

Parkes Pamphlet Collection: Volume 44

Publication/Creation

1837-1868

Persistent URL

<https://wellcomecollection.org/works/s8u93pyz>

License and attribution

You have permission to make copies of this work under a Creative Commons, Attribution, Non-commercial license.

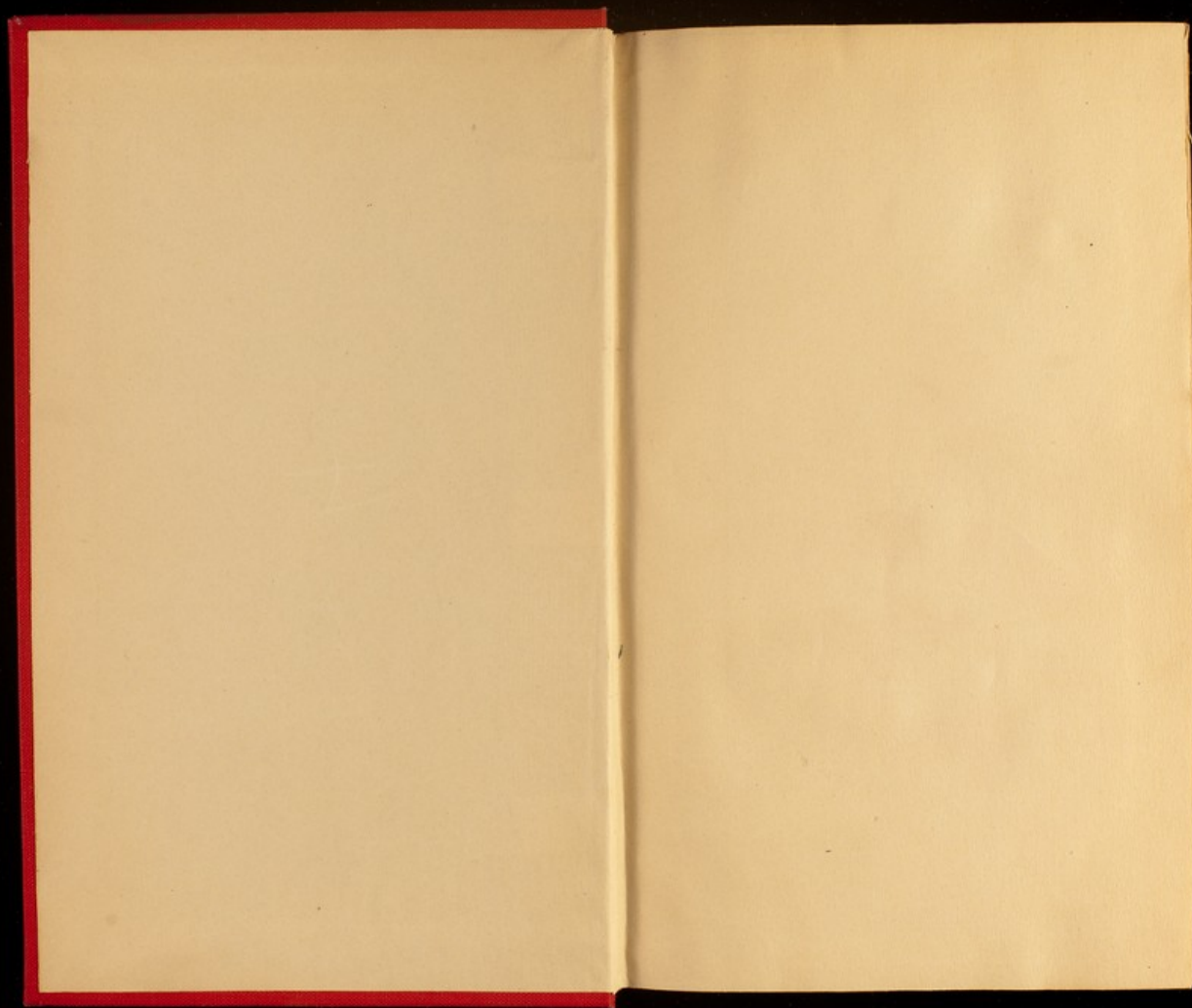
Non-commercial use includes private study, academic research, teaching, and other activities that are not primarily intended for, or directed towards, commercial advantage or private monetary compensation. See the Legal Code for further information.

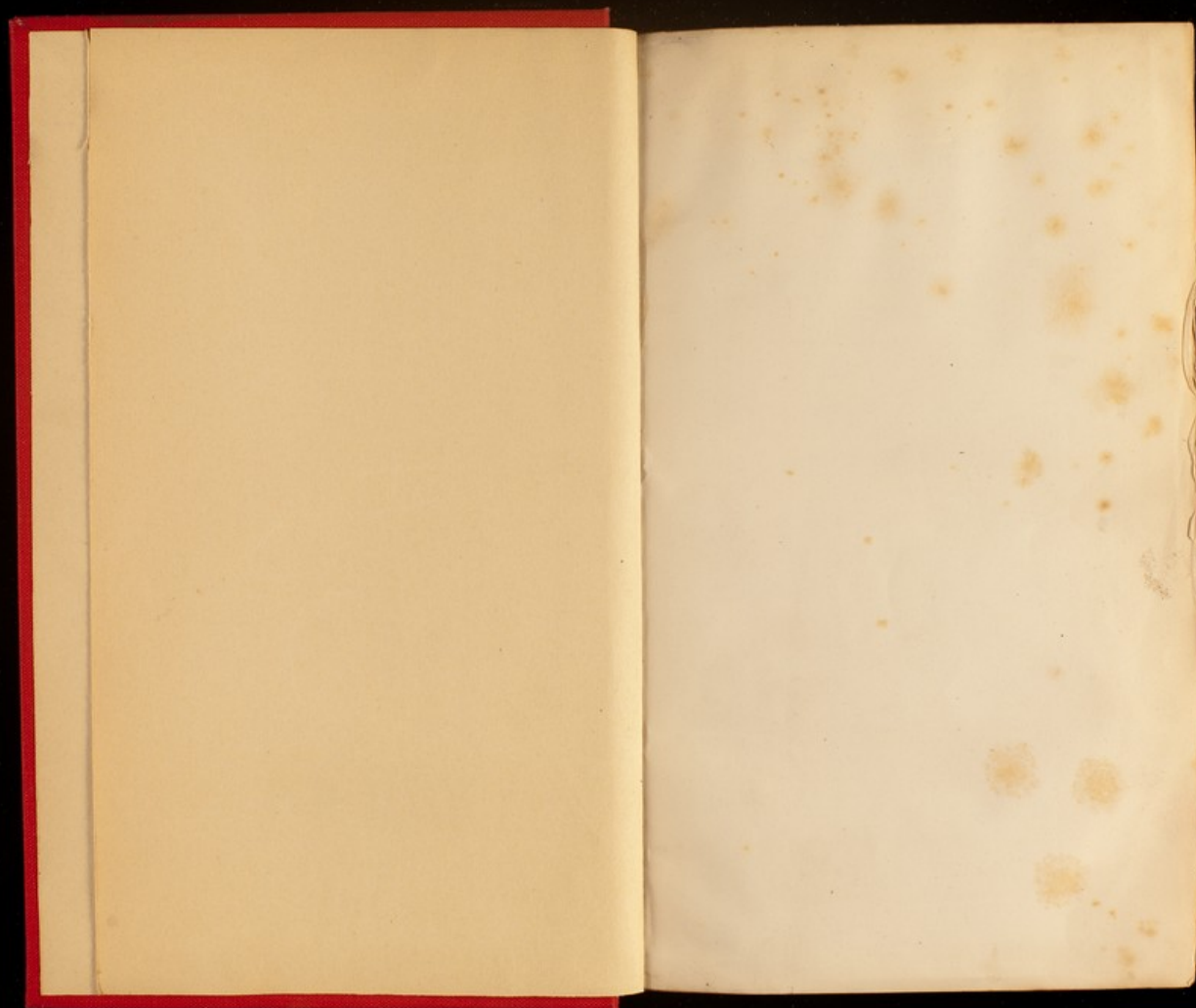
Image source should be attributed as specified in the full catalogue record. If no source is given the image should be attributed to Wellcome Collection.

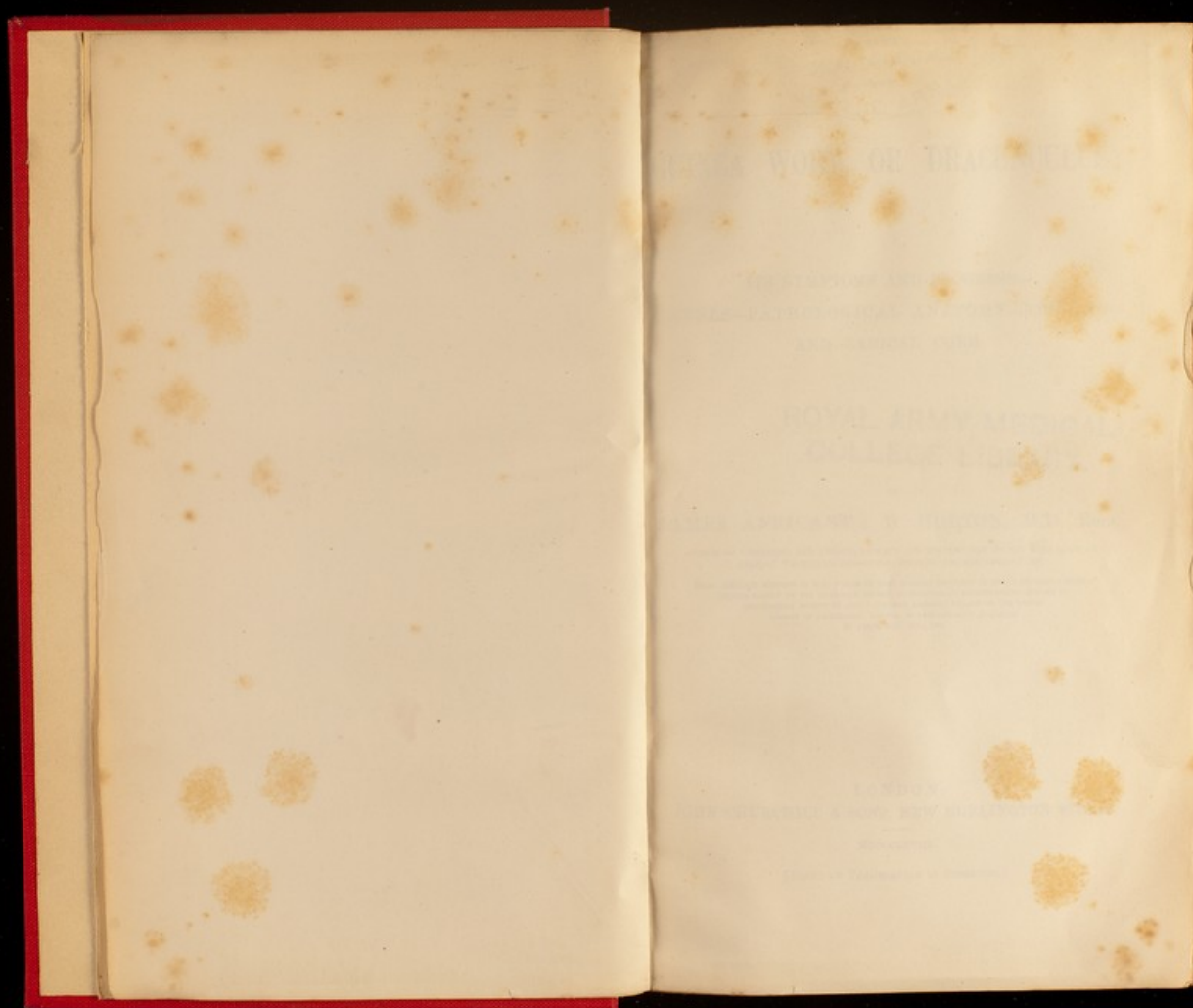


Wellcome Collection
183 Euston Road
London NW1 2BE UK
T +44 (0)20 7611 8722
E library@wellcomecollection.org
<https://wellcomecollection.org>

ETS









GUINEA WORM, OR DRACUNCULUS:

ITS SYMPTOMS AND PROGRESS—
CAUSES—PATHOLOGICAL ANATOMY—RESULTS—
AND RADICAL CURE.

ROYAL ARMY MEDICAL
COLLEGE LIBRARY.

BY

JAMES AFRICANUS B. HORTON, M.D. EDIN.,

AUTHOR OF "PHYSICAL AND MEDICAL CLIMATE AND METEOROLOGY OF THE WEST COAST OF AFRICA," "POLITICAL ECONOMY OF BRITISH WESTERN AFRICA," ETC.

STAFF ASSISTANT SURGEON OF H.M. FORCES IN WEST AFRICA; ASSOCIATE OF KING'S COLLEGE, LONDON;
FOREIGN FELLOW OF THE BOTANICAL SOCIETY OF EDINBURGH; CORRESPONDING MEMBER OF
THE MEDICAL SOCIETY OF KING'S COLLEGE, LONDON; FELLOW OF THE NORTH
SOCIETY OF EDINBURGH; MEMBER OF THE INSTITUTE D'AFRIQUE
DE PARIS, ETC., ETC., ETC.

LONDON:

JOHN CHURCHILL & SONS, NEW BURLINGTON STREET.

MDCCLXVIII.

[RIGHT OF TRANSLATION IS RESERVED.]

53

TO
T. G. LOGAN, ESQ., M.D., C.B.,
DIRECTOR GENERAL OF THE ARMY MEDICAL DEPARTMENT,
Ac., Ac., Ac.,

This Work
IS MOST RESPECTFULLY DEDICATED,
BY HIS OBEДИENT SERVANT,
THE AUTHOR.

LONDON: W. A. JOHNSON, PRINTER, 121, FLEET-STREET, W.C.

P R E F A C E.

THE present Abyssinian Campaign has brought into prominent discussion the subject of Guinea Worm, and as there appeared to be, from the publications lately in non-medical journals, a great many mistakes in the description and character of this disease, I beg to submit the following observations, which I carefully made whilst serving with H. M. Forces on the Gold Coast, West Africa, where the disease is fearfully endemic.

J. A. B. HORTON, M.D.,
Staff Assistant-Surgeon.

R. V. HOSPITAL, NETLEY,
December, 1867.

GUINEA WORM, OR DRACUNCULUS.

GENERAL OBSERVATIONS.

Filaria, Mendinensis, Dracunculus, or Guinea Worm is a disease peculiar only to certain districts in different tropical quarters of the globe. It is most common in places where there is great scarcity of water, or where there are abundance of stagnant pools; thus it is peculiar to certain parts of Asia and Africa. In the former continent it is found in various parts of Sennaar, India, Persia, and Arabia; and in the latter it occurs in Egypt, Nubia, and Abyssinia, in Senegambia, and in the various districts on the Gold Coast, including Apollonia, Ashantee, Ahanta, Wassaw, Denkera, Abrah, Assin, Akim, Winnebah, Accra, Aquapim, Aquamboe, Crobbœ, and Adangme; beyond the Volta, in the Dahomean countries, it occurs sporadically in Aungla or Awoonah, and in Sumah or Abosumah.

SYMPTOMS AND PROGRESS.

The question of the symptoms of Guinea Worm involves the question of its accession, incubation, and maturity. *Accession*.—This period of the worm is never known, for a person might expose himself to the influence which will lead to the production of the disease, without at all noticing any visible change on the cutaneous surface of the parts likely to be affected,

yet after a few weeks or months the usual symptoms of Guinea Worm begin to make their appearance. In some cases the patient might be attacked with several worms at once, as in cases which have come under my notice, one appearing a few days after the other, and two or more simultaneously. Mr. Forbes mentions cases where fifteen worms were at one time exposed; the largest number I have seen was eight.

The pointed rigid extremity of the young worm, "a long cone, ending in a point so inconceivably fine that the point of a cambric needle is a large marlinspike in comparison with it," accounts for the ease with which it makes its lodgment quietly in the tissues of the body through the sudorific ducts.

Incubation.—This period is very various; in some cases—i.e., those in which the worm receives imperfect pabulum from the surrounding tissue—it remains in the subcutaneous cellular tissue for a long time, even months or years, before it manifests its local effects. It is of such frequent occurrence on the West Coast of Africa, that American captains or supercargoes, who remain there for several months or years, travelling from one place to the other, sometimes through mud and swamps, do not observe the least sign that they have contracted the disease until they leave the Coast and approach the colder climate of America, when the peculiar swelling characteristic of the worm appears; in fact, many arrive in America and remain there for some months before the disease begins.

But there are often cases where a person can trace the occurrence of the worm to certain exposure of very recent date, so that this latent period of the worm is most uncertain; sometimes it extends to months, and even years, at other times only to a few weeks. During

this period it resides quietly in the connective tissue, increasing in growth, without producing any irritation in the tissues around.

The period of accession and incubation may be conveniently regarded as the dormant stage of the animal; we have now to consider its period or *stage of excitability* or *maturity*. This is the period at which the patient is made cognizant that he has contracted the disease, prior to which there is no marked constitutional disturbance, progression is by no means impeded, and the person goes about unconscious of the existence of the worm. It is now known that this is the hatching period of the worm, a period when both itself and its progeny are in full maturity; and the uneasiness caused by the overloading of its proligerous capsule, by myriads of young filaria, induces it to endeavour to make its escape or unload itself. This process is instinctive. The worm first enters the system through the sweat glands as a very minute worm, imbeds itself in the subdermoid cellular tissue, receives its pabulum from the humorous fluid from the surrounding parts, grows very rapidly in some cases, slowly in others, becomes filled with embryo, and then endeavours to make its escape.

At this stage of the worm's existence, the individual invariably suffers an attack of fever, sometimes slight, at other times very severe; in some the stomach suffers from severe irritation, leading to bilious vomiting; in most cases, especially at first attacks, the skin itches a great deal, occasioning a small pimple or blister; this is in general a certain sign in a Dracunculus district, especially when accompanied with a swelling. The worm generally commences its operation at night, when the patient is perfectly

quiet, by producing a slight inflammation on the portion of the skin where it intends to make its exit; the point itches dreadfully, and on attention being drawn to it, it is found to be raised into a small vesicle or blister; this gives some pain, and on rubbing it the surface is laid open, and in many cases a portion of the worm—the anterior end—protrudes from it. The fluid of the vesicle at this stage is clear and limpid; but if unopened for two days, the “contents become turbid, and sometimes bloody, from the rupture of the proliferous sac, and the discharge of the young filaria amongst the serum.” As the worm protrudes from the ulcerated surface, if it is at once secured and tied round a small stick or a crow-quill, and then gradually withdrawn from the system without breaking, the parts are freed from its effects, if there is no other worm; but it is seldom so easily cured, as in a great many cases it is broken or retreats before secured, and the dreadful symptoms characteristic of the worm in a few hours begin to appear.

The worm now produces a very severe, extensive, and destructive inflammation in the cellular tissue in the neighbourhood of and beyond its abode; the former outlet is now closed up; severe and intense pain is felt over the affected part; the foot increases twice or three times its size, is very tender to the touch, and in very severe cases progression is entirely prevented. In these cases there is generally no great constitutional disturbance; the tongue may be slightly coated, or there may be a slight feverish state of body, but nothing further except when there has been very great neglect, and death of tissue has taken place; then the constitutional disturbance becomes commensurate with the extent of the destruction of tissue. When matter has been fully

formed, the point of exit is generally indicated, and immediate relief is obtained; when opened, shreds of Guinea Worm escape through it from time to time. In some cases a perfect worm escapes with the gush of pus which takes place; and if the inflammation is very severe, shreds of cellular tissue slough out and are discharged. Sometimes the pus becomes surrounded by a pyogenic membrane, enclosing the worm entirely, and when opened it gushes out with the matter. When once a foot is attacked with Guinea Worm, it becomes more susceptible to the disease than previously.

Sometimes Guinea Worm produces excitement on one part of the body at one time, and after remaining quietly for some days or months, produces excitement in another part; this will lead us to the consideration of a peculiar habit of this worm, which I have termed the *iter, or journey, of the Guinea Worm*. It is not an uncommon thing for a patient to trace out the course the worm pursues in the system. Sometimes this journey is very painful, and causes irritation and inflammation; at another time this process is performed without producing the least inconvenience, and generally at night, when the patient is still; and after remaining in its new abode for some time, it may begin to produce its characteristic irritation, or may make another move; very often it is impeded in its progress, when it at once commences to set up inflammation. It is not unfrequent to meet with individuals who once had Guinea Worm in the ankle, which was quieted by poulticing and rest, having worm in the middle of the leg, and when the direction is through the calf it reaches the thigh and there remains; in a great many cases a cord-like feeling may be traced with the fingers along the course of the worm. In the “Indian Annals,” Dr.

L. W. Stewart, of Madras, relates a very interesting instance of the migratory character of the *Dracunculus*, which happened to an officer who had extracted a worm fifteen inches long from his scrotum: "Ten days afterwards he experienced an unpleasant sensation in the posterior aspect of the left thigh. Day by day the sensation shifted lower down, till it reached the popliteal space. A few days later the sensation was experienced in the calf. Hitherto nothing was visible; but at the end of sixteen days from the first sensation in the thigh, the convolutions of a Guinea Worm could be distinctly traced at the outer side of the ankle-joint. Dr. Stewart now wished to cut down and extract the parasite, but the evening was too dark, and he delayed till the following morning. By the morning visit, however, the parasite had again fled, and had taken up a position in the deeper muscles of the foot; not a trace of the worm could be recognized in the place which he had evacuated. Many abscesses now formed, and severe inflammation of the foot resulted, which confined the patient for three months before he was free of this wandering parasite."

PATHOLOGICAL ANATOMY.

The Guinea Worm attacks the skin either in the form of a minute worm when it passes through the pore or sweat-duct, or in the form of a minute larval embryo in contact with a broken surface of the body. The young Guinea Worm presents the following structure: A head, and a hair-like, finely-pointed tail; the "body constitutes three-fifths, and the tail two-fifths of the whole length. The anterior extremity has a blunted end, with an oval orifice communicating with a cavity occupying about one-half of the whole

length of the body, and terminating cæcally." The minute worm which attacks the body occurs principally in muddy banks, in the bottom of tanks, and in soft, muddy pools; it is computed to be from 1-60th to 1-25th of an inch in length. On entering the body, it is imbedded in the soft and yielding cellular and adipose tissue from whence it abstracts its food. In very fat individuals, who are not of active habits, the worm grows very rapidly, and sometimes within a few weeks it begins to produce local irritation, and endeavours to make its escape; in thin, slender, active persons the reverse is the case.

The full-grown worm varies greatly in length, and on account of its extreme elasticity it is difficult to arrive at a correct measurement; the average length is about twenty inches, and the average diameter in the largest part is about an eighth of an inch. Ewart places the average length at 25.25; the shortest at 12½, and the longest at 40 inches. "Clot Bey records their length at from 6 inches to 4 feet in Egypt. Carter gives their dimensions in India at about 28 inches long and one-ninth of an inch in diameter. Busk gives the dimension at from 4 to 6 feet, and one-twelfth of an inch in diameter." When first removed from the body, the full-grown worm looks like a white cord, small at both ends and large towards the middle, especially the middle third from the tail. The worm may be divided into two parts, a head and a tail. The head terminates abruptly in a cruciform mouth, by which it extracts food from the surrounding tissue; the tail tapers, and terminates in a hook-like process of very delicate texture. The body of the worm is divided into two chambers—viz., the alimentary canal, which is placed in the centre, and by far the smaller

chamber; and the larger one, situated between the alimentary canal and the outer coat of the worm, which is filled with a white, milky fluid, holding in suspension myriads of microscopic embryo. When kept in spirit, this milky fluid becomes coagulated, and so the worm partakes of the character of a whipcord.

Very recently, Dr. Bastian, of University College, read an elaborate paper on the anatomy of the Guinea Worm in the Linnean Society, which was published in their *Transactions* for 1863. The following is the summary of his observations, as quoted by Dr. Aitkin:—

"The anterior end of the worm may be recognized by a 'punctum' in its centre $\frac{1}{20000}$ th of an inch in diameter, surrounded by rugæ in circles, the external of which was $\frac{1}{271}$ st of an inch in diameter. Above and below are two papillæ opposite each other, with a transparent area in the centre of each. These are rather oval, $\frac{1}{475}$ th of an inch in diameter, with a transparent area of $\frac{1}{19000}$ th of an inch. Besides these, two lateral tubercles exist, much smaller, more indistinct, and farther from the punctum than the upper and lower papillæ. They are $\frac{1}{19000}$ th of an inch in diameter.

"It is difficult to obtain a good view of the head, for, as it is the first part to protrude through the skin, it is usually rubbed off or destroyed by the treatment adopted for extraction.

"Great varieties in form are presented by the tail or posterior end of the worm. The remains of the attenuated extremity of the young *Filaria*, being more or less persistent in the form of a hook or spikelet, were believed at one time to be the penis of a male; and such specimens as showed such spikelets have been

mistaken for male Guinea Worms. All these forms, as Busk showed, have been found in specimens containing living young ones (proligerous). All are females that have yet been found, and no males are known to have existed in the human body. The strength of the tissue of the *Dracunculus* is such, that a loop of the parasite will suspend a weight of $11\frac{3}{4}$ ounces (Scott), and it is elastic to a remarkable degree. On opening the body, two longitudinal muscular bands are seen on the dorsal and two on the transverse rugæ, marking the whole extent of the worm; and these are approximated or apart, as the worm is contracted or extended. The body of the worm contains an alimentary canal, which commences at the 'punctum,' and terminates in the concavity of the tail end. It is of a yellow colour, nearly uniform in size throughout its extent, and in its course through the body winds several times round the genital tube (Bastian). No outlet has yet been detected. It is distinct from the tube containing the young (Forbes).

"The genital organs consist of a large uterine sac or tube, occupying nearly the whole length of the worm, and terminating abruptly at either extremity in a much smaller tube (probably ovarian), about three-quarters of an inch in length. No vagina or vulva can be discovered (Bastian).

"The whole extent of this uterine sac or capsule is crowded with innumerable young, and, with the exception of a transparent half-inch or so of the worm, the whole extent of the parent seems to be a *uterus*, a *matrix*, or a proligerous capsule, carrying a countless offspring, to which no parturient female of any animal can be compared for productiveness; and from the fact that no inlet has ever been discovered to the

genital organ, and from various other circumstances, Mr. Bastian has endeavoured to show that this innumerable progeny has been produced by a process of parthenogenesis, similar to that with which we are so familiar in *Aphis*."

The attempt of the worm to relieve itself from the tissues of the body is instinctive; the general cavity being loaded with myriads of embryo, of matured size, produces excitability and a feeling of great weight in the worm, which causes it to endeavour to get out of the system. If the worm be removed entire, the person is said to be perfectly cured; but should it be broken in the process, the remaining part recoils in its subcutaneous or submuscular recesses, the embryo, with the milky juice discharged in the tissue, acting as a powerful irritant, causing intense inflammation, by which the whole of the discharged embryo and the full-grown worm are discharged from the system. Guinea Worm does not only occupy the superficial cellular tissue, but also the deep-seated ones between the muscles; this in most cases regulates the character of the inflammation. When removed from the system alive, the worm moves very sluggishly, by an undulation of its central portion, the head and tail remaining apparently unmoved.

I shall here give the report of six characteristic cases of Guinea Worm, treated on the (Guinea Coast) Gold Coast of Western Africa.

CASE I.

W. X., son of Chief Quapia, of Anamaboe, complained of great swelling, pain, and tension over the pubis, which produced severe irritation in the system.

History.—About three weeks before the 3rd

January, 1859, patient felt great pain over the pubis, with irritation and itching sensation; pain gradually increased, so that at the end of three days the parts began to be rapidly swollen. Patient had Guinea Worm before, but on the ankle, and could not account for the curious position of the present attack. Both sides of the pubis were affected, being swollen and painful. About a week ago he felt great pain and pressure in the testicle, which completely prevented him from going out; both groins became very painful and much swollen; about two days ago one ulcerated, and a large quantity of matter discharged; the pain was not diminished, but continued as before.

Symptoms on Examination.—Great swelling all over the umbilical, hypogastric, and the two lumbar regions; great tension of the epidermis, which showed a slight degree of cracks; intense pain felt on pressure; the tension much increased towards the umbilical region; scrotum much pushed down, and penis slightly erected. Patient was unable to stand erect from the pain. The tongue was lightly coated in the centre, but clean in the edges; appetite good, but not exactly as before; bowels not regular; patient complained of frequent micturition, caused by the pressure of the swelling over the bladder; the urine deposits a brick-dust sediment; no difficulty felt in passing it. Pulse 90, hard and excitable; action of the heart very strong; patient complains of a painful headache, and a general sense of weakness. There is a small opening above the pubis.

Treatment.—The spontaneous opening above the pubis was extended with the lancet, which led to a copious discharge of matter, followed by great relief; about six ounces of healthy pus was discharged in the

course of the evening. Fomentation with warm water, and application of a large poultice were at once ordered, and the following aperient to be taken :—

RECIPE :—

Sulphate of Magnesia . . .	1 oz.
Dilute Sulphuric Acid . . .	20 min.
Sweet Spirit of Nitre . . .	2 fl. drms.
Infusion of Senna . . .	7 fl. oz.

Mix. One ounce to be taken every four hours.

And the following tonic mixture :—

RECIPE :—

Disulphate of Quinine . . .	20 grs.
Co. Tincture of Orange Peel . .	1½ fl. drms.
Dilute Sulphuric Acid . . .	12 min.
Water . . .	10 fl. oz.

Mix. One ounce to be taken twice a day.

The diet should be nutritious, with a glass of port wine twice a-day.

January 5th.—A large quantity of matter was discharged during the course of the day. On examination the pulse was reduced to 80, still strong; tongue clean; appetite good; patient passed a better night than hitherto; swelling much reduced, as well as the pain and tension; discharge was profuse, and flowing from the under surface of the poultice into a large receptacle; shreds of dead fascia and broken Guinea Worm were constantly removed.

8th.—Patient very weak, but much better in general health; the discharge still continuous and profuse, as before; swelling about the groin much diminished, and less painful on pressure.

15th.—Quantity of discharge much reduced; patient greatly improved; able to walk about in the room, but

not without slight pain. To continue tonic mixture and wine.

22nd.—Patient quite well, a small healthy ulcer remaining, which closed up in a few days.

Commentary.—This patient had Guinea Worm before in his ankle, but could not account for its appearance in his pubis. There are two ways of accounting for it—either that of the worm travelling through the system, or of being contracted directly from the ground; the patient being accustomed to sleep on mats spread on the ground. The apparent point of attack, if the latter view be correct, was about three inches above the pubis on the raphe, inclining a little towards the left. This case exemplified the disastrous consequence of Guinea Worm when left to act freely in a part furnished with extensive loose cellular tissue; it produced dreadful inflammation, with death to the tissues around, extending from the umbilicus downwards and outwards to the groin.

CASE II.

E. B., æt. 19, complained of a swelling on the right side of the right thigh, and applied for relief on the 10th January.

History.—Patient states that about four weeks ago she had severe pain and swelling over the lower part of the right thigh, which gave her great uneasiness, and preventing her from pursuing her daily avocation. At its commencement it was tense, throbbing, and occasioned sleepless nights and a loss of appetite; but now she is much relieved of all the symptoms, except the swelling.

Symptoms on Examination.—A localized swelling at the junction of the upper two thirds and lower thirds

of the external portion of the right thigh; no healed ulcer observed over the swelling; the tumour moved from one side to the other according to the direction of the pressure; very superficial, and no pain during manipulation. I first passed the exploring needle, being in doubt as to its contents, and then opened it with Syme's abscess-knife; a large quantity of matter spurted out. When the cyst was half emptied, the tail of the worm made its appearance through the opening, and by gentle traction the whole was removed in a complete condition. To the wounded surface was applied a poultice made of Indian corn flour, and in a few days the patient was perfectly well.

Commentary.—In this case the *Dracunculus* had resided within this individual for some years. It first attacked her ankle, and then, after a considerable time, had made its way to the knee-joint, where the patient last felt the uneasiness; gradually ascending the thigh, it met some obstruction after leaving the knee, where inflammation was set up, which led to the formation of healthy pus. This had become localized, and surrounded by a pyogenic membrane, causing no pain, but mechanical unpleasantness. This sac, it appears, was either in connexion with the track of the worm, and the incision being made whilst it was in the sac, the sudden gush gave the worm no time to enter its proper retreat; or the track had been obliterated. This case, with many others, illustrates the migratory character of the Guinea Worm.

CASE III.

John Robson, æt. 31, a soldier, was admitted into hospital on the 1st of May, complaining of pain and swelling on the posterior portion of the ankle of the

left foot, which greatly impeded his walking. The swelling extended to the lower third of the back of the leg. A poultice was ordered to be applied.

May 3rd.—The swelling was opened; thirty drops of tincture of assafetida were given three times a-day.

4th.—Pain much diminished, but the swelling still continued; a part of the worm came out at night. Mixture to be continued.

5th.—Swelling much reduced; no pain, except around the ulcerated surface, and the patient could move about.

11th.—Patient quite well, and discharged from hospital.

CASE IV.

C. D., æt. 26, Private, No. 164, was admitted into hospital on the 1st June, complaining of great swelling in the left ankle.

History.—On being questioned, patient stated that about four years ago he first suffered from Guinea Worm, after he had taken a day's journey from James Town, Accra, to Aboody, during which he crossed several muddy swamps and rivulets. On his arrival at Aboody, he observed that the whole of his leg began to itch, and small pimples were scattered over his body. About the same time he observed uneasy irritation on the outer part of his left ankle, which afterwards blistered, and on scratching it the surface rubbed off, and a small portion of a Guinea Worm appeared; but not being secured, it receded into the system. After remaining for a short time, it produced severe destructive inflammation, and the whole ankle became much swollen, and a part ulcerated, and the worm in small shreds was discharged with the profuse

matter that escaped. Since then he has never suffered from Guinea Worm until two months ago, whilst on his way from Accra to Cape Coast Castle, a distance by land of nearly 130 miles, when he observed a worm, producing irritation and a blister on the same spot, protrude itself and again recede to its old chambers. It never troubled him until yesterday, when he began to feel the place painful and swollen.

Symptoms on Examination.—A great swelling all over the ankle of the left foot, very prominent towards the inner portion, but more so especially towards the outer side, extending to about four inches above the joint. About an inch above the external malleoli is a prominent part, which appears to be the seat of the old ulcer; it is soft and yielding to the touch. Patient felt a little feverish; tongue slightly coated; appetite good; bowels rather constipated; pulse slightly accelerated (86 full); great pain felt all over the portion of the foot affected, and which, together with the swelling, impedes progression.

Treatment.—Patient to have an aperient draught immediately, and thirty drops of the tincture of assa-fetida to be taken three times a-day, and a large poultice applied.

2nd.—Patient states that the pain is much easier; there is a thin fluid discharge from the old ulcer. Medicament to be continued.

7th.—Pain and tenderness on the back of the foot still continue, preventing patient entirely from walking. On inquiry, it was found out that the assa-fetida had only once been taken; it was ordered to be given three times a-day.

12th.—Back of the leg was lanced; a small quantity of matter discharged; pain much reduced.

13th.—Very little pain or tenderness; large quantity of matter discharged at night; slept very well; poultice to be continued; assa-fetida mixture discontinued.

15th.—Slight pain on pressure; progression easier; ulcer almost healed.

17th.—Patient quite well, and was discharged.

Commentary.—This case shows the result of not using the assa-fetida mixture in time. During the early stage of the disease, when used, the worm is immediately destroyed, the pain and swelling at once arrested, and the patient recovers; but when it is left until matter is formed, although the worm might be destroyed, yet still the existence of the matter in large quantity will keep up a great deal of irritation and pain until it is eliminated by the lancet, or the constant use of poultice. Progression will at the same time be impeded until the ulcer becomes healthy.

CASE V.

J. K., æt. 23, a private, applied to the hospital on the 9th June, complaining of pain and swelling on the ankle of the right foot, and on the posterior portion of the left knee, which entirely prevent him from walking.

History.—Patient states that he had only observed a swelling in his right ankle a month ago, previous to which he never had Guinea Worm. The first thing that attracted his attention was a small blister on the inner portion of the ankle of the right foot, and on opening it he found a small worm, about three inches long, which he drew out and secured with a string tied round his foot, and went to his usual regimental duties. The worm got dried up, and on attempting to

draw it out it broke, and the remaining part receded into its cavity in the cellular tissue, and produced severe inflammation and swelling. He was then admitted into hospital, and after remaining there for some time, and warm poulticing applied, he was discharged.

He was accustomed to bathe in salt water, and after doing so this time, the worm came out in small shreds, sometimes three inches long, sometimes two, and at other times one, which gave him great relief. About a week afterwards he observed the outer and back portion of his left leg began to be painful and swollen, and discharged matter and shreds of Guinea Worm, and prevented him from walking.

Symptoms on Examination.—On the right foot the ankle was much swollen, especially towards the internal malleolus, which also presented a small ulcer. The parts were very painful to the touch, and flexion and extension could not be performed without great pain. On the left side there was a painful swelling on the external and posterior portion, commencing from the upper third to the back of the knee; the swelling was in nodules running obliquely; there were also two small ulcers at the inferior termination. The pain was so great that progression on that leg was entirely out of the question; the leg was half flexed on the thigh, so that the patient could not move on it except by the aid of a walking-stick. The appetite was good, and bowels regular. Pulse 90 full, excited.

Treatment.—A large poultice to be applied, and an aperient mixture to be taken.

12th.—Patient was still in bed, unable to walk; pain on the leg slightly diminished; discharge from the ulcer scanty; swelling about the same. Ulcer in the

ankle closed up, the parts swollen and painful. It was opened, and a large quantity of matter discharged.

15th.—Patient still unable to walk, through the swelling of the leg, which discharges very scantily. The ulcer on the ankle is less painful, and the discharge healthy. Thirty drops of tincture of assafoetida were ordered to be taken three times a-day, and the poultice to be continued.

Vespere.—During the evening visit the patient was lying down; as soon as I came to his bedside he stood upright, without the least appearance of pain; the irritation had entirely gone; no pain unless when the parts were much pressed, and the patient can walk to and fro without any inconvenience; the ankle less painful, but still discharging.

20th.—Ulcer not yet healed; patient better, but could not put on shoes.

25th.—Ulcer quite well, and patient was discharged.

Commentary.—The effect of the assafoetida on this man was very remarkable; although previously he was a cripple, as soon as he took a sufficient quantity of the assafoetida he was able to move about within a few hours. The consecutive inflammation had most likely been produced by irritation of living worms, which were destroyed by its use.

CASE VI.

T. C. applied for relief at Dix Cove on the 5th August, having been suffering from an enlarged testicle.

History.—Patient states that several years ago he had an attack of Guinea Worm in his testicle, which kept him for a long time in bed. The testicle itself

was much swollen and inflamed; he had severe continued fever at the time, after which a portion ulcerated and discharged a large quantity of matter, which ultimately healed up, leaving the testicle enlarged.

About a week ago, after returning from delivering a Government message, it became inflamed and increased in size, and from the old sore a sanious fluid exudes; patient complains of severe pain, the scrotum very much enlarged, and very much hardened; and the testicle not easily detected through it.

Ordered a large poultice, which healed the ulcerated surface, but leaves the testicle still enlarged, though painless.

Commentary.—There are two points of great interest in this case—viz., a permanent enlargement of the testicle, and a hypertrophy of the scrotum. In the first case, the irritation and severe inflammation of the surrounding tissue had a secondary effect in enlarging the epididymis, and subsequently the whole testicle; and by the constant inflammation lymph became infused on the meshes of tissues between the glands, which became enlarged permanently. In the second point, the hypertrophy of the scrotum is so firm and massive that it formed the germ of that dreadful disease, called *Elephantiasis scroti*. Without knowing the history of the case, on first seeing the testicle, one will at once place the disease on that head; in fact, it had now changed its type, and *Elephantiasis scroti* is being formed. The Guinea Worm, therefore, is the excitant; and this is not the only case I have seen where an attack of Guinea Worm was followed by such elephantiasis.

CAUSES OF GUINEA WORM.

The causes of Guinea Worm have long been a disputed point amongst scientific men, and inhabitants of Guinea Worm districts. If the inhabitants along the West Coast of Africa, where the disease is endemic, are questioned as to the cause of the worm, they at once reply that it is not known for certain; but as the best view or the best hypothesis is that which embraces all known facts respecting the subject in question, so I shall here detail and review the different causes which have been alleged to have induced the disease, and then point out, from direct and circumstantial evidence, what is the most likely source of this pest.

I shall divide the causes into predisposing, or *causes which lead to the susceptibility of the system to the disease*; and exciting, or *immediate causation*. I shall, however, both on account of the importance of the latter, and also the bearing of the predisposing on the exciting cause, give the first consideration to the latter.

There are three views which have been maintained as the exciting causes of Guinea Worm—viz., that it is derived—

I.—FROM THE DRINKING-WATER THAT IS USED BY THE INHABITANTS.

II.—FROM HEREDITARY TRANSMISSION.

III.—FROM DIRECT CONTACT FROM THE EARTH.

We shall now consider the value of each of these causes. Those who maintain that drinking water was the cause, support their argument by the following considerations:—

1.—That Guinea Worm is only found where water is scarce—in fact, where the people use tank water.

This is not literally true, although it is principally found in places where water is not plentiful, as in Syria, Arabia, various parts of India, and northern regions of Africa; but it is also found in the tropical regions of Asia and Africa, where water is also abundant. In great numbers we meet with it among the coloured population in the West Indies; and in Western Africa, where I made it a point of special observation, it is very common in regions below the River Volta, where the people obtain good water in abundance by only digging a well three or four feet in depth. It should also be remembered that the poor class of the population in some places where the disease is endemic do not drink tank water, but well water, so that the argument of the drinking of tank water being the cause falls to the ground, since the disease is more prevalent amongst the lower than the higher class.

2.—*That the embryo worm could be seen in a larval state in the water drawn from the tank, which may lead to the deduction that the embryo, being very minute and disseminated in the water, is taken into the system, and distributed amongst the chylopoetic viscera, and thus transmitted into the system.*

It is a positive fact that when water is drawn from a tank that has not been cleansed for a long time, several small species of worm are seen very active and twisting about in the water. Some of these are the larval state of some insects; others are a peculiar worm known as Tank Worm. We meet with the larval state of the mosquitoes in great numbers. By being passed through the filter, the whole of these are removed. If we admit that the worm is taken up by the blood-

vessels which form a network in the chylopoetic viscera, some of the embryo at least will first be distributed in the liver; and as this organ is composed of a number of very minute vessels, a few must be arrested, and thus undergo the different changes necessary for the development of the worm; but we have never heard of Guinea Worm in the liver. I have seen it attack the sides, external wall of the thorax and abdomen, but never the internal organs.

Guinea Worm, therefore, in the system, cannot claim as its original source of production the tank water which is drunk by the inhabitants.

3.—*That the Guinea Worm sometimes attacks far and distant, as well as important organs, which cannot be from actual contact—e. g., the eye, tongue, &c.*

When Guinea Worm is found in the neighbourhood of the eyeball, it must have originally attacked the external surface of the parts near that organ, and cannot be said to be interrupted in the minute blood vessels in the eyeball and then undergo development. The history of the case will always clear up this part of the question. That Guinea Worm has been found in the interior of the eye, lodged in beds made for itself, and only making periodical movements, at that time causing irritation and slight inflammation without destroying vision, can scarcely be believed, on account of the destructive character of the worm. It is most likely that many of those who detail such cases confound it with the entozoa peculiar to the eye—viz., the *Filaria oculi*; for the latter is perfectly harmless when compared with the former.

The tongue has also been the seat of Guinea Worm. According to Dr. Scott, the socket of the eye, the

mouth, the cheeks, and the tongue have formed seats for it; and, according to M. Dubois, the nose, ears, and eyelids.

4.—*That it invariably attacks the lower class of the inhabitants, who drink bad water.*

The lower class of the people in the Gold Coast drink water that is accumulated during the rainy season in stagnant pools, or that obtained by digging a well a few feet into the earth, and which is very brackish, muddy, and unhealthy; they very seldom use tank water. On examining the well water, we do not find so many embryo organisms as in the tank water. More leeward, in the country of Awoonah or Aungla, the people obtain very good water from wells of the depth of from three to six feet, and yet they are affected with Guinea Worm. At Dix Cove, Apollonia, and Akim, where the inhabitants live on river and spring water, Guinea Worm appears to be more common in the first of these places than in any other parts where the disease is endemic.

It cannot be urged, therefore, that the drinking of bad water is the source of the worm, since it has been shown that people who have very good water, either from well or from spring, suffer alike with those who drink bad water where the disease is endemic.

The drinking-water, therefore, is not the source of Guinea Worm, as it is prevalent in places where water is abundant, and where the inhabitants do not use tank water.

II.—HEREDITARY TRANSMISSION.

In making observations on Guinea Worm as it occurs amongst the inhabitants of the Gold Coast, one

is sometimes told that it attacks children a few months or weeks after birth; and they account for it as being transmitted through the mother. This view, I am of opinion, is untenable, since the embryo worms are so large that they cannot be taken up by the absorbents, transmitted into the blood, and conveyed into the foetal system through the membrane which lies between the foetal and maternal system *in utero*. Hereditary transmission, therefore, is impossible.

III.—IMMEDIATE CONTACT FROM THE EARTH OR FROM AN INFECTED INDIVIDUAL.

Every argument goes to prove that this is the direct source of Guinea Worm. That this is the case is proved—

1.—*It occurs only among those who walk barefooted, either constantly or occasionally.*

In discussing the subject with the educated natives, some generally object to immediate contact, on the ground that Guinea Worm occurs on some who do not walk on their bare feet; but if we trace their minute actions we find that they either were accustomed in their youth to go without shoes, or only used them occasionally; that the disease was not engendered after they made shoes a constant part of their dress. Most of those in this class who have got Guinea Worm have travelled a good deal in the interior, and at seasons when the road is covered with mud and water. All authors agree that Guinea Worm exists in moist earth and mud; but the peculiar condition of the young worm before it attacks the system is as yet unknown. "It is probable that the hair-like worms found by gardeners in India coiled up together may be the

filaria of the Guinea Worm in sexual congress, whose progeny, as *zoöspores* or as filiferous females (like the Tank Worm of Carter), make their way into the body. It is known that the *Gordius aquaticus*, when young, enters the bodies of large water-beetles; and at a certain stage of life it leaves its abode in the beetle and goes into the water, where it becomes a variety of Tank Worm. It appears that there are white and brown Tank Worms—nay, that there are no fewer than seventeen species of minute *filaria*; and some say that all Tank Worms are white at first, but become black after a time in the water" (Aitken). But the difficulty is to determine the phase of existence of the young *filaria* after it has quitted the body of the parent, and lived an independent existence.

2.—That it occurs among Europeans who travel about.

That Guinea Worm attacks some European residents in the tropics has been used by some as a strong argument against direct causation, since Europeans are supposed to be always with, or very seldom without, their shoes. But Europeans who remain for a long time, and whose occupations require them to travel from place to place, become after a time careless of themselves, and unwittingly expose their bodies to the influence of the disease. Many a time during their travels have they been obliged in some places to walk on bare feet, or with shoes perfectly saturated with mud and dirt, not knowing that the element of a most painful disease could be transmitted into the system through it. In no case have I known of careful European English officers having been attacked with Guinea Worm, although some have been for several years in places where the disease is endemic; and this is

entirely due to the care they took of themselves. But merchants of long residence and free habits, and super-cargoes of merchant vessels, have been attacked.

3.—That it occurs principally on the lower extremity.

The part of the body in which this worm is most commonly found is in the lower extremities, the foot and ankle more particularly. Out of 300 cases noted, not less than 206 were on the foot; the next in frequency was the leg, then the testicle, and then the thigh: the face, back, breast, and tongue, being rarely affected in Africa.

