

THE KING EMPEROR

AND HIS DOMINIONS

SOUVENIR OF THE CORONATION DURBAR OF
H.I.M. GEORGE V.

DELHI, DECEMBER, 1911



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Bhub Bahadur, G.C.I.F., C.B., A.D.C.), which have taken
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THE STAR OF INDIA

The Star of India is the famous Order of Knighthood for India instituted by the Queen-Empress in 1861. The above illustration depicts the Jewel of the Order as worn by Knights Commanders.

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III

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“ Pray you halt awhile.
His Majesty steps e’en now across the }threshold.
Never did footfall more musically keep time
With our hopes: he comes to lighten all hearts.”



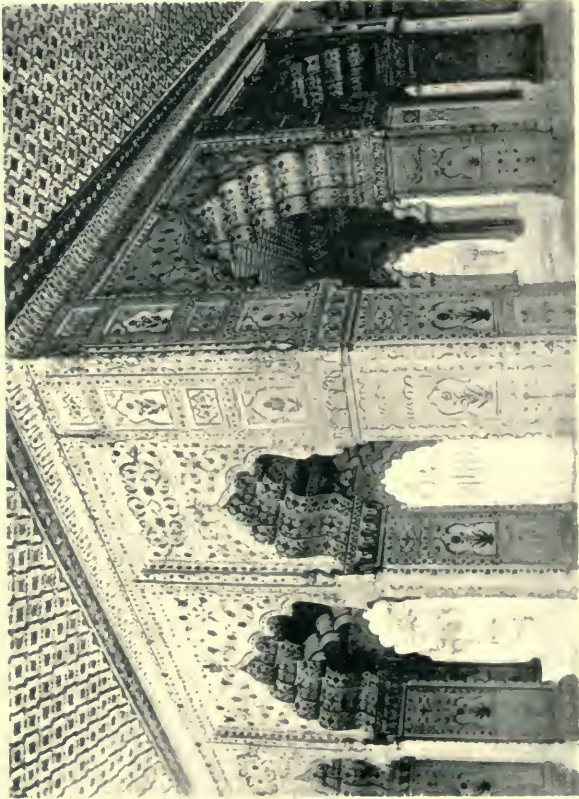
His Most Excellent Majesty
GEORGE THE FIFTH
King of Great Britain and Ireland and of the British Dominions beyond
the Seas, Emperor of India
Born June 3, 1865; succeeded to the Throne, May 6, 1910



Her Majesty **QUEEN MARY**
Born May 26, 1867



His Royal Highness
EDWARD ALBERT, Prince of Wales
Born June 25, 1894



INTERIOR OF THE DIWAN-I-KHAS
Delhi



QUTUB MINAR
Delhi



JAMA MASJID
Delhi



TAJ MAHAL
AGRA



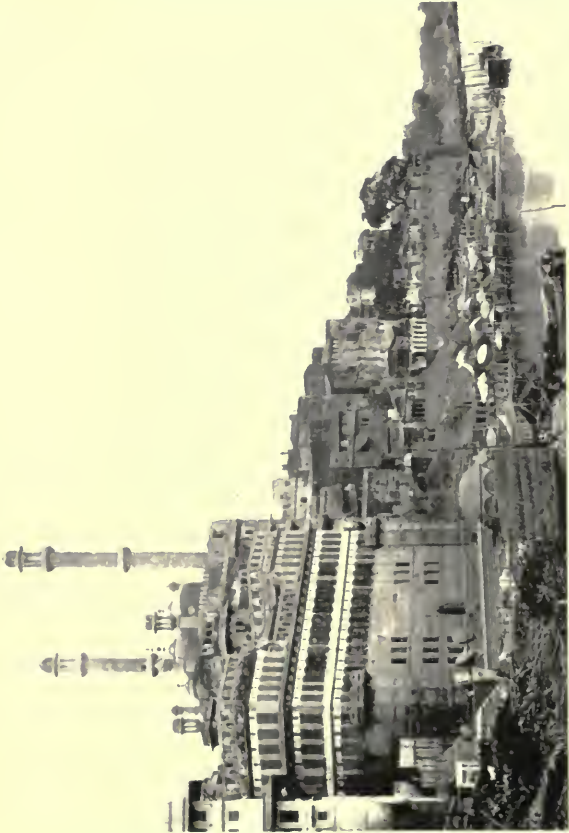
MAUSOLEUM OF AKBAR
AGRA



Meutzi Masjid
Agra



GREAT JAMA'ARA AND MOSQUE
Lucknow



MOSQUE OF AYRANGZHE
Bessarabia



GOLDEN TEMPLE
AMRITSAR

SOME FAMOUS
ANCESTORS AND PREDECESSORS
OF THE
KING EMPEROR



ALFRED—"THE GREAT"
King of the West Saxons, 871-901



WILLIAM THE FIRST
Born 1027. Reigned 1066-1087



HENRY THE FIRST
Born 1068. Reigned 1100-1135



EDWARD THE FIRST
Born 1239 - Rigned 1272-1307



EDWARD THE THIRD
Born 1312. Reigned 1327-1377



KING HENRY VIII.

HENRY THE EIGHTH.
Born 1491. Reigned 1509-1547.



QUEEN ELIZABETH

QUEEN ELIZABETH
Born 1533. Reigned 1558-1603



JAMES THE FIRST OF ENGLAND AND SIXTH OF SCOTLAND
Born 1566. Proclaimed King of Scotland in 1567, and Reigned over



CHARLES THE FIRST
Born 1600. Reigned 1625 1649



From a Picture in Bindwell Hall, London, the Original painted by Sir Peter Lely K^t. See Volume 5, page 226

CHARLES THE SECOND
Born 1630 Reigned 1660-1685



WILLIAM THE THIRD
Born 1650 Reigned 1688-1702



GEORGE THE FIRST
Born 1660 Reigned 1714-1727



GEORGE THE SECOND
Born 1683. Reigned 1727-1760



GEORGE THE THIRD
Born 1738 — Reigned 1760-1820



GEORGE THE FOURTH
Born 1762. Reigned 1820-1830



VICTORIA THE GOOD

Queen of Great Britain and Ireland, and First Empress of India
Born 1819. Reigned 1837-1901



EDWARD THE SEVENTH
King of Great Britain and Ireland, Emperor of India
Born 1841. Reigned 1901-1910

CORONATION REGALIA



Edward I's Crown,
after Sir E. Walker.



Edward III's Crown,
after Sandford.
Enriched by Charles I.



Queen Elizabeth I's
Crown,
after Sandford.

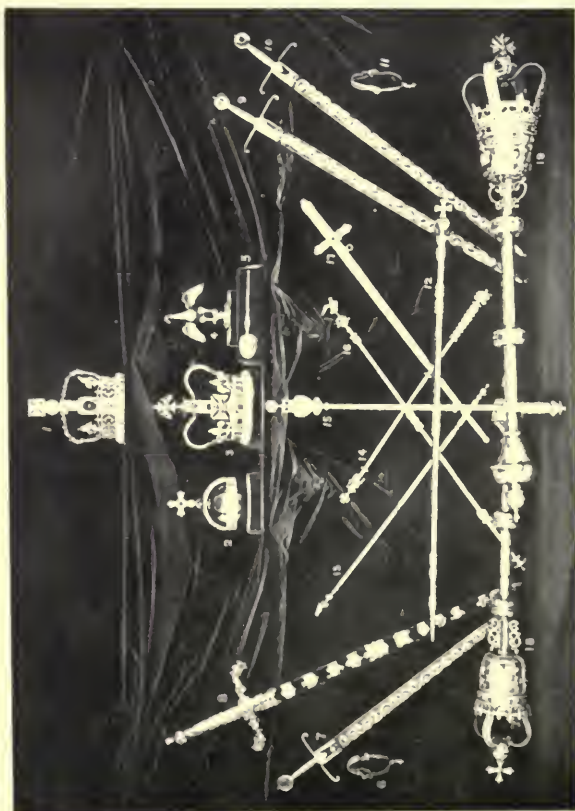


Edward VI's Crown,
as worn by
James VI.



St. Edward's Crown,
as it is at present.

SOME FAMOUS BRITISH CROWNS



THE KING'S REGALIA

- As used at the Coronation in Westminster Abbey
1. The Imperial Crown
 2. The Orb
 3. St. Edward's Crown
 4. The Ampulla
 5. The Anointing Spoon
 6. St. George's Spur
 7. The Curtana, or Sword of Mercy
 8. The State Sword
 9. The Ivory Sceptre
 10. The Queen's Sceptre with Cross
 11. The Royal Sceptre
 12. The Sceptre with Dove
 13. The State Sword of Offering
 - 14 & 15. The Maces of the Sergeants-at-Arms

INDIA :
PAST AND PRESENT



CAVES OF ELLORA
Bombay

INDIA: PAST AND PRESENT

INTRODUCTION

THE history of the early ages is marked by many vague converging lines which point to a nucleus of human civilisation somewhere in the west central region of Asia.

Before written records, before even the beginning of monumental and rock-cut chronicles, pictorial, pictographic or hieroglyphic, the Aryan family peopled the fruitful plains and took shelter among the rocky fastnesses of that birth-place of their race

The history of their wanderings and of the development of their several branches, contains all that is best and greatest and most worthy in the long chapter of human achievement.

The exploits of each of the distinct and very diverse peoples who spread from this common stock over Europe and Asia, are of immense interest, but behind these lies the story of the family itself

The mass of detail and the crowd of figures which spring upon the stage when written history begins tend to obscure the most poignant situations in the slowly unfolding drama of these Aryan brethren. It is only by leaping many centuries in a single stride and disdaining in our flight the narrow landmarks of dynastic and national epochs, that we can mark the steps of evolutionary progress, and observe the true outlines of the strange and moving spectacle of man in the making, as it reveals itself in the story of this great branch of the human race, and from such a rapid review some new points of fascinating study emerge

How dramatic, for instance, when viewed in this light, is the meeting which takes place to-day in Hindustan between the English and their Indian brethren. For brethren they are, scions both of the same Aryan family. Their ancestors once worshipped the same gods, tilled the same earth and roamed side by side the same central plains. They have wandered far apart for many thousands of years, to come together at last upon the sacred soil of India, in the historic streets of Delhi, by the banks of the mighty Ganges or beside the blue waters of Narbada.

The Aryan
family

And its
wanderings

The Anglo-Saxon has come to this eventful meeting through a pathway of long and strenuous educational struggle. His Celtic and Germanic ancestors were among the first to break away from their Aryan home. He has wrestled with fierce enemies and conquered immense natural difficulties, cold and hunger have taught him their bitter but effectual lessons, and the sea has schooled him in its splendid secrets. He has been the heir of all ages and has assimilated as part of his intellectual heritage

"The glory that was Greece,
The grandeur that was Rome."

The struggle for existence against enormous odds has directed his attention towards material problems, and he has learned to tame the forces of nature and mould them to his will.

The sheer necessities of time and place have forced upon him the pursuit of knowledge in its most practical forms. He has had to build against the tempest and the storm, to foresee and provide for winter and famine, to gather energy from mechanical science and capture electricity from the very clouds in order to accomplish the Titanic tasks to which destiny has called him.

And all this time, while the long and stormy panorama of European history was unwinding its slow length, and developing this latest product of Aryan civilisation in the north, another limb of the same growth, a branch of the self-same family tree was progressing and developing in an entirely different direction, upon the fruitful plains which lay secluded from the rest of the world, beyond the barrier of the Himalayas.

The Hindus were, it is thought, the last to leave the central home of the Aryan family. That the whole race, or rather the vast and varied congeries of races, now grouped under the generic name of Hindu, is not all of Aryan descent, is obvious. Few, perhaps, can be regarded as entirely devoid of some admixture of alien blood, but the Aryan has stamped the impress of his character upon the whole of India, and has given to the art, religion and philosophy of this wonderful country its most distinctive and characteristic features.

To the genius of an Aryan people must be attributed the marvellously intricate structure of Hinduism, that all-embracing system which is at once a religion and a social organisation, and which has for ages dominated the minds, and controlled the secular occupations of so many millions of the human race.

While Europeans have sought to conquer the world of external nature, the Hindu has, for thousands of years, been pre-occupied with the affairs of the soul. Religion and philosophy, the pathway towards a higher spiritual state, the search through the visible towards the unseen, these have been the subjects of his constant thought, and such themes form the immense mass of Vedic and post-Vedic literature.

At last the course of events has set these two widely divergent aspects of Aryan civilisation, the Anglo-Saxon and the Hindu, side by side in modern India. In their resemblances, as well as by their contrasts, they provide what is, perhaps, the most remarkable ethnological object lesson on the influence of environment and of heredity which the world has ever seen.

To trace out in brief outline some of the causes and impulses which have moulded modern India, and have made it a land of such vivid contrasts, deep impenetrable problems, and withal a land and a people of such enthralling and surpassing interest, is the object of the following pages

Meeting of
Eastern and
Western
civilisations





COLONNADE OF HINDU PILLARS
Delhi

CHAPTER I

BRAHMANISM

From certain passages in the Vendidad, a part of the sacred Zend Avesta of the antient Persians, it appears that the final dispersion of the Aryan family was traditionally attributed to some great natural cataclysm or upheaval (probably volcanic) which brought about a disastrous change of climate at the site of their antient home.

"There Ingromaniyus the Deadly," says the record, "created a mighty serpent, and snow, the work of Deva; ten months of winter are there, two of summer."

Such a description accords with the present climate of parts of Tibet, Pamir and the district about the sources of the Oxus and the Jaxertes, and points to this region as the cradle of the Aryan race.

There are no known monuments of this great ancestral family but it may well be that Tibet, that home of mystery as yet so incompletely explored, contains some which await the patient investigation of future ages. But man has been more permanent even than his monuments, and language both antedates and outlasts written inscriptions.

Philological research under the impulse of such men as Jacob Grimm, Colebrooke, Max Müller, and others, has succeeded in lifting the veil and throwing some faint light upon the habits of these people and the degree of civilisation attained in that far-off age.

Common origin
of
Indo-European
languages

It has been shown that the Arvan, Greek, Italian, Letto-Slavoman, Germanic and Celtic languages are all derived from the same source.

To such a common origin, the root sounds which lie at the base of these languages in all or most of the words that denote the common daily wants of life, bear witness. These word roots show that, previous to the great disruption, the Aryan tribes had learnt the use of ploughs, boats and wagons, that they had tamed the horse and were accustomed to such domestic animals as oxen, swine, dogs and goats.

They knew something, too, of weaving and the use of numbers, and had weapons of iron.

They had also divided the year into periods of time according to the phases of the moon.

It was a part of this noble race, already far advanced upon the road of knowledge and culture, which began, probably more than 3000 years ago, to force its way through the narrow defiles of the Himalayas, and to descend upon the northern plains of Hindustan.

They marched forward across the Sutlej river and on, in ever-increasing numbers, towards their new home in the south-east, and as they marched they sang.

The Vedic hymns, which have come down in unbroken succession from mouth to mouth, through many generations, form probably the most complete, and certainly the most voluminous body of oral tradition in existence. They were first inscribed, not upon stone or parchment, but upon the unseen tablets of the human brain, and to this day there are youths in Brahmanic families who can repeat the whole of the 10,580 verses of the Rig-Veda by heart.

At what date they were first written down in Sanskrit, is unknown: many manuscripts have doubtless perished in the destructive climate of India. The oldest at present in existence was written about A.D. 1008.

The Vedas, the composition of which is traditionally ascribed to the seven sacred Rishis from whom Brahmans claim descent, are not written in the form of annals or records of scenes, and events: they were mainly invocations to the bright gods whom the Aryans worshipped; but none the less, they contain many references by which it is possible to trace, step by step, the settlement of the conquering Aryan race in their descent southwards through the Punjab.

They also contain much interesting information concerning the social and family customs of the people as well as their religious beliefs. Like most nomadic tribes they were patriarchal in their earliest systems of government.

The father of the family was at once the warrior and the priest. The chieftain was regarded as the father and the priest of his tribe.

They adored the deity as the Father of Heaven, Dyaush-pitar, and the encompassing sky, Varuna. The early gods

Indra was the god of Clouds, and Aquæous Vapour, and Agni the god of Fire.

As the importance of recurrent rains became more and more obvious Indra grew to be the chief deity of these early Vedic hymns.

By degrees, gifted families who composed or learned the Vedas, were chosen to recite them at special sacrifices or festivals, and members of this priestly caste grew to be the sole depositories of all the lore of the national religion.

The successful prayer was called a Brahman, and those who chanted the appropriate hymns and offered sacrifice were Brahmans. The dawn of Brahmanism

At first selected for natural talent, they soon became a hereditary caste, and they succeeded in moulding practically the whole population into the social organisation which they desired. This consisted of the division of the people into four great orders or castes, afterwards split up into almost innumerable subdivisions.

The Brahmans, the priestly and literary caste,

The Kshattrivas or Rajputs, the warriors and companions of the King,

Vaisvas the husbandmen, cultivators of the soil, and the Sudras, or serfs, to whom the lowest tasks were deputed, and who were not permitted to take part in the national sacrifices.

It was not without a struggle that the Brahmans obtained their position of superiority over the proud warrior caste, and they were even forced at one period, to assign a higher place to the Rajputs, but gradually their superior mental attainments and the necessity for their services at all national, tribal and family functions won the day. Through many verses of the Veda there runs the story of a dispute between Vasishtha, an Aryan sage, type of the priesthood, and Visvamitra, a representative of the royal warrior rank.

The Brahmans taught that they came from the mouth of the Creator. It was theirs to counsel and direct men in

the path they should follow, and to propitiate the national gods.

The Kshatriya, or Rajput, was sprung from the Creator's arms, and it was his mission to fight the enemies of the State.

The Vaisya came from the thighs of the deity, and his task was to till the earth, to buy and sell and to practise various trades and professions.

The Sudra came, the Brahmans taught, from the feet of God, and it was his duty humbly to serve the other castes ; he was not permitted to approach the solemn sacrifices, or to touch the food of the Brahman.

Their power once established this great priestly caste showed extraordinary wisdom in its exercise. While claiming for themselves supreme rank, the Brahmans disclaimed worldly pomp and luxury and demonstrated the deep sincerity of their religious aspirations by prolonged study and the practice of severe austerities.

The ideal life of a true Brahman was divided into four parts : his youth was spent in study of the sacred traditions, as a young man he married in his own caste and undertook the duties of a householder ; having reared a family he departed, in middle age, to the forest and spent several years in lonely meditation and asceticism as a recluse. The last stage of his life was that of a holy mendicant, dead to all material joys, wandering from place to place, staying but one day in a village lest earthly ties or claims should beckon him back to the world, and eating nothing save what was voluntarily bestowed upon him as he passed.

All his life a Brahman practised the greatest temperance. It was a life of self-restraint, of self-culture, of prolonged study, and of earnest seeking after spiritual truth.

The study of the Vedas has brought to light many very important and interesting facts concerning the early condition of Hindu society. The oldest, the Rig-Veda, to which reference has already been made, contained no allusions to caste. In it, woman occupies a high and dignified position as the friend and companion of man. The

The ideal life
of a Brahman

The historical
value of the Veda

suttee was as yet unknown. In these sacred and primitive records of religious aspiration the prayers and hymns of a great people, noble yet child-like in their simplicity and magnanimity, rise to their bright gods, their shining ones Brahma, Agni, Indra, Varuna and the rest.

The earliest songs disclose the race still to the north of the Khaibar Pass in Kabul—the later ones bring them as far as Ganges. The settlers spread over the vast plain of the five rivers, and from a nomadic, became a settled, population of husbandmen.

Veda meant simply "inspired knowledge," and in process of time all the Vedic hymns, by their various Rishis or families of composers, were arranged into four books for the use of the ministering priests. The Rig-Veda contained the hymns in their simplest form; the Sama-Veda was made up of extracts from the Rig-Vedic hymns to be used at the great Soma sacrifice; the third, or Yajur Veda, contained Rig-Vedic verses and also prose sentences intended for use at the sacrifice of the new and full moon and at the great horse sacrifice; the fourth, or Atharva Veda, was compiled from the least ancient of the Rig-Veda hymns, and from later songs of the Brahmans.

As the ceremonies became more elaborate, additional instructions in their symbolism and ritual became necessary, and the Brahmanas were composed as commentaries to each of the Vedas. Besides explaining the Vedic ritual, they contain many religious precepts and maxims, and are included among the *śruti*, or things heard from God.

Brahmanas
and Sutras

They were succeeded by the Sutras, or sacred traditions, although these were not regarded as of equal sanctity to the Vedas and Brahmanas.

A further series of theological works, the Upanishads and the Aranyakas; the law codes, including the famous Code of Manu, and much later the Puranas, or traditions from of old, make up a great body of Sanskrit literature, the origin of which, scholars attribute to various periods from 800 B.C. to A.D. 1000.



FACIJS MUNSARPU
Trichinopoly

Thus, in the central plain of the Ganges, the middle land of India, the Aryans established their gods, their learning, and a new social order. Into the spacious triangular region, bounded by the Himalayas, the Vindhyas, and the Ghats, they pushed steadily southwards.

The land was not won without fighting, but once conquered, the aboriginal races appear to have accepted their fate with resignation, and ceased to struggle against the superior civilisation of the north.

The system of caste crystallised and grew harder. The old Vedic gods, who had seemed such near and friendly beings, faded, and the Brahmanical triad of Brahma, Vishnu and Siva took their place.

Of these, Vishnu was the most popular, and the Brahmans taught that no less than ten times he had visited the earth, his seventh and eighth incarnations as Rama and Krishna were the most revered.

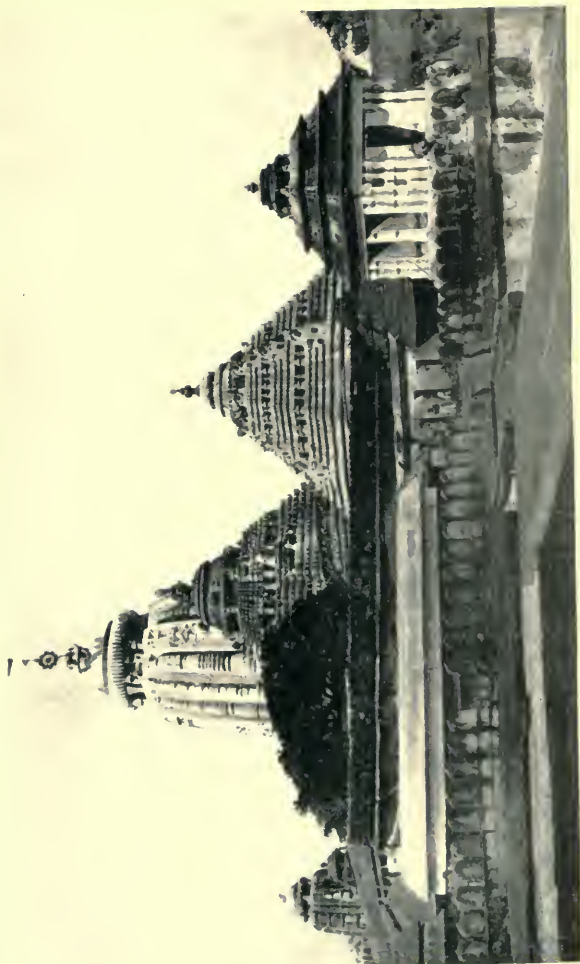
Siva, the Destroyer and Producer, was the embodiment of that conception of death as the gate of a new and altered life, which permeates Hindu thought.

Besides the Vedas and their commentaries, there has come down, from very early times, a great body of traditional poetic literature, including the two great epic poems, the Mahabharata and the Ramayana.

These throw further light upon the early history of the Hindus, and depict the struggles of gods and heroes in the twilight of the prehistoric period, when the Aryans were settling on the territory between the Jumna and the Ganges, which is still regarded as the "holy ground" of India.

The "Mahabharata," which contains 110,000 shlokas or couplets, relates the story of the five miraculously born sons of King Pandu, of how they won the Princess Draupadi at the tournament arranged in her honour. Of the jealousy and hatred of the cruel Kauravas. Of how Yudisthira, the eldest of the five brothers, staked his kingdom on the dice, and losing, went into exile with his brethren and Draupadi. Of how the Pandavas fought and slew all the Kauravas, and reigned in Delhi gloriously, until

The
"Mahabharata"



PURI JAGANNATH TEMPLE

the taunts of their uncle, Dhrita-rashtra, who accused them of the murder of his hundred sons, filled them with remorse.

It relates their abandonment of the kingdom and their pilgrimage to Heaven, far up the heights of Mount Meru in the Himalayas, where Indra dwells in everlasting peace.

Many philosophical and didactic discourses are added to the main story, intended for the most part as instructions to the military caste in its duties, especially in that of reverence towards the Brahmans.

The "Ramayana" has a more mythological and allegorical tone. It recounts the story of Sita, literally the field furrow and symbolical of Aryan husbandry, and of the divine hero Rama, an incarnation of Vishnu, who defends Sita against the raids of savage tribes. A demon prince carries off Sita to Ceylon, and the wanderings of Rama, in his efforts to recover her, incidentally display the southward movement of the Aryan tribes.

The
"Ramayana"

Among later Sanskrit epics, the "Raghu-Vansa" and the "Kumara-Sambhava" are the most notable, and, from the astrological data contained in them, belong evidently to a period about A.D. 350. They are attributed to Kalidasa, who was also the father of the Sanskrit drama and the author of that sweetest of Indian poems, "Sakuntala" or the "Lost Ring," a subject which aroused the enthusiasm of the great Goethe and which he, in turn, enshrined in beautiful and deathless verse. The Brahmans had, too, a circle of the sciences, and a system of philosophy.

Five hundred years before the Christian era, their deep ponderings on the mysteries of the universe had carried them far beyond the early animistic conceptions of the divinity common to most primitive races, and had rendered inadequate also, to their minds, even the friendly forms of the bright gods of their fathers.

Six schools of Brahmanical philosophy came into being. The first was the Sankhya system of the sage Kapila, according to which the visible world has been evolved by successive stages out of primordial matter existing from all eternity.

Brahmanical
schools of
philosophy

The second was the Yoga school of Patanjali which spoke of a primordial soul anterior to primeval matter, and held that from the union of the two the spirit of life arose.

The third and fourth schools, represented by the Vedantas, recognise an omnipotent creator; and the fifth, or Nyaya school of Gautama, describes the methods of arriving at a knowledge of truth and lays stress on the importance of the senses as avenues of knowledge.

The sixth school is the Vaiseshika, founded by the sage Kanada, and is classed with the fifth; it teaches the existence of a transient world composed of eternal atoms, and relates how the divine mind first gave existence to water and then to innumerable worlds floating on the waters. Within the mundane egg lay Vishnu, and from his body there sprang the sacred lotus from which Brahma was born.

These systems of philosophy contain the germ of those evolutionary theories of development which modern scientists have deduced from a wider and more exact study of natural phenomena.

Religion, philosophy and a social organisation, which, despite its defects, attained a marvellous vitality and solidity and has lasted, in an elaborated form to the present day, were the gifts, as has been seen, which the Brahmans bestowed upon India. The study of language remained, and this was entered upon by a brilliant succession of native scholars and grammarians culminating in the splendid achievement of Panini. As early as 350 B.C. Panini wrote a Sanskrit grammar which stands supreme among works of the kind for its luminous precision of statement and for its complete analysis of the roots of language.

Sanskrit, which has been a dead language for nearly two thousand years, bears a relation to many Indian dialects similar to that of Latin in regard to the Romance languages of Europe.

Very early, even before Panini's time, the spoken form of the language called Prakrita-bhasha had begun to diverge from the written Sanskrit, and as the Aryans mingled with the surrounding population, the old synthetic forms were corrupted into various dialects. As an aid to the memory,

Sanskrit writings, even on such grave subjects as law and philosophy, were composed in verses (shlokas), so that the art of prose writing in that tongue almost disappeared. Even dictionaries were written in verse.

Brahmanism, with its immense body of literature, composed in this antique and sacred language, no longer spoken by the people but treasured by priests and men of learning, may be regarded as the fundamental basis of Hindu national character as it exists to-day.

Many circumstances have, however, tended to modify and oppose Brahmanical influence, and of these one of the most important was the growth of Buddhism.





PAGODAS AT RANGOON

CHAPTER II

BUDDHISM

The story of Buddha—the enlightened one—is in some respects typical of that perfect life of the Brahman with its four successive stages of learner, householder, forest recluse and ascetic mendicant, which had already become an ideal. But in the place of the Brahman's social organisation Buddha put forward a new doctrine of universal brotherhood and charity, and, while practising supreme renunciation and self-sacrifice in his own person, busied himself, for the four-and-forty years of his wandering ministry, with the salvation of others.

The story
of Buddha

Many legends and myths have grown up round the events of his life, yet nothing of the miraculous, which has ever been set down among his earthly achievements, equals the miracle of his teaching and of its influence in the world, where, to-day, 500 millions of the human race avow faith in his doctrine. The plain and simple story of his life and work presents a picture of well-nigh matchless dignity and the moral and intellectual splendour which shines out from the whole history of Sakya-Muni is in itself a miracle, a thing of wonder. Through twenty-five centuries of plunder, avarice and crime, the life of Buddha comes down as a priceless human tradition.

His early
life

That precepts so far above the reach of "human nature's daily food" should have been modified to suit first one and then another ambition or frailty of mankind was only natural. These were but the necessary consequences of the serene spirituality and aloofness from all that is vulgar, animal and base, which characterised the life and the message of Buddha.

In the Sanskrit, Buddha means simply Wisdom, and was doubtless applied as a title of honour to more than one religious teacher before the advent of Sakya Sinha, to whom, however, it is now generally confined. Sakya Sinha himself declared that he was the twenty-fifth Buddha and that another, Bhagava Methavo, is still to come.

Gautama Buddha, whose personal name was Siddhartha, and who was afterwards called the Sakya-Muni, or hermit,

has been variously regarded as a saint, an incarnation of Vishnu and a divinely born teacher. He was the only son of Suddhodana, King of Kapilavastu. His father, the chief of the Sakya clan, ruled over an Aryan settlement at the base of the Himalayas, about a hundred miles north of Benares, and himself, a warrior of the Solar race, desired his son to adopt a military career. But from his youth Gautama was given to meditation and study, and loved better his solitary introspective communings than the sports and pastimes of his fellows.

To rouse him from his day-dreams, the King, his father, arranged a Swayam-vara, or "maiden's choice" tournament at his court. Gautama showed unexpected strength and courage, and, becoming the victor, claimed as his bride the fair Yasodhara.

For ten years he lived a life without a history. Peaceful domestic happiness, and such luxury as the age afforded were his, but material felicity failed at last to satisfy the deeper and more spiritual needs of a profoundly religious nature.

Straying beyond his pleasure grounds, Gautama met an old man bowed and broken beneath the weight of years. He saw, too, a paralytic watching with glazed eye the coming of misfortune which he was powerless to hinder or avoid; again he looked and saw a man suffering from the plague, and further on, a corpse. This tragic procession of the woes of humanity made an indelible impression upon the young prince.

His wife had but recently given birth to a son. On hearing of it, Gautama said: "This is another strong tie I have to break." In the palace the nautch girls came as of old to dance before him, but he heeded them not and fell asleep. When he awoke an overwhelming distaste for the world his world of luxurious indulgence and flimsy magnificence seized him. He determined to seek for wisdom and self-control in the negation of all earthly pomp and pleasure.

Calling Channa, his charioteer, he bade him get ready for his departure.

Buddha, a
Rajput prince

It was midnight, and he paused for a moment upon the threshold of Yasodhara's chamber, to give a parting caress to his infant son, but fearing to wake his wife, who would, he knew, dissuade him, he drew back, mounted his chariot and rode forth into the night, vowing never to return till he could come back as a teacher.

This great turning point in the life of Buddha, which is supposed to have taken place on the night of the full moon in July, 504 B.C., is called, in Buddhist Scriptures, the "Great Renunciation."

The "Great
Renunciation"

For some years, Gautama practised the greatest austerities, and learned, under various teachers, all the mysteries of the Hindu religion and philosophy, as then taught by the Brahmans.

With five disciples he lived a life of extreme asceticism in the Jungle of Urevala, and, after six years, his fame as a hermit filled all Central India.

One day he fell fainting from exhaustion caused by prolonged fast, and on his recovery the folly of such extremes was revealed to him. Not thus was the inward peace which he sought to be attained.

On the banks of the Nairanjara, Sujata, a village girl, compassionately brought him food as he sat under the sacred fig tree.

A new conception of the perfect life free from all doubt or heresy dawned upon him, a life based upon purity of the heart rather than upon penances and self sacrifices, and the conquest of evil desires, envy and hatred, instead of the mere mortification of the flesh.

This was the great awakening

He arose as Buddha the Enlightened One, to preach his gospel of Faith, Justice and universal Charity to all mankind.

The
awakening

In the ragged and yellow robe of a wandering fakir he re-visited his father's home and stood once more in the palace court which he had left as a gallant young Rajput prince. The old King heard him reverently.

Buddha's son was converted to the faith, and his beloved wife, Yasodhara, whom he had left so abruptly to follow the higher life, fell at his feet and embraced him. She

also entered the new religion and became the head of the first Buddhist nunnery of female recluses.

The commanding presence, beautiful features and thrilling voice of the great master have become matters of tradition. That he was able to exercise an influence over his followers such as none but the supremely noble, heroic and disinterested have ever wielded, is clear.

A new
religion

The common people heard him gladly, the band of five disciples who had deserted him in the jungle, was rapidly replaced by sixty others, and these he sent forth to the neighbouring countries with the words "Go ye now and preach the most excellent law." All ranks of people, from prince to peasant, from the saintly Brahman to the repentant courtesan, flocked to the new standard. Buddhism, from being merely a new religious order became a new religion, and so popular and potent a one that for centuries it rivalled Brahmanism itself in the number of its adherents in India.

Throughout all Behar and Oudh, and by the banks of the sacred Ganges, in what are now the North-West Provinces, Buddha taught his mild and beautiful doctrine, and at the age of eighty, after a lifetime of ceaseless labour and saintly self-sacrifice, he died with words of blessing and encouragement upon his lips at Kusinagara, the modern Kasia, in the district of Gorakhpur.

Buddhism created for antient India a religious organisation in which all castes and tribes might find entrance. It taught that when any creature dies he is born again in some higher or lower state of being, according to the merit or demerit of his acts in all his previous existences.

The law of
Karma

This law of Karma explained all the sorrows and inequalities of man's life as the consequences of his own acts in a former state and thus established a motive and sanction for the high morality it inculcated.

By its own efforts the soul could win Arahat, the state of freedom from the fetters of selfish desire, in this life, and the everlasting peace of Nirvana hereafter. Some Buddhists regard the goal of Nirvana as the complete annihilation of the soul, set free at last from its age-long wandering through successive incarnations, but others speak of it as merely the

extinction of the sins, sorrows and selfishness of individual existence.

The First Council of the Buddhists, consisting of five hundred disciples, took place immediately after the death of Buddha, which is traditionally fixed at 543 B.C.: they met in a great cave near Rajagriha, and chanted the sayings of the Master, in three great divisions.

A century later, at Vaisali, a Second Council sought to settle disputes and put down abuses which had grown up.

The Third Buddhist Council was convened at Patna by Asoka, King of Magadha or Behar, in 244 B.C.

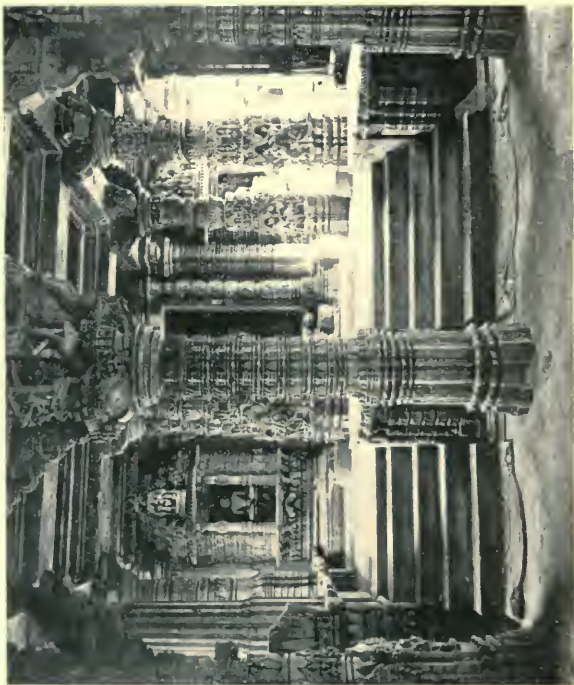
The growth of the new faith owed much to the powerful influence of this monarch, who, after the synod of Patna, published his famous Edicts carved upon stone pillars and rocks. Asoka, whose stormy youth and military prowess had won for him the title of "The Furious," was converted to Buddhism 257 B.C., and, having subdued a large part of Northern India, carried the same fiery zeal for conquest into the task of proselytising all India to his new faith. He distributed throughout the principal cities the relics of Buddha, which Ajasatra had collected and deposited at Rajagriha, and erected an immense number of Vihara or Buddhist monasteries throughout the land.

Buddhist
Councils

The fourth and last Council was held under King Kanishka, who ruled about A.D. 10-40 over a wide region on either side of the Himalayas, stretching from Yarkand and Khokand as far south as Agra and Sindh. Kanishka and his council were also charged with the intense missionary spirit which has always been so prominent a feature of Buddhism, and, just as Asoka had spread the teaching of Buddha to Southern India and Ceylon, so they, in turn, sent forth the new doctrine to China and Tibet.

King Kanishka

Buddhism, as a separate religion, has, to a very great extent, vanished from India, obliterated partly by persecution and partly by that marvellous faculty for absorption which has been the prevailing characteristic of Hinduism. Its sacred shrines such as Budh Gya and the Sanchi Tope, are now in the possession of others, and its temples are served by Brahman priests.



JAIN TEMPLE, MOUNT ABU

In the eighth century of the Christian era, there was a great revival of Brahmanical influence, and the cult of Siva and Vishnu ousted the more abstract doctrines of Buddhism from popular favour.

In Burma it is, however, still the official and almost universal religion, and it has left so indelible a mark upon the religious thought and practical morality of the Hindus generally, that it may be regarded as one of the great determining factors in the formation of their national character. The Jains are the nearest representatives of Buddhism in modern India, although their doctrines differ, in some respects, from the orthodox tenets, and they themselves claim that their origin is earlier, or at least coeval with that of Buddha.

They venerate as saints twenty-four Jains, or just men made perfect, in each of the successive eras of time.

Parsvanath and Mahavira, the last two Jains, are the special objects of their adoration. The Jains are a wealthy community and have built exquisitely-carved shrines in white marble, decked with colossal statues of their saints. They choose for their temples the most beautiful haunts of nature, wooded mountains and leafy groves. Mount Abu, with its matchless array of sculptured buildings, the Parasnath Hill in Bengal, and the temple city of Palitana in Kathiawar, are among their most famous shrines and places of pilgrimage.





SCENES FROM INDIAN HISTORY AS DEPICTED BY
NATIVE ARTISTS. NO. 1

The Conquest on the coasts of the River Jomn

CHAPTER III

THE MINGLING OF RACES

The races who inhabited India before the great Aryan immigration were many and various, and so tenacious have they been in some instances of their tribal customs, languages and hereditary characteristics, that their living representatives supply to some extent the absence of written history.

The Vedic poets gave to them all the common name of Dasyus, the enemy, a name which came to have the exaggerated significance of demons or monsters. They represented these enemies as being eaters of flesh, without gods and without rites, yet it is clear that even at that early period the non-Aryan tribes were not entirely savage, for some are referred to as wealthy Dasyus, and powerful chiefs, possessing castles and forts.

Non-Aryan
races

The Aryans intermarried with their princes, and, in later times, some of the most powerful kingdoms in India were ruled by dynasties of non-Aryan descent.

The origin of these ancient peoples of India is difficult to trace, the only records of their early history which they themselves have left are rude stone circles and the slabs and mounds beneath which they buried their dead. The contents of these tombs show that they commemorate people who were acquainted with iron weapons, that they used ornaments of gold and copper, and made shapely vessels of hard thin earthenware. These Kistvaen builders were the successors of earlier tribes, whose flint and agate weapons are still found up and down the valleys of the Central Provinces.

The vast plain of Hindustan, probably the most fruitful in the world, enriched with the waters of its great rivers, drew by the lure of its wealth successive waves of invaders from the north, and layer upon layer of the earlier inhabitants were forced back into the hills and forests and southward towards the apex of the great triangular continent.

Like a great wedge, the incoming hosts descended, pushing hither and thither in endless raids and tribal wars, seizing the best lands and ousting the weaker tribes who had preceded

them. The earliest vision of India is one in which its territory is being hotly contested by hostile tribes.

From this incessant struggle strange ethnic results have followed in modern India.

In the Central Provinces the aboriginal tribes form a large part of the population, amounting in the State of Bastar to three-fifths of the inhabitants. The Gonds constitute one of the most important modern races of non-Aryan descent in this region. Many of their tribes have made important advances but some, such as the Marias, are still the primitive children of the forest, living by the chase and reported to be using, within living memory, flint points for their arrows, as did their ancestors thousands of years ago.

The Juang, or leaf-wearing race, of the Orissa hills is another detached remnant of primeval man which some strange accident of environment has preserved in almost pristine simplicity.

Other instances of aboriginal tribes who seem to have been early pushed aside, or to have drifted beyond the area of civilising influences in India, are to be found along the spurs of the Himalayas, as, for instance, in some of the Assam hillmen, Abars, Mishmis and Akas, who were wont to gain a precarious livelihood by plundering the neighbouring hamlets. Some of these wild mountaineers who dwell in an unexplored no-man's-land, along the Tibetan and Chinese frontiers, disclaim all allegiance and still live their own secluded life, huntsmen and jungle-fighters, who employ bows and arrows, javelins and knives and, resenting any intrusion from the outside world, do not hesitate to use them upon any luckless traveller who visits their northern home.

Other races of aboriginal descent have made great strides and are now well-ordered communities, retaining their own characteristic customs, they have yet developed into skilful husbandmen and good citizens. Of the non-Aryan races who have more recently responded to progressive influences, the Santals and the Kandhs who inhabit the north-eastern edge of the central plateau are typical examples.

The Santals, who give their name to a large district, the Santal Parganas, in Lower Bengal, cling to the hilly regions

The Gonds

Santals and
Kandhs

and remain quite distinct from the people of the plains. They acknowledge no caste, but are strongly attached to their tribe, and the greatest punishment which could be inflicted upon a criminal was to cut him off from "fire and water" in the village and send him forth alone into the jungle. The Santals have their secret rites and their own ancestral religion, which includes the worship of many tribal and family gods. Six ceremonial observances mark off the epochs of a tribesman's life. The first is a kind of baptism by which the child is received into the clan, and the last the solemn dismissal of the dead hero, by burning his body and floating pieces of his skull down the sacred Damodar river, to join the fathers of his race.

Tribal
customs and
rites

The Kandhs of Orissa, and the Madras districts of Ganjam and Vizagapatam, belong to a group of non-Aryan races who occupy the position assigned to them by Greek geographers 1500 years ago.

They are interesting because their history and their divisions are probably exactly typical in their broad outlines of what has been happening all over India, throughout the ages of its unwritten history.

The Kandhs, up to the time of the Aryan invasions, occupied, no doubt, the fertile Orissa delta. The shock of invasion split them into three sections; the weakest was completely broken up, and its clansmen, losing their old racial and tribal characteristics, sank to the position of landless hewers of wood and drawers of water among the Aryan communities. Another section stood its ground more firmly, and its members became peasant farmers, holding their land on a fental tenure from Hindu chiefs. They, too, lost in this way something of their original characteristics, but attained, in return, a higher degree of comfort and security. A third section, however, fell back upon the mountains and, by reason of their very remoteness from the main currents of civilisation and movement about them, preserved all the more completely their original characteristics and tribal customs.

The typical story
of a race

It is out of such elements as these that the ethnological student of to day is able to reconstruct the story of Indian

racés, a story of immense interest, but so vast in its extent that it is only possible in this brief sketch to indicate the main deductions which have been reached.

Language has been the key to the puzzle of India's many races and the progress of comparative philology has solved many difficult problems upon which written history, and even tradition, are silent.

Three great groups form the fundamental basis of classification of the early peoples of India—the Tibeto-Burman, the Kolarian and the Dravidian.

The Tibeto-Burman tribes are descended from ancestors who, in prehistoric times, dwelt side by side with the forefathers of the Mongolians and Chinese in Central Asia, and who crossed over into India through the north-eastern passes. They are widely scattered but their main branches are in Burma and along the skirts of the Himalayas. The languages belonging to this group are extremely numerous, and include Tibetan, Burmese, the Naga, Kuki and Karen dialects, and many others.

The Kolarians came into India through the same narrow gateway. They are now to be found chiefly along the north-eastern edge of the triangular tableland which forms the southern half of India. The Santals and Kaudhs, of whom mention has been made, belong to this group.

The Dravidians were probably the true aborigines, and from the broad battlefield of southern India they were never entirely displaced.

This great race, whose languages belong to the Turanian family and possess affinities with Ugrian in Siberia and Finnish in Europe, found refuge in the sun-scorched plains and sea-girt slopes of southern India.

Before the coming of the Aryan civilisation to southern India, considerable advances had been made among the Dravidians along the road of knowledge.

They had kings who dwelt in strong houses, minstrels who recited songs at their festivals: they were acquainted with numerals and written characters, and had names for most of the planets known to antiquity. They were well versed in agriculture and in war, and had boats and even

Groups of
non-Aryan
languages

The Dravidians

small coasting ships. All this and more, the Tamil language of to-day, reveals concerning the origins of this ancient people.

The Dravidians were the tree and serpent worshippers of India, and when at last the Aryans came among them, it was not as enemies or conquerors, but rather as instructors and missionaries.

Tree and serpent worshippers

The first Brahman settlers were hermits and sages of whom Agastya, or Tamir-muni, has been deified by the Tamil race as Canopus the brightest star in the southern heavens. To him and his disciples is attributed the settlement of the grammatical principles of Dravidian speech, which ultimately developed no less than four great literary dialects — Tamil, Telugu, Kanarese and Malayalam.

Buddhist missionaries carried Aryan religion and philosophy to the Dravidian kings and peoples before the commencement of the Christian era. But it was when Buddhism itself was sinking, merged beneath the tide of the great Brahmanic religious revival of the eighth century A. D., that the intellectual resources of northern India were poured out in full measure upon the south. The writings of Brahman apostles of the Sivaite and Vishnuite faith, from the eighth to the twelfth century, were composed in Sanskrit, but they gave none the less an immense impulse to the use of the vernacular languages of India, and it is from this period that the abundant literary activity of the south takes its rise.

Brahman apostles of Siva and Vishnu

The Dravidian Buddhists, or Jains, of southern India defended themselves vigorously from the proselytising of the northern missionaries and a cycle of Tamil anti-Brahmanical literature sprang into being. The compact mass of Dravidian population in the south of India, although ultimately subdued by the Aryan civilisation, was never completely broken and absorbed by it. Their pure descendants still exist in scattered tribes, and they have given their language to more than fifty millions of the people of India.

Meantime, while within India itself the clash of swords in intertribal warfare alternated with the war of words among philosophers, religionists and literati, external influences

one after another, and always from the north, had been brought to bear upon the destinies of the country.

Alexander's
victories

In the third century B.C., Alexander the Great stalks across the stage of Northern Hindustan, but although his progress is triumphant and he makes alliances, founds cities and plants the Greek standard as far south in the Punjab as Jhelam and Mong, he does not reach even to the Ganges, and his victorious campaign is but an episode in the annals of India. His conquests were largely absorbed in the northern empire, which Chandra Gupta built up after Alexander's departure and death.

Græco-Bactrian
invasion

Later from the newly-founded Greek kingdom of Bactria invading hosts swept down into the Punjab and carried their conquering arms as far as Oudh, and southward to Sindh and Cutch. They founded no kingdoms, but left the impress of their art, and early Buddhistic sculptures bear witness, in their pure outline and delicate features, to the influence of Hellenic conceptions of ideal beauty in face and form.

The Scythians

Another and ruder race from a wide region of Central Asia, the Scythians, began to pour hostile tribes through the narrow defiles of the Himalayas. For six hundred years, from 100 B.C. to the fifth century A.D., the Scythic inroads continued, and in such numbers did these northern invaders come that they formed for a time a large part of the population of the Punjab, and founded kingdoms. Kanishka was the most famous of the Scythic kings, and he it was who convened the last of the four Buddhist Councils. The Buddha himself was said by some to have been a Scythian, and the modern Mahrattas are regarded as being descended from the same vigorous race.

The invading hordes from the north-west, to whom the generic title of Scythians has been given, were a broad-headed nomadic people, short of stature, good horsemen and skilled in the use of the bow.

That they came in vast numbers, made important conquests and founded powerful kingdoms carved out of the Græco-Bactrian provinces on the north-west of the Himalayas, about 126 B.C., appears certain, yet the theory

propounded by some historians that they were the ancestors of the modern Jats and Rajputs, is untenable.

The Jats and Rajputs are a long-headed race, and no hereditary traits are so fixed and so conclusive as the measurements of the head.

The Jats
and Rajputs

It seems more probable that the Scythian marauders, dislodged from the scenes of their conquests by such vigorous champions of the Indo-Aryan race as Vikramaditya, Salivahana and the Valabhi kings, wandered southwards and were enveloped and absorbed in the vast ocean of Hindu population.

A zone of broad-headed people has been traced far down through the Deccan to the Coorgs; nor does it seem improbable that the clansmen of this wild warrior race who fought their way to the very heart of India and mingled with the Dravidians became the ancestors of the famous Mahrattas, destined in after years to play so great a part upon the stage of Indian history.

The story of the successive invasions of India in early times is written not merely in song and story, in fossilised weapons or in earthen relics, it is indelibly inscribed in the ethnological lineaments of the people themselves. From the earliest ages there has been a constant stream of movement from west to east, and from north to south. Sometimes it has taken the form of a violent and terrible irruption of fierce warriors carrying fire and sword in a long red streak across the hapless country; at others the peaceful visitation of hermit, sage or scholar has borne eastward and southward the light of a higher knowledge and broader culture, or the steady march of immigration has pressed downwards in search of fresh pasturage and tillage.

Invasions
and their
ethnological
record

Scythian raiders, the Tartar hosts of the fierce Tamerlane, zealous servants of Muhammad from far Arabia, all, in turn, swept down upon the Gangetic valley, and the physical types to be met in modern India are the result of the fusion of races which ensued.

