-Earth space. This soul becomes a new spirit. The third soul—generic-soul—probably returns to its original place to be given to other beings who are to be born.

Now I shall try to show you how the Tungus with the aid of this theory explain different manifestations of life.

We have already seen that the phenomenon of sleep is explained as temporary absence of the thought-soul. It can also leave the body when the person is not sleeping. If it is so, the person falls ill, or falls into a state of unconsciousness or semi-unconsciousness, as, for example, that of shamans during performances, that of epileptics, hysterics and so on. A long absence of this soul can cause a malady, mostly psychic, which can be cured by an intervention of the shaman. There is a very good example by which can be seen the Tungus idea of soul and spirit.

Among the Tungus there is known a special type of being called *bon* (bong) and included in the class of spirits. It originates from the dead, it seems to me almost exclusively from the women dead at summer time. This spirit is covered with hair, has a low jaw and red blood, so that, as a distinction from ordinary spirits, it has a physical body. This spirit can beget children, but it does not speak, it does not approach living people and it hunts the badger with a stake in the forests. After a minute analysis of much information on this peculiar kind of spirit I came to the conclusion that in this case the spirit is a real woman, who was buried (the Tungus usually place their dead in very light coffins on trees) in a state of lethargy or in a state of profound unconsciousness. Then being awakened she gets up and goes in search of some food. The easiest animal to hunt is the badger which runs very slowly and can be killed very easily with a piece of wood. Therefore she hunts this animal. She cannot return home because she is already "dead" and she fears to approach the people, who, doubtless, would kill her as a very dangerous spirit. During my long journey among these people I had the opportunity of knowing a boy of about

fourteen who was born of such a spirit. There was a twin. His brother, as well as his mother, was found dead near the coffin. As regards long hair and low jaw they are probably inverted by those who had the bad luck to meet such spirits. Usually they kill these spirits or run away as quickly as possible, because sometimes these spirits attack humans and steal their food. It is quite probable that when the woman has returned to consciousness in the coffin she really believes that she is a spirit and so acts just as a spirit would act, according to the Tungus idea—she does not speak, does not show her face and so on. It can also be noted that these cases occur usually during dry and hot seasons only. It is natural that in the winter time the sleeping woman would be frozen in the coffin. In the symptoms of very many psychic and nervous maladies among the Tungus, lethargy and other cases of unconsciousness can occur more often, I suppose, than among Europeans.

The Tungus explanation of the origin of this spirit is as follows: into the body of a dead woman enters a spirit which is a real woman whose third and second souls are gone. The second soul is substituted by some spirit. If there are no physical infirmities, so far as can be seen by the Tungus, the absence of children is explained by the absence of the third soul.

From the above facts it can be seen that the theory of spirits explains all kinds of phenomena. If there are some new facts, this theory leaves open the possibility of discovering some new spirits, whose activity would explain completely these new phenomena. As examples of this animistic discovery may be taken infectious maladies, some of which were introduced among the Tungus by the Chinese and the Russians, and which are now explained as results of malevolent activities of Chinese and Russian spirits. This theory then is a very elaborate philosophical and cosmogonic system which serves the Tungus as a universal science.

Now I want to detail, as briefly as possible, the very important problem of psychic and nervous maladies and other phenomena which cannot be understood by animism without a supposition of the spirits' influence and peculiar spirits' activity. Psychic and nervous maladies among the population investigated by me are very common, possibly more common than among Europeans. There are also special forms of these maladies, amongst which can be noted especially self-hypnotism. Some of these maladies are not so easily observable, because they take such confused forms that the pathologic side of the psychology of these persons cannot be recognized at once. Some of these forms can also be observed amongst Europeans. Extreme tendency to excitation and exaggeration of facts, different kinds of mania, as, for example, maniacal collecting, maniacal interest in certain problems—religious, sexual, social or otherwise pathologic fantasy, aimless lying and the like are, doubtless, various forms of psychic and nervous abnormalities. Some of these manifestations find their expressions in different forms of literary, philosophic, aesthetic and social movements, which give, if the comparison can

WHAT IS SHAMANISM ?

be allowed, a legal form to these abnormalities, and which serve as a kind of safety-valve for European societies. Sometimes these psychopathological manifestations play a very influential part in the life, and become dangerous to the very existence, of society. Generally speaking, they are regulated absolutely unconsciously and only cases of a very striking nature attract the attention of physicians.

There are among the Tungus some peculiar forms of these maladies, as for example, unconscious imitation of acts. Some examples will better illustrate the character of this malady. Once a woman subject to this malady came to a village and met on the road, that was descending a hill, a carriage laden with big barrels. Just at that moment the barrels fell off and rolled down the hill. The woman, imitating this movement, doubled herself up into a ring and followed the barrels. In another case, a man was sitting in his wigwam. At that moment a big knife fell down. This man took it immediately and plunged it into the back of his small son.

Hypnotic influence of some persons can serve us as another example of these peculiar maladies. Sometimes this influence, possibly absolutely unconscious, leads to crimes, maladies by suggestion and so on. If the hypnotism touches the mass of the people they become so nervous that they begin to act in a manner that is pernicious to themselves. During such periods the hunters cannot kill animals (they miss), the people cannot work, and accidents occur every day. This state of psychology is analogous to the psychology of European peoples at the time of revolutions, popular rebellions and religious movements. As we know, the explanations of these phenomena usually do not touch the essentials of this psychic state, and they attribute it to the influence of some ideas or persons which are only external manifestations and indirect consequences of a pathologic process. It can be stated that for such cases we do not know the cure and the malady usually goes on without intervention and is followed by the death or complete recovery of the community suffering from this malady.

Among the Tungus all these maladies are very highly developed and seem not to be regulated by any medical, political or aesthetic intervention, so that the process is left to itself. But this last assertion is not quite exact—the Tungus have very peculiar methods of intervention which I shall now describe and which I shall include under the title of this lecture, Shamanism.

(To be continued).

SOME SHANSI WATERS, CHEMICALLY
EXAMINED
WITH NOTES REGARDING WATER ANALYSIS IN GENERAL
AND ITS INTERPRETATION.

BY
E. T. NYSTRÖM

Contribution No. 7 from the Nyström Institute for Scientific Research in Shansi.

(Continued from page 180)

Water for Industrial Purposes.

For laundry work water should be as free as possible from *all* salts. Hard water is a very serious obstacle for this branch of industry. *Engineering News* of April 1892, declares that hard water may probably increase the expense for soap in an American household of five persons by 5 to 10 gold dollars per year, and for big laundries using soap by the ton the added expense may be serious. Under such conditions a water softening plant (see below) may be imperative.

Dyeing and printing works require a water as free as possible from calcium, magnesium, iron, aluminium and acids, since the dyes may become precipitated by these impurities. Brewing industries should have water free from germs and organic matter. Sugar factories must have a water free from calcium sulphate and common salt.

For raising steam and boiling in kettles and boilers water should, as indicated above, be as free as possible from both temporary and permanent hardness. A good boiler water is free from suspended matter (silt and organics), it should have as little of compounds of calcium and magnesium as possible. These form scales. It should have no nitrates, no ammonium salts, no sulphides, no sulphuretted hydrogen, no acids and no fats, as all these tend to corrosion of the boiler plate.

Bicarbonates of Ca and Mg upon boiling form CaCO_3 and basic magnesium carbonate which forms mud. Calcium sulphate (soluble in 400 parts of water) is specially bad as it forms hard, adhesive crusts. Take for example the following case. The efficiency of a boiler was reduced by scales thus: one kg. coal could produce, when the boiler was clean, $8\frac{1}{2}$ kg. steam, but after the forming of crusts only $6\frac{1}{2}$ kg.

If there is only a little CaSO_4 (permanent hardness) it is generally enough to heat the water before allowing it into the boiler, and filtering off the mud.

In addition to Partington's description above it might be useful to give the proportions of chemicals that are necessary to purify the water:

Taking the formulas $\text{CaH}_2\text{CO}_3 + \text{CaO} = 2 \text{CaCO}_3 + \text{H}_2\text{O}$
and $\text{CaSO}_4 + \text{Na}_2\text{CO}_3 = \text{CaCO}_3 + \text{Na}_2\text{SO}_4$,

SOME SHANSI WATERS, CHEMICALLY EXAMINED

it is evidently necessary, in order to remove both kinds of hardness, to employ both lime and soda. Using ordinary chemical calculations we may conclude that corresponding to 100 mgr. CaCO_3 (temporary hardness in our analyses) we have 162 mgr. CaH_2CO_3 and 56 mgr. quicklime. That is to say, for every 100 mgr. of temporary hardness, 56 mgr. CaO should be added per litre. As for the CaSO_4 , 136 parts of this corresponds to 100 parts of CaCO_3 , in which this hardness (the permanent one) is expressed. Corresponding to this we have 106 mgr. soda (dry calcinated soda without water of crystallisation) or 286 mgr. washing soda (crystal soda) to be added per litre to every 100 of permanent hardness. Thus the quantities of chemicals required for purification may easily be calculated from our analyses. If cold water and solutions are employed (generally there is a machine which adds automatically the required amount of chemicals) a time of 24 hours is required for the reaction. It is better, however, to conduct operations while boiling. Then the time required is very much reduced. If purification has been well conducted, the hardness after treatment should be only 36 to 54 mgr. per litre. Excess of lime may be tested with ammonium oxalate of soda with litmus paper. It is, however important to know that waters may change as to their composition and that is why frequent analyses of the original supply should not be omitted.

Water Analysis and its Special Difficulties.

William P. Mason (op. cit.) says rightly that a great deal of popular misconception exists upon the subject of potable water. A water analysis is really a series of experiments to assist the judgment which should be established from many other points of view than the chemical. For example, it is very necessary to know the origin and "history" of the water. Now, in the first place, a large tenure of common salt may be harmless, but may also indicate contamination by human or animal refuse (urine). The water should therefore be traced to its source and judged accordingly. Bacteria and other organic impurities are considered very dangerous in Europe and America, and so they are here, but on account of the general prejudice in China against drinking unboiled water this danger is largely eliminated. A full water analysis is a very laborious problem and for most purposes, though desirable, is not necessary. So we have limited our investigations to an elucidation of those qualities which are vital for judging not only the potability but also the industrial suitability of the water sample in question.

Methods Used in our Analyses.

In the tables below are given the results grouped under five different headings, viz., Total Solids, Chlorine, Total Hardness, Temporary Hardness and Permanent Hardness.

Total Solids were examined by evaporating 500 c.c. to dryness on a water-bath and drying the residue in a hot air-bath at 105°C and afterwards weighing it.

Chlorine was found by the usual method of titrating with a standard silver nitrate solution. The method depends on the fact that if a solu-

tion of a chloride is coloured yellow with a little potassium chromate and the solution of silver nitrate added from the burette, white silver chloride will be produced until the last trace of chlorine is disposed of, whereupon red silver chromate will begin to appear. The standard silver solution is made thus: 4.8022 grammes silver nitrate is dissolved in one litre of water. Each c.c. is then sufficient to precipitate one mgr. of chlorine. The solution was checked against a standard sodium chloride solution containing 1.6479 grammes of pure fused NaCl per litre. The potassium chromate indicator was prepared by dissolving 2 gr. pure salt in 100 c.c. of water. The determination was carried out thus: One hundred c.c. of the water to be analyzed was placed in a tall glass tube, 1 c.c. of the indicator added and mixed well. The standard silver solution was then run in from a burette until the red tint of the silver chromate just appeared. The amount of c.c. gave the number of mgr. of Cl per 100 c.c. Multiplied by ten this gave the Cl per litre in our tables.