The following statement, made from the observations of 300 cases, will show the frequency with which the different parts of the body are attacked:—

300 CASES.

Foot, including the ankle.....	206 cases.
Legs	38 "
Thighs	16 "
Testicle	19 "
Abdominal Walls	8 "
Breast	2 "
Face	2 "
Tongue	1 "
Back ..	1 "
Arms	7 "
Total	300 cases.

This is easily accounted for. In India it occurs in the lower extremity of those who are accustomed to go into tanks, dried-up wells which yield a very small quantity of water, where they remain till they can be supplied; they stir up the mud, which is the abode of the *filaria*, from which some make a lodgment in some part of their feet. In other parts it is obtained from

walking through mud and swamp, and also from washing in stagnant pools, disturbing the minute worms from the bottom of the water. Some length of residence is required for development. In the latter part of 1862, two companies of the 2nd West India Regiment landed at Cape Coast Castle, from Sierra Leone; not one had the Guinea Worm. After remaining there for twenty months, most of the cases of admittance into hospital from that disease during the late Ashantee expedition were entirely among that corps. In India it is exactly the same.

Dr. Forbes, whilst examining several tanks in India, in the neighbourhood of Dharwar, found numerous *filariæ* on their banks, and in half-dried beds, "some of them very much resembling those produced by the Guinea Worm when infesting the human limb. Their vermicular motion in the water is exactly the same; their general appearance is the same; and they are active and equally numerous. The point of a pen-knife inserted into the mud will raise up abundance for examination. They are most numerous where the water assumes a variegated appearance, with a pellicle floating on its ochry surface; the fine, soft, impalpable mud just above water-mark contains most, and the best time to find them is about three or four o'clock in the afternoon. Two kinds may generally be detected in the soft mud: one kind is seven or eight times the size of the Guinea Worm young *filariæ*; the other exactly resembles them."

4.—That when it occurs in the upper part of the body, it does so among those who sleep on the ground.

Besides the lower part of the leg, Guinea Worm is sometimes met with in other parts of the body. We

not unfrequently meet it in the thigh, testicle, walls of the abdomen, and sometimes in the upper extremity; this, of course, is not likely to have been produced by Guinea Worm in the foot. It is easily accounted for when we consider the habits of the people. In some parts of the tropics, and where the disease is endemic among the lower class, we find them recline on small mats spread on the ground, which in many cases is very damp. Should the embryo worm be about the spot, which is not unlikely, especially where the worm has prevailed in the family for many years, its access to the most dependent part of the body is very easy; its entrance is insidious, and it does not show itself until it is about to make its exit. Again, this class of people, as a general rule, are not upright pillars of sobriety, and in some of their bacchanalian fits they sometimes lie for hours on damp ground in almost perfect nudity, and on their face; so that the attack in the various parts of the body may easily be accounted for, and also shows that walking or standing in mud is not the only way an attack may be occasioned.

Washing in muddy tanks, or stagnant muddy pools, is another fruitful source. Mr. Mitchell, in the *Madras Times* (supplement) of 18th December, 1861, and 13th January, 1862, relates cases where he could date the accession of Guinea Worm from gentlemen bathing in tanks contrary to his advice.

But it is not all mud worms that are the essential *filariæ*; for in countries where it is not endemic the inhabitants may walk in mud and swamp, may bathe in stagnant pools, without any ill effect, although there are several minute worms in them, but these are not that particular species of *zoöspERM* which produces the Guinea Worm.

5.—*That a similar worm, called in some parts of Western Africa GROUND ITCH, but in the West Indies CHIGA, attacks the body by actual contact, and produces severe but moderate inflammation and an ulcer.*

At Sierra Leone and its neighbourhood, in the Gambia, and in the West Indies, this disease occurs, but it is not very general. Like the Guinea Worm, it generally attacks the sole of the foot, especially between the toes, or at the groove in the plantar surface of the toes. It is a very small worm, which pierces through the skin unobserved. The period of its activity is in the rainy season, when every place is damp; in the dry season the worm could be discovered in some places making a conical hollow in the ground, the small apex in the earth and the broad base on the surface. This opening is surrounded by very fine earth, and if care be taken in the search the worm could be detected in its recesses.

The period of attack is not generally known, but after a time the part itches a great deal, and becomes inflamed, and if hot fomentation and warm Soursour (*Albutilon esculentum*) leaves be applied to it, the inflammation soon subsides; a small ulcer opens, the worm escapes, the parts are healed, and the patient never suffers again from it. But if care is not taken from the beginning, it remains for a long time as a troublesome ulcer, and heals very slowly, interfering with the general health of the individual.

Here is now a minute worm that attacks by actual contact a certain class of people—viz., those who walk barefooted—presenting similar symptoms as the Guinea Worm. The period of entrance is in both cases unknown, both are excited by cold, and are more preva-

lent during the rainy season than at any other time. Each produces the same symptoms of irritation or itching, which terminate in an ulcer. They differ in the degree of inflammation, in the size of the worm, and in the after effect. The Guinea Worm attacks the soft and yielding flesh, preferring to habitate in the soft and yielding meshwork of cellular tissue situated between the true skin and the adjacent parts, and also between the muscles; whilst the "*Ground Itch*" attacks the unyielding hard derma that covers the sole of the foot, preferring, however, the more yielding part towards the base of the toes.

Direct contact, therefore, is the sole manner by which Guinea Worm enters the body; but there are cases where gentlemen are affected with it in parts where it is impossible for them to account for it, such as when it occurs in the scrotum or testicle, among men who neither wash in muddy ponds nor sleep on the floor. In these seemingly unaccountable cases, I am of opinion (although it is opposed to the views of M'Gregor, Bruce, Paton, and others) that the disease is contracted by contact with an infected individual. Females most likely impart it in this way; and if the worm or the larvæ of this worm come in contact with a broken surface or with a highly dilated sudorific duct or pore, it will soon find its way into the subdermoid cellular tissue, and after extracting nourishment from the surrounding tissue, increase gradually or rapidly in size, according to the condition of the patient, until its excitable stage arrives, when it leaves the body.

PREVALENCE OF GUINEA WORM—PERIOD OF THE YEAR.

Guinea Worm is most prevalent during the rainy season in all those places where I made my observa-

tions. Its prevalence commences with the commencement of the rainy season. When the weather is hot, uniform, and dry, individuals are generally free from it. I have observed its prevalence also during the constant blowing of the harmatlan winds, when the weather is cold. The cold season, therefore, seems to be the period of irritation, although it may come on at any other season. I believe we may explain it from the supposition that during the hot season the temperature of the body is uniform, especially in the lower extremity, which is the most constant abode of the worm; but during the cold weather (the worm occurring principally among those persons who go barefooted, exposing them to wet and cold) the worm feels the change, the temperature of its medium becomes changeable, now hot, now cold, which leads it, especially when loaded with eggs, to endeavour to make its escape and discharge them. It then causes severe inflammation and a blister over the part where it intends to make its exit. In India it occurs variously in different parts, but most frequently at the commencement of the rainy season, and reaches its maximum in the middle of the rainy season, as in Bombay, Mattoongha, Kirkee, and vicinity. In the West Coast of Africa it is prevalent also at the commencement of the rainy season, in the Gold Coast and Bight of Benin. In the Gambia, Senegal, and Northern Africa, it is more prevalent in the cold months of December, January, and February; as is the case at Sattimungalum, in the Carnatic villages, according to Dubois (a missionary).

LOCALITY AND PROPAGATION.

Guinea Worm is more prevalent in places where

water is scarce, and where the soil is generally of a secondary formation, consisting of traps of igneous origin. But this is not absolutely the case, as I have known Guinea Worm to be endemic in soils which consist of dark alluvial loam, without igneous origin, and where the rocks consisted of red sandstone. But here the number of cases were very few, and the disease is more a rarity, although it is indigenous to the country.

Scott, Chisholm, Carter, and many others agree that this worm abounds in countries of volcanic origin, where the soil is composed of decomposed trap, of argillaceous consistence, holding moisture percolated by sea-water or impregnated with salt. And this is a very correct view, for where I have met with it in the greatest abundance was in places where trappean rocks of volcanic origin were undergoing extensive decomposition.* The young embryo worm, after being relieved from the parent, who must die when its young is full-grown, undergoes various changes which as yet are unknown, examination of it in this stage being so difficult; they undergo quite a different stage of existence, metamorphic changes take place in them, sexual organs become developed. How many phases or generations the worm undergoes is unknown, but the impregnated female *filaria* or *zoöspERM*, the progeny of the sexual *filariæ*, and not that of the full-grown female Guinea Worm removed from the body, seems to be the animal which attacks the human body and is known as *Dracunculus*.

* The author's work on "The Physical and Medical Climate of Western Africa," "Geological Nature of the Soil of the Gold Coast," p. 127. Churchill, London, 1867.

RESULTS OF GUINEA WORM.

In places where Guinea Worm is prevalent (as on the Gold Coast of Western Africa, &c.), the population are remarkable for the number of distortions and deformities of various kinds met with, and the most fruitful source is to be traced to this detestable pest. They are—

1.—DISTORTIONS OF THE LOWER EXTREMITIES.

(a) *Contraction of the Calf upon the Thigh.*—This takes place when the Guinea Worm attacks the calf. It sometimes is so mild that no contraction takes place; but when it is severe, and when two or more worms are present, the calf becomes so much swollen and tense that the individual is unable to walk. The leg contracts on the thigh, and, if proper means be not applied, this stage continues for a long time; the muscles being kept in that contracted position, and the irritation producing great changes in the minute structure of the muscular substance, the contraction becomes permanent. But the contraction may not only depend on the changes in the muscular fibre, but may depend upon that of the fibrous expansion on the posterior portion of the knee through the irritation. But in both contractions the distortion is easily remedied if early attended to.

(b) *Talipes Equinus.*—This disease commonly comes on when the abscess produced by the worm affects greatly the muscles of the calf, crippling the Gastrocnemii. It is a very troublesome attendant, and remains so after the worm has been removed. When very severe, the *tendo Achillis* will be required to be divided before any cure can be effected.

(c) *Permanent Swelling in the Internal Malleolus.*—

This is the invariable effect of Guinea Worm when it attacks the region of the ankle-joint, which is the most frequent place. The skin and subdermoid tissue become oedematous, and constant irritation makes the tissue permanently hypertrophied. When, however, the Guinea Worm has been destroyed and removed, and the parts remain undisturbed for a long time, it gradually diminishes, until the swelling is almost entirely removed.

2.—MORTIFICATION OF A PART OF THE LOWER EXTREMITIES.

(a) *Mortification of the Toes.*—It is not an unfrequent thing to find this worm invading the dorsal aspect of the foot, in which case the inflammation sometimes affects one or more of the tarso-metatarsal or metatarsophalangeal joints; and in not a few instances the toes have mortified and undergone spontaneous amputation.

(b) *Mortification of the Foot, requiring Amputation.*—Cases like these are not unfrequent, especially in persons in whom Guinea Worm commences in the ankle, and who have not had proper attendance. It is the habit of the natives, in treating this affection, to apply to the ulcer as hot a compound as they can make up. Cayenne pepper is one of the most frequent ingredients, and when applied to the sore, it increases the inflammation. The lower class of the people are filthy in their habits, so that the sore sometimes is never washed for weeks. The consequence is, after a time the joints become involved, and the parts much tumefied; the whole of the back of the leg is involved; the coats of the vessels share the same fate; circulation to the foot is interrupted, the temperature falls, and sensibility is lost; the tissues about the ankle slough out, and the dead foot hangs by the

tendons which run from the leg. I had a case of this kind, in which I was obliged to perform amputation of the leg.

(c) *Mortification of the Leg.*—This generally follows the mortification of the foot, when the ankle and the lower part of the leg are involved, and proper care is not taken to prevent the mortification extending to the middle of the thigh. In these cases it will be found that the Guinea Worm had made its journey to that distance, and had produced some change, more or less, or positive mischief in the parts; the gangrenous matter extends to that distance, and destruction and death of tissue is the result. In a case of the kind that I saw, which occurred in a child, the lower third of the tibia was laid bare, the foot was quite detached, and the line of demarcation was situated nearly at the middle third. Amputation was performed above the knee-joint, and the patient recovered.

3.—ENLARGEMENT OF THE TESTICLE AND SCROTUM— HYDROCELE.

Enlargement of the testicle is caused when the Guinea Worm affects that organ, or tissues in its immediate neighbourhood. When the worm is in the latter position, it may produce merely a very mild inflammation, leading to simple enlargement of the fibrous tissue covering the testis; but its seat is generally in the loose cellular tissue, in which it moves freely and travels about, sometimes without causing any great pain or inconvenience; and in such a case when extracted it produces no injurious effects in the testicle, for it maintains its natural size, whilst the cellular tissue around it and the muscular fibre become thickened.

Sometimes, however, it does not run such an easy course, but produces a severe inflammation, which leads to the effusion of lymph in the cellular tissue, which ultimately becomes organized; the serous membranes covering the testicle—viz., the *tunica albuginea* and *tunica vasculosa*—become united through the inflammation; the testicle greatly and permanently enlarged, and very painful, especially when it involves the Epididymis. Sometimes the inflammation of the serous membrane is not high, and slight *Hydrocele* is the result, but in all cases the scrotum suffers more or less enlargement with the testicle.

4.—ENLARGEMENT OF THE BREAST, AND ATROPHY OR DESTRUCTION OF THE GALACTOPHOUS GLANDS.

The breast is a very uncommon place for Guinea Worm to attack; and when it does attack this part of the body, it produces severe agony to the patient. Out of three hundred cases collected by me, it occurred only in two. Guinea Worm in the breast may be merely a simple inflammation of the cellular tissue, without affecting the gland; but most generally the glands are involved, and abscesses formed in different parts. It occasions great pain, redness, and tenderness; the tissues are infiltrated to a great extent, matter accumulates and is discharged, when relief is obtained. Should the Guinea Worm at this time be removed or discharged, the ulcer quickly heals up, after discharging for some days a large quantity of matter. The swelling gradually reduces, but the breast maintains a size one-half or more larger than the other. Sometimes some of the glands are destroyed or atrophied, a few healthy ones still remaining, but in every case the breast is incapable of performing its functions satisfactorily.

5.—ELEPHANTIASIS ARABICUM.

Along the Gold Coast of Western Africa we notice this disease very prevalent in some parts, whilst in others it does not exist, or is not traceable. Where it exists it is seen from its very mild form, which is the beginning of the disease, to its most hideous form. In the extreme eastern district—viz., Dix Cove—the disease is very prevalent. The town is surrounded by a great number of small hills, except where it faces the sea, and contains a population of about 5,000 souls; and from the number of cases met with among them, it might without error be computed that one out of every ninety persons is an elephantiasis subject.

The natives are supplied with water from two streams running between the central hill. It is very impure, especially during the dry season, when it forms small lakes or stagnant pools, at which time it is muddy and of a white colour. The soil of Dix Cove is argillaceous; the clay forms in some places black alluvium, whilst in others white, intermixed with red. The wealthier class of people use tank water, which is far more healthy and wholesome.

These people with elephantiasis, on being asked the cause of the disease, invariably reply that they do not know, but that they previously had Guinea Worm, and that after its cure the foot began to be enlarged. In my own opinion, it is not to the Guinea Worm that we must look for the immediate cause of it, for then it ought to occur in every place where that disease is to be found; but to the nature of the soil, which imparts certain of its constituents to the water which is used by the inhabitants. The Guinea Worm serves as a stimulant to the epidermis in making it

susceptible to the unhealthy virus which has been taken into the system by the drinking water, and which determinates the disease to the already affected part. But I must remark that there is a constitutional predisposition for the disease, as it is not every one in the same district who has had Guinea Worm that has elephantiasis; but every one who has elephantiasis on whom I made observations had previously Guinea Worm.

6.—ELEPHANTIASIS SCROTI.

This is seen in those cases where the Guinea Worm attacks the testicle, or loose cellular tissue between the testicle and the scrotum. The latter is generally very hard, and has a tendency to increase, but the size is generally smaller than that of the true *Elephantiasis scroti*.

DIAGNOSIS AND PROGNOSIS.

Respecting the diagnosis of this disease, it must be said that, in places where Guinea Worm is prevalent, the patient most generally informs you of its nature; but occasionally one meets with cases where there is some difficulty. An extensive swelling, with severe pain, and inability to move the affected part, commenced with severe itching and a small vesicle, more commonly in the lower extremity, and the protrusion of a small portion of the worm; all these symptoms, in a place where Guinea Worm is rife, are characteristics which will greatly aid in the formation of our opinion of the nature of the disease.

If the Guinea Worm had been for a long time producing its inflammation, the matter might be surrounded by a pyogenic membrane; and if we are not told by the patient, it will be very difficult to decide

positively, as it presents none of the characteristics enumerated above, but only those of a simple abscess. By opening it with a lancet, we may have a gush of matter with a perfect worm discharged, or it may come out in shreds. I have met with cases where I can only derive my information from the patients.

The prognosis is always favourable, unless when great carelessness leads to severe sloughing. When death of the foot occurs, by neglect or through any cause, the symptoms are very unfavourable. After amputation, death may be caused by exhaustion, from the unhealthy state of the constitution, or the patient must have to stand the chance of the operation.

TREATMENT OF GUINEA WORM.

The first step in the treatment of Guinea Worm is the complete rest of the affected part, and then the speedy extirpation of the worm, as when removed the patient immediately receives great relief. In a first attack this is easily accomplished, as the worm gradually protrudes through the blistered surface; and if at once secured and extracted, the patient suffers no more from it. The best mode of securing it is to draw the worm a little out and roll it round a crow-quill, and have it tied with a thread, and by gradually rolling it around this it is wholly extracted. Amongst the natives the worm is secured with a thread, and tied round the ankle or leg, as the case may be, and gentle traction applied every morning until the worm is wholly removed. This may be continued for days, and even weeks.

But things do not always take so smooth a turn; for in eighty-nine cases out of a hundred the worm either breaks or recedes into the cellular tissue, and

then produces that destructive inflammation which is peculiar to the worm. It is at this stage that remedies are useful and called for by the patients; at this stage that enormous swelling is apt to occur, with great pain; and if the proper course is not adopted, great mischief may be the result to the neighbouring tissue.

The remedies for Guinea Worm may be divided into *palliative* and *radical*.

PALLIATIVE TREATMENT.

The palliative remedies are emollient poultices, leaves of various plants applied externally, and salt water dressing. The palliative treatment, therefore, is external. The affected part is to be well sponged with warm water, and a large poultice applied in a warm state. It acts by bringing the swelling into a head, and favours the discharge of matter and slough of cellular tissue which are the results of destructive inflammation. It is a very soothing application, and invariably used in the hospitals. Linseed meal, bread, and Indian corn poultices are used in places where they can be obtained; but an excellent serviceable poultice is made from the starch of the *Jathropa Manihot*, or Common Cassada or Cassava.

Among some natives salt water is in great repute, and is very much valued at certain stages of the disease—*i.e.*, when an ulcer has been formed and the worm is still protruding. The effect of this is to remove the young worm from the sac, and thus expedite the cure. In India, cold fresh water is used in the same way. According to Forbes, after the vesicle has been opened, a stream of cold water is daily poured on the part. "Under these circumstances, the young were daily ejected from the proligenous tube of the parent

parasite, and continued to be so for fifteen to twenty days. After this time a watery fluid only was emitted, without any young, but sometimes containing particles of a white, flaky appearance, which continued two or three days longer. The Guinea Worm then became flaccid, and was discharged spontaneously, without pain or swelling." The worm likes water, and after being extracted soon dies, and gives out her immense brood of young.

Native Plants.—In some parts of the tropics the natives have recommended the leaves of various plants. On the Gold Coast of Western Africa the *Chrynopodia inflata* is used. The leaf is finely ground, or a small quantity of watery extract is obtained from it and applied over the surface, and then a large poultice is put over it; sometimes only the leaf is applied. The alleged effect is that it expedites the removal of the worm. I have not had sufficient opportunities of testing the effect, and therefore cannot vouch for the truth of the statement.

RADICAL TREATMENT OF GUINEA WORM.

This consists in the use of assafoetida. This remedy, although it has a very nauseous taste, appears to have a direct influence on the worm in the tissue, by at once destroying it, and, of course, reducing the high inflammatory action which might be going on in the affected part. I have seen cases where patients were suffering from the most excruciating pains, which entirely prevented them from moving about, being for the time perfectly crippled, who took the remedy; and no sooner was the physiological effect manifest than the pains were dispelled, and the individual was enabled to walk about with ease and freedom.

I must confess that my attention was first drawn to the use of this remedy, by the good effect which its employment had on a family who had suffered fearfully from this worm. After using it for some time, they were perfectly freed from it, and for upwards of nearly fifteen years never had another attack.

There are two main results obtained by the use of assafoetida—viz., *rapidity of cure*, and *total annihilation of the worm*; and there are three stages in which the use and effect of this medicine are to be considered:—

1st.—At the early stage of the inflammation.

2nd.—When but little matter is formed, and deep seated.

3rd.—When the inflammation has been destructive, and much matter formed.

In the first stage, the use of assafoetida at once destroys the worm, and puts a stop to the inflammation that is going on. The person feels perfectly well again. He may be free for years from any attack, unless a fresh worm enters; but the old worm is entirely destroyed, and either undergoes gradual reduction by the absorbents, or becomes harmlessly imbedded in the cellular tissue. This, in fact, is the simplest and easiest cure I have seen effected.

In the second stage, the irritation and inflammation are equally and as rapidly cured as in the first; but the matter still remains in the system, and must be let out at some future period. The patient feels perfectly well, and goes out of the hospital to his usual occupations. Perhaps he takes a very long walk, or receives a wound on the part; inflammation at once takes place, differing in type from that produced by Guinea Worm; the matter accumulates in large quantity towards the surface, and requires to be discharged;

and when so done, shreds of the worm and cellular tissue are removed, and the patient quickly recovers.

In the third stage, where the inflammation has produced destructive inflammation, and much unhealthy matter has formed, although the remedy has been used, and both the maternal and embryo worms have been destroyed, yet still the pain remains; the parts continue to be very tender; and unless the fetid matter is discharged, the patient will not be able to make use of his limbs for weeks. When this severe inflammation attacks the posterior portion of the foot, in the mass of cellular tissue in front of the *tendo Achillis*, it is necessary to make a free incision, so as to give free egress to the slough of cellular tissue, before the patient can be perfectly free.

Sometimes, after the worm has caused such destructive inflammation, it moves from that portion to another, there to inflict on its victim intense pain. Should the assafetida be given whilst it is in this position, it dies; and if under the skin, and matter not being formed, I have seen on the application of a poultice a small circular portion slough out, and the part of the worm just below could be removed with a forceps.

When Guinea Worm has been destroyed by the use of the assafetida, I have in many cases seen it coiled under the skin; and from its difficulty of undergoing putrefaction in the human system, it remains there for months, or even years, without causing the least disturbance, giving to the touch the feeling of a whipcord. By the continued action of the absorbent, it gradually diminishes, until nothing of it is observed. But if inflammation had been caused and matter formed before its death, be it at whatever distance

from the skin, it has a tendency outwards, and must be eliminated from the system.

Lately, Dr. Stewart, Surgeon of the 18th Royal Irish Regiment, serving in Secunderabad, has recommended the cutting down upon the worm, dissecting it carefully, and separating it from its bed—that is, where the parasite's course could be ascertained by the eye or finger under the skin. A curved instrument, or a large ligature needle, is then passed beneath it; gentle traction is now used, and a continuous stream of cold water is poured over the tract from a height, which expedites the extraction. The first case in which this treatment was adopted was in a man who noticed a whipcord swelling beneath the integument of the scrotum. The parasite was felt and seen coiled up in most fantastic loops. A prominent loop was selected near the centre, the skin was carefully incised and dissected, and the animal laid bare, the loop hooked up, and the animal removed by gentle traction. The process was aided by the stream of water, which seemed to paralyze the worm, or make it quickly quit its abode. The length of the worm was nearly three feet, and it contained myriads of young worms in various stages of development. No inflammation or suppuration followed.

This process could be performed with advantage where the cellular tissue is loose, and there are no muscles or important tissues intervening; but in by far the majority of cases it will be found perfectly useless.

WORKS BY THE AUTHOR.

PHYSICAL and MEDICAL CLIMATE, and METEOROLOGY of the WEST COAST of AFRICA. With Valuable Hints to Europeans for the Preservation of Health in the Tropics. 1 vol. 8vo., 10s.

London: CHURCHILL & SONS.

OPINIONS OF THE PRESS.

(From the *Athenæum*.)

"Dr. Horton does not go into the question as to whether colonies of Englishmen could thrive or develop in this part of the world; but, with the intelligence of a well educated medical man, he enters upon the question of the general conditions of human life on the West Coast of Africa, and in the most convincing manner shows that, to a considerable extent, the causes of death and diseases in this part of the world are as much under the control of human intelligence as the fever-breeding courts and alleys of London, or the plague-stricken slums of Constantinople.

"The public, and especially that large portion of it whose occupations lead them to take an interest in the health of the inhabitants of our tropical possessions, owe a large debt of gratitude to the author of this book, for the indefatigable industry he has displayed in giving this learned and interesting account of the climate and meteorology of the West Coast of Africa."

(From the *African Times*.)

"It contains much valuable information and advice, and will, we have no doubt, be a permanent authority as regards the West Coast on the matters of which it treats."

(From the *Medical Times and Gazette*.)

"There is enough valuable original matter to render this, the only work on the climate, &c., of Western Africa, of great value to all interested in the preservation of European life in that malarious region."

POLITICAL ECONOMY of BRITISH WESTERN AFRICA: With the Requirements of the Several Colonies and Settlements. (The African View of the Negro's Place in Nature.)

London: W. J. JOHNSON, 121, Fleet-street.

(From the *African Times*.)

"The pamphlet, of which the proof-sheets are now before us, is indeed well worthy of perusal, both here and in Africa."

"We recommend this little work most cordially to all our readers in England as well as in Africa."

(From the *Hastings and St. Leonard's News*.)

"Whilst the Negro's enemies are so active in traducing him—enemies among the friends of slavery and the teachers of pseudo-science—it is satisfactory to know that there are educated Africans, like Mr. Horton, capable of speaking up for their injured race. The pamphlet named above is written by one who well understands what he is writing about. It is the voice of an African who knows his place in nature, and has ability to make good his claims. The facts and figures of Mr. Horton contrast strongly with the guess-works and fiction of the Bond-street travellers and theorists, who have succeeded in making themselves ridiculous of late by their wrong-headed efforts to appear great and wise at the expense of the labelled Africans."

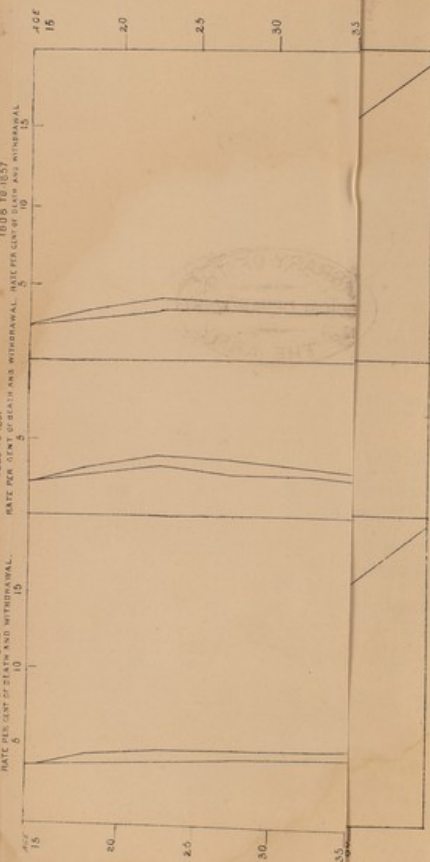
Will shortly be published, in 1 vol. 8vo.,

WEST AFRICAN COUNTRIES and PEOPLES, BRITISH and NATIVE: With the Requirements Necessary for Establishing that Self-Government recommended by the Committee of the House of Commons; and a Vindication of the African Race.

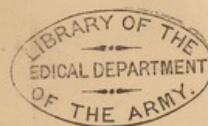


N^o 1. MADRAS MILITARY FUND. TOTAL OFFICERS, MORTALITY AND WITHDRAWAL IN THE TWO PERIODS 1808 TO 1822, AND 1823 TO 1857, AND IN THE FIFTY YEARS 1808 TO 1857.

1808 TO 1822. 1823 TO 1857. 1808 TO 1857.

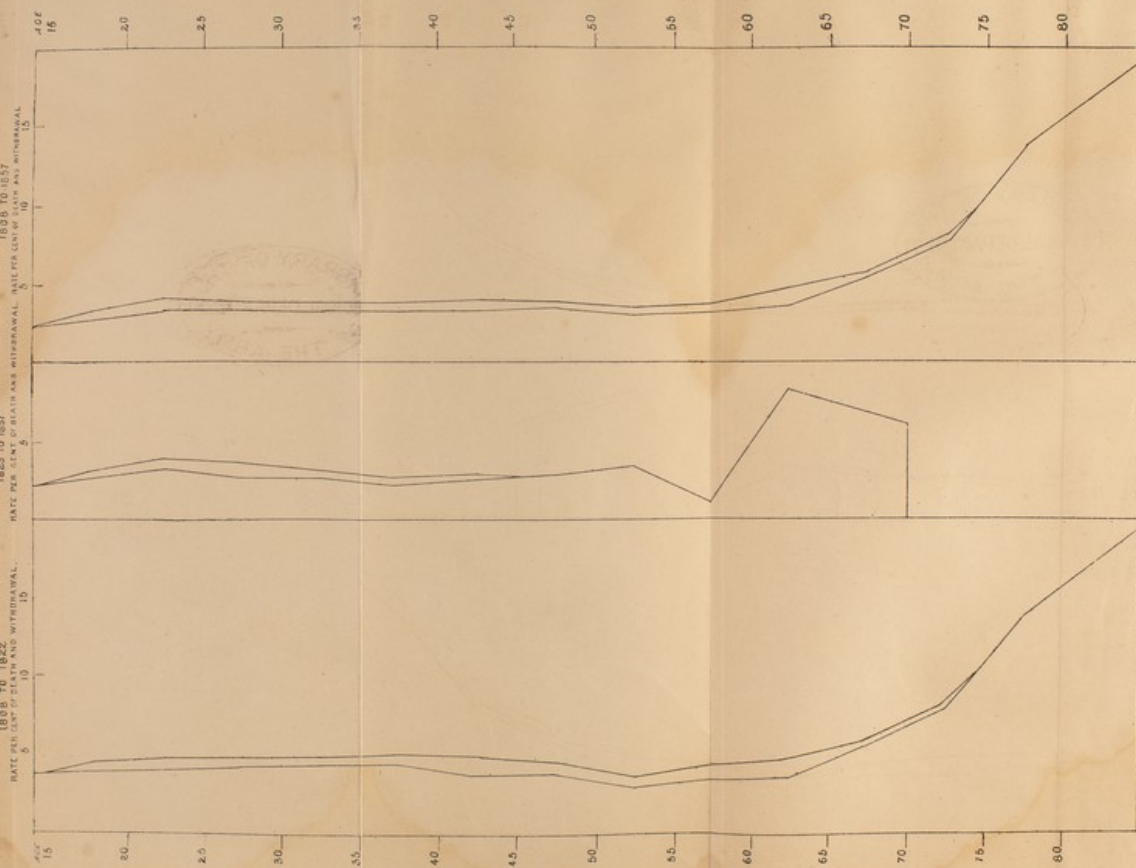


THE FIRST SPACE SHOWS THE RATE PER CENT OF MORTALITY.
SECOND SPACE



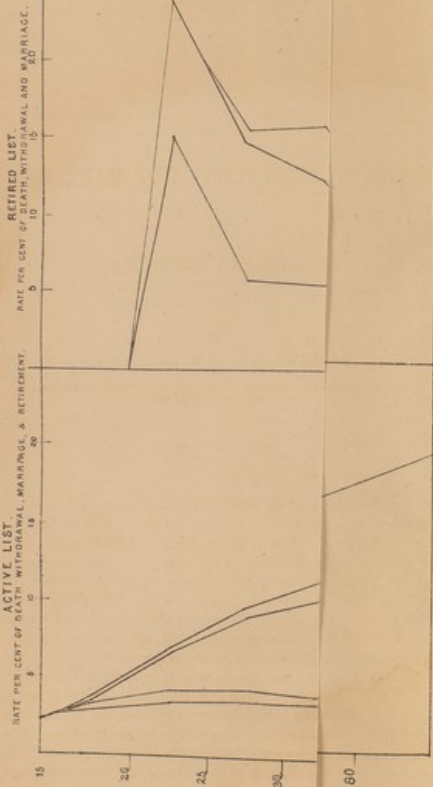
NO. 1. MADRAS MILITARY FUND. TOTAL OFFICERS. MORTALITY AND WITHDRAWAL IN THE TWO

PERIODS, 1806 TO 1822, AND 1823 TO 1857. (THE FIRST SPACE SHOWS THE RATE PER CENT OF MORTALITY, THE SECOND SPACE OF WITHDRAWAL.)



THE FIRST SPACE SHOWS THE RATE PER CENT OF MORTALITY.
SECOND SPACE OF WITHDRAWAL.

NO 2. MADRAS MILITARY FUND - BACHELORS - 1808 TO 1867.



THE FIRST SPACE SHOWS THE RATE PER CENT OF MORTALITY
THE SECOND SPACE - THE RATE PER CENT OF MARRIAGE
THE THIRD SPACE - THE RATE PER CENT OF RETIREMENT
THE FOURTH SPACE - THE RATE PER CENT OF DEATH, WITH REMOVAL, MARRIAGE, & RETIREMENT.



[Extracted from THE ASSURANCE MAGAZINE AND JOURNAL OF THE INSTITUTE
OF ACTUARIES, Vol. XI, page 1.]

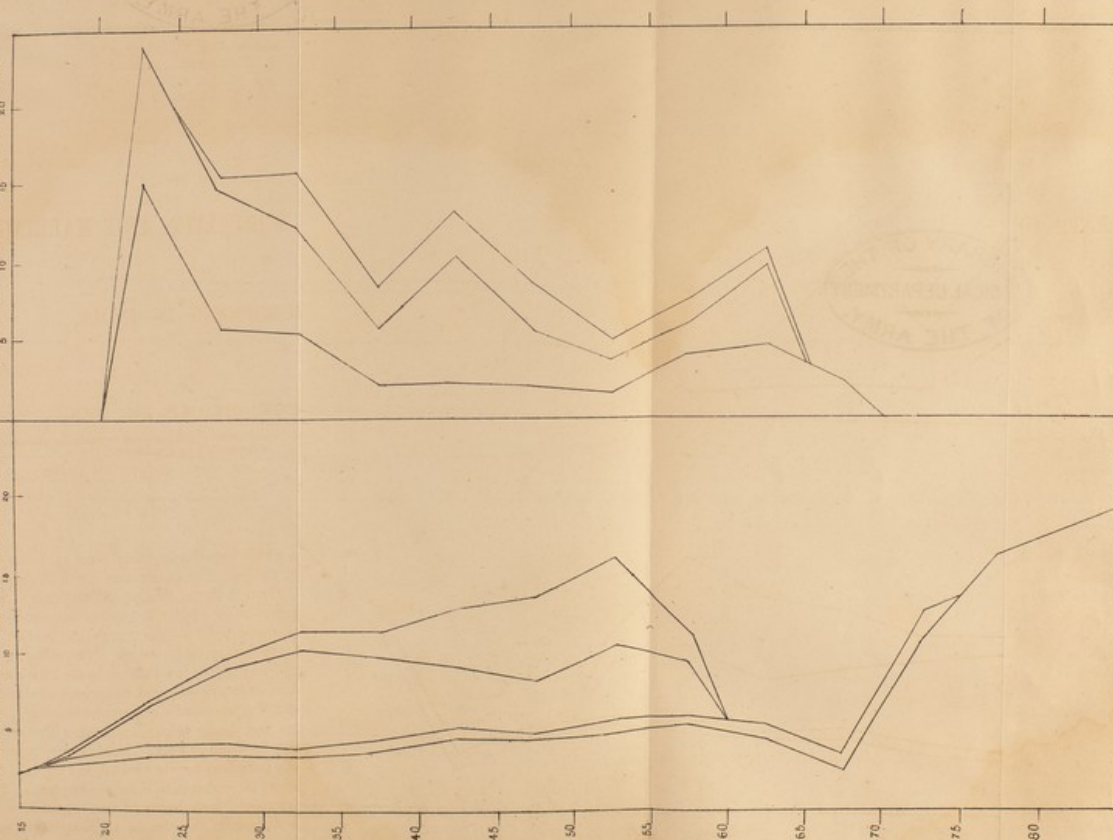
ON THE RATE OF MORTALITY AND MARRIAGE AMONGST EUROPEANS IN INDIA.

BY
SAMUEL BROWN, Esq., F.S.S.,
ACTUARY OF THE GUARDIAN ASSURANCE COMPANY, AND ONE OF THE VICE-PRESIDENTS OF
THE INSTITUTE OF ACTUARIES.

THE great changes which have lately taken place in India—the progress of railways, the extension of commerce, and the impetus which is likely to be given to the emigration of Europeans to those vast fields of enterprise—cannot but add peculiar interest to any inquiries tending to throw light on the causes which affect the health or life of Europeans in that country. The difficulties of arriving at any sound conclusions on these subjects have always been great. In dominions so widely spread, comprising all climates, from the most delightful temperatures of perpetual spring to the fever-haunted jungles and deadly swamp, every cause that affects the health of man may be found at work. Nor is it easy to say to what extent the deadly influences may be avoided, and the localities known for their salubrity be made available for the European. The necessities of war may require large bodies of men to pass through or remain where the dangers of the climate are nevertheless well

NO 2. MADRAS MILITARY FUND - BACHELORS - 1808 TO 1857.

ACTIVE LIST. RETIRED LIST.
RATE PER CENT OF DEATH, WITHDRAWAL, MARRIAGE, & RETIREMENT. RATE PER CENT OF DEATH, WITHDRAWAL AND MARRIAGE.



THE FIRST SPACE SHOWS THE RATE PER CENT OF MORTALITY.
THE SECOND SPACE : THE RATE PER CENT OF WITHDRAWAL.
THE THIRD SPACE : THE RATE PER CENT OF MARRIAGE.
THE FOURTH SPACE : THE RATE PER CENT OF RETIREMENT.

[Extracted from

RATE C

ACTUARY OF THE

THE great change in the progress of race, which is likely to be the result of vast fields of inquiry tending to health or life, arriving at any point, has been great. In fact, from the most fever-haunted of the health of nations, what extent the known for their necessities of war or remain when

known. The first settlements of commerce may have been chosen, not for their salubrity, but as being the only spots where a feeble band of merchants were allowed to erect their temporary factories for trade—unhealthy, but convenient for their shipping—and which, like Calcutta, have since grown into mighty cities of palaces, with their population counted by hundreds of thousands. It is gratifying to reflect, however, that all the observations which have lately been made, agree in showing a great improvement in the health of Europeans in India, and in proving, beyond a doubt, that much of the mortality of former years was due to preventible causes. The first and most important change has been in the improved habits of social life. The establishment of sanatoria, the greater facilities for removal to the hill countries, more frequent and rapid intercourse with Europe, more careful attention paid to drainage and other local improvements, and last, not least, the growing experience and skill of medical officers in the European armies, have produced the most important results.

The precise extent to which these causes have operated, can only be ascertained by collecting statistics in the proper form, and comparing them together; and the question is, from whence can trustworthy facts be obtained? The census of the population, which we have in this country in such perfection, is wanting for the European community in India; and, for the mercantile class, it will probably be many years before any general system of registration will be efficiently established. But, happily, for the purposes of this inquiry, besides the books of the India House, the Funds, which have been established in every Presidency for making provision for the widows and children of the military or civil servants of the late East India Company, contain amongst their records minute particulars relating to the mortality and marriage amongst the members and their families. It is true that, having been entered in their books, not with the view to theoretical inquiries, but for financial purposes, they are seldom arranged in the form required, and it is only with very great expenditure of labour and time that they can be reduced to a useful shape. In all cases, too, a very large number of material facts will be found wanting. But, after making ample allowance for these deficiencies, there remains a mass of important information which can be rendered available. Having lately, in conjunction with my friend Mr. Hardy, been engaged in an elaborate inquiry into one of these Funds—the Madras Military Fund—in the course of which new light has been thrown upon several debatable points,

and some novel questions raised, I have thought it desirable to bring together some of the leading facts relating to mortality and marriage in that Presidency, and compare them with such as have appeared in previous Reports of the same or similar Funds in the other Presidencies. The greater part of all such Reports is necessarily occupied with financial matters of peculiar interest to the directors and members of the Funds, but not useful for scientific purposes. This is an additional reason for extracting from them such information as may be of service to the actuary, and for making comparisons which may show the present state of our knowledge on these subjects, and the deficiencies to which attention may be best directed hereafter.

Sources of information as to European mortality in India.

Before explaining the data last obtained, I will endeavour to give a brief description of the principal sources of our information up to the present time, as to European mortality in India.

It does not appear to be much more than 30 years since the publication of the first paper of any importance on this subject. It is stated, in an interesting paper in the *Calcutta Review* for March, 1853, to have been an article "On the Duration of Life in the Bengal Civil Service," which was printed in a number, for September, 1831, of a periodical called the *Gleanings of Science*, published in Calcutta, but which is now extinct.

In the *Journal of the Asiatic Society*, for July, 1832, appeared a paper, read by Mr. Prinsep before that Society, on the "Mortality of the Bengal Civil Service."

In a list of publications referred to by Messrs. Finlaison and Lewis, in their remarks on Mr. Neison's report of the Bengal Military Fund in 1849, the next paper of consequence is by Mr. Curnin, of the Mint of Calcutta, who is stated, about the year 1835, to have collected, from official records of the India House, the data relating to more than 12,000 cadets, which he communicated to Mr. Finlaison, who, in 1836, formed a plan for a Retiring Fund for the officers of the East Indian army, which was based upon these observations. He also constructed life annuity tables therefrom, which are now in the possession of Mr. A. G. Finlaison, and have been used in valuations on different occasions. Of 12,039 officers, 5,706 had died, 1,706 left the service, and 4,627 were living at the date of observation. Mr. Curnin appears to have subdivided his facts, so as to form separate tables for Bengal and Madras, whilst for Bombay he used the combined experience

of Madras and Bombay. The total number of officers recorded for Bengal was 5,901; and from 1,206 baptismal certificates, which he had carefully examined, he found the mean age of a cadet, on his arrival in India, to be within a few days of 18 years. In his reply to Messrs. Finlaison and Lewis' observations, Mr. Neison states, that the whole of Mr. Curnin's MSS. and data had been purchased and presented to him, some years ago, by a friend in Calcutta, and he points out a slight error in the totals, to show that he had gained possession of the original papers. He also contends that Mr. Curnin was one of the first to perceive that the casualties in the last century so far exceeded those amongst officers of the same standing since the present century commenced, that they ought not to be combined in one table. Mr. Curnin had accordingly investigated, separately, the results for 3,500 officers, who were placed on the Bengal establishment before 1809, and 3,898 who had joined it since.

In 1836, several valuable papers appeared on this subject. Major Henderson, in the 20th vol. of the *Asiatic Researches*, pp. 190-244, gives a law of mortality for British India, showing the rate of mortality amongst British officers from 1814 to 1833—a period of 20 years. He alludes to the documents which were in possession of the Bengal Government Committee, appointed in 1834 to consider the expediency of forming a Government Life Assurance Institution, as bearing out, in most respects, Mr. Curnin's calculations, with which, in the main points, Major Henderson's facts also agree, especially if the comparison be made for the last 20 years only.

In the same year also appeared Mr. Davies' Report of the Bombay Civil Service Fund.

A paper by Mr. Christie, read before the Statistical Society, was printed in their Journal for 1838, "On the Rate of Mortality amongst Officers retired from the Indian Army."

An elaborate Report by Mr. Davies, dated 1st June, 1839, on the Madras Military Fund, contains some original tables, relating both to mortality amongst officers and their wives, the mortality and remarriage of widows, and the mortality of children, deduced from the experience of the Fund to the end of 1836. These observations were afterwards corrected to the end of 1840, in his second Report, in 1845, from facts furnished to him by Colonel de Havilland, in whose letters and Reports are also included some valuable statistics to a later date, though they require simplifying and separating from a mass of other matter.

In 1839 also appeared Mr. Woolhouse's "Investigations of Mortality in the Indian Army." The materials were supplied by Messrs. Dodwell and Miles' Alphabetical List of the Officers of the Indian Army, with the dates of their respective promotion, retirement, resignation, or death, whether in India or Europe, from the year 1760 to 1834 inclusive, corrected to September 30th, 1837. The facts observed were for 6,017 officers in Bengal, 4,260 Madras, and 2,003 Bombay, from which were deduced two separate tables of mortality, one for Bengal, and one for Madras and Bombay combined. They were prepared with great skill, and have since been used by high authorities. Mr. Neison objects, that they include the mortality of the past century, which should be given separately; and further, that, on using the permission he had obtained, in 1847, to extract the correct facts from the Patronage Books of the India House, he found numerous errors in the particulars and dates, and asserts that he has prepared from his corrected copy more perfect tables of mortality, to which we shall refer hereafter. In 1843, from the same List, Mr. Davies deduced a table of mortality for the valuation of the Bengal Military Fund, which appears in his Report, of February, 1844. He seems, indeed, to have used Mr. Woolhouse's facts of death and discontinuance, and merely to have graduated a new table therefrom.

In 1840, Mr. Davies' Report on the Madras Medical Fund contains the original statistics from Dodwell and Miles' List, relating to medical officers, to the end of 1838; but, finding that the rate of mortality nearly corresponded with that for the Madras Military Fund, he used the latter table for the valuation of the Fund. The mortality amongst wives, widows, and children of the Madras Medical are also compared with those of the Madras Military Fund.

Mr. Neison's Report, of 25th August, 1849, contains a great variety of original observations, both upon male and female lives. Having, as he considered, reason to doubt the correctness of the facts in Dodwell and Miles' List, he was permitted by the Court of Directors of the East India Company to have access to the records from which a true table of mortality might be constructed. He, accordingly, used the opportunity to make abstracts, not merely for the Bengal Presidency, but for the whole of India, the results of which he promises to take an early opportunity of publishing in a separate form. The Patronage Books of the India House afforded the means of tracing the appointment, with the age of the officer at the time, testified by certificates of birth, and his dates of promotion through successive gradations of rank, till his

death, retirement, resignation, &c. Table No. 1, exhibits an analysis of such events to all the cadets who entered the Bengal establishment from 1st January, 1800, to 31st December, 1847. Of 5,199 officers entering in that period, 1,874 had died, 781 had discontinued from active service from various causes, and 2,544 were living at the close of the observations. The number exposed to the risk of mortality for a year, was 77,985; and of 100, who entered a year of life, 2.40 had died. The results, being grouped in quinquennial periods of age, showed so greatly a diminished mortality, as compared with preceding returns, that he rearranged the 20 years' observations of Major Henderson, to give the mortality amongst those officers who entered the Bengal army in or after the year 1800, which then exhibited at the older ages a considerable diminution in the average mortality, whilst those of Mr. Davies do not differ much from the totals of Major Henderson's data for officers who entered both before and after 1800.

Another table shows the mortality amongst the officers who entered from 1800 to 1847 inclusive, but excluding only those who had been struck off, cashiered, or dismissed, so as to exhibit the rate of mortality both on the active and retired lists combined. This showed, to the same number of entries, 2,019 deaths, 75 only dismissed, &c., and 3,105 living, on 31st December, 1847. The total number exposed to risk was 88,630, and the probability of dying in a year, 2.28 per cent. At the extreme of the table, the mortality was found to approximate to Mr. Christie's table of retired Indian officers, and not to differ much from the general mortality of England and Wales at the corresponding periods of age.