The path of immigration and conquest has passed over India from the north-west, and commencing at that frontier the first types encountered are the Turki-Ianian, represented



SCENES FROM INDIAN HISTORY AS DEPICTED BY
NATIVE ARTISTS. NO. 2
A Royal Fishing Display

by the hardy Baloch, Brahui and Afghans of Baluchistan, tall with long features and fair complexions, they are descended from Turki-Persian forbears and preserve all the warlike characteristics of their brave ancestors. The province of the five rivers, as well as Rajputana and Kashmir, is the home especially of the Indo-Aryan. The Rajputs, Khattris and Jats are the characteristic members of this group which approaches most nearly to the type ascribed to the first traditional Aryan immigrants. The Scytho-Dravidians are, as a rule, smaller in stature and have longer heads than the Turki-Iranians. The type is to be found among the Mahrattas-Brahmans, the Kunbis and the Coorgs of Western India.

Physical types of Hindu races

An immense number of the inhabitants of the central regions of India belong to the Aryo-Dravidian group and, in Bengal and Orissa the Mongolo-Dravidian type predominates. Along the ridges of the Himalayas, in Nepal, Assam and Burma, the Mongoloid type is represented by the Kanets of Lahul, the Lepchas of Darjeeling and Sikkim, by the Limbus, Murmis, and Gurings of Nepal, the Bodo of Assam and the Burmese.

Throughout the whole of southern India, from the valley of the Ganges to Ceylon, the Dravidian type prevails, its most characteristic representatives being the Paniyans of Malabar and the Santals of Chota Nagpur.

How came these types to be perpetuated? Why have they not been merged into one national type?

Other races have suffered the invasion of diverse tribes and have incorporated their victors or been welded into a homogeneous type bearing some of the characteristics of both conquerors and conquered. Why then should India preserve and display, after all the ages of her history, such widely divergent types of humanity, as well defined and apparently as firmly fixed to day as they have been at any period since the long past wars and tribal movements which they so strangely record?

And their preservation by caste

The answer is to be found in that marvellous institution already referred to which governs and organises Hindu society in every act of life from the cradle to the grave—caste.

Immigration, war, the fire of missionary zeal, the fierce thrusts and interchanges of religious polemics and the kindlier influences of social intercourse, were all potent forces tending to weld together into one race the ethnic elements already present upon the soil of India.

Such a natural process of fusion was actually proceeding apace during the early centuries of Indian history, but it was arrested, and its results crystallised and perpetuated in the strangest manner by the institution of caste. So powerful has been the operation of this social organisation, based originally on racial differences, but elaborated in accordance with occupations and habits of life, diet, etc., that it has affected the physical characteristics of the various orders, and produced in all parts of India, except the Punjab, a remarkable correspondence between the variations of physical type, and the differences of grouping, and of social position.

The primary law of caste, as it has obtained in India for hundreds of years, forbids intermarriage with any but members of the same circle.

A caste is a collection of families, or groups of families, bearing a common name, often associated with the hereditary occupation, and claiming descent from some common ancestor.

This is again subdivided into numerous smaller circles, and within each the same rule applies. Marriage must be within the circle. In modern India there is, however, evidence of a certain restlessness and dissatisfaction with this arrangement. Subcastes are being formed, and even new castes are originated.

The process of subdivision and accretion has proceeded to such an extent that whereas, as has been seen, there were, according to the original Brahmanical organisation of the Hindu world, four castes, there are now no less than 2,378.

The theological sanction given by the Brahmans for the institution of caste has already been described. Its ethnical explanation is to be found in the well-known hypergamous customs which govern the union of two races placed in juxtaposition as the result of conquest or immigration, but divergent in colour, antecedents or type.

The influence
of caste

Its numerous
sub-divisions

The theory is that the first Indo-Aryan settlers were nomadic shepherds who, moving bodily into India with their cattle, households, and all their worldly effects, brought with them their wives and families, and as a consequence they remained unmixed with the surrounding tribes.

But as the land became more crowded fresh parties of adventure consisting of young warriors and pioneers, would sally forth further afield, and found new and more distant outposts of their race.

Separated from the parent clan, they took wives from the surrounding tribes, but did not give their daughters in return, and when their tribe had grown in numbers, they closed its ranks, and formed a separate caste in the midst of an alien population

Hypergamous marriages

A process of this kind has been observed in operation in many parts of the world. In India it has been strengthened and enforced by religious sanction and time-honoured custom. Caste has powerfully moulded the life and character of the whole people, and has formed a social organisation which is to day older, firmer, and, in some respects, more powerful than the state itself.

Every Hindu is born into a place in life. His birth determines his calling, his station, the circumstances of his marriage and his associates. He is not a detached unit struggling for individual ends in the vast welter of humanity, nor is he governed only by his own conscience or desires. He belongs to a caste, and must obey its rules. Whatever limitations and disabilities this condition imposes, it must be remembered that it also confers privileges and blessings not easily over rated.

The utility of caste

The charities, the co operation and mutual helpfulness within the caste take the place of poor law administration in India, and bestow many of the advantages of the trade unionism and benefit societies of other countries.

Caste has two sides - its very exclusiveness towards the rest of the world, emphasises and endorses the community of interests, and the close brotherhood for help and for defence which exist within its own circle.



SCENES FROM INDIAN HISTORY AS DEPICTED BY
NATIVE ARTISTS. NO. 3

A Deerhunt in the presence of the Caliph Akbar

CHAPTER IV

ISLAM

The rise of the Muhammadan power, which culminated in the majestic but short-lived dynasty of the Mughals, was not a sudden movement. For eight hundred years the followers of Muhammad fought for dominion in India. Within a hundred years after the death of the great prophet who had preached so successfully a new and energising faith in Arabia in the seventh century, his followers had invaded the countries of Asia, as far as Hindu Kush. The great mountain frontier of India, no less than the vigour of the northern Hindu kings, delayed, and withstood their advance for a while, but in 711 A.D. Kasim set foot in Sindh. The Rajputs fought with desperate valour. One garrison chose extermination rather than surrender, the women and children immolating themselves upon a funeral pile, while the men, opening the gates of the fortress, rushed upon the enemy and died fighting to the last. Backwards and forwards across the frontier swept the tide of conquest and retaliation. The Hindu kingdoms were grouped under various great suzerains, such as the Rajput, the Pál or Buddhist dynasties, and farther south those of Chera, Chola and Pandya, yet each feudatory chief retained his power of independent action, and their kingdoms had to be conquered separately in detail, before the Musalman could effect any considerable advance.

The gallant defence of the Rajput provinces.

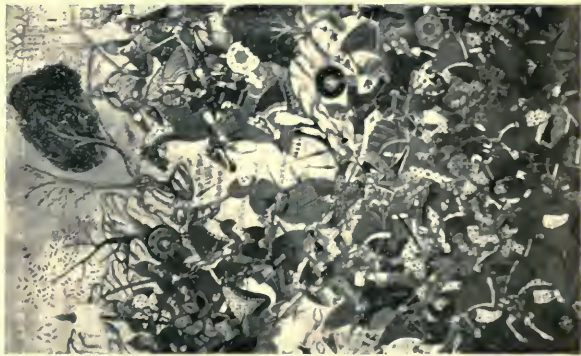
In the tenth century, Subuktigin, the ruler of an Afghan kingdom, defeated Jaipal, Hindu King of Lahore, and placed a garrison in Peshawar. His more famous son, Mahmud of Ghazni, extended his kingdom, plunged deeply into the Punjab, and in no less than seventeen successive invasions carried fire and sword to Kashmir and as far as the cities of Kanay, Gwalior and Somnath.

At the last-named city he stormed the outposts and forced the Hindus to put out to sea in boats, leaving 5000 of their comrades among the slain.

For a hundred and fifty years, the Punjab remained under Mahmud's successors as a province of Ghazni, but in 1152 the house of Ghor, which had long been at bitter feud with



SCENES FROM INDIAN HISTORY AS DEPICTED BY NATIVE ARTISTS, NOS. 4 AND 5
(4) The Siege of the Fortress of Ajmere



SCENES FROM INDIAN HISTORY AS DEPICTED BY NATIVE ARTISTS, NOS. 4 AND 5
(5) A Charge of Muhammadan Cavalry

Ghazni, overthrew the latter, and the Shahab-ud-din, better known as Muhammad of Ghor, marched southward on a war of adventure, with the conquest of India to the faith of Muhammad, as its mission. He suffered a signal defeat at Thaneswar, but gathering fresh forces from his northern heights, again marched into Hindustan in 1193, and this time the dissensions among the Rajput chiefs gave him the victory, and in 1194 he defeated and slew the Prithwi Raja of Delhi and Ajmere, and overthrew even the mighty suzerain of Kanauj.

Ghazni
and Ghor

Northern India, from the mouth of the Indus to the site of modern Calcutta, was within the grasp of the Musalman conqueror, but his dynasty had no historic hold on the throne of Delhi. At his death, his Indian Viceroy, Kutab-ud-din, proclaimed himself sovereign of India, and called for the allegiance of all the Muhammadan leaders and soldiers of fortune who had streamed across the country from Sindh to Lower Bengal.

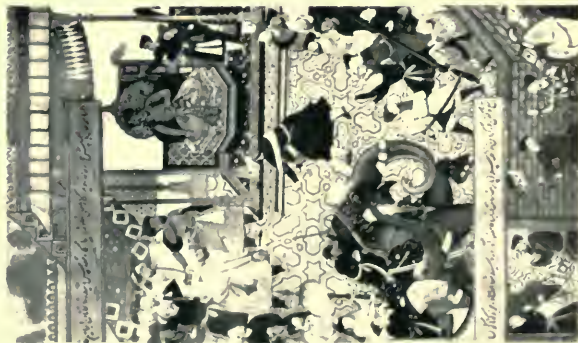
This remarkable man founded the dynasty of the Slave Kings, so called from the fact that both he, and several of his successors, rose by valour and intrigue from the position of Turki slaves to that of rulers.

The
Slave Kings

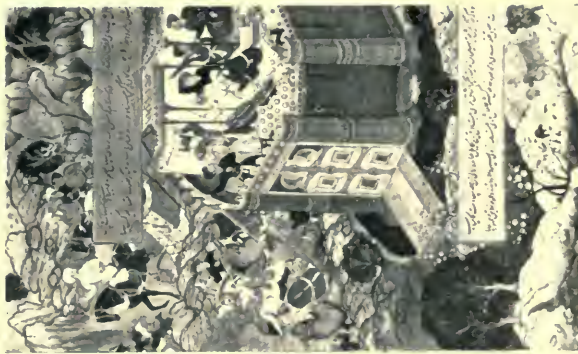
The Kutab Mosque and the Kutab Minar commemorate his reign at Delhi. The epoch of the Slave Kings was a troublous and tragic period of Hindu history. The throne, to which they had waded through so much blood, had to be defended at every moment by the sword, against rebellions from Musalman Viceroys and Hindu revolts, and against fresh waves of foreign invasion, chiefly by the Mughals of Central Asia.

No description can adequately portray the sufferings or the inhumanities of the period which followed under the last of the Slave Kings. The sole method of government, if method it could be called, appears to have been that of striking terror into distant subjects or enemies, by some periodic act of ferocious cruelty, more terrible and disastrous than any which had preceded it.

Under Balban, revolt and massacre, rebellion and a fearful vengeance followed one another in a mournful cycle of



SCENES FROM INDIAN HISTORY AS DEPICTED BY NATIVE ARTISTS. NOS. 6 AND 7
 6) Ibrahim Khan, with sword and shroud
 on his neck, and bringing gifts, enters the
 imperial presence.



SCENES FROM INDIAN HISTORY AS DEPICTED BY NATIVE ARTISTS. NOS. 6 AND 7
 7) Mirza Hakim and other courtiers arrive
 in Kabul. The people, relieved from the
 hardships of a close siege, make joyful
 manifestations.

misfortune and horror. Balban as a youth had entered into a compact, with forty of his Turki fellow slaves in the palace, for mutual assistance. When these conspirators became viceroys he broke up the confederacy by wholesale executions, beating some to death and hanging others. He wiped out a rebellion among the Rajputs of Mewat by putting 100,000 persons to the sword.

Balban's
barbarities

The Khilji dynasty which followed was scarcely less severe in its methods. Prisoners taken in the Mughal wars were either trampled by elephants or slaughtered in cold blood. In Delli, 15,000 settlers were massacred and their families sold as slaves.

Ala-ud-din who had conquered, by a ruse, a part of the Deccan, murdered his uncle, the founder of the house of Khilji, and, seizing the throne, literally carved out the extended frontiers of his empire, leaving famine and desolation in his track.

The dynasty of Tughlak followed and, despite the conquering irruption of Tamerlane, lasted for nearly a hundred years.

The reign of Muhammad Tughlak, the second of this line, a man of cultivated intellect and remorseless temper, was marked by a long series of revolts, followed by pitiless reprisals. His own nephew, who headed one rebellion, was flayed alive. The Punjab governor was also defeated and slain, but the Musalman Viceroys, of Lower Bengal and of the Coromandel coast, were more successful, and the Hindu kingdoms of Karnata and Telugana also broke off from the empire and became independent.

The
Tughlak
dynasty

Tughlak ruthlessly demanded land taxes increased ten and twenty-fold twist the Ganges and Jumna, and the ruined husbandmen fled before his tax gatherers, leaving whole villages to lapse into jungle, while those who should have tilled the soil became robber bands.

Muhammad
Tughlak's
exactions
and cruelties

Tughlak's cruelty and reckless waste of human life knew no bounds. On more than one occasion he held an organised man-hunt. Surrounding a wide area with a circle of his troops, he bade them close in and butcher every human being, helpless peasants for the most part, whom they found within the ring.



SCENES FROM INDIAN HISTORY AS DEPICTED BY NATIVE ARTISTS. NOS. 8 AND 9
 (8) The punishment of Jan Guli Aurenz and other seditious persons.



SCENES FROM INDIAN HISTORY AS DEPICTED BY NATIVE ARTISTS. NOS. 8 AND 9
 (9) The arrival of the Shadow of God, the Emperor Akbar. The flight of Khwaja Alam and his arrest.

Nor was safety to be sought from the rage of the tyrant in the city. Kanauj, the great Kanauj centre and seat of an antient Hindu monarchy, he gave up to general massacre.

To add to the confusion and dismay of this melancholy period in Indian history, famine, that grim camp follower of war and tyranny, swept devastating through the weary land.

There was a brief respite under the mild rule of the enlightened Firuz Shah Tughlak, who undertook many public works, including a great canal which is still used for irrigation, and a beautiful mosque on the banks of the Jumna. But the Tughlak dynasty was doomed, and in the next reign sank into impotence beneath almost universal revolt, and was therefore ill prepared to withstand the great Mughal invasion of 1398.

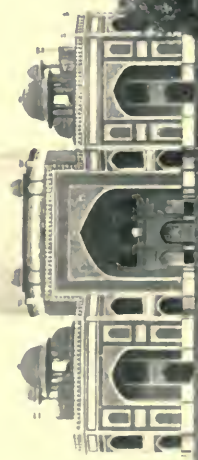
The incursion of Tamerlane (Timur) at the head of a mighty host of fierce Tartars, from the banks of the Oxus, that wild region which had already given to India so many sons, had the appearance of a great natural cataclysm, but it was, in fact, a carefully timed invasion. Tamerlane had no pretext for a quarrel with the Indian princes, but he relates in his memoir how he saw that their disunion rendered the moment propitious for his enterprise. "I ordered," he writes, "1000 swift-footed camels, 1000 swift-footed horses, and 1000 chosen infantry to march and bring me information respecting the princes of India. I learned that Tongtumish Khan had been defeated by Auroos Khan and sought assistance from me. Received information that the princes of India were at variance with each other. Resolved to undertake it (the invasion) and to make myself master of the Indian Empire, did so."

Timur, "the
earth-shaker"

Thus in brief colourless notes, such as might serve for the entry of a business transaction, he records the conquest of a new empire and the beginning of a scene of carnage and horror such as even the tragic history of war, has rarely, if ever, equalled.

His vast army crossed the Indus upon a bridge of rats and reeds, marched to Tulamba, a city on the banks of the Hydaspes, and sacked and burnt it, putting all the

100



MAUSOLEUM OF EMPEROR HUMAYUN
Delhi

inhabitants to death. They marched on towards Delhi, leaving in their track a desert. Only one town did Timur spare, Ajudin, where lay the tomb of a famous Muhammadan saint.

He swept down upon Delhi and signalised his arrival by slaughtering his prisoners to the number of 100,000. The imperial city, despite the fact that it surrendered under promise of protection, was sacked and plundered, and then, at last, the earth-shaking conqueror, sated with blood and victory, turned homewards, only pausing upon his northward journey to execute a general massacre at Meerut.

Slaughter
of prisoners
at Delhi

He left behind him in India, famine, anarchy and pestilence, and carried off to Samarcand thousands of slaves and an enormous booty.

Ruined cities were the only traces of his power in India and, for a time, the dynasties of Tughlak, Sayyid and Lodi ruled, albeit with diminished sovereignty, in Delhi.

Meantime the Brahmani kingdom of the Deccan emerged as the representative of Muhammadanism in southern India and reached its highest power under Brahmani Ala-ud-din II, in 1437, but was broken up by the dissensions of hostile sects belonging to the rival Shia and Sunni faiths. Numerous independent principalities grew up out of the fragments of this kingdom, to be at last merged in their turn in the Mughal empire, the greatest unification of government in India prior to the establishment of British rule.

The Brahman
kingdom

Babar, direct descendant of Timur, invaded India in 1526, and found it suffering from the old trouble of divided councils among princes too hostile to one another to be capable of combining against a common enemy.

He defeated the Delhi sovereign Ibrahim Lodi at Panipat, and overpowered the Rajputs of Chitor at the memorable field of Fatehpur Sikri, near Agra. He was succeeded by Humayun, a monarch whose life-story was crowded with strange adventures and hairbreadth escapes, but who was successful in regaining, at last, the throne of Delhi, where his splendid mausoleum is still to be seen.

Babar's
invasion

Akbar the great, the son of Humayun, who succeeded his father, at the age of fourteen years, was the real founder of

the mighty empire of the Mughals. Victorious alike in arms and in diplomacy, Akbar, during his long and glorious reign, consolidated his empire, which included Kashmir, Bengal and Gujarat.

He conciliated his Hindu subjects, abolished the Jaziah, or tax on non-Musalman, and restrained the restless ambition of the Muhammadan princes.

A splendid builder, organiser and patron of arts and letters, Akbar stands out as one of the greatest among the Muhammadan rulers who initiated the policy of strong unified central government so essential for the safety and progress of India. Two-and-a-half centuries after his death, in 1605, a British Viceroy reverently laid a cloth of honour on the plain marble slab which marks the place of Akbar's sepulture in the mausoleum of Sikandra.

During this reign, the land revenue of India reached an immense total. His finance minister, Abu'l Fazl, who was also a famous man of letters, compiled the "Akbar Namah," a survey of the empire, which incidentally contains a vivid picture of India, at the commencement of the seventeenth century.

Jahangir, the next in order, but not in greatness, among the Mughal emperors, kept a brilliant court, to which many Europeans repaired. The reign of his successor, Shah Jahan, coincides with the most splendid achievements of the dynasty of Timur's descendants, for, though shorn of its Afghan province, Kandahar, the empire was greatly extended southwards by conquests in the Deccan. The famous kingdom of Ahmadnagar was incorporated, and tribute taken from Bijapur and Golconda. Shah Jahan was a magnificent patron of architecture, and his pearl mosque, the Moti Masjid, of Agra, is perhaps the most exquisite house of prayer ever built even in this land of temples, and it may be doubted if marital affection ever raised above the ashes of the loved and lost a more perfect memorial to virtue and beauty than the Taj-Mahal.

At Delhi, too, the Jama Masjid, with its fine cupolas, pinnacles and colonnades, rose in massive dignity and splendour. The palace of Shah Jahan, near the port, covers

Akbar
the great

Abu'l Fazl's
Survey of the
empire

Shah Jahan

Delhi the city
of temples and
palaces

a great area and contains the majestic Diwan-i-Khas, a masterpiece of delicate inlaid work and poetic design.

Aurangzeb still further extended the actual limits of the Empire, but also laid within it the seeds of decay. The essential weakness of the system of personal despotism made itself felt in the succeeding years from 1707 till 1761, when the Mughal empire ceased, in all but name, to exist.

As long as the princes of the house of Timur had been men of intellect and commanding personality, as Babar, Akbar and Jahan undoubtedly were, their rule continued, but the very concentration of power which they effected worked the disintegration of the empire when its diamond sceptre fell into weaker hands. The Diwani, or power of administration of Bengal, Orissa and Behar, was transferred by the reigning Emperor to the British in 1705.

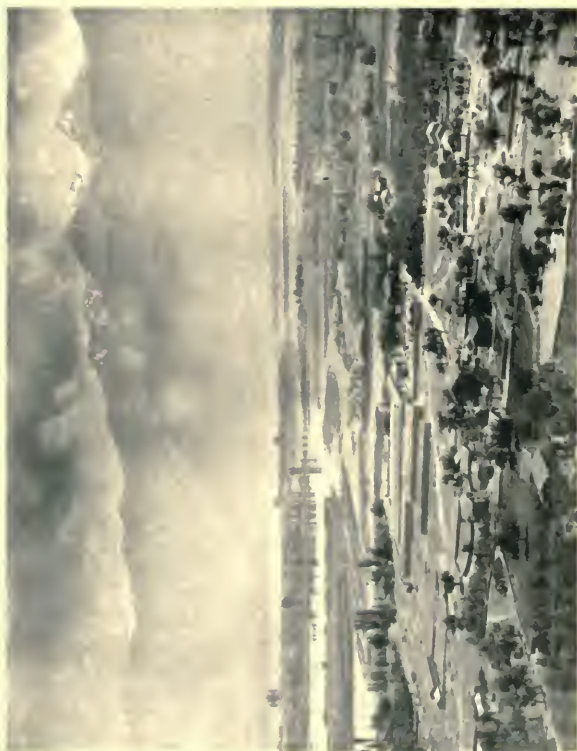
Decay of the
Mughal empire

The rise of Islam has left an indelible mark upon India's history, and one which is to be seen not alone in the mosques, palaces, and other splendid buildings which adorn its great cities, but also in the great Muhammadan community which forms so important a feature of the population of Bengal, the Punjab and the United Provinces, and is also scattered over many other parts of India. There is a soldierly simplicity, dignity and fidelity in the character of the Musalman, which command respect; and among the elements which tend to give strength, solidity and defence to the Empire of India the Muhammadan population, amounting to over 60 millions, is greatly valued.

Islam has ever been a vigorously proselytising faith, and has won and is still winning many adherents to its standard.

Although there is but little intermingling of Muhammadans and Hindus by marriage, yet another unifying process, less obvious and material, is constantly in progress, namely, the fusion of ideas, which comes from the force of example and the pursuit of a common goal.

The future of India will be shaped and its prosperity secured, not by one race alone, but by the united efforts of all who have an interest in its soil, and in the accomplishment of this object, the vigour, loyalty and patriotism of Islam will be an effective contribution.



DHULI LAKE, SRINAGAR

CHAPTER V

THE LAND AND THE CLIMATE

What of the land upon which, as upon a stage, the drama of history has exhibited such a sequence of mighty events? The bare outline of the most appealing circumstances in that history has alone been indicated; yet enough has been said to show that, long before the dawn of the modern epoch, India was a magnet of attraction sufficiently powerful to draw a vast incursion of humanity across Central Asia and through the difficult and forbidding fastnesses which protect its northern frontier; that it supported a great population of many races, produced several noble, though diverse, types of civilisation and became the home of a wealthy and powerful empire.

The attraction
of India

India, to-day, means not the antient kingdom of Hindustan alone, nor even merely that great triangular peninsula, the base of which rests upon the Himalayas, and whose sides are washed by the Arabian Sea and the Bay of Bengal. It includes also huge mountainous plateaux stretching as far north as the frontiers of Persia, Russia and Tibet, and to the west it takes in also Burma and Tenasserim, a region which stretches from the source of the Irawadi, upon the slopes of the Namkiu mountains, to the Malay peninsula in the south.

Its extended
limits

The upper half of this great Empire consists of the highlands and lowlands of Baluchistan, Kashmir, the Himalayas and Burma; the lower, the peninsula itself, tapering southwards to Travancore and Cape Comorin.

It has been chiefly in the western region of the northern uplands that the land gateways to India have been found in the past, either through the rocky footways of South Baluchistan, the plains of Kandahar, or at the passes of Ghazni or Kabul.

The distance across from the dry and withered plains of Makran to the land of the Kachins, in North Burma, is 1,000 miles, being nearly equal to that which divides the northern and southern limits of the empire, Kashmir and Cape Comorin.

The snow
mountains

The Himalayan range is at once the protecting barrier and the storehouse of wealth for India. The name means, literally, the abode of snow. There is one vast elevation, 100 miles in width and stretching for 1,500 miles through 20° of longitude in a curve, which has been compared, by travellers, to the blade of a scimitar. The snow line varies from 15,000 to 16,000 feet, and the topmost peaks of the mountain range (Nanga Parbat and Everest) are from 26,182 to 28,000 feet above the sea level. It may, therefore, be judged what myriad tons of snow perpetually feed the great Indian rivers and fertilise the plains which lie, far below, in the great Gangetic valley or Middle Land of India.

and their
wonderful
function

These calm, icy pinnacles, piercing the very heavens with their immense snow deposits, unexplored and unthought of by the teeming inhabitants below in the crowded bazaars and upon the broad rice fields and plantations of India, have a function to fulfil in the economic life of the country, the importance of which it is impossible to exaggerate. They are the water purveyors of a continent.

When the rays of the vertical sun, through the long hot months of the year, are beating down remorselessly upon the land and drying up every leaf and twig to the familiar burnt-up colour, which is the prevailing tint, the sea is also exposed to the same burning glare.

The mechanism
of the monsoons

Over the wide expanse of the Indian Ocean the air is becoming laden with moisture. Then the heat diminishes, and the land, giving off its stored-up heat to the air above it more quickly than the ocean, draws by the ordinary mechanism of winds, the life-giving, moisture-laden air from the sea. Such are the south-west monsoons, soft humid winds blowing up from the Indian ocean and bearing with them the means of life and livelihood for millions. But their precious burden of moisture might float over many parts of India without benefiting an acre of its soil if it were not for the mountain ranges, which literally drain water from the winds and send it flowing for thousands of miles in a life-giving stream through the parched and thirsty land.

Unfortunately, the causes which determine the course of the south-west monsoons are many and complex, and

periodically, through some unforeseen alteration of relative temperatures, their help is wanting, and Indian agriculture droops and famishes in consequence.

Yet even then its noble rivers remain, the Ganges, Mother Ganges, the sacred and antient water-way which flows

Mother Ganges.

"Like some grave mighty thought
Threading a dream"

through the Middle Land, past the temples, pinnacles and tombs of Benares and Allahabad, never fails the toiling rayats who call to her for water.

The Indus and the Brahmaputra flow down from the Central Himalayan region on either side through deeply-eroded valleys and carry their waters to regions as distant as Karachi and Lakhimpur. The rivers of India not only fertilise the soil, they add to it, tearing down the mountain side in rapid flood, they bear with them a load of earth and the debris of rocks. When the river's movement becomes less rapid, this silt is deposited, forming islands and banks and building up land on what was once the sea shore.

The rivers
of India.

One of the islands thus built up by the Brahmaputra from silt carried hundreds of miles upon its rapid course, now measures 441 square miles.

The Nerbada, the Mahanadi and the Godavari, water the vast region of the Deccan, and besides these, there are hundreds of lesser streams and tributaries many of which are splendid rivers, and only relatively small when compared to the mighty Ganges or the lordly Indus.

To the Hindus, their rivers have ever appeared as the most beneficent and delectable gifts of nature, and they have lavished upon them names full of poetic significance, thus one, the Saraswati is interpreted as the Goddess of Flowing Speech; the Suvarna-rekha is the Streak of Gold—Chitra, the Glancing Waters; others are called by names which indicate the Smiless One, the Arrowry, the Golden, the Stream at which the Deer Drinks, The River of Pools.

Beloved and
revered by
the Hindus.

The most sacred spot in all India to millions of her sons, is the meeting place of the Ganges and Jumna, the tongue of land upon which Allahabad is built. To bathe in



PAGODA, TIRUPATI

the waters and to die upon the banks of the Ganges is the prayer of all hearts.

The scenery of the river plains is extremely beautiful, along their undulating banks in Bengal populous villages lie clustered beneath umbrageous trees.

The mango groves scent the air in spring and yield their luscious fruit in summer. The spreading banyan, that marvellous tree which builds a whole forest of arched roofs and spreading foliage, with its hanging roots, affords agreeable shade; the lofty pipal and the crimson-flowered cotton-tree stand out in vivid contrast against a background of waving yellow crops.

The beauty of the river plains

The fruitful soil of the river plains affords a vast wealth and variety of vegetable products. Agriculture is the chief industry. No less than 295 separate kinds of rice are grown, besides wheat, millet, pulse, oil seed, tobacco, poppy, tea, coffee, and fruit and vegetables in great profusion.

Throughout the whole country 246 million acres of land produced a harvest during the year 1909.

Southern India is separated from the Gangetic valley by a great range of hills and tableland, the Vindhya, below which again lies the Narbada valley, containing some of the most exquisite scenes of natural beauty which earth affords. Upon the slopes of the Vindhya are vast masses of forest, high grassy plains with patches of rich cultivated soil on which the cotton plant is now being grown.

The Vindhya

The Eastern and Western Ghats form the remaining sides of the huge triangle which encloses the plateau of Southern India. From its surface, rise the Blue Mountains, where Utakamand, the summer capital of Madras, gleams white and cool at an elevation of some 7000 feet above the sea level.

The Western Ghats are largely covered with forests abounding in huge trees of splendid growth, and in boundless variety of shrubs and creepers. The teak tree, which provides a fine grained and valuable wood, is found in the greatest abundance in the districts of Kanara, and on the Anamalai hills of Coimbatore and Cochin

Mountains and forests of the south

The Coorg forests, through which elephants, tigers and bison roam, are typical of the primeval jungle which still covers a vast area of the countryside.

Stretching, as it does, through nearly thirty degrees of latitude, India presents almost every variety of climate. The upper, or continental, region ends in the snow mountains and arctic cold.

Climate

The peninsular portion is almost all within the torrid zone. There are three well-marked seasons, the rainy, the cool and the hot, the last continuing from the time when the sun crosses the equator until it is vertical over the Tropic of Cancer.

The rainfall varies from 15 inches a year to the surprising total of 600. Even 805 inches of rain have been known to fall during one year in Cherrapunji, a narrow valley among the Khasi hills.

The temperature in like manner varies immensely in accordance with latitude and elevation. The hottest area is the Pat Desert of Upper Sindh, where at Jacobabad the highest day temperature recorded has ranged from 117 to 126°. The average mean temperature at most of the stations on the plains, varies between 71 and 84.

In the hill stations it varies from 42·6° at Leh, to 70·4° at Pachmarhi.

The cold weather lasts from January to February, during which the normal rainfall measures only 0·99 inch ; during the hot weather season, from March to May, it increases to 4·58 inches ; in the south-west monsoons, from June to September, 34·65 inches is the average, and the remaining three months of the year account upon the average for 4·95 inches.



CHAPTER VI

THE BRITISH RAJ

It is not the purpose of this work to relate in detail the historical circumstances which led to the establishment of British sovereignty in India, suffice it to remark that when the Mughal Empire was falling into decay, it became evident that all the splendid achievements of the Indian peoples, their temples, cities, social institutions, agriculture and accumulated wealth were in jeopardy. In the absence of a central government strong enough to maintain order, the fierce strife of many conflicting interests, and the passionate opposition of diverse races and religions, bred anarchy, and threatened to overwhelm the whole country in universal disaster.

Necessity of
a central
government

Political disorder was pressing, as it invariably must, with fearful weight upon the whole body of the people, upon the workers in every industry, and especially upon that great industry of agriculture which forms, in India, the life-work and the support of eighty per cent. of the inhabitants.

The task of government was forced 'ineluctabile manu' upon those who alone possessed the strength to render it effective.

At the end of a long and successful period of British administration, and at a moment when the myriad voices of India are united in acclaiming the coming of the King-Emperor to the ancient and royal city of Delhi, it will be interesting to recall some of the striking developments which differentiate the present regime from those of the past. India has never lacked that potent factor in the production of national prosperity, an industrious population. For ages her fruitful and responsive soil has been cultivated with patient assiduity. Frugality is another great factor in wealth production, and the Hindu peasant is the most frugal of men; he is largely a vegetarian; his wants are few, and the conditions of the climate, in many parts of India, render clothes rather a matter of decency than warmth. The simple margin of necessities upon

Sources of
Indian
prosperity



SIR O'MOORE CREAGH, V.C., G.C.B.
Commander-in-Chief of His Majesty's Forces in India

which existence is not only possible but comfortable, beneath radiant skies and encompassed by such favourable natural conditions, made India populous.

The idyllic happiness which this highly-favoured clime offered to mankind was, however, perennially threatened by adverse fates of which war, famine and pestilence may be taken as the typical and awful ministrants.

To say nothing of those great wars of conquest or invasion undertaken by powerful monarchs, such as Nadir, the Persian, who slew 150,000 men in Delhi; or Aurangzeb, who, for the fifty years of his reign, was hardly ever without a great army in the field in some part of India; there were also the endless tribal wars and family feuds, and local uprisings, which wasted and debilitated every part of the country in turn.

Disturbing
influences

With many tribes a state of war against their neighbours was pre-supposed as the normal condition of things, and it only wanted opportunity to fan the flame of some smouldering grievance to fever heat, or to send a troop of fierce marauders to demand *chout* from the hapless villages of some less military tribe.

The tide of war rose and fell with almost the regularity of the seasons, and besides taking its terrible toll, year by year, of human life, disturbed all industries by rendering all men insecure in their possessions.

British administration has conferred upon India the inestimable boon of peace both external and internal.

Since the great pacification solemnly pronounced in the name of Queen Victoria at Allahabad in 1858, no hostile army has invaded and no uprising seriously disturbed the serene calm of the Middle Land. There have been, it is true, frontier wars, affairs of outposts and great border States, but these have been far away from the historic cities and fruitful plains of the Gangetic valley.

Fifty years of peace and of security have marvellously increased the productiveness and the population of India.

Fifty years
of peace

At the beginning of the eighteenth century the average value of exports did not exceed £1,000,000. It rose slowly to about £10,000,000 in 1834. The returns for 1910 indicate

that the prodigious total of £137,000,000 has now been reached.

According to the latest census returns, 315 million persons are now living in British India, and the safety of their persons and property is either directly or indirectly guarded by all the forces at the disposal of the Indian Government.

The firm but paternal treatment meted out to the lawless elements among hill tribes, such as the Moghias and the hillmen of the Bhagalpur district, long the terror of the lowland villages, has turned predatory clans into peaceful cultivators. An equitable land settlement, differing in accordance with the needs of each of the great provinces, has been carefully worked out. While securing the proprietary rights of the Talukdars, Zamindars and feudatory chiefs, the government have sought to protect the actual cultivators by conferring occupancy rights upon all tenants of more than three year's standing.

Out of the Panchayat or village council of five, an immemorial institution of Hindu communities, municipal bodies, containing an elective element are being built up, and have power to raise funds for local purposes.

Law is administered without fear or favour, and by its strict impartiality, and its adaptation to Hindu and Muhammadan domestic customs, it has won the confidence of the people.

The causes of tribal dispute and dissatisfaction have in many cases been removed by accurate survey, the delimitation of rights, and by substituting a definite legal status for the loose bond of traditional custom.

Every movement for the improvement of the people, every step in the march of progress, is dependent upon the maintenance of peace, and this is undoubtedly one of the greatest gifts which the British administration has conferred upon India.

It would be impossible, probably, to mention a more striking instance of the way in which the "pax Britannica" has benefited the citizens of the great eastern empire than that which is furnished by the history of the suppression of

An equitable
land settlement

Impartial
law

Thuggee and Dacoity. These two forms of crime, in the strange atmosphere of eastern thought, had assumed in the minds of their debased adherents, the dignity of ancestral pursuits, and the most atrocious outrages upon peaceful passengers, by jungle-path or lonely mountain trail, were sanctioned by tribal custom. Crimes of theft and murder, as secret, sudden, and noiseless as the fall of a leaf, were perpetrated, and the criminal concealed and protected by all the other members of the wicked confederacy. Among the Thugs, assassination had come to be regarded as a religious duty, and to kill, not from enmity or spite, nor even in the hope of gain, was thought by some to be a virtuous act, likely to propitiate Bhowanee, the stern goddess of their vows.

Thuggee and
Dacoity

The term Dacoity, derived from a Hindu word, *daka*, plunder, indicates robbery by armed gangs of marauders. This was a pursuit by which several wild highland clans once maintained a precarious existence.

Amongst the predatory races were the Budak of the Nepal Terai, the Dasadh of Behar, the Bind of Chazipur, the Nath, Boria, Kurmi, Gujar, and a host of other lesser tribes.

In the Punjab, Dacoity usually took the form of cattle lifting, and the tribe of the Meena were concerned in many of the raids in Northern India with this object.

The more terrible crime of Thuggee was practically suppressed by the energetic action of a department formed for the purpose of dealing with it, during the Lieutenant-Governorship of Lord Wilham Bentinck, and under the command of Major (afterwards Sir) W. H. Sleeman.

Information concerning these remarkable criminal associations was first brought to the notice of the English authorities at Fort St. George, by Dr. Richard Sherman and Captain Sleeman as early as 1810.

Phansigars, or stranglers (in the northern parts of India called Thugs, or deceivers), had been apprehended shortly after the siege of Seringapatam, in 1799, but it was not until the date above mentioned that by the capture of Feringhea, afterwards immortalised in Eugene Sue's famous novel, "The Wandering Jew," the widespread and

The Phansigars,
or stranglers



GENERAL SIR W. H. SLEEMAN, K.C.B.
1799-1856

A British officer who conferred a lasting benefit upon the peaceful inhabitants of India, by the suppression, between 1830 and 1840, of the once prevalent system of organised theft and murder known as Thuggee. Sir W. H. Sleeman was afterwards British Resident at the Court of the King of Oudh, Lucknow.

dangerous character of these associations was disclosed. This arch villain was laid by the heels by Major Sleeman ; and to this extremely able and intrepid officer of the Bengal army was entrusted the task of stamping out Thuggee in the dominions under the British control.

The special department formed for the suppression of Thuggee and Dacoity, remained in operation up to the year 1884. But its main task was achieved in the first ten years of its existence, under the leadership of its heroic founder.

Major Sleeman forced some of the Thugs whom he captured to become informers, and from them he learned the names and descriptions of their confederates. The stories these men told of wholesale murders seemed at first incredible, but were confirmed by incontestable proofs. Their method was to attack travellers in superior force ; they would pretend to be themselves peaceful travellers, anxious to secure protection by joining forces with any company they might meet upon the road. At a chosen spot they would ruthlessly strangle their victims and make off with the booty.

Sir
W. H. Sleeman's
work

They had their omens and superstitious observances ; the cloth and pickaxe with which they strangled and then buried their victims, were held sacred, nor would they carry out their fell project if a snake should cross their road, or if they should chance to meet a carpenter, an oilman or a Brahmanee woman.

Bulram, one of the most notorious of the Thugs, was believed to have murdered, during the forty years of his career, no less than 931 persons, and Futch Khan, in a period of twenty years, had done to death 508

The Thugs had a secret language of their own called Ramasecana. Their crimes were committed so stealthily, they were in league with so many allies, and at the least hint of danger they could melt away into the jungle with such ease, that the task of tracking them down, and breaking up their evil confederacy, seemed well-nigh impossible. Captain Vallancy, one of the officers employed upon this difficult and dangerous service, writing in a Madras journal

The Thugs
language

at the time, said : " The day that sees this far-spread evil eradicated from India and known only by name, will tend greatly to immortalise British rule in the East."

The difficult task was accomplished, and to-day, though crimes of violence occasionally occur, Thuggee, as an organised system of theft and murder, is only a memory of the past.

The task of dealing with famine in a vast agricultural country where an immense population has to be supported from the annual harvests of the soil, is even more difficult.

Great heat, a fruitful soil and the periodic recurrence of heavy rains are the factors of India's agricultural prosperity ; unfortunately, the last is sometimes disturbed by the failure of the monsoons. When this happens the cultivators of the innumerable small farms into which the land is split up soon come to the end of their resources, and millions of agricultural labourers are thrown out of employment.

To this problem of recurrent famine the Indian Government has given its most earnest attention and has evolved practical means of combating its worst effects.

The organisation of relief when drought has actually deprived people of their means of sustenance has been well-nigh perfected by experience and now a telegram from head-quarters suffices to set the machinery at work and mobilise relief in any famine-stricken district, but this is felt to be only subsidiary to the better and greater task of diminishing the severity of famine beforehand, and of placing the people in a better position to endure occasional and local failure of crops. A sum of £1,000,000 is annually set aside for the purpose of famine relief and insurance. A portion of this sum is usually spent on the construction of railways and irrigation works.

The intensity of the distress due to famine has been enormously reduced by railways. In former times the inhabitants of one district might be perishing of hunger whilst plenty reigned in a region not 100 miles away.

On the other hand, one of the most terrible famines which afflicted the Madras presidency during the early days of the railway era was alleviated by the importation

The problem
of famine

Relief and
insurance

of nearly a million tons of grain gathered from remote and more fortunate provinces, all of which was carried into the interior by two lines of railway in a single year. The salvation of India from the curse of famine lies clearly in the direction of improved communications, and, to effect this, railway construction has been vigorously pushed forward by the Government.

The utility
of railways

The old guaranteed companies, some of which date back to 1850, were taken over by the State, and, in addition, restrictions on the introduction of private capital for railway enterprise have been removed. The activity which has followed in this direction is rapidly covering the land with the ready means of transit. There are at present no less than 31,614 miles of railway, equipped at a capital outlay of £322,000,000, under the supervision of the railway department.

Modern
railway
enterprise

Up to the middle of the nineteenth century there were few roads in India and not a single mile of railway. Roads were merely footpaths or tracks fit only for ox-waggons. There are now 60,000 miles of good roads, one-third of which are macadamised and provided with bridges. The magnificent highway which stretches for 1,500 miles from Calcutta to Peshawar is a fine example of engineering skill and a striking monument also to the energy and faith in the future which could undertake and complete so gigantic a task. There are 560,000 miles of postal route, and 55,000 miles of telegraph lines.

Roads

India with its teeming population, its many wants and the varying necessities which climatic conditions may force upon distant provinces, is now better prepared than ever for those rapid interchanges of intelligence and of merchandise which are so essential to a modern state.

The good communications which now connect Calcutta, Bombay, Madras and other great cities with every part of the Indian Empire are the first line of defence both against war and famine.

Navigable canals have also been constructed by the government and these, which are quite distinct from irrigation canals, are not remunerative commercially, but,

Navigable
canals

in conjunction with the great natural waterways, furnish additional and most valuable means of conveying quantities of corn from one district to another.

The construction of works and canals for irrigation is also a very important line of defence, which, although not initiated by the government, for it is an extremely antient practice in India, has been greatly developed and largely utilised in the war against famine.

A typical instance illustrating the magnitude of such works is the great Chenab canal which irrigates an area of about 2,000,000 acres and has a discharge of 11,000 cubic feet of water per second.

Innumerable wells, tanks and reservoirs are helping to conserve the natural water supply and render it available when and where required, and it has become evident that great as is the population of India, it is as yet far beneath the number which its natural resources will maintain in comfort when those resources are carefully husbanded and properly controlled.

The forests of India have an important function to fulfil in relation to the prosperity of the country, and a special department of the government is concerned with their preservation.

In the old days nomadic tribes practised agriculture in a very primitive, and, at the same time, wasteful style. Wandering through the forest they would choose a site for a brief settlement and proceed to clear it by the simple device of setting fire to the forest, taking little or no precaution against the spread of the conflagration. After having one or two crops from the virgin soil they would move on to another encampment.

Under the forest department this wasteful method has been discouraged and the immense importance of the preservation of forests insisted upon.

It is in the soil of the forests that the rainfall water is stored up, and their foliage supplies moisture to the air which descends upon the fields in grateful showers or dew. The grazing afforded to cattle in years of drought is also of great value.

India not
over-populated

The forests

The use of suitable manures is being encouraged in every way, and this is increasing very largely the productivity of the soil.

When drought comes it must inevitably inflict suffering and privation where so many millions are dependent upon husbandry for their daily sustenance, but at least starvation will be averted, and the worst effects of the shortage prevented, by the remedial and protective measures which have now been adopted.

Another method by which the Indian Government seeks to avert the dangers of famine, is by stimulating and preserving native arts, industries and manufactures. The distribution of grain to the various parts of this great country, with sufficient rapidity, and in quantities which will prevent any undue shortage, is but one aspect of the question. The provision of an alternative occupation to agriculture, when that fails, is equally important. Many very interesting indigenous crafts have existed in India from an early period. The fine muslins of Dacca, Madras and Arni were famous from remote times

Native arts,
industries and
manufactures

Cotton weaving dates back to the time of the Mahabharata: the Greek name for cotton, *sindon*, is etymologically the same as that of India or Sindh, and the name calico is derived from Calicut, on the Malabar coast, where the fabric was first woven.

Hand loom weaving still continues in many parts of the country, and many cotton mills of the English type, equipped with modern machinery, have been established, mostly in the Bombay Presidency. These latter have greatly increased during the last twenty years, and now find employment for 2,32,000 persons

Cotton mills

Jute mills have doubled in number during the same period, and now employ 1,02,000 persons. The total number of factories using mechanical power is 2,500, and it is calculated that 1,000,000 persons are employed in them.

The great tea industry of Assam, which is of comparatively recent growth, employs already 600,000 people.

These great and thriving industries present an alternative career to the growing of cereals, and thus relieve the dead

Assam tea

weight of numbers pressing to find a livelihood from their cultivation.

In the villages and towns, and in the great cities of India, other more highly specialised native arts and industries flourish and find employment for great numbers of the population.

Beautiful silk fabrics, both pure, and the variety mixed with cotton, known as mashru or sufi, are woven in the Punjab and Sindh, at Agra, Haidarabad, Tanjore and Trichinopoli.

Local
handicrafts

Brocades of gorgeous hue and delicate texture are the speciality of Benares, while, in Bombay, steam silk weaving factories are employed in converting raw silk from the cocoons into *bandannahs*, *tamains* and *patsoes*, chiefly for the Burmese market.

From the old historical cities of the Deccan, such as Gulabgarh and Aurangabad, come beautifully-embroidered velvets for the canopies and rich housings of royal elephants.

Jewellery

Gujarat is famous for its delicately-tooled leather work, and Kashmir for its shawls; while Agra, Mirzapur, Jabalpur, Warangal and Malabar send forth to the markets of the world many thousands of carpets and rugs, some of which are worth not less than £10 per square yard.

Silver filigree work, red gold and precious stones assume exquisite shapes under the hands of the jewellers of Jaipur, and he who desires a sword of damascened steel, hammered with gold, and encrusted at its handle with diamonds, may find many a cunning workman to do his bidding at Gujarat or Sialkot, or among the artificers of Kashmir.

Benares besides being the home of brocades is famous for its brass work.

Sindh potter

Apart from this higher plane of manufacturing and industrial activity, there are the ancestral village craftsmen of India who make their wares, often with wonderful skill not for export but for the village communities of which they form a part. Of these the potter is the most typical, and his work, especially in the province of Sindh, rises to the level of a fine art. Sindh pottery, consisting chiefly of tiles

and domestic vessels, is ornamented with tasteful flower patterns in turquoise blue, copper green and sometimes dark purple or golden brown, and is coated with a fine transparent glaze.

Wood and ivory carving, inlaying and sculpture are among the remaining art-industries of India.

The third danger threatening Indian civilisation in former days was, as has been said, pestilence, and while it is not claimed that this terrible visitant has been entirely banished under the British rule, much has been accomplished to modify and abate the evil.

Plague has been present in India for the last fifteen years, and has, unfortunately, carried off many victims, but the dawn of a better epoch is beginning ; this terrible scourge is being dealt with successfully, and wherever the conclusions and directions of science are listened to, it disappears. It has been proved that the plague is conveyed to man by rat fleas, and that the two effective remedies are inoculation, and the evacuation of infected houses.

Remedial
measures
against plague

The provincial governments are spending considerable sums in the campaign against the plague, many facilities are now offered for improving sanitary conditions, and there are signs that the people are realising the truth and the worth of such preventive measures.

The British Raj exists for the welfare of India—that fact is stamped like the impress of a royal signet upon every department of the administration and every section of their varied activities. In the British House of Commons a notable Secretary of State, the late Lord Wolverhampton, once said, "Every member of this House is the member for India," and the statement was re-echoed with enthusiastic approval by the whole British race.

The welfare
of India

To India and her peoples, Britain has given her best. The highest intellectual achievements, the noblest lineage, the most splendid record of public service, these have been the qualifications which have been sought in those who should preside in various capacities over the administration of this great country.

Upon the ancestral shield of the heir to the throne of England is inscribed the motto "I serve," and it is in that spirit that he mounts the steps which lead to the duties and responsibilities of an imperial throne. To govern for the good of the governed, to fight for the defence of the Empire, to work for the uplifting of his people, have been and are the watchwords and ideals of His Majesty's house.

The royal
visits

As Prince of Wales, his late Majesty, King Edward the Seventh, visited India in 1875, and his son and successor, accompanied by the Princess of Wales, made a tour of its States and provinces in 1906.

The visit of His Majesty the King-Emperor George the Fifth is but another instance and pledge of his determination to fulfil the high mission of his race, and a pledge also of the concord and amity of the whole British nation with their brethren and fellow subjects in India.