Total Hardness.—Whether a water be permanently or temporarily hard, it will destroy soap, and such destruction is often assumed to measure the total hardness. The assumption is only a partial truth as water alone will decompose soap and this must be taken into consideration (see calculation below). In short, the soap test is open to criticism, yet with a bit of care and experience I have found it satisfactory enough and the results fairly well coinciding with the amounts found by quantitative analysis. The principle underlying our tests is that a soap solution of known strength is prepared and added from a burette little by little to the water to be analyzed until a permanent lather is formed, whereupon from the known quantity of soap solution used the amount of hardness present is calculated. This soap test is known as Clark's test and has been in use many years; it is unscientific but convenient, and results are satisfactory enough to provide valuable conclusions. The soap solution was prepared thus: From a new cake of pure hard soap ten grammes were scraped off and dissolved in dilute alcohol ($\frac{1}{2}$ water) and augmented to 1 litre, if not clear it should be filtered. To standardize this solution we need:

Calcium Chloride Solution.—One grammme of pure CaCO_3 (Iceland spar) is weighed and dissolved in a little hydrochloric acid with precautions against loss. Evaporate to dryness. Add a little water and again evaporate to drive off excess of acid. Dissolve residue in water and make up to one litre. Each c.c. will correspond to one mgr. CaCO_3 .

Standardizing the Soap Solution.—Place 10 c.c. of the calcium chloride solution in an eight-ounce glass-stoppered bottle, make the volume up to 100 c.c. with recently boiled but cooled distilled water, and run in the prepared soap solution from a burette, little by little (shaking after each addition) until a lather be formed which persists for five minutes. Even when the amount of soap solution required is approximately known, never add more than half a cubic centimetre at once, and never fail to shake after such addition.

Observation of the lather should be made with the bottle lying on its side (the writer of this paper has found that when the lathering point is approached the harsh rattling sound when the water is shaken disappears

SOME SHANSI WATERS, CHEMICALLY EXAMINED

and gives place to a soft, gentle, almost inaudible oily swish. This gives warning of approaching saturation of the bicarbonates.

Note the amount of soap solution used. Now repeat the experiment, using 100 c.c. pure water only (no calcium chloride solution) and again note the amount of soap solution required. This second reading will give the amount of soap solution (no inconsiderable quantity) used by the 100 c.c. pure water, and by subtracting same from the reading obtained in the first instance knowledge will be reached of the quantity of soap required for the calcium salt alone. Estimate now the value of 1 c.c. soap solution in terms of calcium carbonate and record the result on the bottle. Perhaps an example would be in keeping:

8.2 soap sol. are required for 10 c.c. calcium chloride sol. plus 90 c.c. 0.6 c.c. soap sol. are required for 100 c.c. water.

Hence, 7.6 c.c. soap sol. are required for 10 mgr. CaCO_3 .

Hence, 1 c.c. soap sol. corresponds to 1.316 mgr. CaCO_3 .

Always place the date of standardizing on the bottle, and restandardize frequently, as the soap solution is not permanent.

Determination.—Place 100 c.c. of the water in the eight-ounce bottle run in the standard soap solution in the manner already stated, read off the amount required to produce the lather, multiply by the known value for 1 c.c. soap solution, multiply by ten and there will be obtained the "soap hardness" expressed as so many parts of CaCO_3 per million of water.

Magnesium salts decompose soap rather slowly, therefore do not conclude that the end point has been reached until after the lather has been observed readily to return upon shaking after a few minutes' waiting. For constant results the hardness of a water should be taken at a temperature of 15°C .

Permanent Hardness is found by taking 100 c.c. of the water boiling it for $\frac{1}{2}$ hour and after cooling using Clark's test as above. This will always be found to be much less than the total hardness. To obtain the *temporary hardness* subtract the permanent from the Total hardness.

How the Samples were Obtained.

Large glass bottles containing about 5 litres were employed. They were most carefully cleaned and before taking the sample ultimately rinsed with the water in question. Samples were taken well away from the shore in case of rivers, springs and brooks. The least carelessness in taking samples vitiates results as we deal in small quantities.

The samples were obtained either by myself or by reliable friends. I have specially to express my gratitude to Mr. Pandolfi, of the Chengtai railway, who obtained several interesting samples along this line.

Tables of Analyses.

DIVISION I.

Taiyuanfu and Immediate Surroundings.

The capital of Shansi is situated on a large plain about 50 by 150 km. and at an altitude of about 800 m above sea-level. Taiyuanfu lies at the N. E. rim on slightly rising ground. It is more than probable that the

plain constitutes an ancient lake bottom when the waters of the Fen Ho had not yet dug their passage so deeply through the S. W. rim. When this debouchement was excavated the lake drained away, but here and there isolated patches of water remained which evaporated and left their solid constituents in the ground making the wells still very saline (see analyses No. 6, 7, and 14 below). The plain is now covered deeply with loess-earth blown hither from the surrounding or distant hills. Through the efforts of Mr. Leonhardt, of the Shansi International Famine Relief Well-Drilling Department, a geological section was obtained of the strata near Taiyuanfu and this table is given below :

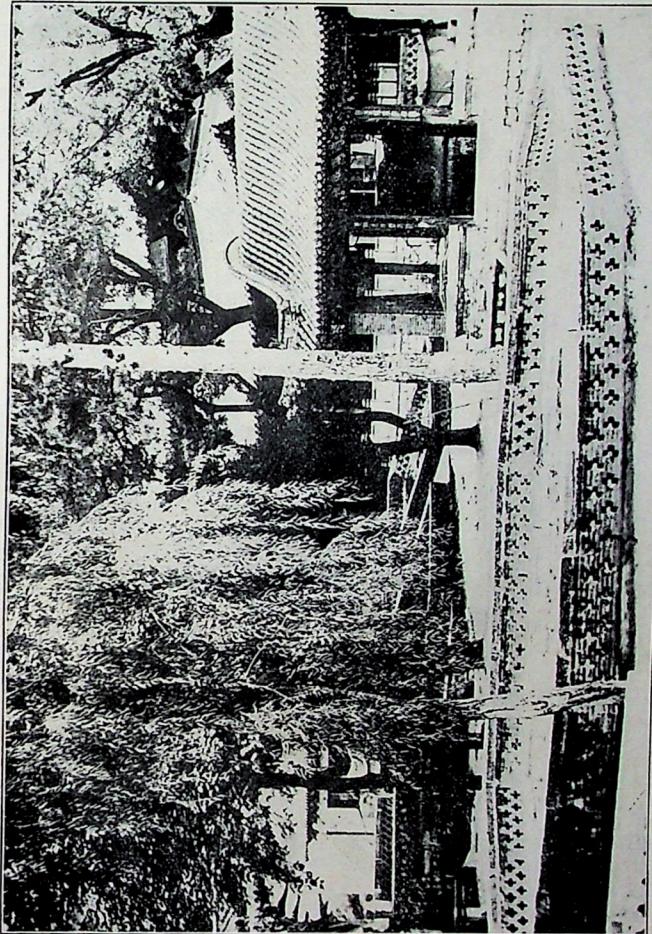
Above	Loess	..	..	..	..	..	34	feet
	Coarse sand	..	..	..	..	..	2	
	Sand and gravel	..	..	..	..	..	19	
	Dark clay	..	..	..	..	..	5	
	Dark fine sand	..	..	..	..	..	8	
	Dark clay	..	..	..	..	..	6	
	Brown fine sand	..	..	..	..	..	5	
	Brown coarse sand	..	..	..	..	..	11	
	Brown clay	..	..	..	..	..	8	
	Sand	..	..	..	..	..	8	
	Coarse sand	..	..	..	..	..	9	
	Clay	..	..	..	..	..	10	
	Brown sand	..	..	..	..	..	15	
	Sand and gravel	..	..	..	..	..	7	
	White fine sand	..	..	..	..	..	1	
	Coarse sand	..	..	..	..	..	10	
	Clay	..	..	..	..	..	12	
	Sand	..	..	..	..	..	8	
	Clay	..	..	..	..	..	88	
	Sand	..	..	..	..	..	8	
	Fine sand	..	..	..	..	..	0.5	
	Sand and gravel	..	..	..	..	..	0.5	
	Sand	..	..	..	..	..	1	
	Coarse sand	..	..	..	..	..	6	
Below	Coarse sand and gravel	..	..	..	..	..	13	
						Total	..	295 feet

This was taken outside the N. W. corner of the city, the locality being situated about 500 m. north east of the corner.

The well was sunk in early spring 1923, and produced self-flowing water, though the hydrostatic pressure is low and the flow inconsiderable, being only something like $\frac{1}{2}$ litre per second. To the west, about 700 m. off, there is another artesian well at the Governor's live stock farm, which gave a better output.* See below.

The well drilling section of the International Famine Relief Committee has also sunk two other wells S. of Taiyuanfu. One at Huang Lin Tsun, 20 *li* away, where 600-ft. were reached but no water obtained

* This well stopped after flowing for a year or so.



Lotus Flower Pond at Chin Ssü. In the background is the Ancient Temple which was founded in the Chow Dynasty, 1122-255 B.C.

SOME SHANSI WATERS, CHEMICALLY EXAMINED^D

and one at Wu Hsi, 30 *li* away, where self-flowing water was produced but as usual in small quantity only.

WATER No. 1.

The International Famine Relief Artesian Well outside N.W. corner of Taiyuanfu, 295 feet deep.

Quantity : Small appearance limpid.

Analysis: <i>Total Solids</i> : in mgr. per litre (parts per million) : ..	356.5
Chlorine :	24.8
<i>Total Hardness</i> : mgr. CaCO_3 per litre	211
<i>Temporary Hardness</i> :	111
<i>Permanent Hardness</i> :	100

This belongs to the usual type of artesian deep well water of this region, being as it seems a good potable water but rather hard > 100 for laundry and boiler use. Regarding chlorine it stands between what the "Chemiker Calendar" calls "pure" and "potable." With regard to T. S. its hardness is between the "Deep Well" and the "Spring Water" of Great Britain as quoted above (average of 589 samples), though the tenure of Chlorine is almost exactly like the latter category.

WATER No. 2.

The artesian well at the Governor's live stock farm outside the north-west corner of Taiyuanfu.

Depth similar to above. Water supply at first better (something like 1 litre per sec.) has formed a small artificial lake at its side, which has been decorated with a pavilion and bridge in Chinese style. During 1923 it stopped flowing.

Quantity : Rather small. Appearance : Perfectly limpid.

Analysis: <i>Total Solids</i> : in mgr. per litre (parts per million) ..	404.5
Chlorine :	60.5
<i>Total Hardness</i> : mgr. CaCO_3 per litre	188
<i>Temporary Hardness</i> :	50
<i>Permanent Hardness</i> :	138

This water contains much more chlorine (common salt) than the last one and the presence of sodium chloride in larger quantity may explain the increase of total solids because that increase does not come from the carbonate of lime which is less than in No. 1. Patches of saline ground are very common in and around Taiyuanfu. In quality it is rather like the "Deep Well Water" of Great Britain quoted above. It is a good potable but rather hard water (> 100).

WATER No. 3.

Surface Well in the Arsenal 1000 m. N. of Taiyuanfu.

Here we encounter another and it might be said at once, very unsatisfactory kind of water in the form of those old fashioned shallow wells which hitherto have been the only water supply of Taiyuanfu.

THE CHINA JOURNAL OF SCIENCE & ARTS

Outward appearance: Whitish film-like threads are seen floating in the water.