In regard to the mortality amongst wives of officers, Mr. Neison found the lists of the married subscribers of the Bengal Military Fund too defective as to ages to be of much service, without great labour required to fill up the deficiencies, and he therefore used, as the basis of his calculations, the table compiled by Mr. Davies, and given in his Report of 1839, from the experience of the Madras Military Fund to 1836; but, for deaths and remarriages amongst widows, he rearranged the experience of the Bengal Military Fund to 1846, showing, out of the number of 635 who entered the list at various ages, the deaths, remarriages, withdrawals, &c., at all ages. Other tables showed, out of a given number, 875, the proportion of officers at different ages marrying wives of different ages; also, the average age of officers on entering upon, or their present age as existing in, different ranks, &c.

The great reduction in the rate of mortality, seen in Mr. Neison's original tables in this Report, led to various questions discussed in the Report being submitted to the opinion of Mr. A. G. Finlaison and Mr. Lewis (Actuary to the Family Endowment Society), who, in a Report, 30th November, 1855, especially examined his law of mortality for British India, as applicable to the valuation of the Fund. They particularly object to the mortality amongst the retired officers of the service being taken as representing that amongst the members of the Fund, many of whom cease connexion with the Fund altogether after retirement. They also contend that, as compared with the observations of Messrs. Curnin, Finlaison, Henderson, Woolhouse, and Davies, at the mean ages 19 to 63, Mr. Neison's table shows only 1,000 deaths, where the others combined would give 1,387 deaths, and in his second table of active and retired lists combined, 1,000 deaths only for 1,665. But they agree with him in the views which he took of female mortality, whether amongst wives or widows, and his final adoption of the female life table which he had constructed for England and Wales, as nearly according with the facts observed.

In his reply, dated 16th April, 1856, to this paper, Mr. Neison brings a variety of facts, both from the Bengal and Madras, and both from the Military and Medical Funds, to prove his conclusions, that a very great diminution has taken place in the mortality in India during the present century; and he objects to deductions drawn from observations which go as far back as 1760. He analyses, in a very interesting manner, the authorities quoted, and refers for confirmation of his views to his recent elaborate Report on the Madras Medical Fund, and of his Reports on the Bengal Civil and Madras Civil Funds. In reply to a remark of Messrs. Finlaison and Lewis, that Mr. Curnin's observations had been borne out by the experience of the Legal and General and Royal Naval and Military Assurance Companies, he argues that their experience of 18 years is insufficient, and that the lives assured in India show a rate of mortality exceeding that of the services in general. He quotes Mr. Scotton Francis' publication, in 1850, whose investigation extended over 9,541 lives assured in the Oriental and Laudable Assurance Offices, in Calcutta, during the 33 years, 1815-47. Of these, 5,600 only were military lives; and the result is said to establish the fact, that the mortality is higher amongst mixed assured lives in India than amongst officers of the Bengal Military service. This was confirmed by his own investigation, for

the 15 years preceding 1853, of the New Oriental Company—the largest of all the Indian Assurance Societies.

I conclude this list of documents and Reports, in which I have incidentally or directly named most of the important sources of original information on the subject of this paper, by drawing attention to our President, Mr. Jellicoe's, paper "On the Rates of Premium to be charged for Assurances on the Lives of Military Officers serving in Bengal," read before this Institute in 1851. It gives, from Mr. Neison's first table in his Report for 1849—a table, admirably graduated by Gompertz's method—and also from Mr. Woolhouse's table for Bengal, the annuity and annual premium, at 4 per cent., properly loaded for actual use by Assurance Offices. The difference between the pure premiums in the two tables is, in Mr. Woolhouse's, as high as 21 per cent. in excess of Mr. Neison's table—a difference easily accounted for, I think, by the explanations I have above given.

Experience of the Madras Military Fund.

I now proceed to explain the mode in which the recent collection of facts from the experience of the Madras Military Fund has been formed, and to make a few comparisons of the results with previous observations.

The contingencies which occur, under the rules of the Fund, are of the most complicated character, for the subscriptions and widows' annuities vary with the rank of the officers, and the widows' annuities cease on their second marriage, but revive if they again become widows. The sons' pensions vary by classes, according to age, under 21, and the daughters' by the same classes of age under 21, and, by a separate contribution at the option of the father, may be continued till their marriage or death. With the view of obtaining as accurate a valuation as possible of these difficult questions, it was decided to form original tables, as far as possible, from the actual experience of the Fund to the latest date. But no table of mortality had been calculated since one, corrected to 1840, by Mr. Griffith Davies, from facts furnished to him by Colonel de Havilland, who was then actuary of the Fund. When we came to examine the large bundles of papers, which were handed over to us by Colonel J. T. Smith, the present actuary, we found them full of long lists of corrections, and dates of births, deaths, and marriages, both of members and their families, extending from 1840 to 1855, with which to amend Mr. Davies' table. It was evidently a much easier task to compile the whole experience of the

Fund anew, for 50 years, from 1808 to 1857, than to make such corrections in documents 15 years old, without reference or index, and with names not given in the order of admission. Accordingly, a list of all the officers who had ever entered the Fund was applied for from Madras, in the order of admission; but it arrived only with the dates of admission against each name, the officers being classed by regiments. In the meantime, an index had been formed, and the corrections and new facts as to death, withdrawal, promotion, marriage, &c., noted in a rough printed copy, containing the names, in a form apparently used by Mr. Davies on the last occasion. But before commencing the copying into the new list, it was very desirable to ascertain if the ages and other dates were sufficiently correct for general conclusions. The authorities of the India House were applied to, to have the data checked by comparing the dates of birth, promotion, &c., with the Patronage Books of the India House. A preliminary comparison of a few pages, taken at random from the list, was sent in by permission, and the dates checked by their clerks. It then appeared that, on the total, 111 out of 152 facts, equal to about 72 per cent., were correct; 18, equal to 12 per cent., were corrected by them; and 23 new facts, or about 15 per cent., could be supplied to us. As these were important additions, the authorities of the India House kindly undertook to authorise the correction of the entire list, amounting to more than 5,000 names, with dates of birth, entry, promotion to every successive rank, death, retirement, &c.; and, though a considerable delay was thus caused, the increase of accuracy was well worth the labour and time employed. Two lists were eventually formed, A and B; the former, of officers, numbered in the order of admission on the Fund; and the latter, with the same number, but containing, from the date of marriage, either of first, second, third, or fourth wife, the name of the wife, her date of birth, death, or becoming a widow, with the rank of her husband at the time, and the date of birth and death or withdrawal of every son, and with the further date of marriage of every daughter, whenever it could be ascertained. There were, of course, many defects. In the older periods of the Fund, from 1808 to 1823, it was optional with an officer to become a member of the Fund when he pleased, and the date of marriage, which might have occurred many years before, or of the deaths of children who had been born and died before he entered the Fund, were consequently, in many instances, not recorded at all. But from 1823 to the present time, an officer is compelled to subscribe to the Fund as a condition of

his appointment, and it is consequently easy to trace, in almost every instance, his date of marriage, and the dates of birth of all his children. It requires only that the age of the wife should be accurately given, to afford us all the information we desire for forming tables of mortality or marriage. The form which we have now recommended for future use is so complete, that in a few years the data will be most valuable, and, with a little time and trouble, even many of the defects of the past registers may be filled in, since the facts are, no doubt, recorded somewhere in the books of the Fund, either directly or by implication. We found, for instance, that approximations to the date of marriage might be obtained from the age of the eldest child being given as an annuitant, &c.

The lists A and B having been thus formed, the particulars of the former were entered under schedules of ages, in which, for every age from entry, the rank for every year of an officer's life was shown by the initial letter of his rank, and his ceasing to belong to the Fund, either by death, withdrawal, resignation, or dismissal, marked at the age at which it occurred. By years of entry being counted only as half years, which would be the case on an average, the simple addition of the numbers at every age gave the living, with corresponding deaths, discontinuances, &c., in every rank. As the officers were entered in this table according to their order of entry, a separate table of mortality might, if necessary, be formed for every rank for every year of entry, from the commencement of the Fund. By continuing the insertion of the initial of rank in succeeding years, this table may at any time be resumed and amended, till the death or discontinuance of the last member of the Fund. This method, though more laborious than that suggested by Mr. Woolhouse in his excellent pamphlet, has the advantage of recording the facts at once, in such a form that they need never be recopied, and may be continued at pleasure. We have also suggested that, when the death of an officer is recorded, the age of his wife and his surviving children should be written against his name, so that the liability which is brought upon the Fund by his death may be averaged at every age.

The observations thus made are given in our Report (which is now in the course of being printed) for every year of entry for 50 years, since 1808; again, in a summary of decennial periods; and finally, in the two divisions from 1808 to 1822 inclusive, and from 1823 to 1857 inclusive—the former period being one of option as to age at entry, and the latter comprising all the events, from the officer's appointment as a cadet.

The following summary will show the number of observations in each class of facts, together with those from Mr. Davies' table, deduced from Colonel de Havilland's observations to 1840, and Mr. Neison's two tables of the Bengal army, from 1800 to 1847 inclusive:—

No. I.

	Entered.	Lived.	Died.	Withdrew or Discontinued.	Living at close of Observation.	PROPORTION PER CENT. OF ENTERED.		Exposed to Risk.	Mortality per Cent.
						Withdrewn.	Living.		
(1) Madras Military, 1808 to 1857 ..	4,979	75,296	2,251	555	2,173	45.2	11.2	43.6	72,439 3.11
(2) Do. Mr. Davies, 1808 to 1840 ..	3,444	53,828	1,769	124	1,611	49.6	3.6	46.8	52,044 3.28
(3) Bengal Military, 1808 to 1847, Active only ..	5,199	80,975	1,874	781	2,544	36.1	15.0	48.9	77,985 2.40
(4) Do. including Retired	5,199	91,267	2,619	75	3,105	38.8	1.5	59.7	88,636 2.28

On this, it may be remarked, that the first Madras table includes, amongst the discontinuance, a large number of officers, mostly unmarried, who are assumed to have withdrawn from the Fund on their retirement, as no further trace could be found of their names, but Colonel de Havilland appears to have excluded only those who were dismissed or resigned. In like manner, Mr. Neison's first table is distinguished from his second, by the former being confined to active service in India, and the latter includes retired officers living in Europe; but both, as I understand it, were deduced, not from the experience of the Bengal Military Fund, but from that of the Bengal army generally. The effect of this would be, that the subscriptions after retirement would appear to be continued longer than the actual facts would warrant; but, as nearly all the cases of withdrawal are found by experience to be those of unmarried members, I do not attach the importance to this objection which Messrs. Finlaison and Lewis have given to it.

Mr. Davies' original table, from the experience of the Madras Military Fund to 1836, was obtained by ascertaining the number of officers, single or married, living in each rank, as given in the current accounts for every year; and then, by comparing the number of deaths in each year, and computing the average age of the members in each rank on the 31st December, 1836, he obtained the rate of mortality for the average age in each rank, and then, as he says, "laid down a curve, taking the ages as the abscissa, and

the mortality per cent. as the corresponding ordinates, making the inflections thereof as regular as I could, so as to preserve the character of a continued curve." This, it must be admitted, was a very rough way of deducing a table from original observations, but it was evidently the best he could then form, and it accounts for a fact which would otherwise greatly surprise us, namely, the very regular graduation of the resulting table. From 66 to 76, his table was made to correspond with Mr. Christie's table for retired officers, and from 76 and upwards with the Northampton table, as he found at that age the two latter tables nearly agreed, and the facts were too few for further graduation.

On computing the average age of existing officers in each rank, from our present observations, they were found to differ somewhat from Mr. Davies' results, and as I have also subdivided the observations for each rank, and for two periods of the Fund, the following comparison may be examined with some interest:—

No. II.

	G. DAVIES, 1808 TO 1835.					PRESENT OBSERVATIONS, 1808 TO 1857.				
	Average Age of Officers		Mortality per Cent.			Average Age of Officers		Mortality per Cent.		
	Enter- ing Rank.	Exist- ing in each Rank.	Single.	Married.	Both.	Enter- ing Rank.	Exist- ing in each Rank.	Single.	Married.	Both.
Ensigns	19	21	2.91	12.06	3.09	19	29	25	20	3.39
Lieutenants	22	27	3.69	3.25	3.63	22	55	56	27	3.14
Captains	32	38	4.22	3.47	3.99	32	33	39	42	2.82
Majors	41	46	3.97	4.92	3.93	41	50	49	54	2.61
Lieut.-Colonels . .	45	58	4.23	4.98	4.67	45	55	54	57	2.77
Colonels & upwds.	51	60	5.59	3.90	4.19	52	72	65	67	4.68

The average age of entering each rank by promotion, in our table, scarcely differs at all from the ages given by Mr. Davies in his Second Report in 1845, which he obtained by extracting from Dodwell and Miles' List the names of 1,000 officers, calculating their average age of promotion, and assuming 19 as the average age of joining the service.

As the rate of promotion in each rank is an important question in almost all the Indian Military Funds, I here subjoin the original facts and the percentages in the two periods 1808 to 1822 and 1823 to 1857, calculated upon the mean number living in the middle of the year. The former period would afford the most correct conclusions at advanced ages, since only 16 per cent. of all who

entered were living at the close of the observations, and all the rest are accounted for under the heads of died, withdrawn, promoted. In the second period of course a great number of young officers must be still living in the junior ranks, not having been in the service long enough to reach the higher grades. The great diminution in the rate of mortality in each rank in the second period will also tend to retard the rate of promotion, and account, in some degree, for the mean age of the higher ranks being greater now than by Mr. Davies' estimate. (See Table No. III., p. 14.)

I do not propose to give further extracts from the tables in our Report, but to proceed to some new data, which were obtained in the course of the investigation, on the conjugal condition of the members of the Fund.

When the List A was completed as far as possible from the documents in our possession, the tables of mortality were formed from them, without waiting for the observations to be completed on the lives of the wives, widows, and children. But in the course of filling in the latter lists facts were occasionally found by which the male life observations could be corrected. Some officers, for instance, who were considered as withdrawn, because they did not appear amongst the deaths nor afterwards amongst the living to 1858, were found to have left widows or children—both, or the latter only. If so, the date of their death was ascertained by the date when their families came on the Fund. If they left wives, their dates of death were inserted in the married list; if children only, in the widows' list. The tables which we have now to consider are such as have been thus finally corrected, and they differ from our first observations by containing a greater number of deaths and fewer withdrawals, but not so as materially to affect the graduated table of mortality. They are divided into the two periods of 1808 to 1822 and 1823 to 1857, for the reasons before specified, and also to throw light on the much debated question to what extent the mortality has diminished in India of late years, and also to compare the other events on which all original information is so desirable. I have thought it unnecessary to give the observations for every age, because in several cases where the age or date of the event was unknown, they have been distributed in proportion to those known. Whilst, therefore, we could not guarantee the precise accuracy of the numbers at every single age, there is reason to think, that, in quinquennial groups of ages, they very nearly indeed accord with the actual truth. They are, therefore, given in the summary of ages 15—20—25, &c.

No. III.—Table showing the Total Number of Officers who entered the Madras Military Fund in the two Periods 1808 to 1822 and 1823 to 1857, in each Rank, and the Total Number who Lived, Died, Withdrew, were Promoted, or Living to 1858, in each Rank; also the Proportions per Cent.

1808 to 1822.	ENTRANTS.		PER CENT. OF ENTRANTS.		PER CENT. OF ENTRANTS.		PROPORTION PER CENT. TO		PROPORTION PER CENT. TO		PROPORTION PER CENT. TO		Actual Number of Living to 1858.	Proportion of Living to 1858.
	Fund.	Rank.	Entered.	Living, 1858.	Withdrew, 1858.	Died.	Living to 1858.	Withdrew, 1858.	Died.	Living to 1858.	Withdrew, 1858.	Died.		
Ensigns.....	759	631	3,622	101	26	1	631	13.31	3.43	13	83.13	4.46	2,968	258.35
Lieutenants.....	631	500	3,622	101	26	1	500	13.81	3.43	13	86.17	4.46	2,468	206.35
Captains.....	167	89	1,167	393	87	8	89	13.81	3.43	13	86.17	4.46	809	67.42
Major.....	13	5	13	5	0	0	5	13.81	3.43	13	86.17	4.46	5	0.42
Lieut.-Colonels.....	31	24	3,622	101	26	1	24	13.81	3.43	13	86.17	4.46	24	2.08
Colonels & upwards.....	10	10	145	2,417	99	13	10	13.81	3.43	13	86.17	4.46	10	0.84
Total.....	1,693	9,634	38,306	1,397	303	301	2,634	69.43	6.74	6.03	50.18	3.77	754	34.129.3
1823 to 1857.														
Ensigns.....	2,778	12,407	312	48	221	2,197	11,923	17.5	7.95	7,909	31.3	48	221	38.71
Lieutenants.....	200	2,197	3,622	101	26	1	3,622	13.81	3.43	13	86.17	4.46	200	16.74
Captains.....	13	13	13	5	0	0	13	13.81	3.43	13	86.17	4.46	13	1.08
Major.....	3	3	3	3	0	0	3	13.81	3.43	13	86.17	4.46	3	0.25
Lieut.-Colonels.....	3	3	3	3	0	0	3	13.81	3.43	13	86.17	4.46	3	0.25
Colonels & upwards.....	3	3	3	3	0	0	3	13.81	3.43	13	86.17	4.46	3	0.25
Total.....	3,006	3,346	42,640	250	1,772	3,346	42,640	14.59	3.89	29.10	52.92	2.90	97	9.01
Totals.														
Ensigns.....	3,557	15,609	413	71	221	3,622	11,923	11.98	2.69	6.38	79.93	3.89	61	23.21
Lieutenants.....	1,153	2,528	3,622	101	26	1	3,622	13.81	3.43	13	86.17	4.46	101	8.36
Captains.....	180	1,596	3,622	101	26	1	3,622	13.81	3.43	13	86.17	4.46	180	15.08
Major.....	55	677	3,622	101	26	1	3,622	13.81	3.43	13	86.17	4.46	55	4.62
Lieut.-Colonels.....	21	21	21	21	0	0	21	13.81	3.43	13	86.17	4.46	21	1.75
Colonels & upwards.....	10	10	10	10	0	0	10	13.81	3.43	13	86.17	4.46	10	0.84
Total.....	4,979	5,809	81,146	2,221	555	2,173	5,809	20.54	5.06	19.83	54.37	3.16	78	8.39
Totals.														
Ensigns.....	3,557	15,609	413	71	221	3,622	11,923	11.98	2.69	6.38	79.93	3.89	61	23.21
Lieutenants.....	1,153	2,528	3,622	101	26	1	3,622	13.81	3.43	13	86.17	4.46	101	8.36
Captains.....	180	1,596	3,622	101	26	1	3,622	13.81	3.43	13	86.17	4.46	180	15.08
Major.....	55	677	3,622	101	26	1	3,622	13.81	3.43	13	86.17	4.46	55	4.62
Lieut.-Colonels.....	21	21	21	21	0	0	21	13.81	3.43	13	86.17	4.46	21	1.75
Colonels & upwards.....	10	10	10	10	0	0	10	13.81	3.43	13	86.17	4.46	10	0.84
Total.....	4,979	5,809	81,146	2,221	555	2,173	5,809	20.54	5.06	19.83	54.37	3.16	78	8.39

I wish to draw attention here to the misfortune which all investigators of statistical tables of this kind lie under, for want of some definite principles of arranging and classifying facts. I regret it the more as in this case we could not accurately compare the results of these tables with those of preceding writers without recomputing the percentages at a considerable cost of time and labour, and we shall have to be satisfied with making an allowance for slight difference of ages. I have followed the classification of ages as given in the Registrar-General's Reports, and which Dr. Farr, in conjunction also with all those Government delegates from foreign countries who have attended the Statistical Congresses, has for some years introduced into the public mortality statistics of this country. But Mr. Neison's quinquennial groups are generally 21 to 25, 26 to 30, &c., differing one year of age from the former. Again, it is convenient to have the percentage rates of mortality, marriage, &c., computed upon 100 living in the middle of the year of age, by deducting from the living under observation half of all who entered or left from any cause, and ascertaining the proportion of deaths, &c., thereto. The number left would then be common to all when several events, such as mortality, withdrawal, retirement or marriage, have to be compared together.* I mention this incidentally because the members of the Institute are peculiarly interested in following an uniform system in such inquiries.

The totals of the two periods are—

No. IV.—Summary of Facts from the Experience of the Madras Military Fund.

	Entered.	Lived.	Retired.	Died.	Withdrew.	Married.	Living, 1858.	Total.
Bachelors—								
Entered, 1808 to 1822	1,806	21,241	19,442	824	156	208	14	1,806
Retired, 1823 to 1857	208	1,890	17,005	54	86	31	37	208
Entered, 1808 to 1857	3,099	26,627	25,897	744	145	172	1,162	3,099
Retired, 1823 to 1857	172	940	809	20	37	25	8	172
Active.....	4,905	52,698	47,948	1,650	422	380	1,762	4,905
Retired.....	380	..	..	..	..	..	..	380
Total.....	5,283	..	..	..	..	..	..	5,283

* The usual plan is to compare them with 100 entering upon a year of life, which requires a different initial number in each class of facts.

	Entered.	Lived.	Exposed to Risk.	Dead.	Withdrawn.	Retired.	Became Widowers.	Living, 1858.	Total.
Married Officers, 1808 to 1822—									
Entered as married ..	117	..	..	..	..	..	165	..	..
By marriage, 1st time ..	635	..	..	..	..	..	15	..	..
2nd " ..	94	..	..	..	..	..	1	..	..
3rd " ..	9	..	..	..	..	..	1	..	..
4th " ..	1	..	..	..	..	..	1	..	..
	856	10,338	9534	364	9	197	182	104	856
Ditto retired	197	..	..	..	..	..	..	..	..
Married after retirement, 1st time ..	12	..	..	..	..	..	..	..	..
2nd " ..	1	..	..	..	..	..	..	..	..
	210	3,161	3069	69	8	..	16	117	210
1823 to 1857—									
Entered by marriage, 1st time ..	1,191	..	..	..	..	..	170	..	..
2nd " ..	85	..	..	..	..	..	12	..	..
3rd " ..	7	..	..	..	..	..	1	..	..
	1,283	10,202	9274	197	16	177	183	710	1,283
Ditto retired	177	..	..	..	..	..	..	..	..
Married after retirement, 1st time ..	7	..	..	..	..	..	..	..	..
2nd " ..	6	..	..	..	..	..	..	..	..
3rd " ..	2	..	..	..	..	..	..	..	..
	192	1,469	1351	25	1	..	17	149	192
Active	2,139	23,170	23,169	655	34	374	398	1,000	2,167
Retired	374	..	..	..	..	..	..	..	..
Married after retirement, 28 ..	402	..	..	..	..	..	..	..	..
	2,541	..	..	..	..	..	..	..	2,541
Widowers, 1808 to 1822—									
1st	165	..	..	..	..	..	79	..	..
2nd	15	..	..	..	..	..	7	..	..
3rd	1	..	..	..	..	..	1	..	..
4th	1	..	..	..	..	..	..	..	..
	182	1,295	1120	53	6	19	67	15	182
Ditto retired	19	..	..	..	..	..	..	..	..
Became widowers after retirement ..	16	..	..	..	..	..	..	..	..
	35	162	131	7	4	..	15	9	35
Ditto, 1823 to 1857—									
1st time ..	170	..	..	..	..	..	85	..	..
2nd " ..	12	..	..	..	..	..	7	..	..
3rd " ..	1	..	..	..	..	..	..	..	..
	183	976	815	28	5	13	92	45	183
Ditto retired	13	..	..	..	..	..	..	..	..
Became widowers after retirement ..	17	..	..	..	..	..	..	..	..
	30	90	65	7	..	..	12	11	30
Married who became widowers	398	2,523	2133	95	17	32	266	80	430
Widowers retired ..	32	..	..	..	..	..	..	..	..
	430	..	..	..	..	..	..	..	..

The total number of officers who entered as bachelors is given as 4,905; and in the first period, 117 officers appear to have been married at the time of entry. A few, mostly clergymen, who entered as married, are included in the 1,191 first marriages of the second period, making altogether 5,104 officers accounted for in these tables. Of these, 2,400 died, 473 withdrew, and 2,231 were living at the close of the observations. From these tables the percentages have been calculated, as I have described, on the number exposed to risk in the middle of each quinquennial period of age, by deducting from the living half of all who entered or left, from any cause, at these ages.

Rate of mortality in two periods.

The most important question is the rate of mortality as compared in the two periods. The result strongly confirms the views which Mr. Neison and others have expressed on this subject. The number exposed to risk in the first period, 1808 to 1822, was 34,938; the rate of mortality, 3.92 per cent.; the rate of withdrawal, .78 per cent. In the second period, the number exposed to risk was 38,313; the rate of mortality, 2.69 per cent.; and of withdrawal, .53 per cent. By Mr. Davies' table, deduced from the officers in each rank from 1808 to 1836, the rate was 3.66 per cent., being a small fraction lower than what he had observed in the Bombay Military Fund. The same marked difference occurs at every quinquennial period of age, the rate of mortality diminishing at each quinquennium of age from 25 to 35, when it is less than half the rate of those officers who entered in the early period—being 2.05, as compared with 4.19 per cent.

That this diminution in the rate of mortality of late years is not accidental, may be seen by examining the table of percentage. In every class, at almost every group of ages of officers in active service, the percentage is less. Amongst retired officers, the numbers are too few at many ages to allow of this minute observation; nor does the question so much concern them, except as showing the permanent effects of an Indian climate on the constitution after return to their native country. In the following table I have compared together the percentages of mortality in two periods by the present tables, by Mr. Davies' table of the same Fund to 1840, by Mr. Neison's table for the Madras army, which he gives as corrected from the Patronage Books of the India House (but which must be allowed for as the average ages taken one year older than ours), and his own observations on the Bengal army,

(1) excluding retired and (2) including retired officers, which I have recalculated on 100 living in the middle of the year. I have also added the percentage from Dr. Farr's original observations for healthy districts—the deaths for 5 years, 1849 to 1853, being taken on the population of 1851. This table, or that of Messrs. Bailey and Day's observations from the British peerage, would, I apprehend, more nearly represent than any others the normal mortality of the class of officers of the Indian army, if they had always been living in this country, and not exposed to the climates of India.

No. V.—Comparisons of the Rate of Mortality.

Quinquennial Ages.	MADRAS MILITARY FUND.				NEISON.				British Peerage, Bailey and Day.	Farr, Healthy Life, Graduated Males.
	Entered.				Madras Army.		Bengal Army, 1800 to 1847.			
	1808 to 1822.	1823 to 1837.	1838 to 1852.	1853 to 1867.	1800 to 1819.	1820 to 1847.	(1) Active only.	(2) Including Retired.		
15—	3.61	2.42	2.78	1.45	2.41	1.31	1.21	1.20	.66	.53
20—	3.90	3.03	3.39	2.72	3.65	3.12	2.25	2.22	1.11	.74
25—	4.05	2.73	3.25	3.66	4.20	2.46	2.48	2.37	1.00	.60
30—	4.11	2.53	3.27	3.66	3.94	2.59	2.79	2.65	.86	.84
35—	4.19	2.05	3.22	3.70	4.29	2.44	2.93	2.67	.69	.89
40—	3.56	2.54	3.16	4.05	3.40	3.53	2.94	2.58	1.10	.59
45—	3.74	2.68	3.40	4.14	3.69	1.25	3.32	2.97	1.38	1.16
50—	2.90	3.22	2.95	3.74	3.43	..	3.45	2.25	1.63	1.44
55—	3.29	..	3.15	4.09	4.62	..	3.90	2.57	1.92	1.65
60—	2.41	3.16	3.63	3.73	5.69	..	4.03	3.08	2.83	2.89
65—	5.50	6.90	5.53	6.16	..	..	..	1.53	4.71	4.44
70—	7.82	..	7.68	3.16	..	..	..	..	7.68	6.79
75—	13.79	..	13.79	10	..	..	..	..	11.63	10.37
80—	17.64	..	17.54	20	..	..	..	..	17.06	15.66
85—	..	..	..	100	..	..	..	..	33.44	23.93
90—	..	..	..	..	..	..	..	..	52.17	..
Total	3.92	2.69	3.23	3.28	3.64	2.56	2.43	2.30	1.80	..

Another interesting question, on which the present observations throw light, is the rate of retirement from the Madras army, and the rate of mortality, as well as the rate of withdrawal and marriage after retirement amongst bachelors and widowers. On the whole experience of the Fund, amongst bachelors, the rate of retirement from active service steadily increases from 15 up to the age of 55—60, when it reaches its maximum, 5.61 per cent. Amongst married men, the rate of retirement is higher than that of bachelors, up to age 30—35, when it is nearly the same—married 1.22, and bachelors 1.23, per cent. It again nearly agrees at 45—50,

married 5.49, and bachelors 5.24, per cent.; after which it diminishes to 2.38 at 55—60. In both cases the retirements appear to cease after 60. Amongst widowers, the rate of retirement is somewhat more irregular. It begins at 25, and continues till after 70, but reaches a maximum between 45 and 50, when it is 4.16 per cent.

Amongst retired officers, the rate of mortality in each class is always highest at the younger ages, and diminishes with great regularity to the ages 50 to 55, or, in the case of widowers, to 55 to 60; at those ages, it is as low as 1.77 for bachelors, and 1.40 for married men, and 2.41 for widowers. This is a singular fact, but the numbers, though not great, are sufficient to give confidence in the average results, the more especially as it is almost entirely confirmed, as a general rule, when the facts are examined in the two periods into which the whole observations are divided.

The numbers exposed to risk on the retired list, are, bachelors, 2,510, deaths, 82; married, 4,361, deaths, 94; widowers, 197, deaths, 14; total, 7,068 years of life, 190 deaths, the total mortality being 2.69 per cent.

It should be particularly noticed, that the retirements do not include those of officers of the rank of Colonel and upwards, as no definite facts of this kind were given at their respective ages. By a computation on the average of the 20 years, 1840 to 1859 inclusive, it appeared that there were about 53 officers of the rank of Colonels and upwards always in Europe, to 19 in India, or about 73½ per cent.

Mr. Davies, in his second Report, gives a table deduced from Dodwell and Miles' List, showing, as nearly as he could ascertain it, the proportion who retire in every rank, from which he computed a table, showing, on the average age of promotion being assumed, how many would be left alive on attaining the next rank, and how many would be gone off by retirement before that time. He computed it

Below the rank of Captain	..	..	10 per cent.
In the rank of Captain	..	..	18 "
" Major	..	..	24 "
" Lieutenant-Colonel	..	..	50 "

and that only $\frac{1}{10}$ th of those who survive to the age of 51 are promoted to the rank of Colonel.

A table, similar to the present, at different ages may be deduced from Mr. Neison's summary of the two tables of Bengal army, 1800 to 1847, by deducting the first from the second, and computing the percentage of mortality on the difference. The totals

are, years of life, $88,590 - 77,979 = 10,611$ years of life, and $2,019 - 1,874 = 145$ deaths, or 1.37 per cent. But this appears to continue the observations till the deaths of the retired members, and to make no allowance for withdrawals from the Fund, which, in the present observations, were most numerous amongst bachelors immediately after retirement.

Several other deductions of considerable interest to similar Funds might be drawn from the table of percentages, as, for instance, the withdrawal of members, by which the subscriptions and liabilities cease. Upon examination, it will be seen that these are almost exclusively confined to bachelors, and widowers without children. The rate per cent. on the whole period for bachelors was .88 per cent, and for widowers .80 per cent.; both being nearly at a maximum at the ages 60-65. But the rate for married officers was only .15 per cent.; a result which, to a certain extent, might have been anticipated, although not hitherto acted upon. It led us to the conclusion, that we were justified in assuming that the subscriptions and liabilities for married men ought to be valued, not for the joint duration of the lives of their wives and their own, but for the whole duration of their lives, provided a reserve was made for the probabilities of second wives and families.

I must conclude, however, this part of the subject, by drawing attention to the rates of marriage amongst bachelors and widowers, and that of married men becoming widowers, which are shown in full detail for each class at quinquennial periods of age, and for the two separate periods under review.

For comparison, I have referred to Mr. Archibald Day's excellent paper, read before this Institute 24th March, 1862, and printed in vol. x., part 4, "On the Statistics of Marriages among the Families of the Peerage." His observations extend for a period of 100 years preceding 31st December, 1855, and comprise 2,721 bachelors; of whom 1,540 had married, 445 died unmarried, and 736 were living 31st December, 1855, still unmarried. The widowers were 945; of whom 438 had married, 368 died, and 139 were still living, to the same date, as widowers. The years of life observed were 42,383.5 for bachelors, and 7,888.5 for widowers.

The present observations comprise 4,905 bachelors, on active service; of whom 1,568 had died, 299 withdrew, 380 retired, and 1,706 married, and 952 were living as bachelors to 1858. The years observed were 45,439.

Of the retired 380, 82 had died, 123 withdrew, 56 had married, and 119 were living to 1858. Years of life observed, 2,510.

Of widowers, our tables give, either by first or subsequent marriages dissolved by death, 365; of whom 81 died, 13 withdrew, 32 retired, 179 remarried once or more times, and 60 still living as widowers. Years of life observed, 1,336.

Besides the 32 retired widowers, we find 33 who became widowers after retirement, making together 65; of whom 14 died, 4 withdrew, 27 remarried, and 20 were living to 1858. Years of life observed, 197.

We thus appear to have ample means for making a fair comparison, except perhaps for the retired, when, from the paucity of numbers, the percentages are irregular.

No. VI.—Comparisons of the Rate of Marriage.

Age.	BACHELORS, RATE OF MARRIAGE PER CENT.			WIDOWERS, RATE OF MARRIAGE PER CENT.		
	Madras Fund, 1808 to 1857.		General Popula- tion.	Madras Fund, 1808 to 1857.		General Popula- tion.
	Active.	Retired.		Active.	Retired.	
15—	.17	..	.19	.46	..	..
20—	2.61	..	4.21	11.21	13.56	20.77
25—	4.82	.69	7.79	12.21	11.45	14.91
30—	6.26	3.48	7.14	7.85	13.19	28.63
35—	5.40	2.67	5.47	8.66	40.99	29.31
40—	4.06	2.67	3.95	2.99	17.39	14.08
45—	3.60	2.94	1.58	1.45	9.01	7.72
50—	4.65	1.18	1.07	.71	16.98	5.91
55—	3.49	1.51	1.05	.35	4.35	4.25
60—	..	1.29	..	.15	3.99	3.27
65—	..	..	..	.05	..	2.17
70—	..	..	..	.03	3.70	1.88
75—	..	..	..	.06	..	.83
	3.75	2.23	3.63	..	9.25	13.71
					5.55	

Mr. Day remarks, that the marriages amongst the aristocracy, as compared with the general population, computed from the Returns for 1851 on the population as it appeared by the census in that year, take place at a much later period of life amongst bachelors, and in a still more marked degree amongst widowers. This peculiarity is even much more strongly marked amongst officers in India, and even when retired, and in about the same degree as in the peerage amongst widowers. The highest marriage rate per cent. given by Mr. Day amongst bachelors is at ages 25-30, 7.70 per cent.; in the Madras table, at 30-35, 6.26 per cent.; in 35-40, the observations are almost exactly alike; and

at 45 and upwards, the Madras military rate is much in excess even of the English peerage.

By the Madras table, below 30, the marriage rate amongst widowers is about 25 per cent. less than that shown by Mr. Day. Above that age it nearly coincides at several points, except at 50-55, when it is almost double both the peerage rate and that of the general population.

This question is a very important one, as affecting the valuation of all the Indian Funds, if the observations generally apply; for we shall see by the next table that the tendency to marry wives younger than themselves increases in proportion as marriage takes place at later periods of life.

Before proceeding to this table, I will merely state that the rate of marriage has considerably increased in the second periods of the Fund, from 1823 to 1857, both amongst bachelors and widowers; and that amongst the former, after the age of 30, and amongst the latter, for all the ages under observation, it is in almost all cases higher than the rate amongst the English aristocracy.

The table I now refer to shows, for 590 marriages in the first period, and 1,178 in the second, in all which cases the ages both of husband and wife were given, the total number of officers at different ages marrying wives of different ages, and distinguishing whether first, second, third, or fourth wife. By leaving out a few, who entered the Fund as married men, I have combined the two tables into one, comprising 1,526 first marriages, 164 second, 17 third, and 1 fourth marriage.

The following tables show, out of 100 officers, bachelors, marrying in each quinquennial period of age, the proportion marrying wives of equal ages, or older or younger than themselves, within equal differences of 5 years of age, and similar proportions for 100 widowers marrying at the same quinquennial period of age:—

No. VII., showing, of 100 Bachelors who Marry in each Quinquennial Period of Age, the Proportion who Marry Wives of different Quinquennial Ages, and the same for Widowers.

BACHELORS.												
Husband's Age.	Wife's Age.										Average Age of Wife.	Difference.
	12-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	Total.		
	12-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	Total.		
15-	..	30.0	41.7	8.3	..	..	..	..	..	8	29.4	+ 2.9
20-	8	39.8	43.8	13.6	1.4	..	..	..	..	23.2	21.3	- 1.2
25-	4	31.3	42.7	21.4	3.2	..	..	..	..	32.5	18.4	- 9.1
30-	..	25.5	42.6	21.1	9.2	..	..	..	..	24.2	23.5	- 9.0
35-	6	19.1	34.6	23.4	11.1	5.6	..	..	..	10.6	24.9	- 12.6
40-	..	16.9	33.8	28.2	12.7	8.4	..	..	..	4.6	25.6	- 16.9
45-	..	18.2	29.3	9.1	27.3	15.1	..	..	..	2.2	27.0	- 20.5
50-	..	13.8	21.1	21.0	15.8	15.8	16.5	..	..	1.2	28.9	- 23.7
55-	..	..	22.2	11.1	..	44.5	11.1	..	11.1	6	35.3	- 22.2
60-	..	..	..	..	..	100.0	..	..	..	1	37.5	- 25.0
Average Age of Husband Difference.	4	29.4	40.9	29.1	6.2	2.4	5	..	1	100	23.1	- 7.1
	26.7	28.4	29.5	31.0	35.1	41.4	40.6	..	57.5	..	30.2	
	13.2	10.9	7.0	3.5	2.6	3.9	1.9	..	5	..	7.1	
WIDOWERS.												
Husband's Age.	Wife's Age.										Average Age of Wife.	Difference.
	12-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	Total.		
	12-15	15-20	20-25	25-30	30-35	35-40	40-45	45-50	50-55	Total.		
20-	..	..	33.3	33.3	33.3	..	..	..	..	1.6	27.3	+ 5.0
25-	..	16.7	38.3	25.0	..	..	..	..	..	6.6	23.0	- 4.5
30-	..	25.7	31.4	8.6	14.3	..	..	..	..	18.2	23.1	- 9.4
35-	..	22.3	32.3	20.0	15.0	7.5	..	2.5	..	22.0	25.1	- 12.4
40-	..	13.5	40.6	27.0	10.8	..	2.7	5.4	..	20.3	26.1	- 16.4
45-	..	9.1	27.3	9.1	21.8	18.2	4.5	..	..	12.1	29.3	- 10.2
50-	..	..	25.1	19.1	33.3	14.3	9.5	9.5	4.8	11.6	34.6	- 17.9
55-	..	..	33.3	..	16.7	33.3	..	..	16.7	3.3	34.1	- 23.4
60-	..	25.0	..	..	75.0	..	..	..	..	2.2	28.6	- 33.7
65-	..	..	..	..	50.0	..	..	..	50.0	1.1	42.5	- 50.0
70-	..	..	..	..	..	..	..	..	..	..	..	..
Total.	..	15.4	35.2	17.0	19.2	6.6	2.2	2.8	1.6	100	27.1	- 14.1
Average Age of Husband Difference.	..	42.2	38.0	39.8	45.6	47.9	48.8	45.5	60.8	..	41.2	
	..	24.7	15.5	12.3	13.1	10.4	6.3	2.0	8.3	..	+ 14.1	

These tables well deserve a careful examination. They show, in a very marked manner, that the later the age at which the officer marries, the greater is the discrepancy of age between himself and his wife.

The average age at which bachelors marry appears to be about 30, and of their wives 23, a difference of 7 years. Under 20, the bachelors marry wives about 3 years younger than themselves; but from 20, the discrepancy in favour of a younger wife steadily increases each 5 years, till at 60—65 it is 25 years younger.

For widowers, the average age of marriage appears to be about 41, and their wives 27, a difference of 14 years. Under 25, in widowers' marriages, the average age of the wife is 5 years older than her husband, but afterwards the discrepancy of age in favour of a young wife increases, till it is higher than that of bachelors, being from 30 to 34 years, when widowers marry at 60 and upwards.

The lowest horizontal line shows the average age of the husband when the average age of the wife is the mean of the quinquennial ages at the top of the column; and it will be seen that, on marrying bachelors, the greatest discrepancy of age is when the wives are married young, which gradually diminishes, till, after 40, they marry men younger than themselves. But the extremes are not so great as in male life. Thus, for wives marrying under 15, the average age of the husband is 13 years greater, and the difference gradually diminishes, till, from 40 to 50, the husband's age averages two years younger than the wife. After 50, there is but one case, which may be considered exceptional.

On marrying widowers the difference is still greater, beginning with 25 years' difference of age, when the wife is from 15 to 20 at the date of the marriage, and diminishing regularly in each quinquennial period of age, till, at 45 to 50, they marry widowers two years younger than themselves.

The materials exist for a similar comparison with the general population of this country, and with the Bengal Fund, from a table given in Mr. Neison's Report of 1849, but the marriages in the last case amount only to 875 in number, and it is not clear whether they are only first, or include second, marriages.

In the second part of this paper, I propose to make some remarks on the original observations which I have collected, as to the mortality amongst wives, widows, and children, both male and female, and the rate of marriage amongst daughters and remarriage amongst widows, both in India and after retirement; and, in a

third part, to bring together comparisons of all these subjects from the other Presidencies, and from previous Reports.

I will merely conclude this part of the subject, by expressing my sincere conviction, that, as regards the rate of mortality, a great change for the better has been for many years going on in those vast territories of India, to which attention is now so earnestly directed for the development of their natural resources, and the improvement of the social condition of their millions of population. We are happy in discovering that, with ordinary precaution, the energies of this country may be safely brought to bear upon the social, moral, and commercial progress of those wide dominions; and it is consolatory to reflect, that we may, at no greater risk of life than is daily incurred in the exploration of the mineral wealth of this country, or in the navigation of her coasts, fulfil our solemn responsibilities to that large portion of the human race, whose destinies Providence has, for some grand purpose, entrusted to our care.

EXPERIENCE OF THE MADRAS MILITARY FUND, FROM 1808 TO 1857.

BACHELORS.—B. Officers who entered as Bachelors, from 1808 to 1822 inclusive.

Quinquennial Ages	1. ACTIVE.						2. RETIRED.					
	Entered.	Lived.	Died.	Withdrawn.	Retired.	Married.	Entered.	Lived.	Died.	Withdrawn.	Retired.	Married.
14-	762	1,639	47	6	..	..	53	..	..	..	..	..
20-	646	5,238	186	46	9	84	325	9	22	2	1	..
25-	260	3,213	212	38	20	153	425	20	74	4	1	..
30-	77	3,790	144	22	47	123	386	47	195	7	12	..
35-	34	2,363	101	22	30	105	258	30	281	8	10	..
40-	13	1,365	56	11	49	35	151	49	313	7	30	..
45-	19	773	37	4	33	28	102	33	335	8	17	..
50-	3	383	15	3	17	18	56	17	311	5	7	..
55-	1	182	9	1	3	6	23	3	208	8	4	..
60-	..	118	5	1	..	..	7	..	88	4	1	..
65-	..	92	2	1	..	..	3	..	44	1	..	..
70-	..	59	6	1	..	..	11	..	16	..	..	..
75-	..	20	3	..	..	..	4	..	5	..	..	..
80-85	..	6	1	..	..	..	2	..	..	..	..	..
Total	1,806	21,241	824	156	208	604	1,806	208	1,890	54	86	31

B. Officers who entered as Bachelors, from 1823 to 1857 inclusive.

Quinquennial Ages	3. ACTIVE.						4. RETIRED.					
	Entered.	Lived.	Died.	Withdrawn.	Retired.	Married.	Entered.	Lived.	Died.	Withdrawn.	Retired.	Total.
14-20	2,159	4,677	86	7	1	8	158	260	1	1	1	9
20-25	894	11,349	321	67	21	315	308	1,032	21	45	5	28
25-30	29	7,915	192	45	49	402	206	894	49	142	6	40
30-35	12	3,382	85	16	36	249	145	531	36	218	12	27
35-40	4	1,336	27	2	25	88	79	212	25	176	1	19
40-45	1	585	2	1	20	39	25	111	20	160	2	27
45-50	..	211	3	..	15	5	15	38	15	151	1	22
50-55	..	42	4	..	5	1	1	21	5	47	1	22
Total	3,099	28,627	744	143	172	1,102	938	3,099	172	940	28	172

B. Officers who entered as Bachelors, from 1808 to 1857 inclusive.

Quinquennial Ages	5. ACTIVE.						6. RETIRED.					
	Entered.	Lived.	Died.	Withdrawn.	Retired.	Married.	Entered.	Lived.	Died.	Withdrawn.	Retired.	Total.
14-20	2,921	6,316	133	13	1	8	158	312	1	1	1	12
20-25	1,540	16,587	507	113	30	399	308	1,357	30	67	7	33
25-30	289	12,258	404	83	69	557	206	1,319	69	216	10	77
30-35	89	7,172	229	38	83	422	145	917	83	413	19	62
35-40	38	3,699	128	29	55	188	70	470	55	457	9	50
40-45	14	1,950	82	12	69	74	25	262	69	473	9	63
45-50	10	984	40	4	48	33	15	140	48	486	9	60
50-55	3	425	19	3	22	19	14	77	22	358	6	47
55-60	1	182	9	1	3	6	4	23	3	208	8	29
60-65	..	118	5	1	..	1	2	..	88	4	1	12
65-70	..	92	2	1	..	..	..	..	44	1	..	8
70-75	..	59	6	1	..	..	..	..	16	..	..	8
75-80	..	20	3	..	..	1	4	..	..	..	..	8
80-85	..	6	1	..	..	1	2	..	..	..	..	8
Total	4,905	49,868	1,568	299	380	1,704	952	4,905	380	2,830	82	119,380

MARRIED OFFICERS.—M. Officers who entered, from 1808 to 1822, either as Married or who afterwards Married.