SOME GOVERNORS
AND
VICEROYS OF INDIA

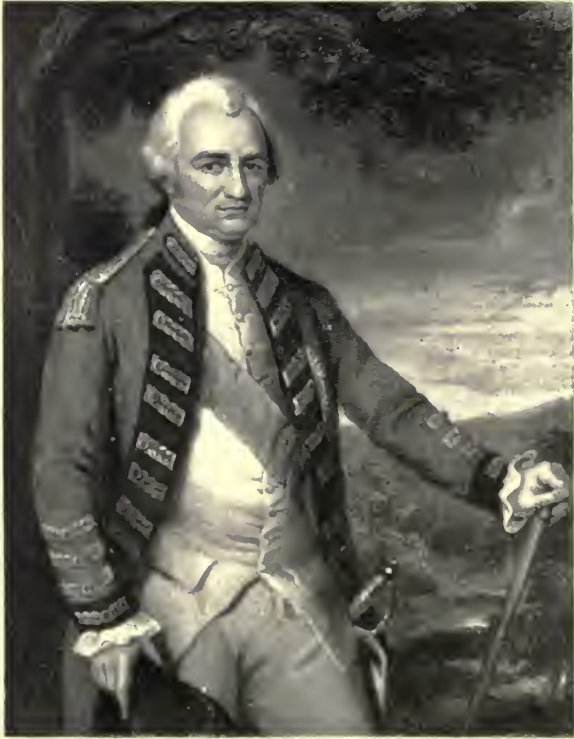
LORD CLIVE

Born at Styche, near Market Drayton, 1725, Robert Clive began his Indian career as a writer in the service of "John Company," but on the outbreak of hostilities, took naturally to soldiering and early displayed his extraordinary genius for war by the capture of Arcot (1751), which he held against a vastly superior force.

This was followed by the victories of Arni and Kaveripak and the capture of Kovilam and Chengalpat. After a brief period in England, Clive returned to India to avenge the atrocity of the Black Hole. Calcutta and Chandarnagar were soon taken, and at Plassey, one of the most fateful battles in the history of the British Empire, he defeated Suraj-ud-Dowla's large army with a small force of 3,200 men. On returning to England he was honoured with an Irish peerage and a seat in the House of Commons. In 1765, the affairs of the East India Company having fallen into disorder, he returned to Calcutta, and during the twenty-two months of this second Governorship established the Indian Administration on a firm basis. In doing so he roused a storm of opposition from those whom he displaced, and, on his return to his native country, his earlier proceedings in India were severely commented upon in a parliamentary enquiry.

In its final resolution, Parliament, while admitting his great and meritorious services, passed at the same time some censure upon Clive's conduct. This so preyed upon him, that ill in mind and body, he died by his own hand on November 22nd, 1774.

Clive's splendid victories at a critical moment in the History of India won for the British the virtual sovereignty of Bengal, Behar and Orissa, established their military prestige throughout the whole country, and paved the way for an Imperial Suzerainty.



ROBERT, LORD CLIVE

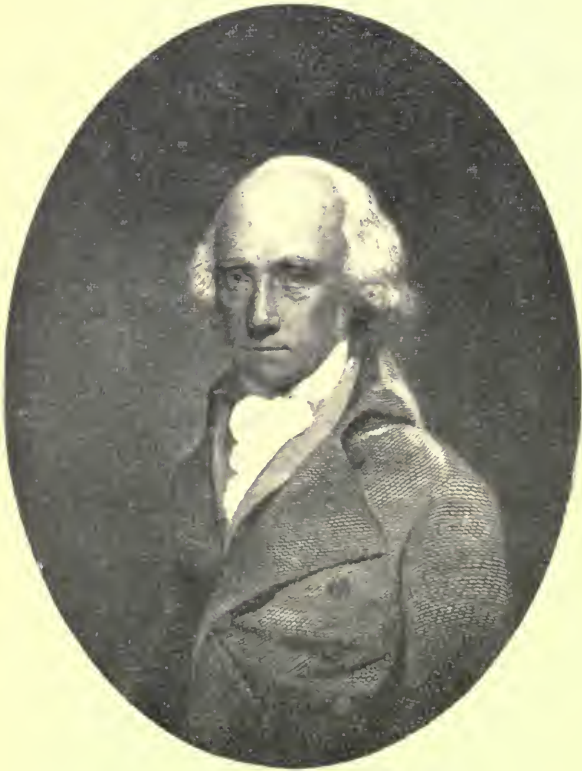
WARREN HASTINGS

1773-1784

This great Indian Administrator was born at Churchill and educated at Westminster, he went to Calcutta in 1750 in the service of the East India Company, and was appointed British Resident at Murshidabad in 1758. In 1769 he became second in council at Madras, and three years later Governor of Bengal and President of the Council.

As Governor-General, to which position he was appointed in 1773, Hastings made an appraisal of the landed estates, revised the assessment, improved the administration of justice, organised the opium revenue, waged vigorous war against the Mahrattas and made the Company's power paramount in many parts of India. After violent dissensions with the members of the council, and a duel, in which he wounded Phillip Francis, one of his opponents, he resigned office and returned to England. Having been impeached at the bar of the House of Lords, he was involved in a trial which lasted seven years, completely stripped him of his fortune and would have reduced him to poverty had not the East India Company for which he had, during troublous times, accomplished so much, provided for his declining years.

By his generalship and diplomacy Warren Hastings established upon a firm basis the British occupation of India.



WARREN HASTINGS



THE MARQUIS WELLESLEY
1797-1805

Richard Cowley Wellesley, eldest son of the first Earl of Mornington, was appointed Governor-General of India in 1797. His victories over the French and the followers of Tipu Sahib, and later, assisted by his brother (afterwards Duke of Wellington) over the warlike Mahrattas, followed up by a far-sighted and vigorous administration, made Britain the paramount power on the great Asiatic Peninsular.



MARQUIS OF DALHOUSIE

1817-1876

One of the greatest of Indian Pro Consuls, became Governor-General in 1847. His term of office was not less successful in the acquisition of territory than in developing Indian resources and in improving the administration. Pegu and the Punjab were conquered, Nagpur, Oudh, Satara, Jhansi and Berar annexed, thousands of miles of railways and telegraph wires laid, the Ganges Canal and important irrigation works all over India opened during the nine short years of his rule in India.



EARL CANNING

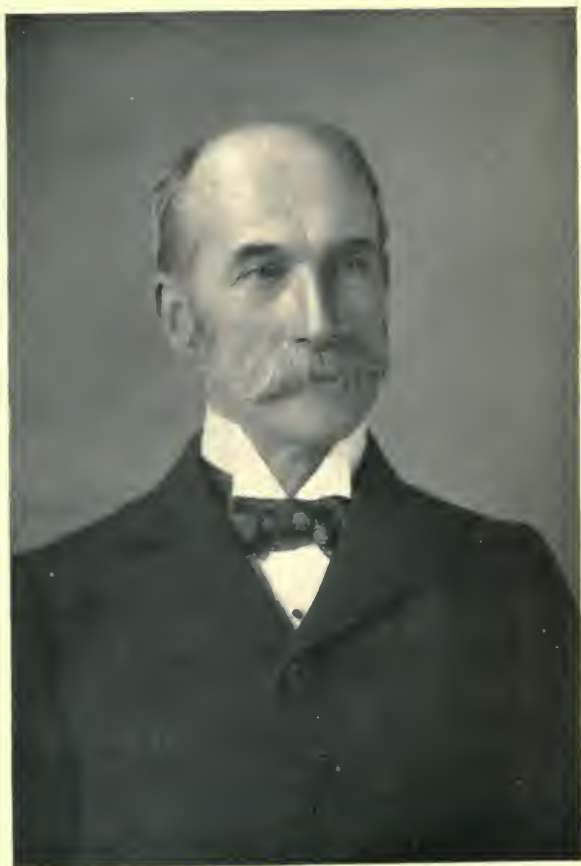
1856-1862

Succeeded Lord Dalhousie in 1856. In 1858 he became the First Viceroy, and in 1859 was raised to an Earldom.

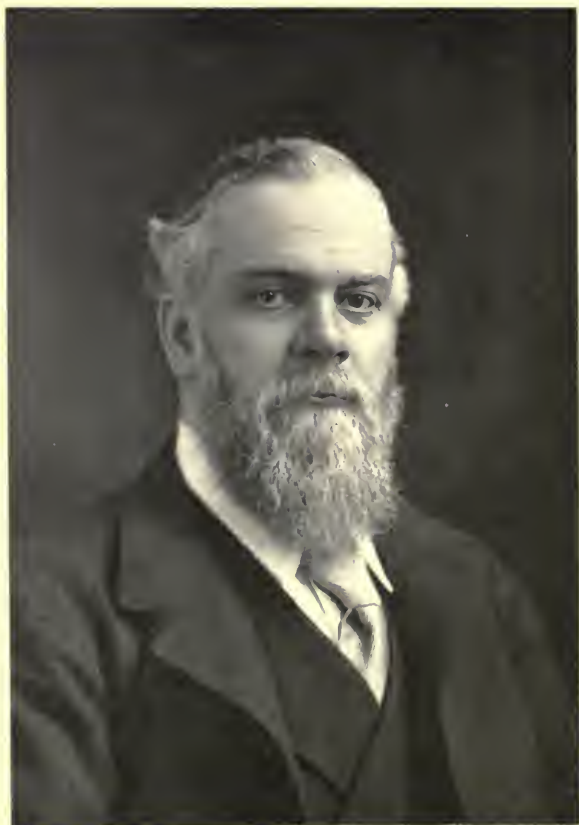


EDWARD ROBERT
Earl of Lytton
(1876-1880)

Succeeded his father as Lord Lytton in 1873. Received the Grand Cross of the Bath and made Viceroy in 1876. Chief events of his Viceroyalty were the proclamation of Queen Victoria as Empress of India (1877) and the outbreak of the Afghan war (1879). Created Earl of Lytton (1880).



THE MARQUIS OF LANSDOWNE
1888-1894



VICTOR ALEXANDER BRUCE
Ninth Earl of Elgin
(1814-1891)

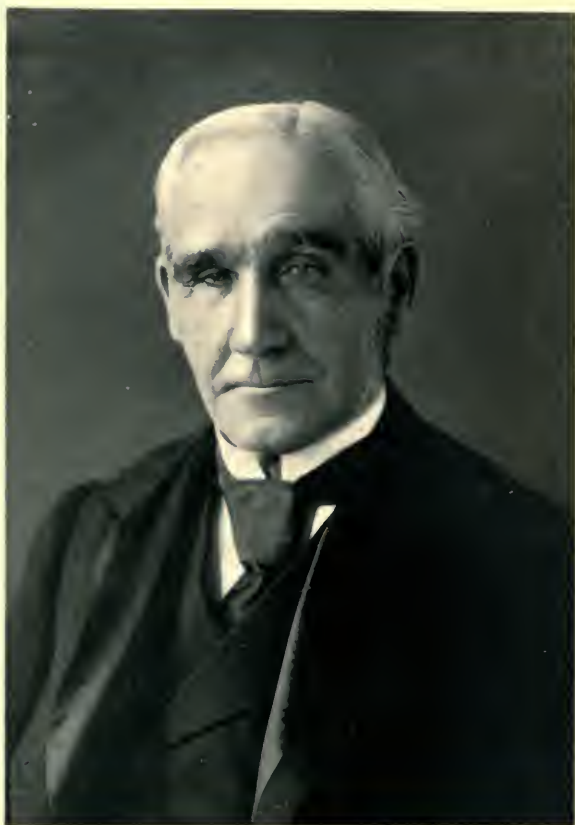


EARL CURZON OF KEDLESTON
1899-1905



FIG. 140. — M.
1845-1870

SOME FAMOUS
SECRETARIES OF STATE
FOR INDIA



THE RIGHT HON. SIR H. H. FOWLER, G.C.S.I.
Viscount Wolverhampton
1894-1895



THE RIGHT HON. JOHN MORLEY
Viscount Morley of Blackburn
1905-1910



ROBERT OFFLEY ASHBURTON CREWE-MILNES
K.G., P.C., M.A., F.S.A.
Marquis of Crewe (U.K.) and Earl of Madeley
since 1910

PROVINCES OF INDIA
AND
THEIR RULERS



THE RIGHT HON. LORD HARDINGE OF PENSHURST
Viceroy of India
since 1910

MADRAS

HISTORY.—The first British settlement in Madras was made at Masulipatam in 1611. This great province of India, which occupies the most southerly portion of the continent, and has a coast line of 1,730 miles, was not only the oldest, but was also the most important of the three original presidencies before Clive's conquest of Bengal. It was, however, small in extent until the annexation of the Carnatic in 1801. The Laccadive Islands are included under the same administration.

DATE OF ANNEXATION.—1746.

AREA. 141,720 sq. miles.

CLIMATE. Tropical; differs greatly according to elevation.

POPULATION. 38,209,436.

CAPITAL. Madras.

GOVERNOR. Sir Thomas David Gibson-Carmichael, Bart., K.C.M.G.

GOVERNMENT. Consists of a Governor assisted by Executive and Legislative Councils.

LAWS AND CUSTOMS. Madras is divided into twenty-one districts, each of which has a collector and district judge. British law, modified by special Indian enactments, prevails.

RACES. Chiefly Hindus.

DEVELOPMENTS. There are good roads, railway communication is extensive, and irrigation works have been carried out on a very large scale.

RELIGION. There are over one million native Christians, Roman Catholics and Protestants. Hinduism or Brahmanism is the prevailing religion.

LANGUAGE. Tamil and Telugu are the principal languages, Malayalam, Kanarese and Uruva are also spoken.

EDUCATION. Numerous government and mission schools and colleges exist.

PRODUCTS. Rice, millet, indigo, coffee, sugar, wheat. Madras is not rich in minerals, but gold and iron have been found, also diamonds in the Karnul district. The forests are of great value, teak being the principal wood.



HON. COL. SIR GEORGE S. CLARKE, K.C.M.G., G.C.I.E., F.R.S.
Governor of Bombay
since 1907

BOMBAY

HISTORY.—The western province of India takes its name from the island of Bombay, which became a British possession in 1662, as part of the dowry of Catherine of Braganza, wife of Charles II. The greater part of the present territory was obtained by annexations from the Mahrattas, and by the lapse of the Satara State. Sindh was conquered in 1843, and its administration is, in some respects, separate from the remainder of the presidency.

DATE OF ANNEXATION. 1662

AREA. 122,984 sq miles.

CLIMATE. The coast districts are hot and moist with a heavy rainfall during the monsoon. Mean temperature at Bombay, 72 F.

POPULATION. 18,515,587.

CAPITAL. Bombay.

GOVERNMENT. Consists of a Governor, assisted by Executive and Legislative Councils.

LAWS AND CUSTOMS. The administration has its base in the village officer, the patel, he reports to the mamlutdar, and he in turn to the deputy collector, who is responsible to the assistant collector or collector.

On the judicial side there are magistrates, small cause court judges, special and assistant judges, and finally, the High Court of Bombay and the Judicial Commissioner in Sindh.

RACE. Especially the home of the Mahrattas.

DEVELOPMENT. Very advanced, the capital is a magnificent city and a great centre of commerce, possessing railways, newspapers, cotton mills, and many magnificent public buildings.

RELIGION. Muhammadan, Hindu, Parsee.

LANGUAGES.—Marathi, Gujarati, Sindhi and Kanarese.

EDUCATION. Is at a high level, numerous schools exist throughout the province, and in the city of Bombay there is a fine university, also several art colleges, veterinary and technical schools.

PRODUCTS.—Oil seeds, millet, rice, sago, sugar, pepper, cotton, coal, iron, silver and gold.

Manufacturing industries have become very active in recent years.



SIR E. N. BAKER, K.C.S.I.
Lieut.-Governor of Bengal
since 1905

BENGAL

HISTORY.—The old Presidency of Bengal comprised, in pre-matiny times, the greater portion of northern India, but the province now under this administration consists of a part of Bengal proper with Behar, Orissa and Chota Nagpur. Fifteen districts of Eastern Bengal were detached from the province in 1905, and combined with Assam, while one district from the Central Provinces was added to Bengal.

DATE OF ANNEXATION—1757.

AREA.—115,819 sq. miles.

CLIMATE.—Hot and humid on the plains. Mean temperature 77 F.

POPULATION.—50,722,067.

CAPITAL.—Calcutta.

GOVERNMENT.—The Lieutenant-Governor is assisted by a Legislative Council. An Executive Council is being created.

LAWS AND CUSTOMS.—There are nine divisional commissioners under the Lieutenant-Governor of Bengal, who superintend the revenue, criminal and executive administration of their respective divisions. These divisions are again sub-divided into districts, each under its district officer, who, besides exercising general supervision, is also the chief magistrate in his district.

RACES. Most of the people are descended from the Arvan stock. There are also representatives of the aboriginal races, such as the Santals, Gonds, Kols and Bhuiyas.

DEVELOPMENT. Good railways, canals, and irrigation works have been constructed.

RELIGION. Hinduism and Muhammadanism are the prevailing religions.

LANGUAGES. The principal are Bengali, Hindi and Bihari.

EDUCATION. In every village of any size there is a vernacular school called a pathshala, and in every district secondary schools affiliated to the Calcutta University, which teach up to the matriculation standard.

PRODUCTS. Rice, opium, indigo, oil seeds, sugar, tobacco, silk, tea and jute.



STEWART, COLONEL SIR STEWART BAYLIS, K.C.S.I.
Lieut. Governor of Eastern Bengal and Assam
Appointed 1911

EASTERN BENGAL AND ASSAM

HISTORY.—Assam, the region of the Surma and Brahmaputra valleys, was ceded to the British after the first Burmese war in 1826, but it was not until 1838 that, in consequence of the misgovernment of the native rajah, the entire country was placed under British administration. It was for many years a separate province, but in 1905 was linked to Eastern Bengal.

DATE OF ANNEXATION.—1838.

AREA—106,130 sq. miles.

CLIMATE. There is an abundant and well distributed rainfall.

POPULATION.—30,901,459.

CAPITAL.—Dacca.

GOVERNMENT.—Is vested in a Lieutenant-Governor and a Legislative Council.

LAWS AND CUSTOMS.—There is a regular system of subordinate and superior courts of justice, culminating in the High Court of Calcutta, which is the Supreme Court of Appeal. Trial by jury has been successfully introduced in Assam.

RACES. Muhammadans and Hindus.

DEVELOPMENT. A large part of this north-eastern tract is still forest, but there are now over 600,000 acres of tea plantations, and this industry has become one of the most important in India. Railways, telegraph lines and canals, furnish the means of communication.

RELIGION. Muhammadans, Hindus and some Christian converts.

LANGUAGES. Bengali and Assamese, are the chief among a great variety of languages.

EDUCATION.—About 20 per cent. of the boys, and 2 per cent. only of the girls, attend school. The Welsh Calvinistic Methodist Mission and other missionary bodies are actively engaged in educational work.

PRODUCTS. Rice, tea, jute, wheat, oil seeds, sugar, tobacco, coal and iron.



SIR JOHN PRISCOTT HEWETT, K.C.S.I., C.S.I., C.I.E.
Lieut.-Governor United Provinces of Agra and Oudh
since 1907

THE UNITED PROVINCES OF AGRA AND OUDH

HISTORY.—Forming the upper part of the great Ganges plain to the west of Bengal, these provinces correspond with the Hindustan of the old Muhammadan historians, and contain many famous cities of Indian history and myth within their borders. These include Benares, the most sacred city of the Hindus, Agra and Allahabad.

From the conquest of Delhi, by Kutb-eb-den, in 1195, to the advent of the English, a period of 600 years, the Muhammadans were the rulers of this part of India. Seven years after Clive's famous victory at Plassey, Sir Hector Munro conquered the combined forces of the Emperor Shah Alim and his ally, Shujah-ud-dowlah, at Baxar. In the absence of any natural military frontier it became necessary to occupy strategic points in Oudh in order to protect Bengal. After the Mahratta war of 1803, Doab, and the country on both sides of the Jumna, was brought into the sphere of British influence. The whole area was placed under one administration in 1877.

DATE OF ANNEXATION. 1803.

AREA.—107,164 square miles.

CLIMATE.—Hot, but well watered and extremely fertile.

POPULATION. 47,691,782.

CHIEF CITIES. Allahabad (Agra), Lucknow (Oudh).

GOVERNMENT. Consists of a Governor and a Legislative Council.

LAWS AND CUSTOMS. British law, modified by special Indian enactments and local customs, is administered in civil and criminal cases. The habits of the Hindus, especially in regard to marriage and food, are regulated by the law of caste, all the septs of the same caste resident within a traditional area, are under the rule of a *punchayat*, or council of elders.

RACES. Hindus of Aryan and Dravidian extraction, and Muhammadans who are divided by history and descent into three great communities—the Pathans of the south-eastern districts, the Mughals of the Upper Doab, and the Afghans in Rohilkhand.



SIR LOUIS WILLIAM DANE, K.C.I.E., C.S.I., F.R.G.S.
Lieut.-Governor of Punjab
since 1908

THE UNITED PROVINCES OF AGRA AND OUDH *continued*

DEVELOPMENT. Railways now traverse almost every district in the provinces, and a net-work of roads connects them with every village of importance. Two great canals on the Upper Doab have been constructed.

RELIGION. Hindu and Muhammadan.

LANGUAGE. Hindustani; also Bihari.

PRODUCTS. Wheat, rice, barley, pulse, tobacco, millet, cotton, sugar, oil seeds, iron and lead.

PUNJAB

HISTORY. The province of the Five Rivers, which occupies the north west angle of the great northern plain of India, remained without a break, under the rule of Muhammadan dynasties of foreign extraction, from the beginning of the eleventh century till the latter half of the eighteenth, when the Sikhs revolted and established a Sikh kingdom. In 1848, after the Sikh war, Dulip Singh's territory became a British province, with Sir John Lawrence as chief commissioner. During the mutiny, many of the Sikh soldiers helped to fight the rebels, and when peace was restored, Delhi and its territory were added to the Punjab.

DATE OF ANNEXATION. 1849

AREA.—97,209 square miles

CLIMATE. Very hot from May to September in the plains; varies according to the elevation in the hilly regions.

POPULATION.—20,330,330.

CAPITAL. Lahore.

GOVERNMENT.—Consists of a Lieutenant-Governor and a Legislative Council.

LAWS AND CUSTOMS. The inheritance of land proceeds throughout a large part of the Punjab, according to the custom known in England in Saxon time as *gavelkind*, that is, all the sons take equal portions of their father's estate. This custom has produced village communities of peasant proprietors, the descendants of a common ancestor.



SIR HARLEY ADAMSON, K.C.S.I., C.S.I.
Lieut.-Governor of Burma
since 1910

PUNJAB *continued*

RACES.—Rajputs, Jats, Pathans and Beluchis.

DEVELOPMENT.—Railways with bridges spanning the great rivers, canals, and irrigation works have been constructed in many parts of the province.

RELIGION.—About half the population is Muhammadan, and half Hindu or Sikh; the Buddhists, Jains and Christians, together, only number about 100,000.

LANGUAGES.—Punjabi and Hindi are the chief languages. the native language of the Pathans and Beluchis is Pashtu, and is quite distinct from Indian dialects.

EDUCATION. The Khatris and Kashmiri Pandits have a special aptitude for education, and many members of these two races have distinguished themselves in commerce, in the civil service of the government, and in the learned professions.

PRODUCTS. Wheat, millet, barley, maize, pulse, oil seeds, sugar, cotton and salt.

BURMA

HISTORY.—A Buddhist Burman dynasty was established on the Irawadi as early as the eleventh century. The gradual extension eastwards of the borders of British India brought its frontier into proximity with Burma, and, owing to border raids by the Burmese, war broke out in 1824. At its conclusion, Assam, Arakan, and Tenasserim, were ceded to the British government. The second and third Burma wars resulted in the deposition of the King of Ava, and the complete annexation of Lower and Upper Burma, which were placed under one administration in 1886.

DATE OF ANNEXATION. 1852

AREA. 236,738 sq. miles.

CLIMATE. Very trying to Europeans, in the delta and along the coast; the rainy season lasts five, six, and sometimes even seven months. From February to April it is dry and hot, the temperature sometimes rising to 100 F. in the shade.

POPULATION. 10,400,024.

BURMA *continued*

CHIEF CITIES.—Rangoon (Lower Burma), Mandalay (Upper Burma).

GOVERNMENT.—Vested in a Lieutenant-Governor and a Legislative Council.

LAWS AND CUSTOMS.—Woman occupies a higher position in Burma than in other parts of India, and the laws affecting marriage contracts are more equitable. The Burmese are extremely fond of music, dancing and social entertainments.

RACES.—Burmans, Karens and hill tribes, such as Kachins, Singphos, Palongs and Chins.

DEVELOPMENT.—Several railways are in operation, including one from Rangoon to Mandalay. The trade of the country has made immense progress during the last forty years.

RELIGION.—Buddhism is the religion of nearly 90 per cent. of the people.

LANGUAGE.—Burmese.

EDUCATION.—The primary schools of the country are the Buddhist monasteries, where every Buddhist lad is expected to serve as a novitiate. There are also numerous government schools. Over 60 per cent. of the males in Lower Burma can read and write.

PRODUCTS. Rice, teak, bamboo, cotton, iron, copper, lead, tin, coal and petroleum.

THE CENTRAL PROVINCES AND BERAR

HISTORY.—The Central Provinces, which include the Vindhyan and Satpura tablelands and the great plain of Nagpur, were formed, in 1861, out of territory taken from the north-west provinces, and from Madras, and originally belonging to the old Mahratta kingdom of Nagpur.

Previous to the rise of the Mahratta power in India, this region was ruled by native Gond dynasties, the most famous

THE CENTRAL PROVINCES AND BERAR—*continued*

being that of Garha Mandla, in the sixteenth century. It still contains an unusually large proportion of aboriginal tribes, whose ancestors retreated to the hilly fastnesses of Gondwana, before successive waves of Aryan invasion, in early times.

DATE OF ANNEXATION.—The northern part of the provinces in 1818; Nagpur and its dependencies in 1854; Berar was leased, in perpetuity, from the Nizam of Hyderabad in 1902.

AREA.—82,635 square miles. Berar 17,710 square miles.

CLIMATE.—Hot and dry, except during the south-west monsoon (June to September).

POPULATION.—9,237,654. Berar, 2,754,016.

CAPITAL.—Nagpur.

GOVERNMENT.—Under a Chief Commissioner. All legislation is enacted by the Governor-General's Council.

LAWS AND CUSTOMS.—British law as modified by special Indian enactments prevails, the chief difficulties lie in the direction of the enforcement of sanitary reforms and of forest conservation.

CHIEF COMMISSIONER.—The Hon. R. H. Craddock, C. S. I.

RACES.—Maharattas, Rajputs and Gonds.

DEVELOPMENT.—Much has been done, by the construction of roads and railways, to open up the country.

RELIGION.—Most of the people are Hindus, about one-seventh belonging to aboriginal or non-Aryan tribes still adhere to their primitive faiths.

LANGUAGES.—Mainly Hindi and Marathi.

EDUCATION.—There are 2,500 State schools and colleges at work in the provinces.

PRODUCTS.—Rice, wheat, millet, pulse, oil seeds, cotton, coal and manganese ore.



SIR H. E. MCCALLUM, K.C.M.G.
Governor of Ceylon
since 1907

CEYLON

HISTORY.—An Aryan invasion established a Cingalese dynasty in Ceylon in the fifth century, B.C. Buddhism was introduced two centuries later. The Portuguese formed settlements in 1505, but were subsequently dispossessed by the Dutch. The British occupation dates from 1795-6, when the settlements were annexed to the Presidency of Madras. War was declared, in 1815, against the government of the interior, whereupon the last Kandyan king was taken prisoner, and the whole island came under British rule.

DATE OF ANNEXATION.—1815.

AREA.—25,332 square miles.

CLIMATE.—The heat is less oppressive than in Hindustan. Mean temperature along the coast 80° F.

POPULATION.—4,082,936.

CAPITAL.—Colombo.

GOVERNMENT.—Is that of a Crown colony, and is in the hands of a Governor, assisted by executive and legislative councils.

LAWS AND CUSTOMS.—The basis of the law is Roman-Dutch, but the criminal code has been remodelled from the Indian penal code. In addition to the district courts, there are Gansabāwas, or village councils, empowered to deal with petty offences and trifling claims.

RACES.—Cingalese, Tamil, Moormen (Arabs), Burghers, Eurasians and Malays. About 9000 European residents. In the interior are the vestiges of an aboriginal nomadic race, the Veddahs.

DEVELOPMENT.—570 miles of railways are owned and worked by the government. Colombo harbour is strongly fortified.

RELIGION.—Buddhism, Brahmanism and Muhammadanism are the chief religions, but Christian missions are making good progress.

LANGUAGE.—The Cingalese speak an Aryan language closely allied to the Pali, or modernised Sanskrit.

PRODUCTS.—Tea, coffee, cinchona, cocoa, cinnamon, cardamoms, ebony, vanilla and the cocoanut palm.

SOME NATIVE STATES
AND
PRINCES OF INDIA



[1914]

[H. H. THE NIZAM OF HYDERABAD, G.C.B., G.C.S.I.]

H. H. THE NIZAM OF HYDERABAD, G.C.B., G.C.S.I.
Princely Prince of the Indian Empire. Born 1866, succeeded his father 1869,
assumed charge of Government 1881.
His Highness receives a salute of 21 guns.

HYDERABAD

The Hyderabad State occupies the greater part of the Deccan proper, or Central plateau of Southern India, between the provinces of Madras and Bombay. The surface is a slightly elevated tableland. In 687, the territory, long called the Nizam's Dominions, became a province of the Mughal Empire; but soon after 1713 the Viceroy of the Deccan made himself independent.

AREA. 82,698 sq. miles (excluding the British assigned districts of Berar *q.v.*).

POPULATION.—11,141,142.

CAPITAL.—Hyderabad, stands on the right bank of the River Musi, 1,700 feet above sea-level, and is distant 390 miles by rail from Madras. Population 450,000.

RELIGIONS.—Hindu and Muhammadan. The Muhammadans number 1,138,666, and are found mainly round the capital.

LANGUAGES. Telugu, Kanarese and Marathi are the chief languages used

Hyderabad is under the direct supervision of the Governor-General in Council.

BARODA

This State includes all the territories of His Highness the Gaekwar. Gujarat, the northern maritime province of Bombay, was at one time included in the Mughal Empire, but in the early part of the 18th century, the Mahrattas, under the leadership of Damaji Gaekwar, and afterwards of his son, Pilaji, succeeded in wresting all power out of the hands of the Mughal officers. From that time, Baroda has remained continuously under the sway of the Gaekwar family, who, ultimately, became feudatory to the British Government under the guarantee of a treaty executed in the war of 1817.



[C. G. G. G.]

[C. G. G. G.]

H. H. THE MAHARAJA (GAJKWAR) OF BARODA, G.C.S.I.
Born 1863. Succeeded 1875. Invested with powers 1881.
His Highness receives a salute of 21 guns.

BARODA *continued*

AREA of the territories of the Gaekwar in various parts of the province of Gujarat, 8,570 sq. miles.

POPULATION.—2,185,005.

CAPITAL.—Baroda, 248 miles north of Bombay. Population 105,000.

Baroda is under the direct supervision of the Governor-General in Council

MYSORE

The Mysore State is situated in Southern India between 11 40' and 15° N. lat., and between 74 40' and 78 30' E. long., and is surrounded entirely by the districts of the Madras Presidency. Mysore is an extensive tableland, much broken by hilly ranges, and divided into two portions by the watershed between the Kista and Kaveri. In early times, Mysore was the principal seat of the Jains. The State has always been governed by Hindu rulers, except for a short time during the 18th century. After the capture of Seringapatam, in 1799, the British restored a representative of the ancient line; but the subsequent misgovernment of this native prince led them to assume the administration in 1831. In 1881, Mysore was restored to the native dynasty.

AREA. 29,444 sq miles.

POPULATION. 5,539,300

CAPITAL.—Mysore. A prosperous and well-built town of 70,000 inhabitants, situated 245 miles W.S.W. of Madras

Mysore is under the direct supervision of the Governor-General in Council. The annual value of the exports (Betel nut and leaves, coffee, cotton, piece goods, cardamoms, rice, silk and sugar) exceeds £1,200,000. of the imports (piece goods, cloth, wheat, etc.), £1,500,000.

Gold is mined in Kolar. The rivers are used for irrigation.

KASHMIR AND JAMU

Kashmir, or Cashmere, is an irregular-shaped mountainous region in the extreme north of India. It lies in the basin of the upper Indus, among the Himalayas. It is a land of perpetual spring, and one of the loveliest spots in



[Copyright]

[Bourne & Ste. 1891]

H.H. THE MAHARAJA OF MYSORE, G.C.S.I.

Born 1884. Succeeded his father 1895. Invested with full ruling powers by Lord Curzon at Mysore 1902.

His Highness receives a salute of 21 guns.

KASHMIR AND JAMU—*continued*

the whole world. It is hemmed in on all sides by snow-capped peaks, and is watered by the Jhelam, which forms, in its course, Lake Wulur and other beautiful lakes.

Kashmir was conquered by Akbar in 1586, and became part of the Mughal empire. It was overrun by the Sikhs in 1819. Ghulab Singh, the feudatory of the Sikhs, made a treaty with the British in 1846, by which he recognised British supremacy. In 1887, a land settlement (under pressure from the Indian Government) abolished serfdom.

AREA.—80,900 sq. miles.

POPULATION.—(Including its dependencies, Ladakh, Jamu, Gilgit, etc.), 2,905,578. In Kashmir proper—1,158,000.

RELIGION.—The ruling family is Hindu, but about three-quarters of the inhabitants are Muhammadans.

LANGUAGES. Thirteen dialects spoken. Kashmiri itself is very closely related to Sanskrit.

Kashmir is under the direct supervision of the Governor-General in Council.

RAJPUTANA AGENCY

Rajputana is the name of a great territorial circle embracing twenty native States (each having its own autonomy and separate chief), and the British district of Ajmere-Merwara. It lies between Sindh (on the West) and the Punjab (on the North). Of the native States, seventeen are Rajput, two are Jat (Bhartpur and Dholpur), and one only is Muhammadan (Tonk).

Their combined area is 127,541 sq. miles, and they contain a population of 9,723,301. The Rajput Agency is under the direct supervision of the Governor-General in Council.

The following table gives a detailed statement of the estimated area and population (including forest tribes) of the States in the Rajputana Agency:—



H. H. THE MAHARAJA OF KASHMIR AND JAMU, G.C.S.I.
His Highness receives a salute of 21 guns within the limits of his State,
and of 19 guns in the rest of India.

SOME NATIVE STATES AND PRINCES OF INDIA

RAJPUTANA AGENCY- *continued*

Name of State	Area in sq. miles	Population 1901
Alwar	3,221	819,688
Branswara and Kushalgarh	1,946	165,350
Bharipur	1,982	626,665
Bikaner	23,311	584,627
Bundi	2,220	171,227
Dholpur	1,155	270,973
Jaipur	15,579	2,353,268
Karauli	1,242	156,786
Kotah	5,684	544,879
Marwar or Jodhpur	34,963	1,935,565
Mewar or Udaipur	12,753	1,021,664
Sirohi	1,964	154,544
Tonk (partly in Central India)	2,752	273,201
Seven Minor States	20,487	451,990

CENTRAL INDIA AGENCY

Central India Agency is the name given to the country occupied by the native states grouped together under the supervision of the political officer in charge of the Central India Agency. These states lie between Rajputana and the Central Provinces. The British Districts of Jhansi and Lalitpur divide the Agency into two main divisions—Native Bundelkhand and Baghelkhand on the east, and Central India proper on the west.

The total area is 78,772 sq. miles, and the total population 8,628,781.

The great majority of the people are Hindus.

The Central India Agency is under the direct supervision of the Governor-General in Council.

The principal states are eight in number and the following list gives their approximate size and population :—

Name of State	Area in sq. miles	Population, 1901
Bhopal	6,902	665,961
Datta	912	175,759
Dhar	1,775	142,115
Gwalior	25,041	2,933,001
Indore	9,500	850,690
Jaora	563	84,202
Orchha	2,080	321,634
Rewa	13,000	1,327,385



(1892-3)

[1890-1900]

H. H. THE MAHARAJA SINDHIA OF GWALIOR, G.C.S.I.,
G.C.V.O., Hon. LL.D. Camb., A.D.C.

Went to China as orderly officer to General Gaselee, 1901, and
provided the expedition with a hospital ship at his own expense.

His Highness receives a salute of 21 guns within the limits of his
State, and of 19 guns in the rest of India.

NATIVE STATES UNDER THE MADRAS PRESIDENCY

The Madras Presidency includes five native states covering an area of 10,087 sq. miles, and having a population of 4,188,086; of these Travancore and Cochin represent ancient dynasties, and Pudukottai is the inheritance of a chieftain called the Tondiman.

The two petty states of Banganapalli and Sandur lie in the centre of two British districts.

The principal states are: -

Name of State	Area in sq. miles	Population, 1901
Cochin	1,361	812,025
Pudukottai	1,178	380,440
Travancore	7,129	2,952,157

NATIVE STATES UNDER THE PRESIDENCY OF BOMBAY

The native states in this presidency number 377 and are divided for administrative purposes into 19 agencies. Total area 65,761 sq. miles, population 6,008,648.

The agencies are:

Bijapur Agency, 2 states

Cutch 1 state.

Dharwar 1 . . . (Savanur)

Kaira 1 . . . (Cambay).

Kathiawar 187 states

(principal states Bhaunagar, Dhranghadra, Gondal,
Junagarh, Nawanager).

West Khandesh Agency, 20 states.

Kolaba 1 state (Janjira).

Kolhapur 9 states

(principal state, Kolhapur with 9 feudatory states)

Mahi-Kantha Agency, 51 states (principal state Idar).

Nasik Agency, 1 state (Surgane)



H.H. THE MAHARAJA (HOLKAR) OF INDORE.
His Highness receives a salute of 21 guns within the limits of his State,
and of 19 guns in the rest of India

NATIVE STATES UNDER THE PRESIDENCY OF BOMBAY
continued

- Palanpur Agency, 17 states (principal state Palanpur).
 Poona Agency, 1 state (Bhor).
 Rewa-Kantha Agency, 62 states (principal state
 Rajpipla).
 Satara Agency, 2 states.
 Sawantwadi Agency, 1 state.
 Sholapur Agency, 1 state.
 Sukkur Agency, 1 state (Khairpur).
 Surat Agency, 17 states.
 Thana Agency, 1 state (Janhar).

The following list gives details of the area and population of the most important states :

Name of State	Area in sq. miles	Population, 1901
Bhamnagar	2,800	112,664
Cutch	7,616	488,022
Dhranghadra	1,156	70,880
Gondal	1,024	162,882
Idar	1,669	168,557
Junagarh (Junagadh)	3,281	345,428
Khairpur	6,050	199,313
Kolhapur	3,165	910,011
Nawanagar (Nawanagar)	3,791	336,779
Palanpur	1,770	122,975
Rajpipla	1,517	117,175

NATIVE STATES UNDER THE GOVERNMENT OF
THE PUNJAB

There are 34 states under the government of the Punjab, which may be grouped into three main classes. The Hill states, 23 in number, lie among the Punjab Himalayas and are held by some of the most ancient Rajput families in all India. The Muhammadan state of Bahawalpur lies along the western half of the southern border. The remaining states, including the Sikh principalities of Patiala, Jind and



OP. 401

H.H. THE MAHARAJA OF KOLHAPUR. G.C.S.I., G.C.V.O.
His Highness is entitled to a salute of 19 guns, and a personal
salute of two additional guns.

SOME NATIVE STATES AND PRINCES OF INDIA

NATIVE STATES UNDER THE GOVERNMENT OF THE
PUNJAB—*continued*

Nabha lie east of Lahore, and, with insignificant exceptions, occupy the centre of the eastern plains of the province.

TOTAL AREA 36,532 sq. miles.

POPULATION 4,424,398.

The following list gives the area and population of the most important states :—

Name of State	Area in sq. miles	Population, 1901
Bahawalpur	15,000	720,877
Chamba... ..	3,216	127,834
Jind	1,259	282,003
Mandi	1,200	174,045
Nabha	928	297,949
Patiala	5,412	1,596,692
Sirmur (Nahan)	1,198	135,687

NATIVE STATES UNDER THE GOVERNMENT
OF BENGAL

There are 27 native states under the Government of Bengal. These states comprise Kuch Behar in the Bhagalpur Division of Bengal, the inhabitants of which are a Mongoloid people, the Cooch; and the petty states attached to the Orissa and Chota Nagpur divisions, 26 in number, in the south. These petty States are inhabited by hillmen of Kolarian or Dravidian origin, and their condition is still very primitive.

TOTAL AREA 31,526 sq. miles.

POPULATION, 3,173,488.

Kuch Behar has an area of 1,307 sq. miles and a population of 566,974.

SIKKIM

This state is bounded on the north and north-east by Tibet, on the south-east by Bhutan, on the south by the British district of Darjeeling, and on the west by Nepal.



II. II. THE MAHARAJA OF BIKANER, G.C.I.E., K.C.S.I., A.D.C.
His Highness receives a salute of 17 guns

SIKKIM *continued*

The population consists of the races of Lepcha and Bhoti, and the Nepali tribe, Limbu.

AREA.—2,818 sq. miles.

POPULATION.—59,014, chiefly Buddhists and Hindus.

Formerly under the Government of Bengal, it was brought under the direct supervision of the Governor-General in Council in 1906.

NATIVE STATES UNDER THE GOVERNMENT
OF EASTERN BENGAL AND ASSAM

Native states under the Government of Eastern Bengal and Assam are two. Manipur has an area of 8,456 sq. miles, and a population of 284,465, of which about 60 per cent. are Hindus, 36 per cent. animistic forest tribes, and four per cent. Muhammadans.

Hill Tipperah is the home of a Mongoloid race. It has an area of 4,086 sq. miles, and a population of 173,325.

NATIVE STATES UNDER THE GOVERNMENT OF
THE UNITED PROVINCES OF AGRA AND OUDH

Native States under the Government of the United Provinces of Agra and Oudh are two. Rampur, area 892 sq. miles, and population 533,242; and Tehri (Garhwal), area, 4,200, population 268,885.



[Copyright]

[Photographed by ...]

H.H. THE MAHARAJA OF PATIALA, K.C.S.I.
His Highness receives a salute of 17 guns



H. H. THE MAHARAJA OF ALWAR, K.C.S.I.
His Highness receives a salute of 15 guns



Copyright]

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H. H. THE MAHARAJA OF KUCH BEHAR, G.C.I.E., C.B., A.D.C.
His Highness receives a salute of 13 guns



H.H. THE NAWAB OF RAMPUR, G.C.I.E. A.D.C.
His Highness receives a salute of 13 guns.

THE MARCH OF SCIENCE

"Without a scientific foundation no permanent super-structure can be raised. Does not experience warn us that **the rule of thumb is dead and that the rule of science has taken its place**; that to-day we cannot be satisfied with the crude methods which were sufficient for our forefathers, and that those great industries which do not keep abreast of the advance of science must surely and rapidly decline?"

Extract from a speech by H. M. King George V. (when Prince of Wales) at the International Congress of Applied Chemistry, London, May 27, 1909.



WELLCOME CHEMICAL RESEARCH LABORATORIES
(KING STREET, LONDON (ENGLAND))

This INSTITUTION is conducted separately from the business of BURROUGHS WELLCOME & CO., and is under distinct direction, although in the Laboratories a large amount of important scientific work is carried out for the firm.

THE WELLCOME
CHEMICAL RESEARCH LABORATORIES

FREDERICK B. POWER, PH.D., LL.D.

Director of the Laboratories

KING STREET, SNOW HILL, LONDON (ENGL.)

AWARDS

CONFERRED UPON THE
WELLCOME CHEMICAL RESEARCH
LABORATORIES
AT INTERNATIONAL EXHIBITIONS

ST. LOUIS 1904	ONE GRAND PRIZE THREE GOLD MEDALS
LIÉGE 1905	ONE GRAND PRIZE ONE DIPLOMA OF HONOUR TWO GOLD MEDALS
MILAN 1906	ONE GRAND PRIZE
LONDON (Franco-British) 1908	TWO GRAND PRIZES
LONDON (Japan-British) 1910	ONE GRAND PRIZE
BRUSSELS 1910	THREE GRAND PRIZES ONE DIPLOMA OF HONOUR

FOR
CHEMICAL AND PHARMACOGNOSTICAL RESEARCH
ETC., ETC.

THE WELLCOME
CHEMICAL RESEARCH LABORATORIES

ORGANISATION, EQUIPMENT AND DEVELOPMENT

THOSE who have observed the progress of events in Great Britain during the last decade cannot fail to have been impressed with the remarkable developments and achievements by which it has been attended, especially in the domains of the chemical, physical and biological sciences. The discovery within the past few years of several new elements in the atmosphere, and of radioactive substances, the liquefaction, and even solidification, of gases that were hitherto regarded as permanent, the synthesis of several important organic compounds, the isolation of new substances, and the more precise characterisation of those previously known, together with the perfection of chemical processes and the applications of electricity in chemical and metallurgical operations, are but a few examples of the contributions to knowledge and the industrial progress which have signalled the closing years of the past, and the beginning of the new, century.

The march
of science

The spirit of research has, in fact, now become so diffused as to have penetrated into almost every department of human knowledge and activity. With a broader recognition of its usefulness, and even of its necessity, as an element of progress, research is no longer confined to institutions of learning, but has proved to be a quite indispensable factor in its relation to industrial pursuits, as well as for the study of those important problems in medical science which are so intimately associated with the health and happiness of mankind. It has indeed been truly said that "without a knowledge of the constitution or structure of the molecules which go to make up the substances employed as remedies, therapeutics, or the administration of these remedies, can never be an exact science. Thus the research chemist may contribute, though indirectly, his share towards placing medicine upon a real and scientific basis."

The spirit
of research



ONE OF THE LABORATORIES—FIRST FLOOR



ONE OF THE LABORATORIES—SECOND FLOOR

It is worthy of note that the year 1896 was marked by the establishment in Great Britain of at least three laboratories devoted exclusively to scientific research—namely, the Davy-Faraday Research Laboratory connected with the Royal Institution, which was formally inaugurated in December, 1896; the new Research Laboratory of the Royal College of Physicians of Edinburgh, which was formally opened in November, 1896; and the WELLCOME CHEMICAL RESEARCH LABORATORIES, which were established in the summer of 1896.

British
Chemical
Research
Laboratories

The scope of these laboratories and the directions in which research is conducted in them, naturally differ. The first-mentioned, for example, is more especially of an academic character, and is therefore devoted to somewhat abstract investigations in chemistry and physics; the second is stated to have for its primary object the examination of morbid specimens and material, the study of zymotic diseases, and, in general, bacteriological, physiological and pathological work, while the third, the WELLCOME CHEMICAL RESEARCH LABORATORIES, are designed for investigations in both pure and applied chemistry, and, in the latter instance, with special reference to the study of that large class of both organic and inorganic compounds which are employed as medicinal agents in the treatment of disease.

The
Wellcome
Chemical
Research
Laboratories

The importance of the work which it is the purpose to accomplish in these different, but more or less closely related, departments of science, is apparent, and is duly appreciated by those who recognise the deficiencies of existing knowledge.

In response to numerous requests, it has been considered that a brief sketch of the WELLCOME CHEMICAL RESEARCH LABORATORIES, descriptive of their organisation, equipment and development would prove of interest to a considerable number who have not the opportunity of inspecting them.

The first announcement of Mr. Henry S. Wellcome's plan to establish the Chemical Research Laboratories



ONE OF THE LABORATORIES—THIRD FLOOR



THE COMBUSTION ROOM

which bear his name, was made on the occasion of a dinner given by him to Dr. Frederick B. Power, the present Director, at the Holborn Restaurant, London, on the evening of July 21, 1896. The occasion was a memorable one in many respects, for the gathering included a large number of distinguished representatives of the various sections of the scientific world. It was then explained by Mr. Wellcome that the work which he proposed to inaugurate was one which he personally had very much at heart, that it would be carried out on no selfish lines, but would be controlled and dictated with the highest regard for science. It was also made clear that the new Chemical Research Laboratories were to be entirely distinct from those of the Works of his firm, in which, as heretofore, research would also continue to be conducted. The expressions of appreciation of the high purpose and the scientific spirit which had actuated Mr. Wellcome in the development of such extended plans for chemical research, as manifested by various distinguished speakers on the occasion referred to, were indeed most auspicious, and fittingly commemorated the inauguration of the work that was to be undertaken.

Appreciation by
distinguished
scientists

The first home of the laboratories was in a building located at No. 42, Snow Hill, but it was soon found desirable to make considerable extensions. In order to accomplish this, it was decided that the laboratories should be transferred to a building of their own, of which they should have complete use and possession. Such premises were secured at No. 6, King Street, Snow Hill, where, in a very central part of London, and amid surroundings replete with many of its most interesting historical associations, the laboratories are now located.

Location in
central London

The building is a handsome, modern one of Venetian style of architecture, and comprises four stories and a basement. A view of it is represented on *page 171*.

On the ground floor of the building are the office of the Director, and the library, the latter being quite complete for the special requirements. It contains not only a

Reference
Library

considerable number of recent chemical and pharmacological works, but also complete sets of many journals, such as the *Journal of the Chemical Society*, *Berichte der deutschen chemischen Gesellschaft*, *Journal of the Society of Chemical Industry*, etc. Files of many of the more important chemical, pharmaceutical and medical periodicals of England, America and Germany are also kept. As several very large and complete scientific and technical libraries are also at all times accessible to members of the staff, it is evident that the requirements in this direction are most abundantly supplied. In the library there is also a cabinet containing specimens of the various substances obtained in the course of laboratory investigations, which already form a collection of considerable interest.

Equipment of
laboratories

The laboratories proper are located on the first, second and third floors of the building, and are represented on pages 178, 180. They are similar in their arrangement, are provided with gas and electricity for both illuminating and heating purposes, and completely equipped with all the necessary apparatus and appliances for conducting chemical investigations. There are pumps on each table for filtration under pressure, and special adaptations for vacuum distillations. A separate connection with the electric mains supplies the current for heating iron plates used for the distillation of ether and other similar liquids. Each laboratory is provided with fine analytical and ordinary balances, which are carefully protected from dust and moisture by tightly-fitting glass cases. There are also telephones on each floor, so that communication between the different laboratories or with the Director's office can be quickly effected.

The basement of the building, which is well-lighted by electricity, contains a combustion furnace and all the appliances for conducting ultimate analyses, whilst two other furnaces of the most approved construction are available in the laboratories; it also contains a large electric motor for working the shaking and stirring apparatus.

drug mill, etc., and a dark-room adapted for polarimetric or photographic work. A view of a portion of the combustion room is shown on *page 180*. In direct communication with the basement are dry and commodious vaults, which afford ample room for the storage of the heavier chemicals and the reserve stock of glass-ware, etc. By means of a small lift, articles may be conveniently transported from the basement to any floor of the building.