Analysis: <i>Total Solids</i> : in mgr. per litre (1 part per million)	..	1574.5
<i>Chlorine</i> : mgr. per litre	..	133.3
<i>Total Hardness</i> : mgr. CaCO_3 per litre	..	402
<i>Temporary Hardness</i> : " " "	..	240
<i>Permanent Hardness</i> : " " "	..	162

This is truly a very unsatisfactory kind of water, and though there are certainly better surface wells than this in and around Taiyuanfu yet we may comprehend at a glance the immense superiority of the modern artesian water supply in this region. The fault of this water No. 3 is not so much its hardness (though this is bad enough being over 300, therefore a "very hard" water according to quotation above) but its evident tenure of soluble salts of Chlorine (common salt) as well as other salts like sulphates and probably nitrates, of sodium and calcium.

The Arsenal has also endeavoured to improve its supply by taking it from artesian supply. This is rather near to the artesian well No. 1 and probably similar to this water.

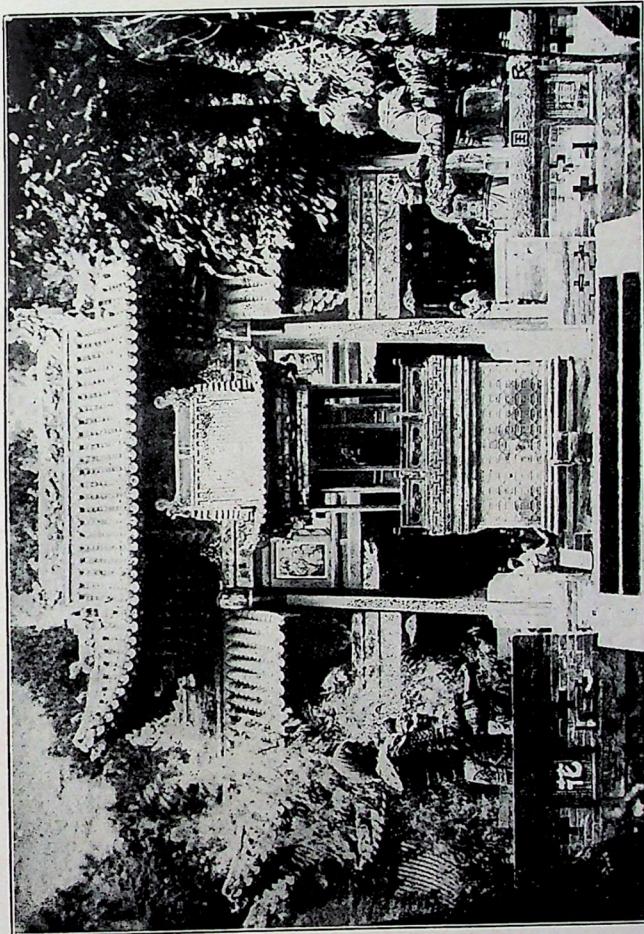
WATER No. 4.

Proceeding southwards and entering the city we find in its western division the Industrial College, which is a centre of activity and reform from many points of view. Here two artesian wells have been sunk. The southern one near the engine house was analysed by me on April 4th, 1923. It is self-flowing but pressure is inconsiderable and said to have decreased of late perhaps through the sinking of other wells in the neighbourhood. Flow used to be 1 litre per second.

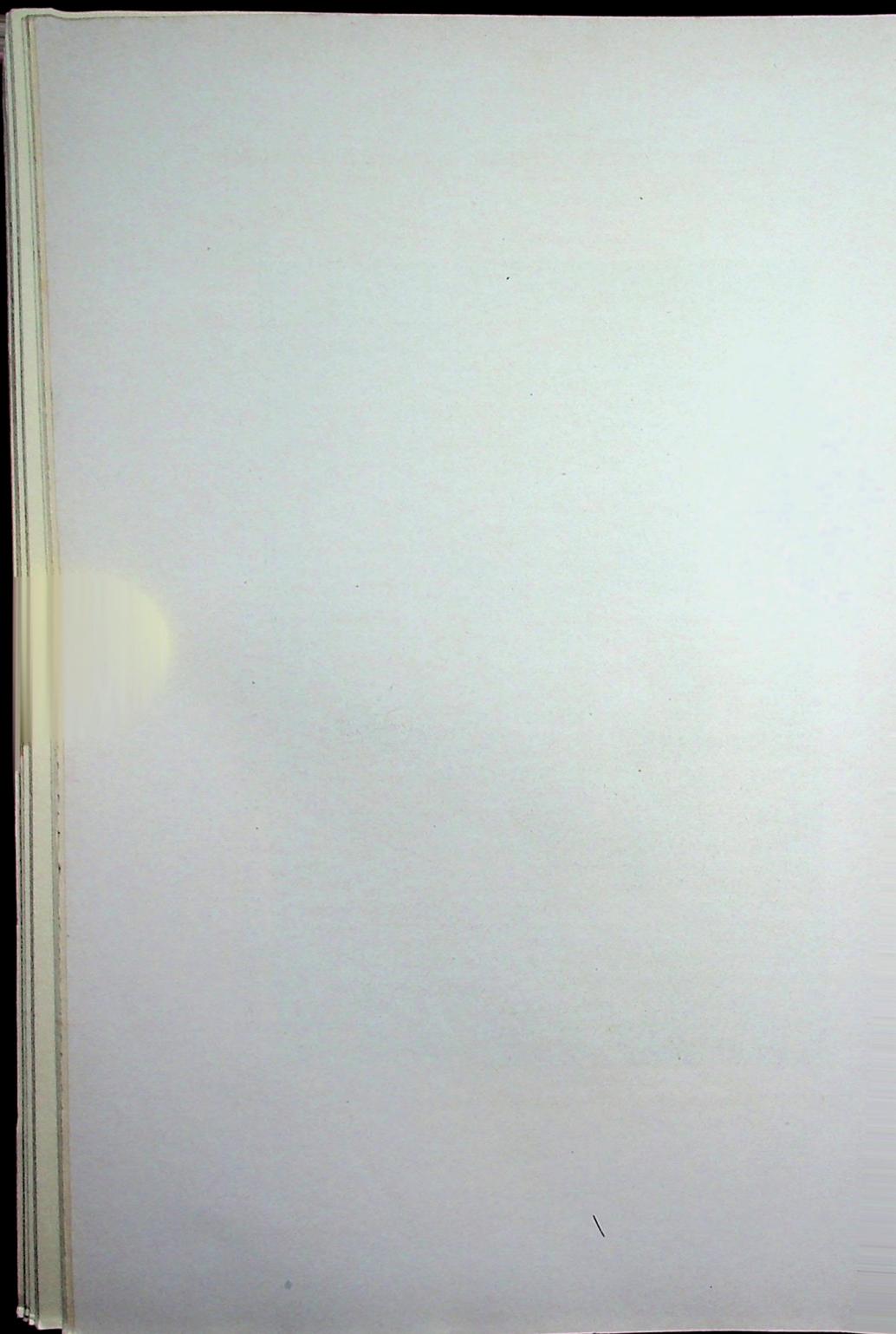
Quantity: Rather small. Outward Appearance: Perfectly limpid and colourless. Temp. 14°C.

Analysis: <i>Total Solids</i> in mgr. per litre (parts per million)	..	317.5
<i>Chlorine</i> : mgr. per 1	..	23.5
<i>Total Hardness</i> : mgr. CaCO_3 per litre	..	229
<i>Temporary Hardness</i> : " " "	..	167
<i>Permanent Hardness</i> : " " "	..	62

It is interesting to note that the quality of this water has undergone some change; when the writer analysed it in autumn of 1922 the chlorine was 33.3 and total solids 307.4. The latter difference is unimportant but the decrease of chlorine might indicate that the water has leached out much of the salt on its way and at the same time by some changed circumstances underground slightly increased its tenure of carbonate of lime and/or gypsum. This water apart from the advantage of being self-flowing is from the point of view of total solids the best water inside Taiyuanfu. It is very like the above quoted "Spring Water" of Great Britain. Eminently wholesome and potable, but too hard to be quite satisfactory for industrial purposes.



The Four Iron Men at Chin Ssü, three of which bear inscriptions dating from the Sung Dynasty.



SOME SHANSI WATERS, CHEMICALLY EXAMINED

WATER No. 5.

From Taiyuanfu Electric Light Company's Well.

Proceeding eastwards and arriving at a point slightly south-east of the centre of the city, we arrive at the Taiyuan Electric Light Company. This company which operates a highly up-to-date steam-plant has a steel cased well 320-ft. deep and the water sample was supplied by the representative of the firm, Andersen, Meyer & Co., Mr. L. M. Hand, who installed the electrical machinery.

Outward Appearance: Perfectly limpid and colourless.

Analysis : <i>Total Solids</i> : in mgr. per litre (parts per million)	..	549
<i>Chlorine</i> : mgr. per litre	..	37.6
<i>Total Hardness</i> : mgr. CaCO_3 per litre	..	225
<i>Temporary Hardness</i> : " " "	..	143
<i>Permanent Hardness</i> : " " "	..	82

This water has much more total solids than that from the Industrial College the reason being that it is nearer to that large saline patch in the S.E. part of the city of which more anon. The increase is therefore due to common salt (NaCl). Chlorine is therefore higher but the hardness caused by calcium salts is much the same. This water having a considerable temporary hardness could undoubtedly be much improved by boiling and letting settle the carbonate of lime. It might be termed a good drinkable water but too hard (more than 100) to be satisfactory for boiler use.

WATER No. 6.

From Hai-tzu Lake.

Proceeding southwards we arrive at a public park containing a small lake about 150 Metre in diameter with an appendix to the S.W. This is popularly called the Hai-tzu Lake. It is very saline and seems to lack an outlet and though there may be sub-surface springs feeding it, much of the supply comes from the drainage round about especially during the flood waters in July and August. Some mystery attaches to this lake the local tradition even going so far as to connect it with the sea (!) probably on account of its saline water. But unfortunately for this theory Taiyuan lies at 800 metres above sealevel! The water was analysed in the autumn of 1922 and showed the following composition :

Appearance : Opal coloured, not quite clear.

Analysis : <i>Total Solids</i> : in mgr. per litre (parts per million)	..	1202.5
<i>Chlorine</i> : mgr. per litre	..	153.5
<i>Total Hardness</i> : mgr. CaCO_3 per litre	..	643
<i>Temporary Hardness</i> : " " "	..	310
<i>Permanent Hardness</i> : " " "	..	333

It goes without saying that this water is quite unfit for all purposes of consumption and industry. The contents of soluble salts, sodium chloride, and sulphate being enormous. This lake may be a relic of the ancient lake covering the Taiyuan plain (see above). It seems to infect

THE CHINA JOURNAL OF SCIENCE & ARTS

all the surface well waters round it with its salinity. As an example we may take a sample of the surface well sunk in the writer's compound 200 m. S.E. of the lake.

WATER No. 7.

Surface well, 25-ft. deep, in Mr. Nyström's compound, Taiyuanfu.
Appearance: Slightly opaque and whitish.

Analysis: *Total Solids*: in mgr. per litre (parts per million) ... 3299.8
Chlorine: mgr. per litre 348.3
Total Hardness: Too hard to be estimated by soap test
Temporary Hardness
Permanent Hardness

The tenure of sulphates and chlorides is too big to allow it to be used for human or other consumption, though it seems not to be too harmful for watering plants. This may have something to do with the nitrates which have been shown to be present. This is the highest percentage of total solids and chlorine found anywhere in this region, and is more than double in comparison with the Hai-tzu lake.