MARRIED OFFICERS.—M. Officers who entered, from 1801 to 1822, either as Married or into garrison service.																										
No. 1. Active List.												No. 2. Retired List.														
Age.	Entered.						Retired.						Entered.						Retired.							
	Married List.						Total.						Married after Retirement.						Total.							
	1st time.	2nd time.	3rd time.	4th time.	5th time.	6th time.	1st time.	2nd time.	3rd time.	4th time.	5th time.	6th time.	1st time.	2nd time.	3rd time.	4th time.	5th time.	6th time.	1st time.	2nd time.	3rd time.	4th time.	5th time.	6th time.		
15-20	2	..	..	..	..	..	2	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
20-25	32	70	5	..	..	..	125	207	1,740	67	7	15	5	..	..	..	..	..	..	..	..	..	..	..		
25-30	28	186	10	1	..	..	197	225	1,766	67	17	24	3	..	..	..	..	..	..	..	..	..	..	..		
30-35	23	203	13	1	..	..	117	137	1,983	24	19	29	3	..	..	..	..	..	..	..	..	..	..	..		
35-40	9	33	20	2	..	..	62	55	1,361	31	62	21	3	1	..	..	..	..	..	..	..	..	..	..		
40-45	4	10	22	19	3	..	47	50	982	35	3	13	7	1	..	..	..	..	..	..	..	..	..	..		
45-50	2	19	3	6	1	..	16	18	952	35	3	13	7	1	..	..	..	..	..	..	..	..	..	..		
50-55	2	1	..	..	..	..	3	5	350	13	8	..	..	..	..	..	..	..	..	..	..	..	..	..		
55-60	1	1	..	..	..	..	2	3	278	9	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
60-65	..	..	..	..	..	..	..	..	113	6	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
65-70	..	..	..	..	..	..	..	..	45	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
70-75	..	..	..	..	..	..	..	..	13	3	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
75-80	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
80-85	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..		
Total	117	635	94	9	1	739	856	10,338	564	9	197	165	15	1	182	104	856	13	197	210	3,161	69	8	16	117	210

M. Officers who entered, from 1823 to 1857, either as Married or who afterwards Married.

Age.	No. 3. Access List.										No. 4. Return List.												
	Entered.					Became Widowers.					Entered.					Lived.							
	Married List.					Total.					From Active List.					Total.							
	1st time.	2nd.	3rd.	4th.	Total.	1st time.	2nd.	3rd.	4th.	Total.	1st time.	2nd.	3rd.	4th.	Total.	1st time.	2nd.	3rd.	4th.	Total.			
15-	12	..	..	..	12	..	..	..	..	..	..	..	..	..	..	10	..	..	..	10			
20-	331	5	..	..	336	794	13	3	6	17	42	1	..	..	17	20	59	..	..	2			
25-	438	8	1	..	447	2,553	40	7	19	42	108	..	..	..	..	32	19	2	..	53			
30-	291	25	..	..	316	2,662	55	4	33	52	142	..	..	..	..	32	189	2	..	163			
35-	99	28	..	..	127	266	29	2	28	35	63	..	..	..	..	32	263	6	..	315			
40-	48	11	4	65	1,334	24	43	18	4	23	95	185	1	43	44	348	5	20	51	533			
45-	10	7	2	19	657	22	41	3	..	8	72	143	21	41	64	376	4	2	51	57			
50-	..	..	..	..	..	1	6	..	..	..	41	48	21	6	9	145	3	..	43	50			
55-	..	..	..	..	..	..	..	..	..	..	5	6	..	1	1	43	..	2	4	6			
60-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
65-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
70-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
Total	1,191	85	7	1,283	10,202	197	16	177	170	12	1	183	710	1,283	15	177	192	1,469	25	1	17	149	192

M. Officers who entered, from 1808 to 1857 inclusive, either as Married or who afterwards Married.

No. 5. Access List.										No. 6. Return List.															
Age.	Entered.					Total entered.	Widow.	Bereaved.	1st time.	Became Widowers.				Living, 1888.	Total.	Married since previous list.	Entered from Active List.	Lived.	Widow.	Bereaved.	Living, 1888.				
	Married List.									2nd.	3rd.	4th.	Together.												
	1st time.	2nd.	3rd.	4th.																					
15-	14	..	..	..	14	14	17	..	1	..	..	..	..	..	1	..	7	15	..	..	2				
20-	12	408	..	..	420	425	990	16	3	..	..	..	..	..	29	..	26	83	3	..	10				
25-	32	398	13	..	443	444	3,303	57	2	..	..	..	..	..	129	6	20	428	8	..	17				
30-	28	30	202	41	351	354	4,055	113	4	..	..	..	..	..	83	156	395	3	5	..	13				
35-	20	202	41	..	264	264	4,055	113	4	..	..	..	..	..	83	156	395	3	5	..	13				
40-	9	81	31	6	118	127	3,124	79	1	..	..	..	..	..	55	325	53	98	662	9	3				
45-	10	39	23	3	55	75	2,018	73	1	..	..	..	..	..	33	72	291	303	108	979	17	3			
50-	4	20	1	..	25	35	1,149	36	1	..	..	..	..	..	15	29	125	36	82	1,027	12	3			
55-	2	9	1	..	12	16	1,149	36	1	..	..	..	..	..	15	29	125	36	82	1,027	12	3			
60-	1	1	4	..	6	6	373	15	..	..	..	..	..	..	6	13	36	..	..	404	10	4			
65-	..	..	..	..	..	2	232	13	..	..	..	..	..	..	2	10	20	..	..	216	12	..			
70-	..	..	..	..	..	2	123	9	..	..	..	..	..	..	2	10	21	..	..	38	4	..			
75-	..	..	..	..	..	..	13	..	..	..	..	..	..	..	..	..	..	..	..	3	1	..			
80-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
85-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..			
Total	117	1,826	179	16	1	2,022	2,139	30,540	561	25	374	335	27	2	1	365	814	2,139	28	374	402	9	33	206	402

WIDOWERS.—W. Officers who entered from 1808 to 1822, and afterwards became Widowers.

Age.	No. 1. Active List.										No. 2. Retired List.					
	Entered.					Retired.					Entered.			Retired.		
	1st time.	2nd.	3rd.	4th.	Total.	1st time.	2nd.	3rd.	4th.	Total.	1st time.	2nd.	3rd.	4th.	Total.	Living, 1836.
20-	5	..	..	..	5	..	..	..	..	..	..	..	..	..	..	..
25-	14	..	..	..	14	..	..	..	..	..	..	..	..	..	..	..
30-	23	3	..	..	26	..	..	..	..	..	..	..	..	..	..	..
35-	41	2	..	..	43	2	10	1	..	13	..	..	..	..	..	..
40-	29	3	..	..	32	1	16	1	..	18	..	..	..	..	..	..
45-	14	1	..	..	15	2	15	2	..	19	..	..	..	..	..	..
50-	7	1	..	..	8	1	4	..	..	5	..	..	..	..	..	..
55-	5	1	..	..	6	2	4	1	..	7	..	..	..	..	..	..
60-	5	1	..	..	6	2	2	..	..	4	..	..	..	..	..	..
65-	2	..	..	..	2	1	..	..	..	1	..	..	..	..	..	..
70-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
75-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
80-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
85-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	165	15	1	1	182	1,295	53	8	19	79	7	1	87	15	182	16
											19	35	162	7	4	15
											9	35				9

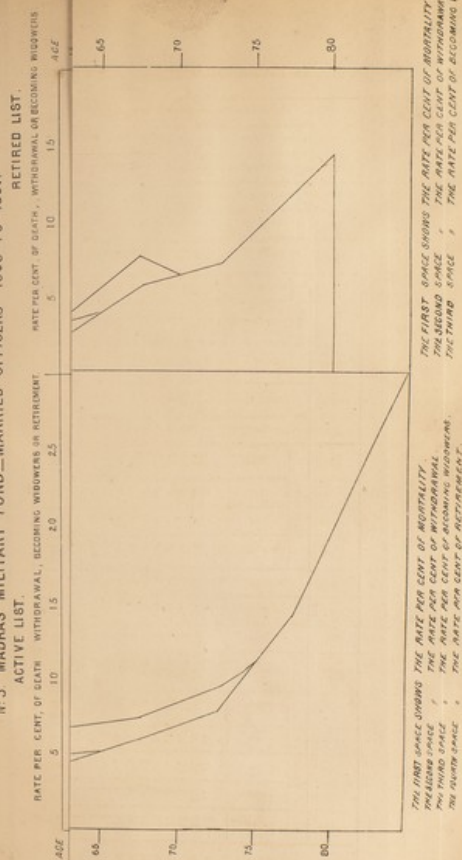
W. Officers who entered from 1823 to 1857, and afterwards became Widowers.

Age.	No. 1. Active List.										No. 2. Retired List.					
	Entered.					Retired.					Entered.			Retired.		
	1st time.	2nd.	3rd.	4th.	Total.	1st time.	2nd.	3rd.	4th.	Total.	1st time.	2nd.	3rd.	4th.	Total.	Living, 1856.
19-	1	..	..	..	1	..	..	..	..	..	..	..	..	..	..	..
20-	17	..	..	..	17	..	..	..	..	..	..	..	..	..	..	..
25-	42	1	..	..	43	1	9	1	..	10	..	..	..	..	..	..
30-	52	..	..	..	52	1	26	..	..	27	..	..	..	..	..	..
35-	19	4	..	..	23	1	14	..	..	15	..	..	..	..	..	..
40-	15	3	..	..	18	1	13	..	..	14	..	..	..	..	..	..
45-	5	..	..	..	5	1	8	2	..	10	..	..	..	..	..	..
50-	..	..	..	..	..	2	1	..	..	3	..	..	..	..	..	..
55-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
60-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	170	12	1	..	183	976	28	5	13	85	7	..	92	45	183	17
											13	30	90	7	..	12
											11	30				11

W.—Officers who entered, from 1808 to 1857, inclusive, and afterwards became Widowers.

[illegible]

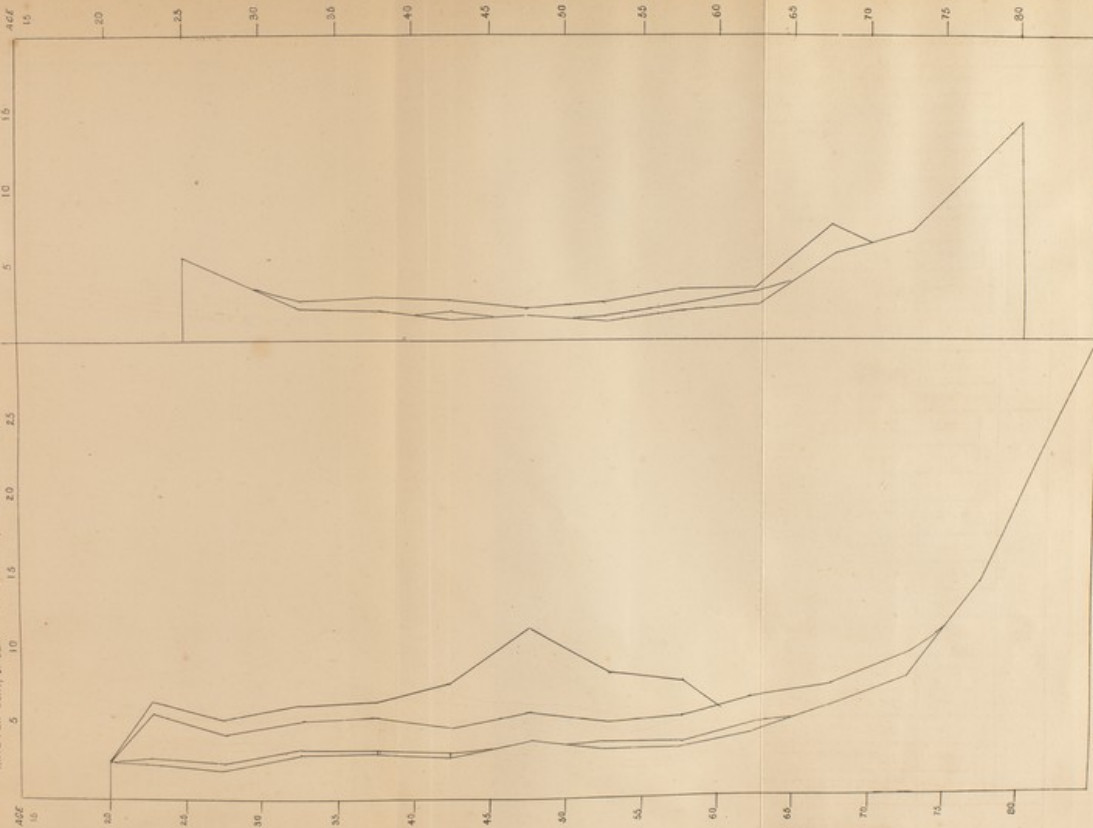
FIG. 3. MADRAS MILITARY FUND—MARRIED OFFICERS 1808 TO 1857.



35-44	7	1	..	55	430	16	2	4	31	5	..	36	8	66	5	4	9	30	..	1	4	2	7
45-54	27	6	1	..	53	329	10	..	12	22	4	..	26	8	56	3	12	13	43	..	5	16	
55-64	26	6	1	..	15	197	9	..	5	16	2	1	19	4	15	6	2	8	48	1	1	3	
65-74	7	1	..	..	6	82	2	1	..	3	..	3	2	10	1	1	2	18	2	1	..	5	
75-84	2	1	..	..	3	58	4	1	..	..	..	..	1	2	6	..	4	16	3	..	..	6	
85+	..	..	..	..	..	2	30	2	..	1	..	..	1	2	6	..	1	1	1	1	..	..	
Total	335	27	2	1	365	2,271	81	13	32	164	14	1	179	60	565	33	32	65	232	14	4	27	20

N°3 MADRAS MILITARY FUND—MARRIED OFFICERS 1808 TO 1857.
ACTIVE LIST.

RATE PER CENT. OF DEATH WITHDRAWAL BECOMING WIDOWERS IN RETIREMENT RATE PER CENT. OF DEATH WITHDRAWAL BECOMING WIDOWERS

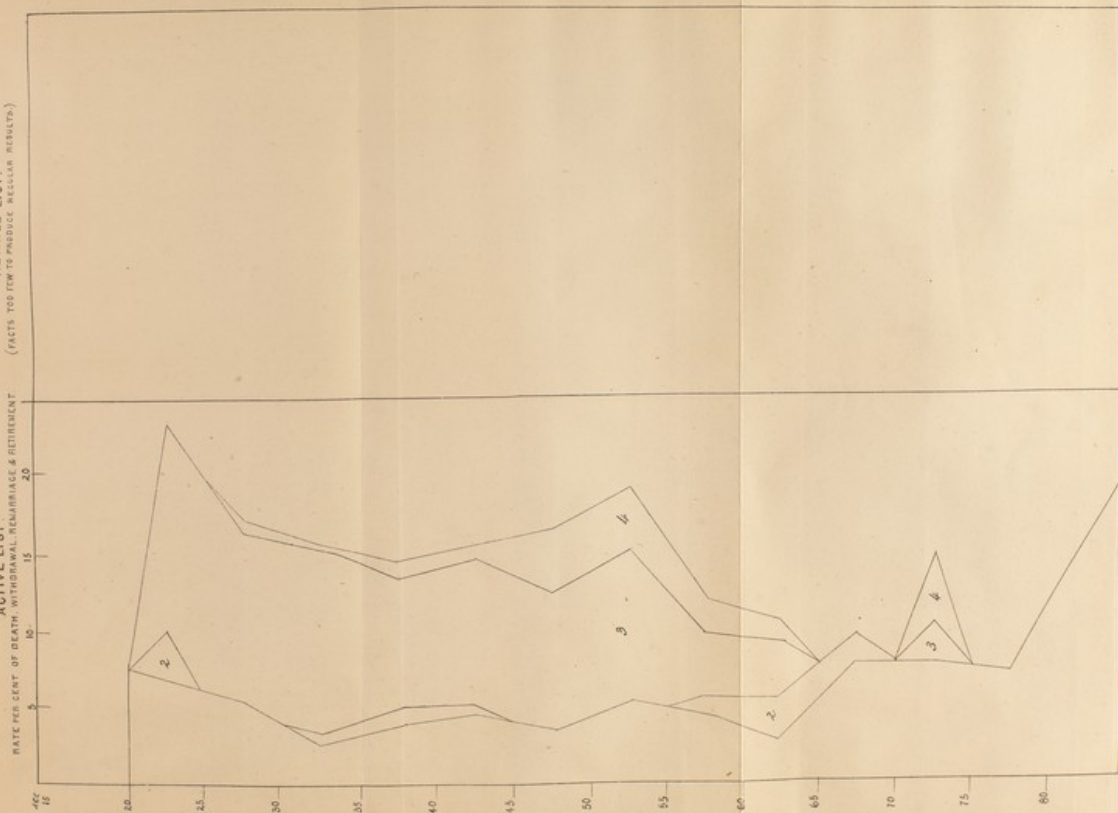


THIS FIRST SPACE SHOWS THE RATE PER CENT. OF MORTALITY.
THE SECOND SPACE THE RATE PER CENT. OF WITHDRAWAL.
THE THIRD SPACE THE RATE PER CENT. OF BECOMING WIDOWERS.
THE FOURTH SPACE THE RATE PER CENT. OF RETIREMENT.

THIS FIRST SPACE SHOWS THE RATE PER CENT. OF MORTALITY.
THE SECOND SPACE THE RATE PER CENT. OF WITHDRAWAL.
THE THIRD SPACE THE RATE PER CENT. OF BECOMING WIDOWERS.
THE FOURTH SPACE THE RATE PER CENT. OF RETIREMENT.

No 4. MADRAS MILITARY FUND - WIDOWERS - 1806 TO 1857

ACTIVE LIST
RETIRED LIST
(FACTS TOO FEW TO PRODUCE REGULAR RESULTS)



THE FIRST SPACE SHOWS THE RATE PER CENT OF MORTALITY AMONGST WIDOWERS BETWEEN THE CORRESPONDING AGE.
 * SECOND * THE RATE PER CENT OF WITHDRAWAL.
 * THIRD * THE RATE PER CENT OF REMARRIAGE.
 * FOURTH * THE RATE PER CENT OF RETIREMENT.

Madras Military Fund, 1808 to 1837.—Officers on Active and Retired Lists combined.—Percentages deduced from the preceding Tables.

(The Number exposed to Risk is the Living in the Quinquennial Period of Age, less half of all who entered or went off the Fund from any cause.)

(The Number exposed to Risk is the Living in the Quinquennial Period; Age, less half of all who are married or widowed, and one-fourth of all who are bachelors or spinners.)																			
Age.	Exposed to Risk.			Bachelors.			Married.			Widowers.			Total Combined.						
	Bachelors.	Married.	Widowers.	Total.	Married.	Total.	Widowers.	Married.	Total.	Widowers.	Married.	Total.	Widowers.	Total.					
14-	4778-5	9-5	5	4788-5	2-78	27	17	3-22	...	10-53	10-53	...	...	...	305				
20-	15329-5	765-5	29-5	16133-5	3-55	76	260	6-71	269	...	...	...	...	...	75				
25-	11725-5	2976-5	132-5	14833-5	3-53	84	476	9-13	476	...	...	...	...	...	405				
30-	7086-5	4356-5	276-5	11725-5	3-53	84	476	9-13	476	...	...	...	...	...	71				
35-	3926-5	4356-5	276-5	11725-5	3-53	84	476	9-13	476	...	...	...	...	...	384				
40-	1359-5	2782-5	324-5	4465-5	3-61	153	3-38	8-54	3-24	...	...	...	...	...	47				
45-	7309-5	1053-5	221-5	2883-5	3-42	137	3-15	6-56	2-63	...	...	...	...	...	387				
50-	371-5	177-5	133-5	1082-5	3-53	141	2-41	5-41	1-41	...	...	...	...	...	49				
55-	198-5	432-5	66-5	632-5	2-24	75	...	2-99	5-79	...	...	...	...	...	344				
60-	13-5	432-5	66-5	632-5	2-24	75	...	2-99	5-79	...	...	...	...	...	344				
65-	71-5	172-5	29-5	273-5	8-39	140	...	13-08	13-08	...	...	...	...	...	344				
70-	21-5	50-5	15-5	87-5	13-95	...	...	13-08	13-08	...	...	...	...	...	344				
75-	...	...	...	...	...	...	...	13-08	13-08	...	...	...	...	...	344				
80-	...	...	...	...	...	...	...	13-08	13-08	...	...	...	...	...	344				
85-	...	...	...	...	...	...	...	13-08	13-08	...	...	...	...	...	344				
	47948-5	23169-5	2133-5	73250-5	3-44	88	3-68	8-00	2-83	1-15	1-72	4-70	4-45	8-0	9-66	14-91	3-28	65	3-93

c

Madras Military Fund, 1808 to 1857—Officers on Active and Retired Lists distinguished.

PERCENTAGES ON 100 LIVING IN THE MIDDLE OF THE QUINQUENNIAL PERIOD																
Age.	Exposed to Risk.					Bachelors.										
	Married Officers.					Widowers.					Total Active.			Total Retired.		
	Bachelors.		Married Officers.		Total.	Bachelors.		Married Officers.		Total.	Bachelors.		Married Officers.		Total.	
	Active.	Retired.	Active.	Retired.		Active.	Retired.	Active.	Retired.		Active.	Retired.	Active.	Retired.		
14-	4778-	5	9-5	11-5	..	4788-	5	2-78	..	..	..	..	..	..	..	
20-	16222-5	46-5	783-5	11-5	16975-5	338-	3-19	72	..	..	..	..	..	..	..	
25-	11811-	146-5	208-5	16-5	1358-5	11178-	600-5	3-68	3-51	74	..	..	..	..	..	
30-	6741-5	364-5	4103-5	22-5	273-	401-	12-5	7676-	821-5	3-68	3-58	5-0	1-19	2-18	3-64	
35-	3489-	412-	3792-	33-5	401-	385-5	23-	5134-5	1039-	4-49	4-66	3-78	4-06	12-99	2-19	
40-	1824-5	411-5	2946-5	604-5	363-5	23-	5134-5	1039-	4-49	4-66	3-78	4-06	12-99	2-19	2-86	
45-	916-5	412-5	1876-	906-	288-5	36-	3081-	1384-5	4-36	4-61	4-85	15-68	1-77	2-07	1-18	
50-	392-	338-5	1077-5	835-5	178-	48-5	1642-	5122-5	4-35	4-77	5-61	15-68	1-77	2-07	1-18	
55-	115-	129	595-5	588-5	92-	48-5	853-5	828-5	5-23	5-58	1-74	3-49	11-94	4-02	2-01	
60-	115-	83-5	358-5	337-	77-	15-5	550-5	496-	4-35	3-87	..	..	5-22	4-79	1-20	
65-	90-5	42-5	224-	208-	54-	12-5	368-5	264-	2-21	11-	..	..	..	..	..	
70-	55-5	16-	116-5	56-	27-	2-5	199-	74-5	10-81	1-50	..	..	..	..	..	
75-	18-5	5	12-5	8-5	14-5	5	12-	16-22	..	..	..	..	..	..	..	
80-	9-	..	..	..	2-5	..	..	16-22	..	..	..	..	..	..	..	
85-	..	..	..	..	2-	..	..	..	..	..	..	..	..	..	..	
45-129-	2509-5	18808-	4561-	1936-	197-	66183-	7067-5	3-45	..	84	3-75	8-70	3-27	4-90	2-23	
															10-10	

Madras Military Fund, 1808 to 1857—Officers on Active and Retired Lists distinguished (continued).

Age.	PERCENTAGES ON 100 LIVING IN THE MIDDLE OF THE QUINQUENNIAL PERIOD OF AGE (continued).																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																															
	Married Officers.					Widowers.					Total Active.				Total Retired.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																	
	Active.					Retired.					Active.					Retired.		Total.	Withdrew.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
	Deft.	Withdrew.	Total.	Deft.	Withdrew.	Deft.	Withdrew.	Total.	Deft.	Withdrew.	Total.	Deft.	Withdrew.	Total.	Deft.	Withdrew.																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																
14-	212	40	53	299	637	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Comparison of the Percentage Rates of Mortality, Withdrawal, Retirement, and Marriage of Officers who entered the Madras Military Fund in the two periods, (1) 1808 to 1822 inclusive, and (2) 1823 to 1857 inclusive.

Age.	Known to Exit.										Bachelors, Active.									
	Bachelors.					Married.					Widowers.					(1).				
	Active.		Retired.		Total.	Active.		Retired.	Total.	Total.	Active.		Retired.	Total.	Total.	Retired.		Retired.	Total.	Total.
	(1).	(2).	(1).	(2).		(1).	(2).	(1).	(2).		(1).	(2).	(1).	(2).		(1).	(2).	(1).	(2).	
14-	1201-5	3546-5	16	30-5	147	7-5	..	..	..	808-19	..	..	..	..	4-31	2-42	..	..	..	2-88
20-	4702-5	6586-5	16	30-5	147	7-5	..	..	..	3-31	..	..	..	..	1-71	6-84	..	..	..	2-88
25-	4870-5	6586-5	16	30-5	147	7-5	..	..	..	1-35	..	..	..	..	1-71	6-84	..	..	..	2-88
30-	3388-5	3183	160-5	184	1307-5	200-5	48	30-5	100-5	1	4-35	7-8	41	5-18	8-72	2-81	..	..	..	6-01
35-	2217	1263	254-5	137-5	1847-5	134-5	169	173	194	3	3-5	4-57	132	4-86	10-83	2-67	..	..	..	7-82
40-	2217	1263	254-5	137-5	1847-5	134-5	169	173	194	2	10-5	4-57	99	13-5	4-74	11-63	2-14	..	..	6-57
45-	217	199-5	302	140-5	1264	612	55-5	331	122-5	18-5	12-5	10-5	17-5	18-5	3-57	5-5	..	..	..	7-20
50-	355	37	294-5	44	915-5	162	718-5	137	160-5	12-5	37-5	11	4-23	8-5	4-80	5-07	11-53	10-81	..	2-70
55-	172	..	199	..	534-5	35	544-5	43-5	192	..	38-5	3	5-23	5-8	1-74	3-49	11-04	..	..	2-70
60-	115	..	83-5	..	338-5	22	326-5	24-5	77	..	13	2-5	4-35	8-7	..	5-22	..	..	..	..
65-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
70-	5-5	..	16	..	111-5	5	8-5	..	14-5	..	12-5	..	16-22	..	..	16-22	..	..	..	..
75-	18-5	..	3	..	42	..	8-5	..	6-5	..	..	..	18-18	..	..	18-18	..	..	..	..
80-	5-5	..	..	..	11-5	..	5	..	6-5	..	..	..	..	..	..	..	..	..	..	..
85-	..	..	..	..	..	..	3	..	2	..	..	..	..	..	..	..	..	..	..	..
Total	10442	25997	1700-5	809	9534	2274	3009-5	1331	51120	3-131-5	65-5	4-24	4-90	1-07	3-11	9-22	2-86	..	..	4-24

Comparison of the Percentage Rates of Mortality, Withdrawal, Retirement, and Marriage of Officers who entered the Madras Military Fund in the two periods, (1) 1808 to 1822 inclusive, and (2) 1823 to 1857 inclusive—(continued).

Age.	Bachelors, Retired.										Married, Retired.									
	Bachelors.					Married.					Bachelors.					Married.				
	Active.		Retired.		Total.	Active.		Retired.	Total.	Total.	Active.		Retired.	Total.	Total.	Active.		Retired.	Total.	Total.
	(1).	(2).	(1).	(2).		(1).	(2).	(1).	(2).		(1).	(2).	(1).	(2).		(1).	(2).	(1).	(2).	
14-	12-5	6-25	..	..	18-75	16-39	9-84	..	..	25-23	2-04	..	..	..	6-53	4-0	6-122	1-4	..	..
20-	6-08	1-63	..	..	8-13	5-61	13-08	..	..	1-86	1-71	4-65	1-91	..	3-33	2-88	5-73	..	..	..
25-	4-36	7-48	1-87	1-37	6-52	3-98	5-87	7-62	4-91	..	..	..	..	..	..	..	..	..	..	..
30-	2-63	1-26	2-63	1-62	5-22	2-76	2-76	6-90	3-26	..	..	..	..	..	..	..	..	..	..	..
35-	2-63	1-26	2-63	1-62	5-22	2-76	2-76	6-90	3-26	..	..	..	..	..	..	..	..	..	..	..
40-	2-63	1-26	2-63	1-62	5-22	2-76	2-76	6-90	3-26	..	..	..	..	..	..	..	..	..	..	..
45-	2-63	1-26	2-63	1-62	5-22	2-76	2-76	6-90	3-26	..	..	..	..	..	..	..	..	..	..	..
50-	1-70	2-38	1-36	5-44	2-27	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
55-	4-02	2-01	1-31	7-34	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
60-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
65-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
70-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
75-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
80-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
85-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
Total	3-18	5-06	1-42	0-96	3-46	4-37	5-69	11-12	3-82	..	..	..	..	..	..	..	..	..	..	..

Comparison of the Percentage Rates of Mortality, Withdrawal, Retirement, and Marriage of Officers who entered the Madras Military Fund in the two Periods, (1) 1808 to 1822 inclusive, and (2) 1823 to 1857 inclusive—(continued).

Age.	Wives and Aunts.						Wives and Sisters.						Exposed to Risk.				Percentages.				Totals.		
	D.			Q.			D.			Q.			D.	Q.	D.	Q.	D.	Q.					
	Deed.	Withdraw.	Retained.	Deed.	Withdraw.	Retained.	Deed.	Withdraw.	Retained.	Deed.	Withdraw.	Retained.											
14-20	14.20	..	..	14.28	4.44	4.44	..	..	..	..	..	..	..	..	1235.5	3555.	3.81	.49	4.30	7.42	20.62	69.	
20-25	..	..	..	..	..	..	..	..	..	..	..	..	..	..	4927.	11,290.5	3.00	.95	4.83	5.03	66.53	69.	
25-30	3.80	1.27	..	12,662.73	2.90	.52	..	..	..	..	..	..	..	..	5860.5	9033.	4.05	.67	4.72	7.35	73.73	34.	
30-35	3.78	1.16	..	6,364.46	2.60	.83	..	..	..	..	..	..	..	..	5479.	6239.5	4.11	.64	4.75	5.35	51.04	40.	
35-40	4.36	1.41	..	10,310.35	1.16	.33	..	..	..	..	..	..	..	..	3837.	5855.	4.19	.55	4.92	5.35	42.37	47.	
40-45	2.69	..	..	3,641.83	14.55	5.21	..	..	..	..	..	..	..	..	16,222.34	2348.	3.74	.69	4.42	6.68	12.37	47.	
45-50	4.36	..	..	18,711.21	74.16	..	..	..	..	..	..	..	..	..	32,424.39	1417.5	3.74	.69	4.42	6.68	12.37	47.	
50-55	4.35	..	..	1,235.11	1.95	..	..	..	..	..	..	..	..	..	2481.5	403.5	2.90	.56	3.43	3.22	..	322.	
55-60	4.35	..	..	6,922.17	4.55	1.19	..	..	..	..	..	..	..	..	1380.5	101.5	3.91	.76	4.03	.99	..	99.	
60-65	2.00	..	..	2,601.30	3.90	10.49	..	..	..	..	..	..	..	..	997.5	49.	3.41	1.30	4.71	18.16	..	816.	
65-70	7.41	..	..	7,841.88	..	..	..	..	..	..	..	..	..	..	518.5	11.5	3.50	..	4.22	9.00	..	6.96	
70-75	7.41	..	..	7,750.44	..	..	..	..	..	..	..	..	..	..	82.5	..	13.79	..	13.79	..	..	..	
75-80	6.90	..	..	6.90	..	..	..	..	..	..	..	..	..	..	..	..	13.79	..	13.79	..	..	..	
80-85	..	..	..	15.38	..	..	..	..	..	..	..	..	..	..	..	..	17.54	..	17.54	..	..	..	
85-	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	
	4.73	..	..	7,7614.90	3.43	.61	1.59	1.38	16.21	5.32	3.04	11.41	19.77	10.66	18.32	29.01	3,035.	3.83	1.23	4.70	2.69	55.3	22.

Madras Military Fund, 1808 to 1857—Table showing, in 1,708 Marriages in which the Ages of both Husband and Wife were given, the Proportion of Officers at each Quinquennial Period of Age marrying Wives Older or Younger than themselves, by successive Differences of Five Years, and distinguishing whether First, Second, Third, or Fourth Time.

[illegible]

G. & E. LAYTON, PRINTERS,
150, FLEET STREET.

GRIFFIN'S CHEMICAL RECREATIONS.

JUST PUBLISHED,

IN ONE VOLUME, 18mo. 576 PAGES: ILLUSTRATED BY FOUR
HUNDRED WOOD-CUTS.

[Price 7s. 6d. Bound in roan.]

CHEMICAL RECREATIONS: A Popular Compendium of
Experimental Chemistry, for the use of beginners. By JOHN J.
GRIFFIN. The ninth edition, entirely re-written.
Published by RICHARD GRIFFIN & Co., Chemical Museum,
Glasgow, (Scotland.)

The Publishers of this work have on sale every kind of AP-
PARATUS required in the pursuit of Experimental Chemistry,
Illustrated Catalogues of which may be had of their Agent,
Mr. ALEX. MCKENZIE, 6 South William st., New York—on ap-
plication, *post paid*.

May, 1847.

ANNALS

OF THE

LYCEUM OF NATURAL HISTORY,

NEW YORK,

CAN BE OBTAINED OF THE SECRETARY,

Mr. R. R. BROWNNE, 39 Crosby st., New York.

CONTENTS.

Nos. 1-4. 6 PLATES.

- ART. 1. A new Mineralogical Nomenclature. By J. D. DANA.
2. Fossil Fish of Connecticut and Massachusetts. By J. H. RED-
FIELD.
3. On the Structure and Affinities of Ceratophyllaceæ. By ASA
GRAY.

4. Notice of the Appearance of the Pine Grosbeak in the Vicinity of New York. By J. F. WARD.
5. Description of five Species of Vespertilio. By WM. COOPER.
6. On two Species of Molossus inhabiting the United States. By WM. COOPER.
7. On two Species of American Plecotus. By WM. COOPER.
8. Discovery of Vauquelinite in the United States. By JOHN TORREY.
9. Account of several new Genera and Species of North American Plants. By JOHN TORREY.
10. Observations on the Genus *Sarracenia*, including a new Species. By H. B. CROOM.
11. *Melanthacearum Am. Septentrionalis Revisio*. Auct. ASA GRAY.

No. 5. 5 PLATES.

Monograph of the Species of *Pasinachus* inhabiting the United States; with Descriptions of two new Genera, belonging to the family Carabica. By J. L. LeCONTE.

Description of a new Species of *Apus*. By J. L. LeCONTE.

Description of three new Fossils from the Falls of the Ohio. By ISSACHAR COZZENS.

On certain Coleoptera indigenous to the Eastern and Western Continents. By J. L. LeCONTE.

Nos. 6, 7. 3 PLATES.

Description of some new Species of Shells. By J. H. REDFIELD.

Description of a new Species of *Anser*. By G. N. LAWRENCE.

A Descriptive Catalogue of the Geodephagous Coleoptera inhabiting the United States east of the Rocky Mountains. By J. L. LeCONTE.

CONTENTS OF NOS. 8 AND 9.

Continuation of LeCONTE's Catalogue of the Geodephagous Coleoptera.

OFFICERS OF THE LYCEUM, 1847.

JOSEPH DELAFIELD, <i>President</i> .	
JOHN L. LeCONTE,	} <i>Vice Presidents</i> .
WILLIAM C. REDFIELD,	
JOHN H. REDFIELD, <i>Corresponding Secretary</i> .	
ROBERT H. BROWNNE, <i>Recording Secretary</i> .	
CHARLES M. WHEATLEY, <i>Treasurer</i> .	
B. W. BUDD, M.D.,	} <i>Curators</i> .
J. G. BELL,	
R. H. BROWNNE,	
J. C. BREVOORT,	
JAMES THOMSON, JR.,	} <i>Committee of Publication</i> .
J. L. LeCONTE,	
W. C. REDFIELD,	
C. M. WHEATLEY,	
J. S. HODGE,	
W. A. SEELEY,	

GENERAL INDEX

TO THE

AMERICAN JOURNAL OF SCIENCE AND ARTS.

FIRST SERIES OF FIFTY VOLUMES COMPLETE.

NOW READY FOR DISTRIBUTION: PRICE TO SUBSCRIBERS, \$3.

With a steel Portrait of the Senior Editor, and an Historical Preface.

[1 vol. 8vo, pp. xx and 344.]

This long expected volume is at last ready for delivery, and will be distributed to those who have subscribed for it, with the May Number of the American Journal of Science. Only a limited edition (500 copies) of this elaborate Index has been printed. It is indispensable to all who have entire or even partial copies of the First Series of the Journal, and hardly less important to those who investigate any department of American, or even of foreign science, whether they possess the entire work or not. No pains or labor have been spared to make it full and complete, and above all, accurate. It has occupied the almost undivided attention of a scientific gentleman for six months merely to read and correct the proof-sheets, and we do not include the great labor of constructing it. Its arrangement is lucid and of easy reference, and a full list of figures, plates and other illustrations in the whole Series is given at the end.

The Historical Preface conveys much interesting information concerning the origin and progress of the work.

It may be procured of all the regular Agents of the Journal.

All subscribers who have given notice of their desire to have the General Index, and who do not receive it soon, will oblige us by sending in their names a second time.

New Haven, May 1, 1847.

CHEMICALS AND CHEMICAL APPARATUS.

The subscriber is constantly receiving from Europe, fresh supplies of the Berlin Apparatus and French Chemicals, and having established an extensive Manufactory on his premises, is now prepared to execute orders for all kinds of *Chemical and Philosophical Apparatus*, at short notice.

The proprietor being the sole and only authorized agent for Prof. Morse, is enabled to furnish the latest and most improved forms of Apparatus for the Electro-Magnetic Telegraph, together with the Acids, Zines, Paper, &c. &c.

Also, *A Description of the Electro-Magnetic Telegraph*. By ALFRED VAIL, Assist. Sup. of U. S. Telegraph.

A Descriptive Catalogue of Chemical Apparatus, Chemical and pure Re-agents, illustrated by one hundred and eighty-five wood engravings, is now ready for delivery, and will be sent "gratis" to all who make application, "post paid," to

EDWARD N. KENT, *Practical Chemist*.

No. 116, John street, New York. [16]

Chemical and Philosophical Apparatus, Pure Chemical Preparations, &c.

DR. JAMES R. CHILTON,

Practical Chemist,

Respectfully informs the public that he has removed from Broadway to No. 83 Chambers street, a few doors west of Broadway, New York; where he keeps for sale a very extensive assortment of Apparatus, &c., especially suitable for Lecturers on Chemistry, and others engaged in chemical and philosophical researches. Among which are Grove's most improved Galvanic Batteries, with platina and amalgamated zinc, for deflagrations and decompositions; Smee's Batteries, with platinized silver and amalgamated zinc; Galvanic Batteries of other construction, as Faraday's, Daniels', &c.; Portable Furnaces, Evaporating Basins, Retorts, Crucibles, Tubes, &c. of the finest Berlin porcelain.

PLATINA WARE—such as Crucibles, Capsules, Spoons, Forceps, &c. Silver Crucibles; Steel and Agate Mortars; Berzelius's, Rose's, and other Chemical Lamps and Stands; Compound Blow-pipes, Superior French Air-pumps, with double glass barrels and improved valves; Electrical Machines and Apparatus; delicate Balances and Weights; all the Apparatus necessary for Organic Analysis; Boxes of Tests, and Blowpipe Apparatus.

Also, an extensive assortment of pure Chemical Preparations, Reagents, &c.

COLLECTIONS OF MINERALS AND GEOLOGICAL SPECIMENS, SHELLS, FOSSILS, &c.

Particular attention paid to the Analysis of Ores, Metals, Minerals, Mineral Water, Commercial Articles, &c. as heretofore. November 1, 1846. [16]

THE

AMERICAN

JOURNAL OF SCIENCE AND ARTS.

[SECOND SERIES.]

ART. XXX.—*On the Relations which exist between the Phenomena of Erratic Blocks in Northern Europe and the Elevations of Scandinavia*; by M. DESOR.*

THERE is a point in the phenomena of boulders not hitherto presented, which appears to me capable of throwing much light on the question that now engages our attention: it is the examination of the connection which subsists between the erratic blocks of Northern Europe and the elevation of Scandinavia. These relations are the more important, as they admirably explain some circumstances which are peculiar to the erratics of the north, and of which there is no example in Switzerland. These peculiarities are: 1, the occurrence of polished and grooved surfaces beneath the present level of the sea; 2, the existence of *marine shells* attached to the polished rocks at a height much above the *present* level of the sea; 3, the presence of marine shells in the midst of the diluvium even at an elevation of eight hundred feet; 4, the *osars*, or ridges of boulders and stones which contain the shells of the Baltic.

Among the phenomena which prove so fully the instability of the Scandinavian soil, there are some facts which indicate the elevation of the land, while others on the contrary attest its subsidence. Thus, we cannot have less equivocal proof of an elevation of a country, than the occurrence at a great height and at a considerable distance from the coast, of shells now inhabiting the adjacent seas, and whose perfect state of preservation leaves no doubt that they lived where they now occur: for had they

* Communicated by the author, through Prof. AGASSIZ, for this Journal. Translated from the French. SECOND SERIES, Vol. III, No. 2.—May, 1847. 40

been transported by a current or any other violent agent, they would have been broken or at least much worn. But should we refuse to admit the evidence which these shells offer, we cannot deny the proof afforded by the serpulæ of Christiania and the barnacles of Uddevalla, whose shells still adhere to the rocks far above the sea.

On the other hand, the fact that the striae and furrows are continued *beneath the waters of the sea*, attests no less strongly that at a certain epoch the land must have been more elevated than now. In fact, it is a point on which the partisans of different hypotheses are nearly agreed, that the phenomena of erratics took place over a submerged country. Glaciers can advance only as far as the limits of the land: we learn from the observations of Mr. Martins, that even the glaciers of Spitzbergen do not project beneath the sea; for, as the temperature of the water is above that of the ice, it melts the glaciers by its contact, and a considerable space equal to the height of the tide, separates the glacier from the water.*

But if, as I believe I have sufficiently proved, the polished surfaces of the north have been occasioned by immense glaciers, which have transported from afar the erratic blocks of Scandinavia and furnished the materials of the diluvium and of the *osars*, it follows that the whole country which bears traces of scratches, must have been out of water when the glaciers produced this polishing and made the striae and furrows which we now see there. If these striae were exactly at the level of the sea, we might suppose that Scandinavia was then at the same elevation as at the present day. But we have seen numerous cases in that island in which the furrows are found *under* the sea, from which facts we must conclude according to the principles laid down, that the land at that epoch was as much above its present height as the striae are now below the waters. These results although opposed, are not as they may at first appear, contradictory; and it is here that the observation of shells completes the study of erratic phenomena properly so called, by showing us the chronological order of these events. In fact, the barnacles of Uddevalla and the serpulæ of Christiania which are found, the former at the height of two hundred, and the latter of one hundred and seventy feet above the sea, prove irresistibly that the coast has sunk in these places: the fact that these animals are adhering to striated rocks, shows not less certainly that

* In order that glaciers should advance upon the bottom of the sea, it is necessary that the temperature of the water should be below zero the year through; but such a climate would render the formation of glaciers impossible. A humid atmosphere rather than a severe temperature, is necessary to the existence of glaciers, and the former is incompatible with the temperature of a sea constantly below zero.

the rocks were dry before these animals were living there; whence I read this double conclusion: 1st, that the graving of the rocks was anterior to the epoch of the barnacles and serpulæ, and 2d, that to receive these animals, the coasts of Uddevalla and Christiania must have sunk as far at least as would be equivalent to the actual height of these fossils.

But the barnacles and serpulæ are not the only proofs of this subsidence. At a much greater height we find shells, over these polished and striated rocks, imbedded in the diluvium; and as the species are in general indigenous, and probably contemporaneous with the serpulæ and barnacles, it follows of course that the submergence must have been considerable, and equal at least to the site of the highest shells of the diluvium, (eight hundred feet.) This submergence must consequently have taken place between the epoch of the furrowing and the stratification of the diluvium. At that time the glaciers having quitted the plain to retire to the interior mountains, the waters of the sea invaded all the low country of Scandinavia, surrounding the solid masonry of the Scandinavian mountains with an ocean to which we shall be able to fix some approximate limit when we are acquainted with the boundaries of the region of diluvial shells. In passing, I would remark, that the analogy of the erratic blocks of Finland with those of Scandinavia, allows us to believe that at that time the Gulf of Bothnia was not separated from the North Sea.

We have no means of determining the length of time which elapsed between the retiring of the glaciers, and that subsiding of the soil which led to the invasion of the sea. However, the perfect preservation of the polishing beneath the diluvium, would seem to prove that the period could not have been long. Nowhere are the grooves and scratches more distinct, than where they have been uncovered by removing the diluvium; they usually form a striking contrast with those rounded rocks whose surface has been for a long time exposed to the wearing effects of the atmosphere.* But as we have no reason to suppose that the action of the atmospheric agents was formerly less energetic than now, I am compelled to believe that the preservation of the polished surfaces under the diluvium, is owing to their having been exposed only a comparatively short time to wear from these agents. It is even probable that the invasion of the sea was one of the causes which have been active, if not decisive, in the destruction of the great glaciers. It explains at the same time the colder

* We may believe, that if after a new deluge the boulders which are at present exposed should be covered again with gravel, the geologists of future ages would have much more trouble in ascertaining the causes which have produced the effects, than we have at the present day, aided as we are by the preservation—frequently admirable—of the polishings, furrows, and fine striae.

character of the diluvial fauna; for a mass of ice so considerable could not be melted without materially chilling the waters which bathed it. The cold having slowly disappeared, the temperature would have been gradually elevated, and the fauna of the waters would take by degrees the more temperate character which distinguishes it at the present day.

To this epoch of the invasion of Scandinavia by the waters of the sea, we should refer the arrangement in beds of the mud, sand, and gravel, which the great glacier has left in place in testimony of its ancient extent. The action of waves coming in upon this movable soil, has here overturned and heaped up the debris of marine life upon the shore, where the remains are found mingled with scratched rocks and pebbles. If such is really the origin of these deposits, there is no reason for surprise that the scratched pebbles should be so numerous. The waves in striking them against each other, would wear them more or less; and if blocks of a considerable size have generally better preserved their markings than the pebbles, it is because from their weight they were less exposed to being moved and rolled. It is very natural in Switzerland, where the action of the waters has been less manifest and less prolonged, that the striated pebbles should be more numerous. Thus you do not find there, or only occasionally, distinct beds in the properly glacial deposits. Those which are met with, ordinarily occur in the neighborhood of torrents.*

After this epoch of immersion, even the proximate duration of which it is impossible at present to ascertain, the country of Scandinavia was again elevated. The shores bordering the high central regions, the plains of Sweden, and those of Finland, were successively raised from the bosom of the waters, bringing back with them to the surface the same mud, the same diluvial gravel, which had been deposited by the glaciers and which had undergone no other change in the interval than that of being irregularly stratified and mingled with shells. The depressions of the soil alone remained covered with water, and formed the lakes of Sweden and Finland, as well as the Gulf of Bothnia. The last, isolated from the ocean by the elevation of the intermediate land, has lost by degrees its saltiness; and this explains the character of its fauna, which is rather the fauna of brackish water than that of the sea. The interior lakes also were transformed completely into freshwater, and here and there may perhaps be found some indications of their ancient condition. It appears that certain fishes in particular have resisted these changes in the water, and according to researches of Scandinavian zoologists, especially of Mr. Esmark, the trout of Swedish lakes (*Salmo*

* Voy. Rod Blanchet, Terrain erratique alluvien du Cassin du Léman.

trutta, L.) is only a species of salmon, like the *Salmo salar*, L. But as the salmon of the coast does not ascend into the lakes, we are naturally led to the conclusion, that this fish has resisted the modifications that have occurred where it dwells. The immersion of land does not take place alike in all parts; the beautiful observations of Messrs. Keilhau and Bravais, upon the ancient marks of the level of the Scandinavian sea, teach us that there it was not uniform throughout. Finally, if it is true that the *osars*, which may be traced a long distance into the interior and whose mode of formation we have explained above, indicate successive sea shores, it follows that the Gulf of Bothnia was once much larger than at present. A large belt of coast now under cultivation, was then under water, and only gradually became elevated.