From this brief description, and the accompanying photographic illustrations, it will be seen that the **WELLCOME CHEMICAL RESEARCH LABORATORIES** are unique in their appointments and in the purpose they are designed to accomplish.

It is perhaps, hardly necessary to explain that some of the problems which engage the time and attention of members of the staff which comprises a number of highly-skilled and experienced chemists are of technical application, having reference to the perfection of the chemical products of Burroughs Wellcome & Co. These naturally do not always afford material for publication, and many other difficult researches extend over considerable periods of time. Nevertheless, one hundred and twenty five publications, embodying the results of original work contributed to various scientific societies, which are consecutively numbered, have already been issued. Other investigations in progress will, from time to time, form the subjects of future communications.

Original
work and
scientific
publications

Although too short a period has elapsed, since the establishment of these laboratories, to afford much material for a historical retrospect, their present measure of success may be considered to have justified the expectations of their founder and of those who are in sympathy with the work which they aim to accomplish.

SCIENTIFIC PAPERS PUBLISHED BY
THE WELLCOME CHEMICAL RESEARCH
LABORATORIES

1. SOME NEW GOLD SALTS OF HYOSCINE, HYOSCYAMINE AND ATROPINE
2. THE CHARACTERS AND METHODS OF ASSAY OF THE OFFICIAL HYPOPHOSPHITES
3. NOTE ON THE MYDRIATIC ALKALOIDS
4. PREPARATION OF ACID PHENYLIC SALTS OF DIBASIC ACIDS
5. A NEW METHOD FOR THE ANALYSIS OF COMMERCIAL PHENOLS
6. THE ASSAY OF PREPARATIONS CONTAINING PILOCARPINE
7. PILOCARPINE AND THE ALKALOIDS OF JABORANDI LEAVES
8. A NEW GLUCOSIDE FROM WILLOW BARK
9. THE CONSTITUTION OF PILOCARPINE—Part I
10. THE COMPOSITION AND DETERMINATION OF CERIUM OXALATE
11. RESEARCHES ON MORPHINE—Part I
12. OBSERVATIONS RELATING TO THE CHEMISTRY OF THE BRITISH PHARMACOPŒIA
13. MERCUROUS IODIDE
14. THE COMPOSITION OF BERBERINE PHOSPHATE
15. A CONTRIBUTION TO THE PHARMACOGNOSY OF OFFICIAL STROPHANTHUS SEED
16. THE CHEMISTRY OF THE JABORANDI ALKALOIDS
17. A NEW ADMIXTURE OF COMMERCIAL STROPHANTHUS SEED
18. RESEARCHES ON MORPHINE—Part II
19. THE CONSTITUTION OF PILOCARPINE—Part II
20. THE CHEMISTRY OF THE BARK OF ROBINIA PSEUD-ACACIA, *Linn.*
21. THE ANATOMY OF THE BARK OF ROBINIA PSEUD-ACACIA, *Linn.*
22. A SOLUBLE MANGANESE CHIRATE AND COMPOUNDS OF MANGANESE WITH IRON
23. THE CHEMICAL CHARACTERS OF SO-CALLED IODO-TANNIN COMPOUNDS
24. THE CONSTITUTION OF PILOCARPINE—Part III
25. A NEW SYNTHESIS OF α -ETHYLTRICARBALLYLIC ACID
26. THE CONSTITUENTS OF THE ESSENTIAL OIL OF ASARUM CANADENSE *Linn.*
27. DERIVATIVES OF GALLIC ACID
28. THE OCCURRENCE OF SALICIN IN DIFFERENT WILLOW AND POPLAR BARKS

SCIENTIFIC PAPERS—*continued*

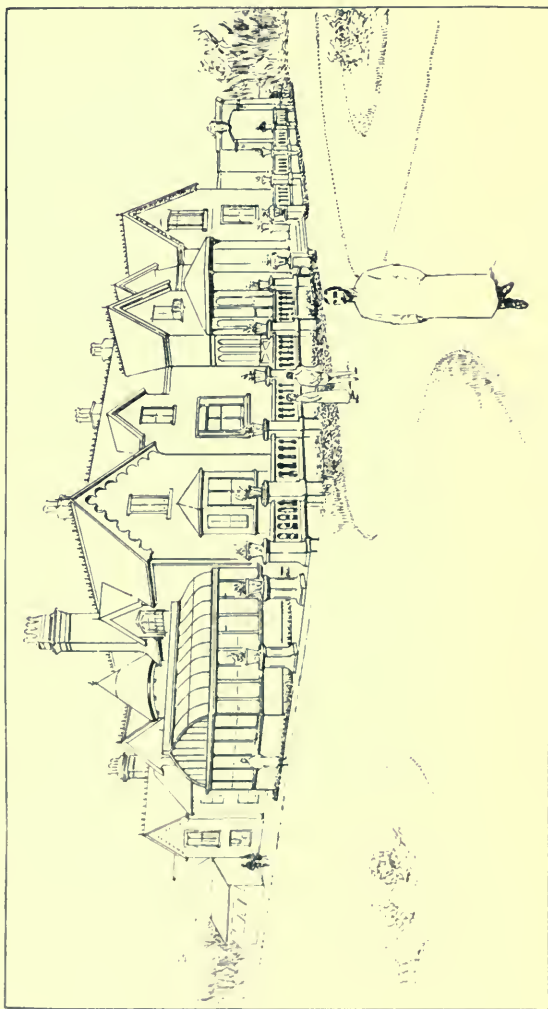
29. THE CONSTITUENTS OF COMMERCIAL CHRYSAROBIN
30. THE CONSTITUENTS OF AN ESSENTIAL OIL OF RUE
31. METHYL β -METHYLHEXYL KETONE
32. INTERACTION OF KETONES AND ALDEHYDES WITH ACID CHLORIDES
33. THE ANATOMY OF THE STEM OF DERRIS UUGINOSA, *Benth.*
34. THE CHEMISTRY OF THE STEM OF DERRIS UUGINOSA, *Benth.*
35. THE CONSTITUTION OF PILOCARPINE—Part IV
36. PREPARATION AND PROPERTIES OF DIMETHYLGLYOXALINE AND DIMETHYLPYRAZOLE
37. THE ELECTROLYTIC REDUCTION OF PHENO- AND NAPHTHO-MORPHOLONES
38. CHEMICAL EXAMINATION OF KÓ-SAM SEEDS (*BRUCEA SUMATRANA, Roxb.*)
39. COMPARATIVE ANATOMY OF THE BARKS OF THE SALICACEA—Part I
40. THE CONSTITUTION OF CHRYSOPHANIC ACID AND OF EMODIN
41. THE CONSTITUTION OF EPINEPHRINE
42. A LIVO-ROTATORY MODIFICATION OF QUERCITOL
43. THE CONSTITUENTS OF THE ESSENTIAL OIL OF CALIFORNIAN LAUREL
44. SOME DERIVATIVES OF UMBELLIFONE
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47. CHEMICAL EXAMINATION OF CASCARA BARK
48. CHEMICAL EXAMINATION OF GYMNEMA LEAVES
49. THE RELATION BETWEEN NATURAL AND SYNTHETICAL GLYCERYL PHOSPHORIC ACIDS
50. GYNOCARDIN, A NEW CYANOGENETIC GLUCOSIDE
51. PREPARATION AND PROPERTIES OF 1:4:5-TRIMETHYLGLYOXALINE
52. THE CONSTITUTION OF PILOCARPINE—Part V
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54. THE CONSTITUENTS OF THE SEEDS OF HYDNOCARPUS WIGLIANSIA *Blume*, AND OF HYDNOCARPUS ANTHELMINTICA *Pierre*
55. THE CONSTITUENTS OF THE SEEDS OF GYNOCARDIA ODORATA, *R.Br.*
56. THE SYNTHESIS OF SUBSTANCES ALLIED TO EPINEPHRINE
57. CHEMICAL EXAMINATION OF GRINDELIA
58. CHEMICAL EXAMINATION OF ALTHESIA CYNAPIUM, *Linna.*
59. PREPARATION AND PROPERTIES OF SOME NEW TROPINES
60. THE CONSTITUENTS OF THE ESSENTIAL OIL FROM THE FRUIT OF PITTOSPORUM UNDAULATUM, *Vent.*

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61. THE CONSTITUTION OF UMBELLULONE
62. LONDON BOTANIC GARDENS
63. CHEMICAL AND PHYSIOLOGICAL EXAMINATION OF THE FRUIT OF
CHAILLETIA TOXICARIA
64. CHEMICAL EXAMINATION OF ERIODICTYON
65. THE BOTANICAL CHARACTERS OF SOME CALIFORNIAN SPECIES OF
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PHOSPHORIC ACIDS—Part II
67. THE CONSTITUTION OF UMBELLULONE—Part II
68. THE REDUCTION OF HYDROXYLAMINODIHYDROUMBELLULONEOXIME
69. THE CONSTITUTION OF CHAULMOGRIC AND HYDROCARPIC ACIDS
70. THE CONSTITUENTS OF THE ESSENTIAL OIL OF AMERICAN
PENNYROYAL
71. THE CONSTITUTION OF HOMO-ERIODICTYOL
72. THE INTERACTION OF METHYLENE CHLORIDE AND THE SODIUM
DERIVATIVE OF ETHYL MALONATE
73. CHEMICAL EXAMINATION OF THE FRUIT OF BRUCEA ANTI-DYSENTERICA
Lam.
74. CHEMICAL EXAMINATION OF THE BARKS OF BRUCEA ANTI-DYSENTERICA
Lam., AND BRUCEA SUMATRANA, *Roxb.*
75. CHEMICAL EXAMINATION OF GRINDELIA—Part II
76. CHEMICAL EXAMINATION OF LIPPIA SCABERRIMA, *Sonder* ("Beukess
Boss")
77. CHEMICAL EXAMINATION OF THE ROOT AND LEAVES OF MORINDA
LONGIFLORA
78. THE CONSTITUENTS OF THE ESSENTIAL OIL OF NUTMEG
79. CHEMICAL EXAMINATION OF MICROMERIA CHAMISSONIS *Verba
Buena*)
80. THE CONSTITUTION OF UMBELLULONE—Part III
81. THE CONSTITUENTS OF OLIVE LEAVES
82. THE CONSTITUENTS OF OLIVE BARK
83. CHEMICAL EXAMINATION OF IPOMEA PURPUREA
84. THE CHARACTERS OF OFFICIAL IRON ARSENATE
85. PREPARATION OF A SOLUBLE FERRIC ARSENATE
86. THE CONSTITUENTS OF THE EXPRESSED OIL OF NUTMEG
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88. SOME OBSERVATIONS REGARDING "OLEUROPEIN" FROM OLIVE
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90. THE CONSTITUENTS OF THE BARK OF PRUNUS SEROTINA
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SCIENTIFIC PAPERS *continued*

92. *iso*-AMYGDALIN, AND THE RESOLUTION OF ITS HEPTA-ACETYL DERIVATIVE
93. THE ACTION OF NITRIC ACID ON THE ETHERS OF AROMATIC HYDROXYALDEHYDES
94. THE SYNTHESIS OF SUBSTANCES ALLIED TO COLARINI
95. CHEMICAL EXAMINATION OF ELATERIN AND THE CHARACTERS OF ELATERIN
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99. SYNTHESIS IN THE EPINEPHRINE SERIES
100. CHEMICAL EXAMINATION OF JALAP
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104. CHEMICAL EXAMINATION OF PUMPKIN SEED
105. CHEMICAL EXAMINATION OF WATERMELON SEED
106. CHEMICAL EXAMINATION OF *ORNITHOGALUM THYRSOIDES*
107. THE CONSTITUENTS OF THE FLOWERS OF *TRIFOLIUM INCARNATUM*
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109. SYNTHESIS OF COLARINI
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114. THE CONSTITUENTS OF *LEPANDRA*
115. THE CONSTITUTION OF ERIDICAYOL, OF HOMOERIDICAYOL, AND OF HESPERIDIN
116. THE SYNTHESIS OF 2 : 4 : 6-TRIMETHOXYPHENYL-3 : 4-DIMETHOXYSTYRYL KETONE
117. THE CONSTITUENTS OF *GELSIUM*
118. SYNTHESIS IN THE EPINEPHRINE SERIES. PART II.
119. THE ABSORPTION SPECTRA OF SOME SUBSTITUTED PYRIDINES AND THEIR SALTS
120. ACTION OF SODIUM AMALGAM ON METHYLENE ETHERS
121. THE CONSTITUENTS OF THE RHIZOME OF *IRIS VERSICOLOR*
122. CHEMICAL EXAMINATION OF THE ROOT OF *LASIOSIPHON MISSOURIANUS*
123. THE ORIENTATION OF THE NITROGROUP IN NITROMYRISTIC ACID
124. *o*-*p*-HYDROXY-*p*-METHOXYETHYLAMINE AND THE RESOLUTION OF *o*-*p*-HYDROXYPHENYLETHYLAMINE
125. THE CONSTITUENTS OF *WILHEMIA SOMNIFERA*



WELLCOME PHYSIOLOGICAL RESEARCH LABORATORIES

HERNE HILL, LONDON (ENGLAND)

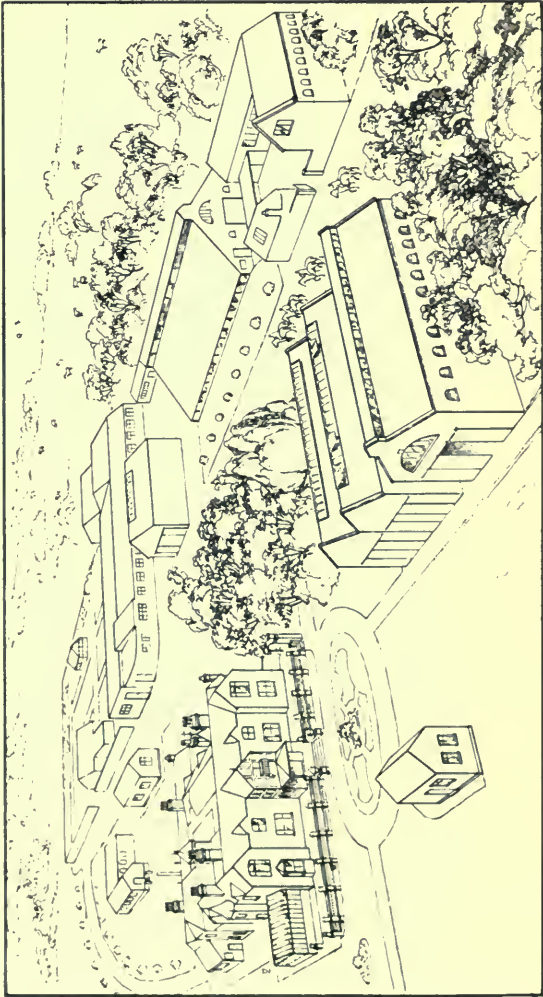
This INSTITUTION is conducted separately from the business of BURROUGHS WELLCOME & CO., and is under distinct direction, although in the Laboratories a large amount of important scientific work is carried out for the firm.

THE WELLCOME
PHYSIOLOGICAL RESEARCH
LABORATORIES

H. H. DALE, M.A., M.D.

Director

BROCKWELL HALL, HERNE HILL, LONDON (ENG.)



BIRD'S-EYE VIEW OF THE WELLCOME PHYSIOLOGICAL RESEARCH LABORATORIES

THE WELLCOME
PHYSIOLOGICAL RESEARCH LABORATORIES

THE activities of the Wellcome Physiological Research Laboratories cover a wide field of therapeutic investigation. The production of Anti-Sera and of bacterial preparations for therapeutic inoculation, and the researches in bacteriology and the mechanism of immunity necessitated by the progressive development of this comparatively new department of therapeutics, have been carried on side by side with investigations into the mode of action and the nature of the active principles of drugs of animal and vegetable origin, and the production by synthesis of substances identical with, or related to, the naturally-occurring principles, in chemical structure and pharmacological action. Incidental to this pharmacological work has been the development of methods for controlling and standardising, by physiological means, the activity of potent drugs to which chemical methods of assay are not applicable.

ANTI-SERA

A large series of Anti-Sera is now available for therapeutic use, and many have been first produced in these Laboratories. They may be classified into Antitoxic Sera, possessing the power of neutralising the soluble toxins produced in artificial culture by certain organisms, or elaborated in the poison glands of animals; and Bactericidal Sera which are obtained by immunising horses against the actual bacterial substance of such pathogenic organisms as do not form soluble toxins. Early representatives of the two classes were Diphtheria Antitoxic Serum and Anti-streptococcus Serum, and these have maintained their position as the most widely and successfully used sera of their respective classes. These Laboratories were pioneers in the production of these sera in the British Empire, and produced the first Anti-Diphtheria Serum used in the United States of America.

Pioneer
products of
serum therapy

DIPHTHERIA ANTITOXIC SERUM, 'WELLCOME'

Since the foundation of the Wellcome Physiological Research Laboratories, a number of pamphlets, leaflets and reports dealing with therapeutic sera have been issued in connection therewith.

In the early editions, the origin, history and development of serum therapy were given, as well as an explanation of the meaning of the expression "antitoxin unit." It is scarcely necessary to repeat that the antitoxin unit adopted at the Wellcome Physiological Research Laboratories is the Ehrlich-Behring unit. It is not intended in these notes to take into view any of these aspects, but merely to bring up to date and present, in a succinct form, the progress of the treatment and the results obtained by means of it in more recent years. Diphtheria Antitoxic Serum is standardised by Ehrlich's method. In its earlier form the unit was based upon the power of completely neutralising the local as well as the general effects of the minimum dose of a given specimen of diphtheria toxin which sufficed to kill, in 48 hours, a guinea pig weighing 250 grammes. The quantity which just sufficed for this was said to contain one-tenth of a unit. Thus, if 0.01 c.c. just completely protected, the serum was said to contain 10 units per c.c.

Antitoxin
unit

Samples of serum, carefully standardised by this method in the early days of its introduction, having been preserved, it soon became known that one-tenth of a unit of serum would not protect against ten times the minimal fatal dose of every filtered culture. An explanation of this curious fact has been put forward by Ehrlich. The filtered culture contains, besides the specific toxin, other bodies, named by him "toxoids," which, while in moderate doses incapable of causing death, have yet the power of combining with the antitoxin and rendering this inert. The number of minimal fatal doses which one-tenth of a unit of serum will neutralise depends, therefore, on the ratio of toxoids to toxin in the filtrate. For the purpose of testing serum, therefore, it is necessary to use a filtrate,

Toxoids
in filtered
cultures

the neutralising capacity of which has been ascertained by careful titration with standard diphtheria antitoxic serum. This standard has remained unaltered throughout, thanks to the fact that some of the earliest serum tested has been carefully preserved.

In May, 1897, a change in the method of standardising serum was introduced by Ehrlich. The presence or absence of a local swelling at the seat of injection is no longer taken as the criterion of neutralisation, but the death or survival of the animal—four days being taken as the limit; and the test dose of filtrate is no longer that which is neutralised by one-tenth of a unit, but that which just suffices to kill the animal within four days when mixed with a whole unit of serum. This change did not introduce any alteration of the standard, because the test dose is ascertained by a series of experiments in which a unit of the standard serum is employed. It has the great advantage of being a purely objective method. For instance, no discrepancies can arise from difference of opinion as to what is to be considered as the smallest local swelling worthy of notice. All errors of measurement, also, are reduced ten per cent.

The new
method

STATISTICS OF TREATMENT BY DIPHTHERIA ANTITOXIC SERUM

Amongst the most valuable English statistics on the subject are those compiled by the Medical Officers of the Metropolitan Asylums Board; and from them may be gathered the following figures: In 1894, only a small number of cases were treated with antitoxin. In 1895, 61·8 per cent., and in 1896, 71·3 per cent., of the total cases were treated with antitoxin, it not having been employed in moribund or hopeless cases, nor in those which were doubtful in nature, or so mild as not to require any specific treatment. The accompanying table shows clearly a regular percentage decrease in mortality *pari passu* with a regular increase in the percentage of cases treated with antitoxin:—

Statistics
of
diphtheria

CASES OF DIPHTHERIA TREATED IN THE HOSPITALS OF
THE METROPOLITAN ASYLUMS BOARD

Year					Mortality Per cent. of all cases
1890-93 ...	...	...	...	...	30·4
1894 ...	...	...	...	...	29·6
1895 ...	...	...	...	...	28·1
1896 ...	...	...	...	...	25·9
1897 ...	...	...	...	...	20·4
1898 ...	...	...	...	...	17·5
1899 ...	...	...	...	...	15·4
1900 ...	...	...	...	...	12·9
1901 ...	...	...	...	...	12·6
1902 ...	...	...	...	...	11·8
1903 ...	...	...	...	...	10·2
1904 ...	...	...	...	...	10·9
1905 ...	...	...	...	...	9·0
1906 ...	...	...	...	...	10·4
1907 ...	...	...	...	...	10·2
1908 ...	...	...	...	...	10·9

The Colchester epidemic in the summer of 1901 furnishes evidence of especial weight.* Up to a certain date, the cases in hospital were treated with antiseptic sprays. These in all amounted to 81, of whom 21 died, giving a case mortality of 25·9 per cent. After this date, all the cases were treated with antitoxin without antiseptic spray, and of 119 so treated, 7 died. The case mortality of this group was therefore 5·8 per cent.

The
Colchester
epidemic

The inference that antitoxin thus saved many lives is much strengthened by the fact that of 37 cases treated at home before the date indicated, 10·8 per cent. died, whilst of 48 cases treated at home after this date, 14·5 per cent. died. This concurrent evidence clearly shows that the severity of the disease was not declining at the time when such good results were being obtained at hospital with antitoxin.

* *Journal of Hygiene*, April 1, 1902

CURATIVE AND PROPHYLACTIC DOSES OF DIPHThERIA ANTITOXIC SERUM

Experiments on animals have shown that the amount of antitoxin which is necessary to save life increases at a rapidly accelerating rate, according to the length of time which elapses between the injection of the diphtheria virus and the administration of the curative serum, and this is amply confirmed by the results of experience in hospitals. Thus Wernicke and Behring, having determined the amount of antitoxic serum necessary to save from death a guinea pig which had immediately before been injected subcutaneously with a lethal dose of diphtheria toxin, found that ten times this amount was required to effect a cure if this administration was deferred until eight hours after the injection of the toxin; whilst twenty-four hours afterwards, fifty times the initial quantity was necessary.

The efficacy of antitoxin given early in the disease, and the urgent necessity of beginning the treatment at the earliest possible moment, are well illustrated by the following statistics from the Brook Hospital, published in the Metropolitan Asylums Board Report for 1902:

Day of the disease on which treatment commenced	Mortality per cent.					
	1897	1898	1899	1900	1901	1902
First	0	0	0	0	0	0
Second	5.4	5.0	3.8	3.6	4.1	4.0
Third	11.5	14.3	12.2	6.7	11.9	10.5
Fourth	19.0	18.1	20.0	14.9	12.4	19.8
Fifth	21.0	22.5	20.4	21.2	16.6	19.4

The serum from normal horses may cause rashes and rise of temperature in susceptible individuals, but apart from this the only limit to the administration of antitoxin is the bulk of the fluid in which it is contained. Therefore, a large dose should be given at the earliest possible moment, whenever there is reason to suspect diphtheria; and in cases which progress unfavourably, the treatment may be repeated in about six hours, giving at least double the initial dose.

Limit of dose

Repeated injections

Far less, however, is to be expected from repeated injections at intervals than from one full dose given at the outset of the attack. In no case should either the administration of antitoxin or the repetition of the dose be delayed until the result of a bacteriological examination has been made known.

CURATIVE DOSE.—The dose for a case of moderate severity should not be less than 2000 units, and in severe cases 4000 units at least should be given at once, and larger doses are recommended by many authorities. These doses should be given irrespective of age, because diphtheria is very fatal to young children. If any difference were to be made, adults would have the smaller doses, as the prognosis in diphtheria improves with the age of the patient.

Dosage irrespective of age

As the question of the keeping-quality of sera is frequently raised, it may be stated generally that, provided they are kept in a cool place at a fairly constant temperature, and protected from light, these sera may be relied upon to remain practically unaltered for at least a year from the date of issue. They are issued in phials hermetically sealed in the blow-pipe flame, a method which greatly favours this result.

Keeping-quality of serum

PROPHYLACTIC DOSE. Protective injections, of at least 1000 units, may be administered to the rest of the family whereof one member has been attacked with diphtheria. It must be borne in mind, however, that the prophylactic action gives only a temporary protection against attack to the person so treated, the protection thus conferred lasting probably about three weeks at the most. The whole of the contents of one phial may be injected in each case. It

Prophylaxis

should be carefully noted that, when once a phial is opened, it is highly undesirable, owing to risk of contamination, to reserve a portion of the contents for a future occasion. It should all be used at once on one or more patients.

BACTERIOLOGICAL DIAGNOSIS OF DIPHTHERIA

The injection of antitoxin at the earliest possible moment in the course of the disease may be a matter of such importance to the patient that this should be done on the clinical evidence alone where the diagnosis is doubtful; but immediate steps should be taken to confirm the diagnosis by bacteriological methods.

ON SERUM ERUPTIONS

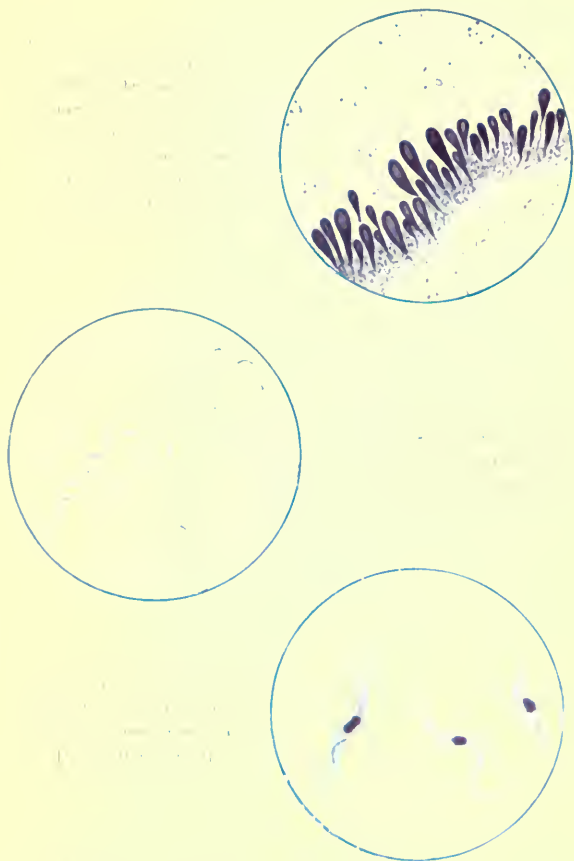
In some cases, the administration of a curative serum is followed by rashes and transitory rise of temperature; occasionally by pains and swellings in the joints. These accidents have been shown to be also caused by normal horse serum, so that they are not to be attributed to the anti-bodies in the serum. The introduction of more highly potent serum, allowing a diminution of the bulk to be injected, has rendered these complications less frequent. They arise for the most part during convalescence, and do not appear to have resulted, in any case, in death, though they have doubtless sometimes retarded recovery.

The following account of this subject, by Dr. Arthur Stanley,* deals with 500 cases of diphtheria at the North-Western Hospital of the Metropolitan Asylums Board, all of which were treated with antitoxin: "The diagnosis of doubtful cases was verified by bacteriological examination. The total number of deaths in the series was 80, a death-rate of 16 per cent. The antitoxin was injected in quantities usually of 4000 Behring antitoxin units immediately after admission, but varied from 1000 to 30,000 units according to the severity of the case and the time of admission after onset. No constant relation between the quantity of

* *British Medical Journal*, February 15, 1902.

Normal horse
serum

Diphtheria
antitoxin
injections



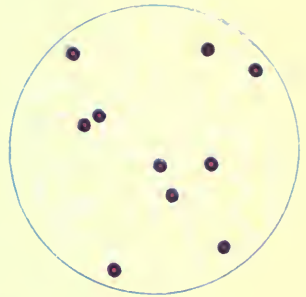
REPRODUCTION IN ACTUAL COLOURS OF PREPARATION
 STAINED WITH 'SOLID' MICROSPORE STAINS

(Magnified $\times 1000$ diameters)

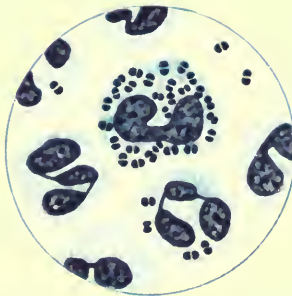


No. 4. *Polysiphonia* (No. 8)
stained with
Methyl-*soloid*
Soloid. Methyl-*soloid*
with the addition of
methyl-*soloid*, near
methyl-*soloid*.

No. 5. *Polysiphonia* (No. 8)
stained with
Methyl-*soloid*
Soloid. Fuchsin (Basic) and
Methyl-*soloid* Blue.



No. 6



No. 6. *Polysiphonia* (No. 8)
stained with
Methyl-*soloid*
Soloid. Methyl-*soloid*
Soloid. Methyl-*soloid*.

REPRODUCTIONS IN ACTUAL COLOURS OF PREPARATIONS
STAINED WITH 'SOLOID MICROSCOPIC STAINS'

(Magnification 1000 diameters)

antitoxin given and the frequency of eruption was noted, but in one case, where antitoxins from two different sources were injected at the same time, two separate antitoxin rashes were observed; the first occurring ten days, and the second fourteen days, after the giving of the antitoxins. No special sources of antitoxin were found to cause a preponderating number of eruptions, and the eruptions occurred throughout the two years I was working with diphtheria.

Different
sources of
antitoxin

* Skin eruptions appeared in about a fourth of the cases. The period of onset was usually during the second week after the giving of the antitoxin. The eruption met with was not so peculiar as to be pathognomonic, but was sufficiently marked, especially in relation to the general symptoms, as to constitute a distinct type.

* There may be a little desquamation after severe and prolonged erythemata, but there is rarely any confusion between true scarlet fever occurring in the course of diphtheria and eruptions produced by antitoxin.

* The general symptoms, beyond a rise of temperature of some 3° F. and its accompanying malaise, are not marked. Pains in the joints have been frequently described, but were not observed in one of these 500 cases. This result may have been due to the cases being chiefly among children. The only marked case in which pain was present was that of a girl of 13, who had frontal headache and lumbar pain extending down the thighs. She had a marginate erythematous eruption, and the temperature rose to 101° F.

Rise of
temperature

* Transient early erythematous blushes, and also urticaria, often occur soon after the injection of antitoxin, but these may be generally considered to be of traumatic origin, and not to be related to any specific property of the antitoxin. The area of skin, before injection, was sterilised with soap and carbolic lotion, and the injection syringe was boiled before each injection. No abscess at the seat of injection occurred.

* The occurrence of an antitoxin eruption during the course of a case of diphtheria did not appear to influence the

Prognosis

prognosis seriously, though it cannot but be held that any febrile disturbance of the heart would tend to have a harmful effect. No case, however, was observed where fatal heart-failure was precipitated by the occurrence of an antitoxin eruption."

A long experience of reports received at the Wellcome Physiological Research Laboratories, leads to the conclusion that idiosyncrasy of the patient is more responsible for the varying severity of the eruption and other symptoms attributable to serum than the use of serum from different horses.

Several observers have found the administration of calcium salts efficacious in preventing or dispelling serum-rashes.

Super-sensibility

An interesting light has in recent years been thrown on the susceptibility of some patients to the toxic action of serum, by the observation that the injection of a small quantity of horse-serum into an animal, renders it liable to fatal intoxication by a large dose given upwards of ten days later. Goodall* has shown that an injection of serum may render a patient liable to severe constitutional effects when another injection is given even two years later; and interesting cases are on record in which patients have had progressively more severe symptoms as a result of three or more successive injections of serum separated by intervals of years. It must be borne in mind, however, that cases of natural abnormal susceptibility to other substances are not uncommon. Eggs, strawberries, shell-fish, etc., produce in certain individuals, when taken in comparatively minute quantities, symptoms very similar to the serum rashes.

Concentrated diphtheria antitoxin

The administration of the large doses of diphtheria antitoxin, which most authorities now advocate, is much facilitated by reducing the volume containing the requisite number of units. Formerly this was only made possible by the chance discovery of a horse which responded well to the immunising injections and yielded a natural serum of high potency. During the last few years, however, methods of

* *Journal of Hygiene*, 1907

separation of the antitoxin by salt-precipitation have been developed, which render it possible to get high unit value in small volume and at the same time to eliminate those proteins of the serum which, though they have no antitoxic value, are at least equally responsible with the antitoxin-bearing fraction for the incidental toxic symptoms which serum produces in susceptible patients. Such concentrated solutions of the antitoxic globulins have been reported in practice to cause a smaller percentage of rashes and other symptoms, and those of a milder type, than are produced by equivalent injections of untreated serum.

'Wellcome' Brand Concentrated Diphtheria Antitoxin is prepared by such a method of salt-precipitation and fractionation the final product containing 1000 antitoxic units in 1 c.c. or less.

ANTIVENENE

This serum continues to maintain its claim to be a trustworthy remedy for snake-bite, if injected in large quantity, not later than three or four hours after the bite. A case reported in the *Lancet* of January 5, 1901, illustrates the efficiency of fresh antivenom serum, even after the appearance of general symptoms, and in the absence of any local treatment except sucking the wound. The serum was injected into each flank, about $3\frac{1}{2}$ hours after the bite.

Antivenene
injection

'Wellcome' Brand Anti-venom Serum is standardised against the venom of the cobra and Russell viper (Daboiat), and is the result of immunising horses against these venoms.

The surgical treatment of snake-bite is very important, and depends upon the fact that "it is possible, after even half an hour or more from the time of the bite, a considerable portion of the venom may still be unabsorbed at the site of the injection, and so may still be destroyed" by suitable means *

Surgical
treatment of
snake-bite

The first thing to do in every case where the position of the bite makes it possible, is to place a ligature (rope, cord

* *Lancet*, February 6, 1904, page 355.

or handkerchief) round the limb between the wound made by the fangs of the snake and the body, and wash the wound thoroughly, encouraging it to bleed.

The wound should then at once be bathed with a fresh solution of chloride of lime (1/60 in distilled water), or with a 1 per cent. solution of chloride of gold, with the object of destroying *in situ* any venom which may remain unabsorbed (Calmette, Institut Pasteur de Lille).

Or a small incision may be made through the wound, and pure crystals of permanganate of potassium, moistened with a little water, rubbed into it. (Captain L. Rogers, I. M. S., quoting Brunton, Fayrer and others.*)

The successful carrying-out of either of these procedures depends upon an intelligent appreciation of the exact position of the poison, which may be indicated by a local extravasation of blood-stained serum.

The following important considerations should be specially noted:—

In severe cases, and in others where some time (two or three hours) has elapsed after the bite, the serum should, if possible, be injected intravenously.

The dose should not be less than 10 c.c., whether injected subcutaneously or intravenously. The snake-bite should be very carefully cleansed and disinfected before injecting the serum.

“Artificial respiration may . . . be of great value while medical aid or antivenene is being sent for. . . .” †

ANTI-TETANUS SERUM

This serum, like anti-diphtheria serum, is antitoxic in its action. Although it may be stated that some cases of this disease have been distinctly benefited by its administration, in many others the serum has failed. A consideration of the nature of the disease shows why this is so, and why, even more than in diphtheria, it is necessary to commence the treatment at the earliest possible moment.

* *Lancet*, February 6, 1904, page 354. † *Lancet*, February 6, 1904, page 352.

The position
of the poison

Anti-tetanus
serum

Tetanus is a disease caused by the action of the toxin of the bacillus tetani upon the central nervous system; the toxin, as in the case of diphtheria, being produced in some local lesion, the seat of the growth and multiplication of the specific organisms. In tetanus, the toxin makes its way to the motor ganglion cells, partly by way of the nerves in connection with the affected part, and partly by way of the blood.

Unfortunately, the convulsive stage of tetanus is an indication not of the commencement of the disease, as is the appearance of a membrane in diphtheria, but of a comparatively advanced stage of the disease, and of the occurrence of serious damage to the nervous system. The remedy should therefore be administered immediately on the manifestation of any distinct symptoms, possibly tetanic, such as difficulty in opening the mouth, stiffness in the neck, or the onset, some days after the accident and without obvious cause, of an acute pain at the point of injury; and in view of the fact that the tetanus bacillus is localised and restricted to the seat of infection, attention is called to the advantage, in cases of punctured wounds, of excising freely and thoroughly the tissues around. The curative dose of anti-tetanus serum may vary from 50 c.c. to 100 c.c., in one dose or more, but, as a prophylactic in the treatment of wounds contaminated with dust, dirt, soil, etc., a smaller dose of 10 c.c. is said to be sufficient. This protection, however, does not persist longer than five or six weeks. It should be remembered, in considering doses, that it is impossible at present to state definitely the quantity of serum necessary to meet a given case, for so much depends on the severity of the attack, and the stage at which treatment is begun. It is, therefore, better to give a large dose at the commencement. The old medicinal treatment should not be neglected.

Symptoms of tetanus

Dose of the serum

The records of 98 cases treated by serum were collected by Weischer*. Of these, 41 died, the mortality per cent. thus being 41.8.

* *Munch. Med. Woch.*, Nov. 16, 1897.

The serum has been injected directly into the substance of the brain with success, and it has been claimed that this method gives the best results. A full account of this, giving details of the operation, may be found in the medical papers.*

Whilst, as a curative agent, the serum has thus proved a relative failure, it has proved a most valuable prophylactic in the case of wounds infected with soil in districts where tetanus abounds.

BACTERICIDAL SERA

Anti-streptococcus Serum.—The disappointing results which were obtained in many cases in the early days of the preparation of anti-streptococcus serum were doubtless due in part to the absence, at the time, of any adequate classification of the streptococci, with the result that a serum prepared against one strain of streptococcus was tried for a wide range of different infections, which would now be recognised as due to specifically distinct organisms.

Polyvalent Anti-streptococcus Sera.—A prolonged and serious attempt has been made in conjunction with clinical observation and laboratory tests to obtain specific polyvalent anti-streptococcus sera. Cultures were obtained from as many cases as possible of a particular disease, taken from such situations and under such precautions as to make it probable that the organisms were causally associated with the disease. The following are details of the origin of the organisms used in producing some of the 'Wellcome' Sera :—

Anti-streptococcus Serum (Puerperal Fever).—Cultures from 26 cases, mostly fatal, obtained from the uterus or the spleen.

Anti-streptococcus Serum (Erysipelas).—Cultures from 3 cases.

Anti-streptococcus Serum (Scarlet Fever).—Cultures from 9 cases, several of which were fatal, obtained from the blood, the spleen and the knee-joint.

* *British Medical Journal*, January 7, 1899

Anti-streptococcus Serum, Rheumatism (*Micrococcus Rheumaticus*).— Cultures from 6 cases, obtained from the knee- or shoulder-joint.

Anti-streptococcus Serum, Polyvalent.—The horses are immunised against all the strains mentioned above, and, in addition, with strains obtained from 2 cases of Angina Ludovici and 6 cases of Ulcerative Endocarditis (from blood cultures obtained during life), and with 10 strains of *Streptococcus Pyogenes* from Pyæmia, Mammary Abscess, Acute Peritonitis, Suppurative Arthritis, etc.

This serum has found more extended application than any of those prepared from organisms associated with a particular clinical picture, and the recorded cases in which its use has been attended with beneficial results are now too numerous to leave much room for doubt of its efficacy in streptococcal infections.

A point to be specially borne in mind is that all cases of puerperal fever, spreading inflammation of the skin or subcutaneous tissues, are not necessarily associated with the presence of actively growing streptococci. They may be due to some quite different organism, and so would not be benefited by injections of anti-streptococcus serum. The importance of ascertaining by bacteriological tests the kind of organism at work in all such cases is thus manifest.

Septicæmia
due to various
micro-organisms

Other anti-bacterial sera which have been prepared at the Wellcome Physiological Research Laboratories are :

Anti-coli Serum. In the preparation of this, 20 strains of *Bacillus coli* are used, obtained mostly from the peritonem in fatal peritonitis and the uterus in puerperal fever due to *B. coli*.

Anti-staphylococcus Serum. This is also a polyvalent serum, cultures of staphylococcus albus, aureus, citreus and hæmorrhagicus, 15 in all, and all obtained from pus, being used in its preparation.

Anti-dysentery Serum.— Prepared by injecting killed cultures of Shiga's, Flexner's and Kruse's bacilli, 6 strains in all being used.

Anti-gonococcus Serum.—This is prepared from strains obtained from urethritis and gonorrhœal conjunctivitis, and is described as having given good results in the acute stage of the disease.

Anti-meningococcus Serum.—Four strains of the diplococcus of Weichselbaum are used.

BACTERIAL VACCINES

Phagocytic
activity

While it seems clear that, even with the methods of preparation which have as yet been fully tried, the anti-bacterial sera have a certain value, it cannot be denied that they have not, in the same degree as the antitoxic sera, fulfilled the early hopes of their efficacy. Meanwhile, the technique for estimating phagocytic activity introduced by Leishman, and its application and development at the hands of Wright and others, has given a noteworthy impetus to the method of actively immunising the patient against the organism attacking him, by injection of very small doses of a killed culture of the same organism. The new method of controlling the effect of an injection, by determination of the "opsonic index," has not only given a stimulus to the extensive use of vaccination with killed cultures in various chronic suppurations and localised inflammations; it has also, to a remarkable extent, reinstated in the confidence of the medical world the tuberculin (T. R.) of Koch, which had been brought into discredit by the unfavourable results of its early application, in doses which, as the new methods of control indicate, were much too large for safety or benefit. While Wright's opsonic method has undoubtedly been largely responsible for the revival of interest in specific inoculation and the widening of its scope, its complicated and specialised technique has probably had a deterrent effect on the spread of the method in general practice. At present there is a perceptible tendency to doubt the need for the elaborate and difficult opsonic determination, and its adequacy as a control. If this

The opsonic
index

movement continues in the direction of reliance on constitutional indications or a more simple phagocytic determination, it will undoubtedly lead to a wider use of these so-called bacterial vaccines.

Vaccines are usually prepared by suspending in saline solution organisms grown on nutrient agar or some such solid medium, and killing them by heat. They are standardised according to the number of micro-organisms present in 1 c.c. The counting may be done by the absolute method, *i.e.* direct counting of a known dilution in a Thoma-Zeiss apparatus by a method similar to that employed in enumeration of red blood corpuscles. This is a tedious process, and it is more usual to employ Wright's or Harrison's method. Wright's method is to mix the vaccine with fresh blood in known proportion, make a film of the mixture, stain and then compare the total number of red corpuscles in a large number of fields with the number of organisms in the same fields. If the number of red blood corpuscles per cubic mm., the proportion by volume of blood and vaccine, and the ratio of the counts are known, it is a matter of simple calculation to determine the number of organisms present per c.c. of vaccine. The objection to this method is that many organisms may be dissolved by the bacteriolytins of the blood plasma. To overcome this difficulty, Harrison washes the blood corpuscles by several centrifugalizations with citrated saline to remove all the blood fluids, determines, by a Thoma-Zeiss count, the number of cells present in the suspension of red corpuscles in saline, and then proceeds as in Wright's method. It is of considerable value to control the counts by means of the dried weight, which, for each organism used, bears a fairly constant ratio to the bacterial count.

Methods of
standardisation

Counting
the blood
cells

Typhoid Vaccine is used only as a prophylactic, and not at present as a curative, agent in typhoid fever. To secure immunisation, two doses are given. The first dose consists of 0.5 c.c. of vaccine, equivalent to 500 million bacteria. The second, **given ten days later**, is 1 c.c., equivalent to 1000 million bacteria.

After the first, and, to a much smaller degree, after the second inoculation, local and constitutional symptoms may occur. The local symptoms, present at the site of injection, are redness, swelling, pain and tenderness.

The following vaccines have been successfully employed therapeutically :—

Staphylococcus Vaccine, Mixed

Containing *Staphylococcus pyogenes aureus*, *albus* and *citreus*.

This vaccine may be employed in various staphylococcic infections, such as pustular acne, furunculosis, carbuncle, sycosis, blepharitis and localised abscesses.

The initial dose is usually 500 million organisms. A second dose may be given in a week's time, or, if the constitutional effects of the first dose have been slight and evanescent, 1000 million organisms may be deemed necessary. Many authorities recommend the use of much smaller doses.

Staphylococcus Vaccine, Aureus

Containing *Staphylococcus pyogenes aureus*.

This vaccine is employed in the treatment of acne and sycosis. It should only be used when the infection has been shown to be due to *Staphylococcus aureus* alone.

The dose usually employed is similar to that in the case of Staphylococcus Vaccine, Mixed.

Gonococcus Vaccine

Containing *Micrococcus gonorrhœa*.

This vaccine may be used in the chronic and later stages of gonorrhœa, in gleet and gonorrhœal prostatitis, and also in such generalised infections as gonorrhœal arthritis. Good results have also been obtained in the acute stages of gonorrhœa.

The initial dose recommended by different authorities varies considerably: in some cases only 5 million organisms, and in other cases as many as 250 million are injected as an initial dose. Subsequent dosage is regulated by the constitutional effect.

Streptococcus Vaccine, Polyvalent

Containing over 60 strains of streptococci obtained from the following sources: erysipelas, scarlet fever, puerperal fever, rheumatic fever, septicaemia, angina, pneumonia and ulcerative endocarditis.

This vaccine may be used in all forms of localised or generalised streptococcal infection, *e.g.* abscesses, pyaemia, septicaemia, otitis media, endocarditis, peritonitis of streptococcal origin, puerperal septicaemia, and erysipelas.

The dose is from 20–50 million organisms, and it may be administered at intervals of from one to three weeks, according to the reaction produced.

Bacillus Coli Vaccine

Containing the *Bacillus coli communis*.

This vaccine may be used in all forms of coli infection of the bladder, ureters, kidneys and peritoneum; in mucous colitis, and in coli infection of the uterus and gall bladder.

The initial dose is 5–15 million organisms, which may be repeated, or increased, according to the reaction produced, from 2 to 10 days later.

Pneumococcus Vaccine

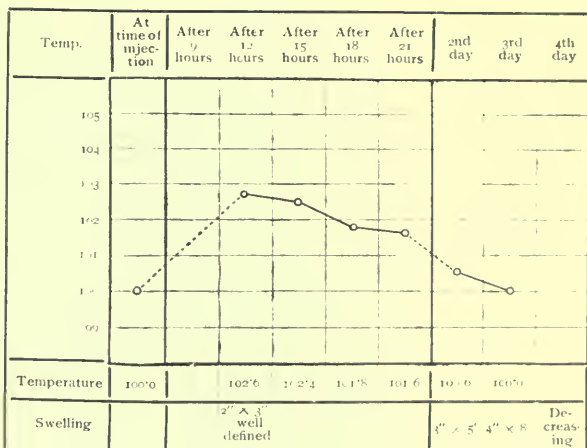
Containing various strains of the *Diplococcus pneumoniae* (*Weichselbaum*).

This vaccine is used in pneumococcal infections of all kinds, pneumonia, empyema, pericarditis, endocarditis, septicaemia, meningitis and pneumococcal infections of joints.

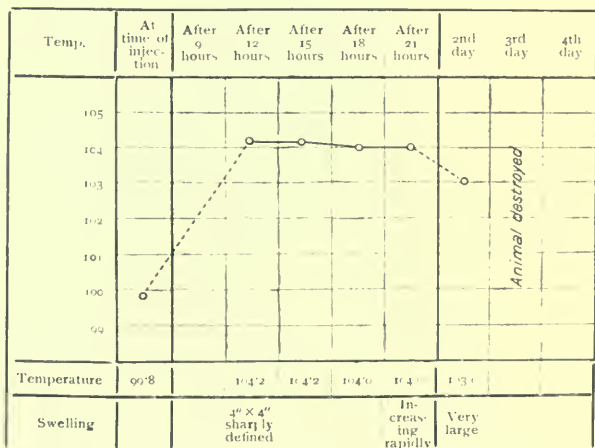
The usual dose is 10–50 million organisms, which may be repeated, according to the reaction produced, every 36 or 48 hours.

Acne Vaccines

Recent research has shown that acne is primarily due to infection by a micro-organism known as the Acne Bacillus. In the early stage, when the eruption is papular in character, a bacteriological examination of the comedones or "black-heads" shows a pure acne bacillus infection. Later on, infection by the staphylococcus occurs, giving rise to the acne pustule.



Reaction to mallein of a healthy horse immunised against Diphtheria toxin. The horse was subsequently killed and the absence of glanders confirmed by post-mortem examination



Reaction to mallein of a glandered horse

A vaccine is chosen for treatment, therefore, in accordance with the stage and nature of the infection.

Acne Bacillus Vaccine

This is intended for the treatment of the papular form of acne. In this form comedones are abundant, but suppuration has not yet occurred. There is no febrile reaction after the injection of this vaccine, but if the dose be excessive, a prolonged negative phase results, in which a fresh crop of acne papules appears. However, these papules disappear by subsequent injections.

Acne Vaccine, Mixed

This is for use in ordinary cases of acne, usually characterised by the presence of comedones and pustules. A bacteriological examination of such cases shows a mixed infection by the acne bacillus and the staphylococcus (*aureus*, *albus* or *citrens*).

Dose. The initial dose is 4 or 5 million acne bacilli with or without staphylococci, according to the nature of the case. Subsequent dosage is regulated by the local effect. Larger doses than 10 million acne bacilli can rarely be tolerated.

In the pustular and furuncular forms of acne without comedones, Staphylococcus Vaccine, Mixed, is used.

Tubercle Vaccine (Human or Bovine)

An emulsion of killed tubercle bacilli of human or bovine origin.

Treatment should commence with a dose of 1 c.c. of emulsion containing 0.0001 mgm. dried tubercle bacilli, increasing to 0.0005 mgm., or even more, according to the indications of the opsonic index, or the clinical symptoms.

MALLEIN AND TUBERCULIN

Mallein is a bacterial filtrate used in the diagnosis of glanders. It is prepared from cultures of the organism causing glanders (*Bacillus mallei*) which have been grown for about six weeks on bouillon containing glycerin, sterilised by heat and filtered. A small quantity of some antiseptic,

such as phenol, is added as a preservative. When injected under the skin of a normal horse, mallein produces little or no apparent effect, but, should the horse be suffering from glanders, a large swelling forms at the seat of injection, and this is usually accompanied by a rise in the temperature of the animal.