WATER No. 8.

Artesian Self-flowing Well in Gen. Chao's Compound.

Proceeding S.W. of the lake we arrive near the city wall to General Chao Yü Ch'ing's European-style house and compound. Here there exists a fine self-flowing well and the difference between its water and the neighbouring saline lake surface water is enormous.

Appearance: Perfectly limpid and colourless.

Analysis: *Total Solids*: in mgr. per litre (parts per million) ... 465
Chlorine: 53.4
Total Hardness: mgr. CaCO_3 per litre 233
Temporary Hardness: " " " 130
Permanent Hardness: " " " 103

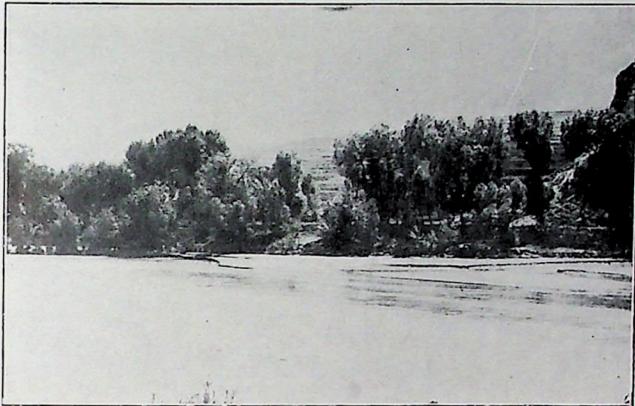
This water is somewhat between the one of the Industrial College and the Electric Light Company with regard to total solids but the chlorine is higher than both no doubt on account of seepage from the saline layers above, and nearness to the Hai-tzu lake. However it is a good potable water though the same remarks as stated before apply in reference to its rather considerable hardness.

WATER No. 9.

Shansi University Artesian Well.

Proceeding eastwards and arriving inside the S. E. corner of the city we come to the large compound of Shansi University. Some years ago a steel-case-lined artesian well was sunk here by Mr. James Turner, Engineer from Tientsin. The artesian wells in Taiyuan are all about 300-ft. deep.

The artesian water in the University does not quite rise to the surface but has to be pumped up for the last ten metres or so. The ground here



The Fên Ho soon after emerging on to the Tai-yuan Fu plain.



The Fên Ho west of Tai-yuan Fu, Shansi.

SOME SHANSI WATERS, CHEMICALLY EXAMINED

as well as the whole S. E. corner of Taiyuanfu lies a few metres higher than the rest of the city and that may account for the absence of self-flowing ability.

Appearance : Perfectly limpid and colourless

Analysis : <i>Total Solids</i> : in mgr. per litre (parts per million) ..	441
Chlorine :	.. .. 48.5
<i>Total Hardness</i> : mgr. CaCO_3 per litre	207
<i>Temporary Hardness</i>	110
<i>Permanent Hardness</i>	97

This water is very much like that supplied by General Chao's well (see Analysis No. 8 above) and the same remarks may apply. It is a good wholesome, potable water though hard for laundry and boiler use.

WATER NO. 10.

Hsiao Wu T'ai Surface Well.

About 100 metres E. S. E. of the University compound we find a large surface well the water of which used to enjoy the reputation of being the best in Taiyuan. The name is the Hsiao Wu T'ai (small Wu T'ai) well. But we shall soon see that it compares poorly with the artesian water.

Appearance : Clear but with some organic impurities floating about.

Analysis : <i>Total Solids</i> : in mgr. per litre (parts per million) ..	622.4
Chlorine :	.. .. 40.1
<i>Total Hardness</i> : mgr. CaCO_3 per litre	348
<i>Temporary Hardness</i> :	150
<i>Permanent Hardness</i> :	198

The total solids and hardness are very great, the latter above 300, putting this water in the category "very hard." The only thing said to the advantage of this water might be the comparatively low tenure of Chlorine. But the large permanent hardness points to considerable tenure of Gypsum (CaSO_4). It has almost exactly double the quantity of total solids as compared with the Industrial College artesian well. But it is no doubt a wholesome potable water, having been used for so long a time with benefit. It is interesting to remember that the old well here collapsed during the earthquake in 1920, and the present one is newly built.

(To be continued).

SCIENTIFIC NOTES AND REVIEWS

ANTHROPOLOGY OF NORTHERN CHINA : by S. M. Shirokogoroff,
Royal Asiatic Society (North China Branch) Extra Vol. II, 1923.

This monograph by the distinguished Russian ethnologist represents one of the first efforts in a very large and difficult field, and cannot fail to attract the attention of all those interested in many of the relatively untouched problems suggested by its title. The degree of satisfaction or of disappointment attending the inspection of this work will depend in a very large measure upon the degree of familiarity on the part of the reader with the technique as well as with the inherent difficulties attending such investigations in general. On the whole the reader is apt to approach the article with a greater anticipation than is justified. That the author himself is not guiltless of further intensifying this anticipation is indicated by such statements in his preface as, "The principal purpose of the present study is to offer a *summary description of the physical characteristics of the Chinese and to discover the constituent types.*" (Italics those of Reviewer) Subsequently repeated qualifications of this statement to the effect that "this study, therefore, cannot be considered as a final investigation of the anthropology of the northern Chinese" are hardly enough to make amends to the already abnormally whetted appetite of the reader.

By far the best part of the work, unfortunately restricted almost entirely to the closing paragraphs of the first chapter and several excellent ethnographical observations and charts at the extreme end of the treatise, are those sections dealing with the ethnical compositions of the little known peoples inhabiting the rather indefinite northern border of Mongolia and northeastern China. Many years of travel and study in this region under the auspices of the Russian Academy of Sciences and most intimate association with the Tungus, Burials, Yakuts, and other peoples of this and other regions just to the east, have made Professor Shirokogoroff the best living authority on the ethnography of this difficult part of Asia. An anthropometric study of these people who have so profoundly influenced the racial admixtures of the northern Chinese during the last six or seven centuries would not only have been a most valuable contribution to the study of the northern Chinese in particular but one much more within the scope of the author's opportunities than the actual study of the northern Chinese themselves.

The anthropological sections suffer the inevitable embarrassment incident upon any attempt to draw conclusions from an utterly inadequate number of individuals observed and measured. In view of the fact that the study is based upon such a relatively small number of Chinese, 395 all told, and from a no wider range of distribution than the coastal provinces immediately surrounding the bay of Chihli (Manchuria, Chihli, and Shantung), it is open to question whether or not the title "Anthropology of Northern China" is not a little misleading. In noting the use of a small group of "Manchurian Chinese" (96 individuals in this group) for comparison with the other Chinese groups on the one hand, and their

SCIENTIFIC NOTES AND REVIEWS

inclusion in the "total Chinese" for comparison with the Manchu and Korean groups on the other, the reader is unwisely left in doubt as to the basis upon which this particular "Manchurian" group is selected and the degree of care exercised in the differentiation of the lineage of its members from that of the surrounding Manchurian population in general. A similar question as to the validity of using purely political divisions (i.e., Chihli and Shantung) without further regional designation as the basis of grouping Chinese for the study of Chinese types also arises in the mind of the anthropologist reader. In view of the restricted field for sampling, therefore, as well as the inclusion of a large number of Chinese of rather doubtful racial affiliations, the deduction as to fundamental types seems rather premature and of uncertain value.

In spite of the above criticism, however, there is much valuable information presented in the work. The physical data so admirably compiled and arranged in tables throughout the work and in the appendix at the end represents a great deal of painstaking labor on the part of the writer and will prove most valuable to anyone interested in the physical measurements of the Chinese in the districts represented. The political and other handicaps under which the author's studies have been carried out have not been few and yet the work represents the only worthwhile contribution to this general problem during the year just passed. Much credit will most certainly be due the author for providing the stimulus for other studies which will doubtless be undertaken along this line by other workers in the years to come. In addition it is also hoped that Professor Shirokogoroff will himself be able to enlarge greatly his field of observation among the Chinese and apply his excellent methods to a much larger proportion of the population of China.

P. H. S.

AN ARCHEOLOGIST'S PARADISE: Kansu and neighbouring parts of Mongolia, Chinese Turkestan and Tibet are turning out to be a regular paradise for archaeologists to judge from news that has come to hand recently. Mr. H. H. F. Jayne, curator of Oriental Art at the Pennsylvania Museum, Philadelphia, and a member of the Harvard Oriental Expedition headed by Professor Langdon Warner, has returned to Peking with reports of splendid work done and rich discoveries made by the expedition in Kansu as far west as the Shinkiang border. The discoveries, of which the most valuable are those made in the vicinity of the Twin Lakes, source of the Black River in Mongolia, have a strong bearing upon the history of the Chinese, who are believed by some to have entered China from Central Asia by way of what is now known as Chinese Turkestan, or Shinkiang, the New Dominion. The full results of this expedition will not be made known till Professor Langdon Warner returns to civilization, which he intends doing by way of the Gobi and Pao-tou Chen.

Dr. J. G. Andersson, mining advisor to the Chinese Government, also appears to be making a rich haul. A correspondent in the "North-China Daily News" (February 11), writing from Titao on the Kansu-

THE CHINA JOURNAL OF SCIENCE & ARTS

Tibetan border south of Lanchoufu, says that one of Dr. Andersson's collectors has unearthed a lot of ancient pottery and stone and bone instruments in that neighbourhood. Here also some large pots with a distinctive pattern, which have been dug up by the local inhabitants from time to time have been secured. The reports says there is no trace of metal implements in any of the sites located. Dr. Ardersson is at present engaged in an extended expedition in Kansu, looking not only for archaeological but also for paleontological remains. Dr. Zansky, his associate, has been exploring in these parts for over eighteen months. We may expect some very interesting results when the members of these two expeditions return to Peking.

THE PRACTICAL ELECTRICIAN'S POCKET BOOK, 1924 (S. Rentell & Co., Ltd.) (3s net).

The twenty-sixth edition of this old and familiar friend has, as usual, been carefully revised and kept in every way in line with present day installation practice, thus maintaining its reputation as an invaluable and convenient pocket manual for every contractor, foreman and wireman. The chapter on the many wiring systems now on the market is indeed most comprehensive, while other sections including wireless broadcasting make the book directly useful to a very wide circle. The fifty pages of Central Station Tables are certain of constant reference by manufacturers. The return to the pre-war binding is a decided improvement and we are confident that it will appeal to every enterprising electrical engineer.

SOCIETIES AND INSTITUTIONS

THE CHINA SOCIETY OF SCIENCE AND ARTS.

The third meeting of the above Society was held on Saturday, March 22, at the usual time and place. The Society was fortunate in having its vice-president for arts, Dr. J. C. Ferguson, of Peking, who was on a visit to Shanghai, for lecturer. Mr. A. de C. Sowerby, the president of the Society, was in the chair, while Dr. Wu Lien-teh of the Manchurian Plague Prevention Service, also on a visit to Shanghai, and a member of the committee of the Society, was present.

Before calling upon Dr. Ferguson for his lecture, the president asked Dr. Wu to speak to the meeting, which he did. In a few well chosen words referring to the conditions in China and the opinions concerning them engendered by flaring headlines in the newspapers, Dr. Wu pointed out that behind all the turmoil and stress there was a very strong body of serious minded and well-educated citizens who stood for real progress in matters intellectual in China, and he sincerely hoped that in the near future, their ideas and efforts would crystallize in the establishment of an up-to-date and well-equipped museum, with its adjuncts of an art gallery and reference library, in Shanghai, as so consistently advocated by Mr. Sowerby, whose efforts in this direction were well-known to all.