This successive retreat of the waters has taken place mostly during the present epoch, as undeniable traces of man* are found in the interior of the *osars*. It is probable that during this period of slow immersion, there lived in Scandinavia a primitive people, an entirely different race, as their osteology indicates, from that of recent Scandinavia, and whose skeletons are found in the peat beds mingled indiscriminately with those of animals, some of which have completely disappeared from the surface of the earth, such as the *Bos urus*, and others which are no longer known in the same countries, as the reindeer.†

Conclusion.—It follows from the preceding considerations, that whilst the upheavals of Scandinavia are of great importance in the study of erratic blocks, the latter furnish us in their turn with valuable hints as to the time and the geological bearing of these elevations. I have shown that the elevations are not confined to the historical epoch, but extend far back into the period of the diluvium. On the other hand we learn from the same examinations, that these elevations have not been continuous; that on the contrary they were intermitting and in sweeps, since the soil is successively raised and depressed. We have distinguished in this connection three principal points: 1st. An epoch when the land was higher than now, the epoch of the glaciers; 2d. A general sinking of the plains of Scandinavia, bringing with it an irruption of the sea; 3d. The rising of the same plains, which is even now in operation.

Each of these periods must have had a considerable duration. We can readily believe that while an agent is acting so slowly that a glacier might transport for hundreds of leagues the stones and gravel taken from the Norwegian mountains, a long time must have been required, whose minimum of years would be thousands, if the movements of glaciers in our day are regarded as a criterion.

* See Lyell, upon the proofs of a gradual elevation of the soil in certain parts of Sweden.

† I am indebted to the beautiful works of Messrs. Wilson and Eschricht for these details.

The second period must have been at least as long, if we consider the time required for the existence, propagation, and death of an entire fauna, whose numerous remains are found upon a land once submerged.

Finally, the third period comprehends the historical epoch, when the country was inhabited by the foreign race whose remains are discovered in the peat beds.

It follows therefore, that the glacier epoch is not merely an accident in the history of our globe, but that it embraces a long period, the more important to the geologist, that it is the connecting link between the antediluvial times and the historical era.

ART. XXXI.—On the Analysis of the Oat; by Prof. JOHN PITKIN NORTON, of Yale College.

(Continued from p. 235, this volume.)

3. *Of the Ash yielded by the Chaff.*—The chaff forms a very small and seemingly unimportant part of the plant; but it is in reality indispensable to its perfection, and a close examination shows that it is admirably adapted to its particular end.

1. The quantity of ash which it yields is greater than that left by any other part, and as in the other parts, this quantity varies with the soil and with the variety of oat.

The following table exhibits the per-centage of ash and water, in seven specimens of chaff.

TABLE XXI.

	Hopeton Oats.			Sandy Oats.	Dun Oats.	Potato Oats.		Mean of seven trials.
	No. 1.	No. 2.	No. 3.			No. 1.	No. 2.	
Per-centage of water,	10.28	10.62	10.58	9.46	11.42	11.16	10.45	10.39
Do. of ash, calculated dry,	7.23	10.62	16.53	18.97	19.16	18.59	27.47	16.94

It is singular that the per-centage of water in the thin, dry, light chaff, should be fully equal to that in the straw.

The average of the above is nearly 17 per cent.; as this is higher than that of any other part, so no other exhibits so wide a range. The chaff of Potato oat, No. 2, has nearly four times as much ash as that of Hopeton oat, No. 1. This last-mentioned chaff is from the sample of oats I have noticed before, as grown on a poor mossy soil.

2. The quality of the ash from the chaff also varies greatly in different samples, and its composition suggests some interesting inquiries. As before, I will give an extended analysis first.

Composition of Ash from Chaff of Hopeton Oat, from Mr. Harbottle, Hexham, Northumberland.

TABLE XXII.

	Per-centage.
Sulphuric acid,	5.32
Chloride of sodium, (common salt,)	5.11
Potash,	7.56
Soda,	5.84
Phosphates of lime, magnesia, and iron,	4.55
Lime,	1.84
Magnesia,	11.99
Soluble silica,	56.65
Insoluble silica,	98.66

The quantity of silica in this ash amounts to nearly 70 per cent., being much greater than in any ash that I have before instanced. There is an extraordinary quantity of soluble silica in this chaff, and it may probably in this respect be considered an extreme case, for I have not found so much in any other sample.*

The office of the chaff seems to be to protect the oat during the earlier stages of its growth. For this reason fully one-sixth of its weight is ash, and of this ash 70 per cent. is silica. While the husk is yet soft and green, the chaff has arrived nearly at maturity, and closely envelops the tender seed with its flinty covering. As the husk gradually hardens, the chaff unfolds, and at last leaves the grain entirely to this its ultimate protector.

3. It now remains to show that the chaff varies in quality as well as quantity. The above single analysis must not be considered as a standard for the composition of the ash in other samples, it only indicates its leading features. The four following analyses, on a less extended scale, will be found to present variations equally extensive with those we have noticed in the other parts of the plant.

Composition of Ash from four specimens of Chaff.

TABLE XXIII.

	Hopeton Oats.		Potato Oats.	Dun Oats.
	No. 1. Legh. Barley soil.	No. 2. Poor Moss.	Gravelly soil.	Good loam.
Salts soluble in water, chiefly sulphates and chlorides,	35.62	34.12	19.86	18.65
Phosphates of lime, magnesia and iron,	4.29	2.73	2.26	2.40
Lime and magnesia,	4.03	7.14	7.01	4.44
Silica,	56.65	50.01	70.86	74.50
	99.99	100.00	99.99	100.00

* I have taken many precautions in my determinations of soluble silica; in the above instance the quantity was so large, that I fused the substance obtained with carbonate of soda, and confirmed my previous result. I was at first accustomed to burn and weigh, before treating with acid, that portion of the watery solution which refused to redissolve after evaporation to dryness; but latterly, fearing that by burning, some alkaline silicates might be formed, insoluble even in strong acid, I added the acid to the undissolved portion before burning.

The soluble silica, here included in the salts soluble in water, is to be added to the insoluble silica. With this addition, the silica in the last sample amounts to about 80 per cent. The Hopeton chaff, No. 2, is from the same mossy land which I have noticed in all the other parts as deficient in silica. In the chaff and leaf, however, this deficiency is not so great as in the straw; a subsequent table, No. 30, will show that the husk also has nearly its full proportion. This partiality, as it may be called, in the distribution of silica, I have noticed in several other analyses of the various parts. The leaf must have its framework to sustain it, while drawing food for the whole plant from the atmosphere; the chaff must have a large quantity of silica to form an effective covering for the tender oat; and the husk also must in its turn be fitted to protect the grain through all vicissitudes, until it is committed to the earth, and has commenced its growth. We find it actually the fact, that these parts are better supplied than the stalk, a part which can better perform its functions with a small supply than any other. Are we not then justified in supposing that some law exists by which those parts, where a particular substance is most needed, are supplied, even to the deprivation of other parts which can exist with a smaller quantity? Nature thus does all in her power towards the complete performance of her duties. She labors to perfect the leaf, the chaff, the husk, and through them finally the seed, upon which the future continuance of the species depends; if now the materials are exhausted, the straw must be weak and imperfect. Nature can do no more, the necessary substances are not within her reach, or she is prevented from obtaining them by the physical condition of the soil; the responsibility is thrown upon the cultivator, who has neglected his duty in the preparation of the soil, or in furnishing those substances which are essential to its fertility.

4 and 5. *Of the Ash yielded by the Husk and the Grain.*—In the consideration of the quantity of the inorganic constituents of the husk and of the grain, I shall separate them as I have done the other parts of the plant. In the first place, however, I shall draw attention to some points in which comparisons of the two parts are involved.

1. I have thought it of some importance to ascertain the relative proportions of husk and grain in different samples of oats, with the view of determining whether this might be an index of quality.

The following table gives these proportions in nine samples of oats.

TABLE XXIV.

	Hopeton Oats.				Potosi Oats.	Dan Oats.	Victoria Oats.	Black Ter. Oats.	Sandy Oats.
	No. 1.	No. 2.	No. 3.	No. 4.					
Grain in 100 parts,	75.4	77.39	77.39	74.36	76.80	76.28	71.86	72.38	76.28
Husk in 100 parts,	23.42	22.61	22.61	25.64	23.20	23.66	28.14	27.62	23.68

An average of the above gives 75.54 as the usual proportion of grain, and 24.26 of husk. I am inclined to think that this separation cannot be considered a *certain* indication as to quality, because the above Victoria oat, which afforded the largest percentage of husk, was sent as a sample of peculiar excellence, having yielded an extraordinary quantity of fine meal to the boll. The thinness of the skin, in this instance, was more than an equivalent for the thickness of the husk.

2. Of the water in the oat at ordinary temperatures, the annexed table gives the per-centage in five of the ordinary varieties.

TABLE XXV.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Per-centage of water,	13.02	13.59	11.02	11.50	11.90

The mean of the above gives about 12 lbs. of water in 100, or about 5 lbs. in a bushel of oats, as they are when kept in a dry place at the ordinary temperature. This is probably somewhat below the true average, as my determinations were made upon oats that had been kept for some time in small parcels.

I was next desirous to ascertain how much of this water was contained in the grain, and in the husk respectively, and accordingly made trials of each part separately. The following table contains my results.

TABLE XXVI.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.
Per cent. of water in grain,	13.17	13.66	11.06	11.27	11.56
Do. do. in husk,	12.55	13.33	10.19	10.09	11.32

The difference is not great. It is singular that the husk should contain so very nearly the same per-centage as the grain, a body we should suppose so much more suited to absorb and retain water. The chaff, as we have seen, presents an analogous case.

3. The next inquiry relates to the quantity of ash, and is of much importance. I am now to show that in these two parts of the plant, the ash varies in quantity under different circumstances of growth, as we have found it to do in the parts already examined. I shall first give the husk and grain separately, and then the quantity yielded by the whole oat.

The annexed table gives the per-centage of ash in the dry husk and grain of different varieties of oats, grown on unlike soils.

TABLE XXVII.

	Hopeton, Light loam.	Hopeton, Poor moss.	Hopeton, Line-sick land.	Hopeton, Reclaim. ed moss.	Potosi, Thin gravel.	Dan, Good loam.	Sandy, Gravelly loam.	Mean of seven trials.
Ash in grain,	2.14	2.81	2.28	2.32	2.22	2.11	1.61	2.07
Ash in husk,	6.47	5.27	6.49	7.11	6.90	5.24	6.03	6.06

It appears from the mean of the above trials, that the husk contains three times as much ash as the grain. The variations of

ash in the different samples of each are not so wide as in other parts of the plant, but there are no two even of the same variety alike.*

The following table gives the per-centage of ash in the whole oat.

TABLE XXVIII.

	No. 1.	No. 2.	No. 3.	No. 4.	No. 5.	No. 6.	No. 7.	No. 8.	Mean of eight trials.
Per cent. of ash in whole oat calculated dry, }	3.17	3.32	3.37	3.25	3.56	2.58	2.66	3.65	3.19

If we take the above mean as near the true one, the bushel of 40 lbs. contains nearly 1½ lbs. of ash; a crop of 60 bushels, therefore, carries off about 7½ lbs. When the whole oat is burned, we find that the grain being in so much larger quantity, brings down the united per-centage of ash far below what is yielded by the husk alone.

Having now completed these preliminary inquiries, I turn to the consideration of the composition of the ash from the husk and the grain.

I shall now separate the two parts, and give the analysis of each in a distinct table.

1. *Composition of the Ash from the Husk.*—I have already shown that the ash of this part is three times greater in quantity than that of the grain, and that it constitutes about the third part of that which is taken from the land in the seed. In proceeding another step, and ascertaining its composition, I shall first direct attention to a table containing extended analyses of the ash from four specimens, grown in widely separated parts of the country, and of the two most common varieties, the Hopeton and the potato oats.†

TABLE XXIX.

	Potato Oats, Northern-berland.	Hopeton.		
		No. 1. Northern-berland.	No. 2. Wagon-shire.	No. 3. Ayrshire.
Sulphuric acid,	4.39	9.61	5.01	4.50
Phosphoric acid,	0.65	1.64	2.65	1.80
Chloride of sodium, (common salt),	2.39	0.24		
Chloride of potassium,			2.37	0.40
Potash,	2.23	3.93	5.55	5.30
Soda,	9.97	6.33		
Lime,	4.30	1.05	4.31	2.03
Magnesia,	2.35	0.38	1.01	0.64
Peroxide of iron,	0.32	1.58	1.61	1.80
Peroxide of manganese,		0.92	0.86	0.72
Soluble silica,	5.79	4.46	2.91	1.61
Insoluble silica,	68.39	68.39	71.82	80.11
	99.80	98.83	98.10 F.	99.33 F.

* The grain burns with exceeding difficulty. The abundance of alkaline salts is so great that it is almost impossible to prevent their melting, and enveloping the carbonaceous matter. I have, in some instances, been compelled, after charring the grain, to dissolve out these phosphates, by boiling in successive portions of distilled water. The remaining ash then burns white. The alkaline solution is again added, and the whole evaporated to dryness. This method, with care, is perfectly accurate.

† The analyses marked F, are from Mr. Fromberg.

The very large per-centage of silica is one of the most striking features in this table. It amounts in every case to more than 70, and in Hopeton oats, No. 3, to more than 80 per cent, averaging considerably higher than in any other part of the plant. It is no doubt present in such quantity that the husk may be a proper covering to the grain. While the husk is yet green, the chaff, as I have stated, protects both it and the grain; but this is only until the husk arrives at maturity; it is then, by itself, admirably fitted to protect the grain, and the chaff is no longer necessary.

In the salts soluble in water, sulphuric acid still predominates; phosphoric acid is usually there also, but in minute quantities, and the phosphates in the acid solution seldom amount to more than 1 or 2 per cent. In two of these analyses there is no soda, neither is it found in the ash from the grain of the same oats. The two alkalies seem to fulfill the same purpose in the economy of the plant, and it appears to take one or both indifferently, as they are more or less abundant in the soil.

The above table has shown that the ash of the husk varies in its composition, but I have prepared another in a condensed form, which exhibits the fact more distinctly.

Composition of Ash from four samples of Oat Husk.

TABLE XXX.

	Hopeton Oats.		Potato	Dun oats.
	No. 1. Light sandy loam.	No. 2. Poor moss.	Oats, Gravely soil.	Good loam.
Salts soluble in water, chiefly sulphates and chlorides,	22.92	33.84	23.14	19.96
Phosphates of lime, magnesia, and iron,	1.84	4.62	1.10	2.49
Lime and magnesia,	6.79	1.54	5.18	3.38
Silica,	68.35	60.00	70.57	74.25
	100.00	100.00	99.99	99.98

To the insoluble silica in each of the above, must be added 4 or 5 per cent. of soluble silica contained in the watery solution. The Hopeton oat husk, No. 2, on "poor moss," is the same to which I have referred before. It is less deficient in silica than any part of the plant to which it belongs. Its demands, as most imperative, seem to have been supplied first.

No part of the plant has so small a portion of salts soluble in water as the husk. From the instance of the Dun oat above, they may even be below 20 per cent. in a perfectly healthy sample, for this was inferior to none in general appearance and size.

2. *Composition of the Ash from the Grain.*—With this last part of the plant I shall follow the same plan as I have hitherto pursued, first giving extended analyses, and then directing attention to the differences caused by variety of soil, manure, &c.

TABLE XXXI.

	Potato Oats, Northumb. Berland.	Hopeton Oats.		
		Northumb. Berland.	Ayrshire.	Ayrshire.
Sulphuric acid,		17.37		
Phosphoric acid,	49.19	38.48	46.26	50.44
Chlorid of sodium, (common salt,)	0.35	0.49		
Chlorid of potassium,			5.32	1.03
Potash,			16.97	20.65
Soda,	31.56	29.56		
Lime,	5.32	6.57	10.41	10.28
Magnesia,	8.69	11.00	9.98	7.82
Peroxid of iron,	0.88	0.38	5.08	3.85
Peroxid of manganese,			1.25	0.42
Soluble silica,	0.89	1.29		
Insoluble silica,	0.98	2.31	3.70	4.40
	97.86	98.85	98.27 F.	98.89 F.

In every part of the plant hitherto, we have found sulphuric acid in the watery solution of the ash; in the grain it seems to give way to phosphoric acid. In only one of the above analyses is it present; the grain was from a poor crop, grown on an exhausted soil, and it is possible that the sulphuric acid may have been present only because it was impossible to obtain a full supply of phosphoric acid.

The large quantity of this acid is remarkable; in nearly every case it constitutes almost or quite one-half of the ash. It is easy, therefore, to see how the addition of bones or guano should benefit the oat crop.

Silica, heretofore so prominent an ingredient in the ash, is here very small in quantity.

The second sample of Hopeton oats was grown on what is called lime-sick land, but it will be perceived that the proportion of lime is not larger than in some of the other ashes. This is in accordance with an opinion of Prof. Johnston, first suggested after an analysis of a lime-sick soil, that the defect does not consist in a superabundance of lime, but in a physical condition of the soil, produced originally by too large a dose of lime at once. The oats from this soil were very poor, the grain full sized but light. The quantity of chlorine is large compared with the others, as is that of the oxide of iron also, otherwise there are no very striking differences.

The grain constitutes three-fourths of the weight of the oat, and furnishes a little more than one-half of the ash; in which ash, if we consider 45 lbs. of phosphoric acid the average, a crop of 60 bushels will carry off about 68 lbs. of that acid, equivalent to about 300 lbs. of bones.

From the many analyses of grain that I have made, I will only select three, in addition to those which I have already given.

The three samples of oats to which the grain belonged were obtained through the kindness of my friend Mr. Simpson of Teawig, Beaulieu, Inverness. In accordance with my request, he selected specimens from the same neighborhood, grown on very unlike soils. They were of crop 1844.

"No. 1. *Sandy Oats*.—Grown on a stiff clay soil, which was much baked by the early summer's drought. They were after grass sown with wheat laid down after a crop of turnips, manured with farm-yard dung and a small quantity of bones. Crop, four quarters per acre."

"No. 2. *Hopeton Oats*.—Grown on a poor sandy soil, which also suffered much from the drought. The oats were after two years' grass, pastured, the grass sown down with barley, after a turnip crop (raised with bones), which was all eaten off on the ground by sheep. Produce, three quarters per acre."

"No. 3. *Hopeton Oats*.—Grown on a deep rich vegetable mould, one of the best soils in that part of the country. Managed in the same manner as No. 1. Produce, eight quarters per acre."

I will first give the per-centage of ash obtained from the grain of these oats, and then its composition.

Per-centage of Ash in Grain, from Mr. Simpson.

TABLE XXXII.

	No. 1.	No. 2.	No. 3.
Ash calculated dry,	1.80	1.48	2.48

The differences in this table are certainly very striking; after the above account of the soils, and amount of the crops, they scarcely need any explanation. The poorest crop has least ash. This is a very decisive proof of the absolute necessity of this small portion of inorganic matter to the grain. The scanty supply yielded by the soil of No. 2 seems to have made a difference of five quarters per acre in the crop.

We will now consider the composition of these ashes, as given in the following table.

TABLE XXXIII.

	No. 1.	No. 2.	No. 3.
Salts soluble in water, chiefly sulphates and chlorides,	68.52	70.96	72.96
Phosphates of lime, magnesia, and iron,	21.60	18.63	12.42
Lime and magnesia,	7.10	7.11	11.95
Silica,	2.78	3.30	2.67
	100.00	100.00	100.00

The chief differences in these ashes are in the lime and magnesia, and in the phosphates. It seems strange that the latter should be least in the ash of No. 3. This would perhaps be explained by some local circumstances, with which I am not acquainted.

The quantity of silica, in the ash of No. 2, from the sandy soil, is, as we should expect, somewhat larger than in the others.

On the whole, the differences between these ashes, are not very striking, and it would be hard to say from an inspection of the above, which had belonged to a poor crop. This fact is most worthy of attention, since, in so far as the present analyses go, they show that the plant will only produce as many seeds as it can bring to perfection, so far as the inorganic part is concerned. It may, and will, as we have seen, produce an imperfect straw, but the essential parts of the ash of the grain must always be present, and that too in the proper proportions.

Before closing my account of the inorganic part of the oat, I will introduce two tables, the first of which gives a comparative view of the per-centages of ash yielded by all the parts of the plant in different specimens, and the second an analysis of each of these parts united in one table, so as to give a comprehensive view of the whole.

1. Comparative view of the quantity of Ash yielded by the different parts of the Plant. Calculated dry.

TABLE XXXIV.

	Hopeton, North- umberland, Fife.	Hopeton, Fife.	Pottery, North- umberland, Edinburgh.	Dun, Edinburgh.	Sandy, Fife.	Mean of each part.
Grain, . . .	2.14	1.81	2.22	2.11	1.67	2.00
Husk, . . .	6.47	6.03	6.99	8.24	6.03	6.75
Chaff, . . .	16.53	17.23	18.59	19.16	18.97	16.69
Leaf, . . .	8.44	7.19	14.39	10.29	15.92	10.88
Top straw, . .	4.95	5.44	9.22	8.25	11.01	7.77
Middle straw, .	6.11	5.23	7.41	6.53	9.01	6.66
Bottom straw, .	5.33	5.15	9.75	7.10	7.30	6.93

2. Comparative view of the Composition of Ash from each of the above parts in Hopeton Oats, from Mr. Harbottle, Hexham, Northumberland.

TABLE XXXV.

	Grain.	Husk.	Chaff.	Leaf.	Top straw.	Middle straw.	Bottom straw.
Sulphuric acid, . .	19.61	5.32	14.80	16.33	15.45	13.29	
Phosphoric acid, .	49.19	1.94		3.13	3.03	15.36	
Chlorid of sodium, .	0.35	0.24	5.11	2.29	3.13		
Phosphates of lime, } magnesia, and iron, }		5.84	6.13	2.84	3.03	0.78	
Potash, . . .	31.56	10.26	7.96	14.89	19.09	21.80	43.17
Soda, . . .							
Lime, . . .	5.32	1.95	4.53	6.99	7.02	7.23	6.06
Magnesia, . . .	8.63	0.38	1.84	2.55	2.84	2.91	2.07
Peroxid of iron, . .	0.98	1.58	0.24		0.30	1.40	0.61
Peroxid of manganese, .	0.92						
Soluble silica, . . .	0.89	4.46	11.99	5.90	5.13	7.34	5.03
Insoluble silica, . .	0.78	68.30	56.65	45.75	43.31	33.14	12.25
	97.50	98.23	98.96	99.30	99.99	98.33	98.35

Sprengel and Boussingault have published analyses of the grain of oats. Those of Sprengel are inserted in Prof. Johnston's Lec-

tures, and those of Boussingault in his own works. As all the results hitherto presented in this paper are original, I merely refer to these without introducing them.

I have now finished the course that I at first marked out for the inorganic division of this chapter. The plant has been divided into seven parts, the top, middle, and bottom straws, the leaf, the chaff, the husk, and the grain. The leaf was again subdivided into a bottom and top part. Of each of these nine parts it has been shown—

1. That it varies from every other, both in the quantity of its ash, and the composition of that ash.

2. That variations also exist between the ash from different specimens of the same part, grown on different soils.

3. That in these variations, although often very great, the distinctive character of the part is always preserved; the composition of the ash from the husk, for instance, never being like that from the straw or leaf.

4. That the soil has a direct influence on the quality of the ash. This has been proved in several instances, and particular deficiencies pointed out.

5. That each part is furnished with an ash—in quantity and quality peculiarly adapted to the function which the part is designed to fulfill.

The silica, for instance, is in the straw so distributed as most effectually to strengthen those parts which need its supporting power; in the leaf it sustains an extended surface of pores in contact with the atmosphere; in the chaff it forms an impervious coating for the husk, until that part has also received a supply which enables it to protect the grain, upon which the perpetuation of the species depends.

Equally beautiful are the facts which we discover respecting the alkaline sulphates and phosphates. We find little of the latter in the whole length of the straw, in the leaf, or in the chaff. But when we arrive at the grain, the alkaline sulphates disappear, and the phosphates take their place; these have passed up the whole length of the stalk, avoiding the leaves and the chaff, and at last, by a law infinitely more unerring than any which human wisdom can devise, deposited themselves in the very place where phosphoric acid is most needed, in order that, as part of the food, it may build up the bones, the framework of the animal body.

These are only two of the many theoretical deductions that we have been enabled to draw during our gradual ascent.

But it is not only such theoretical and physiological questions that have been elucidated by these analyses; they indicate many facts of great importance to the practical man.

The composition of every part of the healthy plant being known, the means for obtaining a healthy crop are obvious. The

inorganic part being entirely derived from the soil, to the soil must attention be directed in case of failure, and its deficiencies ascertained. With these results before him, any farmer may see that if his straw refuses to stand, the chief cause is probably a lack of soluble silica in the soil. In some of the alkaline silicates now manufactured for sale, he may find a ready means of remedying the defect.

The straw, it should be noticed, does not return to the soil all that the grain has taken from it, and thus even where all the straw is returned in the shape of manure with the greatest possible care, the land may ultimately become exhausted of the materials for the inorganic part of the grain, which is all carried away and sold. With these remarks I pass on to the second division.

II.—Of the Organic part of the Ripe Plant.

Under this division will come more especially the nutritive properties of oats. In the consideration of the inorganic part, attention was chiefly drawn to questions connected with the circulation of the plant, and with the best means of supplying those deficiencies which are invariably found when an imperfect crop is produced.

These inorganic substances, especially the phosphates, are indispensable to our food, but they form a small part of the whole grain, only 2 lbs. in 100. The remaining larger part merits our attentive consideration, particularly as it chiefly distinguishes the oat from other varieties of corn.

I speak here of the grain alone: that being the most important part, for its nutritive properties, I have confined my attention chiefly to it. I have also been able to make the husk the subject of a few researches. It would have been very interesting and useful to examine the straw also, but I was obliged reluctantly to conclude my observations, as the time for the delivery of this essay approached.

The proximate principles of the grain will first demand our attention, and it will be necessary, by way of preface, to give an account of the methods by which they were obtained.

The quantity of grain taken for analysis was from 75 to 100 grains.

1. This was rubbed thoroughly in a mortar, and successive portions of water added, until the starch, &c. was all washed away from the epidermis. The solution was allowed to stand in a cool place for twenty-four hours, and the liquid was then drawn off by a syphon. Fresh water was now added, and after some hours again drawn off; this was repeated until the liquid came away quite clear. The starch then remained pure, it was collected on a weighed filter and dried at 212°, until it ceased to lose weight.

2. To the solution drawn off from the starch, acetic acid was added, to throw down the casein or avenine. This was allowed to settle, and the liquid drawn off by a syphon of small bore. The precipitate was now transferred to a weighed filter. It is necessary to stop the washing while the water is still acid, otherwise a portion of the casein will be re-dissolved. It was now dried in the same way as the starch.*

3. The solution separated from the casein was evaporated to a very small bulk, and treated with strong alcohol to throw down the gum. After standing some hours the gum was collected on a filter, washed with alcohol, and dried as above.

For the remaining solution nothing more was determined.†

4. The epidermis, after separation from the starch as above, was collected in a retort, and boiled with acetic acid. On neutralizing the solution, a small precipitate of albumen fell. This was collected, and the epidermis boiled again in a very weak solution of caustic potash. On neutralizing the solution, another slight precipitate of some protein compound was obtained. This was so small in quantity that it was classed with the albumen. After this boiling with caustic potash the epidermis was collected, washed, dried, and weighed.

5. To determine the oil, sugar, and gluten, a fresh portion of grain, about the same weight as before, was taken and boiled with successive portions of alcohol, until a drop left no trace on evaporation. The solution was then carefully distilled to dryness in a small retort. The dry mass was treated with successive portions of pure ether to dissolve the oil; and this ethereal solution was carefully evaporated to dryness in a small weighed capsule.

* This substance has been called casein, because in many respects it resembles some of the kinds of casein found in other bodies; but as its exact composition has not yet been determined, I use for it the provisional name of *avenine* proposed by Prof. Johnston.

† From the casein of milk, it differs in some important properties. Rochleder describes the casein of milk as soluble in weak acid, but precipitated by more acid and weak alkalies. Insoluble, when free from acid or alkali, in water.

I have found the casein of oats to agree more nearly with the casein of beans, as described by Liebig. He says, "It is soluble in cold water, does not coagulate by heating, is precipitated by dilute acetic acid, and is not soluble in an excess."

The casein of oats is very soluble in pure water, being nearly all dissolved by the first water added to the bruised grain. Weak acetic acid causes an abundant precipitate, which an excess of acid does not seem to re-dissolve, as no precipitate fell from the liquid filtered and neutralized by carbonate of soda. Boiling a portion of the original solution did not coagulate the casein, but after cooling, on the addition of acetic acid, the precipitate fell more quickly than before. When this was filtered and neutralized by carbonate of soda, a slight precipitate fell, showing that the casein was slightly soluble in an excess of acetic acid by the aid of heat, or that there was a small quantity of albumen present.

† I made some experiments upon the legumin of almonds, to which also this casein seems to bear some resemblance. A copious precipitate of legumin falls on the addition of a little acetic acid, but a small portion of it re-dissolves in an excess. From the strongly acid solution filtered and neutralized by carbonate of soda a slight precipitate falls.

After weighing, it is safer to re-dissolve the oil, and evaporate again, as some of the sugar sometimes finds its way over with it.

6. The mass left in the retort is now treated with water to dissolve the sugar; this solution is also evaporated to dryness in a small weighed capsule. It is an impure sugar, always containing more or less of the soluble salts of the inorganic part.

7. The substance originally dissolved by alcohol and finally left undissolved by water in the retort, was considered analogous to the gluten of wheat, and was accordingly set down as such in the analyses. It was collected, dried, and weighed, either in a cup or on a filter.

Having now described the process employed, I will proceed to give the results obtained by it in four specimens of grain, the same four of which the full inorganic analysis of the ash was given.

The soluble salts of the ash are in these analyses distributed to some extent among nearly all the substances. It is impossible to say how much water dissolves when the grain is unburned, and an indefinite quantity of this undetermined portion is thrown away in the solution from which the starch, &c. are obtained. The quantities contained in the precipitates can only be determined by burning them all. I have, in the following analyses, considered the greater part of the loss as alkaline salts, and have made the sums up to 100.

Proximate Composition of the Organic part, in four samples of the Grain of Oats. Calculated dry.

TABLE XXXVI.

	Hopeton Oats, Northumberland.	Hopeton Oats, Ayrshire.	Hopeton Oats, Ayrshire.	Potato Oats, Northumberland.
Starch, . . .	65.24	64.80	64.79	65.60
Sugar, . . .	4.51	1.58	2.69	0.80
Gum, . . .	2.10	2.41	2.12	2.28
Oil, . . .	5.44	6.97	6.41	7.28
Casein, (avenine), .	15.76	16.36	17.72	16.23
Albumen, . . .	0.46	1.23	1.76	2.17
Gluten, . . .	2.47	1.46	1.33	1.45
Epidermis, . . .	1.18	2.30	2.84	2.28
Alkaline salts and loss,	2.84	1.84	0.94	1.75
	100.00	100.00 F.	100.00 F.	100.00

In reference to the above table, we naturally turn our attention

1. *To the Starch.*—The four results are remarkably uniform. I am inclined to think, however, that the starch may be stated a little too low in this table, for reasons which will afterwards appear. As the table at present stands, the quantity of starch in the oat is nearest to that in barley.

2. *The Sugar.*—This, as I have said, is impure, and a little deduction should be made from its weight, especially in Hopeton oat, No. 1.

3. *The Gum.*—The quantities of this substance are nearly alike in the four trials: wheat contains a little more—about 3 or 4 per cent.

4. *The Oil.*—The quantities of oil given above are large, but I think correct. The earlier analyses of oats only give from three to four-tenths of a per cent. of oil. Both Boussingault and Johnston, however, have recently found from 6 to 8 per cent. This oil is of a beautiful pale yellow color, and its smell may be perceived on heating oatmeal cakes. The fattening qualities of the oat must be very great. The maize, or Indian corn, is celebrated for fattening animals; and Dumas gives only 9 per cent. as its maximum of fatty matters. Boussingault gives 7 per cent. as the average; while Leibig has denied that it contains more than 5 per cent. If we take 7 per cent. as the average, the meal of the oat, so far as the oil is concerned, should nearly equal that of the Indian corn.

5. *The Casein (avenine), Albumen, and Gluten.*—These three I have grouped together as nitrogenous compounds. Their quantity is certainly very remarkable, being, in the potato oat above, a little more than 20 per cent. I have been led to think, however, that the quantities of all these compounds are a little overstated in the above analyses. Every one who has engaged in this kind of organic analysis knows the exceeding difficulty of obtaining the substances perfectly pure. I am somewhat suspicious that, in defiance of my precautions, my casein precipitates may have contained a little starch. I insert the above analyses, therefore, as open to correction.

In order to arrive at a more certain result as to the actual quantity of these nitrogenous compounds, I determined the nitrogen directly, by combustion in a number of specimens.*

The annexed table gives the result of nine of these combustions. Each burning was repeated two or three times.

TABLE XXXVII.

	Hopeton Oats, No. 1, No. 2, No. 3, No. 4, No. 5, No. 6, No. 7, No. 8, No. 9, No. 10, No. 11, No. 12, No. 13, No. 14, No. 15, No. 16, No. 17, No. 18, No. 19, No. 20, No. 21, No. 22, No. 23, No. 24, No. 25, No. 26, No. 27, No. 28, No. 29, No. 30, No. 31, No. 32, No. 33, No. 34, No. 35, No. 36, No. 37, No. 38, No. 39, No. 40, No. 41, No. 42, No. 43, No. 44, No. 45, No. 46, No. 47, No. 48, No. 49, No. 50, No. 51, No. 52, No. 53, No. 54, No. 55, No. 56, No. 57, No. 58, No. 59, No. 60, No. 61, No. 62, No. 63, No. 64, No. 65, No. 66, No. 67, No. 68, No. 69, No. 70, No. 71, No. 72, No. 73, No. 74, No. 75, No. 76, No. 77, No. 78, No. 79, No. 80, No. 81, No. 82, No. 83, No. 84, No. 85, No. 86, No. 87, No. 88, No. 89, No. 90, No. 91, No. 92, No. 93, No. 94, No. 95, No. 96, No. 97, No. 98, No. 99, No. 100.	Potato Oats, No. 1, No. 2, No. 3, No. 4, No. 5, No. 6, No. 7, No. 8, No. 9, No. 10, No. 11, No. 12, No. 13, No. 14, No. 15, No. 16, No. 17, No. 18, No. 19, No. 20, No. 21, No. 22, No. 23, No. 24, No. 25, No. 26, No. 27, No. 28, No. 29, No. 30, No. 31, No. 32, No. 33, No. 34, No. 35, No. 36, No. 37, No. 38, No. 39, No. 40, No. 41, No. 42, No. 43, No. 44, No. 45, No. 46, No. 47, No. 48, No. 49, No. 50, No. 51, No. 52, No. 53, No. 54, No. 55, No. 56, No. 57, No. 58, No. 59, No. 60, No. 61, No. 62, No. 63, No. 64, No. 65, No. 66, No. 67, No. 68, No. 69, No. 70, No. 71, No. 72, No. 73, No. 74, No. 75, No. 76, No. 77, No. 78, No. 79, No. 80, No. 81, No. 82, No. 83, No. 84, No. 85, No. 86, No. 87, No. 88, No. 89, No. 90, No. 91, No. 92, No. 93, No. 94, No. 95, No. 96, No. 97, No. 98, No. 99, No. 100.	Oats from Mr. AF. Imperial Oats, new, Ayrshire. New York, No. 1, No. 2, No. 3, No. 4, No. 5, No. 6, No. 7, No. 8, No. 9, No. 10, No. 11, No. 12, No. 13, No. 14, No. 15, No. 16, No. 17, No. 18, No. 19, No. 20, No. 21, No. 22, No. 23, No. 24, No. 25, No. 26, No. 27, No. 28, No. 29, No. 30, No. 31, No. 32, No. 33, No. 34, No. 35, No. 36, No. 37, No. 38, No. 39, No. 40, No. 41, No. 42, No. 43, No. 44, No. 45, No. 46, No. 47, No. 48, No. 49, No. 50, No. 51, No. 52, No. 53, No. 54, No. 55, No. 56, No. 57, No. 58, No. 59, No. 60, No. 61, No. 62, No. 63, No. 64, No. 65, No. 66, No. 67, No. 68, No. 69, No. 70, No. 71, No. 72, No. 73, No. 74, No. 75, No. 76, No. 77, No. 78, No. 79, No. 80, No. 81, No. 82, No. 83, No. 84, No. 85, No. 86, No. 87, No. 88, No. 89, No. 90, No. 91, No. 92, No. 93, No. 94, No. 95, No. 96, No. 97, No. 98, No. 99, No. 100.
Of nitrogen, . . .	2.15 2.35 2.28 2.76 2.82 2.80 5.51 2.49 3.40		
Of protein compounds, .	14.00 14.78 14.04 17.36 17.77 18.24 22.01 15.66 18.86		

This table shows a range of no less than 8 per cent. in the nitrogenous compounds.

* The nitrogen was determined by combustion of the grain in a mixture of caustic soda and lime in the usual way. The method of such combustions is so well known among all chemists, and so universally inserted in all recent chemical works, that it seems quite unnecessary to enter into a lengthened description of it here. From the ammonia-salt thrown down by platinum, the nitrogen is determined, and from the nitrogen the amount of protein compounds calculated.

Nos. 1 and 2, from Mr. Vans Agnew, were the first crop, after very old grass. No. 1 was manured with two cwt. of guano per acre harrowed in with the seed. No. 2 was *without manure*. This result is a most surprising one, and although I have repeated my trials, I feel that it needs still further confirmation. The crop being after old grass, the land must have been in good condition, and therefore would mature a crop even without the addition of guano, though that manure undoubtedly increased the yield upon the part to which it was applied. It is possible that on such a good soil with a healthy plant, the more slow growth and maturing of a less luxuriant crop than that to which guano was added, may have been more favorable to the largest possible amount of nitrogenous compounds; so that, while the seed was less in quantity, it should be richer in quality. The opinion somewhat prevalent among farmers, that guano turnips or potatoes are less nutritious than others, seems to countenance this view.

The Potato oat, No. 2, was also from a very fine crop, as was the American imperial oat, which was remarkable for its weight. The three samples of Hopeton oats were all from rather inferior soils, and poor crops.

But even if we take the lowest per-centage of protein compounds, they amount to 4 per cent. more than is stated to be the average quantity in wheat. The mean may, probably, be safely taken as 16 or 17 per cent.

Before concluding the organic part of the grain, I wish to give some account of the organic part of the husk, and afterwards some determinations in which the two parts are united.

I did not make a complete analysis of the proximate principles of the husk, but determined the oil and sugar only, by boiling in alcohol and ether, as described under the analysis of the grain.

The following table gives the results in two samples of husks calculated dry:—

TABLE XXXVIII.

	Hopeton Oats, Hexham, Northumberland.	Potato Oats, Park End, Northumberland.
Of oil,	1.50	0.52
Of sugar and gum,	0.47	0.75

Besides these substances, there was a considerable quantity of some nitrogenous compound left undissolved by water, somewhat analogous to gluten, and amounting in one instance to 1.28 per cent. The husk, then, is by no means without value for feeding. A determination of the nitrogen by combustion, shows that in addition to $1\frac{1}{2}$ per cent. of oil, it contains at least $1\frac{1}{2}$ per cent. more of protein compounds.

The following table gives the nitrogen in the husk and grain separately, and afterwards in the whole oat of the same sample. The results calculated dry:—

TABLE XXXIX.

	Husk.	Grain.	Whole Oats.
Of nitrogen,	0.30	2.82	2.18
Of protein compounds,	1.88	17.77	13.72

A proximate analysis of Boussingault's gives 13.7, as the amount of protein compounds in the whole oat, exactly coinciding with the above determination. We see, then, that even including the husk, the oat is superior to almost any other corn, in those ingredients which go directly to the production of muscle in the body. The strong muscular forms of the Scottish ploughmen have long been living witnesses to the good properties of their favorite and almost only food; and now that it has been shown what those properties really are, I feel sure that Dr. Johnson's definition of oats—"Food for men in Scotland, and for horses in England"—will be remembered only for its appropriate answer—"And where will you find such men and such horses?"

In conclusion, I may be permitted to say, that the extent of this investigation, and the many points which I have been compelled to leave undetermined, or doubtful, after eighteen months of constant labor, must convince those who entertain false ideas of the time and patience necessary for chemical researches of this kind, that they have erred in supposing the chemist able to do in a few days or weeks, what can only be effected by the labor and study of many successive years.

In presenting my results to the Society, it is with a consciousness of their imperfections, and a feeling that it would have been most desirable to extend them much further in every direction.

At the same time, I think that much *new* ground has been gone over, and that in many respects the bounds of our knowledge, with regard to the oat plant, have been considerably enlarged.

I have endeavored to condense rather than extend my conclusions and descriptions, which might have reached a very great length indeed, from the mass of tables and facts now presented.

Laboratory of the Agricultural Chemistry Association, October, 1845.

ART. XXXII.—On Free Electricity; by ROBERT HARE, M. D.,
Professor of Chemistry in the University of Pennsylvania.

PRACTICALLY there is a striking difference between the excitement of an electrified insulated conductor, the prime conductor of an electrical machine for instance, and the charge of a coated pane or Leyden jar. In the one case disruptive discharge is productive of a comparatively short thick spark, in the other of a spark distinguished by comparative length and tenuity. The discharge from the pane or jar is productive, for equal surfaces, of a much greater shock than could result from a spark ten times as long, from the conductor of the machine by which the electricity is generated. And yet if the intensity be inversely as the square of the striking distance, it must be a hundred times as great in the case of the conductor, as in that of the coated surfaces.

Electricity, as it exists in the conductor, has been called free: as it exists about the coated pane, has been called simulated or disguised. Yet Faraday has alleged "that the charge upon an insulated conductor in the middle of a room, has the same relation to the walls of that room, as the charge upon the inner coating of a Leyden jar has to the outer coating of the same jar." "The one is not more dissimulated than the other." "As yet no means of communicating electricity to a conductor, so as to place its particles in relation to one electricity and not at the same time to the other, in an equal amount, has been discovered."

It seems to me that these opinions of Faraday have been judiciously criticized by Mr. Goodman in the London and Edinburgh Philosophical Magazine and Journal, Vol. xxiv, p. 174.

It appears likewise that opinions harmonizing with those of Mr. Goodman, have been entertained by Charles V. Walker, Hon. Sec. L. C. S., as may be seen in the Proceedings, Dec. 20, 1842. Agreeably to Mr. Walker, lightning resembles the discharge from a prime conductor, not that which takes place between the surfaces of a coated pane or jar.

I will proceed to state the considerations which induce me to concur in opinion with Mr. Goodman and Mr. Walker.

If two sufficiently remote insulated metallic disks, such as usually enter into the construction of an electrophorus, be made communicative with the rubber and collecting points, be made to serve, one as the positive, the other as the negative conductor of an electrical machine in operation, a disruptive discharge from either may be obtained, by the approximation of an uninsulated conducting body, or one communicating with one conductor while approximated to the other. When this discharge takes place from a small knob on the positive side, to a large one on the negative side, of the circuit, the resulting spark is compara-

tively long, and by its zigzag form represents lightning in miniature.

If, in the next place, a sufficiently large pane of glass being interposed, the disks be made to serve as a coating to the glass, the surfaces of the pane which they touch will become oppositely charged. If immediately after the charging is effected, both disks being insulated, the knuckle of the operator, or any other conducting body in communication with the earth, be approached to either disk, a spark will pass, and on contact, a certain portion of electricity will be discharged. This is what I would call free electricity: but on making a conducting communication between the disks acting as coatings, a much larger discharge of electricity will take place. This is what I would call neutralized or dissimulated electricity. But the ratio in quantity of the latter to the former, varies evidently with the thickness of the pane or panes which may be interposed; so as to be inversely as the square of the distances of the charged surfaces. If a stratum of air perform the part allotted as above to the panes, the same law must hold good. But when instead of flat disks, corresponding in size and shape, we substitute a cylindrical or globular metallic mass, such as is generally used for the prime conductor of an electrical machine, on the one side, and on the other side the walls, floor, and ceiling of a room, for the other surface, evidently the ratio of the free electricity to that which can be neutralized, must be enormously great. Supposing the glass pane to be one-tenth of an inch in thickness, the distance between the surfaces of the conductor and the parietes of the room to be ten feet, the quantity of electricity neutralized in the case of the pane will be to that neutralized in the case of the conductor as the square of one to the square of twelve hundred inversely; or in other words nearly as a million and a half to one. It follows that in the phenomena of discharges from a prime conductor the neutralizing or dissimulating influence of the conducting superficies opposed to it must be too small to be regarded.

The allegation of Faraday, that no mode has been discovered by which to place the particles of a conductor in relation to one electricity, and not at the same time to the other, is verified, as Mr. Goodman has observed, when the friction between the rubber and glass takes place. The glass becomes positive to precisely the same extent as the rubber becomes negative; but when the vitreous surface thus excited moves away from the rubber, the compensating electricity of the rubber being no longer at hand, that upon the glass cannot realize Faraday's idea, excepting so far as it may be competent to act upon the walls, ceiling, and floor of the apartment, as electricity on the inner surface of a Leyden jar acts upon the outer surface. But in the case in point, the electric interposed is so enormously thick, compared with the

glass in a Leyden jar, that very little of the inductive influence can avail to produce an opposite state tending to neutralize the electrical excitement "to an equal amount."

Just so far as it can produce an equivalent opposite state, it becomes dissipated or neutralized; so far as it does not, it is free, or, in other words, exercises that uncompensated activity which has, in my opinion, justified the distinction made between free, and dissipated, neutralized, or latent electricity.

It will be perceived that I concur with Mr. Walker in the opinion, that on account of the distance of thunder clouds from the earth, the electricity which they may acquire is too remote from the terrestrial surface to induce in this an opposite electrical state, capable of neutralizing the electricity of the cloud beyond a minute proportion.

There seems to be an obvious means of discrimination between free and neutralized electricity, in the fact, that the one is associated with the surface of a conductor, so as to accompany it when moved, while the neutralized electricity is inseparable from the superficies of the electric, through the intervention of which it exists. It is well known that the coatings of a pane or jar may be removed without disturbing the charge which may have been imparted by their presence. Yet if removed after the pane is fully saturated, each coating will hold a charge which it will give out in a spark to any uninsulated body, without any reference to the other coating which may meanwhile be remote and insulated from all communication with it. The spark thus yielded has the characteristics of free electricity. Having served as a part of the conductor, with which it had communicated, the coating is surcharged in proportion to its capacity, and gives up the redundancy on communicating with the earth, without any reference to the other coating. The spark thus given I conceive to have the characteristics of free electricity.

In the case of electric accumulations in the atmosphere, there can be no substitute for the service performed by glass in Leyden charges but that which air can render; and it can hardly be conceived that while agitated, as it is during thunder gusts, a stratum of that fluid can perform the part of a glass pane.

It is well known that the coatings of a pane or jar may be removed without disturbing the charge which may have been imparted by their presence. Yet if removed after the pane is fully saturated, each coating will hold a charge which it will give out in a spark to any uninsulated body, without any reference to the other coating which may meanwhile be remote and insulated from all communication with it. The spark thus yielded has the characteristics of free electricity. Having served as a part of the conductor, with which it had communicated, the coating is surcharged in proportion to its capacity, and gives up the redundancy on communicating with the earth, without any reference to the other coating. The spark thus given I conceive to have the characteristics of free electricity.

ART. XXXIII.—On Zoöphytes, No. V.; by JAMES D. DANA.

CLASSIFICATION OF ZOÖPHYTES.