Recent investigation at these Laboratories* has shown that many non-glandered horses, if they have been immunised against other bacterial products, give a reaction to mallein in some ways similar to that given by glandered animals.

The size of the swelling produced in such cases appears to depend on the degree of immunity. Thus, in the case of a group of horses injected with diphtheria toxin, 6 of which were highly immune, all gave large local reactions; out of 7 moderately immune, 4 gave large swellings; and in 4 horses in which the serum had a low antitoxic value, only small mallein reactions were produced. The local swelling obtained in such healthy, immune horses differs very markedly from that given by the glandered animal in its rapid disappearance. Similarly, when a rise of temperature is produced by mallein in a healthy horse immunised against other bacterial products, this is smaller, attains its maximum more rapidly, and is far less persistent than the febrile reaction to mallein of a horse suffering from glanders. These differences are illustrated in the charts on page 210.

Similar results were obtained upon immune horses with tuberculin and several other bacterial products, such as those obtained from *Streptococcus*, *Bacillus coli communis*, *Bacillus typhosus*.

Tuberculin ("Old" Tuberculin).—Tuberculin for veterinary diagnostic use is prepared from bacillus tuberculosis by a method similar to that used in the production of mallein from bacillus mallei. For the diagnosis of tuberculosis in cattle, the temperature reaction is of much greater importance than the local effect of the injection. A rise in temperature of 2.5° F. within 12 to 15 hours of

* Südmersen and Glenny, *Journal of Hygiene*, 1908

Reactions of
healthy and
glandered
horses

Diagnosis of
tuberculosis

injection is usually considered sufficient to warrant the condemnation of an animal.

Ophthalmo-Tuberculin Reaction. — The reaction is produced by purified tuberculin obtained by the alcoholic precipitation of ordinary tuberculin. If a small quantity of the precipitate, dissolved in water, be applied to the surface of the conjunctiva, a marked reaction results in the case of tuberculous individuals. Cases have been reported where some inconvenience due to persistence of inflammation has arisen as a consequence of the application to the eye. Cases have also been reported in which reactions have been obtained in non-tuberculous subjects.

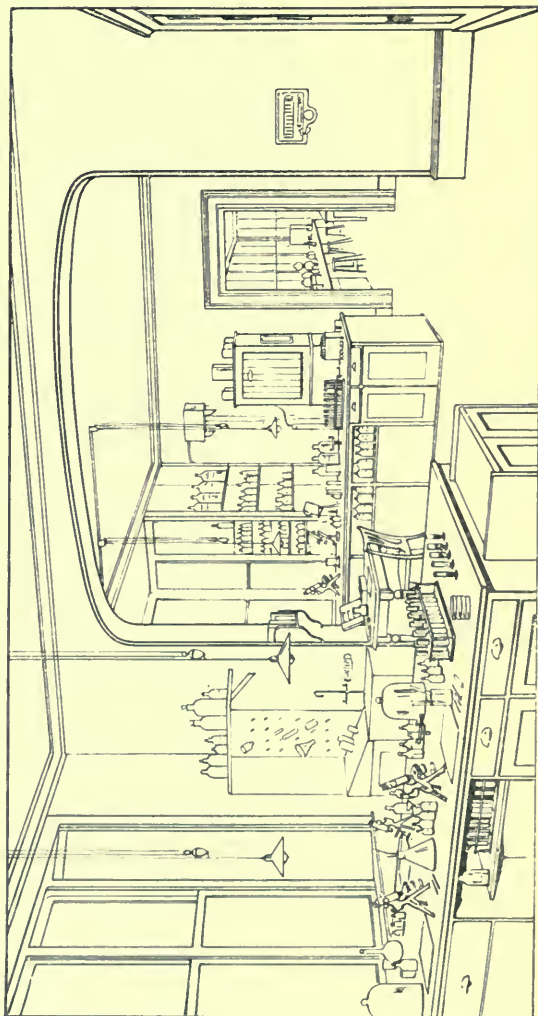
Other modifications are the reaction of von Pirquet, in which the "old" tuberculin, applied to lightly scarified areas of skin, produces, in a large proportion of tuberculous subjects, inflamed papules persisting for some days, and Moro's modification, in which an ointment containing tuberculin is rubbed on the skin, with a similar result.

THE SERUM DIAGNOSIS OF TYPHOID FEVER

A series of investigations, made in different countries, has brought to light the fact that the serum of an animal rendered highly immune to the typhoid bacillus has a marked action upon the organisms, causing them to lose their motility, and to become collected together into little masses, which rapidly sink to the bottom of the tube containing the mixture of serum and culture.

Following this, the fact that the serum of patients suffering from typhoid fever usually gives a reaction with cultures of the typhoid bacillus, similar to, though less marked than, that given by the serum of animals immunised by the bacillus, has been confirmed by a host of observers. This affords evidence of great weight that the bacillus is really the cause of typhoid fever, and it also affords a valuable method of diagnosis.

In the serum of those suffering from typhoid fever, the reaction is said to have been observed as early as the fourth



PRINCIPAL BACTERIOLOGICAL LABORATORY

day. Usually it appears about the beginning of the second week, but it is undoubtedly often absent at this period. According to Courmont,* it is in cases which are exceptional, either on account of complications or severity, or because they are extremely mild, that the agglutinative power is feeble or delayed. In simple cases of moderate severity it appears constantly about the sixth or seventh day, is active, in dilution of 1 in 100, about the tenth day, undergoes a more or less rapid rise towards the end of the febrile period (critical rise), and then disappears more or less rapidly. The persistence of the agglutinative power after recovery appears to be very variable, in some cases rapidly disappearing, in others remaining for years. The blood of those who are not suffering from typhoid fever, and from whom no history of this disease can be obtained, occasionally gives a reaction in dilution of 1 in 10, or even 1 in 30 (the dilutions recommended by Widal). But these instances do not appear to be sufficiently numerous to impair seriously the value of the test. It is thought desirable, however, to use higher dilutions, viz., 1 in 50.

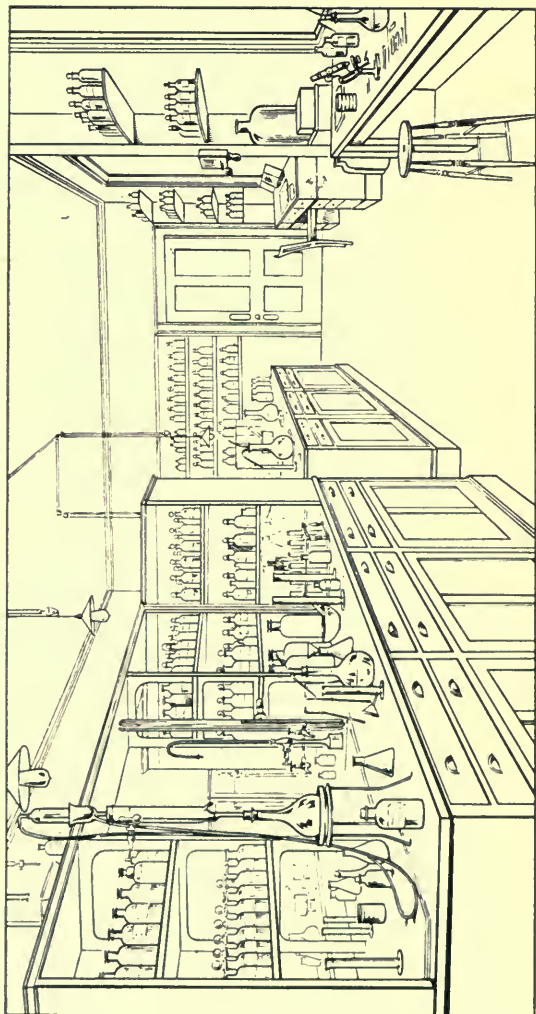
Agglutinative
power

From the considerations briefly set out above, it seems permissible to conclude that (1) A negative reaction is of little value in the early days of the fever. It is of greater importance in proportion to the lateness of the period at which it is observed. It can, however, never absolutely exclude typhoid fever. (2) A positive reaction, on the other hand, except with dilutions of less than 1 in 40, is sound evidence of typhoid fever, present or past. The latter can be excluded if several quantitative tests have been made at different periods, and decided changes in the agglutinative power observed.

Conclusions

Recently an ophthalmo-reaction in typhoid fever, produced by a special culture filtrate and resembling the tuberculo-ophthalmic reaction, has been described by Chautemesse, and some promising results of a similar nature have been obtained by the use of a typhoid endotoxin prepared at the Wellcome Physiological Research Laboratories.

* *Revue de Médecine*, October, 1897.



ONE OF THE LABORATORIES FOR CHEMICAL RESEARCH

ORGANO-THERAPY

The brilliant success which attended the introduction of the treatment of myxœdema by administration of thyroid substance, led to the investigation of the effects of other ductless glands. In no other case has a similar success attended similar methods* ; but the attention directed to these organs has resulted in the discovery of marked physiological actions, of great therapeutic importance, possessed by some of them. It has been shown, by Schäfer and others, that the posterior or infundibular lobe of the pituitary gland contains an active principle—as yet of unknown nature—the effects of which are not less striking than those of the more familiar active principle of the supra-renal medulla. The effects of the pituitary extract include a pronounced rise of blood-pressure chiefly due to arterial constriction, the heart-beat being somewhat slower, and more powerful; intense and prolonged contraction of the uterus,* and profuse secretion of urine. All these effects have already found important therapeutic applications, the clinical value of the extract having been demonstrated by Blair Bell †

ORGANIC AMINES

'HEMISINE'

'Hemisine' is a name given to the active principle occurring in the medulla of the supra-renal gland and other smaller masses of paraganglionic tissue related to sympathetic ganglia. Its action likewise is closely connected with the sympathetic nervous system, intravenous injection producing all the effects which are elicited by stimulation of the nerve fibres of the true sympathetic system. Prominent among these is a great rise of blood-pressure, produced by constriction of peripheral arteries and augmentation of the heart's activity. So active is 'Hemisine' in this direction, that a dose of as little as 0·000001 gramme will produce a perceptible rise of blood-pressure. Contraction of the uterus

* Dale, *Bio-Chemical Journal*, 1909

† Blair Bell, *British Medical Journal*, 1909

is also caused in those animals in which the sympathetic nerve-supply to that organ is motor in function. These effects are illustrated by tracings (*see page 220*).

'TYRAMINE'

'Tyramine' is a name which has been given to the organic base Para-hydroxyphenylethylamine ($\text{HO}-\langle \square \rangle \text{CH}_2-\text{CH}_2-\text{NH}_2$). It has been recognised now for some years, having been first pointed out by Abelous and his associates, that extracts of putrefied meat contain substances which, when injected into the circulation, produce an effect on the blood-pressure reminiscent of that produced by supra-renal extracts. The same phenomenon was encountered by Dixon and Taylor, who found that certain extracts of human placenta caused a rise of blood-pressure and contraction of the uterus, it being subsequently demonstrated by Rosenheim that a certain amount of putrefaction of the placenta was necessary for the development of this activity. The substances concerned in this action have recently been isolated at the Wellcome Physiological Research Laboratories, and identified as *iso*-amylamine, phenylethylamine, and *p*-hydroxyphenylethylamine.* The action of these substances has been found to be similar in most respects to that of the supra-renal active principle, but weaker and more prolonged.†

Of the three, *p*-hydroxyphenylethylamine is much the most active, being also the most nearly related in chemical structure to the supra-renal principle. Its relatively weak and prolonged action, as compared with the latter, enables it to be absorbed from the alimentary canal or the subcutaneous tissues, so that its general constitutional effects, rise of blood-pressure, increased vigour of the heart's action, and contraction of the uterus, can be produced by administering it by the mouth or hypodermically. The study of this substance has recently gained greatly in interest by the discovery that it is present in watery extracts of

* Barger and Walpole, *Journal of Physiology*, xxxviii, p. 344, 1909.

† Dale and Dixon, *Journal of Physiology*, xxxix, p. 25, 1909.

Isolated
at W. P. R. L.

'Tyramine' the
most active

ergot, and is chiefly responsible for the well-known effects of such extracts on the blood-pressure and the uterus.*

Several methods of preparing this base synthetically have been worked out at the Wellcome Physiological Research Laboratories † and it will probably find wide therapeutic use.

Another amine derived from an amino-acid by splitting off carbon dioxide is β -iminazolyethylamine, which can be obtained from histidine by the action of certain putrefactive bacteria (Ackermann) or by chemical agents.

This base has an action of quite a different type, being a very potent stimulant of plain muscle, conspicuously of uterine muscle, irrespective of innervation. In carnivora, however, it causes a large fall of systemic pressure by arterial dilatation, its action in this and other respects being markedly similar to that of various depressor organ extracts of certain commercial preparations of "peptone" (Dale and Laidlaw). Barger and Dale identified as this base the constituent of ergot extracts chiefly concerned in the very powerful action on the isolated uterus described by Kebrer.

ERGOTOXINE AND 'LERNUTIN'

Many substances which have in the past been described as active principles of ergot, and which undoubtedly showed physiological activity, have not possessed the characteristics of pure chemical substances. Such were the sphacelinic acid and cornutin of Kobert, and the chrysotoxin, secalin toxin, and sphacelotoxin of Jacobj. On the other hand, the alkaloid which Tanret isolated in an undoubtedly pure and crystalline form, and named "ergotinine," was found by several observers to possess practically no pharmacological action, although there was some clinical evidence of its activity. Recent work in the Wellcome Physiological Research Laboratories ‡ has cleared up this anomaly by

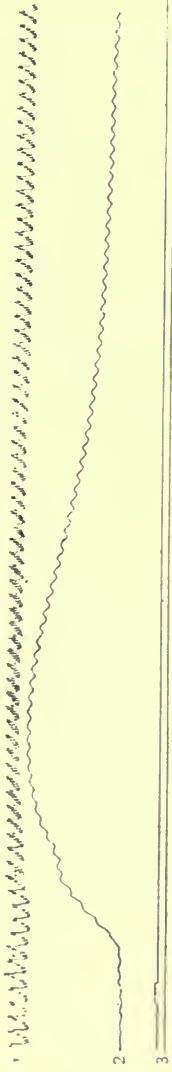
Active
principles
of ergot

The
alkaloid
ergotoxine

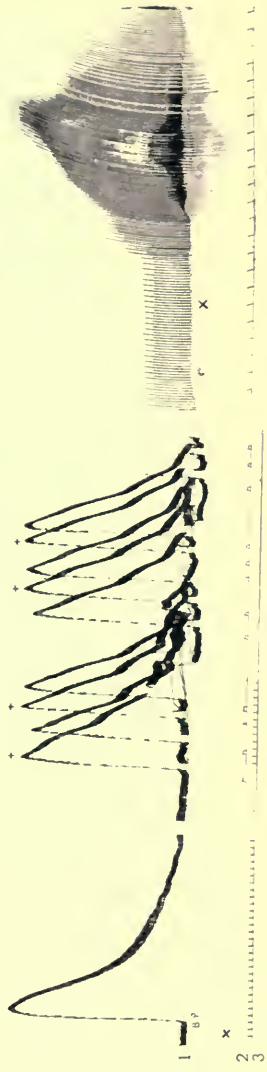
*Barger and Dale, *Journal of Physiology*, 1907, XXXIII, p. 7. [Proc. Phys. Soc.]

† Barger, *Journal of the Chemical Society*, xc, p. 1123, 1909.

‡ Dale, *Journ. of Physiol.*, XXXIV, p. 163, 1906; Barger and Carr, *Journ. Chem. Soc.*, xc, p. 337, 1907; Barger and Dale, *Bio-Chem. Journ.*, II, p. 240, 1907.



No. 1. TRACING SHOWING THE EFFECT OF 'HEMISINE' ON THE BLOOD-PRESSURE
 See page 224



No. 2. TRACINGS ILLUSTRATING ACTION OF 'HEMISINE' AND METHOD OF STANDARDISATION
 See page 225

demonstrating the presence in ergot of the alkaloid ergotoxine, which is closely related chemically to ergotinine, being a hydrate of the latter and easily produced from it, but differing from it in being intensely active physiologically. Subsequent investigations have shown that ergotoxine has acid as well as basic properties. Unlike ergotinine, therefore, it is soluble in dilute alkali, and also forms organic esters, of which the ethyl- and methyl-esters have been prepared.

These facts throw further light on the occurrence of ergotoxine as the true active constituent of various preparations both of basic and acidic nature which have, from time to time, been described as "active principles" of ergot. Ergotoxine, though itself amorphous, forms crystalline salts, and has accordingly been prepared in a chemically pure condition. Its physiological action is characteristic, consisting of a stimulant action on plain muscular organs, and in particular on the arteries and the uterus. When a large dose is given, a secondary paralytic effect on the motor functions of the true sympathetic nervous system is produced. As a result, the injection of 'Hemisine,' or stimuli applied to the sympathetic nerves concerned, now cause a fall of blood-pressure and relaxation of the uterus in place of the previous rise of pressure and contraction. This secondary action affords a convenient means of recognising the presence of the active alkaloid, and estimating the quantity present in any specimen or preparation of ergot. This physiological method of assay is the more valuable in that no satisfactory chemical method is yet available for estimating ergotoxine.

Its crystalline salts

Physiological assay of ergot
1916-1918

While ergotoxine is the only active principle identified as specific and peculiar to ergot, it does not account for the whole of the activity of all ergot preparations. It was pointed out by Barger and Dale, in 1907, that certain extracts of ergot, and in particular the official watery preparations, possess a pharmacological activity too great to be attributed to the traces of ergotoxine which they contain.



No. 3. EFFECT OF 'HEMISINE' AND 'ERNUTIN' ON THE BLOOD-PRESSURE.
See page 225

Two distinct types of activity, neither due to ergotoxine, can be recognised in such extracts, *i.e.* (1) a pressor effect due to a principle which, in general features of its action, resembles the supra-renal active principle; this has been shown to be due chiefly to the presence of *p*-hydroxyphenylethylamine; and (2) an intense stimulating action on the plain muscle of the uterus, independent of its reaction to nerve impulses, this has been traced to the presence of β iminazolyethylamine (Barger and Dale). It is quite in accord with what might be expected on theoretical grounds, that the ferments of a fungus like ergot should, equally with putrefactive bacteria, have the power of producing these bases from the amino-acids, derived, in this instance, from the proteins of the rye-grain. The presence of varying amounts of *p* hydroxyphenylethylamine, together with small amounts of ergotoxine, accounts for the whole of that action of ergot extracts on the blood-pressure, which has been widely recommended as a basis of standardisation.

Ferments and putrefactive bacteria

'Ernutin' is a fluid preparation which contains these active principles of ergot in a definite and uniform proportion, unmixed with depressant and harmful impurities.

PHYSIOLOGICAL STANDARDISATION

No insistence is needed on the desirability of a uniform standard of activity in all drugs, and especially in such as contain principles of a highly active and toxic nature. In the case of some, such as cinchona or belladonna, such a standardisation is easily carried out by chemical means. There are, however, other drugs in which the active principles are of such a nature that attempts at chemical estimation are only misleading, even though the active principles are recognised and something known of their chemical nature. Typical instances of such drugs are those of the group including digitalis, strophanthus and squill. In the case of digitalis, research in these Laboratories* has shown the futility of the chemical methods suggested and the adequacy of an estimation based on the effect of

Necessity for physiological methods

*Barger and Shaw, *J. of B. C. P. Pharmac.*, 1914.

the drug on the frog's heart. The conclusions reached apply, with little modification, to strophanthus and squill, and preparations of all these drugs are now standardised by this method in these Laboratories.

Cannabis indica is a notoriously variable drug, but, by observing the nervous symptoms produced by a given dose in a dog or cat, a fair estimate of the activity of any specimen can be made.

Ergot is another drug in which the amount of the active principles varies to a very marked degree. The isolation of ergotoxine and the other active principles, and the demonstration of the presence of *p*-hydroxyphenylethylamine in ergot extracts, may eventually lead to the development of a satisfactory chemical method of determining its activity. Hitherto, however, physiological methods, based on the action of ergotoxine and of the amines described above, have proved a far surer guide than any chemical assay.

The purity of a specimen of 'Hemisine' can be much more satisfactorily determined by comparison of its activity to that of a standard specimen than by chemical tests. The method illustrated, in which the amount of a given specimen is determined, which produces a rise of blood-pressure equal to that given by a given dose of a specially-prepared pure standard sample, is found in these Laboratories to be workable to an accuracy of about 5 per cent., and is used in standardising all supra-renal preparations.

Kymograph tracings are reproduced on *pages 220 and 222*. They represent the results of pharmacological research and some methods of physiological standardisation in use at the Wellcome Physiological Research Laboratories.

DESCRIPTION OF TRACINGS

- (1) 'Hemisine.' The lines of tracing, from above downwards, are :—
- I. Plethysmographic tracing of heart volume.
 - II. Manometer-record of blood-pressure from the carotid artery.
 - III. Signal line, showing time of injection.

The active principles of ergot

The standardisation of 'Hemisine'

At *H*, 0.0001 gm. of 'Hemisine' was injected into the jugular vein, causing a large rise of blood-pressure, and quickening and strengthening the heart-beat.

(2) 'Hemisine'

(a) Effect of 'Hemisine' on the blood-pressure of a decerebrate cat: -

Lines of tracing

- (1) Blood-pressure
- (2) Signal line marking the point of injection.
- (3) Time-clock marking every 10 seconds.

(b) Method of standardising 'Hemisine' and other suprarenal gland preparations. Varying doses of the solution to be tested are interposed between injections of 0.00002 gm. of the standard specimen of 'Hemisine.' Effects of standard doses are indicated by a **X**. Between the injections the recording drum is moved back so as to produce partial superposition and facilitate comparison.

(c) Effect of 'Hemisine' on the isolated heart of a rabbit, perfused through the coronary circulation with oxygenated Ringer's solution (Locke's method). At **X** 0.00005 gm. of 'Hemisine' was added to the perfusion fluid

(3) Effect of 'Hemisine' and 'Ernutin' on the blood-pressure

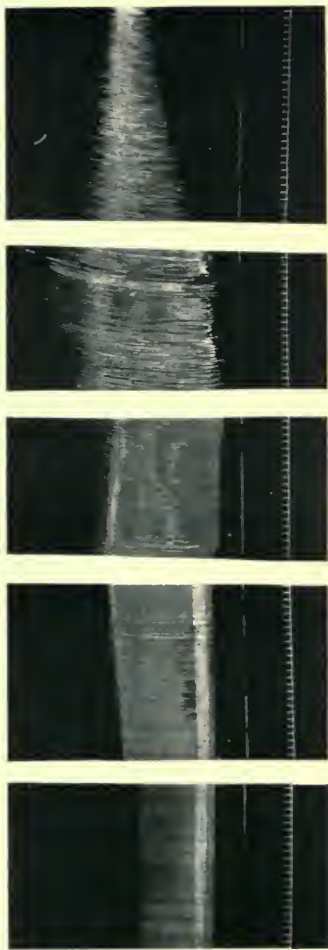
(a) Effect on the blood-pressure of intravenous injection of

- (A) 0.00005 gm. of 'Hemisine.'
- (B) 2 c.c. 'Ernutin.'
- (C) 0.00005 gm. 'Hemisine'

Showing the rise of blood-pressure and the subsequent reversal of the effect of 'Hemisine,' due to ergotoxine in the 'Ernutin'

FOUR STAGES IN THE ACTION OF STROPHANTHIN ON THE ISOLATED HEART

The heart of a rabbit was perfused with warm oxygenated Ringer's solution and the ventricular beat recorded, upstroke of the level indicating systole. Between 1 and 2 the pure Ringer's solution was replaced by Ringer's solution containing 1 in 150,000 Strophanthin



- | | |
|-----|--|
| (1) | Normal beat |
| (2) | Soon after commencement of Strophanthin perfusion, systole increased |
| (3) | Later, systole and diastole increased |
| (4) | Later, violent and irregular activity |
| (5) | Diastole becoming less perfect, heart passing gradually to permanent fatal systole |

DESCRIPTION OF THE WELLCOME PHYSIOLOGICAL RESEARCH LABORATORIES

The original laboratories, established in 1894, were enlarged from time to time to meet the requirements of constantly increasing work, until it was found necessary to acquire more commodious premises. The new laboratories were established at Brockwell Hall, Herne Hill, London (Eng.), in the early part of 1899

The new
laboratories

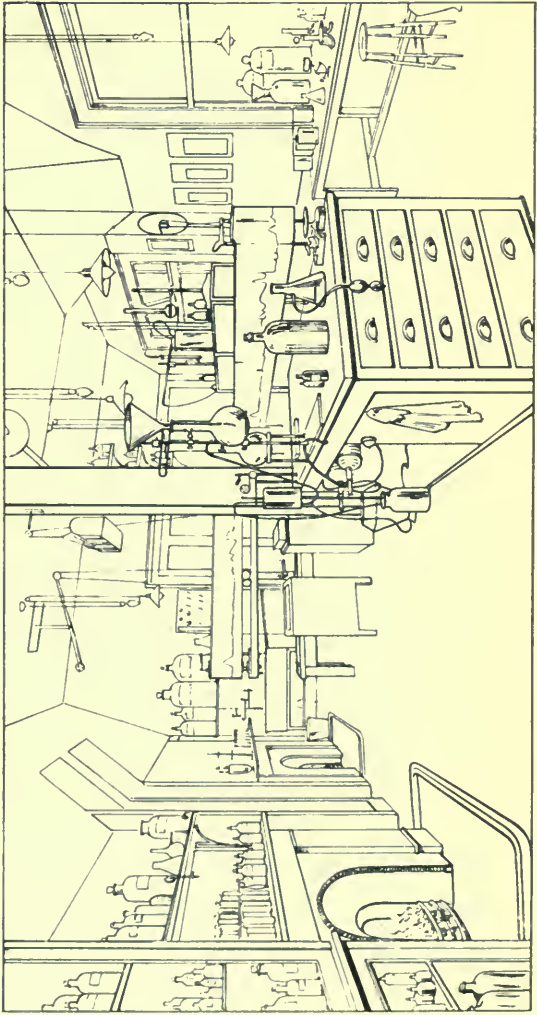
Brockwell Hall is an old-fashioned country mansion, standing in its own grounds. The adaptation of these premises to the requirements of research work has been carried out with the greatest care, and no pains or expense have been spared in rendering their appointments as complete as possible, so that the Institution's highly-qualified staff of research workers have full scope for their energy.

The room shown in the illustration on *page 214*, is the principal Bacteriological Laboratory. In this laboratory research is carried on in bacteriology and serum-therapeutics, injections are made for the standardisation of sera prepared in the establishment, and the elaborate series of sterility tests is made to which all sera are submitted before issue. On the other side of the entrance-hall is the principal Chemical Laboratory (*see page 216*) devoted to research on the nature of naturally occurring substances of biological importance, and the synthesis of new compounds likely to be pharmacologically and therapeutically interesting

Bacterio-
logical and
Chemical
Laboratories

A small Chemical Laboratory, the Secretary's office, a dark-room for photographic work, and the Library, are also on the ground floor. The Library is well supplied with standard works of reference, both chemical and physiological, and the current scientific literature of both these subjects, as well as that of bacteriology, is well represented.

The spacious cellarage contains, in addition to compartments for storage of various materials, a cold chamber,



THE PHYSIOLOGICAL LABORATORY

9 ft. x 7 ft. in floor area, kept constantly below freezing point by means of an ammonia freezing installation, and also an incubating room.

The Physiological Laboratories are situated on the first-floor of the building. In these rooms physiological and pharmacological research, and the physiological testing and standardising of various drugs and chemicals are carried on.

Physiological
Laboratories

On the same floor are:—

(1) **The Directors' Office.**

(2) **Serum Office.** A small room at the head of the staircase where all the records of procedures connected with serum production are preserved in perfect order for daily work and reference.

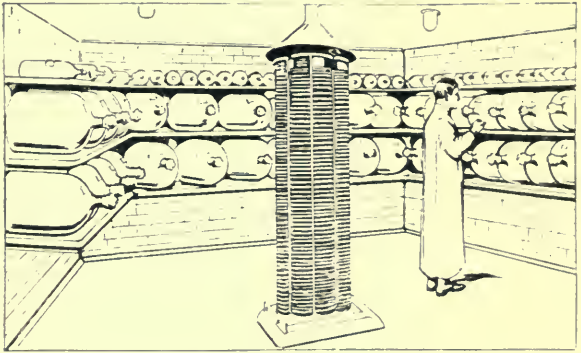
(3) **Serum Concentration Laboratories.** A room paved with cement is fitted with special glass benches for the manipulation of serum. It can be flushed all over with water to free the air from dust, and, with the door closed, can be sterilised with formalin. This and the adjoining laboratory are used for the processes involved in the artificial concentration of antitoxin. A special chemical laboratory is devoted to research in connection with these processes.

(4) **Vaccine Laboratory.** A room devoted to the preparation and standardisation of bacterial vaccines.

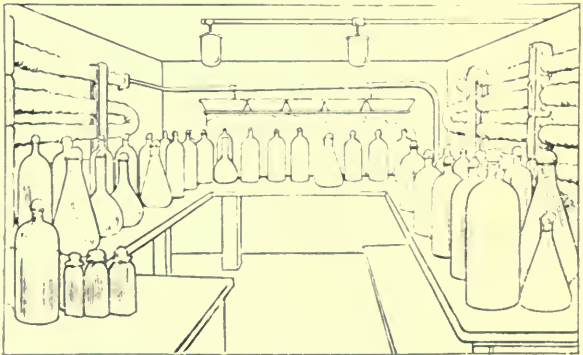
(5) **Serum testing room.** A room set apart for making dilutions of diphtheria antitoxic serum and preparation of injections of mixed diphtheria toxin and serum used in standardising the latter for issue from the laboratories (to Burroughs Wellcome & Co.). The standard apparatus employed is never moved from this room nor used for any other purpose.

Two special laboratories are devoted to the preparation of media: one, a small pent-house, occupied entirely in the production of test-tube media for use in the bacteriological laboratory; the other, a commodious well-lit outbuilding communicating with the boiler-house, having a floor paved with cement, and the walls enamelled

Nutrient
media



ONE OF THE INCUBATING CHAMBERS



COLD STORAGE CHAMBER

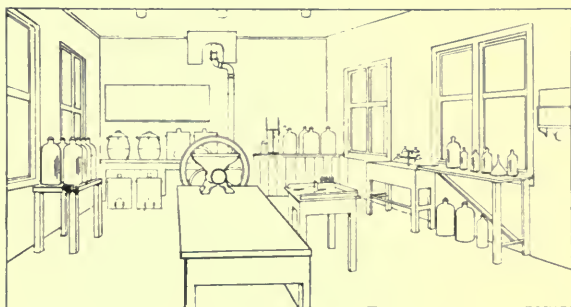
in order to facilitate cleaning. Here is made nutrient broth of various kinds on a large scale, to be used in the preparation of the various cultures and toxins for use in the stables. This laboratory is also used for the initial work upon crude animal material before it is sent to the chemical laboratory for further elaboration. Between this room and the boiler-house are two compartments, one for stores, the other to accommodate the large high-pressure steriliser which can deal with bottles, containers, etc., of large size.

The serum, after being obtained in the collection-laboratory adjacent to the stables, is taken to a special building recently erected, where all further processes involved in separating it and measuring it into phials are now carried out. The building contains a cleaning-room for all apparatus used in the manipulations, a sterilising-room, for the heat sterilisation of the same; and a phial-room, where the phials, in which the sera and vaccines are issued, are cleaned and prepared for sterilisation, and subjected to scrutiny after filling. The rest of this building is completely closed from the outside air, and ventilated by an ample current supplied by a large motor fan, placed outside in a special building. The air is passed through a germ-proof filter before it enters the main building, the rooms are constructed without angles or corners, and can be sterilised mightily with formaldehyde vapour, which the sterile, fan-driven air removes again in a few minutes. This sterile section includes

Germ-proof
filters

(1) A store-room in which the sera and vaccines are kept, ready to be run into the issuing phials.

(2) Duplicate rooms in which the process of separating the serum from the clot is carried out. One of these rooms is always being sterilised while the other is in use. These rooms open out of the serum store, and can only be approached through it. A small chamber, in which the serum is mechanically driven through germ-proof filters into the storage bottles, also opens out of the store-room.



ONE OF THE ROOMS IN WHICH PHIALS ARE FILLED



SPECIAL LABORATORY FOR THE COLLECTION OF BLOOD
AND SEPARATION OF SERA

(3) A room in which the serum is filled into phials. This is approached from the phial-preparing room by means of a double air-lock. Before entering the room the assistants must assume sterilised overalls, caps and goshes, and sterilise the hands. Into this room the serum passes by tubes from the store-room, and each phial, as soon as filled, is passed under a glass screen to another assistant, who immediately seals the neck at the blow-pipe.

All packing of serum is done in an adjacent, separate building, built for the purpose, and self-contained in every way, which also provides amply for the storage of the materials used.

Packing

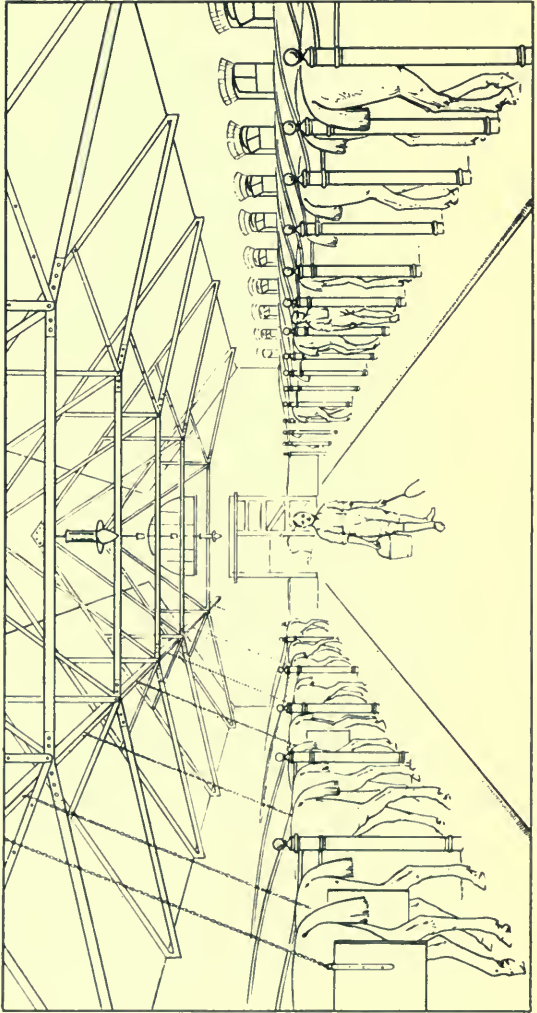
Between the main building and the animal houses a brick building of one storey has been erected. The one room on the ground level is specially fitted for bacteriological work. The floor is cemented, the walls tiled to a height of four feet, and all corners avoided by a rounding of angles. In this room manipulations are carried out connected with stock cultures, special research work, and the preparation of various vaccines. The cellarage, surrounded by a drained area, is divided into two rooms. The larger, 12 ft. square, is kept at a constant temperature, ranging from 35-40° at different levels in the room. This is used for incubation on a large scale. Alongside it is a smaller room, in which a still atmosphere affords especially suitable conditions for bacteriological operations. Recently another building, containing three laboratories, and two rooms for keeping rodents, has been erected at a distance from the other buildings, for the purpose of special bacteriological research.

Other
Laboratories

THE STABLES AND OTHER ADJUNCTS

The stables are situated about one hundred yards from the laboratories. They are lofty, well lighted and well ventilated, and are fitted with every convenience and contrivance conducive to the well-being of the horses. The walls are of white glazed brick and cement, the floor being paved throughout with the best stable bricks.

The old stables and coach-houses of the Hall have been remodelled in accord with modern views, and are now used



INTERIOR OF ONE OF THE STABLES

for the testing of new horses with mallein and tuberculin before they are admitted to one of the large stables. Near by is a special laboratory for the collection of blood and separation of sera. This laboratory, like the stables, has been so built as to permit of the whole room being flushed with water, so that sera can be manipulated under the conditions necessary for ensuring sterility.

Collection of
sera

An entirely new system of drainage for the laboratories, stables and other premises has been carefully carried out.

The laboratories, stables, outbuildings and grounds are electrically-lit, and are all in telephonic communication. The boiler, engine and dynamo necessary for the generation of the current used in the various motors on the premises are placed in brick and cement buildings adjoining the south-west side of the Hall. Near the boiler is a large cylindrical steriliser, constructed for a working pressure of 30 lb. The sterilisation of all large vessels containing nutritive media, etc., is effected here, as also of all vessels which have been used in the laboratories.

Electric
installation

The grounds contain a large paddock, and also gardens for growing vegetables for the animals. A large store for fodder, with electrically-driven chaff-cutter, has recently been erected.

Paddock
gardens

THE ANIMAL HOUSES

A large animal house has been erected, which accommodates all the rodents required for the work of the laboratories. It contains full provision for the efficient isolation of animals inoculated with living cultures. The heating and ventilation of this building have been very carefully carried out, with a view to the health and comfort of the animals.

Efficient
isolation

Another range of sheds contains well-drained, comfortable kennels for dogs, a stable for goats, and a steam heated apartment for cats, communicating with a large open-air cage.

THE
EVOLUTION OF WEAPONS
FOR THE
BATTLE OF LIFE



ADAPA

About 6000 B.C.

Adapa is the earliest known personage directly associated with medicine. He was the human incarnation of Marduk, the divine Son of Ea, and was believed to possess the spells of life and death.

"Ea gave him wisdom,
So that his command was like unto the word of God.
To him also he gave deep knowledge ;
With the healing spell of life and the spell of death he was made."

(Translated from a Babylonian Tablet)

HISTORICAL EXHIBITION
OF
RARE AND CURIOUS OBJECTS
RELATING TO
MEDICINE, CHEMISTRY, PHARMACY
AND THE ALLIED SCIENCES
TO BE HELD IN LONDON, 1913

ORGANISED BY, AND UNDER THE DIRECTION OF
HENRY S. WELLCOME

WITH the object of stimulating the study of the great past, I have been for some time organising an Exhibition in connection with the history of medicine, chemistry, pharmacy and the allied sciences, my aim being to bring together a collection of historical objects illustrating the development of the art and science of healing, etc., throughout the ages.

For many years I have been engaged in researches respecting the early methods employed in the healing art, both among civilised and uncivilised peoples. It has been my object in particular to trace the origin of the use of remedial agents, and enquire why and how certain substances came to be employed in the treatment of disease.

A consideration of such questions is always of interest and sometimes adds to our knowledge.

I anticipate that the Exhibition will reveal many facts, and will elucidate many obscure points in connection with the origins of various medicines, and in respect to the history of disease. It should also bring to light many objects of historical interest hitherto known only to the possessors and their personal friends.

I shall greatly value any information sent me in regard to medical lore, early traditions or references to ancient medical treatment in manuscripts, printed works, etc. Even though the items be but small, they may form important connecting links in the chain of historical evidence. Medical missionaries, and others in contact with native races, can also obtain particulars of interest in this connection. Every little helps, and, as I am desirous of making the Historical Medical Exhibition as complete as possible, I shall be grateful for any communication you may be able to make.

It is my desire ultimately to place before the profession, in a collected form, all the information obtained.

The success of the Historical Medical Exhibition will depend largely upon the co-operation of those interested in the subject with which it deals, and I again appeal, therefore, to all who possess objects of historical medical interest, to render their kind assistance by lending them to me so that the Exhibition may be thoroughly representative. I should also highly esteem your kindness if you would inform me of any similar objects in the possession of others.

I need hardly say that the greatest care will be taken of every object lent. All exhibits will be insured (also while in transit, if requested), and packing and carriage both ways will be paid.

The Exhibition will be *strictly professional and scientific in character*, and will not be open to the general public.

The response to the preliminary announcement has been beyond my expectations, and this, together with the many valuable suggestions received from leading members of the medical profession, chemists and others at home and abroad, has prompted me to considerably widen the scope of the undertaking since it was first projected.

I have been strongly urged, and have now decided, to hold the Historical Medical Exhibition at the same time as the International Medical Congress, which is fixed to take place in London in the year 1913.

This decision will, I have no doubt, suit the convenience of the many medical practitioners from all parts of the world, who will be visiting England on the occasion of the Congress, and the intervening time will enable me to make the Exhibition more comprehensive, and to include many objects of exceptional interest that have been promised from different quarters of the globe.

Hints and suggestions in connection with the Exhibition will be much appreciated.

HENRY S. WELLCOME

SNOW HILL BUILDINGS
LONDON, E.C., ENGLAND

CLASSIFICATION OF EXHIBITS

SECTION I

Medicine: -



FIG. 1
 FIG. 2
 FIG. 3
 FIG. 4
 FIG. 5
 FIG. 6

- (a) Animal medicine; *materia medica* of the animal creation: the tradition of the connection of animals with the healing art.
- (b) Medical deities of savage tribes and nations, figures, fetishes, charms, implements, and other objects associated with the art of healing by primitive peoples.
- (c) Antient deities of healing and other subjects associated with the art of healing by primitive peoples and the early civilisations.
- (d) Votive offerings for Lealth (*Donaria*), amulets, amuletic medicines, gems, emblems, talismans, rings, charms,

and other objects connected with the art of healing.

(e) Paintings, drawings, engravings, etchings, photographs, models, bas-reliefs, sculptures and casts of medical interest.

(f) Pictures from MSS. of all ages, of medical, surgical, pharmaceutical and alchemical interest



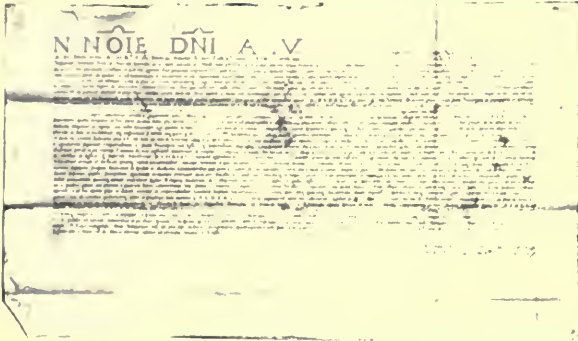
- (g) Portraits in oil, water-colours or wax, miniatures, silhouettes, etchings and engravings, or busts in sculpture of physicians, surgeons, alchemists, botanists, apothecaries, chemists, pharmacists, nurses, etc., of all periods.
- (h) Pictures of medical, chemical and pharmaceutical institutions of all nations.
- (i) Pictures representing the important epochs and interesting events, such as original operations, discoveries, etc., in the history of medicine, surgery, chemistry and pharmacy.
- (j) Medals, medallions, plaquettes and coins of historical medical interest.



FIGURE 10. (j) (a) Medal, and (b) coin

- (k) Rare and curious MSS., xylographs, incunabula, early printed books and works of especial historic interest, periodicals, pamphlets, book-plates, etc., of, and connected with, medicine, surgery, pharmacy, chemistry, botany and the allied arts.
- (l) Historic letters, prescriptions, autographs, case and note books, records of experiments, antient

diplomas, licences, corporate insignia, and personal relics of medical, pharmaceutical and chemical interest.



(m) Relics of the influence of astrology in medicine, horoscopes, and other astrological diagrams bearing on the art of healing



SECTION 2

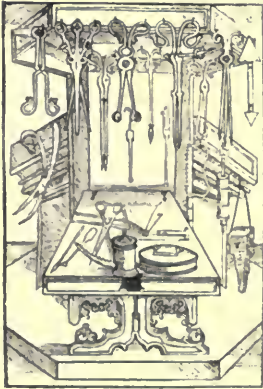
Surgery, Dental Surgery, Veterinary Surgery and Anesthetics

- (a) Instruments used in surgery by pre-historic and savage peoples.
- (b) History and development of instruments and appliances used in surgery from the earliest times.
- (c) Curious appliances used in ancient times—barber surgeons' bleeding basins and bowls, cupping implements, etc.



BARBER-SURGEON'S SHOP
From an Engraving of the XVII century

(d) Improvised instruments and appliances that have been used in emergencies, especially those that have led to inventions and discoveries.



(e) Calculi, and other curious specimens of historical interest.

(f) Relics of ancient dentistry; early artificial dentures.

(g) Ancient dental instruments and appliances.

(h) Ancient instruments used in veterinary surgery.

(i) Historical apparatus connected with the discovery and use of anaesthetics.

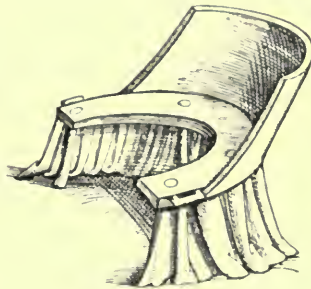
SECTION 3

Anatomy, Pathology, Obstetrics, etc.:

(a) Curiosities of anatomy, and curious anatomical models in wax, ivory, etc.

(b) History of the nomenclature, causation and treatment of the most important diseases that have afflicted mankind from the earliest times.

(c) Obstetric chairs, and other appliances used in early midwifery practice, the lying-in room in ancient times, models for obstetrical teaching.



(d) Manacles and other appliances used in the treatment of the insane in ancient times.



AN APOTHECARY'S SHOP

1505

SECTION 4

Ophthalmics :

- (a) Antient spectacles, eye-glasses and instruments used as an aid to sight.
- (b) Antient instruments and appliances for testing sight, employed by oculists.
- (c) The microscope from the earliest period.
- (d) Historic microscopes.



SECTION 5

Hygiene, Public Health and Preventive Medicine :



- (a) Objects of interest, antient and modern, connected with public health, preventive and tropical medicine.
- (b) Masks, and other preventive methods of protection against plague in antient times.
- (c) Exhibits illustrative of physiology, anthropology, microscopy, bacteriology, biology, parasitology, and geography.
- (d) Placards, posters, manifestos, declarations concerning epidemic diseases, etc.
- (e) Antient bills of health.

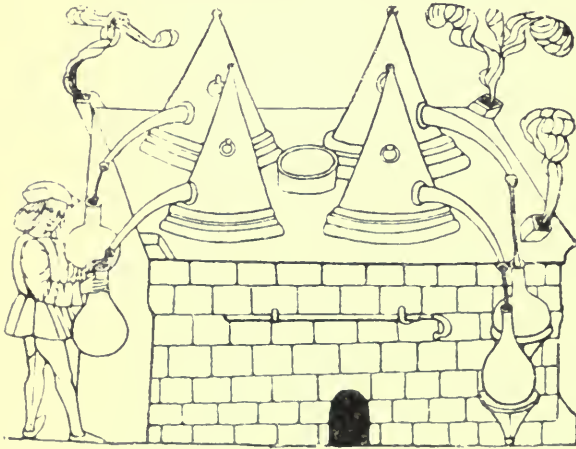
SECTION 6

Pharmacy

- (a) Antient pharmacies.
- (b) Materia medica of all ages, specimens of antient medicines and remedial agents of various periods.
- (c) Specimens illustrating the use of animal substances in medicine.

HISTORICAL MEDICAL EXHIBITION

- (c) Historical apparatus used by famous discoverers.
- (d) Products and preparations, antient and modern, of chemical and scientific research.



- (e) First specimens of rare alkaloids, and other preparations made by their discoverers.
- (f) Rare elements and their salts, etc.
- (g) Curious astrological, magnetic and early electrical appliances.
- (h) Antient herbaria.
- (i) Specimens of abnormal plant forms and curious roots used in medicine
- (j) Relics of famous botanists.

SECTION 8

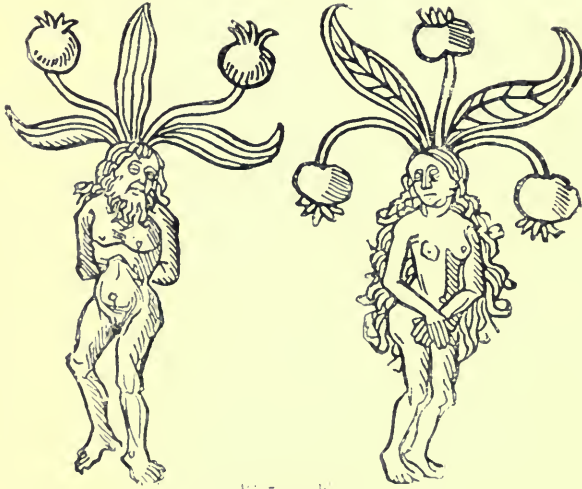
Hospitals, Nursing and Ambulance :

- (a) Objects connected with early hospitals and general nursing
- (b) Early appliances in nursing the sick.
- (c) Early ambulance appliances
- (d) Antient feeding cups, bottles, urinals and bed pans.
- (e) Naval and military nursing and ambulance appliances and equipments.



ST. ROCH
Healing sufferers from the plague—XVI century

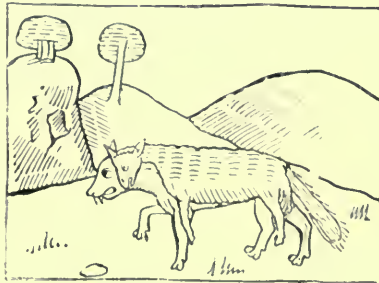
- (f) Relics and objects of interest associated with nurses.
- (g) Relics of foundling hospitals.



SECTION 9

Toxicology and Criminology:

- (a) Specimens of rare and curious poisons.
- (b) Historical objects connected with famous poisoning and other criminal cases.
- (c) Curious methods of torture and execution.
- (d) Improvised instruments used for criminal purposes.



SECTION 10

Quackery:—

- (a) Antient and modern pictures, prints and relics of notorious quack doctors.

- (b) Antient and modern specimens of quack medicines, preparations and appliances.
- (c) Old bills, placards and pamphlets referring to quack medicines.

SECTION II

Adulteration of Foods and Drugs :—

- (a) Specimens showing the adulteration and falsification of drugs, medicines, foods, fabrics and other articles affecting health, or associated with medicine, pharmacy and allied sciences.