Dr. Ferguson prefaced his address with remarks along the same general line and then led his audience in an interesting verbal ramble through the history of Chinese art. He pointed out that the first artistic work done was in bronze, the decorations on the bronzes of the Shang period being superior to anything of a similar age in other countries. In the casting of bronze, the artisans of this period were superior to any others, either contemporary with them or of any subsequent date. They did not do much in iron, preferring the harder medium of bronze.

The "bronze age" in China was followed by a period in which some extraordinarily fine work was done in jade, the so-called Han jades, which were used in burials as well as ceremonially by the living. Here again the technique of the early Chinese exceeded anything that existed in the world at that time.

In discussing his subject the lecturer referred to the wonderful people known as the Chows, who, he said, appear to have come from somewhere in Central Asia, entering China by way of Chinese Turkestan and following the course of the Yellow River, gradually spreading their conquest, together with their culture and art, throughout a large part of China. Another cultural, and closely parallel drift, was taking place at the same time to the south. These immigrants found certain aborigines, and even a fairly high degree of culture already established in the country.

After the "jade period" came one in which stone work generally developed. The earliest known examples of work done in building stone, such as granite, are of the Chin period, about the 3rd Century B. C. The

THE CHINA JOURNAL OF SCIENCE & ARTS

stone work of the Han period was also very fine. They are to be found along the Shensi and Szechuan border.

It was in the reign of Chin Shih Huang Ti, the builder of the Great Wall and the destroyer of the Chinese classics, that architecture in China was developed in its present form. The palaces built by him were the work of scholars, strangely enough, and for grandeur of conception, size and beauty were superior to anything that had gone before, while all subsequent Chinese building of temples and palaces has been modelled on them. Not only so, but the architecture of Korea and Japan have both been controlled by that of this period.

In the Han period very fine pottery, with some of the most brilliant blazes that have ever been produced, was developed.

Statuary did not develop till the Tang dynasty. This, Dr. Ferguson maintains, is due to the fact that the Chinese philosophy of nature has never placed man in the centre of the universe as all our Western philosophy and religions have done. The Chinese philosophers place heaven first, earth next and man as a very unimportant third. In the West the idea has always been that heaven, earth, and all living things were created especially for man's benefit. Thus the Chinese have never developed the human figure as the greatest motif in art.

The earliest stone figures known are those situated in the cave temples near Tatungfu in North Shansi, and were work of Turkic artisans imported from Central Asia. Their work strongly influenced all subsequent work of a similar nature, such as is found at Lungmen in Honan, also of the Tang dynasty.

It was in the period of the Warring States that Chinese calligraphy came into its own, and the lecturer claimed that it was in their writing that the Chinese found, and still find, their highest artistic expression. He says they have been the only people in the world to express ideas in writing artistically as well as accurately. Calligraphy is the spirit and soul of Chinese art, and it greatly influenced the art of painting which reached its zenith in the Tang period. In the Sung period pottery reached a very high level, while porcelain was developed in the Ming and early Manchu periods. Summarizing, the lecturer said that the primary arts of China were developed in the following order: Bronze, Jade, Architecture, Stone, Writing, Painting, Pottery, Porcelain; while the Chinese divide the history of their art into the following four groups: (1) Metals (2) Stone (3) Writing (4) Painting.

The great patrons of art in China throughout the ages were: Tang Tai-tsung of the Tang dynasty, who preserved all records of art previous to his time; Hui Tsung of the Northern Sung dynasty; Wang li and Chen Hua of the Ming dynasty; Kang shi, Yen Cheng and Chien Lung of the Manchu dynasty.

After Dr. Ferguson's lecture, Mr. Sowerby once more emphasized the need of a museum and art gallery in Shanghai, and on behalf of the members thanked the lecturer, and Messrs. Sopher for acting as hosts in such a gracious way.

SOCIETIES AND INSTITUTIONS

MEDICO-BIOLOGICAL SECTION

At the meeting of the Medico-Biological section of the Society held on Tuesday, April 22, at 9 p.m., in the offices of "The China Journal of Science and Arts," the constitution and regulations drawn up by the committee appointed for that purpose were passed. Mr. A. de C. Sowerby, as president of the Society, presided at the meeting. The following officers were elected to serve for the ensuing year: President, Dr. Eugene C. Peck; Vice-President, Prof. A Bary; Secretary, Prof. W. M. Porterfield; Committee, Dr. F. Oppenheim, Dr. E. Hibert, Dr. Y. Tongu and Dr. Ruth Leonard. Dr. F. Reiss, who has been very energetic in forming the section, formally resigned his office as secretary as he felt the duties connected therewith took up too much of his time.

The opinion of the meeting seemed to be that for the present there was no great need for a medical laboratory, but rather a need for a biological laboratory in Shanghai. Most medical men engaged in research work either have their own laboratories or have access to one in some hospital. The same does not apply to biological research work and it was felt that efforts should be directed towards the establishment of a well-equipped laboratory in Shanghai for biological research work, especially in relation to medical science. It was decided that not only qualified physicians and surgeons should be eligible for membership, but also professional biologists.

The constitution and regulations will be printed shortly and circulated amongst the members of the section. All who are interested in the important work of Medico-Biological investigation are cordially invited to send in their names for membership in this section of the Society.

ART SECTION

The Art Section of "The China Society of Science and Arts" has been very active during the past two months and has organized an exhibition of pictures and sculpture by artists in China. The "North-China Daily News" has very kindly placed some of their spacious office room at the disposal of the Society for this purpose, and the exhibition is to be held on May 13, 14 and 15. Paintings have been received from artists in Peking and Tientsin as well as from local artists, and it is expected that the exhibition will be a great success. This will be the first of a series of exhibitions to be held under the auspices of the Society and it is hoped that in the future not only will the work of local artists be displayed, but also that of well-known artists in Europe and America, as well as pictures of the ancient Chinese painters.

The committee for the art exhibition consists of the following:—

Mrs. A. H. Swan, <i>Honorary Secretary</i>	Mrs. E. M. Gull
Mrs. G. E. Tucker, <i>Honorary Treasurer</i>	Mr. R. T. Peyton-Griffin
Mrs. Charles Ferguson	Mr. A. Kets
Mrs. R. J. Roberts	Mrs. Warren Manley
Mr. H. E. Gibson	Mr. J. Frost
Mr. R. Utz	Mr. Liu

Mr. Tsoo H. Lee

THE CHINA JOURNAL OF SCIENCE & ARTS

Miss M. A. Mullikin, who has been acting as honorary secretary for the Art Section up to date, formally resigned from this position as she felt that it was impossible for her to keep in touch with the Society's activities while residing in Tientsin. Mrs. A. H. Swan has very kindly undertaken the duties of honorary secretary in her place and all communications in regard to the activities of the Art Section should be addressed to her at her home, 82 Route de Say Zoong, Shanghai.

A full report of the exhibition will appear in the July number of the Journal.

PEKING INSTITUTE OF FINE ARTS.

The Peking Institute of Fine Arts is a very active organization of Europeans and Chinese in the capital of the country. It comprises three schools, that of Music, that of Painting and Design, and that of Dramatic Expression.

During the past winter its members have been very busy, and a very full program has been staged.

The Executive Secretary, Miss Mary Ferguson, daughter of Dr. J. C. Ferguson, writes as follows :

"I shall be glad to send you reports of the activities of the Institute for publication in the Journal. Our activities are many and varied, some of them being perhaps of less interest to the readers of the journal than others, but you will use your own discretion in choosing out the material of most interest to your readers. I am enclosing a list of the activities of the Institute since September 1, 1923, which may interest you. You will notice that up to the present date we have had eight exhibitions of great variety in character. Perhaps the most interesting of all was the first one which we held for one day only, before sending the Chinese paintings off to America where they have been on exhibition at the great exhibit "China and the Chinese" under the auspices of the Newark (N. J.) Museum Association. We have had very favourable reports from America of the impression made by this group of modern Chinese paintings, and we feel that the sending of these paintings is perhaps the most important piece of work of our whole year, linking up as it does the modern artists of China with those in America who are interested in China. I notice that at the recent exhibition held in Shanghai, Miss Edith Yang was one of the exhibitors. She had an exhibition at the Institute in October when she showed nearly a hundred paintings. Mrs. Lum's exhibition of woodblock prints attracted interest, Mr. Weatherall's beautiful photographs of China were very much admired, Miss Hauer's charming treatment of Chinese children was the outstanding feature of her exhibition—and we have just closed a most successful exhibition of Miss Mullikin's lovely paintings.

Following is the season's program of the Institute.

September 1, 1923—February 22, 1924.

September 7 Exhibition of 14 Modern Chinese Paintings ordered by the Newark museum for its exhibit "China and the Chinese."

SOCIETIES AND INSTITUTIONS

October 8-13 Exhibition by Miss A. M. Hotchkis and Mr. V. Chytil (Oils and Watercolours).
22-27 Exhibition by Miss Ina Rahusen and Miss Edith Yang (Oils, Watercolours, Etchings, Chinese paintings).

November 5, 12, 19, 26, Series of readings "Great Poems" by Dr. Lewis C. Chase.
6. Concert for Violin and Piano by Mrs. Walter Whiffen and Mrs. Jay C. Huston.
9. Lecture by Dr. Sven Hedin (Joint auspices of Institute and P. U. M. C.).
12-24. Exhibition of Woodblock Prints by Mrs. Bertha Lum.
22. Lecture on "Psychoanalysis and Religion" by Dr. C. U. Ariens Kappers.
29 First performance of "You and I," a comedy by Philip Barry, produced by Miss Frances Drake Smith.

December 3-8 Exhibition by Mr. R. W. Paulden (Oils and water-colour paintings).
4. Second performance of "You and I."
December 10-19. Exhibition by Miss Dora Hauer (Watercolours, pen and ink, crayon, pastel).
13. Concert by the Russian Choir.
27. Concert by Madame Karinskaya.

January 9-12. Exhibition by Mr. M. E. Weatherall (Photographs).
10. Concert by the Russian Choir.
23. Concert by the Institute Amateur Orchestra.
29. Concert by A. d'Alessio assisted by Madam Karinskaya.

February 11-16. Exhibition by Miss Mary Augusta Mullikin (Oils and Watercolours).
18. Lecture by Miss Mullikin "The Use of Chinese Furnishings in Foreign Homes."

February 26. Recitals by Pupils of the Institute Music School.
27. First performance of "Prunella."

March 5. Second performance of "Prunella."
6. Lecture by Dr. J. C. Ferguson "The great Artistic Past of China" (Illustrated).

Coming events.

April 20. First performance of "Dulcy."
21 Talk by Mrs. Bertha Lum "Woodblock Prints."
25. Second performance of "Dulcy."
27 Author's Reading "The twilight Hour of Yang Kuei Fei" by Mrs. Munthe.

THE SHANGHAI CHEMICAL SOCIETY.

A meeting of the "Shanghai Chemical Society" was held on Friday March 21 at 5.30 p.m. at the Winter Garden Cafe, when about 10 members were present, the president, Mr. J. Dalton, being in the chair.

THE CHINA JOURNAL OF SCIENCE & ARTS

An interesting paper was read by Prof. Mabee of the Shanghai College entitled "Chemical Education and Investigation in China."

The paper was divided into two parts. The first dealt with education and the second part gave an account of the work carried out at various laboratories in China. This again was divided into research laboratories and laboratories dealing with special problems, and also commercial laboratories.

The paper proved to be most interesting, and it is to be regretted that there was not a larger attendance.

Signed : J. DALTON,
President.