General Remarks on Classification.—It has often been justly said, that there can be but one strictly natural classification in either of the organic kingdoms. Yet if we look upon any system presented in the usual order on paper, as correctly and completely the natural system, we greatly mistake nature; for the various affinities cannot be fully expressed on a plane surface. The lines are so many, and so interlaced, that to be understood, they must be conceived of as ramifying in space. The mind, proceeding properly to its work, determines first upon those qualities which are physiologically of the most fundamental importance: it follows out the variations of structure under the grand divisions thus ascertained, fixing its attention successively upon qualities of a less and less general character; it traces the species through the various modifications in these several particulars, marking out the lines of gradation in affinities, observing some, it may be, partly isolated and terminating abruptly, others graduating into the different series by frequent blendings or anastomosing, and often between different lines detecting a serial parallelism: in this way the network is finally completed to the mind's eye.

When the relations are fully understood, we are ready to divide off into classes, orders, and the smaller subdivisions, cutting the threads here and there, as shall best exhibit the general character of the whole, remembering to make the corresponding divisions of equivalent importance and character. The institution of these various groups is not properly classifying; for the classification is completed when the branchings and interlinkings of affinities are made out. Subdivisions with appropriate names are, however, necessary, to aid the memory and convey this knowledge in words. Genera are convenient artificial sections, based on natural affinities; and very commonly they shade almost imperceptibly into one another. Whoever has attempted to lay out classes and their families and genera, has perceived the interlinkings, and felt the perplexity they produced. It may often have seemed vexatious to the systematist to have had a *well characterized* family or genus spoiled in its characteristic, and *exceptions* introduced, by the discovery of new species which blend it with another group, before considered quite distinct. But such perplexities will not be perceived, if we follow nature with docility, and make it our aim to bring out prominently the various shadings between subdivisions. The true object of classification is not to dissect the departments of life into as many distinct parts as possible for display like anatomical preparations; but to illustrate the system

of nature in its unity, and exhibit the myriad parts blended in one concordant whole.

The modifications of structure in living beings evidently proceed, to a great extent, from the nature of the world we inhabit, and the general laws and necessities of life. There are air, earth, and water, and these have their varieties of condition. Plants and animals offer other sites for living beings. The same circumstances may be said to call for the variety of size which exists in nature, for otherwise there would be possible conditions for existence unoccupied. The general nature of life, and its modes of exhibition, with the primary systems of structure, being determined upon in infinite wisdom, we need attribute no other plan to creative power than that of the simple adaptation of life, as thus constituted, to the conditions the world affords. Circles and numerical relations may amuse the imagination; but we have no evidence that the hand, which made, was confined by such prescribed courses. We cannot fail to see, however, that in the primary plan of structure in living beings, certain organs or their parts, through extended groups, have been limited by fixed numbers: and this is so distinct in some classes, that it becomes an interesting study to trace out the sources of variations from the typical number.* We see the boundless resources of nature's Author displayed with greater force, the fewer the types from which an infinite variety might proceed; but not in any limiting of the number of species constituting groups.

Among the organs upon which the range of characters in the animal kingdom depends, the nervous system takes necessarily the precedence, for, as has been said with much propriety, this system is itself *the species*; since upon its characters, in connection with the general laws of organic growth, depends in a very great degree the nature of the individual. Next to this, come those organs which are intimately connected with the sustaining of life, *primarily*, those pertaining to respiration and circulation, and *secondarily*, those adapted to the receiving and digesting of food; and next, or of parallel value with the last, the provision for the continuation of the species. The means of locomotion and the associated structure, constitute a characteristic intimately

* Milne Edwards has well illustrated the fact, that seven is a normal number in Crustacea, the cephalic, thoracic and abdominal parts, each consisting normally of this number of segments, and variations taking place by a union of two or more segments, or by subdivisions; and this same law extends even to the joints of the legs and antennae. The prevalence of such a law through so large a class, affords a sufficient ground for belief that specific numbers have not been entirely disregarded in any branch of nature; though the actual exhibition of them has been obscured in ways not understood. We cannot disbelieve, therefore, that numerical relations were involved in the plan of creation; yet, while admitting them as regards the nature of organic structures, we do not admit that the number of structures made on any particular type, had reference to any similar ratio.

connected with the causes just mentioned. Under the several grand divisions to which we are led by the above considerations, there are subordinate variations arising from the adaptation of life to minor differences in the conditions of existence around us:—such as minor differences of soil, (if we may extend this word to all those varieties of sites, afforded by the air, earth, water, vegetable and animal structures, variously modified by temperature, light and pressure); differences in the modes of taking prey or food of whatever kind, and in some peculiarities of the organs of digestion; certain differences depending on the sexual relations, and the means of preserving and developing the young, varying with the modes of existence alluded to; modifications of the provisions for self-preservation against enemies. These minor differences are exhibited in two ways: either particular organs retaining the same functions, undergo modifications in form and structure; or with other modifications, they subserve the purposes of different functions. When adaptations to different circumstances or purposes take place by variations in corresponding sets of organs or parts of organs, the relations produced are termed *homological*; and the relations are *analogical*, when they depend on a similarity of function, however produced.*

As the several families or classes of animals are exposed, in some respects more or less general, to the same circumstances, they would naturally undergo, in many instances, either *homological* or *analogical* modifications, occasioning that serial parallelism alluded to on a preceding page. And again, as the animals of the same class may be fitted to many different circumstances in nature, other parallelisms should exist, of a wider character.

The order in which the above sources of distinctions in the animal kingdom are mentioned, may be in the main nearly that

* Prof. R. Owen, the eminent comparative anatomist of England, mentions three kinds of homology, viz: "general," "serial," and "special." "General homology is the relation in which a part or series of parts stands to the ideal or fundamental type; and thus, when the basilar process of the occipital bone in Anthropotomy is said to be the 'centrum' or 'body of the last cranial vertebra,' its general homology is enunciated. When it is said to repeat, in its vertebra or natural segment of the skeleton, the body of the sphenoid bone, the body of the atlas, and the succeeding vertebral bodies or centra, its serial homology is indicated. When the essential correspondence of the basilar process of the occipital bone in Man, with the distinct bone called 'basi-occipital,' in a crocodile or a fish is shown, its special homology is determined."—*Phil. Mag.*, xxviii, iii ser., 525, June, Sep. 1846.

We refer the reader also to a very excellent paper "on the Structural Relations of Organized Beings," by H. E. Strickland, *F. G. S.*, *Phil. Mag.*, xxviii, iii ser., 354, in which the subject of affinities in organic beings, is presented in a clear and philosophical light. In addition to the terms *homology* and *analogy*, Mr. Strickland proposes the word *iconism*, to express resemblance of form without a similarity of structure or function; for example, the resemblance of the flower of the pea to a butterfly, or the shell *Haliois* to an ear; and it includes also resemblances between species arising from accidental coincidence of color; while *analogy* includes such resemblances as depend upon a similarity of function.

of their relative importance. Yet it is well known that a set of characters valuable in one group is worth nothing in another: and this holds true in some cases even with those characteristics that are in general fundamental. It seems at first a violation of all propriety, to arrange together animals having gills, and those that have none; those that have a heart, and those that are destitute of even a vestige of one beyond a distant valve or two in the circulating system; those that have distinct arteries, and those whose arteries are only the lacunal passages among the muscles and other organs. Still this may be in accordance with a philosophical classification. The class Crustacea actually illustrates each of the three anomalies just stated. If the singular Amphioxus is truly a fish, as many ichthyologists affirm, we may have a vertebrate animal without a brain, and without a sense to raise it above the Polyp. In such cases, the system of structure typical of a group, is ascertained by a general study of the species, and then an acquaintance with this structure assists in tracing out transitions, and determining how far one and another organ may fail without requiring an entire separation of an individual from the group.

To classify, requires therefore the widest possible range of knowledge of organic beings, and the nicest balancing of affinities: and we remark again that it consists rather in expressing the various chains of affinities or homologies direct and parallel, with their shadings and blendings, than in searching for certain inviolable characteristics for distinguishing groups of species.

Classification of Zoöphytes.—In view of the foregoing principles, any classification of Zoöphytes made out without reference to the structure of the animals must necessarily be faulty. There have been several of this kind in the department of corals; and as the subject has been little understood till within a few years past, their errors were to be expected. They subserved, for the time, the purpose of systematizing the facts known, and afforded a means of characterizing species: so far, they were good. But at the present day, to make out a classification based on the corals alone and the easiest method of distinguishing them, would partake of times of past ignorance: they can no more be properly arranged without reference to their animals, than shells without regard to their molluscs. The zoological relations of the species should be first studied, and afterwards such characters laid down for the corals, as belong to the orders and families thus deduced.

The first classification of Zoöphytes in which the animals received attention, was offered by Blainville.* Lamarck had led

* *Manuel d'Actinologie ou de Zoöphytologie*, par H. M. D. de Blainville. 644 pp. Évo, with an atlas of 100 plates. Paris, 1834. (The printing began in 1830.)

the way with a discriminating study of the corals. Blainville availed himself of the observations of Quoy and Gaymard, besides the few investigations of older authors, and with great acumen, made out an arrangement, which in its general features was highly natural. He divided Zoöphytes, including the *Actinie*, into the groups *Zoantharia*, *Polyparia*, and *Zoophytaria*; and if we strike out from *Polyparia* a few species that belong with the first division, and others that are Bryozoa, we have the groups *Zoantharia* and *Zoophytaria* corresponding to the groups *Actinaria* and *Alcyonaria*, of the classification by the writer, and *Polyparia* nearly to the *Hydroidea*. The only other change of importance which the writer has proposed in these primary subdivisions, is the union of the *Actinaria* and *Alcyonaria* into a single group, *Actinoidea*, equivalent in importance to *Hydroidea*. Blainville was the first author who actually introduced coral zoöphytes fairly into the animal kingdom by his mode of describing and arranging them. He did not call the department a branch of zoology, and then describe corals as if they were *porous, stelligerous stones*, which is even now in many instances the case.* Still he speaks of the cells as *containing* the polyps, which is the reverse of the fact.

Ehrenberg in 1834,† after a more thorough acquaintance with coral animals obtained by investigations in the Red Sea, made some important improvements in the minor subdivisions; but his grand divisions were unfortunate. He separated in many cases the attached from the unattached species, and again, the simple from the compound, and thus broke up the natural assemblages which Blainville had made out. Even the natural group *Alcyonaria*, (Blainville's *Zoophytaria*), is subdivided by him, and the parts widely separated. His system, notwithstanding some anomalies, exhibits great reach of mind and searching investigation. He removed correctly the Bryozoa from other Zoöphytes, and first suggested the relation of the Millepores and Favosites to the Madreporacea. He pointed out the true nature of coral secretions, and described the mode of reproduction by spontaneous subdivision, which had not before been noticed. The modes of growth were also to a considerable extent described by him, and important use made of them, though not always correctly, in the classification of Zoöphytes.

Milne Edwards, whose acquaintance with Zoöphytes had been extended by a personal examination of many species, and by a thorough study of the labors of others, besides a comprehensive

* In descriptions of corals, (the internal or basal secretions of Zoöphytes,) those characters which belong to the Zoöphyte ought to be first stated, such as the general form, mode of growth, &c.; and afterwards, separately, whatever, not already stated, may require mention with respect to the coral itself.

† *Abhandl. der Königl. Akad. der Wissensch. zu Berlin*, für 1832, pp. 225-438.

knowledge of nature, proposed, in 1837, a brief outline of a classification, which as far as detailed, exceeded those preceding it, in philosophical character. The Hydroidea, ("Sertulariens,") the Actinaria, ("Zoothaires,") and the Alcyonaria, ("Alcyoniens,") are laid down as the grand divisions, and without the striking violations of affinities which appear in Blainville's order Polyptaria. We only observe that the Favosites are separated from the Madreporacea, with which group they were placed by Ehrenberg, and where they beyond doubt belong.

These are the principal authors since Lamarck, who have undertaken a general arrangement of the class Zoöphytes. The "Stony Corals" have quite recently been arranged mostly from the corals alone by Mr. J. E. Gray, of London.* We may express the belief, without entering into any criticisms on his classification, that with a more extended study of the animals and their corals, he would not have separated the *Millepora* and *Helopora* so widely from the *Pocillopora*; the *Stylaster* from the *Sideropora*; the *Montipora* from a part of Lamarck's *Porites*; the *Fungia* from the *Pavonia*; nor united into a single group the *Pavonia* and many *Astræa*; nor the *Fungia*, *Flabella*, and *Meandrina*;—in the last case giving an unreal importance to the oblong shape of the *Flabella*, and implying a relation which is wholly without foundation between the oblong cell of the *Meandrina*, *Flabella*, and *Fungia*, for in the first, the form arises from budding, in the second, it is the shape of the polyp's disk, and in the third, the cell is only a depression at the center of the disk, and the form has not even generic importance.

Before giving a general view of the classification of Zoöphytes, to which the writer has been led by the study of coral animals,† the importance of different characters as a basis of classification may be briefly considered.

Owing to the simplicity of polyps, there are few organs or functions to afford distinctive characters. They are as follows: I. The digestive system; II. The ovarian; III. The modes of budding and growth; IV. The tentacles and general character of the exterior; V. The secretion of coral and its nature.

I. The Digestive System.—In this system the stomach varies (1) in length as compared with the internal or visceral cavity

* An outline of an Arrangement of Stony Corals, by J. E. Gray, F.R.S., &c. *Annals and Magazine of Natural History*, xix, 130, Feb. 1847.

† As it may be of some importance to those interested in the department of Zoöphytes, the writer here states that the animals of more than sixty species of coral animals, exclusive of Alcyonaria and Hydroidea, and pertaining nearly to every genus, have been figured by him, from living specimens obtained in the Pacific and East Indies, and these figures will appear along with others of different corals whose animals were not obtained, in the forthcoming Atlas to accompany the Report on Zoöphytes.

below, and (2) in the character of the parts below and around it. In the first particular, the difference is one of less general importance than has been allowed; the relative length in the *Actinia* and most Actinoid corals, is between four-fifths and one-third; in the *Zoanthidea* it is between one-third and one-sixth; in the *Alcyonaria*, between one-third and one-twentieth; in the *Hydroidea* the stomach is sometimes much shorter in proportion than in many Alcyonaria, though often far longer. In the second particular the difference is wide, the Actinoidea having the stomach suspended within the visceral cavity, and attached to the sides of the polyp by a radiating series of vertical fleshy lamellæ, which are wanting in the Hydroidea. The visceral cavity is a simple tube in the latter, and is radiated with vertical lamellæ in the former: but these peculiarities are also connected with the modes of reproduction. We omit other less obvious points of difference.

II. Ovarian System.—In this system, ranking in importance with the digestive, the absence of special organs with spermatie and ovarian functions, distinguishes the Hydroidea, and the existence of such organs, the Actinoidea. No character can be of higher value, or more marked in its attending peculiarities.

Among the Actinoidea, there is a great variation in the number of genital lamellæ, and in the relative position of the two kinds, the spermatie and ovarian. In the *Alcyonaria* there are uniformly eight in all; in the *Actinaria*, either six, twelve, or more.* In many of the latter division if not in all, the two kinds of lamellæ, (spermatie and ovarian,) are distinct: in some of the former, the same lamella is ovarian above, and spermatie below, or two are spermatie and the rest ovarian; or perhaps other conditions may exist. There is good reason for separating the *Alcyonaria* from the *Actinaria*, but not for making each division equivalent in rank to that of Hydroidea.

III. Process of Budding and Growth.—1. We find that the fact of species budding or not budding, is not connected in Zoöphytes with any peculiarity of structure that can be detected, and farther, the transitions are gradual and frequent. This character, therefore, as it indicates no difference of concentration in the ner-

* A passage of the *Actinia* into the *Alcyonaria* may perhaps be observed in the *Lucernaria*, which have a four or eight-lobed summit; and other *Actinia* approximate to this lobed character. These lobes bear a number of tentacles, or correspond to a number; and hence analogy suggests that possibly in the *Alcyonaria* each tentacle properly corresponds to two tentacles or more, or to a lobe in the *Actinia* alluded to. This view is borne out by finding in the larger *Alcyonaria*, the tentacles having a size wholly incompatible with the structure of the *Actinaria*; for the writer has shown in another place that in the *Actinaria* there are limits to the relation between the number of tentacles, as well as the width of interval between the genital lamellæ, and the size of the animal. Whether the analogy holds or not, the facts show striking differences between the *Actinaria* and *Alcyonaria*. See further, Report on Zoöphytes, pp. 34, 132, and this volume, p. 7.

vous system, is entitled to little consideration as a means of distinction in the classification of these animals:—it is no more important here than in botany, where a plant consisting of a single individual bud, may be placed along side of one which consists of several. It may sometimes however be used to distinguish genera: yet in the genus *Fungia*, there are a few species that increase until they consist of two or three individuals; and there is thence a passage to the *Herpetolithi*, Eschsch. (*Haliglossæ*, Ehr.) and *Polyphyllia*, Q. and G. The simple and compound Cyathophylla are other examples of the difficulty of this separation.

2. But the *modes of budding and growth* are of higher character; especially the distinction of *superior* and *inferior* gemmation, in the former the buds being terminal or at summit, and in the latter lateral or basal. It is of little importance whether the summit-widening, which accompanies superior gemmation, takes place in the disks, or just exterior to the disks. In either case, the visceral lamellæ are prolonged at top beneath the upper surface, by the process of growth, and hence such species have the upper surface of the corallum lamello-striate.

3. In superior gemmation, when the disks widen and bud, they sometimes subdivide as each new mouth opens, and sometimes not till several mouths have opened. This difference (distinguishing the genera *Astræa* and *Meandrina*) is of small importance. There are *Astrææ* in which the disks become 2 or 3-compound before they subdivide; and thus the two genera graduate into one another. There are simple and meandrine *Mussa*, Oken, (*Lobophyllia*, Bl.) between which no line of separation can be drawn, and they have been always retained in the same genus. The *Monticulariæ*, in the same manner, are related to the *Meandrinæ*.*

4. There is a group of species having superior gemmation, in which the disks have no proper limits; and in the compound species, the surface is a single disk with many mouths and scattered tentacles, (the latter often obsolescent.) The *Fungia* are examples of simple species of this kind; and the *Polyphyllia*, *Pavonia*, &c., (including the *Astræa sideræa*), are compound species. The coralla of compound species are characterized by the continuation of the lamellæ of the stars from centre to centre, without interruption along a medial line; and they have no cells except it arise from a prominence of the intervals between the polyp-mouths. They thus differ from the *Astrææ*; for the cells in the *Astrææ* correspond to the visceral cavities of the polyps.

* See on this subject Report on Zoöphytes, pp. 76, 77, and this volume, p. 19.

5. Growing *free or attached* is a character of minor importance. It is sometimes a convenient *generic* distinction, as with the *Fungia*, but in other cases cannot be appealed to. All species, as is well known, are attached in the young state; and the time of becoming free varies with the species, some earlier and some later. The *Flabellæ* thus pass so gradually to attached species, and the animals in the two cases are so completely identical, that the separation can be sustained only on the ground of convenience in a distribution. We add that in this last mentioned case, the simple species pass as gradually into the compound, and they are closely connected with the group *Euphyllia*, D. (a part of *Lobophyllia*, Bl., having entire lamellæ.)

6. Growing *massive*, or *circularly branched*, (aggregate or segregate,) is sometimes a good generic distinction. But polyps in contact grow together so readily that it can be of importance only when supported by other characters. In the group *Manicina*, no line can be drawn between the segregate and coalescing species; and the *Cyathophylla* are other examples. Difficulties in the way of characterizing groups thus arise, which must be fairly met and not denied nor overlooked.

7. The *forms of growth*, whether branching, massive or explanate, afford good distinctions for species, but seldom generic characters. We find *explanate* and *massive* Gemmiporæ and Porites; *explanate*, *massive*, and *branching* Porites and Manoporæ; and *explanate* and *branching* Merulina and Echinopora. No more unfortunate generic character can be laid down than one drawn from this source: it may, however, be occasionally used, when sustained by other characters. The genus *Explanaria* of Lamarck is an agglomerate of species of several genera.

We have elsewhere shown that the sizes of branches, the frequency of branching, and the width of intervals in groups between branches, are good trivial characters within certain limits. But in all cases in instituting species, the specimens examined should be good and full grown, and not fragments.

8. Growth by budding from an apical polyp, or from serial budding, are points that may afford good generic distinctions.

IV. *Tentacles and General Character of the Exterior*.—In many genera, the tentacles are too short to take any part in the prehension of food, and apparently subserve only the purpose of aeration. As the whole body takes part in this function, the size of the tentacles must necessarily be unimportant as a family character. Hence we find, even in the same genus, (*Fungia*, *Porites*), species with comparatively long tentacles, and others in which they are almost obsolete. The species of the genus *Actinia*, are almost as various in the sizes of the tentacles. Among the *Astrææ*, one species was observed by the writer, in which the place of tentacles was supplied by numerous spine-like processes

over the surface between the disks; and the same is true of the *Echinopora*, or at least partly so, for the writer observed no tentacles in the two species he examined. The same reason shows that the moss-like subdivision of tentacles, observed in some *Actinidae*, is a character only of generic importance, for it takes place generally in such species as live more or less buried in the sand or mud, which fact seems to require an extension of the aerating surface, such as this delicate branching affords.

The number of tentacles appears to have a relation to two distinct series; in one the number is *six, twelve or more*, with the alternate usually unequal when exceeding six, (and always so, when over twelve;) in the other, *eight* simply, and all equal. The character of the tentacles is different in the two series, the former (the *Actinaria*) having them naked; the latter (*Alecyonaria*) having them fringed with perforate papillae. A large number of species of *Actinaria* are characterized by *twelve* tentacles, and have been separated to form the group *Madreporacea*; but notwithstanding this point of resemblance, the several genera are as closely related to species having a greater number of tentacles.

The occurrence of suctorial vesicles on the lateral surface or disk, is a character of only generic importance.

Color is seldom of much importance, even for trivial distinctions. Yet the mode of arrangement of colors may be characteristic of species. A mutual dependence or relation of certain colors may possibly be hereafter ascertained, by which a knowledge of one will determine the others that may be possible in a species; and in such a case, the character may have a value which cannot now be allowed it.

V. *Secretion of Coral*.—1. The secretion or non-secretion of coral internally, is at the best no more than a family distinction; and among the *Alecyonaria* it is only generic. This is an admitted truth with regard to calcareous secretions among Molluscs; and Olivi and Blainville long since acknowledged it with reference to zoöphytes.

2. The secretion of coral at base, distinct from internal secretions, is a characteristic of much value; it produces the structure of the *Gorgonia* and allied zoöphytes, and also of the *Antipathi*.

3. The nature of coral secretions sometimes affords generic distinctions, and with other characters, in some instances, distinguishes the higher divisions of zoöphytes. The *Hydroidea*, as far as known, never form any but membranous or horny coralla. The *Astreacea*, *Caryophyllacea* and *Madreporacea*, secrete only calcareous coralla, excepting a few marine *Actinidae*, (*Actinecta*), which form a cellular membranous float at base to keep them at the surface. The *Antipathi* form only basal horny secretions, and therefore have a horny axis. The *Alecyonaria* are more various in this character, the different genera having their peculiar-

ities; the internal secretions are always calcareous and in grains or spicule, and in this last particular they differ from the calcareous of the *Actinaria*; these grains are sometimes so abundant as to unite into solid tubes, (*Tubipora*.) The basal secretions are either horny, (*Gorgonina*), calcareous, (*Corallium*), or siliceous, (*Hyalonema*); and in some instances, from a mixture of membranous tissue with the earthy matter they resemble cork.

4. Among the calcareous corals, the texture or density of the coral is often of little importance, as it may vary in different parts of the same specimen, according to their full exposure to the free ocean waters or not.

In species with stellate cells, there is always a definite number of rays to the adult cell, excepting among those that bud in the disks, and this number is some multiple of four or six, and usually of both. The characters of the cells, whether immersed or occupying a prominent calicle; and, internally, deep and open at bottom, or transversely septate, or spongy cellular, or solid,—are important; also the peculiarities of the lamellae, whether entire or not, equal or irregular, exsert or included.

In transverse sections of the stellate cells, the number of rays, (when adult,) the diameter, and the character of the centre, and of the interstices, are generally good characteristics for species.

The corals of *Alecyonaria* never have rays to their cells or tubes; the *Madreporacea* have never more than *twelve* rays; the *Caryophyllacea* and *Astreacea* have always more than twelve; and the last order is distinguished by having the interval between the cells lamello-striate (see p. 344, III, 2) internally, with few exceptions, as well as externally.

This brief review of the characteristics of zoöphytes, has prepared the way for an exposition of the classification into which the species naturally fall.

ART. XXXIV.—Notices of Koordistan.—Hot Sulphur Spring—Manna—Mines of Lead—Sulphur and Orpiment—Rock-Salt and Saline Springs—Ruins, &c., derived chiefly from the letters of Rev. A. H. Wright, M. D., of the Mission of the A. B. C. F. M., at Oroomiah,* Persia; communicated by OLIVER P. HUBBARD, M. D., Prof. Chem., &c., Dartmouth College.

THE Nestorians of the mountains of Koordistan, which lie to the west, in the limits of Turkey, have recently suffered severely

* This Mission is situated among the Nestorians, at Oroomiah, in Persia, by the salt lake of the same name. This lake is about 1400 yards above the sea, about eighty-nine miles in length from north to south, and in breadth about thirty-two miles. The governor of this district is Yahyah Khan.

in two campaigns against them by Badr Khān Bey, chief of Buhtan, who resides near Jesireh, on the Tigris—which disturbances have rendered the passage of the mountains unsafe and even dangerous for all travellers.

B. K. Bey, however, needed medical advice, and made an urgent request, through his neighbor Noor Ali Khan, the Hakkary chief, residing at Julamerk, and directly through the Governor of Oroomiah, that Dr. Wright should make him a professional visit, assuring him of "every practicable means for his security on the journey."

Accordingly, on the 4th of May last, accompanied by Mr. Breath, of the Mission, two native assistants and a guide, Dr. Wright commenced his journey, and lodged at night in an encampment of Koords, by the roadside. The next day, the 5th, they came to the fort of Ali Aga, a Koordish chief, who resides on the frontiers of Koordistan, and who hospitably entertained them; and when they left on the following morning, he gave them a London thermometer. Having crossed a high range of mountains, they reached Hoshgan, a small Koordish village, on the 6th. The 7th being rainy, they rode but two hours to a place called "the Four Churches," and on the 8th, spent the night at Kermē. The next day, the 9th, about noon, they arrived at the castle of the chief, at Julamerk.

Here "they were detained thirteen days, it being reported that the mountains beyond were still covered with snow, and that it would be impossible to pass them for some time to come." The chief was "enlarging and ornamenting his castle, and as iron is dear in Koordistan, great quantities of the guns, daggers and other weapons taken in war from the Nestorians, were used up in making nails." They left Julamerk on the 21st of May, and soon ascended a high range of mountains lying west of Julamerk, and on reaching the summit, had an extensive view of the surrounding country. On the east and south, rose the lofty mountains of Diss, Jeloo, Tehoma and Tiyary; in the west, far in the distance, were the mountains of Bahtan; and on the north, lay a wild region, reaching to Lake Van, which is some 1800 yards above the sea.

In the course of the day, they passed through the districts of Sillah and Leewin. Next morning they ascended another mountain, (range,) the higher portions of which they found covered with snow, but so frozen on the surface as not seriously to impede them. In the forenoon, they passed a Nestorian village of fifteen houses, situated on a plain, surrounded by the mountains which contain the sources of the Khabour, a branch of the Tigris. From Julamerk to this point, the course had been "about west. They now turned to the south, taking the western bank of the Khabour."

Hot Sulphur Spring.—"On the 23d of May," says Dr. Wright, "just before noon, we came to a hot sulphur spring, where we stopped some hours. Though we had heard much of it on the way, as a natural curiosity, our expectations were more than realized. The water rushes out of a crevice in a high rock, which is a spur of a still higher mountain, in a bold, rapid current, sufficient to carry a grist mill of ordinary size, and after passing some twenty feet, the stream becomes a branch of the Khabour. Just as the water issues from the crevice, the rock projects above and beyond, in such a manner as to form a small apartment, quite sheltered from the wind; thus affording an unequalled hot bath in this wild region, so destitute of the ordinary comforts of life. The water is clear as crystal, and of a temperature of 105° Fah., and very remarkable for its quantity, purity and temperature. I have seen most of the Virginia springs, all of which appear quite insignificant in comparison with this. I have visited the baths in Constantinople, Erzeroom, Tabreez and Oroomiah, which are fitted up with every thing to please; but weary and worn as we were in crossing mountain heights and snow-capped peaks, it was a greater, an inexpressible luxury to throw ourselves into this beautiful water and bathe our aching limbs. We wished to carry away with us some of the water for the purpose of analysis, but as our loads were thrown down some precipitous bank every little while, breaking every thing that could be broken, we were not disposed to add to them.

"The place is much frequented by the people living in these parts, both Koords and Nestorians; and many a poor traveller, crossing these snowy regions in the winter, finds here a delightful shelter for the night, from the cold mountain blasts."

After leaving the spring, the road was exceedingly rough and precipitous; and on the 25th of May, they left the Khabour and travelled nearly west, and after crossing an elevated range of mountains, their course lay along the base of immense rocky palisades. On the 26th, the course was southwest; and a ride of seven hours on the 27th, over an uneven and barren country, brought them to Dergulē, the residence of Badr Khān Bey,—a small town of a few hundred houses, built of stone and mud, and twelve miles east of Jezireh. The castle of this chief stands near the village, on the brow of a hill, overlooking a small stream, which flows into the Tigris. The chief was about removing, on account of the heat, to more elevated and cooler regions, and Dr. Wright and Mr. Breath accompanied him in his migrations from place to place, during four weeks: the former was engaged professionally every day, more or less, among the sick in the Emir's family and retinue, and successfully introduced vaccination among them.

These gentlemen commenced their return to Oroomiah on June 24th, by an easier route, farther to the north, by Baskallah, which they reached in six days travel, and on the 3d July, arrived at Oroomiah, after an absence of two months.

Dr. Wright thus speaks of the country:—

"*Physical Features.*—Our route to Dergulê, led us across central Koordistan, and through a region of almost unequalled interest, in a physical point of view. Mountains, valleys, precipices, gorges, rivers, &c., combined to form the most attractive scenery; and such was the variety of rock and minerals, that the geologist and mineralogist would find it a region of rare interest. No man devoted to natural science has ever been through these regions. Some twelve or fifteen years ago, Prof. Schultz, of a German University, made the attempt, with purely scientific objects in view. His motives were mistaken, and he was murdered by order of the Koordish chief of Julamerk. We have now formed such an acquaintance with that chief and others having power in the mountains, that I think we can ensure one a safe passage through any part of the country. The Emir, B. K. Bey, prides himself on being a man of 'one word,' and pledged himself as our 'friend.'"

The peculiarities of the different routes are thus referred to. Dr. W. says of his return route:—

"The country over which we passed was elevated and mountainous; but the mountains were not heaped up in regular ranges or chains, as on the Julamerk route; they seemed rather to have been thrown together in a confused manner, resembling the surface of the ocean, when lashed into commotion by contrary winds." "During the first day and part of the second, we passed over a district covered with a stunted growth of oak and gall-nut trees, &c., but from that time until we reached Salmas, we did not see trees or shrubbery of any kind. The mountains and hills were not barren, however, but covered with grass to their summits, affording a grazing district equal to any in the world. In the winter they are a waste, being enveloped in snow, and no dweller or traveller is ever seen among them." The flocks of sheep from the plains of Mesopotamia, are driven here by a gradual ascent, as the season advances in the spring, and retire before the early snows, from the summits to the campaign below, for winter quarters. Thousands of sheep, with their keepers, were seen on the hills at this time.

Dr. W. describes a substance he met with, under the name of *Manna*. We found "in one part of the mountains (probably on the return route) great quantities of a sweet substance, formed on the leaves of certain trees, generally the oak and gall-nut tree, and which is called *gezza* in Koordish, and *manna* in Syriac, and perhaps *honey-dew* in English. It forms on the leaves in such

abundance, that when they are dried and pounded, it comes off in scales, and is collected and used as an article of food. When melted and strained, in order to separate the crumbled leaves, it is very delicious, and is eaten by the people often in preference to honey. In the summer, it is collected in large quantity and put up for winter use. Often, as we were riding along among the trees loaded with it, we found it pleasant to break off the branches and lick the leaves, which were so coated with it that in a very few minutes our appetites were satisfied. There is a species of willow growing on the water courses in Persia, on which this article is sometimes found; but we have never seen it there in such abundance as in the Koordish mountains."

The term *manna* ordinarily refers to the well known product of several species of *Fraxinus*, "that grow spontaneously in Italy and Sicily, and very probably in all the oriental Mediterranean region," and which is used for medicinal purposes. Substances which resemble this in form, or taste, or mode of production, are also called by the same term, which, in every case, therefore needs defining. The *gezza* was observed in June, and from Dr. W.'s account, we infer it was a semi-fluid exudation upon the leaves of certain trees. This has been mentioned by writers in other parts of Asia; and as it differs so entirely from other forms of *manna*, which occur under peculiar circumstances, a few facts from various authors may here be cited.

Wellsted,* in his journey from Tiv to Mount Sinai, September, 1836, "found in the Wadi Hibron, fifteen miles from the sea, and at an elevation of about two thousand feet, the tree which produces the *manna*. This remarkable substance is secreted by several trees, and in various countries in the East. In some parts of Persia, it is believed to be an insect secretion, and is collected from a shrub called *gavan*, about two feet high, bearing a striking resemblance to the broom. In the hilly district of Looristan, (southeast from Koordistan,) as in Mesopotamia, we find it on several species of oak, which there, however, are of more stunted growth than in England. From these, the *manna* is collected on cloths spread beneath them at night, and it then bears the form of large crystal drops of dew, such as we see on plants in England, in the early part of the morning. Burckhardt observes that at Erzurum, a substance resembling *manna* in taste and consistence, distils from the tree which bears galls, and with the inhabitants of the country forms one of the principal articles of their food."

In the Horticulturist, No. 7, January, 1847, is an article translated from the *Révue Horticole*, from which we extract the following notice of what appears to be the same (or similar) thing with the *gezza*.

* Travels in Arabia, vol. ii, pp. 47, 48.

"Ehrenberg and Bové described the '*Manna Tamarisk*,' which is abundant throughout Arabia, and even found on Sinai, nine hundred feet above the sea. The women and children collect this, which flowed from the branches of these trees. The Arabs clarify the manna by dissolving it in warm water, and making a syrup, the taste of which is equal to that of the best honey."

Under the word "*manna*," in the Diet. Univ. d'Hist. Nat., Paris, 1846, is mentioned "a stunted, spinous shrub—*Hedysarum alhagi*, Linn., *Alhagi Maurorum*, Tourn.—as growing in the deserts of Arabia and Persia, upon which is gathered a white, concrete juice, which is called *manna alhagi*. Olivier, on his return from Turkey, brought to France several pounds of this substance, which, according to Niebuhr, is used in Persia instead of sugar in pastry, &c."

"Mr. Lindley* has recently pointed out an oak, *Quercus manifera*, from the leaves of which also drops a sweet substance, which seems to have been mentioned under the name *chelber*, by Olivier. This name, which is applied by the hordes of Korassan and Little Tartary, to a nutritious substance which falls on the ground, it is easy to see approaches very nearly to that of *Semljenoï-chleb*, by which name the nations of the Kirghiz designate the *Lecanora esculenta*."

"Several occurrences of what is called a fall of *manna*, are attributable to the accumulation of this Lichen, *Lecanora esculenta*. Ancher-elouï observed it in Persia in layers of nearly four inches (0 m. 12 to 0 m. 13) in thickness. He sent specimens, with the following note, to France. 'In 1829, during the war between Persia and Russia, there was a great famine in Oroomiah, south-west of the Caspian. One day, during a violent wind, the surface of the country was covered by a lichen, which fell from heaven. The sheep immediately attacked and devoured it eagerly, which suggested to the inhabitants the idea of reducing it to flour and making bread of it, which was found to be good and nourishing. The country people affirm that they had never seen this lichen before nor after that time.' "During the siege of Herat, (which is about eight hundred and seventy-six feet above the sea,) more recently the papers mentioned a hail of *manna*, which fell upon the city, and served as food for the inhabitants." "A rain of manna occurred April, 1846, in the district of Jenischehir—the government of Wilna—on the grounds of M. Tizenhauz, and formed a layer three or four inches in thickness. It was of a greyish-white color, rather hard, and irregular in form, inodorous and insipid."

* Révue Hort., as already cited.

† Relat. d'un Voy. en Orient, vol. ii, p. 339.

"Pallas observed it in the mountainous, arid and calcareous portions of the great desert of Tartary. M. Eversham collected it in the steppe of the Kirghiz, to the north of the Caspian Sea, where it is called *semljenoï-chleb*. M. Ledebour has observed it in the same countries, but chiefly those which border on Altai; and Bilezikdgi saw it also in Anatolia, in 1845. Dr. Lévillé gathered it in Crimea, and Dr. Guyon recently in Algeria."

"It is found in irregular shaped bodies, varying in size from that of a pin's head to a pea or small nut, and when seen in its proper sites, has never been found attached to any support whatever. An analysis of the *Lecanora* shows that there is no fecula in its composition."

Wellsted, p. 49, "learned from a Jewish Rabbi, that on his journey through the desert contiguous to Damascus, far removed from trees or vegetation of any kind, a substance was deposited, which, from his description, in appearance, size and flavor, accurately resembled the manna of the Scriptures. Similar testimony was derived from several Bedouins."

It may be remarked, in passing, that several writers have not hesitated to identify some of these species with the manna miraculously supplied to the Israelites, in the wilderness. They were obviously acquainted with manna of some kind, from the fact that they named the new substance from its resemblance to it. Dr. Wright describes, also,—

"*Mines of Lead, Sulphur and Orpiment*, which exist in the mountains, and are worked by the natives there. The lead mines are found mainly in the Nestorian country, where they are worked chiefly to furnish balls for rifles. *Sulphur* is found in many localities, and is obtained for the purpose of making powder. In many cases, a man makes what he wants for his own use, and may sell a little to his neighbors. The *Orpiment* mine is owned by the chief of the Hakkary Koords, Noor Ali Khan. It is worked extensively, and has been for many years. About twenty Koords are employed, day and night, in digging the ore and bringing it out to the surface. The ore occurs in veins, which run, in various directions, into the body of a high mountain. The mineral is exported to every part of Persia and Turkey, where it is largely used in making a composition with which Mussulmān's remove the hair growing on their bodies, when frequenting the baths; for hair is an abomination to them, except on the face, and a lock or two on the head. Orpiment is also used by them as a pigment." Mr. J. D. Dana informs me he has purchased specimens of orpiment in Smyrna, which were probably derived from this locality.

"*Salt and Saline Springs*.—There are some salt springs on the west side of the mountains, near the Tigris, which are very useful in furnishing salt, by solar evaporation of the water. Most

of the salt, used in Eastern Koordistan, however, is carried from the lake of Oroomiah, 'the saltiest water in the world,' on the shore of which it is found in great abundance. Porter says of the lake, as seen from the hills on the east, that 'its waters now appeared of the deepest blue, and most singularly hemmed in by a broad belt of salt, looking at a distance like a violent surf.' 'In many places it lies more than a foot thick, and where the bed of the lake slopes gently from the land, the salt left by evaporation in summer often exceeds a breadth of three or four miles down to the verge of the waves.' 'Rock salt is found in some localities in this vicinity, and is a very good article.'¹⁷⁸

After these mineralogical notices, Dr. Wright mentions some

Remarkable Ruins.—"We found in great numbers, scattered over the country, a mysterious species of ruins, which puzzled us extremely in endeavoring to satisfy our minds as to their history. They consisted of collections of stones, many of them very large, which were once built up in the form of a regular structure, usually oblong. We heard of some still standing, built up some ten or fifteen feet high, without door, window or roof. The Koords have the idea, as we learned upon inquiry, that they are the work of DEEVS,† whom they regard as spiritual beings, who were engaged in a war with the human race, and who built these structures for their strongholds in the conflict. My companion, Mr. Breath, conjectures they may be the remains of the works of the Fire Worshipers, who formerly occupied these parts, though it is difficult to imagine what object they could have had in constructing them. On the plain of Oroomiah, there are numerous remains, which it is altogether probable are the relics of the ancient Fire Worshipers. The indications of their character are much more obvious than those of the mountains."

ART. XXXV.—*Caricography*; by Prof. C. DEWEY, M. D.

(Appendix, continued from this volume, p. 173.)

No. 209. *C. oxylepis*, Torrey. Mon. N. Am. Cyp., p. 409.

Spicis 4-6 longo-cylindraceis subaxilliferis erectis exsertis pedunculatis, inferioribus subremotis basi distantifloris, superiore inferne staminiferis; fructibus *tristigmaticis* oblongis utrinque acutis subtriquetris glabris ore vix bilobatis, squama ovata oblonga margine hyalina cuspidata paulo longioribus; culmis inferne foliatis.

¹⁷⁸ V. Am. Jour., vol. xxxvii, p. 350, et seq.

† Sir R. K. Porter, in his *Travels in Persia*, describes a mound with massive marble structures upon it, in the plain of Morgan, near Persepolis, called "the Court of the Deevs, or Devils," and in many places the temples of the Fire Worshipers.

Culm erect, slender, 15 inches high, with shortish leafy bracts; leaves flat, lanceolate, acute, striate, originating towards the root, and shorter than the culm, slightly pilose on the under side; spikes 4-6, erect, pedunculate, bracteate, lower ones sheathed and very loosely flowered at the lower part, the upper spike staminate below, with long and lanceolate staminate scales; stigmas three; fruit oblong, tapering to each end, smooth, subtriquetrous, dark brown, rather loose, orifice nearly entire; pistillate scales ovate, oblong cuspidate, white and membranous on the edges, shorter than the fruit; plant pale green.

Texas—Torrey; Florida—Dr. A. W. Chapman, author of the *List of Plants near Quincy, Florida*; Louisiana—Dr. Hale.

Related to *C. formosa* and *C. aestivalis*, though far different. Specimens from Florida and Louisiana are fine and beautiful.

No. 210. *C. Baltzellii*, Chapman. *List of Florida Plants*, 1845.

Spica staminifera unica perlongo-pedunculata, squamis oblongis obovatis obtusis vel submarginatis brevimucronatis; spicis pistilliferis 3-4, oblongis erectis laxifloris subradicalis pedunculatis, suprema interdum apice staminifera; fructibus *tristigmaticis* oblongis obovatis obtusis triquetris brevi-rostratis ore integris subpubescentibus vel scabris nervosis, squamam similem staminiferam subsequantibus; foliis radicalibus subpubescentibus.

Culm 6-10 inches high, slender, triquetrous, terminated by a cylindric and clubform staminate spike, as if supported by a nearly radical peduncle; leaves radical, flat, striate, lanceolate, much surpassing the culm, and slightly pubescent; pistillate spikes 3-4, subradical, pedunculate, approximate, cylindric, loosely flowered, the highest often continued into a short staminate spike; stigmas three; fruit oblong, obovate, obtuse, short rostrate, subscabrous, entire at the mouth, sometimes distinctly triquetrous, nerved; pistillate scale, like the staminate, oblong, obovate, obtuse or slightly emarginate, mucronate, and often slightly surpassing the fruit, deep reddish-brown on the edges, and green on the keel; whole plant rather light green.

Florida—Chapman; a singular and beautiful species, closely allied, as Dr. Chapman remarked, to *C. pedunculata*.

No. 211. *C. polymorpha*, Muh. Gram. Muh., p. 239.

Spicis staminiferis 1-2, raroque 3, oblongis cylindraceis erectis, superiore pedunculata, ceteris sessilibus; spicis pistilliferis 2, longo-cylindraceis erectis incluse pedunculatis bracteatis densifloris *tristigmaticis*, superiore apicem staminifera; fructibus ovatis acuminatis vix rostratis ore bifidis nervosis glabris, squama ovata fusca duplo longioribus; foliis lanceolatis inferne abbreviatis.

Culm 14-20 inches high, erect, with leafy bracts; leaves lanceolate, striate, shorter below and shorter than the culm; staminate spikes 1-3, erect, cylindric, often more than an inch long, with ovate and oblong short acute scales, upper one pedunculate; pistillate spikes 2, oblong, cylindric, closely jointed, erect, upper one often staminate at the apex, all with enclosed peduncles, upper nearly sessile; fruit ovate, acuminate, bilobate, scarcely rostrate, longer than the ovate and tawny scale.

Penn.—*Muh.*;—New Jersey—*Torrey*; Florida—*Chapman*.

All the varieties noticed by Muhlenberg, have not been found by later botanists. Perhaps one of them is *C. Halseyana*, which is, however, too different in various respects. In *C. Halseyana*, the staminate scale is more obtuse, and the fruit is distinctly rostrate, or more nearly ovate-globose, and continued into a distinct beak, two-toothed, much less glabrous, and the spikes less closely flowered. All the Carices in Muhlenberg's Gram., are ascertained.

No. 212. *C. turgescens*, Tor. Mon. Am. Cyp., p. 419.

Spica staminifera solitaria oblonga erecta pedunculata; spicis pistilliferis 2-3, ovatis paucifloris erectis subsessilibus folio-bracteatibus *tristigmaticis*, infima nunc remota nunc subapproximata exserte pedunculata; fructibus ovatis inflatis conico-longo-rostratis striatis divergentibus ore bifidis, squama ovata magis duplo longioribus.

Culm 15-30 inches high, erect, with long and leafy bracts; leaves linear-lanceolate, striate, shorter towards the root, and all surpassed by the culm; staminate spike long cylindric, pedunculate, and small bracteate; pistillate spikes 2-3, ovate, few flowered, erect, mostly sessile, except the lowest, which is often remote and long pedunculate; stigmas three; fruit ovate, inflated, long-conic, and thus rostrate, two-toothed, with prominent or raised striae, diverging, glabrous, more than twice longer than the ovate scale; ligist green.

This is *C. folliculata*, Elliott, (not of Lin.,) found in South Carolina; also in Louisiana—*Torrey*; Florida—*Chapman*.

Related to *C. folliculata*, Lin. and *C. intumescens*, Rudge, the *C. folliculata*, Schk. Dr. Torrey saw the difference and properly gave the species a name. Its fruit is far more inflated than that of *C. folliculata*, L., and far more tapering and conic than that of *C. intumescens*, Rudge.

ART. XXXVI.—On a New Metal, Pelopium, contained in the Bavarian Tantalite; by P^{ROF.} H. ROSE.*

In a former paper,† on the composition of the so-called tantalac acid which occurs in the columbite of Bodenmais in Bavaria, I showed that it consisted of two acids, one of which differs so decidedly from all known metallic oxyds, that I did not hesitate to regard it as the oxyd of a new metal, which I named niobium. I did not then enter into a description of the second acid, which occurs in company with the niobic acid, but merely observed that it possessed great similarity to the tantalac acid procured from the Finland tantalites.

The separation of the two acids according to the method I formerly described, was exceedingly troublesome and tedious. After I had suspected a peculiar substance in the so-called tantalac acid from columbite, and had vainly attempted in various ways to isolate it, I succeeded in effecting this only approximately on converting the acid into chlorid, by mixing it with charcoal and passing a current of chlorine over the heated mixture. I obtained a yellow, readily fusible and very volatile chlorid, and a white, infusible, less volatile chlorid. Both were converted by water into metallic acids, which were not dissolved by the hydrochloric acid formed, but separated on boiling, and could easily be freed by washing with water from every trace of acid; but when the acid from the white infusible chlorid, after I had separated it as well as possible from the yellow one, was again mixed with charcoal, and treated with chlorine, I constantly obtained yellow and white chlorid; less, it is true, of the first than when the mixture of the two acids as they occur in the mineral was employed; but even when the operation was very frequently repeated with the acid from the white chlorid, it was not possible to obtain by this method a pure white chlorid free from yellow. I observed, however, that the white chlorid was only partially sublimed. When it was separated as much as possible from the yellow chlorid, and by sublimation also from a white non-volatile residue, it at last afforded an acid, which, on treatment with charcoal and chlorine, yielded a tolerably pure, white, wholly volatile chlorid, the chlorid of niobium. The white fixed residue yielded with charcoal and chlorine a large quantity of yellow chlorid; and after removing this by sublimation, again left a white non-volatile residue, which, on being again subjected to a similar treatment, afforded the same products.