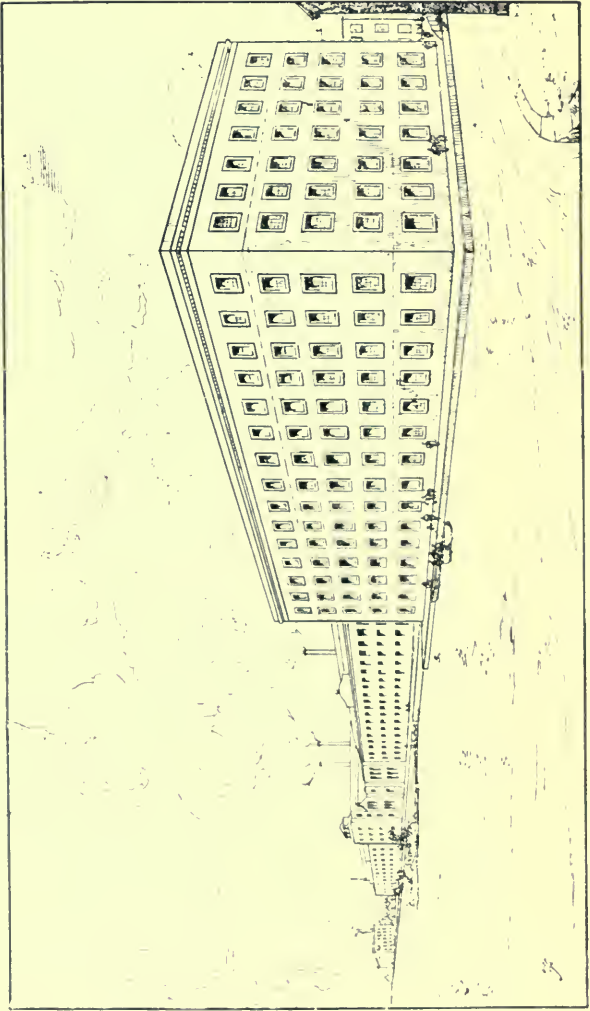
Louis Jacques Mande' Breguet
a pioneer of photography;
born 1780, died 1848.

SECTION 12

Photography :—

- (a) Objects illustrating the invention and history of photography.
- (b) Early cameras and apparatus.
- (c) Daguerrotypes.
- (d) Portraits of the pioneers of photography.
- (e) Original papers and MSS. connected with photography.
- (f) Application of photography to medicine and surgery, X-ray photography.
- (g) Early and rare apparatus.
- (h) Curiosities of photography and its latest development.

WEAPONS OF PRECISION
PRODUCED BY
SCIENCE AND INDUSTRY



WILLOWEY CHEMICAL WORKS, DARTFORD, KENT, ENGLAND

THE WORK OF
BURROUGHS WELLCOME & CO.

FROM the time of the founding of the firm, scientific advance has been steady and continuous. The keynote of this success lies in the firm's own original work, conducted under the most favourable conditions, as well as their ready recognition of all forward movements in scientific research, and adaptation of the results to the methods of modern production.

Keynote of
success

The rule of thumb is dead and the rule of science has taken its place*

"Science and Industry" has been the guiding motto of B. W. & Co. from the first. They have aimed at attaining and maintaining the highest possible degree of excellence in the products they issue. By keeping abreast of research work, and by promptly adopting the most scientific modern methods, they have not only kept pace with the latest developments in medicine and pharmacy, but have been pioneers in the introduction of some of the most notable agents employed in modern medicine, and have contributed largely to the great advances of the times.

"Science and
Industry"

Patient and persistent research* by a staff of chemical, pharmaceutical and physiological experts has yielded fruitful results. Not only has the firm satisfied the highest requirements of physicians by the purity, reliability and scientific precision of the products, but it has met the needs of conscientious pharmacists who pride themselves on the *supreme* quality of everything they dispense.

Results of
scientific
research

To supply medicaments characterised by purity, accuracy, uniformity and reliability has been the firm's policy from

* Research pioneered by Burroughs Wellcome & Co. many years ago is still continued in their works by a highly-qualified staff. The Wellcome Chemical Research Laboratories, King Street, London (Eng.), and the Wellcome Physiological Research Laboratories, Brockwell Hall, Herne Hill, London (Eng.), are Institutions conducted separately and distinctly from the business of Burroughs Wellcome & Co., and are under separate and distinct direction, although in these two Institutions a large amount of important scientific work is carried out for the firm.



PORTION OF FRONTAGE
BURROUGHS WELLCOME & CO.'S CHIEF OFFICES, LONDON
Corner of Holborn Viaduct and Snow Hill
facing Holborn Viaduct Station

its earliest days. This has been achieved by devising new appliances, by employing only the most scientific methods, and by conducting the various stages of manufacture under the direct supervision and control of specially-trained and qualified pharmacists and other experts. High appreciation has been accorded by physicians and pharmacists throughout the world to the "WEAPONS OF PRECISION" created by the firm. Untiring, strenuous endeavour and vast expenditure have been required to attain these successful results.

"Weapons of Precision"

WORKING IMPERIALLY

Mr. Joseph Chamberlain has taught the nation to think Imperially—Burroughs Wellcome & Co. work Imperially. It has been the special ambition of this firm to win back to England by actual merit some of the lost industries snatched away from the country in recent years by alert, enterprising rivals of other lands, who wisely and well apply science to their industries, and slumber not. B. W. & Co., never content with the time-honoured "rule of thumb" methods, have in a considerable measure gratified their ambition. Particularly in the production of Fine Medicinal Chemicals including the powerful alkaloids, glucosides and other active principles now so largely replacing the use of bulky and nauseous crude natural drugs, thus securing greater certainty and uniformity of potency.

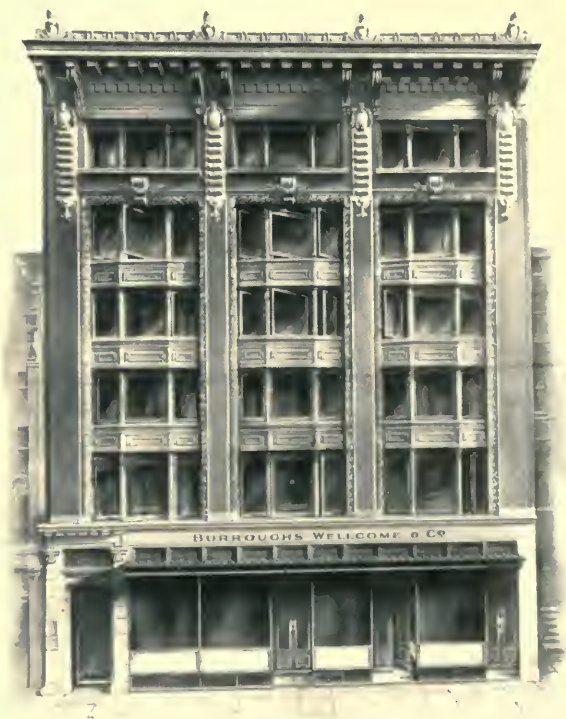
Bringing back to England lost industries

In this work it has been the aim not only to equal but to surpass foreign production, and the results speak for themselves.

PIONEERS IN NEW DRUGS

The firm has pioneered the introduction of many new and valuable natural drugs, notable amongst which may be mentioned Strophanthus, or Kombé, the powerful African arrow poison which has proved so efficacious in certain heart disorders. Science and enterprise have in this instance

"Turned a deadly enemy into a valued friend."



United States of America:
BURROUGHS WELLCOME & CO.'S
Offices and Exhibition Rooms
35, 37 & 39, West Thirty-third Street (near Fifth Avenue)
NEW YORK CITY

SIR THOMAS FRASER, of the Edinburgh University, first investigated and demonstrated, in 1885, the properties of Kombé from a comparatively small specimen, and B. W. & Co. immediately took vigorous steps to procure supplies of the drug regardless of expense and immense difficulties.

Pioneers in the introduction of Strophanthus

Emissaries were sent to collect the small reserves of arrow poison from the rude huts of many Central African warriors. In this way a fair quantity was accumulated, but at a cost of more than £20 per pound.

£20 per pound

Thus, the true Strophanthus Kombé was first introduced to England and to the world—B. W. & Co. were first in the field.



These earliest supplies were obtained quite regardless of monetary considerations, and, notwithstanding the great cost, parcels of the drug and its preparations were at once distributed, without charge, to leading physicians throughout the world. By this means the therapeutic properties of strophanthus were confirmed by investigators in various lands.

For more than a year this was the only supply of Strophanthus outside the "Dark Continent," and then B. W. & Co. again secured all that was obtainable, and were the only suppliers for many months. Strophanthus is now one of the approved remedies of the Pharmacopœias. In less than two years the firm was treating several hundred-weights of strophanthus seeds at a time, thus securing perfect uniformity in the activity

Products of B. W. & Co. secure precision of dose



Italy:
BURROUGHS WELLCOME & CO.
26, Via Legnano, MILAN

of the products, and enabling the dosage and action to be controlled with precision.

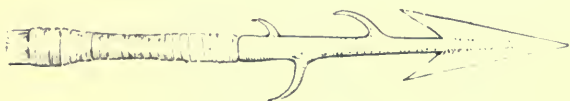


FIG. 1. ARROW WITH STROPHANTHUS.

Amongst those who were interested in the introduction of *Strophanthus* were Sir JOHN KIRK (then of Zanzibar), and Dr. DAVID LIVINGSTONE, who referred to its employment by natives as an arrow poison, in his narrative of his expedition to the Zambesi. It was the intimate association which BURROUGHS WELLCOME & Co. have always had with the pioneers of African exploration which enabled them to be first in placing supplies of the drug at the disposal of the medical profession.



STROPHANTHUS KOMBE, the source of the drug, is a woody climber growing freely in many parts of Eastern Africa. From the seeds the natives prepare a paste with which they poison their arrows.

The source



Australia:
BURROUGHS WELLCOME & CO.
441 Kent Street, SYDNEY, N. S. W.

The seeds are contained in follicles, and each bears a beautiful plume-like appendage springing from a delicate stalk. Each seed weighs about half a grain.

PIONEERS IN PHARMACOLOGICAL WORK ON ANIMAL SUBSTANCES

When renewed attention was drawn to the therapeutic action of certain animal substances, this firm pioneered the pharmacological work on the various glands. Having already been long engaged upon researches on brain matter and other substances of animal origin, they were first to produce a stable and reliable product of the thyroid gland, and this remains the standard and accepted preparation amongst the medical profession throughout the world.

Although the principle suggesting and guiding this modern departure in therapeutics is the outcome of recent physiological research, the belief in the use of organs or tissues for the relief of human suffering, or for the production of certain physical conditions, is known to have existed from the earliest times.

Antient belief

The belief in the utility and value of animal glands and tissues in the cure of disease is not altogether the outcome of modern research, for we learn from Herodotus, fifth century B. C., that in his day, the people called Budini or Geloni "used the testicles of otters, beavers and other square-faced animals for diseases of the womb." From prehistoric times savage peoples have eaten the hearts of lions, tigers and other courageous animals, and even of human enemies, with the object of acquiring added valour in battle.

Among old-world medicines, compounds of the organs and tissues and excreta of mammals, birds, fishes and insects occupied permanent positions of prominence. They were included in the London Pharmacopœia issued by the Royal College of Physicians in 1676, and in Salomon's New London Dispensatory of 1684. The present increasing use of animal substances may be largely traced to the researches and enthusiastic advocacy

The use of animal substances



South Africa:
BURROUGHS WELLCOME & CO.
5, Loop Street, CAPE TOWN

of Brown-Séquard, though it must be admitted that such advocacy was exaggerated, and perhaps lacked dignity and reserve. In spite of his attitude, which experience has not justified, he, in some considerable measure, succeeded in establishing his contention that all glands, with or without excretory ducts, give to the blood, by internal secretion, principles always important and in most cases essential, to the general well-being of the body.

Organo-therapy, animal medication, and glandular therapeutics are among the terms now applied to the administration of organs or tissues or of the internal secretions of glands, in certain diseases, induced, or believed to be induced, by the degeneration, disease, defective development, or removal of the corresponding organs, tissues, or glands. Many diseases, arising from defective functions of particular organs, are now treated with these animal substances, and the principle has been established that the lessened or lost power of an organ may, in some cases, be restored by the administration of corresponding organs taken from healthy lower animals.

Modern
knowledge

The work of Burroughs Wellcome & Co. on these animal substances has been directed not only to the therapeutic but to the chemical and pharmacological side, and the production of active and staple products for the use of the medical profession, and in this they have attained marked success.

Amongst other animal products dealt with was the suprarenal gland, which yielded first to Abel and Crawford a powerful and highly valuable active principle which they named Epinephrine. Other workers produced modified products, but the active principle was first produced in a dry, soluble, active form in the Wellcome Physiological Research Laboratories, and is now issued by the firm under the title 'Hemisine.'

A NEW BLOOD-PRESSURE RAISING PRINCIPLE

More recent researches have led to the discovery at the B. W. & Co. Works Laboratories of a synthetic substance, 'Epinine,' possessing the valuable properties of the

natural active principle of the supra-renal gland and, in addition, showing certain marked advantages in use. Being a synthetic base which combines to form crystalline salts, 'Epinine' can be readily purified, and the rise of blood-pressure produced by it is equal in degree and more prolonged than that due to the supra-renal active principle.

GOOD OR EVIL

Ergot, "the blessed and cursed blight of rye," which has wrought much good and much evil, is now greatly valued as a remedy, yet it destroyed countless lives during the grain plagues, called St. Anthony's fire, in the middle ages.

Ergot of rye for many years presented a problem which baffled scientific workers. It has been investigated in these same laboratories, and the true representative active principle has been discovered, and is now issued as a standardised product, 'Ernutin,' of great power and uniform activity, of immense importance to the medical profession.

THERAPEUTIC SERA

The Wellcome Physiological Research Laboratories were pioneers in the production of Anti-diphtheritic Serum in the British Empire, and also supplied the first used in the United States of America. During the early days, and until the real value was conclusively demonstrated, all offers to purchase supplies of the serum were refused, but all that could be produced was freely placed without charge at the disposal of the principal clinics, hospitals and private medical men who had diphtheritic cases under treatment. These trials proved successful, and the 'Wellcome' brand of serum, supplied by Burroughs Wellcome & Co., has continued to hold first place throughout the world. These laboratories have done a vast amount of original work in the whole range of therapeutic sera—and in vaccines, etc., and in many other organic bodies of importance in medicine.

Though these Physiological Research Laboratories are conducted under separate and distinct direction, and many

Ergot blessed
and cursed

At first for
clinical tests

of the researches are solely of scientific interest as contributions to human knowledge, yet much work of practical value is carried out for the firm, the Principal of which founded the laboratories.

FINE CHEMICALS

The Wellcome Chemical Research Laboratories have worked in the same manner, with benefit to science and to the firm, devising new chemical processes and producing new chemical agents, both organic and inorganic. The investigation of vegetable drugs and their representative principles have yielded highly important results, both in the discovery of new principles and in raising the standard of purity and potency of valuable well-known substances, notably Pilocarpine, Aconitine, etc., etc. The co-operation of these two research laboratories, with their efficient scientific staffs working under the guidance of the two highly-qualified Directors, distinguished for thoroughness and accuracy, is of immense importance to the firm.

Raising the
standard

But the research work does not rest here. There is also in the experimental and analytical laboratories at the firm's works, a highly-skilled staff constantly engaged in research for the discovery of new active chemical and pharmaceutical substances, and for the improvement of those already known.

Amongst the notable discoveries are 'SOAMIN,' the new substance which has proved so successful in the treatment of Syphilis, and of the dread Sleeping Sickness so prevalent among the population of the Congo, Uganda and other parts of Central Africa, also 'NIZIN,' the new antiseptic, powerful, but free from many of the dangers of other antiseptics.

A large number of other important developments in chemistry and pharmacy have been made in the Works Laboratories, including the production of Chloroform of a standard that secures greatly increased uniformity and safety, and the confidence of the medical profession.

A reliable
chloroform

In the manufacturing departments every operation is studied with the view to new discoveries and improvements, and aiming to make daily progress.

EQUIPMENTS

Completely fitted cases have been devised to meet the requirements of up-to-date medical men and others engaged in medical and sanitary science; for example, hypodermic, ophthalmic cases, urine testing, water analysis, bacteriological testing cases, etc.

Medicine and first-aid chests, cases, belts, etc., for military and naval purposes, for explorers, missionaries, travelling journalists, war correspondents, aeronauts, aviators, motorists, yachtsmen, planters; in fact, equipments for the air, for the earth, for the depths, and for every clime under every condition.

HISTORY OF COMPRESSED DRUGS

Burroughs Wellcome & Co. are successors to, and the sole proprietors of, the business of BROCKEDON, who, in 1842, originated compressed medicines in the shape of bi-convex discs — issued under the designation of "compressed pills." The production of compressed substances has been developed and carried to a high state of perfection by B. W. & Co. This has been accomplished by research and the use of chemicals of exceptional quality, and by the employment of specially-devised machinery of rare accuracy. This exclusive machinery, invented by the firm, and produced at great cost, operates with the precision of the finest watch-work. By its aid the firm's specially-trained expert chemists are enabled to prepare compressed products for issue under the 'Tabloid,' 'Soloid,' and other brands, of unique accuracy of dosage and of a perfection of finish never before attained. These products present medicines, etc., of so varied a character as to represent a range of dosage of $\frac{1}{1000}$ of a grain to 60 grains or more.

The qualities of purity, accuracy, activity and stability which characterise 'Tabloid' and 'Soloid' products have secured unusual appreciation and approval from medical and pharmaceutical experts, and these preparations are prescribed in private practice and in military and civil hospitals in all parts of the world.

Origin of
compressed
products

B.W. & Co.'s
work in
perfecting

World-wide
appreciation

MEDICAL AND FIRST-AID EQUIPMENTS

Burroughs Wellcome & Co. have, from the time of the founding of the business, made a special feature of studying medical and surgical requirements for expeditions to tropic and arctic and other trying climates, especially for the use of explorers, journalists and other travellers; for armies in camp, on the march, and on the battlefield.

Careful and prolonged enquiry and practical experimentation have enabled them to so perfect their equipments for these purposes that almost every military expedition and journalistic pioneering tour of recent years has been fitted out by the firm.

B. W. & Co. GENERAL OFFICES

The firm's chief offices and administrative premises are centrally situated in the City of London, facing Holborn Viaduct Station, and at the junction of Holborn Viaduct and Snow Hill. They are thus within a stone's throw of such historic sights as St. Paul's Cathedral, the Old Bailey (Central Criminal Courts), the Charterhouse, St. Bartholomew's, and Smithfield.

Chief offices

B. W. & Co. EXHIBITION ROOM

A well-equipped Exhibition Room has recently been opened at 54, Wigmore Street, London, W., for the purpose of providing increased facilities for the inspection of medical equipments and other products of the firm. A great variety of 'Tabloid' Medical and First-Aid Equipments suitable for offices, factories, workshops, mines, expeditions, theatres, etc., may here be seen. See page 270.

Exhibition Room

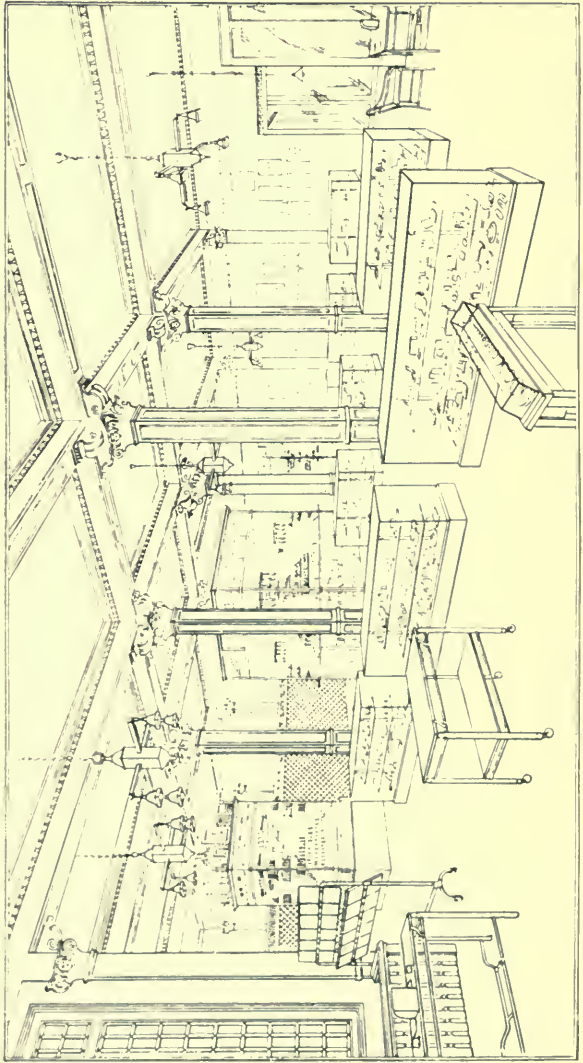
'WELLCOME' CHEMICAL WORKS

The 'Wellcome' Chemical Works (*illustrated on page 254*), which form the principal manufacturing premises of the firm, are situated at Dartford, Kent, near London. On one side, the Works have direct water communication with London and the Docks of the Waterway of the Thames; on the other side they front on to the railway and so are in touch with the metropolis and the Continent.

Works

SEVEN B. W. & Co. ESTABLISHMENTS ABROAD

Burroughs Wellcome & Co. have fully-equipped establishments at New York, Montreal, Sydney, Cape Town, Milan, Shanghai and Buenos Aires. Photographs of the New York, Milan, Sydney and Cape Town Houses appear on pages 258, 260, 262 and 264.



BURROUGHS WILLCOME & CO. EXHIBITION ROOM, 54, WIGMORE STREET, LONDON, W.

MALARIA
AND
QUININE

MALARIA AND QUININE

Malaria is computed to cause an average annual death-rate in India of five per thousand, which, in so densely populated a country, amounts to the alarming total of 1,130,000 persons. Every employer of labour, or master of a household, has a direct financial interest in the diminution of this evil, which at present incapacitates men in all grades of life for a considerable proportion of their whole working time, and thus adds enormously to the cost of upkeep on every estate.

The remedy lies in the habitual use of quinine, both for treatment and prevention. The death-rate, so far from being the whole extent, is only the index to the suffering, inconvenience and loss which malarial fevers inflict. Between a quarter and a half of all the cases of sickness in hot countries are malarious in origin, and a very large number of residents are prevented at one period or another every year from carrying on their ordinary pursuits. The whole nation is the loser.

Although not directly the most fatal, malaria is undoubtedly, from an economic standpoint, the most injurious of all human diseases.

Malaria

It is not surprising, therefore, that malarial fevers have become, during recent times, the objects of the closest and most careful study.

The extreme importance of quinine in tropical countries is well enforced by the following striking statement by one of the greatest living authorities on malaria. Speaking of the long struggle between the invading parasites of disease and the natural forces of the body in a non-immune and non-treated case, he says: "The case may be cut short at any time by death, spontaneous recovery, or quinine."

The researches of Celli, Laveran, Ross, Grassi and other distinguished scientists have clearly demonstrated that malarial infection is due to certain animal parasites of the genus *plasmodia* belonging to the sporozoa group. These parasites are conveyed to man by the agency of mosquitoes, and, although Europeans appear to be more susceptible to the infection than others, it has been proved that no race of mankind is immune to these

The method
of
infection

attacks. Families and individuals here and there appear to be endowed with natural immunity, but they are comparatively rare.

A natural immunity is also acquired by persons of long residence in malaria-infested districts, if they survive the debilitating influences of successive attacks, but the risks and suffering incurred constitute a sufficient drawback to this method of escape.

Two practical measures remain for dealing with malaria: first, the absolute avoidance of mosquito bites, and, second, the use of quinine.

The mosquito (*anopheles*) is most likely to convey the infection at night; it drives its proboscis into the skin of its unconscious human victim, and injects from a few to some thousands of protospores of one or more species of *plasmodia*. Many of these are doubtless killed off, but the survivors enter the blood corpuscles and begin to multiply. After the organisms have developed within the corpuscle the latter bursts, and the free spores invade new corpuscles and undergo similar changes. No inconvenience is felt until something like fifty parasites per cubic millimetre of blood are present, when fever commences. At the same time, the forces of resistance available, varying in different individuals, are called up; germicidal and antitoxic substances are formed in the blood, which tend to diminish the number of the parasites and lessen their effect upon the body.

Parasites
carried
by
mosquitoes

The subsequent history of the attack is that of a constant struggle, swaying now to one side and now to that, between successive incubations of parasites and the growing forces of immunisation in the blood.

The relapses which occur indicate that so long as any of the hostile animalcula remain in the blood there is always the possibility of their multiplying and again reaching the fever limit.

The devices evolved to avoid these uncomfortable and sometimes disastrous results, by destroying the mosquitoes or by using suitable netting to keep them away, are excellent, and, within certain limits, may be successful but it is

Means
of
escape

obvious that they do not at the present time furnish efficient protection from infection.

No one can spend his whole life under a mosquito net, and, although much useful work has been done in various parts of the world, by drainage, the use of oil on standing water, etc., to diminish the mosquito pest, these efforts are purely local and are liable to be counteracted from time to time by the amazing fecundity of these insects.

Quinine exerts its beneficial action by directly destroying the malarial *plasmodia*. Laveran has shown that a solution of 1 in 10,000 is sufficient to kill them. Romanowsky and Mannaberg found that in patients who had been taking quinine the nuclei of the parasites underwent degenerate changes, and that many spores within the sporocysts were dead. In this remarkable alkaloid of cinchona bark has been discovered an antiseptic and germicide powerful enough to destroy the invading parasite of malarial disease, yet without toxic effect upon the human organism.

The scientific demonstration of its extraordinary value has confirmed the experience of nearly three hundred years in its practical use. Its unique utility in the curative treatment of malaria, kala-azar, blackwater fever, etc., is widely recognised, but it is not so generally appreciated that a judicious use of quinine is an efficient preventive against malarial infection. And yet this is a point of supreme importance, especially to those whose rank and administrative position surrounds them with many servants and subordinates whose efficiency depends upon their health being maintained.

In all countries where malaria is most dreaded, quinine has been successful in warding off the disease, while in those cases in which malaria has appeared after prophylactic treatment, there is reason to believe that the attacks have been much less severe than would have been the case without the previous use of quinine. Small doses are given for preventive purposes, but the point of primary importance is that they must be taken systematically. As has been said in a Government report: "Take quinine systematically, and one is absolutely malaria-proof."

Scientific
tests

Success
as a
preventive

In one province of India, regular prophylactic administration of quinine to all prisoners in the jails has been carried out very thoroughly. The result is strikingly seen on comparing the rate of incidence of malaria among the jail population protected by quinine, with that for the same period among the free population not protected by quinine. The figures (a) refer to the whole province, (b) and (c) to particular areas :

Striking
results

MALARIA RATE

Among quinine-protected jail population	Among free population not protected by quinine
(a) 10 per cent.	90 per cent.
(b) 1 ..	33 ..
(c) 3·84 ..	85-88 ..

The economic importance of such results wherever large numbers of people are employed is obvious : their average working strength will be greatly enhanced by warding off attacks of malaria. And, from the point of view of the employer or the master of a large household, there is another consideration. The regular administration of quinine to every servant who comes within a short distance of the house is one of the most useful measures of protection for those within the house itself. The anophelines who carry the infection are weak, short-lived insects. They do not travel far from the pools which are their breeding-places. If they bite no malarious individual in the course of their wanderings they have no opportunity of conveying the disease to another.

As to which particular salt of quinine gives the best results, there is no general agreement among authorities. All are in accord as to the necessity for using only preparations of great purity and of high alkaloidal value. In the keen competition to produce quinine at low prices, the importance of this point is sometimes overlooked, with the result that preparations are put on the market containing undesirable alkaloids and impurities.

The products of Burroughs Wellcome & Co. are reliable highly-standardised quinine preparations, well-known for their purity and potency. In their production the utmost

Pure
and potent
preparations

care is taken to eliminate everything which might be detrimental to their therapeutic effect. Being pure and uniform in composition, they are uniform also in activity and effect, while their solubility and ready assimilability are other noteworthy features. Their use is not followed by disagreeable after-effects. In keeping-qualities the B. W. & Co. products are unrivalled.

An interesting discussion has recently been carried on in a leading organ of public opinion in Calcutta with regard to the quality of drugs and chemicals which are offered for sale in the bazaars.

Danger of
adulteration

It is alleged that gross adulteration is being practised, and chemists of long experience and high reputation confirm that unscrupulous firms are shipping to India very large quantities of drugs, the sale of which in England, Germany, France or the United States of America (or any country where a food and drugs act is in force) would expose the vendors to prosecution.

So-called one ounce bottles of quinine are imported containing only 390 instead of $437\frac{1}{2}$ grains.

Another report states "short-weight, mis-description, imitation of labels and packing, and adulteration to a most astonishing extent are used to reduce cost and secure business."

Under these circumstances, the only pathway of safety is to insist upon chemicals of known purity, the high standard of which is guaranteed by the trade mark.

This is specially important with regard to quinine, since it is so easily adulterated by other cinchona alkaloids of very similar appearance and physical characteristics, but possessing febrifuge properties greatly inferior to the true quinine.

THE 'TABLOID' BRAND QUININE PRODUCTS

[B. W. & Co.]

The various 'Tabloid' Brand preparations of quinine present the drug in what is, undoubtedly, the most desirable form for general use. 'Tabloid' products are easy to take, and they do away entirely with the objections which so

generally attach to quinine on account of its taste. Each contains an accurate dose of medicament, so that all trouble and inconvenience of weighing and measuring are rendered unnecessary, while, in addition, the ease with which the 'Tabloid' products may be carried about in the pocket or bag ensures the taking of regular doses in all circumstances.

Ideal quinine products

'Tabloid' Brand Quinine preparations contain only ingredients of the utmost purity and medicinal activity, and can always be relied on to produce the best possible results. Their therapeutic value is in no way affected by any climatic conditions.

'TABLOID' BRAND QUININE BISULPHATE
B. W. & Co.

'Tabloid' Quinine Bisulphate is a particularly useful preparation on account of its being readily soluble, and therefore easily absorbed a highly necessary quality in such conditions as malaria, where the digestive disturbance is considerable. It is also very stable, and does not lose its activity or solubility on keeping, or in unfavourable climates.

Soluble and easily absorbed

As a preventive against malaria, etc., or as a tonic and bitter stomachic, two grains are usually given twice or three daily. For the treatment of malarial conditions, much larger doses are used, as much as from twenty to sixty grains having been given in extreme cases, though the usual anti-periodic dose may be put at ten grains. When large doses are employed the bowels must be kept open. In ordinary chills, influenza and fevers, four grains are prescribed three or four times a day.

'Tabloid' Quinine Bisulphate, *sugar-coated*, is particularly easy of administration, and many people who cannot tolerate quinine in any other form, take it without trouble.



For dispensing purposes, on estates, etc., 'Tabloid' products are supplied in containers of 500 at special rates.

'Tabloid' Quinine Bisulphate is issued in seven strengths : gr. $\frac{1}{2}$, gr. 1, gr. 2, gr. 3, gr. 4, gr. 5, *plain or sugar-coated* ; and gr. 10, *plain only*.

Supplied in bottles of 25 and 100, except gr. $\frac{1}{2}$ and gr 1, which are in bottles of 50 and 100, and of 36 and 100 respectively.

TRADE MARK 'TABLOID' BRAND

QUININE HYDROCHLORIDE [B. W. & Co.]

This is an extremely soluble product of high alkaloidal value, which is stated to be preferable to other quinine salts in cases of blackwater fever and in regions where blackwater fever is prevalent. It is also valuable in those cases where large doses of quinine are not well borne. In the treatment of malaria, three to four 'Tabloid' products, of the greatest strengths, should be administered, followed by smaller quantities regularly. As a tonic and stomachic, small doses only are given.



Reduced to size.

For dispensing purposes, on estates, etc., 'Tabloid' products are supplied in containers of 500 at special rates.

'Tabloid' Brand Quinine Hydrochloride is issued in five strengths : gr. 1, gr. 2, gr. 3, gr. 4 and gr. 5, *plain or sugar-coated*.

Supplied in bottles of 25 and 100

TRADE MARK 'TABLOID' BRAND

QUININE HYDROBROMIDE [B. W. & Co.]

This product is largely prescribed by physicians for patients who are liable to suffer from the disagreeable effects which sometimes follow the use of other salts of quinine. It has the advantage of being very soluble and is readily absorbed.

'Tabloid' Quinine Hydrobromide is issued in five strengths : gr. 1, gr. 2, gr. 3, gr. 4 and gr. 5, *plain or sugar-coated*.

Supplied in bottles of 25 and 100

In
blackwater
fever

Well
tolerated

TRADE MARK 'TABLOID' BRAND QUININE SULPHATE
[B. W. & Co.]

Quinine Sulphate, which formerly was the salt most commonly used, has still adherents. For these, 'Tabloid' Quinine Sulphate is the ideal preparation. It is greatly superior to the powder in being easy and pleasant to take, and is quite as readily absorbed, since it disintegrates immediately. Its compactness leads to a great saving in space, and allows of a supply being carried, the bulk of which, in the ordinary form of crystals, would present difficulties.

Easy and pleasant to take

'Tabloid' Quinine Sulphate is issued in five strengths: gr. 1, gr. 2, gr. 3, gr. 4 and gr. 5, *plain only*.

Supplied in bottles of 25 and 100, except gr. 1, which is supplied in bottles of 36 and 100.

For dispensing purposes, on estates, etc., 'Tabloid' products are supplied in containers of 500 at special rates.

TRADE MARK 'TABLOID' BRAND QUININE COMPOUND
[B. W. & Co.]

'Tabloid' Quinine Compound is a valuable preparation combining the specific action of quinine with analgesic, expectorant, stimulant and tonic laxative properties. By its administration the normal action of the bowel is regulated and maintained, thus assisting in the elimination of toxic materials.

Anti-malarial stimulant and tonic laxative

Supplied, plain only, in bottles of 25 and 100

'TABLOID' BRAND
QUININE AND RHUBARB COMPOUND
B. W. & Co

(Well known for many years as 'TABLOID' LIVINGSTONE ROUSER)

This product is specially adapted for use in tropical countries. It combines purgative with tonic, stomachic and anti-periodic properties, and in the treatment of malaria is stated to be of marked value. When an attack of malarial fever threatens, one to three 'Tabloid' products should be taken with a little water; the dose may be repeated in two hours if necessary.

Purgative tonic, anti-periodic

Supplied, plain only, in bottles of 25 and 100

For dispensing purposes, on estates, etc., 'Tabloid' products are supplied in containers of 500 at special rates.

'Tabloid' Brand Quinine preparations are obtainable from the leading wholesale and retail chemists.

TRADE MARK 'WELLCOME' BRAND QUININE PREPARATIONS

In order that those who prefer to use quinine in the form of powders or fluid mixtures may be able to do so with full assurance that the materials they employ are of the same high standard as 'Tabloid' products, a series of quinine preparations is supplied under the trade mark 'Wellcome.' These 'Wellcome' Brand products are prepared under the direction of highly skilled experts, by the most perfect processes and with the aid of the latest and most accurate appliances and are submitted, before issue, to a series of tests, unique in their stringency.

Highly
standardised
preparations

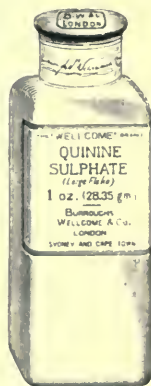
TRADE MARK 'WELLCOME' BRAND QUININE SULPHATE

This preparation is typical of the 'Wellcome' Brand products. It presents the drug in an exceptionally pure state, the standards of purity to which it is required to conform being higher than that demanded by the official tests of the British and U.S.A. Pharmacopœias. It is issued in two forms, "large flake" and "compact crystals." The "large flake" is the ordinary form of bulky feathery crystals, which in the 'Wellcome' Brand products are unusually large and white. The "compact crystals" are identical in composition with the large flakes, but occupy only about one-third of the space, and have much, therefore, to recommend them from the point of view of convenience in storage.

'Wellcome' Brand Quinine Sulphate is issued as follows: "Large Flake," in $\frac{1}{4}$ oz., $\frac{1}{2}$ oz. and 1 oz. bottles, and in 4 oz., 25 oz. and 100 oz. tins; "Compact Crystals," in 1 oz. and 4 oz. bottles, and in 25 oz. and 100 oz. tins.

When ordering 'Wellcome' Quinine Sulphate, please indicate whether "compact" or "large flake" is required.

'Wellcome' Brand Quinine Preparations are obtainable from the leading wholesale and retail chemists.



Wellcome's
Quinine Sulphate
(Large Flake)
1 oz. (28.35 gm.)
BURROUGHS
WELLCOME & CO.
LONDON
SYDNEY AND CAPE TOWN

'TABLOID' BRAND FIRST-AID

FOR

Automobilists, Aviators, Yachtsmen, Sportsmen, Travellers,
Tourists, Boy Scouts, and residents in out-of-the-way districts.

Compact outfits of bandages and first-aid accessories, etc., suitable for use in emergencies when travelling, or at home, especially where medical aid is not immediately available.

NO. 707. 'TABLOID' FIRST-AID

Contains 'Tabloid' Bandages and Dressings, 'Vaporole' Aromatic Ammonia, for use as "Smelling Salts," 'Borofax,' Carron oil (solidified) and jaconet, castor oil, plaster, protective skin, scissors, pins, etc., and seven tubes of 'Tabloid' and 'Soloid' Brand products.

In Rex Red *as illustrated*, Royal Blue or Brewster Green Enamelled Metal, or in Aluminised Metal.



NO. 715. 'TABLOID' FIRST-AID

Contains 'Tabloid' Bandages and Dressings, 'Vaporole' Aromatic Ammonia, for use as "Smelling Salts," 'Borofax,' sal volatile, Carron oil (solidified), jaconet, plaster, protective skin, scissors, pins, etc., and eight tubes of 'Tabloid' and 'Soloid' Brand products.



In Rex Red, Royal Blue *as illustrated*, or Brewster Green Enamelled Metal, or in Aluminised or Black Japaned Metal.

NO. 708. 'TABLOID' FIRST-AID (FOR NURSES)

Contains 'Tabloid' Bandages and Dressings, 'Vaporole' Aromatic Ammonia, for use as "Smelling Salts," 'Borofax,' Carron oil (solidified), jaconet, plaster, protective skin, camel-hair brush and safety pins; also a supply of 'Tabloid' Ammonium Carbonate, for use in place of "sal volatile," and a tube of 'Soloid' antiseptic products.



Measurements $9\frac{1}{2} \times 4 \times 11$.

In Rex Red, Royal Blue or Brewster Green (*as illustrated*) Enamelled Metal, or in Aluminised Metal. Webbing-strap for attachment to waist-belt at a small extra charge.

NO. 709. 'TABLOID' FIRST-AID (FOR BOY SCOUTS)



Measurements $9\frac{1}{2} \times 4 \times 11$.

Contains 'Tabloid' Bandages and Dressings, 'Vaporole' Aromatic Ammonia, for use as "Smelling Salts," 'Borofax,' Carron oil (solidified), jaconet, plaster, protective skin, camel-hair brush, pins, etc.

In Rex Red or Royal Blue (*as illustrated*) Enamelled Metal.

Belt or Cycle attachment (*as illustrated*) may be obtained at a small extra charge.

NO. 730. 'TABLOID' FIRST-AID

Has been designed to meet the need for an efficient first-aid equipment in large buildings such as theatres, clubs, assembly rooms, schools, university halls, also for business offices and all places where many persons are domiciled or employed.

It is intended to be fixed against the wall about five feet from the ground, and is provided with two keys, one of which may be left in charge of the steward, caretaker or other official. The other key hangs at the side of the case, enclosed under a small piece of glass which may be broken in case of emergency.

No. 730 'Tabloid' First-Aid contains 'Tabloid' Bandages and Dressings, 'Hazeline' Brand 'Witch-Hazel' 'Hazeline' Cream, 'Hazeline' Snow, 'Biofax' Camellion-oil, 'Vaporole' Aromatic Ammonia, for use as "Smelling Salts," dressing forceps, scissors, camel-hair brushes, plaster, etc., also eight phials of 'Tabloid' medicaments and two tubes of 'Solid' antiseptic products.



NO. 710. 'TABLOID' FIRST-AID

This first-aid outfit is very little larger than a cigarette case, and can easily be carried about in the pocket in constant readiness for emergencies. It contains a 'Tabloid' Bandage, 'Tabloid' Dressings, 'Vaporole' Aromatic Ammonia, for use as "Smelling Salts," 'Borofax,' Carron oil (solidified), camel-hair brush, plaster, etc.

In Scarlet Enamelled Metal (*as illustrated*).



Measurements $4 \times 4 \times \frac{1}{16}$ in.

NO. 905. 'TABLOID' PHOTOGRAPHIC OUTFIT



Measurements $4 \times 4 \times \frac{1}{16}$ in.

A complete outfit of 'Tabloid' Photographic Chemicals for developing, sepia toning, intensifying, reducing, gold toning, fixing, etc.

Fresh, reliable solutions without weighing or waste.

In Rex Red, Royal Blue, Imperial Green or Bright Scarlet Enamelled Metal (*as illustrated*), or in Black Japanned Metal.

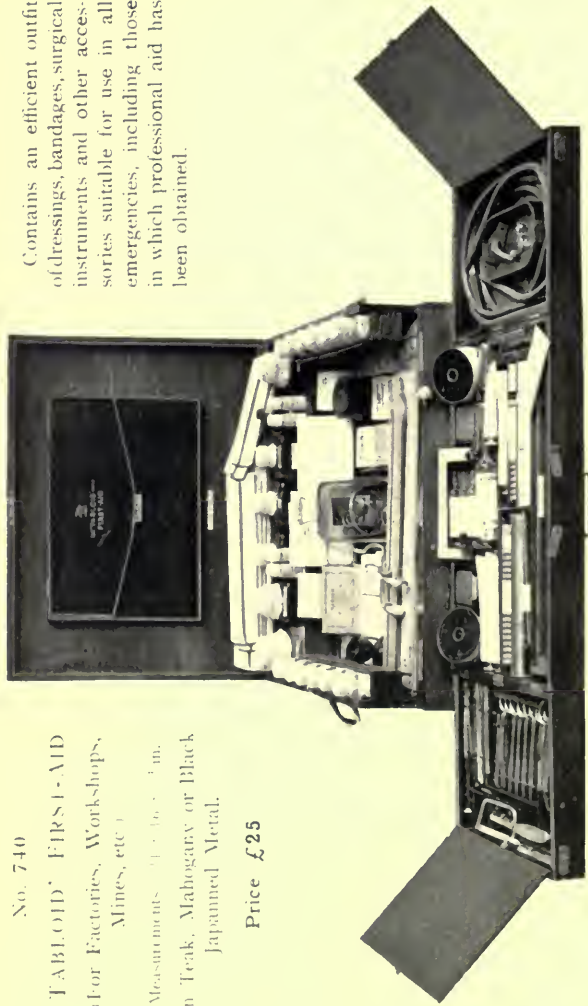
No. 740

'TABLET' FIRST-AID
for Factories, Workshops,
Mines, etc.

Measurements 10 1/2 by 13 in.
In Teak, Mahogany or Black
Japanned Metal.

Price £25

Contains an efficient outfit of dressings, bandages, surgical instruments and other accessories suitable for use in all emergencies, including those in which professional aid has been obtained.



'TABLOID' BRAND MEDICINE CASE

(As suggested by SIR W. MOORE)



Measurements: $10\frac{3}{4} \times 7\frac{1}{2} \times 3$ in.

Contains fifteen 1-oz. corked phials and one 4-oz. corked bottle; minor surgical instruments and dressings. Fitted with 'Tabloid' Brand products, etc., as recommended in SIR W. MOORE'S *Manual of Family Medicine for India*.

In Black Japanned Metal	...	...	...	Approximate price in London
With modified fittings	...	...	...	£3 17 6
				£3 10 0

Specially adapted for use in India and the Tropics. When fitted with a thick felt cover, this case forms a very admirable motor car case.

SOME HISTORIC FLIGHTS

BY

AIRSHIP AND AEROPLANE

The charm of rapid movement through the air, on the earth, or above it, exercises an irresistible fascination, and gains more votaries daily for aviation and for motoring.

It is impossible to eliminate entirely all risk of injury from these attractive sports, and, unfortunately, accidents occasionally befall even the most careful and experienced.

The most famous aeronauts of recent times, including those whose flights are here recorded, have carried with them 'Tabloid' First-Aid as their sole medical equipments on their voyages through the air.

'Tabloid' Equipments have been specially designed to provide within the least possible space, what is necessary for rendering first-aid in cases of accident or injury, and have been carried on air voyages by such distinguished aeronauts as M. "Beaumont," M. Védrières, M. Paulhan, Mr. Grahame-White, etc., and on the Clément-Bayard II., the "Willows," and other famous airships. So that no one need be deterred from carrying a first-aid equipment by its bulk, an outfit (No. 700) has been specially designed, the size of which has been limited to that of an ordinary cigarette case.



It contains one bandage, 3 yards by 2½ inches, one small package containing pins and compressed boric gauze, a metal box containing strapping plaster in detached pieces mounted on tape, so that it can be used without scissors, safety pins and 'Vaporole' Aromatic Ammonia, for use as "smelling salts."

A tube of Carron oil (solidified), for use in case of burns or scalds is also included; a packet of jaconet, some of which may be placed over the oil, and forms an impervious covering, protecting the injured part from the air; and a little booklet of court plaster cut into convenient-sized strips.

The case is made of aluminium, light yet rigid, with a fluted surface and a steel spring catch. It can be carried in the pocket under all circumstances without the slightest



OPEN
 Tabloid Brand First-Aid No. 706. Measurements $\frac{1}{2} \times \frac{3}{4} \times \frac{1}{4}$ in.
 Weight 4.25 grs.

inconvenience, and forms a real safeguard against the complications which may arise out of a neglected wound.

The preparation of a complete 'Tabloid' First-Aid outfit of such small dimensions has been rendered possible by the use of the 'Tabloid' pleated compressed bandages and dressings originated by Burroughs Wellcome & Co. A small quantity of gauze or lint can be removed from one of the packages, when required, without disturbing the bulk, and the remainder retained, free from contamination by dust or dirt, for future use.

Among the Grand Prizes awarded to Burroughs Wellcome & Co. by the International Jury of the Franco-British Exhibition, one was presented specially for Medical and First-Aid Equipments.



"BEAUMONT"

Naval-Lieut. Jean de Conneau, better known under the *nom de vol* of "Andre Beaumont," learned to fly a Blériot monoplane in December, 1910, and won on this type of machine the European Circuit Race, covering the whole distance in 58 hrs., 38 min., and also the *Daily Mail* £10,000 prize for the circuit of Britain, finishing first in 27 hrs., 28 min., 48 sec. During his flights he carries "Tabloid" First Aid No. 706, which he is seen to be examining in the above photograph, and concerning which he reports:

"Grâce à sa légèreté et son format la petite boîte "Tabloid" First-Aid se recommande spécialement aux aviateurs."

Brooklands, le 21 Juillet 1911."



PAULHAN ON HIS FLIGHT TO MANCHESTER

M. Paulhan won the first *Daily Mail* £10,000 prize in 1910, for a flight from London to Manchester. Inset is a photograph of the aviator, and the No. 706 First-Aid which he carried during his flight, and concerning which he reports:—

“Je profite de cette occasion pour vous exprimer le plaisir que j'ai eu de porter avec moi durant le vol que j'ai fait de Londres a Manchester une trousse Premiers-Secours 'Tabloid.'”

M. Paulhan



CLARENCE GRAHAM WHITE

Mr. C. Clarence White made a plucky attempt to win the first *Daily Mail* £10,000 prize, for a flight from London to Manchester, in 1910. He won the Gordon-Bennet Cup for England, at the great aviation meeting at Belmont Park, New York, in the same year, on a Bleriot monoplane which is shown in the photograph on the right, with First Aid equipment attached. He reports on these "Tabloid" equipments as follows:

"DUP STEEL. You will be interested to know that I first made the acquaintance of your "Tabloid" First-Aid Cases by carrying one of the small aluminum pocket equipments (No. 706) on my flight from London to Manchester last April. I found it so well adapted for the requirements of aviators that I have never been without this case, or one of your other models, on subsequent flights, and I consider no aviator should be without one."

Yours faithfully,





JULES VÉDRINES

M. J. Védrines, a Frenchman who has attained front rank in the aviation world, won the Paris-Madrid race in 1911, and holds a record of speed for crossing the English Channel (European Circuit) in 30 minutes. He competed in the *Daily Mail* £10,000 Air Race in 1911, and completed the 1,010 miles flight round Great Britain, in 23 hrs., 38 min., 5 sec. He flies a Morane-Borel monoplane, and carries a 'Tabloid' First-Aid. The photograph shows the aviator handling his 'Tabloid' pocket outfit, concerning which he reports:—

"Je considère votre Premier-Secours 'Tabloid' comme très utile. Son peu de volume en fait un modèle d'une extrême commodité."



LIEUT. H. F. WATKINS, R.F.

with the Vickers Monoplane, fitted with "Tabloid" First Aid for the Mawson Antarctic Expedition. Lieut. Watkins reports as follows on "Tabloid" First Aid:

"Fortunately for myself I have had no occasion to use the small 'Tabloid' First Aid you so kindly sent me, but a great friend of mine, Dr. Pointer, R.N., who has been in aviation for many years, had a bad fall on his monoplane and was badly cut in many places. Your small outfit came in most handy.

"I consider that the 'Tabloid' Equipment that you sent me for the Vickers Monoplane is quite the most useful thing one could desire."



CHARLES WEYMANN

Mr. C. Weymann accomplished a flight of 231 miles, carrying a passenger, from Buc to Clermont Ferrand, in 6 hours, with three stops, on September 7, 1910. In 1911 he won the Gordon-Bennett Cup for America, at Eastchurch, Isle of Sheppy, using a Nieuport monoplane. He is shown in the above photograph holding a No. 706 'Tabloid' First-Aid in his hand.



Mr. S. F. Cody, an American who has become a British Citizen, and has done important work for the War Office, uses aeroplanes of his own design. He has made numerous successful flights, and was the winner of the British Michelin Cup in 1910. His was the only biplane and the only All-British machine that finished the 1010 miles circuit of Great Britain, 1911. He carries 'Tabloid' First-Aid as his

medical equipment. Mr. Cody reports as follows:

"The 'Tabloid' First-Aid Case has always been in its place on my machine and I have found the contents of inestimable value on numerous occasions. I consider it altogether a most excellent idea, enabling one, as it does, to carry in the smallest possible space, remedies with which to meet every emergency."



S. F. CODY

The arrows in the above photographs indicate the position of the 'Tabloid' First-Aid which is fixed on the machine within easy reach of the Aviator.