EDUCATIONAL NOTES AND INTELLIGENCE

CHINA CHRISTIAN EDUCATIONAL ASSOCIATION.

ANNUAL MEETING HELD APRIL 2 & 3, 1924.

At the annual meeting of the Advisory Council of the China Christian Educational Association considerable progress was made toward carrying out the re-organization of the association along the general lines proposed in the report of the China Educational Commission which visited China in 1922.

The most important change consisted in the development of a General Board of Christian Education for China which will function through the following Councils :

(1) The Council on Higher Education, which will deal with all matters affecting the higher educational institutions conducted by the Christian forces in China. This council was created by the China Association for Christian Higher Education which met in Nanking in February. It is a representative body composed of one or more members appointed by each of the six higher educational areas recognized in the report of the Commission.

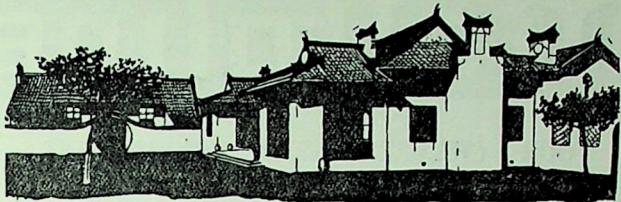
(2) The Council of Elementary and Secondary Education, the bulk of whose membership will be composed of members elected by the ten regional educational associations and (or) Board of Christian Education.

(3) There will be in addition, the Council of Religious Education.

(4) The Council of Adult and Extension Education. These last three are not yet fully organized.

Reports were presented by the local associations and showed that considerable progress had been made during the past year both in the way of standardization and in the development of the machinery for more effective co-operation within the areas concerned.

The staff of the Association has been strengthened during the year by the addition of an Associate General Secretary and steps are being taken with a view to securing a Chinese associate general secretary and executive secretaries for the several councils.



KALEECO WIRING SYSTEM

The Best Electric Wiring for the Climatic
Conditions in China

Ask your Contractor to quote

CALLENDER'S CABLE & CONSTRUCTION CO., LTD.

LEIGH

LONDON

ERITH

STOCKS CARRIED AT 89 PEKING ROAD

Phone C 2590-2594

SHANGHAI

THOS. COOK & SON

ESTABLISHED 1841

Official Passenger Agents for all Railway and Steamship
Companies in China and throughout the World

Cook's Travellers Checks accepted everywhere

Baggage Shipped and Forwarded to all parts of the World

INSURANCE EFFECTED

THOS. COOK & SON

SHANGHAI, PEKING, TIENSIN, HONGKONG, KOBE

Chief Office: LUDGATE CIRCUS, LONDON

Maltoline

TRADE MARK

YOUR CHILDREN NEED NOURISHMENT.

The most nourishing foods for children are those which contain sugar, but that does not mean that children should always be eating sweets, as that injures the teeth. Much good food that children eat contains starch, and the starch is converted into sugar in the process of digestion.

Therefore the best thing for children, is that which will the most readily convert starch into sugar. If that something is prepared in an acceptable form, and also contains added nourishment which builds up the tissues, so much the better.

MALTOLINE is such a preparation, for its power of converting starch into sugar is nearly three times as great as next best Malt product on the market, which is testified to by the British Medical Journal.

In addition to this, Maltoline contains 30 per cent. of Tasteless Olive Oil which in itself is a great recommendation.

As to its acceptability, children take to it like sweets, for it is a Dry Powder, and has a most attractive taste, and NO SMELL.

Its power of converting starch into sugar may be tested in a very simple way:—

Take a dessertspoonful of cooked porridge, and add a half teaspoonful of Maltoline, and see the effect. This is proofpositive.

There is none of that stickiness which is so objectionable in liquid Malt preparations and doctors recommend Maltoline not only for children, but for people in the convalescent stage after illness, and for all wasting diseases, general debility, and any cases where building up of the tissues is needed. A short trial will prove its worth.

Maltoline may be obtained at all the leading Dispensaries.

Sole Agents: JAMES HAMILTON, LTD.

16 Canton Road, Shanghai.

BANDOENGSCHE KININEFABIEKE BANDOENG, JAVA

Manufacturers of pure Quinine products,
and suppliers to Hospitals, Dispensaries
and the Medical Profession all over the
world.

QUININE

SULPHATE (Powder)

BISULPHATE (Powder)

BISULPHATE TABLETS (gr. 1 to gr. 5)

HYDROCHLORATE (Powder)

BIHYDROCHLORATE (Powder)

Stocks of all above held in Shanghai

*Quotations given for all Quinine products in
powder or tablet form on application to*

SLOWE & CO., LTD.

72 Szechuen Road

Tel. C. 1984

SHANGHAI

Wholesale Agents for

BANDOENGSCHE KININEFABRIEK

TO AMATEUR PHOTOGRAPHERS

If you value the exposures you make send us the films and plates for developing and printing. We have up-to-date dark rooms and methods (under FOREIGN supervision) and guarantee to take the greatest possible care with all orders entrusted to us.

MACTAVISH & CO., LTD.

OPPOSITE THE GARDEN BRIDGE
SHANGHAI

RUBBER BELTING

FOR
CONVEYORS
TRANSPORTERS
AND
POWER TRANSMISSION

Netherlands Gutta-Percha Co.

(Singapore Rubber Works)

SHANGHAI

17 MUSEUM ROAD

Asthmolysin

(Registered as a Trademark)

An unusually effective remedy for the treatment of acute attacks
of Bronchial-Asthma

A cardiac—and a foremost vaso-motor Tonic

Subnormal bloodpressure:

Sudden weakness of the heart

Pulmonary oedema

Angina pectoris

Haemorrhages—hard to control

Severe fainting spells

Asphyxia

Sold in boxes containing 10 Ampoules (to be administered
by physicians) or in glass tubes of 20 tablets.

TESTOGAN

For Men

Formula of Dr. Iwan Bloch

After seven years' clinical experience these products stand as proven specifics.

INDICATED IN SEXUAL IMPOTENCE AND INSUFFICIENCY OF THE SEXUAL HORMONES

They contain SEXUAL HORMONES, i.e., the hormones of
the reproductive glands and of the glands of internal secretion.

Special Indications for Testogan:

Sexual Infantilism and eunuchoidism in the male. Impotence and sexual weakness. Climacterium virile. Neurosis, hypochondria.

Special Indications for Thelygan:

Infantile sterility. Underdeveloped mammae, etc. Frigidity. Sexual disturbances in obesity and other metabolic disorders. Climacteric symptoms, amenorrhea, neurasthenia, hypochondria, dysmenorrhea.

DIRECTIONS: A tablet three times daily after meals.

Also in ampules for intragluteal injection, every second day.

Drink

OVOMALTINE

For Health

BUILDS UP NERVE, BRAIN AND BODY

Obtainable from all Dispensaries and Provision Stores.

Sole Agents for China:

SIBER HEGNER & CO., Shanghai

USE
“CROWN” TOILET DAINTIES

On Sale at all Leading Stores

Tooth Paste: Tooth Powder: Shaving Sticks:
Vanishing Cream: Complexion Powder: Hair
Cream, etc. etc.

THE CHINA SOAP CO., LTD.
7 HANKOW ROAD SHANGHAI

Garner, Quelch & Co., Ltd.

WINE MERCHANTS

(Wholesale)

Champagnes: Red and White Wines: Spirits:
Liqueurs: Cordials.

Sandy MacDonald's Scotch

Choicest Brands: Highest Quality

73 and 73A Szechuen Road
SHANGHAI

Agfa

PHOTOGRAPHIC GOODS
OF HIGH STANDARD.

Agfa Rollfilms

Agfa Filmpacks

Agfa Plates for all purposes

Agfa Developers

Agfa Accessories

New: Agfa Colour-Plates for
Photographs *in natural colours.*

Ask for Catalogue.

United Dyes and Chemical Works,
LIMITED

SHANGHAI, TIENTSIN, CANTON, HANKOW, PEKING,
NEWCHWANG, MUKDEN, TSINANFU.

A NEW

No Change in Price for **CORONA**



With the following
improvements—

1. Automatic Ribbon Reverse
2. Longer space bar and shift keys on both sides
3. 10 inch carriage
4. Combination carriage return and line space lever

*Write for particulars
of our*

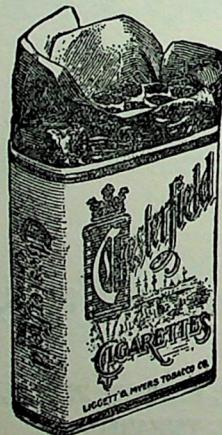
Instalment Plan

M.\$22.50 places it
in your hands and
the balance in easy
payments.

General Agents for China:

DODGE & SEYMOUR (CHINA), LTD.

18 Museum Road, Shanghai.



THE choicest of rich Turkish
tobaccos blended with the
best of American tobaccos.
That's why—

They Satisfy
—and the blend
can't be copied

LIGGETT & MYERS TOBACCO CO.

JOHN RICHARDS & CO., LTD.

8 EZRA ROAD, SHANGHAI

FINE AND HEAVY

CHEMICALS

FOR ALL MANUFACTURING PURPOSES
DIRECT FROM WORKS

Telegraphic Address:
"RICHLY" SHANGHAI

Telephone C. 286



OLIVER

TYPEWRITER *Sole Agents:*

The Anglo-Chinese Import and Export Co., Ltd.

113 AVENUE EDWARD VII

REDUCTION IN PRICES

Model No. 9	\$170
„ No. 10	\$185
„ No. 11	\$200

PRICES:

For 10-in. Carriage

Also 15-in. and 18-in.
In Stock

ENGLISH, FRENCH
AND RUSSIAN
KEY-BOARDS

OLIVER RIBBONS
In Stock

“THE NORTH-CHINA DAILY NEWS”

Established in 1850 as a weekly; in 1865 as a daily.

The "North-China Daily News" writes the history of China. It records the pulse of its politics; it reports the conditions of its finance and its markets; and it chronicles the daily doings of its people.

Annual Subscription \$28

“THE NORTH-CHINA HERALD”

Is the weekly edition of the "North-China Daily News" for readers abroad. It contains 95 per cent. of news and is the best medium for keeping in touch with events in China when out of reach of the daily.

Annual Subscription \$16

Copies of either of the above sent to anyone interested on request.

“The North China Desk Hong List”

Is the only trade Directory of North China issued twice a year. Its information is the most accurate and complete. Published regularly since 1865 it has grown to 1,000 pages. In addition to voluminous classified information it contains the names and addresses of every foreign firm, resident, and missionary in China.

Price : Mex. \$7; with Map \$8. Postage extra.

PAMPHLETS AND BOOKS

On Sale at the Offices of

THE NORTH-CHINA DAILY NEWS

SHANGHAI

THE FAR EASTERN REVIEW

FINANCE—ENGINEERING—COMMERCE

To obtain China Trade, and Knowledge of the Far East

THE GREAT HIGHWAY IS

THE FAR EASTERN REVIEW

The only Engineering Publication in Eastern Asia.

SUBSCRIBE FOR IT

STUDY IT

ADVERTISE IN IT

It Will Pay You

FOUNDED IN 1904

16 JINKEE ROAD

SHANGHAI

**ASIATIC
MOTOR**

Official organ for

The Automobile Club of China
Hongkong Automobile Association

Will keep you fully informed on the World's latest
developments in the Automotive Field.

**INTERESTING, INSTRUCTIVE
FULLY ILLUSTRATED**

30 cents per copy

\$3.00 per year

Head Office : 16 Jinkee Road, Shanghai, China.