* Neber ein zweites im Tantalit, (Columbit,) von Baiern enthaltenes neues Metall; von Heinrich Rose. Poggend. Annal.; cited from Chem. Gazette, September 15, 1846.
† Poggend. Annal. Bd. 63, S. 317.

On comparing this behavior of the yellow chlorid with that observed on treating a mixture of pure tantalic acid and charcoal with chlorine, I obtained a perfectly similar yellow chlorid and a white non-volatile residue; but the quantity was far smaller, and its production could be entirely avoided, if, in the preparation of the chlorid of tantalum, every trace of humidity and atmospheric air had been carefully excluded. Moreover, the sublimed yellow chlorid from the Bavarian mineral, very much resembled the chlorid of tantalum. This similarity likewise extended to the acids prepared from the two chlorids; they behaved so much alike, that it was only after long-continued investigation that properties were discovered by which they might be separated.

In the preparation of chlorid of tantalum from the tantalic acid from the Finland tantalite, and especially in that of the yellow chlorid from the Bavarian mineral, I frequently obtained considerable quantities of a red chlorid, which was still more volatile than the yellow one, and proved on examination to be the chlorid of tungsten. When the chlorids are exposed for some time to the air, the tungsten can be removed by digestion with ammonia, as soluble tungstate of ammonia.

Sometimes chlorid of tin and chlorid of titanium were obtained in preparing the chlorid; they could be readily distinguished, by their fluid state of aggregation, from the other chlorids.

The formation of the chlorids of tungsten and tin appears remarkable, inasmuch as the acids from which the chlorids were prepared had been kept in a moist condition for a long time in contact with sulphuret of ammonium. I draw especial attention to this circumstance, because, unless perfectly freed from these impurities, the chlorids and the acids prepared from them are obtained with very different properties.

The yellow chlorid from the Bavarian mineral differs, therefore, principally from the chlorid of tantalum by its leaving a white non-volatile residue on its production, or rather on its volatilization, at a high temperature. This residue consists principally of the acid which may be obtained from the yellow chlorid by decomposition with water.

In the preparation of the yellow chlorid from the columbite of Bodenmais, there is formed along with it an oxychlorid, which is decomposed by heat into chlorid and acid, just like the tungstate of the chlorid of tungsten. The formation of the oxychlorid can be prevented by placing a long layer of charcoal in the anterior portion of the glass tube, in which the mixture of acid and charcoal is to be treated with chlorine. While the chlorine is passing through the tube, this charcoal is first raised to a strong red heat, and then the mixture.

The acid of the yellow chlorid from the Bodenmais mineral, which is contained in it along with the niobic acid, I have named

Pelopie acid, and the metal *Pelopium*, from Pelops, the son of Tantalus, and the brother of Niobe; to point out, at the same time, by this name, not only its simultaneous occurrence with the oxyd of niobium, but more particularly the very great resemblance of pelopie acid to the tantalic acid from the Finland tantalites. This similarity is indeed more perfect than exists between the combinations of any other two simple metals; it is so great, that it was only after a long-continued and most minute investigation that I could decide upon publishing the results I had obtained. The combinations of niobium are, on the contrary, very different from those of pelopium or tantalum.

I will here describe the most important properties by which the compounds of tantalum differ from the corresponding compounds of pelopium, and at the same time enumerate those of niobium.

In its properties, pelopie acid is intermediate between tantalic and niobic acids, just as strontia is between baryta and lime. And in the same way as we are able to explain many properties of strontia, by assuming it to be a mixture of the two last-mentioned earths, we are able to determine *a priori* most of the properties of pelopie acid, by admitting it to be a mixture of a large proportion of tantalic acid, with a small quantity of niobic acid; and as was the case with bromine, which, on its discovery, was considered to be a combination of chlorine and iodine, I myself was long of opinion that the pelopie acid was nothing more than tantalic acid, still contaminated by a certain quantity of niobic acid, which I had not succeeded in separating. It was only by an uninterrupted investigation of this subject for several years that I became convinced of the distinctness of pelopie acid.

The chlorids of the three metals dissolve in cold concentrated sulphuric acid without any evolution of heat, but with disengagement of hydrochloric acid; but if the solution of the chlorid of tantalum and pelopium is boiled, it solidifies to a jelly. Water then does not dissolve any of the tantalic acid, but a large quantity of the pelopie acid. The solution of the chlorid of niobium by sulphuric acid is not rendered turbid by boiling; it even remains clear on dilution with water, but if it be now boiled, the whole of the niobic acid is precipitated from the solution.

Chlorid of tantalum dissolves in hydrochloric acid in the cold to a turbid liquid, which after some length of time forms an opaline jelly, from which water both cold and boiling dissolve only traces of tantalic acid.—But if chlorid of tantalum is treated with boiling hydrochloric acid, it does not dissolve entirely, and on cooling it does not form a jelly, but water now dissolves the whole of it to an opaline liquid, which is not rendered more turbid by boiling. Sulphuric acid produces in it, after some time, a voluminous precipitate even in the cold. The chlorid of pelopium behaves in a similar manner, except that sulphuric acid

does not produce a precipitate in the cold, in the solution obtained by boiling and diluted with water, but only on boiling. Chlorid of niobium does not dissolve in cold hydrochloric acid, and scarcely anything is dissolved on the addition of water: when, however, chlorid of niobium is boiled with hydrochloric acid, though not dissolving at first, on diluting with water the whole dissolves, and the niobic acid is not even precipitated from the solution by boiling. When sulphuric acid is added, a turbidness results even in the cold, and the whole of the niobic acid is precipitated by boiling. On the other hand, when but a small quantity of hydrochloric acid is placed in contact with the hydrates of the acids, the result is quite a different one. The same is the case when the chlorids of the three metals are treated with much water. The niobic acid is then completely separated on boiling from the chlorid of niobium, and also the pelopie acid from the chlorid of pelopium; but tantalic acid does not separate quite so completely from the chlorid of tantalum.

Chlorid of tantalum, heated with a solution of hydrate of potash, is partly dissolved; but a solution of carbonate of potash does not dissolve any tantalic acid even on boiling. Chlorid of pelopium is dissolved in large quantity by a solution of caustic potash, and even carbonate of potash dissolves it in tolerable abundance on boiling. Chlorid of niobium is dissolved even in the cold by a solution of potash, and also by boiling in a solution of carbonate of potash.

Tantalic acid remains white on being heated to redness; pelopie acid is rendered slightly yellowish; niobic acid, dark yellow. On cooling, both again become as white as before ignition.

All three acids exhibit, when their hydrates are heated very strongly, the phenomenon of phosphorescence. This, however, is not the case when the compounds with sulphuric acid are treated with ammonia, and then heated to redness.

Tantalic acid, exposed in a current of hydrogen to a strong red heat, remains white; pelopie and niobic acids become black; but the reduction which these acids undergo is quite inconsiderable, for very doubtful traces of water are perceptible, and the blackened acids quickly become white when heated with access of air, without experiencing any perceptible increase in weight. When tantalic acid is heated to redness in a current of gaseous ammonia by a brisk charcoal fire, it is turned gray, with the formation of but slight traces of water. Pelopie and niobic acids become black, and are reduced, with the production of a considerable quantity of water.

When tantalic acid is heated in a brisk charcoal fire, and sulphuretted hydrogen gas passed over it, it becomes slightly gray, but no trace of water is perceptible. Pelopie and niobic acids are converted by the same treatment slowly but entirely into sulphurets, with formation of water and separation of sulphur.

Metallie pelopium can be prepared from the chlorid by treatment with ammonia, in the same way as the metals from the chlorid of tantalum and chlorid of niobium. It has the greatest resemblance to tantalum.

When the ignited acids, which are insoluble in almost all reagents in the moist way, are fused in a silver crucible with hydrate of potash, they are dissolved. The fused mass is soluble in water. Hydrate of soda behaves in a different manner. When the ignited acids are melted with it, the fused masses obtained are not clear; but an insoluble sediment is formed, which does not dissolve in any excess of the alkali. If the fused mass be treated with a moderate quantity of water, the excess of soda is removed, and a white insoluble mass remains. If, after removing the free soda, a large portion of water be poured over the insoluble mass, it dissolves, and most completely when niobic acid has been employed.

The insolubility of the three acids in excess of soda, while the potash compounds are soluble in excess of potash, essentially characterizes them. In this they differ from similar acids, especially from tungstic acid. When the solutions of the soda salts are mixed with concentrated solutions of hydrate of soda, they immediately become turbid; if the mixture be made very slowly and carefully, all three soda salts may be obtained in crystals, which are deposited on the sides of the vessel. But crystals only of the niobate of soda can be easily obtained of any size. I succeeded in obtaining them half an inch and more in size, but in general they are much smaller. They are sparingly soluble in cold water, more readily soluble in hot; the solution may be boiled without becoming turbid; it can be evaporated, and the niobate of soda deprived of its water of crystallization without being decomposed. The salt is only rendered insoluble in water by being heated to redness.

The pelopate, and especially the tantalate of soda, are less stable; when their solutions are boiled, an insoluble white precipitate separates, which is an acid salt of soda.

When the niobate of soda is exposed to a red heat, and a current of dry sulphuretted hydrogen passed over it, a dark black crystalline mass is obtained, from which water removes hydro-sulphated sulphuret of sodium, while crystalline sulphuret of niobium remains undissolved.

When pelopate of soda is treated in the same manner, there is no sulphosalt formed, but only sulphuret of pelopium. The tantalate of soda remains white on treatment with sulphuretted hydrogen, but its soda is converted into sulphuret of hydrogen and sodium.

When niobic acid is fused with an excess of carbonate of soda until the fused mass no longer decreases in weight, the amount

of oxygen in the expelled carbonic acid is twice that in the niobic acid employed. The results obtained on fusing pelopie and tantalic acids with carbonate of soda did not agree. By long-continued fusion of tantalic acid with carbonate of soda, so much carbonic acid is expelled that its amount of oxygen was equal to that of the tantalic acid employed, and finally exceeded it. But nevertheless this basic salt does not dissolve undecomposed in water, but leaves a considerable residue of acid tantalate of soda. Something similar takes place with pelopie acid, only the basic pelopate of soda formed dissolves entirely in water.

When the three acids are fused with carbonate of potash, they exhibit similar properties; but the potash salts are as soluble in the excess of carbonate of potash as in hydrate of potash. In this way we obtain compounds which are soluble in water and crystallize; but they contain carbonate of potash, which cannot be separated in any manner.

The combinations of tantalic acid with the alkalies, are characterized by their passing on all occasions into insoluble acid salts, especially on boiling and evaporating their solutions. The solutions of the alkaline pelopates exhibit this property in a far less degree, those of the niobates not at all. Insoluble acid niobates of potash or soda can only be produced by not fusing the acid a sufficient time with the carbonates.

Tantalie acid is soon and entirely precipitated from its alkaline solutions by carbonic acid as an acid salt; the same is the case with pelopie acid, but with greater difficulty and far more slowly. It is owing to this that the neutral solution of tantalite of soda becomes turbid even by exposure to the air, while that of the pelopate of soda does not become turbid even after long exposure, which is characteristic of it. Carbonic acid produces a precipitate in the solution of alkaline niobate only after a considerable length of time, which, however, is again dissolved by much water.

When the solutions of the alkaline tantalates and pelopates are treated with an excess of hydrochloric acid, the eliminated acids dissolve to faintly opaline liquids. Sulphuric acid produces in these solutions precipitates, and separates the acids on boiling; however, only the pelopie acid entirely, and but partly the tantalic acid. Hydrochloric acid precipitates the acid from the solutions of the alkaline niobates in the cold, and still more so on boiling; an excess of hydrochloric acid merely dissolves slight traces. This behavior is interesting, since we have seen that under other circumstances niobic acid may be wholly soluble in hydrochloric acid. Sulphuric acid precipitates niobic acid from its alkaline solutions even in the cold.

From the solutions of the alkaline tantalates the acid is entirely precipitated, without the assistance of heat, by chlorid of ammonium, pelopie acid less perfectly, and niobic acid still less.

When the solutions of the alkaline tantalates are rendered acid with hydrochloric or sulphuric acid, a pale yellow precipitate is produced in them by tincture of galls. An orange-yellow precipitate is formed, under similar circumstances, in solutions of the pelopates, and a dark orange-red in those of the niobates.

Ferrocyanid of potassium produces in solutions of the tantalates of the alkalies, when they have been rendered slightly acid, a yellow precipitate; in those of the pelopates, a brownish-red; and in those of the niobates, a red one.

When the three acids are fused with bisulphate of potash, they dissolve in it. Niobic acid alone solidifies with it to a crystalline mass. Water removes sulphate of potash from the fused masses, and leaves compounds of sulphuric acid with the metallic acids, from which, however, the sulphuric acid can be removed by very long treatment with water.

When hydrochloric or sulphuric acid is added to the solution of the niobate of potash or soda, and then a bar of zinc immersed in it, the separated niobic acid soon assumes a very beautiful pure blue color. It gradually becomes dirtier, and finally brown. The blue color is produced, in the solutions of the alkaline pelopates, only on the addition of sulphuric acid; but not even then is a blue color produced in the alkaline tantalates, which, however, takes place when the solution of the chlorid of tantalum in sulphuric acid is treated with water and zinc.

Tantalie acid yields before the blowpipe, with the fluxes, colorless beads, even in the inner flame; pelopie acid gives with the microcosmic salt in the outer flame a colorless, in the inner one a brown bead. Niobic acid colors the microcosmic salt in the inner flame of a beautiful blue; the bead can be easily blown colorless in the outer flame.

These are the most important differences between pelopie acid and tantalic acid on the one hand, and niobic acid on the other. To ascertain accurately the behavior of these acids and their combinations, is a most difficult task, as all three acids frequently exhibit highly anomalous properties. We have seen, for instance, that the niobic acid is readily dissolved, under certain circumstances, by hydrochloric acid, when separated from its combinations, while under not very dissimilar circumstances it is almost entirely precipitated by it. This is owing to the acid assuming different isomeric modifications.

The three acids resemble in this respect silicic acid, the behavior of which towards reagents is frequently remarkable, and only excites less surprise from our having been long acquainted with this acid, and its properties having been thoroughly examined.

This tendency of the three acids to assume different isomeric modifications is connected with the great variability which they

exhibit with respect to their specific gravity. My experiments on this subject have led me to the most unexpected results; although I have not terminated my investigations, I will nevertheless communicate at present some of the most important.

Some time ago I drew attention to the fact, that in the artificially prepared titanous acid the specific gravity gradually increases by long-continued ignition, until it attains that of rutile. In the same way the modifications of titanous acid which occur in nature, anatase and Brookite, may be converted by continued ignition into rutile. I thought that the publication of these facts would have induced chemists to examine the specific gravity of other oxyds at different temperatures, since these changes have an important influence on the atomic volume. This, however, has not happened, with the exception of a very interesting investigation of Count Schafgotsch, on the specific gravity of silicic acid, in which he has shown that opal, before heating to redness, has so low a specific gravity, that it floats on oil of vitriol; but that the specific gravity is so increased by heating to redness, that it equals that of chemically prepared silicic acid (2.2), but which is still considerably lighter than quartz and rock-crystal (2.6).

The changes which the three metallic acids under consideration experience by heating to redness are far more remarkable. When the hydrate of pelopous acid is deprived of its water by a gentle red heat over a spirit-lamp, just sufficient to produce the phenomenon of incandescence, and then exposed to a strong red heat in a charcoal fire, its specific gravity is considerably increased. If we examine the ignited acid under the microscope, we see that it consists for the greater part, of amorphous granules, in which some small crystals are perceptible. The ignited acid was then exposed to the most intense, and at the same time continuous heat, that a platinum crucible is capable of bearing, that of the porcelain furnace of the Berlin Royal manufactory. The acid was not melted by it, but was converted into a coarse sandy powder, which, examined under the microscope, consisted of perfect crystals. The specific gravity of the acid, however, was thereby considerably diminished; curious enough, it had become still lower than that which the acid possessed after the hydrate had been exposed to a gentle heat over a spirit-lamp, in order to expel its water.

On repeating this experiment, the specific gravity of the crystallized acid, which had been ignited in the porcelain furnace, was found to be constant, while by no other temperature could the acid be brought to a constant specific gravity.

These experiments are in so far remarkable as they prove precisely the contrary of what has hitherto been frequently admitted. Crystalline bodies, such as idocrase, epidote, and garnet, fuse at a high temperature, become amorphous, but of lower specific

gravity. It is evident that what applies to these substances cannot be advanced as a general rule.

Niobic acid has a far lower specific gravity than pelopous acid. It exhibits a similar behavior. The acid, exposed to the temperature of the porcelain furnace, appears under the microscope perfectly crystalline.

Tantalous acid behaves very different from the other two acids. It is the heaviest of all, and, by heating to redness in a charcoal fire, increases considerably in specific gravity, from 7.0 or 7.1 to 8.2. In the fire of the porcelain furnace it is likewise converted into a coarse powder, but which does not appear distinctly crystalline under the microscope. Its specific gravity is thereby only slightly lessened.

In all these experiments no alteration in the absolute weight was perceptible.

ART. XXXVII.—Termination of the Palæozoic Period, and Commencement of the Mesozoic; by D. D. OWEN, M. D.

SOME of the most distinguished and experienced geologists seem, from their recent publications, disposed to include the Permian system, in the Palæozoic division of the fossiliferous strata, regarding it as the terminating group of that period. Their arguments in support of this view, are—

The corals of this system are considered to have a palæozoic type.

From ten to thirty species* of brachiopodous mollusca are common to the Carboniferous and Permian systems.

The genera *Productus* and *Spirifer* are continued into it.

The *Chonetes sarcinulata* is common to the Silurian, Devonian and Carboniferous strata, and penetrates, according to M. de Verneuil, into the gypsum and marl deposits of Bakhmout, which are believed to belong to the Permian system.

The analogy which exists between the plants of the Permian and those of the Carboniferous system.

In estimating the value of the above arguments, the following facts must not be overlooked.

"Of all the corals of the Permian system which have come under the observation of Lonsdale, he has not yet detected one species† that is identical with any found in the inferior systems;‡ and the only corals which occur in profusion, pertain to genera

* The tables only show nine species.

† The table gives *Fenestella antiqua* (*Gorgonia antiqua*, Goldf.) as common to the Permian, Devonian and Silurian systems; and *Fenestella dubia*.

‡ See note Sur les équivalents du système Permien, par M. de Verneuil, p. 8.

analogous in structure to the *Fenestella*, *Retepora* and *Gorgonia*. But these reticulated corallines are by no means confined to the palaeozoic strata. Six species of *Retepora* are given by Goldfuss, as occurring in the cretaceous system of Maestricht, and two species in particular, viz: *R. fenestrata*, Goldf., and *R. vibicata*, Goldf., are remarkably analogous in structure to forms occurring in the Silurian and Devonian rocks, whilst the genus *Gorgonia* is still living in the ocean.

As yet but one single species has been established as common to the Silurian, Devonian, Carboniferous and Permian systems, viz: *Chonetes sarcinulata*, (*O. striatella*, Dal. *L. lata*, v. B.); since the *Spirifer hystericus* is given in the tables as only problematical in the Permian system, and but one, besides the preceding, is common to the Permian and Devonian, viz: *Terebratula concentrica*.

The only other four species of brachiopods noted in the table above referred to, *not peculiar* to the Permian system, are—*Lingula mytiloides*, *Productus Cancrini*, *Spirifer cristatus*, *Terebratula Rossyi*. These are given as common to the Permian and Carboniferous systems.

It appears from the above, that the force of the argument in favor of placing the Permian system in the palaeozoic period, proves chiefly an analogy between it and the Carboniferous system; for when we examine the evidence to show that the Devonian and Silurian systems belong to the same era, the proof is feeble, resting on but two instances of specific identity.

Reflecting on the above, and other facts which are about to be enumerated, I have been led to differ from the writers alluded to, or at least to doubt the propriety of a classification which throws the Permian and Carboniferous systems into the palaeozoic period, high as the authority is from which the proposed classification emanated.

Before proceeding to give the arguments in favor of a different arrangement, let us see what ought to be our most important guide in determining the great division of rocks.

These divisions are, in one sense, arbitrary. Geological eras cannot be considered as separated by abrupt transitions: where the series are complete, there is a blending of one system into the other; especially a gradual dying off of orders, genera and species of fossil forms, rendering it difficult, sometimes impossible, to draw broad and well defined lines of separation. Still, taken as a whole, the best guides in defining their limits seem to be the evidence of a more or less complete change in the physical condition of our planet; the termination of one great class of phenomena and the beginning of another; the extinction of races and the development of new tribes; the proofs of the elevation and disruption of formations and the unconformability of stratifica-

tion; the evidence of a change in the relative position of land and sea.

Let us consider, then, in the first place, what is the evidence of such phenomena about the termination of the Permian system and the commencement of the Triassic.

In every country where these systems exist, so far from there being any evidence of disturbance or unconformability about the termination of the one and the beginning of the other, there is so complete a blending of adjacent strata, that it is only since the geological examination of Russia, by Murchison, Verneuil and Keyserling, that the Permian beds have been distinguished from the variegated marls and sandstones of the trias; indeed, even at this day it is hardly decided where the dividing line ought to be drawn.

It is true that a few genera of Brachiopoda and Gasteropoda, which occur in the Silurian and Devonian systems, are continued into the Permian, and here, perhaps, become extinct. But is this to be considered of as much importance as the extinction of a whole tribe? Is it of as much moment as the commencement of a luxuriant tropical vegetation? Is it to be compared to the apparent coming in of a new order of terrestrial animals?

If we except the small and rather insignificant genera of *Griffithides* and *Phillipsia*, which occur in the limestone on which the coal measures rest, does it not appear that the entire race of trilobites becomes extinct at the termination of the Devonian period. Just at the time when this remarkable family of crustaceans passes away, have we not the strongest proof of a most extensive accession of dry land in the luxuriant and extra-tropical vegetation of the carboniferous epoch. Before this period, with one or two rare examples, no trace of land plants has been discovered. If, during the Silurian and Devonian periods, a suitable climate had prevailed, capable of supporting a terrestrial vegetation, and dry land had existed in a proper position, we should certainly, long ere this, have obtained marks of its presence.

In the Permian system, there have been discovered in Europe, at least twelve species of Sauroid reptiles, an order of animals which may be regarded as singularly characteristic of the mesozoic period, and imprinting, more than any other race, a peculiar type to the mesozoic fauna. If the footmarks observed by Dr. King, in the coal measures of Pennsylvania, should prove, as at present suggested, to be referable to some reptile, then the commencement of air-breathing reptiles is just coeval with the grand carboniferous flora.

These are certainly strong arguments in favor of placing, not only the Permian, but also the Carboniferous group in the mesozoic period, and terminating the palaeozoic division with the commencement of the coal measures.

The previous remark with regard to the blending of adjacent strata, and the prevalence of some characteristics of one era in the nearest members of the next, applies, to a certain extent, to the systems in question. Indeed, the Carboniferous and Permian systems may be regarded as transition groups, connecting the palaeozoic and mesozoic periods. But, take them as a whole, if we are to include them in one or the other of these periods, there is, to my mind, far more reason for grouping them with the mesozoic than with the palaeozoic deposits.

Besides the arguments just brought forward in support of the above classification, I invite attention to the following.

Hardly a vestige exists in the Permian system, of the numerous Cephalopods so conspicuous in the Silurian and Devonian. The only specimens of this order of mollusca recorded, are: *Nautilus Freislebeni*, a nondescript *Nautilus*, and a problematical fragment of an *Ammonite*. So far, therefore, as the Cephalopoda are concerned, analogy connects the Permian species with the mesozoic strata.

Only a single fossil fish is known common to the Permian and inferior systems, and that not lower than the Carboniferous; i. e. *Palaeoniscus Freislebeni*, which occurs both in the Permian and Carboniferous systems, but not in the Devonian and Silurian.

But three Gasteropoda are cited as common to the Permian and inferior systems, and two of these are problematical; i. e. *Loxonema Urii* and *L. rugifera*; the former, perhaps, common to the Permian and Devonian systems. The third, the *Pleuromaria carinata*, is given as common to the Permian and Carboniferous systems.

Only one of the Monomyaria, i. e. *Arlicula antiqua*, is common to the Permian and inferior systems, being found also in the Carboniferous.

All the species of Dimyaria are peculiar to the Permian. On the whole, therefore, very few even of the mollusca are common to the Permian, Devonian and Silurian; and when we recollect that this class of animals is capable of surviving very great vicissitudes, it cannot be considered extraordinary that a few may have escaped and outlived even a great change of temperature, or some sudden catastrophe.

In addition to the above arguments in support of the views here taken of the classification of rocks, the reader may be reminded that the Permian system of Russia, according to M. de Verneuil, rests unconformably on the upturned edges of the Carboniferous group, whilst a similar want of conformity ("*pareille discordance*") is very rare between the Permian and Triassic.

ART. XXXVIII.—*Glycocol (Gelatine Sugar) and some of its Products of Decomposition*; by E. N. HORSFORD.

(Read before the Albany Institute, September, 1846.)

As there are laws in physics, whose evolution, carefully traced, would constitute a general history of this department of science, so there are bodies in chemistry, whose career, if we may employ such an expression, accurately followed out, would acquaint us with the prominent periods through which this science has passed. The history of sulphuric acid, for example, may almost be said to be the history of technical chemistry, as that of hydrosulphuric acid and ammonia is of analytical; or, as that of oxygen is of theoretical chemistry.

Among the bodies belonging to organic chemistry, perhaps no one presents itself, whose history, fairly exhibited from the time of its discovery down to this date, contains more obvious and lasting impressions of the periods through which this branch of chemical science has passed, than the sugar of gelatine. It bears the stamp of a period when an organic analysis had scarcely been made; of a time when the substance was not obtained pure; then of a time when, from the perfection of methods and apparatus, analyses enjoyed the whole confidence of the chemist, and it was only necessary that formula should coincide with them, in order to their being considered correct; and finally, of a time in which the relations to other substances came in to share in the solution of the problem of the constitution of an organic body. These circumstances may justify a glance at the history of this interesting body.

Braconnot,† in 1820, by treating isinglass with sulphuric acid, obtained a body of sweet taste, ready solubility in water, difficult solubility in alcohol, capable of uniting with nitric acid, and in this state of combination uniting with alkalis and alkaline earths; to which substance he gave the name of sugar of gelatine, (*sucré de gelatine*.)

Boussingault,‡ to whom we are indebted for the first analysis of this body, gave it the formula $C_{12}H_{21}N_6O_{11}$, which, expressed in equivalents, is $C_{12}H_{14}N_2O_{11}$.

From this body he obtained a crystallizable compound, with the protoxyd of lead, which, upon analysis, yielded the formula $C_{12}H_{14}N_2O_{11} + 3PbO$. Three atoms of protoxyd of lead had taken the place of two atoms of water.

* Published in Liebig and Wöhler's *Annalen*, 1846; and translated for this Journal by the author.

† *Annal. de Chim. et de Phys.*, T. xiii, p. 113.

‡ *L'Institut*, No. 245. *Phar. Centr. Blatt*, No. 50, 1832.

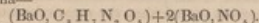
SECOND SERIES, Vol. III, No. 3.—May, 1847. 47

If this be regarded neutral, Boussingault remarks, the body without water would be $C_4H_4NO_2$.

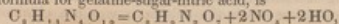
The investigation undertaken at this period (1838) was resumed in 1840, '41,* when, from the same chemist, a new formula, obviously based upon a conscientious trust in the results of analysis, was produced.

Meanwhile, Mulder† had obtained the same body with Leucin, by treating glue with caustic potash. His analysis led him to the formula $C_4H_4N_2O_2$. With protoxyd of lead it lost two atoms of water. Its composition would then have been $C_4H_4N_2O_2 + 2HO$, the two atoms of water being replaceable by two atoms of protoxyd of lead. This formula differs from that of Boussingault, chiefly in that it is about two-thirds as large. In that of Boussingault, an equal loss of water was, however, replaced by three atoms of protoxyd of lead, instead of two.

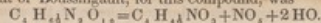
With the gelatine-sugar-nitric acid, (*acide-nitro-saccharique*; *leim-zucker-salpetersaure*.) Mulder obtained a compound with baryta, of unusual constitution, which he expressed by the following formula—



His formula for gelatine-sugar-nitric acid, is

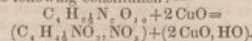


while that of Boussingault, for this compound, was

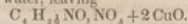


These differ from each other in the relative and absolute quantities of hydrogen and oxygen, and yet not so widely but that the want of correspondence might be attributed to slight impurity of substance.

Boussingault analyzed a compound of this acid with oxyd of copper, of the following constitution:—



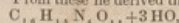
At a temperature of $165^\circ C.$, [$329^\circ F.$] this compound lost 17.71 per cent. of water, leaving



Deducting the two atoms of oxide of copper, there remains a body—



In this condition of the question, as to the constitution of glycocol, the investigation was resumed by Boussingault. He analyzed the body itself, and several most interesting compounds of it with oxyds of copper, lead and silver, nitric acid and nitrates of metallic oxyds. From these he derived the formula

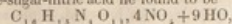


* Ann. de Chim. et de Phys., 3d Ser., T. i, p. 257-270.

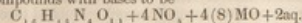
† Nat. en Scheik. archief, 1838, p. 146.

in which the three atoms of water were replaced with four atoms of metallic oxyd.

The gelatine-sugar-nitric acid he found to be



and its compounds with bases to be



This exceedingly complicated formula, and its high atomic weight, together with the fact that the several formulæ for gelatine sugar, enumerated above, though differing absolutely from each other, are nevertheless but slight modifications from once, twice, three and four times the following formula,



led naturally to the conclusion that the differences might be attributed partly to the impurity of the substances analyzed, and partly to the imperfect atomic weights at that time in use.

Beyond the description and analysis of the body itself, and the few salts above enumerated, gelatine sugar had met with no detailed examinations. These considerations gave occasion to the investigation which follows. It is scarcely necessary to add to the statement of its having been conducted at Giessen, that the counsel and coöperation there enjoyed, have united with the recollections of this labor, some of the most grateful memories of a life.

Formula of Glycocol.

Finding it impossible to obtain as large a per-centage of carbon by the combustion of gelatine sugar, either in chromate of lead or oxyd of copper, as had been found by both Mulder and Boussingault, no conclusion remained, but that the analyses they had recorded, and those we had made, were of different bodies. After the analyses of several compounds of this body with hydrochloric, sulphuric and nitric acids, oxyd of copper, nitrate of silver, and bisulphate of potash, the conviction was established that its constitution was



to which in crystallized gelatine sugar, an atom of water is united.*

Upon comparing the per-centages derived from this formula with the results of analysis in Boussingault's last investigation, the differences will be seen to be scarcely greater than frequently occur in a series of the best determinations.

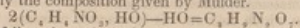
The body analyzed by Boussingault, was dried at $120^\circ C.$, [$248^\circ F.$] That analyzed by us lost nothing in weight at $150^\circ C.$,

* For the anhydrous body, we have adopted the already proposed name Glycocol. The inappropriateness of the name *sugar*, has been noticed by Dessaigne. The attribute of sweetness it shares with AqO , S_2O_2 , oxide of glyceryle and nitrous ether, and beside, it is incapable of fermentation.

We submit the symbol $Gl.$, as least likely to lead to confusion. $G.$ might confound with Glycium, (Glucinum, Beryllium,) and Gly. is already appropriated to Glycerite.

[304° F.] When exposed upon a watch crystal to the heat of a lamp, with a metallic screen between, and at such distance that the escape of vapor is barely discernible, a part of the mass in contact with the glass becomes browned, while another portion melts and shoots into crystals. These continue to form even after other portions have become charred. Rubbed together with finely pulverized hydrate of baryta, it becomes almost instantly fluid, the whole dissolving readily in water, from which, in process of time, crystals containing baryta and glycoll deposit themselves. Here, in the act of combination, the water from one or both the ingredients was given up.

The above circumstances, and others yet to be noted, induced the opinion that at a certain temperature, a lower one longer continued, an atom of water from one half of the hydrated glycoll might be given up, and the remaining half take its place. This would give almost precisely the analytical results of both Mulder and Boussingault, and yield from the formula determined on by us, precisely the composition given by Mulder.



Below, follow the estimated per cent. constitution, according to the above formula, and the average of a series of analyses by Boussingault and Mulder.

	Estimate.	Bous.	Mulder.
8 equiv. Carbon,	34.94	33.79	34.17
9 " Hydrogen,	6.38	6.44	6.49
2 " Nitrogen,	19.85	19.90	19.84
7 " Oxygen,	33.73	39.70	39.50
	100.00	100.00	100.00

The effort to expel this half atom of water was unsuccessful. A temperature of 150° C. [302° F.] produced scarcely a perceptible diminution in weight. At 170° C. [338° F.] it began to brown with the escape of gaseous products of decomposition. At 190° C. [374° F.] though portions had become quite charred, others had merely melted and crystallized anew.

The support which the analyses of Boussingault give to the formula $C_4H_5NO_3, HO$, will justify the following juxtaposition of the estimated per cents. and the actual results.

Glycoll and Oxid of Silver; dried at 110° C. [230° F.]

Boussingault.				Horsford.			
$C_{16}H_{15}N_4O_{11} + 4Ag_2O$				$C_4H_5NO_3 + Ag_2O$			
	Equiv.	Estimate.	Result.		Equiv.	Estimate.	Result.
Carbon,	16 = 96	13.35	13.62	4 = 24	4 = 24	13.15	13.15
Hydrogen,	15 = 15	2.68	2.21	4 = 4	4 = 4	2.19	2.19
Nitrogen,	4 = 56	7.78	8.67	1 = 14	1 = 14	7.69	7.69
Oxygen,	11 = 88	12.96	13.35	3 = 24	3 = 24	13.21	13.21
Ox. silver,	4 = 64	64.53	63.75	1 = 116	1 = 116	63.73	63.73
		719	100.00		182	100.00	

Glycoll and Oxid of Copper; dried at 120° C. [248° F.]

Boussingault.				Horsford.			
$C_{16}H_{15}N_4O_{11} + Cu_2O$				$C_4H_5NO_3 + Cu_2O$			
	Equiv.	Estimate.	Result.		Equiv.	Estimate.	Result.
Carbon,	16 = 96	23.19	23.57	4 = 24	4 = 24	22.65	22.65
Hydrogen,	15 = 15	3.62	3.75	4 = 4	4 = 4	3.77	3.77
Nitrogen,	4 = 56	13.53	13.53	1 = 14	1 = 14	13.24	13.24
Oxygen,	11 = 88	21.29	21.29	3 = 24	3 = 24	22.70	22.70
Ox. copper,	4 = 158.8	39.37	37.69	1 = 39.7	1 = 39.7	37.61	37.61
		413.8	101.00		105.7	100.00	

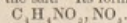
Glycoll and Oxid of Lead; dried at 120° C. [248° F.]

Boussingault.				Horsford.			
$C_{16}H_{15}N_4O_{11} + 4PbO$				$C_4H_5NO_3 + PbO$			
	Equiv.	Estimate.	Result.		Equiv.	Estimate.	Result.
Carbon,	16 = 96	13.67	13.88	4 = 24	4 = 24	13.48	13.48
Hydrogen,	15 = 15	2.12	2.12	4 = 4	4 = 4	2.24	2.24
Nitrogen,	4 = 56	7.97	7.78	1 = 14	1 = 14	7.86	7.86
Oxygen,	11 = 88	12.57	11.62	3 = 24	3 = 24	13.50	13.50
Ox. lead,	4 = 466.8	63.66	64.90	1 = 111.7	1 = 111.7	62.92	62.92
		701.8	100.00		177.7	100.00	

Glycoll and Nitric Acid, dried in vacuo by ordinary temperature.

Boussingault.				Horsford.			
$C_{16}H_{15}N_4O_{11} + 4NO_3 + 9HO$				$C_4H_5NO_3, HO + NO_3, HO$			
	Equiv.	Estimate.	Result.		Equiv.	Estimate.	Result.
Carbon,	16 = 96	17.30	17.32	4 = 24	4 = 24	17.39	17.39
Hydrogen,	24 = 24	4.34	4.53	6 = 6	6 = 6	4.34	4.34
Nitrogen,	8 = 112	29.29	29.23	2 = 28	2 = 28	29.29	29.29
Oxygen,	40 = 320	57.98	57.92	10 = 80	10 = 80	57.98	57.98
		552	100.00		138	100.00	

At 100° C. [212° F.] this salt lost 9.18 per cent., and at 110° C. [230° F.] 4.5 per cent. more, with which it began to brown. This loss, 13.68 per cent., corresponds nearly with 13.77 per cent., the water in the salt. Its formula would then be



Glycoll and Nitrate of Silver.

Boussingault.				Horsford.			
$C_{16}H_{15}N_4O_{11} + 2HO + 4(Ag_2O, NO_3)$				$C_4H_5NO_3 + Ag_2O, NO_3$			
	Equiv.	Estimate.	Result.		Equiv.	Estimate.	Result.
Carbon,	16 = 96	10.67	10.69	4 = 24	4 = 24	10.16	10.16
Hydrogen,	17 = 17	1.78	1.84	4 = 4	4 = 4	1.69	1.69
Nitrogen,	8 = 112	11.75	11.50	2 = 28	2 = 28	11.87	11.87
Oxygen,	33 = 264	27.72	27.87	8 = 64	8 = 64	26.75	26.75
Ox. silver,	4 = 464	48.68	48.70	1 = 116	1 = 116	49.53	49.53
		553	100.00		236	100.00	

Glycoll and Nitrate of Potash.

Boussingault.				Horsford.			
$C_{16}H_{15}N_4O_{11} + 2HO + 4(KO, NO_3)$				$C_4H_5NO_3 + KO, NO_3$			
	Equiv.	Estimate.	Result.		Equiv.	Estimate.	Result.
Carbon,	16 = 96	14.14	14.36	4 = 24	4 = 24	14.35	14.35
Hydrogen,	17 = 17	2.55	2.42	4 = 4	4 = 4	2.39	2.39
Nitrogen,	8 = 112	16.50	16.50	2 = 28	2 = 28	16.78	16.78
Oxygen,	33 = 264	28.86	28.86	8 = 64	8 = 64	28.21	28.21
Potash,	4 = 189.6	27.95	27.49	1 = 49.4	1 = 49.4	28.27	28.27
		678.6	100.00		167.4	100.00	

Glycocoli and Nitrate of Copper.

Boussingault.				Horsford.			
$C_{16}H_{12}N_4O_{11} + 4NO_2 + 8CuO + 9HO.$				$C_4H_4NO_2, HO \left\{ \begin{array}{l} CuO, HO \\ CuO, NO_2 \end{array} \right.$			
	Equiv.	Estimate.	Result.		Equiv.	Estimate.	Result.
Carbon, .	16 = 96	11.02	11.04	4 = 24	11.02		
Hydrogen, .	24 = 24	2.75	2.89	6 = 6	2.75		
Nitrogen, .	8 = 112	12.86	12.08	2 = 28	12.86		
Oxygen, .	40 = 320	36.79	37.45	10 = 80	36.79		
Ox. copper,	8 = 317.6	36.58	36.54	2 = 79.4	36.58		
	269.6	100.00	100.00	217.4	100.00		

If we review the estimates from the two systems of formulae, and the results of analysis recorded above, it will be seen—

1st. That the analyses of the compounds with nitrate of silver, more nearly correspond with the estimates from Boussingault's formula.

2d. That the analyses of the compounds with nitric acid, nitrate of potash and nitrate of copper, are suited equally well to either formula. And

3d. That the analyses of the remaining compounds, viz: with the oxyds of silver, copper and lead, correspond more nearly with the simpler formula.

As additional reasons for adopting the simpler formula, the following, drawn from our investigation, may be recorded.

4th. The analyses give this constitution: as the average of four combustions for carbon and hydrogen, and two for nitrogen, will show, placed side by side with the estimates from the formula $C_4H_4NO_2, HO.$

	Theory.	Experiment.
Carbon,	4 equiv. = 24	32.00
Hydrogen,	5 " = 5	6.67
Nitrogen,	1 " = 14	18.67
Oxygen,	4 " = 56	42.66
	70	100.00

5th. It forms a compound in which sulphuric acid replaces the atom of water: $C_4H_4NO_2, SO_2$

corresponding with Boussingault's nitrate, dried at $110^\circ C.$ [$230^\circ F.$]: $C_4H_4NO_2, NO_2.$

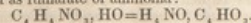
6th. It forms a compound with oxyd of copper, of this formula: $C_4H_4NO_2, CuO, HO,$

which, at $100^\circ C.$, [$212^\circ F.$] loses an atom of water.

7th. It forms a compound in which the atom of water is replaced by an atom of nitrate of silver: $C_4H_4NO_2, AgO, NO_2.$

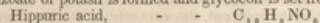
8th. It forms, when long digested with sulphuric acid, a salt of this constitution: $C_4H_4NO_2, SO_2, HO \left\{ \begin{array}{l} H_4NO_2, SO_2, HO. \end{array} \right.$

The ammonia is taken from the hydrated glycocoli, which may be considered as fumarate of ammonia:



9th. It decomposes when subjected to the action of the galvanic battery; an acid (fumaric?) and oxygen appearing at one pole, and an alkali (ammonia) and hydrogen appearing at the other.

10th. It may be derived from hippuric acid by treatment with a mineral acid, in which case a neutral salt of glycocoli is formed and benzoic acid set free; or by treatment with potash, in which case benzoate of potash is formed and glycocoli is set free.



We may add also that the formulae of Boussingault and Mulder have not the advantage of so great simplicity.

Preparation of Glycocoli.

The recent brilliant discovery of Dessaigne,* that by boiling hippuric acid with sulphuric, hydrochloric or any of the stronger acids, this body separates into benzoic acid and a salt of glycocoli, rendered the preparation of the latter, in purity, a task of no difficulty. It was, of course, necessary first of all to obtain a quantity of hippuric acid.

This acid was prepared according to the method proposed by Dr. Bensch,† by evaporating in a water bath, the morning urine of stall-fed horses, to from one-eighth to one-tenth of its volume; adding hydrochloric acid till all effervescence ceased; setting aside, in a cool place, for the perfect separation of the hippuric acid; filtering through linen, and pressing; dissolving in freshly prepared solution of hydrate of lime, with addition of boiling water; filtering, as before, and pressing; heating the filtrate to boiling, acidifying with solution of alum, cooling to $40^\circ C.$ [$104^\circ F.$], adding solution of bicarbonate of soda till no farther precipitation takes place; filtering and pressing; and precipitation of the filtrate with hydrochloric acid. After washing, filtering and pressing the precipitate of hippuric acid, it was again dissolved in boiling water, and blood coal added in the proportion of half an ounce to a pound of moist acid, again filtered at boiling heat through paper, and set aside to crystallize. By this method prismatic crystals are obtained of the most perfect whiteness, an inch in length, and from one to two lines in diameter.

* Compt. Rend., xxi, p. 1224-1227. Liebigs Annalen, Bd., lviii, S. 322.
† Liebigs Annalen, Bd., lviii, S. 307.

From three to four ounces of hippuric acid were digested in a flask of one litre* capacity, over a spirit lamp, in four times their weight of concentrated hydrochloric acid, until entirely dissolved. A larger quantity is less manageable, and the subsequent treatment less expeditious. It is well to continue a gentle heat, with the addition of water half an hour after the solution is completed. In this time a part of the benzoic acid gathers into oily drops and sinks to the bottom, becoming, as the whole cools, a solid crystalline mass, not easily removed from the flask. The presence of water retains the hydrochlorate of glycocoll in solution. After the whole mass has become cool, the benzoic acid having for the most part crystallized out, the contents of the flask are poured upon the filter and washed till the filtrate no longer tastes sour. The filtrate is then evaporated in an open porcelain basin over a water bath, nearly to dryness,—by which process the excess of hydrochloric acid and benzoic acid are, for the most part, removed. Redissolving and again evaporating two or three times repeated, at length give the hydrochlorate of glycocoll quite pure. Ammonia is then added to the syrup till it yields an alkaline reaction. Absolute alcohol being then added, the remaining traces of benzoic acid and the salammoniac are dissolved, while the glycocoll is thrown down in the form of a white precipitate, consisting of myriads of minute prismatic crystals. As the body is slightly soluble in alcohol, and more so in alcohol containing salammoniac, it is well to let the fluid stand a few hours. The precipitate is then brought upon a filter and washed with absolute alcohol, till the filtrate no longer gives a precipitate with nitrate of silver.

Properties of Glycocoll.

Thus obtained, hydrate of glycocoll tastes sweet, though less so than cane sugar,—has neither acid nor alkaline reaction; dissolves in from 4.24 to 4.35 parts of water; is more soluble in hot than in cold spirits of wine; is quite insoluble in ether, and scarcely less in absolute alcohol.

When heated with a concentrated solution of caustic potash, in excess, it assumes, with the evolution of ammonia, a fine brilliant red color. If the heat be continued, the color gradually disappears.

Heated with hydrate of baryta or oxyd of lead, the same brilliant color is produced.

With sulphate of copper, a trace of glycocoll prevents the precipitation by potash, and the solution assumes a characteristic blue color. Boiled with oxyd of copper or its hydrate, it yields the same blue solution, which, if concentrated, crystallizes in fine needles.

* = 0.2201 English gallon.

With nitrate of suboxyd of mercury, it gives a precipitate of metallic mercury.

From a concentrated solution in diluted spirits of wine or in water, in process of time large prismatic crystals are formed, which apparently belong to the monoclinic system, of the combination $\alpha P. OP. + P. \alpha P \alpha$. Prof. Kopp, to whom I am indebted for an examination of these crystals and of several others of salts of glycocoll, obtained from crystals prepared by Prof. v. Liebig, an admeasurement of the sharper angles of αP , (through which the orthodiagonal passes,) giving $66\frac{1}{2}^\circ$.

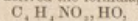
The combustions for carbon and hydrogen were made with chromate of lead; those for nitrogen, according to the method of Varrentrapp and Will,—

- I. 0.6770 grm. gave 0.7940 carbonic acid and 0.4170 water.
- II. 0.5576 " " 0.6607 " " " 0.3474 "
- III. 0.4670 " " 0.5455 " " " 0.2882 "
- IV. 0.4003 " " 0.4686 " " " 0.2478 "
- V. 0.1338 " " 0.4100 platin-salammoniac.
- VI. 0.1937 " " 0.5646 " "

These determinations correspond in per cent. with

	I.	II.	III.	IV.	V.	VI.
Carbon,	31.89	32.31	31.81	31.92	.	.
Hydrogen,	6.84	6.92	6.85	6.87	.	.
Nitrogen,	.	.	.	.	19.24	18.36

From these may be derived the formula,



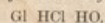
as will be seen by comparing the estimated and average actual per cents. of the several elements.

		Theory.	Experiment.
Carbon,	4 equiv. = 24	32.00	31.98
Hydrogen,	5 " = 5	6.46	6.87
Nitrogen,	1 " = 14	18.66	18.79
Oxygen,	4 " = 32	49.68	49.35
	75	100.00	100.00

The atomic weight of glycocoll is, with the above constitution, 66.

GLYCOCOLL AND HYDROCHLORIC ACID.

Neutral Hydrochlorate of Glycocoll.