MAURICE TABUTEAU

M. M. Tabuteau won the French Michelin Cup, 1910, flying 365 miles in 7 hrs., 48 min., 31 sec.; he also holds the duration record of 8 hrs., 35 min., and several other distance and duration records. Originally flying a Maurice Farman Biplane, and more recently a Morane Monoplane, he has lately joined the staff of the British and Colonial Aeroplane Company, at Bristol, and now pilots their machines. In the above photograph he is seen examining the contents of the No. 706 'Tabloid' First-Aid, which he carries on his flights.



HERBERT LATHAM

M. H. Latham has made many successful flights, notably at the Rheims Aviation Meeting, 1909, and at the Blackpool Meeting which followed, when he accomplished a flight against a strong gusty wind, and at the Rheims Meeting, 1910, when he rose to a height of 4,658 feet. He reports as follows:

"Messieurs, Paris, 1. Mai 1911.
 "Je tiens à vous dire combien m'a été utile votre trousse de Premiers Secours 'Eabloud'."

"Elle est si peu volumineuse que je n'hésite jamais à l'emporter en aéroplane, et m'a rendu service plusieurs fois, surtout dans les meetings d'aviation où un pansément rapide est souvent nécessaire."

Bien à vous,



PIERRE PRIER

M. P. Prier is a French airman, who came to England to act as instructor to the Blériot School at Hendon. During the motor show, 1910, he flew over Olympia, and subsequently flew from London to Paris without a stop, using on both occasions a Blériot monoplane. M. Prier has recently joined the staff of the British and Colonial Aeroplane Company at Bristol, and will in future use exclusively that Company's machines. He reports as follows:—

“Messieurs,

“J'ai bien reçu votre lettre du 11 juillet et vous en remercie.

“La trousse que vous m'avez gracieusement fournie m'a servi trois ou quatre fois déjà.

“Elle est cependant encore suffisamment garnie pour un certain temps; j'ai l'intention de la laisser dans la voiture automobile de mes mécaniciens pour le prix du *Daily Mail*.

“Je préférerais donc que vous m'en adressiez une autre pour mettre sur mon appareil; ces trousses 'Tabloid' sont en effet excessivement pratiques.

“Dans l'espoir de vous lire je vous prie d'agréer, Messieurs, mes salutations empressées.”



H. PÉCQUET

M. H. Pécquet commenced his career as an aviator on a Voisin biplane at Hamburg in 1909. He was the first flying man in Buenos Aires, where he took part in the Aviation meeting. He also flew at the Rheims meeting, on which occasion he used a Sanchez-Besa machine. While in India for the Humber Company, he carried the first airmail recognized by the Government of India. He always carries a "Tabloid" First Aid, and reports as follows:

"J'ai toujours emporté avec moi l'équipement Premier Secours 'Tabloid,' et puis vous confirmer qu'il m'a toujours été de très grande utilité aux petits accidents que j'ai eus."

H. Pécquet



E. KEITH-DAVIES

Mr. Keith-Davies was the first man to fly in India, where he has made some admirable flights, winning special distinction at the Allahabad Exhibition. "Tabloid" First-Aid forms part of his equipment for his aerial voyages. Mr. Keith-Davies reports: "I think that no aviator should be without one of these compact cases."

E. Keith-Davies
[Signature]



THE FRONT OF THE AIRSHIP "AMERICA"

Mr. Wellman and five companions started from Atlantic City, October 13, 1901, with the intention of crossing to Europe, but were driven out of their course. After remaining in the air 72 hours, and covering a distance of 1,008 miles, they were rescued by the K.M.S. *Trent*. They carried with them, as their sole medical equipment, a Lablond Medical Chest No. 26, and after their return Mr. Wellman made the following report:

1901-02, WELLMAN & CO.
1236 WEST 41ST ST., NEW YORK.

I DOAK STOPS. We are glad to inform you that your "Lablond" Medical Equipment was the only one carried in the Airship "America" during her 72 hours' flight over the Atlantic Ocean. We had several occasions to use its contents for minor troubles, and found it reliable and wholly satisfactory, which was but repeating the experience I have had with your equipments in my expeditions to the Arctic region.

THE WATLING ASTORIA HOTEL,
NEW YORK, Nov. 9, 1901

Sin eredy yours,

Walter Wellman



A GOOD CATCH

(From a negative by J. F. Moore

Exposure $\frac{1}{250}$ second; developed with 'Tabloid' 'Rytol' Universal Developer

MODERN METHODS IN PHOTOGRAPHY

Every age has had its special predilections and its own favourite vehicle of artistic expression—there has been an age of marble and an age of ivory, an era of huge mural paintings and a time when dainty miniatures were most in vogue. Epic poetry and the writing of voluminous letters delighted the eighteenth century and disappeared in the twentieth. On the other hand, the art of the camera with its brilliant realism and poignant actuality has appealed with irresistible force to the modern spirit and, without ousting any of the older methods of delineation, has become the helper and servant of all. So important is the position in the national life, taken by photography at the commencement of the present reign, that it may be regarded as the characteristic art of the age.

The
characteristic
art of the age

Moreover, its pursuit is no longer hedged about by the difficulties and inconveniences which at first beset it. The wet plate process is practically obsolete, and in its place plates and films of convenient size, and hand-cameras of excellent design, and in endless variety, are now offered to the amateur on every hand.

The method of making chemical solutions has also been reformed, and instead of bulky bottles of liquid for developing, toning, intensifying, etc., it is sufficient to provide oneself with 'Tabloid' Chemicals which occupy a minimum of space, and achieve a maximum of efficiency.

'Tabloid' Photographic Chemicals are pure chemicals compressed into small bulk, but yet more readily soluble than the same chemicals in crystallised form. These products each contain a precise weight, so that the trouble of weighing or measuring is entirely obviated.

Chemical
difficulties
solved

The advantages which 'Tabloid' Chemicals possess in home use are intensified when development and similar operations have to be conducted under trying conditions, such as exist in the tropics. This wonderful compactness is well shown by the coloured illustration. A complete chemical outfit of 'Tabloid' products is comfortably carried in the pocket or wallet without danger of trouble consequent on breakage.

Not only do 'Tabloid' Photographic Chemicals rid development, toning and other processes of all the uncertainties which accompany the use of impure chemicals and stale solutions, but they also remarkably simplify these operations, and impart to them a scientific precision which cannot otherwise be obtained.

All developers and chemicals essential for the practice of photography at home and abroad are issued as 'Tabloid' products, but to meet the special needs of travellers, tourists and amateur photographers who require the utmost condensation and the widest utility in the equipment they carry, Burroughs Wellcome & Co. have issued, as the result of special research and wide experience, a developer which is universal in utility and unique in compactness. This is 'Tabloid' 'RYTOL' Universal Developer. It is so compact that the materials for 88 ounces of solution occupy only the same space as *one* ounce of fluid. It is so universal in application that it will develop plates, films, bromide and gaslight papers as well as lantern slides with equal facility and equal certainty. It makes a bright clear solution even with water which, with ordinary chemicals, becomes cloudy and discoloured. The importance of this to travellers who are forced to use whatever water is available will be readily appreciated.

An ideal
developer

CORRECT EXPOSURE IN ALL LANDS

The photographer who desires to obtain pictures of places which he may never re-visit, of moving objects, or of dramatic scenes of special interest which he may observe in the course of his journeys, must be able to decide on the correct exposure quickly and under all circumstances. To meet this need, Burroughs Wellcome & Co.'s photographic experts have condensed the results of their special study of the question of exposure into a pocket-book known as THE 'WELLCOME' PHOTOGRAPHIC EXPOSURE RECORD AND DIARY, and have combined with their own experience that of travellers in all parts of the globe.

Certainty in
exposure

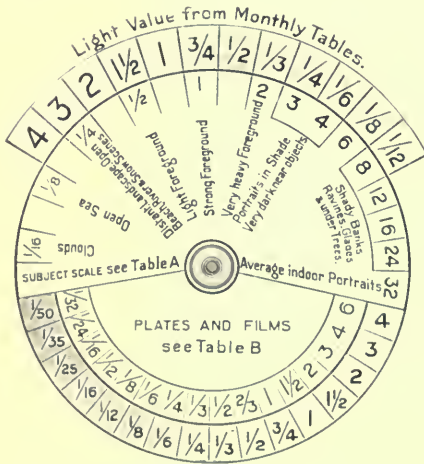
Many methods have been devised for ensuring correct

exposure some requiring complicated calculations, others the use of elaborate tables or special apparatus. The simplest and most certain method is provided by the ingenious mechanical Calculator contained in each copy of THE 'WELLCOME' EXPOSURE RECORD AND DIARY. Its essential feature is a disc, *one* turn of which tells the correct exposure at a glance.

The simple way

The illustration here shown makes its simplicity clear. The central white portion is the revolving disc which registers with the two fixed scales, shown in tint. Facing the Calculator are tables giving light values, so arranged that the table for each month comes to the front in its proper season. The Calculator is set by turning the disc until the subject to be photographed registers with the figure repre-

sents the light value. That *one* turn is all that is necessary. In addition to this providing an easy way of calculating correct exposure, THE 'WELLCOME' EXPOSURE RECORD is a pocket note book and encyclopedia of photographic information. There are three Editions: (1) Southern Hemisphere and Tropics, (2) Northern Hemisphere and Tropics, (3) United States of America. These editions give the information necessary for correct exposure in all parts of the world.



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H.R.H. THE DUKE OF
CONNAUGHT AND
PARTY

At the grave of

CECIL RHODES
Matoppos, Rhodesia,
S. Africa.

By

ERNEST BROOKS

From a negative developed
with

'TABLOID' 'RYTOL'
Universal Developer

(see pages 306-7)



THE RECORDS OF TRAVELLERS

Records of travel and exploration into distant and little known parts of the world constitute a most fascinating department of literature, and one which is especially attractive to British readers. The Empire upon which the sun never sets has been built up by men who have possessed in a remarkable degree the genius of exploration, and a restless and insatiable love of travel runs in the blood of their descendants. Even those Britons who are compelled to stay at home, love to catch an occasional glimpse into some far-off untamed region of the earth's surface, "where foot of man has rarely, if ever, trod," even though it be only in imagination. Books of travel bring before us, vividly, the conditions of life among races widely removed from our own in the line of their development, or lagging behind the stream of human progress like remnants and reminders of primeval man; their pages open up to us a whole world of adventure in which we can track wild beasts in their native haunts, scale lofty mountains and penetrate mysterious caverns and inaccessible deserts.

The charm of
books of
travel

Nothing delights the home-keeping lover of travel more than thus to dive into the unknown in the company of an author who has seen and heard what he describes. Such books as "Through Darkest Africa," "Trans-Himalaya," "Farthest South," etc., etc., which palpitate with actuality and bring before us a new vision of the world as it is, are full of interest and of immense educational value.

Workers in this strenuous field of literary effort have found in Photography a most serviceable ally, and the difficulties which at first enveloped the practice of this art on the march or in out-of-the-way places have, to a great extent, disappeared.

Enhanced
by
photographs

With a modern camera and a good supply of 'Tabloid' Photographic Chemicals, there is hardly any part of the process which cannot be carried out on the very spot where the negative has been exposed.

The Rev. B. M. McOwen, famous for his vivid and picturesque treatment of Chinese domestic scenes, regularly uses 'Tabloid' 'Rytol' Universal Developer.

A well-known New York journalist, Mr. Frank G. Carpenter, who in 1906 travelled through Northern,



THE KING OF BE KWA

One of the Ashanti Chiefs of the Gold Coast Colony sitting under the state umbrella and surrounded by his followers



CHINESE PHOTOGRAPHER

Eastern and Southern Africa, commenting on the 'Tabloid' Photographic Outfit which he had taken with him, wrote: "The Photographic material sent was of the highest quality, and I am forwarding a few

of the photographs among the many we took from time to time."



LONG WAGON CARAVAN IN THE DESERT

Caravan of pack animals in the desert

A characteristic Saharan picture of a string of camels from one of Mr. Carpenter's prints is reproduced on *page* 304.

Among those who have carried 'Tabloid' Photographic Chemicals as part of their travelling equipment for an exploring expedition may be mentioned Sir Sven Hedin, the story of whose intrepid journeys in Tibet is related in "Trans-Himalaya" (*see page* 243).

Sir Sven Hedin
in Tibet

Sir Ernest Shackleton took a complete outfit of 'Tabloid' Photographic Chemicals on his perilous journey into the Antarctic zone (when he got within 97 miles of the South Pole), and pronounced them quite satisfactory.

'Tabloid' Photographic Chemicals were also taken by Capt. Scott on his famous Antarctic voyage in the *Discovery*, and on the *Terra Nova*, in which the same distinguished explorer has again sailed southward in search of the Pole, a very complete outfit of 'Tabloid' Photographic Chemicals has been taken. Mr. H. G. Ponting, the photographer who accompanies Capt. Scott on this latest British Antarctic Expedition, selected as his one developer for all plates, films, bromide prints and lantern slides, 'Tabloid' 'Rytol,' and this developer is also to be used for the very large quantity of cinematograph film which it is intended to develop on the voyage.

Mr. R. L. Jefferson, F.R.G.S., in his book "Through a Continent on Wheels," writes: "I should like to mention that this firm (B. W. & Co.) prepares Photographic Tabloids in a compressed form, and those photographers who desire to develop their plates *en route* cannot do better than adopt their portable and reliable outfits."

Mr. L. N. G. Ward, a traveller whose photographic work is of a high order, uses 'Tabloid' Chemicals. The roll film of a striking picture of his, entitled, "The King of Bekwai," which is reproduced on *page* 304, was developed with 'Tabloid' Pyro-Metol.

'Tabloid
Photographic
Chemicals
in China

The keeping qualities of 'Tabloid' Photographic Chemicals in hot climates have been amply proved by the experience of voyagers to various parts of the world. One

In
Equatorial
Africa

well-known traveller, Lionel Declé, used them to develop no less than 4000 plates during the course of his wanderings across Africa, and, in recounting his experiences and referring particularly to a package of 'Tabloid' Pyro, he wrote: "This bottle has been to Madagascar through a heavy rain season, to Africa also, and to Algeria. The fact that none of the products are discoloured is for me a conclusive proof that your 'Tabloid' Photographic Chemicals are absolutely perfect."

A writer in the *Pall Mall Gazette* (November 5, 1909), in an article entitled "Chasing the Sun," thus describes the advantages of these products.

Convenience
of the new
methods

"A camerist myself, I have often come across—I had almost written 'always come across'—brethren in the art who took bulky cases of developers, fixers and other chemicals, which took up much room in the kit-bag, and which they sometimes could not replace when they were used up. This is one of the drawbacks to Kodaking in out-of-the-way places. All this inconvenience and worry can be saved, since the time-tested, excellent tabloids sold by Burroughs and Wellcome are sufficient for all needs. In a phial that may be carried in the waistcoat pocket, you have sufficient developer to last during an ordinary tour, and in other phials of similar size, fixers and toners. In a small corner of the bag you can stock away sufficient materials to take you around the world, and you may keep on snapshotting all the way.

"Four phials of the firm's excellent pyro tabloids lasted me through the South African War, and, during a siege, I was well provided with chemicals when other men, not so far-seeing, were without them. The new, handsome, little case for home or touring use, packed with all tabloids necessary for negative and print, is one of the best things ever placed on the market."

The visit of H.R.H. the Duke of Connaught to South Africa, in 1910, was worthily recorded, photographically.

In spite of the difficulties presented by constant movement and changes of climate, Mr. Ernest Brooks, the official photographer on the tour, managed to secure an album of views replete with charming scenes and subjects of historic interest.

On his return he gave some interesting particulars as to the methods employed.

Here is his report :

H.M.S. BALMORAL CASTLE

Jan. 6, 1911

DEAR SIRS,

While acting as official photographer to H.R.H. the Duke of Cornwall during his tour in South Africa, I used 'Tabloid' Photographic Chemicals to the exclusion of anything else.

My whole outfit for the development of plates, films and papers, and for toning prints, was comprised in a metal case measuring 9 x 7 x 6 inches.

The only developer I used was 'Tabloid' 'Rytol.' It is the best developer I know, and on this tour alone has yielded me over 500 half-plate negatives of first-class quality.

Although my developing was all done *en route*, 'Tabloid' 'Rytol' Developer enabled me to prepare a fresh active solution in a moment, wherever I might be.

It is wonderful what beautifully graded negatives this developer yields. It gives full details in the shadows, and yet keeps the high lights soft and well modulated even in most difficult subjects. For retaining the full printing value in cloudy skies I know nothing to equal it.

The convenience, portability and keeping qualities of your chemicals are further points in their favour.

Yours faithfully,

Ernest Brooks.

These, among other notes and comments from travellers and photographers in various parts of the British Empire and elsewhere, indicate the growing interest felt in modern methods of photography, and serve to emphasise the reliability of 'Tabloid' Photographic Chemicals under conditions which would render ordinary chemicals useless.

THE

Trade Marks

‘Tabloid’ }
AND } Invented
‘Soloid’ } by
B. W. & Co.

Are
B. W. & Co.

Hall Marks

They *mark* the work of
Burroughs Wellcome & Co.

They *mean* “Issued by
Burroughs Wellcome & Co.”

They *stand* for

24 CARAT products

COLOUR
EFFECTS
BY
STAINING
PHOTOGRAPHS



Stained with
'Soloid' Photographic
Stain (Blue)



Stained with
'Soloid' Photographic
Stain (Red)



Stained with
'Soloid' Photographic
Stain (Yellow)



Stained with
'Soloid' Photographic
Stain (Green)

*For description
of this paper
see page 215*



FIRELIGHT STUDY

COPYRIGHT

By
J. WESTON AND SON
Folkestone

Reproduced from a Bromide print developed with
'TABLOID' 'RYTOL' UNIVERSAL DEVELOPER
and stained with 'Soloid' Photographic Stain (Salmon)

COLOUR EFFECTS
BY
STAINING PHOTOGRAPHS

Many striking and original colour effects may be obtained by immersing lantern slides, bromide, platinotype and similar prints in solutions of suitable dyes. For this purpose, a series of products has been introduced under the title of 'Soloid' Photographic Stains. Portraits, fireside and forge studies may be stained with 'Soloid' Photographic Stain (Red or Salmon), moonlight views and seascapes with a blue 'Soloid' product, street scenes and twilight views with yellow, landscapes with green. The firelight study on the opposite page is a reproduction of a print stained with 'Soloid' Photographic Stain (Salmon). The method of staining is quite simple: Dissolve one 'Soloid' Photographic product in four ounces of water, and having soaked the prints (which should not previously have been hardened) in water until flaccid, immerse them in the staining solution for a few minutes, then rinse and dry in the usual way. The most pleasing effects are produced in the majority of cases by employing solutions of this strength, thus obtaining a suggestion of colour rather than a pronounced tint. For lantern slides where a deeper colour is required, one 'Soloid' Photographic Stain product may be used with *one* ounce of water.



A FIELD OF BELLADONNA (*Atropa belladonna*)

Atropa belladonna is grown from genuine wild seed. The best crops of leaves are obtained in the second, third or fourth year of the plant's growth, and it is at this period that the alkaloidal content is greatest.



LOADING BELLADONNA

The yield ranges from 1.12 to 5 tons per acre. The freshly-cut herb is weighed in bundles and carried straight to the laboratories in a motor trolley. A portion of the leaves is dried in a few hours in specially-ventilated chambers. The roots, which are collected in the autumn, are sliced in order to accelerate the drying, and so prevent any undesirable change taking place.

THE 'WELLCOME' MATERIA MEDICA FARM

THE vital importance of standardisation of drugs has always been recognised by Burroughs Wellcome & Co. Constant attention has been devoted to the subject, and the principle has been applied not merely to the chemical, but also to the vegetable and animal substances required for the preparation of the firm's products. The old method of picking samples of drugs by their colour and appearance has long been felt to be inadequate, and it has become necessary to view them in the more penetrating light of chemical analysis and of physiological tests.

Standardisation

Even the most experienced pharmacognosist may select drugs which, on the basis of form, colour and other physical characteristics, appear to possess a high standard of quality, yet on assay do not yield the requisite percentage of active principles.

In this connection, a paper by Carr and Reynolds, published in the *Chemist and Druggist*, shows in tabular form the very considerable range of variation in the proportion of active principles existing in samples of drugs bought on the market. Amongst the examples given are the following :

Drug	Lowest per- centage	Highest per- centage	Active Principle determined
Belladonna (dried herb)	0.23	1.08	Total alkaloids
Broom tops	0.07	1.06	Sparteine Sulphate
Cinchona Succirubra	1.06	4.64	Quinine and Cinchonidine
Hydrastis Root	2.3	5.8	Berberine Sulphate
Ipecacuanha Root (Rio)	0.18	1.83	Emetine

It is evident that the accuracy and care exercised by the pharmacist in weighing and measuring drugs for use in medicine are nullified if the active principles are variable to such an extent. The obvious remedy for this state of matters is standardisation.

Closely bound up with the question of standardisation is that of the possibility of exercising scientific control over



FRESH
BELLADONNA
LEAVES

About to be expressed for juice and for making the green extract. It is extremely important that this be done promptly to avoid fermentation and consequent deterioration of the product. The fresh herb is gathered as soon as the sun is up, and expressed and treated before sunset.

'WELLCOME'
CHEMICAL
WORKS

HEMLOCK
(*Conium maculatum*)

A typical bush of Hemlock (*Conium maculatum*). The fresh leaves and branches are collected when the fruit begins to form.

'WELLCOME'
MATERIA
MEDICA FARM





GATHERING HYOSCYAMIS (*Hyoscyamus niger*)

Hyoscyamus niger, one of the most difficult plants with which the herb farmer has to deal, is grown from seed sown about March or April. The young plants show above ground at the end of May or beginning of June. In the autumn they are separated if too close together. In the following May an aerial stem is developed, which rapidly grows until it reaches the height of three or four feet. The flowering takes place in June or July, when the crop is harvested.



DIGITALIS (*Digitalis purpurea*) IN FLOWER

Digitalis purpurea is obtained from carefully selected wild seed, and any variations from the wild type are struck out. Great care is taken in collecting and drying the leaves, otherwise the medicinal activity would be adversely affected. Blighted, faded or defective leaves are rejected, and only the finest preserved for use.



ACONITE (*Aconitum napellus*) IN FLOWER

Aconitum napellus, when raised from seed, takes two or three years to flower; it is best propagated by dividing the roots; each root is biennial, but, as it has the power of forming new ones every year, the plant itself is perennial.



A FIELD OF DATURA METEL

This handsome plant is interesting, as recent investigation has shown that it contains Hyoscine, Hyo-cyanine and Atropine in proportions differing from those occurring in other solanaceous plants.

the cultivation of medicinal herbs, more especially those which are found to present great variations in activity when obtained in the wild state. Hence, with the introduction of the 'Wellcome' Brand standardised galenicals, Burroughs Wellcome & Co. found it necessary, in order to obtain a constant supply of herbs of a sufficiently high standard of quality, to grow them under their own immediate supervision. The benefits of conducting a materia medica farm in conjunction with the preparation of pharmaceutical products are many. For instance :

Expert
supervision
of growth

(1) A drug may be treated or worked up immediately it has been collected.

(2) Herbs may be dried, if necessary, directly they are cut, before fermentation and other deteriorative changes have set in.

(3) Freedom from caprice on the part of collectors who, in gathering wild herbs, are very difficult to control in the matter of adulteration, both accidental and intentional.

(4) The ability to select and cultivate that particular strain of a plant which has been found by chemical and physiological tests to be the most active, and which gives the most satisfactory preparations. Notable instances of these are to be found in connection with *Digitalis* and *Belladonna*.

Fortunately, suitable land was available near the 'Wellcome' Chemical works at Dartford, and there the 'Wellcome' Materia Medica Farm has been established. The following extracts from a descriptive article which appeared in the *Chemist and Druggist* of January 29, 1910, will give some idea of the nature and scope of this enterprise :—

' Wellcome '
Materia
Medica
Farm

" A suitable piece of land for ' a physicke garden ' (had been chosen) on an undulating slope, with here and there a clump of trees and a strip of wild woodland, between the river and the North Downs, hard by the little village of Darenth. No more ideal spot for a herb farm could have been chosen. It has shade, sunshine and moisture, and a fine loamy soil, varied by sandier uplands. Here the firm have for the last six years been cultivating medicinal

Research
and
experiment



GOLDEN SEAL (*Hydrastis canadensis*)

An experimental crop of *Hydrastis*, grown under natural conditions, in a grove shaded by hedges and trees.



GOLDEN SEAL (*Hydrastis canadensis*)

The same plant under a specially-designed lattice structure, which ensures the requisite amount of shade.

plants under the immediate superintendence of pharmaceutical and botanical experts. The farm was established, firstly, to provide opportunities and materials for research and experiment, and, secondly, to supply the manufacturing departments with medicinal herbs of proper quality.

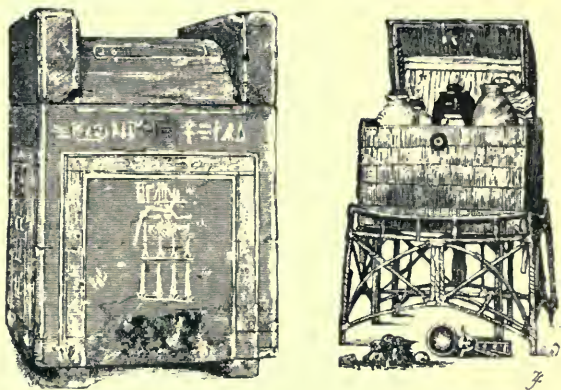
"A visit to the farm shows that the greater part is devoted to the cultivation of staples; but a number of plots are used for experimental crops. Among such are meadow saffron (*Colchicum autumnale*), with its pale-purple flower. Lavender, peppermint and French roses grow side by side. Senega and the unpretentious taraxacum, with its bright yellow petals, occupy other spaces. Ginseng, the root that plays so important a part in Chinese medicine, is also grown. *Podophyllum peltatum*, *Scopolia atropoides*, *Datura meteloides*, sea poppy (*Glaucum luteum*), and *Grindelia robusta*, are other plants that one does not usually find growing on a scale greater than the experimental; but the plots of *Hydrastis canadensis* are botanically and commercially the most interesting on the farm, in view of the fact that we are coming within measurable distance of the end of the natural supply from North America.

A few of the plants grown

"It is grown at the 'Wellcome' Materia Medica Farm in the open under perfectly natural conditions, in a little woodland dell shaded by tall elms and bramble bushes; and, in another part of the farm, under a lattice-work structure, an effort to re-create the conditions of the native home of golden seal, which is in rich, moist woods from Canada to Carolina. The growth under the latter conditions is more generous. In this case the plants are protected from the noonday heat.

Golden Seal

"The purpose which Burroughs Wellcome & Co. had immediately in view when they established this farm, *i.e.* supplying the products of the field direct to their Works, has been fulfilled, and the farm has in that respect passed the experimental stage, and reached one of great practical utility. On the research side, experiment goes on, especially in regard to selection and cultivation of strains which have been found by chemical and physiological tests to be the most active."



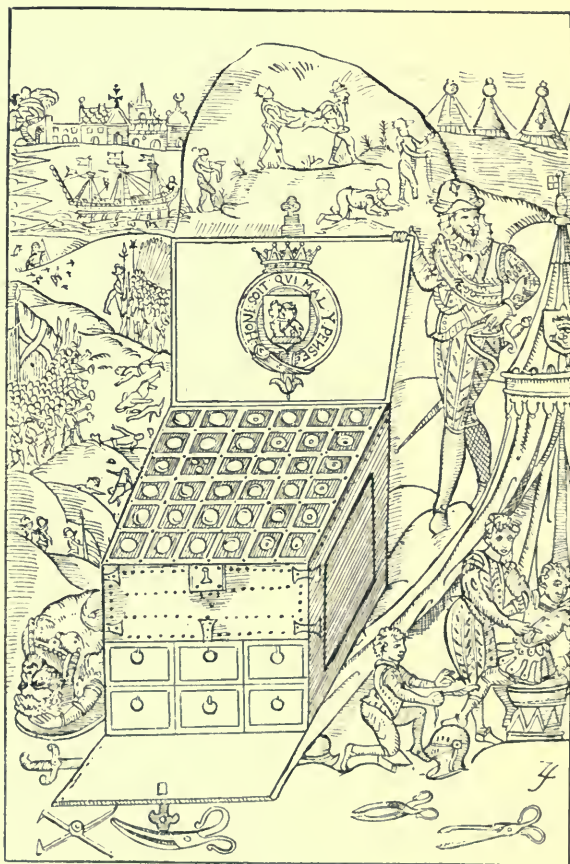
THE MEDICINE CHEST OF
QUEEN MENTU-HOTEP, WHO LIVED 2200 B.C.

The massive outer case for the chest is shown on the left. It is composed of wood, decorated with hieroglyphics, amongst which are the royal cartouche and the figure of a crouching jackal.

The chest itself is depicted on the right. It is composed of plaited papyrus reeds, and is supported on a stand. The chest is divided into six compartments, each containing a beautifully-shaped medicine jar of oriental alabaster. Various medicinal roots, and a wooden spoon, the handle of which is ornamented with the head of Hathor, were discovered in the chest.

This unique Egyptian medical equipment was discovered at Thebes, and demonstrates the huge bulk and cumbersome fittings, combined with paucity of supplies which have been characteristic of medical outfits from the days of the Pharaohs until the introduction of 'Tabloid' products. The modern medical man armed with a 'Tabloid' brand Pocket-Case carries a scientific therapeutic equipment, the equivalent of which in the drugs of antient Egypt could be transported only by a regiment of slaves.

HISTORICAL
MEDICAL EQUIPMENTS
USED IN
MILITARY, GEOGRAPHICAL
AND
JOURNALISTIC EXPEDITIONS



MILITARY MEDICINE CHEST—1588

Fabricius, a noted Swiss physician of the XVI century, recommended that the military chest should be furnished with no less than 362 varieties of medicine, some of which contained as many as 64 ingredients. The complexity of arrangement, the huge bulk and great weight, the liability to breakage, and the complicated inconvenience of medicine chests persisted until the introduction of 'Tabloid' Medical Equipments.



THE SMALLEST MEDICINE CHEST IN THE WORLD

This tiny gold medicine chest is fitted with twelve square medicine chest bottles containing 300 doses of 'Tablord' Brand Medicaments, equivalent to 15 pints of fluid medicine.

AT THE NORTH POLE
'Tabloid' Equipments were carried by
Rear-Admiral PEARY



'Tabloid' Medical Equipments were
carried by Sir Ernest H. SHACKLETON
FARTHEST SOUTH

'TABLOID' MEDICAL AND FIRST-AID EQUIPMENTS
Have reached the North Pole, and as near to the South Pole as
man has gone

HISTORICAL MEDICAL EQUIPMENTS

FOR MILITARY, GEOGRAPHICAL AND JOURNALISTIC EXPEDITIONS

THE Medical Equipments of the present day, differ notably from those of olden times in two distinct directions—diminished bulk, and in purity and efficacy of content. This improvement has only been effected in the last quarter century, and mainly by B. W. & Co. ; before that time, campaigning medicine chests had to be either of enormous and unwieldy size, or, if small, they could contain only the most meagre supplies

Bulky yet inadequate equipments

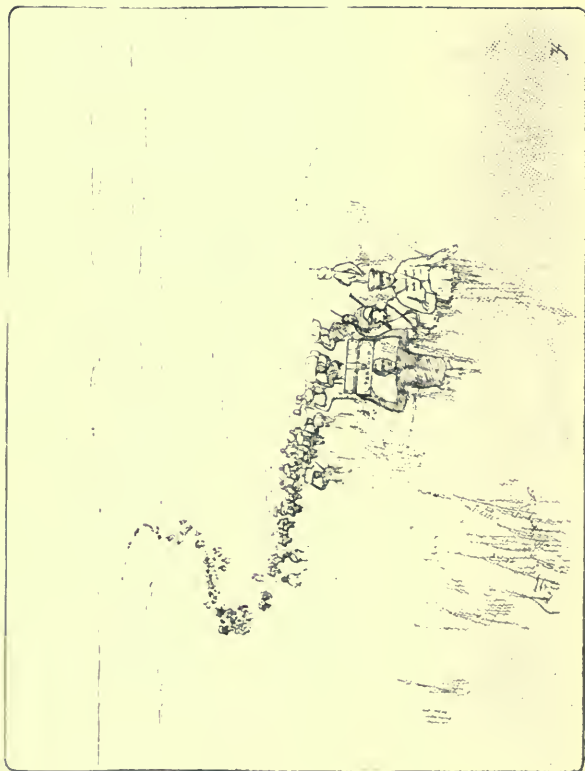
In the Middle Ages, owing to the great variety and bulky nature of the remedial agents used, the medicine chests employed in military campaigns assumed enormous proportions, and it was not until the middle of the nineteenth century that progress was made towards reducing the bulk of campaigning medical outfits



Early explorers, particularly in Africa, found the difficulties of procuring suitable portable medical supplies practically insuperable, and the horrors of disease and death associated with their expeditions were almost beyond description.

When I think, said the late Sir H. M. Stanley, in the course of one of his lectures, of the dreadful mortality of Capt. Leake's Expedition in 1816, of the Niame Expedition in 1831, of the sufferings of Baker and Speke, and of my own first two expeditions, I am amazed to find that much of the mortality and sickness was due to the crude way in which medicines were applied to travellers. The very recollection causes me to shudder.

A serious journalistic early expeditions. Mortality due to crude medicines.

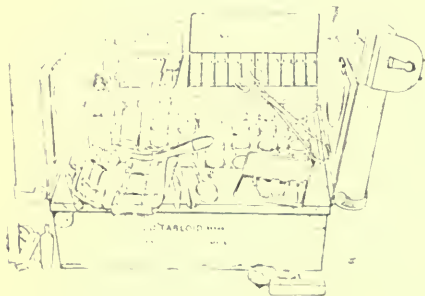


TABLOID MEDICAL EQUIPMENTS
IN CENTRAL AFRICA

That a very marked change has taken place can be gathered from a more recent speech of this eminent explorer and journalist, in which he said :—

" In my early expeditions into Africa, there was one secret wish which endured with me always, and that was to ameliorate the miseries of African explorers. How it was to be done I knew not; who was to do it, I did not know. But I made the acquaintance of Messrs. FERROT GUIS WELLCOME & Co. As soon as I came in sight of their preparations and their works, I found the consummation of my secret wish. On my later expeditions I had all the medicines that were required for my black men, as well as my white men, beautifully prepared, and in most elegant fashion arranged in the smallest medicine chest it was ever my lot to carry into Africa."

E. W. & Co.
solved the
problem



In his books, *Founding the Congo Free State* and *In Darkest Africa*, the late Sir H. M. STANLEY wrote in the very highest terms of 'Tabloid' Medical Equipments.

Amongst other cases used during STANLEY'S travels, is the famous "Rear-Guard" 'Tabloid' Medicine Chest, which remained in the swampy forest regions of the Aruwimi for nearly four years, and more than once was actually submerged in the river. When it was brought back to London, the remaining contents were tested by the official analyst of *The Lancet* (London, Eng.) who reported that the 'Tabloid' medicaments had perfectly preserved their efficacy.

Contents of
Stanley's
"Rear-Guard"
Chest
tested by
"The Lancet"



'TABLOID' MEDICAL EQUIPMENTS
IN MOROCCO

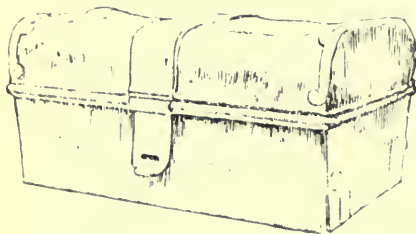
The late Surgeon-Major PARKE, Stanley's Medical Officer, in his *Guide to Health in Africa*, writes :

"The medicinal preparations which I have throughout recommended are those of BURROUGHS WELLCOME & Co., as I have found, after a varied experience of the different forms in which drugs are prepared for foreign use, that there are none which can compare with their 'Tabloid' products for convenience of portability in transit, and for unfailing reliability in strength of doses after prolonged exposure."

Unfailing
reliability
portability and
convenience

At this point it is of interest to turn to the 'Tabloid Medicine Chest, here illustrated, which was discovered near Kenia, in the Aruwhimi Dwarf Country. It was the last chest supplied to EMIN PASHA, GORDON'S Governor of the Equatorial Sudan. This chest was taken by Arabs when EMIN PASHA was massacred in 1892, and

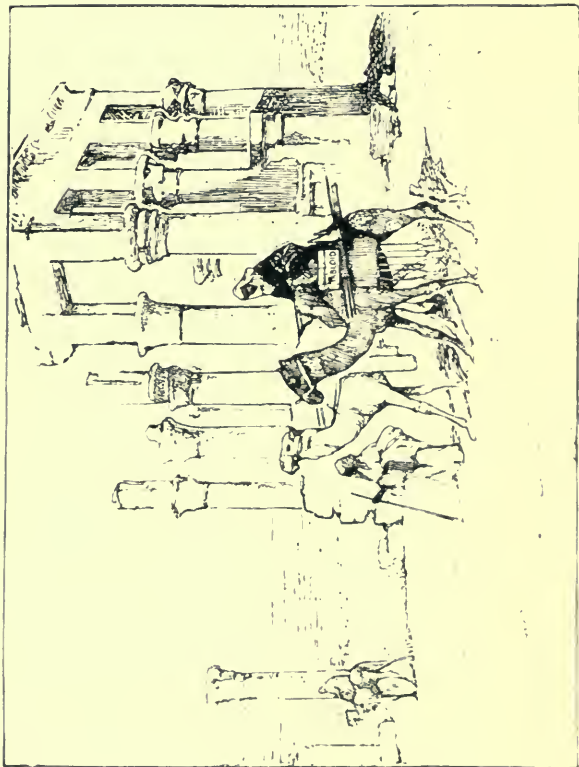
Emin Pasha



was recaptured by BARON DEHAIS, Commandant of the Congo Free State troops, after the battle of Kasongo. It was subsequently stolen by natives, and finally recovered by an officer of the Congo Free State, and returned to BURROUGHS WELLCOME & Co.

The following is a copy of EMIN PASHA'S letter written to BURROUGHS WELLCOME & Co. on receiving the chest :

"Gentlemen, I found the medicine chest you forwarded fully stocked. I need not tell you that its very completeness made bound my heart. Articles like those could not be made but at the hand of the greatest artists in their own department. If any one relieved from intense pain pours out his Blessings, they will come home to you.



'TABLOID' MEDICAL EQUIPMENTS
IN EGYPT

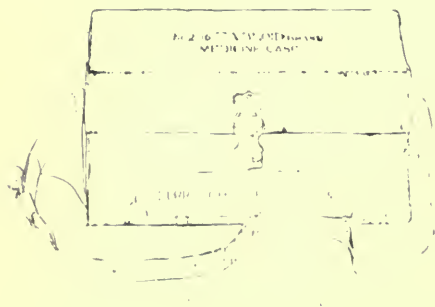
I should like to expatiate somewhat longer on the intrinsic value, but sickness preventing me to do so. I wish you to believe me,"

Yours very faithfully

Dr. Garcia Posada

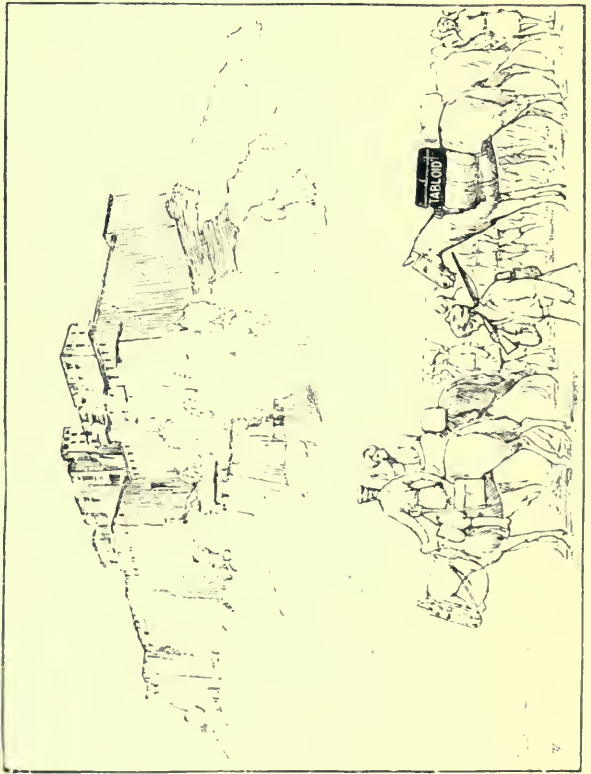
Another case associated with Stanley is the raw-hide 'Tabloid' Medicine Case used by Thomas Stevens, the well-known journalist who travelled round the globe on a bicycle, and was the hero of other pioneer exploits in different parts of the world. Stevens was the first to greet the great explorer on his return to civilisation, and during his twelve months' journeyings in Masailand and German East Africa, was greatly impressed with the portability

Thos. Stevens'
'Tabloid'
Medicine Case



and compactness of his medical outfit, and with the efficacy of its contents. In his book, *Scouting for Stanley in East Africa*, he wrote: "Stanley, in recommending these Medicines 'Tabloid' products, has earned the gratitude of every man who goes to a tropical country."

A history of all the 'Tabloid' equipments associated with African exploration would, of itself, make a large volume, and it is only possible to make brief mention of a few other instances of their use



'TARLOID' MEDICAL EQUIPMENTS IN TIBET

That 'TABLOID' EQUIPMENTS excel for military purposes has been abundantly demonstrated during various British and foreign military campaigns. The following is an extract from the **Official Government Report** made by the Chief Medical Officer of the last BRITISH MILITARY EXPEDITION to ASHANTI, on the 'Tabloid' Brand Medical Equipment supplied by BURROUGHS WELLCOME & CO.:—

Military expeditions

"The supply of medicines, both as to quality and quantity, left nothing to be desired. There was no scarcity of anything. The 'Tabloid' medicines were found to be most convenient and of excellent quality. To be able to take out at once the required dose of any medicine, without having to weigh or measure it, is a convenience that cannot be expressed in words. Time is saved to an extent that can hardly be realised, and so is space, for a fitted dispensary, or even a dispensary table, is unnecessary. The quality of medicines was so good that no other should be taken into the field. The cases supplied are almost ideal ones for the Government. They are light, yet strong, and the arrangement of the materials and medicines is as nearly perfect as possible."

No delay to weigh or measure

Quality so good no other should be taken into the field

It is instructive to compare the experience of this Expedition with that of the WOLSELEY ASHANTI EXPEDITION of 1873, fitted out according to old-time methods.

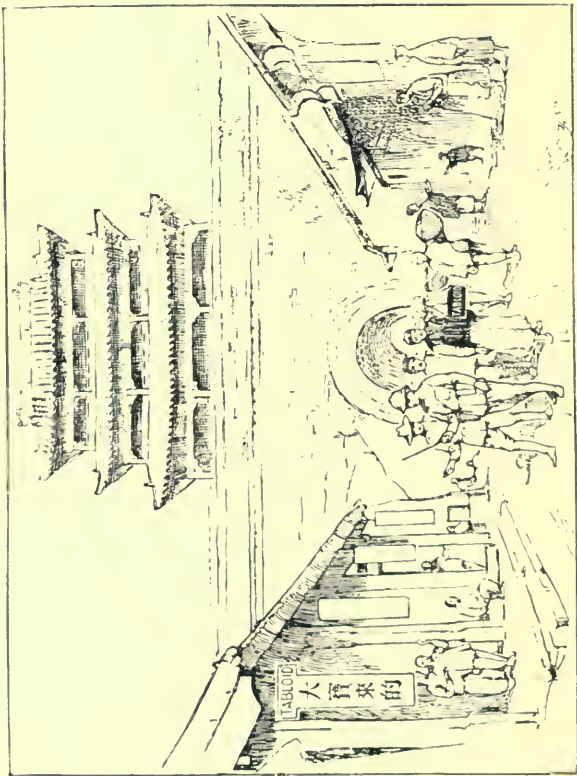
The suffering and loss of life were then terrible, for want of suitable medical equipments.

Without exception, 'Tabloid' Medical Equipments have been used in all the campaigns of the last twenty five years, and have played an important part in combating the diseases which seem inseparable from an army in the field.

During the war with Spain, in Cuba and the Philippines, 'Tabloid' Medical Equipments were specially ordered for, and used by, the U.S. Army and Navy.

The Military Expedition which, under the command of LORD KIRCHENER, defeated the Khalifa and reconquered the Sudan, was supplied with 'Tabloid' Brand Medical Equipments.

An illustration of one of the 'Tabloid' Medical Equipments specially designed for, and supplied to, the British



TABLOID MEDICAL EQUIPMENTS IN CHINA

Colonial Forces for use in the South African Campaign is here shown. Similar cases were designed for, and supplied to, the CITY OF LONDON IMPERIAL VOLUNTEERS and IMPERIAL YEOMANRY.

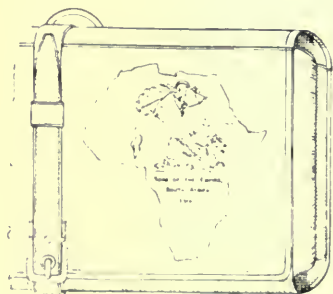
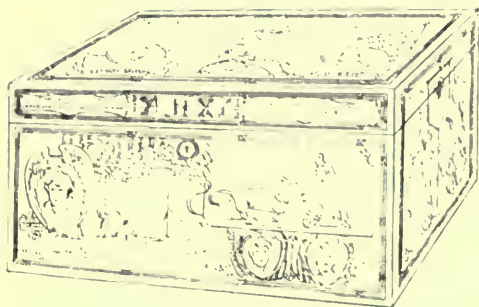


FIG. 10. CASE FOR THE SOUTH AFRICAN CAMPAIGN. THE CASE WAS DESIGNED FOR THE CITY OF LONDON IMPERIAL VOLUNTEERS AND IMPERIAL YEOMANRY.

The equipment of the American Hospital Ship *Mauncie* and the valuable services it rendered in connection with the campaigns in South Africa and in China are so recent as to be within the memory of all. The whole of the medical outfit was supplied by BERKROGHS WELLCOME & Co.



Referring to this equipment, the *Lancet* (London, Eng.) reported:—

The whole of the medical outfit has been supplied by Messrs. Burroughs Wellcome & Co. One of the medicine chests supplied by this firm is in tooled leather, designed by Mr. Henry S. Wellcome.

The following description of this chest may be of interest:—

The chest is made of oak covered with Carthaginian cow-hide, tooled by hand, with chaste designs successfully representing in allegory the alliance of Great Britain and America in the succour of the wounded. On the top panel appear the Union Jack and the Stars and Stripes entwined, portraits of Queen Victoria, George Washington and President McKinley; also representations of the British Lion and American Eagle. The front panel bears portraits of Lady Randolph Churchill (Mrs. George Cornwallis-West), the hon. secretary and the hon. treasurer of the fund; a picture of the ship itself; a scene representing the British Lion, wounded by an arrow which lies at his side, being ministered to by Britannia and Columbia. A frieze is formed by a representation of an American Indian wampum, upon which Brother Jonathan and John Bull are depicted hand-in-hand. The panel at each end of the chest represents Britannia and Columbia supporting a banner bearing the Red Cross, and on the panel at the back the British Regular and Colonial Lancers are shown charging a Boer force. Keble's line, "No distance breaks the tie of blood," and Bayard's phrase, "Our kin across the sea," are inscribed on the chest. This beautiful cabinet contains a number of smaller cases fitted with 'Tabloid' and 'Soloid' products and 'Tabloid' Hypodermic Outfits, and is in itself a compact and complete dispensary.

In addition to their adoption by military and naval authorities, 'Tabloid' Medical Equipments have been used by the War Correspondents who have accompanied all modern expeditions

The conclusive proofs afforded by all these campaigns and expeditions of the incomparable utility of the B. W. & Co. equipments, under circumstances of the most trying nature, naturally led to their still more extensive employment in South Africa during the late war. The trying conditions of transport and the climatic influences were just such as 'Tabloid' Equipments and 'Tabloid' Equipments only, had been proved, by earlier experience, to be capable of resisting. Constant references were made to the adequacy and efficiency of the equipments supplied.

A WAR CORRESPONDENT'S EQUIPMENT



An equipment of the greatest personal interest is the chest here illustrated. It was formerly the property of the late G. W. Steevens, and used by him throughout the war in Greece, the two Sudan campaigns, and his journey in India. In the South African War the same chest did good service until this brilliant writer's life was brought to a premature end during the siege of Ladysmith.

G. W. STEEVENS



'TABLOID' MEDICAL EQUIPMENTS
IN ARCTIC AND ANTARCTIC EXPLORATION

IN ARCTIC AND ANTARCTIC EXPLORATION

In the successive heroic endeavours to reach the Poles, during recent years, and in the exploration of Arctic and Antarctic lands, 'Tabloid' Medicine Chests have taken a pioneer position, and continue to hold supremacy.

The 'Tabloid' Belts and other Medical Equipments supplied to NANSEN for his journey in the *Fram*, and those used by the JACKSON-HARMSWORTH ARCTIC EXPEDITION, have been added to the historic collection of BURROUGHS WELLCOME & Co.

A famous
journalistic
enterprise



One of the 'TABLOID' BRAND MEDICINE BELTS carried by NANSEN on his Arctic Expedition.

The ITALIAN ARCTIC EXPEDITION, commanded by the DUKE OF THE ABRUZZI, found that, despite the fact that the northern latitude of 86° 33' 40" was reached, the

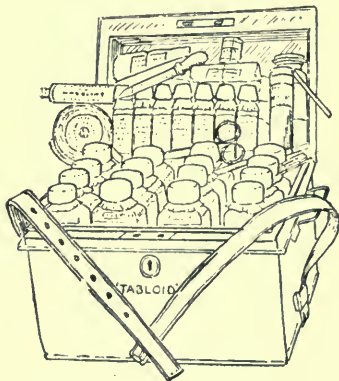


One of the 'TABLOID' BRAND MEDICINE CASES, carried by the DUKE OF THE ABRUZZI'S Polar Expedition

'Tabloid' Medicine Chests and Cases with which the Expedition was equipped were brought back with their remaining contents quite unaffected by the rigour of the climate.

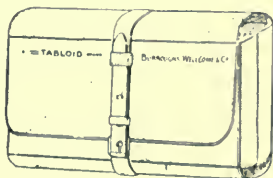
REAR-ADMIRAL PEARY, to whose record stands the achievement of reaching the farthest northern latitude, writing from Etah, Greenland, reported:—

Burroughs Wellcome & Co. 'Tabloid' Medicine Cases and supplies have proven invaluable.