PROBSTHAIN & CO.

(J. MURRAY-WOOD),

Oriental Booksellers and Publishers, 41 Great Russell Street, LONDON, W.C.1.
(Specialists in Chinese Literature)

Largest Stock of Books on China and Chinese in the World.

Comprehensive Catalogues on China and Chinese will be issued during 1923.

PUBLICATIONS:

HIRTH ANNIVERSARY VOLUME.
Presented to FRIEDRICH
HIRTH, Professor of Chinese,
Columbia University, New York,
in Honour of his Seventy-fifth
Birthday, by His Friends and
Admirers, 1923. £3 15s. net.

The work contains 28 original and
scholarly contributions dealing with
Chinese Art and Civilisation. Among
the contributors are JOHN C.
FERGUSON, AGNESS E. MEYER, Sir
AUTIEL STEIN, and A. WALEY.

CHU HSIA: THE PHILOSOPHY OF
HUMAN NATURE (HSING LI).
Translated from the Chinese, with
valuable Notes by J. PERCY
BRUCE. 8vo, pp. xvi+444. Price
£1 16s.

The first translation of Chu Hsi,
who is considered the greatest of all
Chinese, ranking next to his master,
Confucius himself.

CHU HSIA AND HIS MASTERS: An
Introduction to Chu Hsi and the
Sung School of Chinese Philosophy.
J. PERCY BRUCE. 8vo, pp. xvi+
336. Price £1 4s.

BUDDHISM AS A RELIGION. By H.
HACKMANN. 8vo. pp. xiii+315.
Price 15s. net.

The only comprehensive work on
Buddhism in all Buddhist countries.
BRIEF HISTORY OF EARLY CHI-
NESE PHILOSOPHY. By Dr. D.T.
SUZUKI. Crown 8vo, pp. 188.
Price 8s. 6d. net.

ILLI; or, BOOK OF ETIQUETTE AND
CEREMONIAL. Translated from
the Chinese, with full Comment-
ary by J. STEELE. 2 Vols. Illus.
1917. Price 30s. net.

The Times states that this is the
most noteworthy work amongst
Chinese work of recent years.

THE CHINA ILLUSTRATED REVIEW

Meets a long-felt need on the part of those interested in
events and politics in the Far East. Edited and printed
in the same offices as the PEKING and TIENTSIN
TIMES, it gives a more comprehensive and reliable
survey of events in the Far East than any other paper.
The illustrations deal chiefly with events in the Far
East, and picturesque scenery in China and Japan.

Proprietors:

TIENTSIN PRESS, LIMITED,
VICTORIA ROAD,
TIENTSIN, NORTH CHINA

PEKING AND TIENSIN TIMES

(Established 1894)

The leading daily newspaper of Northern China, British Owned and British Edited.

Entirely independent in its views and criticisms, the "Peking and Tientsin Times" is by far the most influential newspaper in the district.

Proprietor:

TIENTSIN PRESS, LTD.

VICTORIA ROAD

TIENTSIN, NORTH CHINA

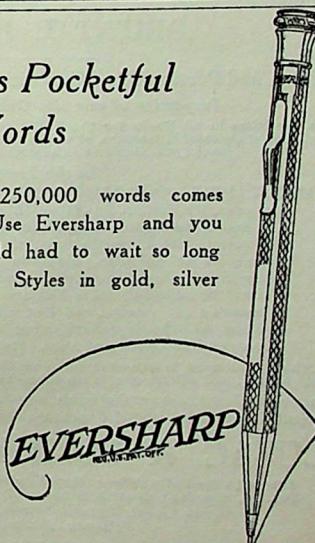
An Endless Pocketful of Words

Enough lead to write 250,000 words comes with every Eversharp. Use Eversharp and you will wonder why the world had to wait so long for this marvelous pencil. Styles in gold, silver and enamel.

Standard Products Co.

14 CANTON ROAD
Shanghai

Wholesale Distributors





FOR INFORMATION

GOW'S GUIDE
TO SHANGHAI
1924

Mex. \$1.00

At all Bookstalls
and Messrs. Thos. Cook
and the American Express Co.

A Complete, Concise and Accurate
Handbook to the City and District
for the use of Tourists and Com-
mercial Visitors.

ORIENTAL BOOKS

Indian and Persian Art, Miniature Paintings, Bronzes, Etc.

Inspection of our Art Gallery is invited.

We specialize in all Books for the Study of Oriental languages, and other
branches of Oriental Literature, of which we keep a large stock. Catalogues
issued periodically and sent gratis on application.

In the Press.

PARUCK (F.D.J.) SASANIAN COINS. Consisting of nearly 500 pages
of text, with about 60 plates, 15 of which contain reproductions
of more than 200 remarkable Sasanian Coins in the British
Museum, the Paris Cabinet, the Berlin Museum, the Indian
Museum at Calcutta, and the Paruck Cabinet at Bombay.
The Facsimiles of the Legends will take up 13 plates of which
4 will be of numismatic Pahlavi alphabet, 3 of legends, 2 of
numerals (in words), and 4 of mint-monograms; the 32 scarce
plates of Bartholomaei have also been reproduced, with
genealogical tables and map. Roy. 4to. Cl., pp. 500. Price £5.

∴ The above work is expected to be ready January, 1924, and as there will
only be a limited edition clients are advised to register their orders in advance.

Luzac's Oriental List, published since 1890, is the best bibliography of new
Oriental literature, issued quarterly. Annual Subscription 3/- post free

LUZAC & COMPANY, Foreign Booksellers. Oriental and

Agents to the India Office; Royal Asiatic Society; School of Oriental
Studies, London; Asiatic Society of Bengal, Calcutta; etc.

46 Great Russell Street, London, W.C.

'Phone: Museum 1462.

SEAPORTS OF THE FAR EAST

Compiled and Edited by
ALLISTER MACMILLAN, F.R.G.S., 1923.

SHANGHAI MERCURY (21/1/24): "The book should have a tremendous sale, as it will be of immense value to all consular officials, business men, educationalists, etc., containing as it does historical and descriptive as well as commercial and industrial facts, figures and resources. We have much pleasure in recommending it."

Price \$45.00 Mexican

(Special reduction to Educational Institutions and Libraries)

CHRISTIAN EDUCATION AND THE NATIONAL CONSCIOUSNESS IN CHINA

By JAMES B. WEBSTER, Ph. D.,
Shanghai College, China

Price \$5.50, Postage 13 cents.

EDWARD EVANS & SONS, LTD.

30 North Szechuen Road, Shanghai 137 Victoria Road, Tientsin.

Keep informed about the new books being published in America

Subscribe for

BOOKS and AUTHORS

A National Guide to the New Books

A literary newspaper, established in 1916 by Frederick Moore. In addition to reviews of new books, this publication contains special articles about books, excerpts from the important books, and general news pertaining to the political, economic, and literary trends.

For the Readers and Buyers of Books

Not edited for Novelists

Not a Trade Paper

Published Monthly.....\$1.00 (gold) Yearly

FREDERICK MOORE, Editor and Publisher

730 Fifth Avenue, New York, U.S.A.



The Brightest Sunday Paper

THE SHANGHAI SUNDAY TIMES

and the Newsiest Daily Paper

THE SHANGHAI TIMES

Delivered to your address for \$20.00 a year

(Postage to Outports EXTRA)

THE SHANGHAI TIMES

24 YUEN MING YUEN ROAD, SHANGHAI

Telephones:

Editorial Offices:
Central 227

Business & Printing Offices:
Central 225

THE NATURALIST IN MANCHURIA.

By ARTHUR DE C. SOWERBY, F.R.G.S., F.Z.S.

Volume I. Travel and Exploration \$12.50 (Mex.)

Volumes II and III. Mammals and Birds. Ready Shortly.

A NATURALIST'S HOLIDAY BY THE SEA.

By ARTHUR DE C. SOWERBY, F.R.G.S., F.Z.S.

\$5.00 (Mex.)

The above books may be had from

THE CHINA JOURNAL OF SCIENCE AND ARTS

102 The Ben Building, Shanghai.

THE UNION TRADING CORPORATION INCORPORATED

Cable Address:
"UNCO" Tientsin

All standard
Codes used.

EXPORTERS
and
IMPORTERS
Correspondence invited.

Head Office:
210 Bristow Road,
Tientsin, China.
Branches and Agencies
throughout China and
principal cities all over
the world.

FURS, FEATHERS AND RUGS

All kinds of Oriental furs—silver and red fox, weasel, squirrel, lamb's and kid's skins and other fine North China furs and skins. Oriental fancy feathers of various colours. Fur mats of every description and Tientsin and Peking rugs and carpets in beautiful and original designs.

GENERAL IMPORT AND EXPORT GOODS

Walnuts, peanuts, apricot seeds, sesame and rape seed, soya beans, white beans and other vegetable products.

NOTICE

COVERS INDEX

THE CHINA JOURNAL OF SCIENCE AND ARTS

The proprietors of the above journal are desirous of acquiring the following back numbers and are willing to pay for same as stated below:—

January 1923 copies ... \$3.00 per copy
March " " " ... \$2.00 "

Subscribers who wish to bind the 1923 numbers of the Journal in Volume form may apply for the printed **Title Page** and **Index** which are now ready.

A Special Cover for binding the 1923 numbers of the Journal in Volume form has been prepared, and subscribers may have same on application for the sum of **\$2.00**, which should accompany order.

Office : 102 The Ben Building, 25 Avenue
Edward VII, Shanghai.

The National Aniline & Chemical Co.,

U. S. A.



Manufacturers of COAL TAR DYESTUFFS

Indigo Paste 20% Buffalo Head chop

Sulphur Black Buffalo Head chop

and a FULL LINE of ACID, DIRECT and
BASIC COLORS

Manufacturers of

ACRIFLAVINE

NEUTRAL ACRIFLAVINE

(sometimes called Trypaflavin)

STOCKS CARRIED

Fully equipped laboratory in Shanghai

Head Office : 40 Rector Street, New York City

Factory : Buffalo, New York, U.S.A.

Main Office for China : 14 Canton Road, Shanghai

Branch Office : 7 Russian Bund, Hankow

Agents :

Newchwang, Tientsin : Messrs. Arnhold & Co., Ltd.

Hongkong : Messrs. Bradley & Co., Ltd.

NESTLE'S
PETER'S
CAILLER'S
KOHLER'S } CHOCOLATES

Are sold **EVERWHERE** in China

Because

They are **KNOWN** as the Best

FLYOSAN

FLYOSAN is a new spray—though it has been on the market but a short time, it is already used regularly by the United States Navy, leading hospitals, hotels and progressive farmers who realize how insects and parasites worry and sap the energy of their live stock and poultry.

FLYOSAN does not drive flies away. It kills them before they can get away. While killing flies it kills spiders, lice, bugs, and any of the other insect pests you find around a farm.

FLYOSAN will not gum or discolor the hair of white animals, as it evaporates completely, leaving no stain or trace behind.

FLYOSAN is purely mechanical. It kills bugs by strangulation. It clogs their breathing apparatus. Thus it may be used freely on animals or fowl without fear of injury.

Sole Distributors for the Far East:

THE YOUNG LEE CO.,

25 JINKEE ROAD, SHANGHAI



*Glorious Health
follows in the
Path of Sanatogen*

There are thousands upon thousands of healthy people who owe all their glorious health of body and nerves solely to the regular use of Sanatogen. It contains, in an easily digested form, every restorative element needed to make good worn out nerve cells and body tissues.

When beset by weakness of nerves and body, then is the time to take Sanatogen, before the undermined constitution becomes an easy prey to dysentery, malaria, typhoid fever or some other serious ailment.

Mr. Harry de Windt, the famous traveller, writes:—"I have derived enormous benefit from taking a short course of Sanatogen. In a few short weeks it made a new man of me, physically and mentally."

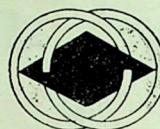
Dr. C. W. Saleebey, says:—"To maintain health and vigour in hot climates a man must pay very careful attention to the problem of diet." He recommends Sanatogen as an "ideal nerve food which precisely responds to the requirements of diet in the tropics."

Of all Chemists and Stores

SANATOGEN
The True Tonic Food

Sir Hall Caine, the eminent author, writes—
"I have lately had further proof of the efficacy of Sanatogen in building up and restoring the nervous system under conditions of severe mental or emotional strain."

THE KAILAN MINING ADMINISTRATION



KAIPING COAL

Well known throughout the East for STEAM RAISING,
FORGING, SHIP'S BUNKERS, and all Industrial and
Household Purposes.

KAIPING COKE

Competes with best quality ENGLISH COKE for FOUNDRY,
SMELTING, etc.

FIREBRICKS AND FIRECLAY

Highest Grade Square, Arch and Cupola.

STEAMSHIP SERVICE

Frequent Sailings to Tientsin and Chinwangtao.

For further particulars apply to

The Kailan Mining Administration,

The Hongkong & Shanghai Bank Building

No. 12 The Bund

North Corner, First Floor

Telephone: All Departments Central 317

Chemical Works **Gedeon Richter** Budapest X.

SPERMIN

“RICHTER”

Acknowledged by the highest medical authorities as the only reliable and unsurpassable remedy as well as a tonic in cases of :

Sexual-Neurasthenia, Impotence,
Anemia, Pernicious-Anemia, etc.

SPERMIN-LIQUID

Three times a day 15 to 20 drops.
One bottle (25 cc.)
Mex. \$1.40

SPERMIN-INJ.

One injection each second day.
One box (6 Amp.)
Mex. \$2.00

SPERMIN-GRANULATED

Three times a day 1 teaspoonful.
One bottle (75 gr.)
Mex. \$1.40

SPERMIN-TABL.

3 to 6 tablets a day.
One tube (50 tabl.)
Mex. \$1.40

Obtainable at all leading dispensaries.

Sole Agents for China :

G. GMEHLING & CO., SHANGHAI, 26A Canton Road

Express International Forwarding Agents

Expert Curio & Furniture Packers

MERCHANDISE AND FURNITURE
WAREHOUSING.

CUSTOMS CLEARANCE BROKERS.
MOTOR TRUCK TRANSPORTATION.

Commercial Express & Storage Co.

8B YUEN-MING-YUEN ROAD 'Phone C. 937 and 347

SCIENTIFIC TRAVEL

Itineraries arranged and Hotel reservations made without
charge.

Railway and Steamship tickets at tariff rates.

World-wide service at your disposal.

American Express Travelers Cheques are recognized as
an International Currency.

Offices in the Far East

Shanghai—Tientsin—Peking—Kobe—Manila—Calcutta—
Bombay

AMERICAN EXPRESS

RUBBER GOODS

English Goods of Messrs. Ingram & Son's
Noted Make.

A large assortment always in stock

Red Hot Water Bottles, of guaranteed quality
in all sizes.

These bottles will not burst, and cannot leak.
Fitted with Ingram's patent neck and stopper.
Red and white sheeting in various qualities.
Enemas, Syringes (various), Spray bellows, etc.
The quality is the best. Prices moderate.

Sole Agents:

JAMES HAMILTON, LTD.

16 CANTON ROAD, SHANGHAI

Write for catalogue

GERMOL

For beautifying and strengthening the hair there is no
better Tonic than Germol.

Germol removes Dandruff and cleanses the scalp.
Attack the trouble where it originates and remove
it at once.

One bottle will prove the superiority of

GERMOL over other
preparations.

Attend to the children's hair whilst they are young,
and avoid trouble later.

Remedy whatever trouble you have before it is too late.
Preserve your hair in advanced age by giving it the
nourishment it requires.

Obtainable from all Dispensaries

Sole Agents:

JAMES HAMILTON, LTD.

BOURNVILLE COCOA



Manufactured by
CADBURY BROS., LTD.,
BOURNVILLE, ENGLAND.

本味可可粉

“A DELICIOUS BEVERAGE”

AND

“MAXIMUM FOOD VALUE”

BOURNVILLE COCOA can be obtained in
principal cities and outports throughout
China and Japan.

AGENTS IN CHINA:

GEO. McBAIN, Import Dept., 17 Kiangse Road, Shanghai
W. G. HUMPHRIES & CO., Des Vœux Road, Hongkong
TWYFORD & CO., 2 The Bund, Tientsin
F. J. BARDENS, Dairen, South Manchuria
J. WITKOWSKI & CO., Kobe and Yokohama, Japan

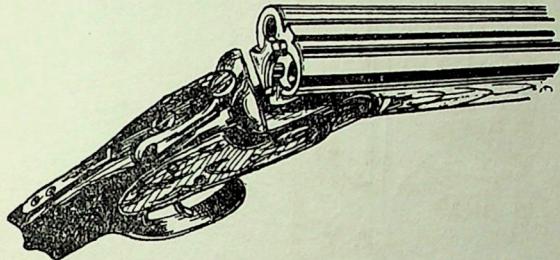
VICKERS LIMITED

19 GAN MIEN HUTUNG, EAST CITY, PEKING.

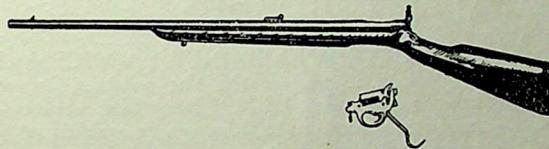
Manufacturers of Sporting Guns.

THE VICKERS "IMPERIAL" DOUBLE BARRELLED 12-BORE GUNS, and also

THE VICKERS "VANGUARD" SINGLE BARRELLED 12-BORE GUNS, both of EJECTOR TYPE.



MANUFACTURERS OF THE FAMOUS VICKERS .22 BORE MINIATURE RIFLES as supplied to the Small Bore Club of the Shanghai Rifle Association. These small rifles are excellent not only for target shooting but for Rook, and Rabbit shooting, etc.



Manufacturers of all kinds of Rifle Range Equipment and Rifle Accessories.

THE VICKERS .242 MAGAZINE EXPRESS RIFLE, unsurpassed for Deer stalking and use against soft skinned game difficult of approach in both hilly and open country.

THE VICKERS .318 MAGAZINE EXPRESS RIFLE for all game including Tiger and Lion.

Full information regarding any of the above from Vickers Limited, Peking.

SAMPLES OF ABOVE IN STOCK.

LUX



For Dainty Fabrics.



DELICATE AND DAINTY FABRICS should always be washed with that delightful, creamy, lathering preparation LUX. Every flake of Lux is transparently pure. The flakes can be whisked into a cream-like lather in an instant. The fabrics are washed with a surprising speed, for Lux dissolves the dirt from each garment quickly as well as very gently.

WOOLLENS, AND FLANNELS also, should always be washed with LUX, because it prevents the texture of loosely woven fabrics from matting together and shrinking in the wash. Lux preserves to all fabrics their natural softness and charm. No material looks or feels harsh when washed with Lux.

WONT SHRINK WOOLLENS. WONT DISCOLOUR SILKS.

The China Soap Co., Ltd.

Shanghai-Hongkong-Tientsin
Hankow-Tsinanfu-Moukden

The China Press

Every year readers and advertisers alike are demonstrating their increasing confidence in the value of *The China Press*, as a recorder of the world's news and as an unrivalled publicity medium throughout China.

If you are not already a subscriber to

THE CHINA PRESS

you may not be aware of the pains we have taken and the improvements we have effected in the production of a brighter and a better paper, containing all the news of the day, besides special features for all classes of readers.

Subscription rates: 6 months \$15, 12 months \$28; outport and foreign postage extra.

THE CHINA PRESS

14 Kiukiang Road, Shanghai.

Sample Copies Free upon Request

THE ADMIRAL ORIENTAL LINE

Agents :

UNITED STATES GOVERNMENT SHIPS

A Fast and Comfortable

TRANS-PACIFIC PASSENGER SERVICE

STEAMSHIPS:

President Madison—President Grant—President Jefferson—President McKinley—President Jackson

SAILING EVERY TWELVE DAYS

THE SHORT ROUTE

SEATTLE; VICTORIA; YOKOHAMA; KOBE; SHANGHAI; HONGKONG AND MANILA

For Information and Rates apply to

THE ADMIRAL ORIENTAL LINE

Agencies :

YOKOHAMA
KOBE

SHANGHAI
HONGKONG

MANILA
SINGAPORE

PHYLLOSAN

Invaluable for the treatment of Anaemia, Chlorosis and Wasting Diseases of whatever origin.

WYANDOTTE

SANITARY CLEANSING PREPARATIONS.

Detergent for Marble, Tiles, Painted Surfaces.

Cleaner and Cleanser (an unequalled Water Softener), for the kitchen, ice chest, etc.

Yellow Hoop, for the laundry.

ALABASTINE

Wall Tints. Used in Churches, Schools, Hospitals, or wherever beautiful walls are desired.

ELI LILLY & CO.

INDIANAPOLIS

Manufacturers of Pharmaceutical and Biological Products.

Stocks carried in Shanghai

Prices and Particulars from the Sole Agents:

China & Japan Trading Co., Ltd.

42 KIANGSE ROAD, SHANGHAI

(MENTION THIS JOURNAL)



LACTOGEN

THE NATURAL MILK FOOD

IS

FULL CREAM
COW'S MILK

SPECIALLY PREPARED TO RENDER IT THE MOST
PERFECT SUBSTITUTE FOR MOTHER'S MILK.

COMPOSITION

The analysis of Lactogen as packed, and when suitably diluted for use, is as follows:

Lactogen.	Lactogen diluted with 6½ parts of water by weight.	Average Composition Human Milk.
Fat...	23.49	3.10
Lactose	47.86	6.60
Proteids	21.00	2.00
Ash	4.65	0.20
Water	3.00	88.10
	<hr/> 100.00	<hr/> 100.00
		<hr/> 100.00

Lactogen contains ALL the fats of milk, and NO foreign ingredients.

閱此上粉列成之表請 優美代乳品 成爲最純全 方法製煉而 牛乳用特別 乃是純淨之 代勒吐粉精

ATTENTION READERS

It is an undisputed fact that every unendowed or unsubsidized journal depends for its existence upon the advertisements it carries: and if our readers are pleased with this journal, and desire that it shall continue to exist, they cannot help us in any better way than by supporting those who advertise with us. When contemplating making any purchases, will they please look through our advertisement pages to see if what they require is advertised therein, and, if so, will they direct their enquiries to the firm concerned. Do not forget that we are absolutely unsubsidized, and our existence depends entirely upon the support of our subscribers and advertisers.

1924 • ORDER FORM • 1924

“The China Journal of Science & Arts”

EDITED BY ARTHUR DE C. SOWERBY.

102 THE BEN BUILDING
SHANGHAI CHINA

To the Manager,

Please enter my name as a subscriber to “The China Journal of Science & Arts” for the year 1924, for which I enclose ten dollars (\$10,00), Shanghai currency (or equivalent), or six dollars Gold (G. \$6.00)

Name.....

Address to which journal is to be sent.....

POSTAGE FREE