One of the 'TABLOID' BRAND MEDICINE CHESTS used by REAR-ADMIRAL R. E. PEARY

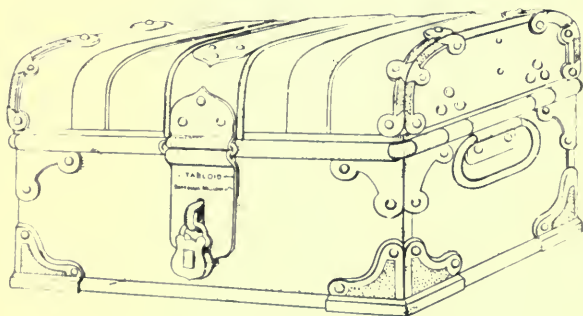
The entire medical outfit of the National Antarctic Expedition was furnished by Burroughs Wellcome & Co., and on the return of the *Discovery*, with the members of the Expedition on board, the medical officer made a highly satisfactory report on the 'Tabloid' Medical Equipment.



One of the 'TABLOID' BRAND MEDICINE CASES carried by the National Antarctic Expedition.

In August, 1901, the *Discovery* left England, and, in the following January, crossed the limit of the Antarctic Circle.

Having passed the farthest eastward point attained by Ross sixty years before, the explorers discovered a new land, which they named King Edward VII. Land. One of the most noteworthy features of the Expedition was the



No. 251. One of the 'Tabloid' brand Medicine Chests used on the National Antarctic Expedition.

arduous sledge journey undertaken by the commander, Captain SCOTT, accompanied by Lieutenant SHACKLETON and Dr. WILSON. This journey over the ice occupied three months, and the latitude of 82° 17' South was reached.

On sledge journeys the question of weight is of great moment. The traveller on such occasions must carry but the barest necessities, and of these the lightest procurable. The medicine chest is an important item, for upon the efficacy of its contents the lives of the explorers may depend. Every drug carried must be of the utmost reliability, in the most compact state, and capable of withstanding an extremely low temperature.

Reliability
essential

That 'Tabloid' Medical Equipments fulfil all requirements has been proved again and again. They enable the traveller to carry a comparatively large supply of medicines, and may be used under conditions which would render the carriage and administration of ordinary preparations impossible.

To the enthusiasm of Sir CLEMENTS MARKHAM, K.C.B., then President of the Royal Geographical Society, the successful organisation of the National Antarctic Expedition was largely due. Referring to the 'Tabloid' Medical Equipment of the *Discovery*, he reports:—

National Antarctic Expedition,
1, Savile Row,
Burlington Gardens, W

The Medical Equipment of the Exploring Ship of the National Antarctic Expedition was entirely supplied by Messrs Burroughs Wellcome & Co., and, proved in every way most satisfactory.

The few other drugs and preparations which were taken with the Expedition were only supplied for purposes of experiment, and, can in no way be regarded as part of the medical equipment.

Clements Markham

27. Oct 1905

DR. KÄETTLITZ, the Senior Medical Officer to the Expedition, reports:—

Discovery ANTARCTIC EXPEDITION

The Medical Equipment of the *Discovery* Exploring Ship, of the National Antarctic Expedition, was entirely supplied by Messrs. Burroughs Wellcome & Co., mostly in the form of 'Tabloid,' 'Soloid' and 'Eunle' preparations.

The preparations proved in every way most satisfactory, and there was no deterioration of any of them, in spite of the conditions of climate and temperature to which they were exposed. The few other drugs and preparations which were taken with the Expedition were only taken for the purpose of experiment.

The cases supplied by Burroughs Wellcome & Co. to us have also been found satisfactory: the small leather one was very useful upon sledge journeys, being light and compact. The No. 251 'Tabloid' Case was used for some weeks at the camp eleven miles north of the ship, when the whole ship's company was engaged in sawing and blasting the ice, and it was found very convenient.

The other cases were useful in our cabins, etc., for a handy supply.

Reinhold Käetlitz

BRITISH ANTARCTIC EXPEDITION, 1907-9

SIR ERNEST H. SHACKLETON on his memorable voyage with the *Nimrod*, when he penetrated to within ninety-seven miles of the South Pole, took with him as his sole medical equipment 'Tabloid' Medicine Chests and Cases, and the subjoined reports show that under the trying and difficult conditions of Antarctic exploration 'Tabloid' Medicines maintained their reputation for efficiency and stability.

British Antarctic Expedition, 1907-9

Copy of Report dated Sept. 17, 1909

The British Antarctic Expedition, 1907-9, was equipped with a very complete Medical Equipment contracted for solely by Messrs. Burroughs Wellcome & Co., and consisting of 'Soloid' and 'Tabloid' Preparations, which are the only forms that can be conveniently carried and preserved under such conditions.

The packets of compressed Dressings are in extremely convenient form. The Congo Cases (No. 251, 'Tabloid' Brand) were always used when at our base, and both the party of three who reached the South Magnetic Pole, and the party under Lieut. Shackleton, who attained a point 97 miles from the geographical South Pole, carried a brown leather 'Tabloid' Case and all the 'Tabloid' products that remain are now in as good condition as when first handed over to my care two years ago.

The "Nimrod" was also supplied with 'Tabloid' Cases and equipment.

The 'Tabloid' Photographic Outfit supplied by Burroughs Wellcome & Co. proved entirely satisfactory.

Signed,

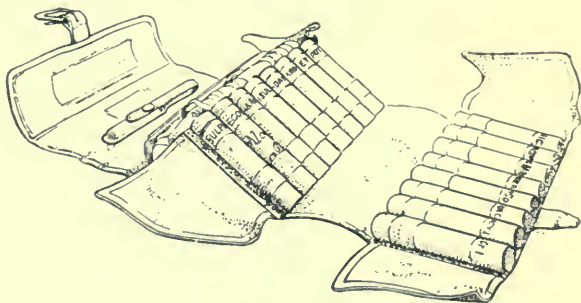
British Antarctic Expedition, 1907-9,

ERNEST H. SHACKLETON,

Commander.

ERIC P. MARSHALL, M.R.C.S., L.R.C.P.,
Surgeon to the Expedition.

The 'Tabloid' Medicine Case carried "Farthest South"
by SIR ERNEST H. SHACKLETON.



The full record of this Case, as given in the report from the Surgeon to the Expedition, is printed below.

Copy of Report dated Sept. 17, 1909:—

The B. W. & Co. Brown Leather 'Tabloid' Case herewith, was taken with party of six that made the ascent and reached the summit of Mount Erebus, 13,350 ft., March 5-11, 1908.

Used on Southern Journey under Lieut. Shackleton, *October 28, 1908—March 4, 1909. Latitude 88° 23' S. Longitude 162° E.

Distance covered in this journey, 1,728 statute miles.

Used on S. Depot Laying Party, from September 20 to October 15, 1908. Distance covered, 311 miles.

Taken on Depot journeys to Hut Point. Aggregating 150 statute miles.

Medicines quite satisfactory.

Signed,

E. P. MARSHALL, M.R.C.S., L.R.C.P.,

Surgeon to British Antarctic Expedition, 1907-9

* Reached "Farthest South" Jan. 9, 1909

RECORDS OF JOURNALISTS, TRAVELLERS AND SPORTSMEN

Mr. JULIUS PRICE, the special artist and correspondent of the *Illustrated London News*, reported that he carried his 'Tabloid' Medicine Case over 30,000 miles through Arctic regions, across Siberia, through China, Japan and America. Despite the severe wear and tear of this great journey, the case suffered little damage, and the remaining contents were quite unaffected by exposure to every variety of climate.

30,000 miles
Arid desert and
humid swamps
Extreme heat
and cold

Another interesting 'Tabloid' Medicine Chest is that which belonged to Dr. Charles Burland, who reported that it was used during a year's journey through Cashmere, Tibet, the high ranges of the Himalayas, and encountered a vast amount of rough usage by transport on the backs of coolies, elephants, camels, bullocks, etc. Intense cold in high latitudes on the Himalayas, as well as the heat and moisture of Indian monsoon weather in the lowlands, equally failed to affect its contents adversely.

Dr. Charles
Burland

Sir Sven Hedin whose remarkable achievement in the exploration of Central Asia, when he set foot in one of the sacred forbidden cities of Tibet, is well known, took with him on his journey across the Himalayas, a 'Tabloid' Medicine Chest, and, in his fascinating book "Trans-Himalaya," he speaks in the highest terms of the utility and completeness of the equipment.

To this enterprising explorer his 'Tabloid' Medicine Chest was of great use, not only in providing medical treatment for his followers and himself on their long and

perilous march, but also in his diplomatic relations with the great Tashi-Lama.

We are indebted to the courtesy of his publishers, Messrs. Macmillan, for permission to quote the following description by Sir Sven Hedin of the presentation of his 'Tabloid' Medicine Chest as an offering of friendship, in accordance with Oriental custom, to the venerated chief of the Buddhist religious community at Tashi-Lunpo:—

"'Bombo Chimbo' [the name by which Dr. Sven Hedin was known], we know that you are a friend of the Tashi-Lama, and we are at your service."

* * *

"When we had conversed for two hours I made a move to leave him, but the Tashi-Lama pushed me back on to a chair and said 'No, stay a little longer.' Now was the time to present my offering. The elegant English Medicine Case was taken out of its silk cloth, opened and exhibited, and excited his great admiration and lively interest; everything must be explained to him. The hypodermic syringe in its tasteful case, with all its belongings, especially delighted him. Two monks of the medical faculty were sent for several days running to write down in Tibetan the contents of the various 'Tabloid' boxes and the use of the medicines."

Sir Sven Hedin also carried a 'Tabloid' Medicine Chest in his journey through the Persian deserts, an account of which he has published in his new book "Overland to India" (Macmillan and Co., 1910).

Mrs. Bishop, better known as Miss Isabel Bird, whose record as a traveller embraced wanderings over a considerable portion of the uncivilised surface of the globe, in her book describing her journey through the wildest parts of Eastern Persia and Kurdistan, said:—

"The remaining portion of the outfit, but not the least important, consists of a beautiful medicine chest of the most compact and portable make, from Messrs. Burroughs Wellcome and Co., containing fifty small bottles of their invaluable 'Tabloids.' The fame of Burroughs Wellcome and Co's chest has spread far and wide, and the natives think its possessor must be a Hakim."

'TABLOID' MEDICAL EQUIPMENT FOR A SPORTING TOUR

MR. ROOSEVELT IN AFRICA

Mr. Roosevelt on the occasion of his famous shooting expedition into Africa, took with him, in accordance with the precedent set by so many travellers in the Dark

Continent, a "Congo" No. 251 'Tabloid' Medicine Chest. His Medical Officer, Colonel E. A. Mearns, upon the return of the party, pronounced the outfit "very satisfactory and useful."

From almost all parts of the globe similar testimony to the durability and utility of 'Tabloid' equipments comes to hand, two typical reports are appended:—

Extract from the report of R. F. RAND, Esq., M.D., F.R.C.S., Principal Medical Officer, British South Africa Company:—

We have had Burroughs Wellcome & Co.'s "Congo" Chests, fitted with 'Tabloid' medicines, in daily use during the occupation of this country. They have proved of inestimable service.

Extract from the report of the late W. H. CROSSE, M.D., M.R.C.S., Principal Medical Officer, British Royal Niger Company:—

All these 'Tabloid' drugs are so good it is impossible for me to speak more highly of one than another. They are all of the very best quality, each drug is accurately described, and reliable. To the traveller these preparations are simply invaluable, and I would strongly advise everyone coming out to the Tropics to get a full supply of 'Tabloid' medicines.

BURROUGHS WELLCOME & Co. have for many years made a special study of the requirements of travellers and expeditions, not only in respect of compactness, portability and permanence, but also in the selection of remedies necessary to combat the maladies prevalent in every clime, from the Arctic to the Antarctic. In the course of their long experience in the medical equipment of exploring, military and sporting expeditions they have acquired a large fund of special information on this subject, which is always at the service of medical practitioners who may be called upon to act as expeditionary medical officers, or to give advice as to the supplies necessary for any climate.

Study of medicines suitable for every climate

'Tabloid' Brand Medicine Cases contain, in a small space, a complete outfit of pure drugs in doses of extreme accuracy. They can be carried in the pocket, in the carriage or motor-car, or on the cycle, their contents being always ready for use in emergencies. They are specially valuable to the country practitioner, who is often called upon to cover long distances, and who would experience great difficulty in carrying or obtaining supplies of such medicines as he may desire to administer promptly, were it not for the convenience and portability of 'Tabloid' Brand Medicine Cases.

Emergency Cases for pocket, cycle, motor or carriage

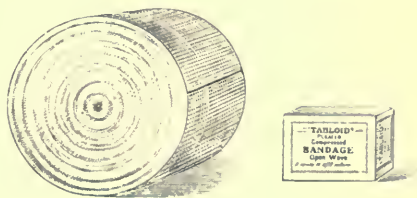
TRADE MARK 'TABLOID' BRAND

PLEATED COMPRESSED
BANDAGES AND DRESSINGS

Pleated Compressed Bandages and Dressings were originated and introduced by Burroughs Wellcome & Co.

In
emergencies

'TABLOID' BANDAGES AND DRESSINGS provide the means of applying strictly scientific treatment, and, in cases of accident, enable those on the spot to render first-aid treatment should medical assistance be unavailable or delayed. Their use in such emergencies may prevent serious complications which frequently arise in minor accidents, and from the neglect of wounds, abrasions, etc.



Graphic representation showing relative bulk of an ordinary and a 'Tabloid' Bandage, each 6 yds. \times 2-1/2 in. (One-half actual size)

Ideal for
general
use

'TABLOID' Bandages and Dressings are made of materials of the finest quality, very highly compressed. Each is enclosed in an efficient protective covering, thus securing freedom from all risk of contamination. For all purposes, whether at home or when travelling, they are superior to the ordinary varieties and their advantages are obvious.

NOTE.— A further important advance, original with B. W. & Co., is the issue of these 'Tabloid' Bandages and Dressings—sterilised.

TYPICAL AWARDS

AT INTERNATIONAL EXHIBITIONS

CONFERRED UPON BURROUGHS WELLCOME & CO.
FOR THE SCIENTIFIC EXCELLENCE
OF THE FIRM'S PRODUCTS

ST. LOUIS
1904
THREE GRAND PRIZES
THREE GOLD MEDALS

LIEGE
1905
SIX GRAND PRIZES
THREE DIPLOMAS OF HONOUR
THREE GOLD MEDALS

MILAN
1906
THREE GRAND PRIZES
THREE DIPLOMAS OF HONOUR
ONE GOLD MEDAL

LONDON
(Franco-British)
1908
SEVEN GRAND PRIZES
ONE DIPLOMA OF HONOUR
TWO GOLD MEDALS

LONDON
(Japan-British)
1910
FIVE GRAND PRIZES
ONE GOLD MEDAL

BRUSSELS
1910
EIGHT GRAND PRIZES
THREE DIPLOMAS OF HONOUR
ONE GOLD MEDAL

BUENOS
AIRES
1910
ONE GRAND PRIZE

ALAHABAD
1910-11
ONE GOLD MEDAL

MAKING IN ALL

MORE THAN **240** HIGHEST AWARDS

“The strong thing is the just thing”
Carlyle

‘Tabloid’ marks the work of
Burroughs Wellcome and Company.

The use of the word is to enable
the prescriber, dispenser and patient
to get the right thing with one short
word, instead of the firm’s long name.

If another maker apply the word
to his product, the act is unlawful.
‘Tabloid’ is our trade mark.

If a vendor disregard it, in dispens-
ing or selling, the act is unlawful—
for the same reason.

We prosecute both offenders rigor-
ously, in the interest of prescribers,
dispensers, patients and ourselves.

Please inform us of any instance
of either offence.

BURROUGHS WELLCOME & CO.



ORIENT AND KEARS) OF A GOLD COMMEMORATION MEDAL
Specially designed and struck in honour of KOU KI CHAY Siuow, and presented to him in commemo-
ration of his loyal and efficient services to the firm for more than a quarter of a century.
Mr. Siuow is now Treasurer of the firm, having retired from the position of General Manager.

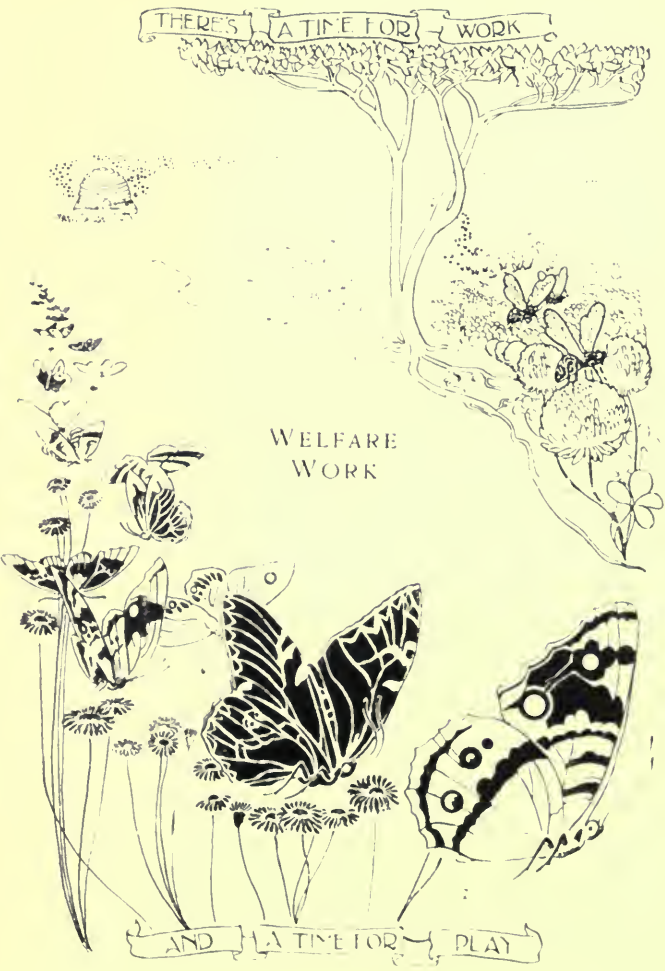


DRILL OF BURROUGHS WILCOX & CO.'S FIRE BRIGADE

THERE'S A TIME FOR WORK

WELFARE
WORK

AND A TIME FOR PLAY





BIRD'S-EYE VIEW OF WELLCOME CLUB AND INSTITUTE
BUILDINGS AND GROUNDS

THE WELLCOME CLUB AND INSTITUTE

“ And all this house was peopled fair
With sweet attendance, so that in each part
With lovely sights were gentle faces found,
Soft speech and willing service : each one glad
To gladden, pleased at pleasure, proud to obey.”

Sir Edwin Arnold

“The true veins of wealth are purple—not in rock, but in flesh—and the final outcome and consummation of all wealth is in producing as many as possible full-breathed, bright-eyed and happy-hearted creatures.”

Ruskin

OBJECTS OF THE WELLCOME CLUB AND INSTITUTE

From the first, Welfare Work has been a special feature with the firm. This Club and Institute is a part of the general scheme, and was founded for the benefit of the employees of BURROUGHS WELLCOME & CO., amongst whom are included a large number of professional scientific workers. The premises consist of the old manor house formerly known as Acacia Hall, together with other buildings which provide libraries, reading rooms, assembly rooms and a gymnasium. These are surrounded by an extensive park through which the river Darent runs.

The objects of the club are to promote harmony and happy social intercourse amongst the employees and to supply them with a pleasant resort out of business hours to encourage mental and physical recreation by means of music, literary and other entertainments, technical and other instruction classes with occasional lectures, and athletics, field sports and games.

The Executive Committee of the club regulates the conduct of the club and controls the use of the river for boating, swimming, fishing, etc., as well as the gymnasium, library, museum, baths, sports fields, games and various other features. All suitable technical journals and a large selection of newspapers, magazines, etc., are available in the reading rooms.

All employees willing to attend the DAYTON TECHNICAL INSTITUTE have their fees paid, and the firm gives prizes through the Institute for proficiency in the technical subjects in which it is interested.



CLUB HOUSE FOR MEMBERS OF THE STAFF

Containing music room, ladies' sitting, dining, writing and dressing rooms; gentlemen's sitting, dining, writing, and smoking rooms; secretarial offices, and committee rooms

INAUGURATION OF THE
WELLCOME CLUB AND
INSTITUTE, JUNE 24, 1899

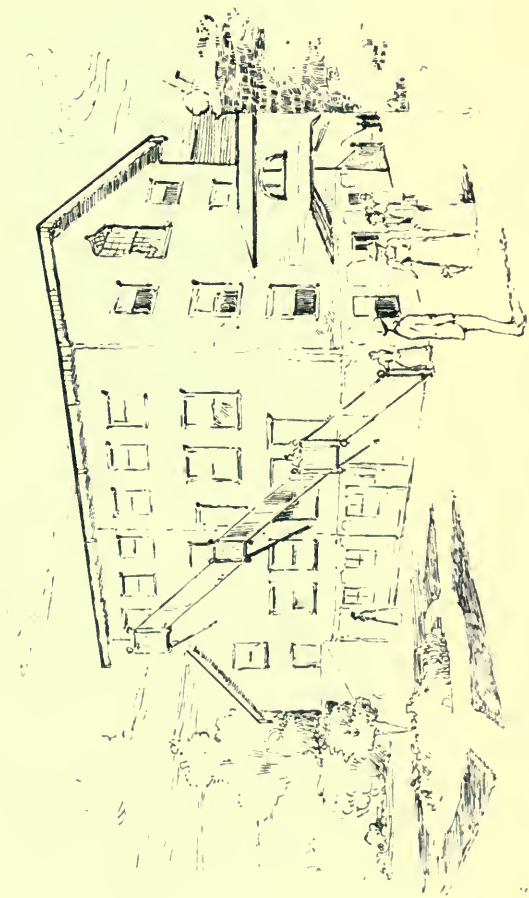
(Reprint from Press Report)



ONE of the most interesting events which have taken place in the town of Dartford for many years past was the opening of the Wellcome Club and Institute. When it is remembered that the prosperity of the town is so closely identified with that of its greatest industry, it is not surprising that Saturday's event evoked so much enthusiasm throughout the district. Messrs. Burroughs Wellcome & Co. have always been recognised as model employers, and

the events of the day bore eloquent testimony not only to this kindly consideration of the welfare of their employees, but also to the precision, exactness and marvellous organisation which have always characterised their work.

The club has been founded by Mr. Wellcome, the head of the firm, to provide the employees with opportunities for recreation, and for promoting technical education. With these ends in view, he acquired the Manor House, commonly known as Acacia Hall, together with its beautiful and extensive grounds, through which flows the river Darent. The manor house itself and the adjoining buildings have been elaborately fitted and furnished to meet the new requirements. A large gymnasium and extensive baths and lavatories with the most perfect modern fittings have been built, and the grounds beautifully laid out for the purposes of enjoyment and recreation.



THE LIBRARY BUILDING AND CLUB HOUSE FOR LADY EMPLOYEES

Ground floor: ladies' tea rooms. First floor: ladies' sitting, sewing and writing rooms. Second floor: reading room and library. Third floor: general concert and lecture hall.

No pains or expense have been spared in any direction, and it is doubtful if there is any body of employees in the world which can boast of so magnificent a club and pleasure park.

THE DAY'S PROCEEDINGS

The proceedings on Saturday were favoured with perfect weather, and great credit is due to those responsible for the arrangements, which were admirably carried out. At 11 a.m., immediately after the special train conveying the London visitors steamed into Dartford station, the day's programme commenced with a fire drill at the firm's works and laboratories. From the station platform an excellent view was obtained. Sir Hiram Maxim, the distinguished engineer, who was present, timed the display and stated that the streams of water from four principal points were in full play within two minutes of the sounding of the alarm which called out the firemen.

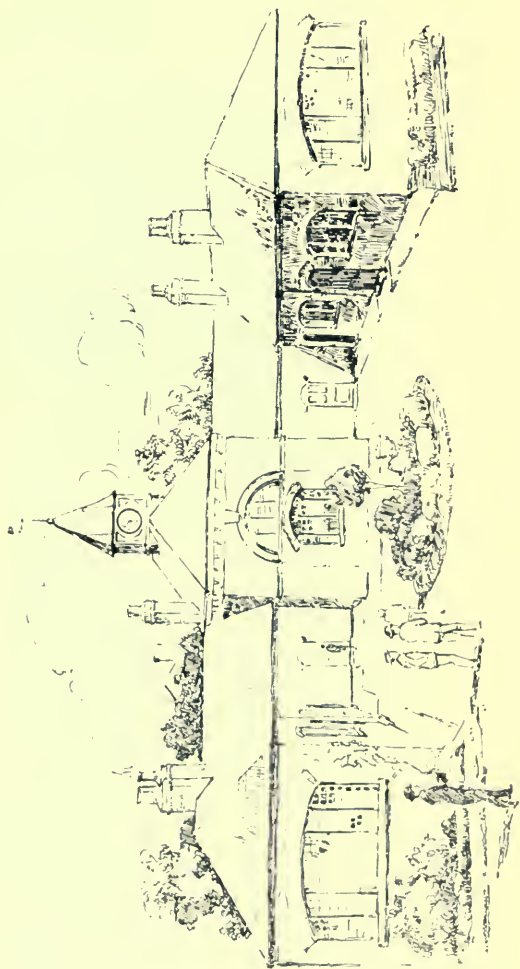
SERVICE AT THE PARISH CHURCH

The company then proceeded to the historic old Parish Church, which was quickly filled by the visitors and the firm's employees. The service, conducted by the Rev. E. P. Smith, Vicar of Dartford, was, although simple and undenominational in character, a beautiful and impressive ceremony, in which were appropriately included the following texts:

"Bear ye one another's burdens, and so fulfil the law of Christ." *Gal. vi. 2*

"And that ye study to be quiet, and to do your own business, and to work with your own hands, as we commanded you; that ye may walk honestly towards them that are without, and that ye may have lack of nothing." *1 Thess. iv. 11 and 12*

The service over, the party, headed by visitors and the principal members of the staff, accompanied Mr. Wellcome from the church to the gates of the club, where Mr. Sudlow, the general manager, presented his chief with a golden key.



CLUB HOUSE FOR GENTLEMEN EMPLOYEES
Containing sitting, writing, smoking, tea rooms, etc.

Mr. Sudlow said: "Mr. Wellcome, the members of the management in London and at Dartford beg your acceptance of this key as a memento of this very interesting occasion."

Mr. Wellcome unlocked and swung open the gates, saying: "I declare this Club and Institute now open, and may God bless and prosper it." The visitors were then conducted over the club buildings and through the grounds, which were much admired.

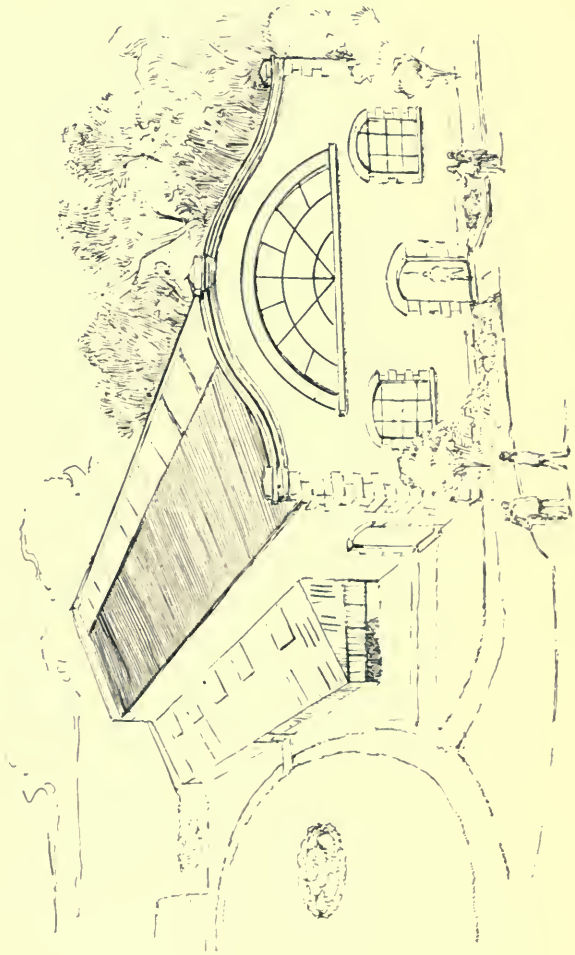
THE LUNCHEON

At 12.30 an adjournment was made for luncheon. About eleven hundred sat down to an excellent repast in an enormous marquee erected in the club grounds, all the company, except a few visitors, being employees and wives of employees. Mr. Wellcome acted as chairman and Mr. Sudlow as vice-chairman. After the loyal toasts

THE TOAST OF THE DAY

"THE EMPLOYEES' SUCCESS TO THE WELLCOME CLUB
AND INSTITUTE"

THE CHAIRMAN said: "Most of those assembled here to-day are employees of the firm. People often speak to me with wonderment at the good relations which exist between the firm and its employees, and the explanation which I have always been able to give in reply to such comments is that there is mutual consideration. It is and always has been the policy of the firm to consider the welfare of everyone associated with it, and by our bearing, our warmth of feeling, and our interest in the welfare of our employees we have won consideration from them—and we have a corps of employees, which, I am proud to say, I believe surpasses any similar body of people employed by any other firm in the world."



GYMNASIUM AND ASSEMBLY ROOM

Fully equipped with all apparatus necessary for the practice of indoor athletics

“ By our care in selecting those who possess not alone the required talents and qualifications, but who are also in hearty sympathy with us in our unique work, and by fostering mutual regard, we secure not only the hand work, but the heart work, of those who are associated with us. We have not only efficiency and devoted zeal amongst our great chiefs who form our Managerial Staff, and in the distinguished Directors of my Chemical Research Laboratories and of the Physiological Research Laboratories, but also expert workers as Heads of Departments, and again in the personnel of their staffs, and yet again amongst the rank and file. I must pay a special tribute to the efficiency of the Ladies' Departments, so ably presided over by the talented Lady Superintendent, ably supported by a highly-qualified staff of lady assistants, some of whom are efficient scientific workers.

“ It is peculiarly gratifying to me to-day, in inaugurating this club, to feel that I meet with those associated with me heart to heart. A strong spontaneous expression has come to me from the employees, which accords perfectly with my own ideas and sentiments, that this club should not be regarded as a charitable institution, but should be self-supporting. I want it to be a resort and meeting-place for the promotion of harmony and happiness amongst the employees—an institution for mental and physical recreation and development, where all shall be knitted closer together in personal friendship. I am certain that a charitable institution, or what is usually so-called, is not what we want. None of the employees of Burroughs Wellcome & Co., I am thankful to say, are in need of charity. They are self-respecting, self-reliant and self-supporting, and I want them always to continue so. I am doing, and shall do, all I can practically to facilitate the work of organisation and equipment. The premises, suitably furnished and maintained, I am very gratified to offer for the purposes of the club and institute.

“ I rely upon the members working hand in hand and heart to heart to make a success of this institution on a self-



BRIDGE OVER THE DARENT

Connecting the lawn with the orchard, garden and playing fields

supporting basis. It is my strong desire that every employee will become a member of the club and institute. We shall have an administrative committee, but also every member of the club should regard himself or herself as a member of a grand committee with duties to perform. It is essential to the success of this club that the members should all strive to bury every selfish desire in order to promote the happiness of their associates. We had some beautiful texts this morning during the inaugural service at the church. I want to recall one—'Bear ye one another's burdens.' We know that those who seek their own selfish gratification in this world are the least happy, and those who try to bear each other's burdens and to assist each other, get the greatest happiness to be found in this life. Following such a course requires self-sacrifice, and I hope everyone will keep this text in view, and that it will be the first and constant thought and endeavour of members of this club and institute to make others happy.

"I cannot sufficiently express to the members of the Management at London and Dartford, who have presented me with a golden key with which to unlock the gates of this club and institute, how deeply touched I am by this expression of their kindness. I am always receiving kind consideration and support from these, my valued associates. I shall always treasure this jewel. Those beautiful giant storks, in antique bronze, which grace the fountain immediately within the entrance to the grounds, were presented to us by Mr Lloyd Williams, of the Works Management. We all deeply appreciate his generous gift of these superb works of art. Let us drink heartily the toast 'The Employees, and Success to the Wellcome Club and Institute,' and I associate with the toast the name of Mr. R. Clay Sudlow, our esteemed General Manager, the oldest member of our staff, and my invaluable right-hand support in the direction of this business."

MR. R. CLAY SUDLOW replied, "Before I refer to the toast that has been so very kindly proposed from the



THE GARDEN CREEK

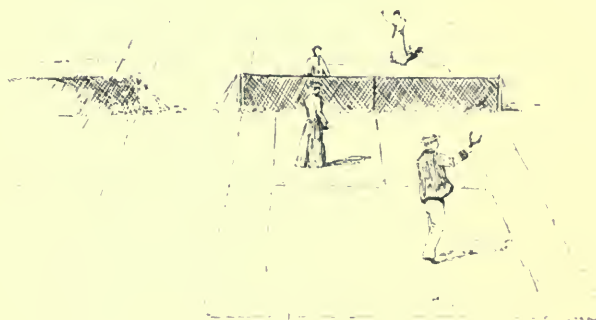
Is a tributary of the Darent, dividing the orchard from the kitchen garden.

chair, I believe I shall be expressing the feelings not only of the employees, whom I am very proud to represent, but also of the visitors who have honoured us with their presence, when I say how glad we are to have Mr. Wellcome with us to-day in renewed health. He is the hardest worked and the hardest working member of our large community, and it is a matter for very sincere rejoicing that, after another twelve months of incessant thought and labour in the conduct of this business, he is able to preside over us on this unique occasion, this red-letter day in the annals of the firm, with his accustomed force and vigour.

"I cannot but think that the knowledge gained by us here this morning as regards the extent of the provision made for our comfort and happiness, of the advantages and privileges secured to us by this club and institute, is a perfect revelation. The idea of this club, as we all know, originated with Mr. Wellcome. It is absolutely his creation, and we owe him a very deep and lasting debt of gratitude for the initiation of the scheme, and for the immense amount of thought and study that he has so ungrudgingly given, in order to make this club perfect and complete in every detail.

"If I mistake not, our visitors have already come to the conclusion that to be an employee of the firm of Burroughs Wellcome & Co. is to occupy a very happy and a very privileged position. As the oldest member of that body next year I shall attain my majority in Mr. Wellcome's service. I am glad to assure our visitors that their conclusion is an absolutely just one. Mr. Wellcome has proved himself a master whom it is at once a pride, a pleasure, and an honour to serve, and there are many of us here present to-day who, having given him our best, feel that we fall very short of the service that we would desire to render him.

"Mr. Wellcome, you have told us that you do not want, and that you do not look for thanks, but I do hope that



THE SPORTS FIELD
The first of the playing fields-

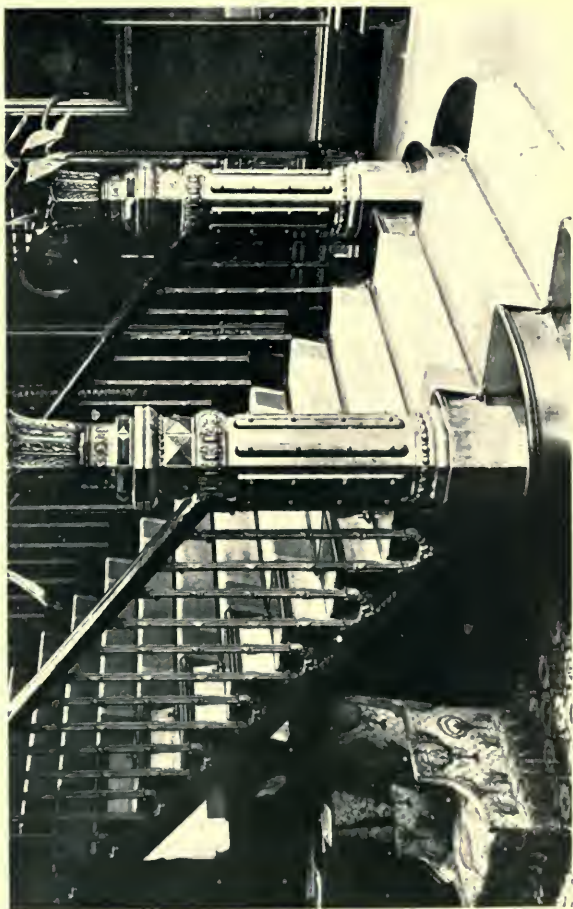
you will allow us to express our very deep appreciation of your generous kindness in placing this club at our disposal, of the personal feeling you have thrown into the undertaking by loaning to the club many of those treasures that you have been at such pains during many years to collect, and of your friendly goodwill in allowing us, in accordance with our unanimous wish, to call this club by your own name. We sincerely hope that you will be spared for many years to witness, and to rejoice in, the complete fulfilment of the high ideal that you have formed with regard to your employees and may that realisation be brought about in a great measure by means of the Wellcome Club and Institute, so happily and so successfully inaugurated to-day."

TOAST: "THE FIRM."

PROFESSOR JOHN ATTFIELD, F.R.S., said: "I have the great honour of asking you to drink to the continued prosperity of the firm of Messrs Burroughs Wellcome & Co. I assume that everyone present is interested in the leading work of this firm, which is the association of scientific and commercial pharmacy

"The firm is distinguished in many ways. It is distinguished for its progressive spirit. I look at the various journals of pharmacy and medicine that are published in our Colonies and India, as well as those published in the United Kingdom, and I never take up one but I find the mention, and sometimes a very long mention too, of this firm. A second great characteristic of the firm is the entire reliability of all the articles it sends out. I am sure no one could have followed its development without noticing the wonderful originality that has always characterised it, and I may add that all this is chiefly due to the present head of the firm, Mr. Wellcome, and his wonderful skill in organisation in every department

"Talking of organisation, we who are here to-day as visitors, must, I am sure, have been charmed by the evidence of organisation which we have seen from the time



STAIRCASE
Staff Club House

we left Charing Cross till the present moment. The great comfort of the arrangements of that special train that was provided for us; and, when we had arrived at Dartford station, the very interesting fire alarm drill, with its wonderful evidence of promptitude and precision; the extremely beautiful and, I may add, poetic inauguration service at the church, and the interesting, though it has been termed formal, opening of the Club and Institute, by Mr. Wellcome. I was very proud indeed, seeing that I have known the principals of the firm for so many years, and have watched their progress, to be the first one welcomed on this occasion by Mr. Wellcome when he opened the gates with that beautiful golden key, which has been presented to him by his managers.

“ I feel sure you will respond to this toast for, perhaps, a deeper reason than I have offered you up to the present time, and this is the spirit which characterises this firm from beginning to end, and which I take to be, first, the promotion of scientific and commercial research, and secondly, the promotion of good-fellowship amongst all the employees. Now, here I venture to speak, as Mr. Wellcome said, from the heart to the heart, because of my extreme interest in all that relates to research in pharmacy and the promotion of friendly intercourse amongst those who follow that calling. It is now 36 years since a few of us assembled in a very small room at Newcastle, and ventured to start an association (The British Pharmaceutical Conference) having objects which I find reflected here to-day— that is, the promotion of research in connection with pharmacy, and the promotion of good fellowship amongst the followers of that calling. I allude to it as I want to remind you once more that the objects of that society, which we ventured to set forth as objects that could be followed by the principals and by the employees of every pharmacy in this country, are the principles which are so successfully prosecuted by the firm of Burroughs Wellcome & Co.

“ I cannot but rejoice and congratulate Mr. Wellcome on the fact that, in addition to his organisation of scientific



SEATING ROOM
Staff Club House

and commercial research coupled with good fellowship, as indicated by this club, financial success, which has been abundantly deserved, has been realised.

"I must allude, before I sit down, to one other great pleasure that has forced itself upon me, though I must not say much about it, because a compliment to myself is in it, and that is that in every department of this great firm I find myself here to-day welcomed by my old pupils. Their merits have been realised by this firm, and I can assure them, though I am perfectly certain they need no such assurance, that the men they have obtained from the Bloomsbury Square Laboratories and Lecture Rooms were some of our brightest ornaments during the whole time I was connected with that Institution, viz., from 1863 to 1896. I come here and I find Mr. Lloyd Williams, Dr. Jowett, Mr. Carr, and many others—but really they are too numerous to mention—all old students who distinguished themselves at Bloomsbury Square, now occupying prominent and responsible positions in this firm.

"On all these grounds—and you will see I have given you a wealth of reasons—I heartily offer the toast of Messrs. Burroughs Wellcome & Co., and I will associate with the toast the name of the chief ornament of the firm, Mr. Henry S. Wellcome."

Mr. WELLCOME replied: "No one could fail to be deeply gratified by the honour Professor Attfield has done to our firm and to me. I, as a youth, took my first lessons in chemistry from Professor Attfield's text-book. This great master led my first steps in gaining a knowledge of chemistry, and I feel it a peculiar honour that he should have paid such a tribute to the results of the efforts to which I have devoted my life.

"Professor Attfield touched upon one feature of our work which is especially dear to me, that is my two Scientific Research Laboratories. We are sometimes asked



Music Room
Staff Club House

to say more about what is being done there. Our products constantly indicate to the profession important results. But you are not likely to learn the details of all our doings in the outside world. There is much extremely important work going on in these research laboratories of the highest scientific and practical importance—work that is satisfactory to us as marking progress and which promises us still greater advancement. The greatest work is sometimes done silently.”

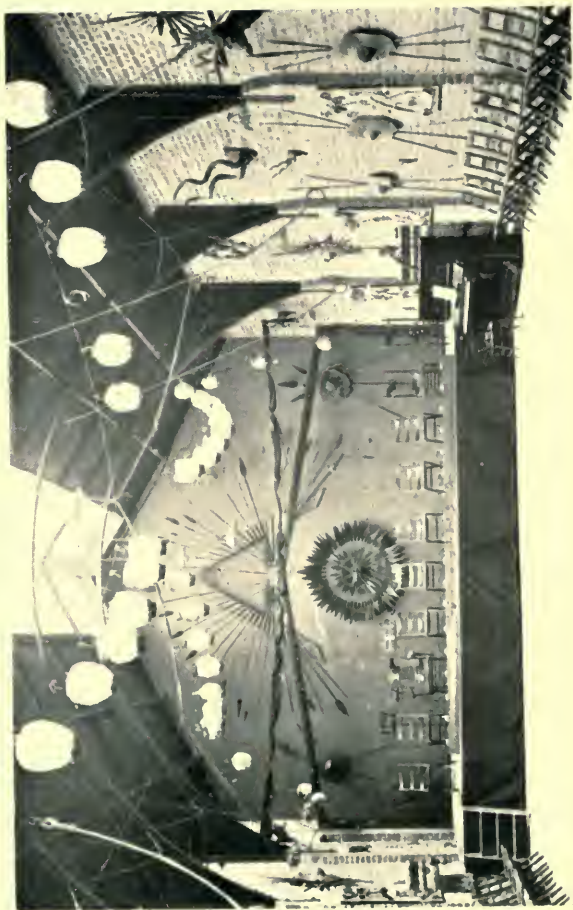
TOAST : “ THE PRESS AND VISITORS.”

THE CHAIRMAN said : “ We are honoured by the presence of distinguished visitors from the four quarters of the globe, and some of these are old and intimate personal friends of mine, who have strengthened me in my work by their counsel and their friendship. There are those of the Press here who have not failed when we have done anything that merited it to chronicle it, and this has been greatly to our advantage. We have only asked to be treated on our merits, and we have been treated justly by the Press. I will ask you to drink very heartily to the toast of The Press and the Visitors, connecting with the toast the name of Dr. Creasy, of the *British Medical Journal*.”

DR. CREASY replied : “ It is a very great privilege to be the guest of a firm like this. It is a privilege, moreover, because this firm is one that has gained, and gained rightly, the highest repute in the world for good scientific work of every description. What the Press says is only what is due to the splendid work that is done by the firm.”

ENTERTAINMENTS

Shortly after luncheon an adjournment was made to the sports field for a pretty floral maypole dance by a group of lady employees. This was followed by athletic sports, most of the events of which were very keenly contested and watched with intense interest. Tea was then served in the great marquee.



INTERIOR OF GYMNASIUM AND ASSEMBLY ROOM

In the evening there were well-contested aquatic sports, and a graceful and artistic musical bicycle ride by lady employees, the cycles being elaborately decorated with flowers. The presentation of the prizes followed, and the day's entertainment culminated in a magnificent display of fireworks and an illumination of the grounds. The twinkling of hundreds of fairy lights effectively arranged throughout the grounds, the glow of Chinese lanterns everywhere among the trees, and the flood of coloured light from the fireworks, combined to form an entrancing spectacle, which was further enhanced by the quivering reflections in the river and lake. It formed a delightful setting to the final events of a day which was as enjoyable as it was unique in the history of chemical industry.

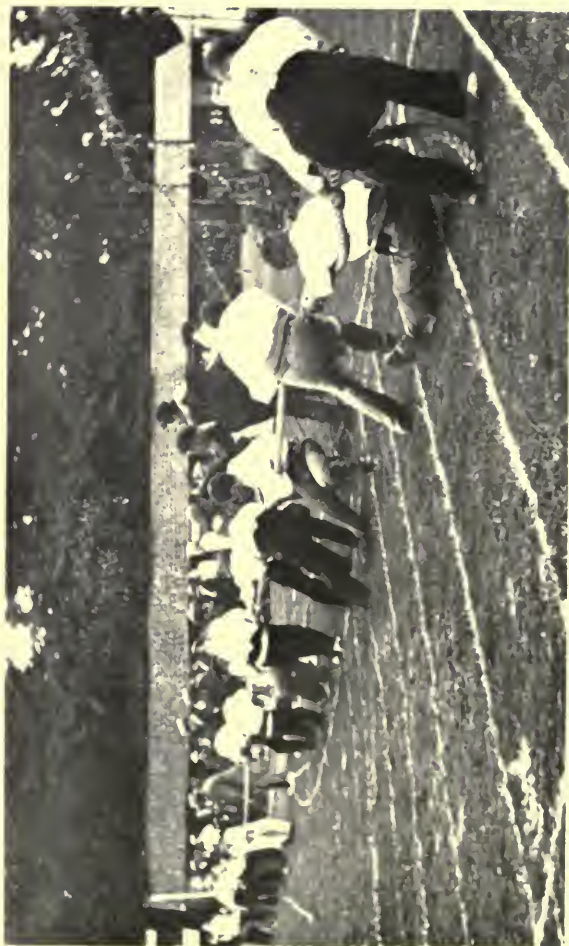
The absolute precision with which every item in the programme, from early morning until nearly midnight, was carried out, was evidence of a most complete and painstaking organisation, and was commented upon by scientific visitors as typical of the firm's remarkable scientific exactness in other directions.

. . .

The Wellcome Club and Institute thus happily inaugurated in 1899 has continued to thrive during the last twelve years, and has formed an attractive centre for social recreation and intellectual intercourse for the employees of the firm. Associated with it are now several subsidiary societies and sports clubs, all conducted by committees appointed by their respective members, and affording a congenial sphere of activity for widely differing tastes. These include the Philharmonic, Photographic and Horticultural Societies, the Hockey Club, the Ladies' Hockey Club, Croquet, Tennis and Cricket Clubs. There is also a very successful Book Club and Entertainment Committee which periodically concerns itself with fêtes, garden parties, concerts and other social events.



MAYPOLE DANCE BY LADY EMPLOYEES
Welcome Club and Institute



TUG OF WAR
Interdepartmental Wellcome Club and Institute

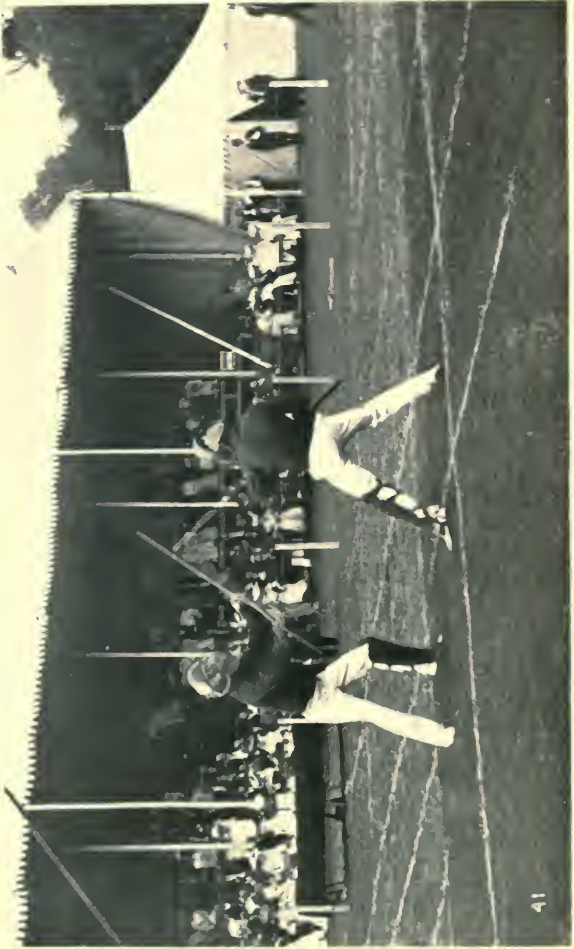


DUMB-BELL EXERCISES

By Members of the Gymnastic Club—Wellecome Club and Institute



GYMNASTIC EXERCISES
By Members of the Gamma Psi Club, Williams Club and Institute



QUARTER-STAFF DISPLAY
By Members of the Gymnastic Club Welcome Club and Institute



VOYAGE SPORTS

Member of the Swimming Club, Williams Club and Institute



QUARTER-MILE HANDICAP RACE
By Members of the Athletic Club - Wellesome Club and Institute



CROSS-COUNTRY RACE

E. M. (left) - The Athletic Club, Wellesley Club and Institute



HOCKEY MATCH
By Members of the Hockey Club - Wellcome Club and Institute



WINTER SCENE
In the Grounds of the Wellescome Club and Institute



BOATING ON THE LAKE
Wellcome Club and Institute



WHOLESALE CHEMISTS' AND DRUGGISTS' CRICKET
CHAMPIONSHIP, LONDON

Won by the WELLCOME CRICKET CLUB five years in succession.

During these five years the Club's record in the championship
matches was—

Won 31 Drawn 1 Lost 3

At the end of the five years the Club withdrew from competition



THE
GREEK
TEMPLE

WELLCOME CLUB AND INSTITUTE

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