This is the product of boiling hippuric acid with concentrated hydrochloric acid, as already described. If the filtrate, page 376, be carefully evaporated to syrup consistence, and suffered quietly to cool, the whole mass becomes filled with groups of long, flat prisms, perfectly transparent, and of the greatest brilliancy. The mother liquor poured off, and the crystals washed with spirits of wine, gives the salt in the utmost purity. A second and third

portion of crystals may be obtained by concentrating the mother liquor and similar treatment.

This salt slowly absorbs moisture from the air and deliquesces: over sulphuric acid, the crystals retain their form and constitution any length of time. It tastes sour, and slightly but positively stiptic; reacts acid: dissolves readily in water; in hot spirits of wine, and slightly in absolute alcohol.

The substance dried over sulphuric acid, on combustion with chromate of lead,

- I. 0.2368 grm. gave 0.1833 carbonic acid and 0.1272 water.
 II. 0.3218 " " 0.2555 " " 0.1711 "
 III. 0.2853 " " 0.5698 platin-salammoniac.
 IV. 1.5920 " " 2.0562 chlorid of silver.
 V. 1.0008 " " 1.2961 " "
 VI. 1.5300 " " 1.9300 " "

Expressed in per cents., the above determination correspond with

	I.	II.	III.	IV.	V.	VI.
Carbon,	21.11	21.28	.	.	.	.
Hydrogen,	5.96	5.95	.	.	.	.
Nitrogen,	.	.	12.57	.	.	.
Chlorine,	.	.	.	31.91	31.99	31.99

With these numbers, the following formula is in accordance:

$C_2H_4NO_3, HCl, HO,$
 as the annexed comparison will show.

		Theory.	Experiment.
Carbon,	4 equiv. = 34	21.42	21.29
Hydrogen,	6 " = 6	5.35	5.95
Nitrogen,	1 " = 14	12.56	12.57
Oxygen,	4 " = 32	28.53	28.40
Chlorine,	1 " = 35.4	32.14	31.94
		111.4	100.00

Basic Hydrochlorate of Glycocol.

(a.) $2Gl, HCl, HO,$

This salt is formed by adding hydrochloric acid to a cold concentrated solution of glycocol in water, and then pouring in alcohol till the solution becomes slightly turbid. Crystals of the utmost transparency and regularity commence forming immediately. To continue the crystallization, alcohol is added drop by drop, at intervals. It is perhaps better to let the solution in water slowly evaporate over sulphuric acid. In this way larger crystals, of surpassing beauty, were obtained. They are rhombic prisms of 87° and 93° . They do not deliquesce like those of the neutral salt, upon exposure to the air. The salt has a pleasant sour, and at the same time sweet taste, reminding one of fine fresh pippins.

The solution reddens litmus with chromate of lead.

- I. 0.3505 grm. gave 0.3550 carbonic acid and 0.1743 water.
 II. 0.2758 " " 0.6729 platin-salammoniac.
 III. 1.5050 " " 1.1940 chlorid of silver.

These determinations expressed in per cents.:

	I.	II.	III.
Carbon,	27.59	.	.
Hydrogen,	5.52	.	.
Nitrogen,	.	15.37	.
Chlorine,	.	.	19.58

Correspond with the formula

$C_2H_4NO_3, HCl + C_2H_4NO_3, HO,$
 which, calculated, gives:

		Theory.	Experiment.
Carbon,	8 equiv. = 48	27.65	27.59
Hydrogen,	10 " = 10	5.63	5.52
Nitrogen,	2 " = 28	15.78	15.37
Oxygen,	7 " = 56	31.59	31.94
Chlorine,	1 " = 35.4	19.95	19.58
		177.4	100.00

Basic Hydrochlorate of Glycocol.

(b.) $2(Gl, HO) + HCl,$

This salt was obtained by dissolving glycocol in hydrochloric acid and leaving the solution to a quiet crystallization. The exact proportions of acid and base necessary to procuring it have not been determined. Indeed, it will appear obvious, after the accounts of the hydrochloric and sulphuric acid compounds, that the task of accurately fixing the temperature, concentration and quantity of the several ingredients necessary to the formation of a given compound of acid, glycocol and water, will be exceedingly difficult.

Combustion with chromate of lead gave the following results:

- I. 1.0290 grm. gave 0.9840 carbonic acid and 0.5580 water.
 II. 1.0890 " " 0.8180 chlorid of silver.
 III. 0.9760 " " 0.7305 " "
 IV. 0.9710 " " 0.7290 " "

	I.	II.	III.	IV.
Carbon,	26.08	.	.	.
Hydrogen,	6.02	.	.	.
Chlorine,	.	18.53	18.46	18.41

These numbers conduct to the formula,

$2(C_2H_4NO_3, HO) + HCl,$

the estimated per cents. of which with the results of analysis are here placed side by side.

		Theory.	Experiment.
Carbon,	8 equiv. = 48	36.46	35.08
Hydrogen,	11 " = 11	6.06	6.02
Nitrogen,	2 " = 28	15.43	.
Oxygen,	8 " = 64	33.12	.
Chlorine,	1 " = 35.4	18.91	18.47
		120.4	100.00

The rational constitution of this salt may be considered as one atom of hydrated glycocol, united to one atom of hydrochlorate of hydrated glycocol, thus, $\text{Gl, HO} + \text{Gl, HCl, HO}$.

Basic Hydrochlorate of Glycocol.

(c.) $3\text{Gl, } 2\text{HCl, } 2\text{HO}$.

This salt was prepared in the same manner as the last; a simple solution of glycocol in hydrochloric acid, set aside to crystallize. The acid was, however, in excess.

It was also prepared by passing dry hydrochloric acid gas over melted hydrate of glycocol. For this purpose, a gramme and a half of substance was distributed along the bottom of a Liebig's drying apparatus, and carefully heated with a spirit lamp; at the same time conducting over it hydrochloric acid gas. At a temperature of between 150°C . and 170°C . [between 302°F . and 338°F .] as determined in an oil bath, the glycocol melts in the acid atmosphere. It was found better, however, to employ the spirit lamp. With the latter the apparatus could be readily inclined or half inverted, to spread the molten substance over the interior of the tube, and thus facilitate absorption.

The absorption is attended with the escape of aqueous vapor. The process was continued until no further increase in weight was observed. At each interval the hydrochloric acid was thoroughly removed by long continued passing of dry air through the tube before weighing. At the end of the absorption, the glycocol usually became slightly green, owing doubtless to a trace of decomposition and separation of carbon.

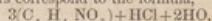
From an analysis of crystals obtained by the first method,

I. 1.2550 grm. of substance, gave 1.2520 grm. chlorid of silver.

By the other method,

II. 1.9727 grm. of hydrated glycocol, increased in weight to 2.4580 grm. Precipitated with silver, this gave 2.3855 grm. chlorid of silver. The increase in weight was 24.60 per cent. The per centages of chlorine, I. 24.59; II. 24.23.

These numbers correspond to the formula,



which requires 24.51 per cent. of chlorine.

Basic Hydrochlorate of Glycocol.

(d.) $3\text{Gl, } 2\text{HCl, HO}$.

This salt is prepared precisely as the last mentioned, both by crystallization from the acid solution and by leading dry hydrochloric acid gas over fused hydrate of glycocol.

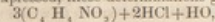
The notice of this salt would scarcely have been ventured upon, had not a precisely corresponding compound with sulphuric acid been analyzed. It will contribute to show how multifarious may be the relations of a body, that combines as a salt, and yet possesses both acid and basic properties.

From crystals of the salt prepared as above mentioned,

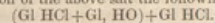
I. 1.2864 grm. gave 1.3203 grm. chlorid of silver.

II. By leading dry hydrochloric acid gas over glycocol in the manner already described, a compound was formed, of which, 1.1370 grm. gave 1.1845 grm. chlorid silver.

In per cent. expressed, these determinations give,

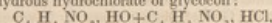


which requires 25.30 per cent. of chlorine. As the probable rational constitution of the above salt the following is submitted,



Anhydrous Hydrochlorate of Glycocol.

Having found a basic hydrochlorate, which might be regarded as a double salt of one atom of hydrate of glycocol, with one atom of anhydrous hydrochlorate of glycocol:



and especially having found as will be seen below, an anhydrous sulphate of glycocol, it was natural to suppose that the anhydrous hydrochlorate might be obtained by itself, viz. $\text{C, H, NO}_3, \text{HCl}$.

To this end absolute alcohol was saturated with hydrochloric acid gas, and this added to a solution of glycocol in hot spirits of wine. Upon evaporating the liquid, delicate prismatic crystals appeared which deliquesced with the greatest rapidity. They even dissolved in absolute alcohol. This latter circumstance led to the supposition that the crystals might have been a double salt of hydrate of glycocol with hydrochlorate of oxide of ethyle. This supposition was further strengthened from an analysis of a sulphate of corresponding constitution soon to be noticed.

(To be continued.)

ART. XXXIX.—*Origin of the Grand Outline Features of the Earth*; by JAMES D. DANA.

THE traveller who follows along the indented shores of a continent, or, traversing the ocean, touches here and there at an island, is likely to become strongly impressed with the common idea that the land has every where the utmost irregularity of form, and that islands are "scattered dots" over the wide seas. Such must be the conclusion of any one who should judge from his own casual observations. Were there a system in the world's physiognomy, it could not become apparent till explorations had traced accurately the varying outlines and elevations of continents, and the positions of islands. A good map or globe is a register of the thousand observations of voyagers and surveyors upon these points. It is a miniature of the world within the grasp of

our view, and may be properly appealed to with reference to the earth's features. The evidence has not been overlooked by the philosophers of the day, and is more or less fully discussed by Humboldt, Malte Brun, L. A. Necker, Elie de Beaumont, Boué, and other geographers and geologists. Yet it has failed of fixing general attention. It is proposed to pass briefly in review the principal facts, and consider the causes to which the existing features of the earth are attributable.

The remarks which follow will be hardly intelligible to the reader without a globe before him, or a Mercator's chart of the world: and the latter, though the best kind of map for the purpose, is somewhat erroneous in consequence of the parallelism of the meridians.

Trends of Coasts and other Features of Continents.—1. On the continent of America, the reader will observe the nearly straight coast line from the Gulf of Mexico along by Newfoundland and Greenland, a distance of 5000 miles; the near parallelism of this line with the southeast coast of South America, 4000 miles in length; also with the line of Lakes Ontario and Erie, and the river St. Lawrence; also with the coast on the northwest of Hudson's Bay, and that by Prince Regent's inlet. These parallelisms are too striking not to be at once obvious. They are instances of a *northeast* and *southwest* trend; and the distance between these great parallel lines are respectively about 3000 miles, 250 miles, 1400, and 380 miles.

Again: look at the west coast of the same continent, from Darien to Russian America, and laying down a rule, mark the near parallelism of the course with the line of great lakes, from Erie through Michigan, Superior, Winnipeg, Slave and Bear, to the coast by the mouth of the Mackenzie; also with the southwest side of Hudson Bay; with the coast on the west of Davis Strait and Baffin Bay, and that also on the east. Here the uniformity is even more remarkable. These are instances of a *northwest* and *southeast* trend. To one of the two lines correspond the greater part of all the grand features of the continent. The apparent exceptions will be hereafter considered. The distances separating these *northwest* lines average respectively 1000 miles, 350, 700, and 400 miles.

2. Compare the sides of the Atlantic Ocean. The southeast coast of South America, from Magellan to St. Roque, is almost an exact continuation of the western line of the opposite continent, by western Africa, Spain, and Norway or the Baltic; and the break in the line made by the Atlantic, is partly filled by the islands Fernando Noronha, St. Paul and the Cape Verdes. It will be shown hereafter that the northeast coast of South America belongs to the northwest system of trends, and extends by Guatemala and California northward; and if we cross the ocean,

we find the Cape Palmas coast of Africa, or rather the Kong mountains adjoining, and the Pyrenees between Spain and France, having the same trend as the northeast of South America.

3. In the eastern continent, the western coast of Europe and eastern of Africa have a striking parallelism, in which the north coast of Asia, from the Obo Gulf to the northeast cape, partakes; and so also the east coast of Asia, the east coast of Hindostan, and also the island of Madagascar. These are *northeast* trends. Again, we observe that the Red Sea, Adriatic and British isles, the Persian Gulf, Western Hindostan, and the coast from Calcutta by Malacca, are nearly parallel lines, having the *northwest* trend. Whatever may be said of the exceptions and irregularities, there are evidently too many coincidences to be set aside as mere accident; and the two courses have accordingly been considered by Humboldt, the great geographical lines of the globe.

We might pursue the same course with the mountains. But the general parallelism of the chains with the coast lines, is so obvious that we barely allude to them in this brief outline of the subject under discussion. The fact is plainly true with respect to the great chains of America: and some particulars, soon to be stated, will bring into one system what appears irregular in Europe and Asia. We observe only that Tchihatchef, a Russian traveller, has pointed out the conformity of the main range of the Altai to the course of the east coast of Africa and the island of Madagascar, while there is also a northeast range in the same chain, parallel with the Persian Gulf and Red Sea: the highest point of the Altai mountains occurs at the intersection of the two ranges.*

Trends of Groups of Islands.—We proceed to a few remarks on the islands of the ocean; and they are the more satisfactory, as islands are the culminant peaks of submerged mountain chains, and therefore mark correctly the proper outline features of the earth's surface. The fact that the islands range in lines was long since pointed out; and Malte Brun remarks on the regularity of these lines in the Pacific Ocean. Compare the line in which lie New Ireland, the Salomon group and the New Hebrides, with the Sandwich or Hawaiian range, extending to the northwest through a number of small islets 2000 miles, from longitude 155° W., beyond 180°. Though 3500 miles apart, the lines are nearly parallel; and parallel also with New Caledonia, and with northeast New Holland, on one side, and nearly also with the coast of California and Guatemala on the other; and moreover, these lines are

* Comptes Rendus, May 12, 1845. Tchihatchef observes that the occidental chain runs s. w. and s. e., and the other or oriental, s. e. and s. w. He mentions that a similar system exists in the Alps; but as the identity of direction is not exact, he considers the two systems different.

parallel with the several intermediate chains of islands, as is apparent on the largest charts: the details which are highly interesting will be given by the writer in his Geological Report on the Pacific. Here, then, is an approximate parallelism in ranges over more than a quarter of the circumference of the globe; and nearly all correspond to the *northwest* trend. New Zealand and the Tonga group, and the Ladrões, are examples of the transverse or *north-easterly* trend. The latter trend, (approaching *s. s. e.*), characterizes a part of New Holland, the Australian Alps of the southeast, and as observed by Fitton,* the west coast of the Gulf of Carpentaria and the islands off its north cape; besides, also, the north-west coast: the inlets of the coast correspond almost uniformly to one of the two courses pointed out. The Galapagos illustrate distinctly both trends, and they are so mentioned without alluding to any general law, by Darwin.† Beyond the American continent, in the Atlantic, we find the Azores closely parallel with the Hawaiian line; and the same is illustrated in the Canaries, according to the position of the islands given by von Buch,‡ and also in the Cape Verdes. These lines are also parallel with north-east South America, and the Pyrenees. Thus, not only over one ocean, but over both, the same system prevails, and alike also over the intermediate continents, the one corroborating the other. The system in truth belongs to the world. To this conclusion Humboldt, Necker, Boué, and other geologists appear to have arrived.

But if we survey the facts more minutely, may we not find that an element in this branch of physical geography has not been properly apprehended? Do not the exceptions throw in a vexatious doubt, if they cannot be blended with the theory? We propose, then, to pursue the subject still farther; and we believe that instead of proving that there are as many distinct systems in orography as there are mountain courses,§ it will

* Sketch of the Geology of Australia, Phil. Mag., 1836, lxviii, 18, 132. The regular lines of islands were observed by Flinders, as remarked by Fitton, (*ibid.*, p. 132.). See Flinders's Voyage, ii, 246.

† Volcanic Islands, p. 115. "Three great craters on Albemarle island, form a well marked line, extending *s. w.* by *s.* and *s. e.* by *s.*; Northborough island and the great crater on the rectangular projection of Albemarle island, form a second parallel line. To the east, Hood's island and the islands and rocks between it and James' island, form another nearly parallel line; which, when prolonged, includes Culpepper and Wrenn islands, lying seventy miles to the north. The other islands, lying further eastward, form a less regular fourth line. Several of these islands and the vents on Albemarle island, are so placed that they likewise fall on a set of rudely parallel lines, intersecting the former lines at right angles; so that the principal craters appear to lie on the points where two sets of fissures cross each other."

‡ Les Îles Canaries, 369. The craters of Gran Canary, Tenerife and Palma, are in a northwest line, while a transverse trend is distinct in the several islands.

§ Essentially the theory of Elie de Beaumont, in which view he is supported by many distinguished names in geology.

appear more in accordance with facts, to refer even wide deviations of directions to one and the same system.

General character of the lines of Mountains, Coasts, and Islands.—A careful study of the courses of island groups, coasts and mountain chains, leads us to the following important results:—

I. The ranges are made up of shorter consecutive and sometimes parallel lines, instead of being uninterrupted for long distances.

II. The ranges are more commonly curved, than straight or coincident with the course of a great circle.

III. The straight ranges are generally straight in the constituent lines, but may consist of a series of curves.

IV. Curved ranges may arise from a general curvature in the whole; but often proceed from the positions of the several consecutive parts.

V. The same range, owing to the mode of curving, may vary greatly in its course, in different portions.

In these points we are stating merely the facts or results of observation, free from speculation. The following figures may serve to illustrate the positions stated.

In figure 1, the entire range is straight, as well as the parts.

In figures 2, 3, and 4, the parts are straight and overlap, and thus form a range which is sometimes straight as a whole, but is more frequently curved. The direction of the whole range, as shown by the dotted line, differs from the direction of the subordinate lines.

Figures 3 and 7 represent a common condition in which there are parallel lines in some parts of a range.

In figure 5, the parts are curved; and here, too, the resulting range may be straight or curved.

Fig. 6 represents a range made up of longitudinal parts along with some transverse; this is of common occurrence (figure 7.)

The more thorough examination of the trends of groups of islands and of mountain chains, the more distinctly will this system of things be apparent; and instead of straight lines, or parts of great circles, it will be found that the predominant courses in the earth's features are curves. All these points might be abundantly illustrated by the groups of the Pacific islands; but we omit the details, as the subject will be fully presented in the Report, by the writer, on the Geology of the Ocean. Suffice it to say, that in the Hawaiian range these principles are distinctly

represented; so also in the Samoan group, the Kingsmills, the Ladrões, and others.

The citation from Mr. Darwin, in the note to p. 384, exhibits both parallel and transverse lines in the Galapagos; and in the Canaries there are similar facts. The position of the Azores here given, well illustrates the subject. The main parallel lines are too obvious to require particular remark, and the transverse are also apparent.

A system of curves, on a grand scale, is seen along the east of Asia, resembling figure 5. The reader, to appreciate the facts, should refer to his map, and the best and largest within reach.

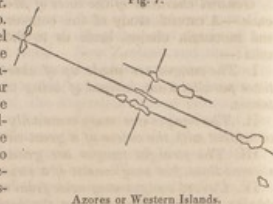
The *first* of these curves extends from Kamschatka south by the Kuriles to Yezo, and is 1500 miles long; a *second*, from Yezo, or the island Sanghalian just north, along Nippon to its southwest extremity, 900 miles long; a *third*, from the southwest extremity of Nippon, through Kiusiu and other islands, to Looschoo and Formosa, about 900 miles long; a *fourth*, from Formosa, by Luzon, Palawan and the western coast of Borneo, 2000 miles long. These curves are singularly alike in form and relative position.

These coincidences are facts: accidental, that is, without a cause, no one will pretend. The Alaschka Archipelago, at the north, seems like a part of the same system; it forms a regular curve, 1600 miles long, between Kamschatka and Russian America.

Another corresponding system is apparent in the west coast of Asia, though less regular, as its outline is varied by differences in the extent of the plains and slopes of the land. But we cannot fail to observe the curving lines from Okhotsk south to Pekin; from Pekin to Tongquin; and perhaps also from Tongquin to Malacca. The mountain ranges of the eastern side of the continent also correspond, as laid down on the best charts. The Stanovoi and the Khingan mountains form three great curves of similar character, convex in the same direction; and the Altai range, farther in the interior, is parallel with the last.

When the particular islands in the curved lines south of Kamschatka, are laid down with minute accuracy, there is reason to believe that each of the curves pointed out, will be found to be not a simple curve line throughout, but a compound one, having some degree of resemblance either to figure 2, 3, 4, 5 or 6.

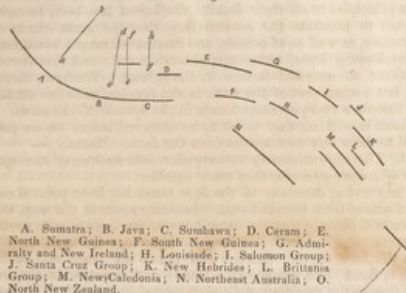
Fig. 7.



Azores or Western Islands.

On a large recent map of the Pacific and East Indies, the range of the New Hebrides (K, fig. 8) and the nearly parallel New Caledonia, (M,) is observed to be continued in the Salomon islands, New Ireland and Louisiade group, (I, G, H,) as before stated; but the range, we remark farther, is becoming to the westward, gradually more east and west in direction, changing from N. 40° W. to N. 65° W. The range does not stop here: it is continued

Fig. 8.



A. Sumatra; B. Java; C. Sumbawa; D. Ceram; E. North New Guinea; F. South New Guinea; G. Admiralty and New Ireland; H. Louisiade; I. Salomon Group; J. Santa Cruz Group; K. New Hebrides; L. Britannia Group; M. New Caledonia; N. Northeast Australia; O. North New Zealand.

in New Guinea, (E, F,) falling off still more towards an east and west course; and the southern division of it, at least, is continued farther through Flores, Sumbawa, and Java, (C, B,) and from the last island trends northward through Sumatra (A) and the Andaman Islands. This is an example of a long curving range; and we may properly connect with it, northern New Zealand, northeastern New Holland, and the islands between this coast and New Caledonia. Viewing the broad band, we observe the whole conforming to one system; and the separate parts, if analyzed on a good map, confirm each the same principles.

Malte Brun mentions the great range of the central Pacific from the Marshal Islands by the Samoan to the Austral Islands south of Tahiti, which is full 5000 miles long. Leaving the particulars for another place, we observe only that this great range curves north as it goes westward, varying from N. 66° W. to N. 35° W.

It is also true of mountain ranges that they have this compound character, though they have seldom been surveyed with sufficient care to allow of deriving much accurate knowledge of them from maps or descriptions.

In the valuable work on New South Wales, by Strzelecki, this intelligent and laborious traveller mentions and figures the succes-

sive curves, convex westward, which characterize the mountains of Eastern Australia, and without reference to any hypothesis, or to such a system of things elsewhere. Profs. Rogers in their elaborate papers on the Appalachians, mention that these mountains, in their course from Maine to Georgia, are made up of a series of great curves, which they describe separately and with detail. We shall allude, on a following page, to Dr. Percival's interesting observations on the trap ridges of New England, which sustain the same principles in all their detail. Sufficient has been brought forward to illustrate the general fact, that the great chains of mountains, as well as of islands, are interrupted ranges, consisting of overlapping lines, either straight or curved; and that curves constitute an essential feature in the system. We have, therefore, but a small part of the truth in the conclusion before stated, that there are two prevalent trends in the system of the earth.

There is still another point to be observed before we are prepared to draw any conclusions from the facts. Namely:—

VI. *The approximately rectangular intersections of two systems of trends wherever they occur together.*

The curving direction of the Java range has been pointed out in its course from Sumatra east. Looking again at the map, the reader will observe that the coast lines of the large islands north, are approximately north and south in direction; but vary exactly with the Java curve. Celebes and Gilolo are north and south (*ef, gh, fig. 8*) like western Mindanao; and correspondingly, the Java line in the meridian of Celebes, is east and west. The east coast of Borneo varies a little to the east of north, and a line drawn along it (*cd, fig. 8*) would meet the Java range at right angles, or where this range inclines about as many degrees to the north of west. The west side of Borneo varies forty degrees to the east of north, (*ab, fig. 8*), and at the same time the Java range, where the line of this side continued would meet it, has a like variation to the north of west, not differing even a degree, thus making the intersection rectangular. Hence it would seem that the shape of Borneo was connected in origin with the trend of the Java range; and not only this, the whole surface covered by the islands from Luzon to the Java range, has nearly the same shape as Borneo.

The successive curves on the east coast of Asia, are nearly at right angles with one another at their extremities. Thus Nippon stands nearly at right angles with the south extremity of the Kurile range; so Kiusiu, with the same extremity of the Japan range; and also Formosa with that of the Loochoo range.

In New Zealand, the two systems, as shown by the outline of the group, are nearly at right angles. The Tonga range is nearly at right angles with the Samoa or Navigators. Passing by other facts in the central Pacific, the Galapagos present the same rect-

angularity of the two systems. The line of active vents in Mexico and that of the great chain are at right angles, as stated by Humboldt, and the former is parallel with Cuba. The Canaries present the same facts as the Galapagos.

We often find parts of a chain at right angles with the rest, as illustrated in figure 6. In the chain of lakes from Lake Erie to Bear, which has the *northeast* course, several of the lakes themselves are oblong *across* this course. This is the case with the parts of Bear lake, with Slave lake, Athabasca, and the northwest shore of Superior; and the whole line is at right angles with the line of the St. Lawrence, Ontario, and Erie. Indeed such facts are closely connected with those first stated with regard to the relation of the two prevalent trends of the globe, the northeast and northwest, and have long been recognised.

We have not alluded to a highly important branch of the subject:—the direction of cleavage joints in rocks. It has often been observed that there is a general correspondence between them and the direction of the mountain ranges of a region. Necker has presented a great variety of facts on this subject, showing the prevalence of northeast and northwest lines in Europe and elsewhere.* Professor Sedgwick, in 1831, stated the law of parallelism.† De la Beche mentions the same in Devon and some other parts of England, where north-northwest and a transverse direction are the common courses.‡ Phillips observes that in Yorkshire, fifty-five out of eighty-nine of the cleavage joints observed by him, were between northwest and north, and twenty-eight were at right angles with these; only six were anomalous. The same facts have been remarked by other English geologists. Fitton has presented similar facts from Australia.§ Mr. Darwin in his work on South America, gives various facts showing that the principle holds west of the Andes, that the cleavage joints are in general parallel to the mountain range. It is also true of the United States, east of the Appalachians. We observe therefore that the question with regard to the cause of this structure is intimately connected with that of the origin of mountains.

This survey of the geological features of our globe leads to several important conclusions.

A. *That the earth has a strongly marked physiognomy, or a system in its grand outlines.*

B. *That throughout this system, northwest and northeast lines are every where prevalent.*

C. *That these strongly drawn lines are usually curved instead of conforming to the direction of a great circle; and*

* Bibliothèque Univ., de Genève, xliii, 166. 1830.

† Trans. Geol. Soc., London, ii ser., iii, 68.

‡ Geol. Rep. on Cornwall, Devon, and W. Somerset, Ser. London, 1832.

§ Sketch of the Geology of Australia, Phil. Mag., lxxviii, 135.

whether curved or straight, consist of a series of subordinate parts; these parts having often a different direction from the line of the range.

D. That the lines, even when curving, cross or meet any transverse lines very nearly or quite at a right angle, the one dependent on the other or varying with it. Consequently—

E. That the same grand chain may vary even sixty degrees or more in its course, and hence the trend of a ridge is no independent evidence of its age. Thus a northwest course may gradually change to an east and west, as in the great Java range from New Hebrides to Java, and thence become northwest again, as in Sumatra;—a west-northwest range may change to north-northwest, as in the great Pacific chain from the Society Islands to the northernmost of the Marshall group. A north-northeast range may change through northeast, to east and west; and also a north and south range may go through the same changes, as shown along the east coast of Asia and elsewhere.* Just west of New Guinea the east and west line is a little north of east in Timor. Consequently, while northeast and northwest lines are on the whole most common, there are other courses to be considered, and all are so dependent that they evidently must have a common explanation.

Causes of the Earth's Features.

The direction of mountain chains is universally attributed to the courses of former fissures in the earth's surface; and as islands come under the same head, and coast lines are mostly dependent on the ranges of heights adjoining, the question before us is reduced to this:—What can have occasioned such ranges of fissures, with their several peculiarities; their composite character, general uniformity of direction, curves, irregularities, and usual rectangular intersections?

Peculiarities of Fissures.—Before proceeding farther, it is important to understand the general character of fissures; and we present a case to the point from the map accompanying the elaborate Report of Dr. J. G. Percival on the Geology of Connecticut;—a work of vast labor, and of minute and cautious research, by one of the ablest men of America. Dr. Percival has afforded us a key to this subject, of the highest value, by the results of his investigations among the trap dikes of New England. The chart annexed is a small section of the map near its centre, showing the positions of the dikes or trap ridges. They commence twelve miles south of the dikes here given, in the vicinity of New Haven bay, and extend northward into Massachusetts, and beyond into New Hampshire.

* The same principle is recognized by the Professors Rogers, in view of the facts observed by them in the Appalachians. *Trans. Assoc. Amer. Geol.*, 1840-42, p. 540.
† Report, &c., by James G. Percival, 455 pp. 8vo., New Haven, 1842.

Fig. 9.



The dikes (courses of fissures) have the following characteristics:—

1. A general uniformity of direction.
2. A situation in several parallel ranges.
3. An interrupted character, and a frequent advancing or receding in the successive parts of a line, or an overlapping of the extremities, as in figures 1, 2, 4, 5, constituting what Dr. Percival has well designated "advancing," "receding" or "continued" series.
4. Curved lines; some simple, others composed of several straight lines, and others of subordinate curves.
5. Various irregularities in the lines, and deviations from parallelisms, although belonging to the same general system.

These peculiarities, as laid down and described by Dr. Percival, are confirmed by the writer's observations on dikes elsewhere and by fissures in volcanic regions.

We have in the above, an example on a comparatively small scale, of the general characters of fissures; and we find that it is an almost exact representation of the facts presented by the prominent features of the earth. The coincidences confirm the view that the ranges of mountains and islands correspond to ranges of fissures, and also illustrate their subordinate peculiarities.

The formation of many associated fissures, instead of a single rent, is the natural result from the general character of the material ruptured, and the manner in which the force must act.

Causes of the general uniformity, and composite character of ranges.—The most important point with relation to the ranges, is their general uniformity over the globe. These great systems of parallelisms must have arisen from the ruptures taking place in certain directions rather than in others, and the cause lies either in the forces causing ruptures solely, or in them in connection with the nature or structure of the earth's crust: and if the latter, the structure must be coextensive with the world, as the facts have no narrower limits. The

Fig. 10.

annexed figure illustrates as we have stated a common character of ranges. To produce such a result must there not be two distinct causes, a force to rupture, and a structure to determine the direction of the lines? Were there no structure, the force should have produced a fissure in the general direction of the dotted line A B. But instead of this effect it produced a series of parallel lines oblique with this course. We can conceive of such a systematic result only on the ground that there is a tendency to fracture in a certain direction; and the force is applied obliquely to the lines of easiest fracture. Such ranges, as that of the Hawaiian for example, may exceed a thousand miles in length: and the great central range of the Pacific, 5000 miles long, illustrates the same point, proving the existence of directions of easiest fracture in the very nature of the earth's crust. The fact of such a structure has been suggested by Necker,* De la Beche,† Boué‡ and other geologists.

The nature of this structure, or the cause of this tendency to break in two directions, is a difficult subject of inquiry. The material of the crust, to which we naturally look for an explanation, is crystallized rock, for all igneous rocks are crystalline in their nature on cooling; and we observe that such rocks often break most easily, in certain directions dependent on the crystallization of some one of the included minerals or the position

* Bib. Univ. de Genève, xliii, 1833, 180.

† Geol. Report on Cornwall, Devon and W. Somerset. p. 251.

‡ Bull. Soc. Geol. de France, xiv, p. 439, 1843, and ii Ser., i, pp. 353, 355, 1844.

of crystalline grains; though there may be also other independent lines of fracture. There is abundant evidence of a uniformity of cleavage direction in the rocks of the surface over large areas, as already explained. Such a cause would have acted more uniformly at the first cooling of the surface, when from the previous free liquidity, the material was more uniform in character than at any time afterward: and even though the material were different in different parts, it matters little, since feldspar is common in almost every igneous rock, and is a frequent source of cleavage in two directions at right angles with one another, independently of the foliation due to mica and hornblend when either of these minerals are present.

M. Necker, in the article already alluded to, suggests that the trends of mountains, coast lines, and the strike of strata, coincide with *magnetic curves*. The same cause is appealed to by Boussé* and De la Beche, on the ground that the electrical currents traversing the globe may influence the polar forces of crystallization. It has since been demonstrated by Mr. R. Hunt that the direction of crystallization is influenced by magnetism,† and R. W. Fox had before shown the action of electrical forces in determining the direction of lamination.‡ The magnetic chart of the world, by Captain Sabine in the sixth Report of the British Association, exhibits some striking coincidences throughout the Pacific; the exact trend of both the Hawaiian and Samoan groups and also the east and west courses in the East Indies and in the West Indies, correspond with lines on his chart. The exceptions are many and look insurmountable; but they are to some extent removed by a knowledge of other sources of influence. It should also be remembered that lines of magnetic intensity, as Brewster has shown, correspond nearly with isothermal lines; and the two agencies, heat and magnetism, must therefore have acted in some degree together, at all periods.§

Hopkins in his able "Researches on Physical Geology,"|| (1835,) attributes the regularity of joints in rocks to the mechanical action of an elevating force, and he establishes a perfect uni-

* Treatise on Primary Geology, by H. S. Boase, M. D.; Svo, London, 1834, and L. and E. Phil. Mag., and Jour. of Sci., ix, 4; x, 14.

† Phil. Mag., Jan., 1846, p. 1; Amer. Jour. Sci., ii Ser., ii, 116.

‡ Report of the Polytechnic Society of Cornwall, for 1837, pp. 29, 31 and 63, 69.

§ M. Boué observe:—Sans avoir besoin de supposer que la terre ait été primitivement un cristal, il suffit de lui accorder un certain ordre dans ses irrégularités de surface en harmonie avec son mode de refroidissement, ses forces intérieures et les forces centrifuge et centripète. Ceci admis, on en doit déduire nécessairement que les premières mers ont occupé les parties du sphéroïde les plus accidentées, certaines grandes chaînes offrant encore les indices de ces formes régulières, ou pseudo-régulières; et puisque ces séries de montagnes constituent l'ossature des continents, et déterminent leur figure, on voit de nouveau combien la similitude des continents éclaire l'étude pour ainsi dire cristallographique du noyau terrestre. Bull. de la Soc. Geol. de France, i, ii Ser., 365.

|| Trans. Camb. Phil. Soc., vii, 1.

SKODD SERIES, Vol. III, No. 9.—May, 1847.

formity between the facts and the necessary effects of this cause. Mr. Darwin adopting essentially the same view in his remarks on the parallel relation of the planes of cleavage in western South America to the axis of the Andes range, explains the uniformity by supposing the mass to have been subjected to tension unequal in different planes, arising from the elevation of the mountains.* Mr. Sedgwick in his valuable memoir "On the Structure of Large Mineral Masses," (1835,) also appeals to tension as the cause, and supposes that this tension may arise from the contraction attending solidification.† If tension be the proximate cause, the various facts require that both sources of it, the mechanical and that of refrigeration, be equally appealed to. With reference to this subject, it should be considered that if curves of magnetic intensity are approximately isothermal lines, they must have been lines of equal cooling, and consequently *lines of equal tension*. This cause would then cooperate with the electrical, and might aid in producing the general uniformity of trend, which could not proceed from contraction alone. Acting during the period of early cooling, its effects should therefore have been universal: and through subsequent ages, the cooling or crystallization, *beneath* the crust, making still slower progress, (inconceivably slow,) would have continued to be governed by the same cause, liable to those modifications that isodynamic lines have undergone. But a perfect correspondence in the *surface* plutonic rocks, with the structure of the crust, should not be expected, since the lines of tension, determining the structure of the former, must have depended somewhat on the direction of the force producing fissures and mountain elevations.

The bare possibility that the earth's axis of rotation has been at any time changed, suggests that a cause may have cooperated in these results, whose influence cannot be fully estimated. Yet if magnetism has been a cause of structure, the coincidence of trend with existing curves of magnetic intensity tends to prove that such a change of axis has not taken place. It would be a grand result for geology if the science should settle this debated point. The coincidence of the magnetic curves with the trends in the central Pacific and north of New Holland, and also in the West Indies, is so close, that we have reason to suspect that the two facts are some way mutually dependent and have always been so. Still if the earth's axis may have changed, it is possible that the trends may once have had a direction that could have been

* Darwin on South America. *Ser.* London, 1846, p. 163.

† Trans. Geol. Soc., London, 2^d Ser., iii, 450, March, 1835.

‡ Tidal movements in the fluids during incipient cooling might be a source of tension, transverse to the line of motion. And a gradual change in the oblateness of the globe would be another source of tension. But it does not appear that the existing system would correspond with the possible effects of either of these causes.

mainly caused by tension consequent on a diminution of the earth's oblateness.

Whatever the origin, there can be no doubt of the *fact*, that a kind of cleavage structure, or, at least, a capability of fracturing most easily in two directions, was given the crust during its formation, and that such a structure has influenced the direction of the lines of fissures that have since taken place. And while there is evidence of this structure, there is proof that the rupturing force often acted obliquely to the planes of easiest fracture, causing deviations from straight lines in the long ranges. The next question is with reference to this *rupturing force*.

Contraction is a known dynamical cause that must have begun with the beginning of refrigeration; and it is hence essential to consider how far it meets the various facts in view. In the theory of mountain ranges, by Elie de Beaumont, this agency is appealed to; we believe as confidently in its efficiency, though led by the facts to somewhat different results.

The effects of contraction have been illustrated elsewhere in this volume. A prime feature in the operation of cooling, influencing all the results proceeding from it, depends on the tendency of heat to spread itself circularly, or to diminish circularly, around a centre. This cause gives a circular form to pools of lava, and they retain this form as they cool. The great crater areas of the moon, several hundred miles in diameter, illustrate it; and this size is no necessary limit to their extent. In a cooling globe there would therefore be necessarily such vast circular or elliptical areas. Here then we perceive a cause modifying all the results of cooling; and we observe that throughout all ages there must therefore have been some reference to such circular or elliptical areas in contraction; and especially, to aggregations of such areas, which also would be more or less curvilinear in outline, and would act as a whole in the progressive subsidence.

The force of tension in the crust from contraction beneath, is exerted to a great extent horizontally; and in a subsiding area, the direction would be nearly radial, or from the centre outward. This cause then should generally *act obliquely to the lines of structure*, though sometimes coincident with them. If the tension cause ruptures, the rents should follow the lines of cleavage structure in the earth, in case the direction of the force corresponded; otherwise a series of rents should result having a direction of range different from the direction of the line of structure. The peculiarities of fissures, which have been explained, the "receding," or "advancing," or "continued" series of parallel courses, and the curved directions, are therefore necessary effects of the cause appealed to. Curved as well as straight ranges, ought therefore to characterize the grand features of the globe.

The important generalizations of Mr. Hopkins with regard to the *direction of fractures* and the necessary dependence of two

transverse lines in an elliptical area under a state of tension, not only remove any difficulty arising from the existence of two transverse systems and their rectangular intersections, but actually require this result.*

Areas of non-contraction or of comparative slow contraction, should modify the direction of the ranges of fissures formed in a surrounding region where more rapid contraction is going on. Also, the interference of two contracting areas would produce irregularities; still wider effects would proceed from more extended combinations, such as have produced the oceanic depressions and the continental areas. Thus the continents which were early free from fire† have generally experienced the tension along their borders; and fissures and mountain ranges, frequently several in parallel series, have been formed, whose main courses are a resultant between the direction of the planes of cleavage structure in the earth and the action of the force of tension arising from the contraction going on over the oceanic areas.‡ Causes of certain irregularities in mountain ranges were mentioned on page 185 of the last number of this Journal, and these discussions afford a more extended view of the action of these causes. The principles explained in the paper just referred to, have here their full application.

Any other cause besides contraction, occasioning elevations or subsidences would produce the same general result as regards direction of lines of fissures; but we know no other cause of probable operation that would be so related to elliptical or circular areas; and thus none but this cause appears to satisfy the conditions presented in the frequent curvilinear forms of ranges.

The positions of some great contracting areas may be distinguished over the oceans, from the curving lines which enclose them. The great Pacific range of lands, from the Marshall Islands to the Society group, 5000 miles in length, has been described as convex to the southwest, while the line of the Hawaiian range, 2000 miles long, is nearly straight. May not this part of the ocean have been one of the large *compound* contracting areas, and a line from Pitcairn's, in lat. 25° S., long. 130° W., to northern Japan the course of its axis? Using the registers of

* The mathematical deductions of Mr. Hopkins were made with special reference to the elevation of the Wealden, though brought out so as to be of general application. He lays down the facts, that in "districts where faults abound, two distinct systems are usually found, in each of which the faults approximate to parallelism with each other;" and that "the common direction of one of these systems is approximately perpendicular to that of the other;" and he establishes the necessary dependence of these transverse systems by calculation.

† The mode of producing the tension required by fracture is different in the foregoing explanations, from what is assumed by Mr. Hopkins; but it does not appear to alter the general results; and it is believed to set aside some objections urged by Dr. Busse to the conclusions of Mr. Hopkins. See *L. and E. Phil. Mag.*, and *J. of Sc.* ix, 4, 171, 265, and x, 14, 1836.

‡ See this Journal, ii, 132, and iii, 181.

§ Ibid, iii, 98, 181.

subsidence, so happily distinguished and brought forward by Mr. Darwin, the Coral Islands, we have evidence that an elliptical area with the same line for its axis was subsidising even as late as since the tertiary epoch. The very region therefore which bears evidence of having been the original great elliptical area of contraction for the Pacific, on which the courses of the islands were in part dependent for their direction, was also undergoing contraction till within a late period; and we know not that some parts about the Northern Carolines—the nearest to the centre of the area—may not still be contracting, as there is some evidence of it, which the writer will elsewhere present. The *transverse* line including New Zealand, the Kermadec and Tonga Islands, crossing the other systems nearly at right angles, would pass in its course northward the Samoan and Hawaiian Islands, and also some smaller groups intermediate.

The position of a large area undergoing *little* contraction, compared with the region around, is before us in New Holland, as is evident from the absence from this semi-continent of volcanoes or their remains. Such an area would occasion a tension acting to some extent circularly around it; and which might determine the courses of ranges in its vicinity. The ranges of islands from New Zealand by the New Hebrides to New Guinea and Java, is just such a concentric range, as the view would seem to require. Borneo is another vast region without volcanic traces over its interior, and may have influenced the upward trend exemplified in Sumatra. However this may be, the cause brought forward—large isolated areas of comparatively slight contraction,—must have had their influence in determining the direction of lines of tension or of forces causing rupture.

M. Boué remarks that the trends in the tropics in general approach a parallelism with the equator, and he attributes the supposed fact to the centrifugal force of rotation. It holds true to a considerable extent. There are however so many exceptions that we may perhaps doubt whether the fact is sufficiently general for so general a cause.

The conclusions which appear to flow from the facts that have been presented, are as follows:—

That the general direction and uniformity of the grand outline features of the globe may be in a great degree the simple effects of the earth's cooling: this operation resulting in (1) solidification, and under the circumstances, whatever they were, an attendant jointed structure or courses of easiest fracture, in two directions at right angles nearly with one another, both varying together according to the rates of cooling in different parts;—and (2) occasioning tension in the crust through the contraction going on beneath, with some relation to circular areas but especially to large compound areas, which tension caused ruptures conforming

or not to the lines of jointed structure according as the force of tension acted in accordance with this structure or obliquely to it. (3) The age of mountains cannot therefore be determined necessarily by their courses; a different direction in a particular region might exert its horizontal force in somewhat different directions at different epochs, or other such areas might cooperate, and exert a modifying influence; and at the same time, an identity of direction for different ages was to have been expected.

From the facts before us it may be inferred that the great volcanic band which is drawn by von Buch in the East Indies, in the shape of the letter U, from Sumatra and Java around by the Philippines, gives an incorrect view of the volcanic system in that part of the world. Much the larger part of the Philippines consists of primary and secondary rocks instead of volcanic, and in Luzon, the southern volcanic portion corresponds nearly to the west-northwest trends of the Pacific. The volcanic line of Sumatra and Java, including also the islands farther east, belongs, as we have shown, to the system of the Pacific, to the north-westward courses which characterize nearly all the groups of that ocean; and it is continued east by a volcanic line along North New Guinea to the New Hebrides. Although an erroneous impression may therefore be conveyed by the chart of von Buch, it presents properly the fact intended to be illustrated by its distinguished author, that volcanoes prevail along the track laid down. The band seems like a grand volcanic border to the Asiatic continent, stretching from the vicinity of northern New Holland, (and we may say from New Zealand,) to Kamschatka; and it curves around into the great American range through the Alaskan Archipelago.

It is a fact of no little interest that the Pacific Ocean should thus be nearly encircled with volcanoes, active or extinct, as well as by high mountains, while the sides of the narrow Atlantic and Indian Oceans have comparatively few traces of such fires; and it tends to confirm the opinion thrown out as to the agency by which the deep ruptures and elevated ranges of the globe have been produced.*

This subject properly forms an introduction to the preceding papers on the earth's contraction, in this volume;† and the whole is offered as a simple view of the earth's dynamics, the sufficiency of which is to be tested by future discoveries.

NOTE.—On page 188, it is implied that Lyell and Poisson admitted the former fluidity of our globe; whereas the writer simply intended to acknowledge that these authors first brought forward the argument that a crust could not form upon a globe while it was in a state of free fluidity. See Lyell's Principles, ii, 439, where Cordier is mentioned as having presented the argument subsequently to himself.

* See this volume, pp. 96, 98, 181, 185, 186.

† Ibid. pp. 94, 176.

ART. XL.—*Notes on the Algae of the United States*; by J. W. BAILEY, Professor of Chemistry, &c., at the U. S. Military Academy.

(Continued from Vol. iii, Second Series, p. 89.)

IN the continuation of the list of Algae hitherto found in the United States, I have thought it best to adopt for the *Confervæ*, the names employed by Harvey, in his *Manual of British Algae*; for although the recent subdivisions of the old and heterogeneous genus *Conferva*, are doubtless necessary and proper, yet Algologists do not seem agreed as to what names shall be generally adopted. The old and well known names will answer all my present purposes.

LIST OF NORTH AMERICAN ALGÆ, (CONTINUED.)

Conferva alpina? Bory. Murdiner's Creek, near Newburgh, N. Y.; v. sp., in herb. Tor.

Conferva ericetorum, Roth. Salem, N. Ca., Schweinitz!

Conferva floccosa, Ag. Salem, N. Ca., Schweinitz! Rhode Island, S. T. Olney. West Point, N. Y. Common.

Conferva bombycina, Ag. Salem, N. Ca., Schweinitz! Rhode Island, S. T. Olney. Ponds near West Point.

Conferva rivularis, Linn. Common from Maine to Ouisconsin, and south to Virginia.

Conferva aerea, Dillw. Narragansett Pier, S. T. Olney! Newport and Seacomet.

Conferva (Elachista) fucicola, Vellay. Very common on *Fucus vesiculosus* at Stonington, Newport, &c.

Conferva fracta, Fl. Dan. West Point, N. Y. Providence, R. I.

Conferva glomerata, Linn. Lake Ontario, Pickering! Falls of Niagara, and in Lakes Erie, Huron and Michigan. Also in Fourth Lake, near Madison, Ouisconsin.

Conferva refracta, Ag. Eastport, Maine, Rev. J. L. Russell! Very common on shores of Rhode Island. I have not now at hand Schweinitz's specimens of *Confervæ* from North Carolina, and therefore can only present the following memoranda, which I made while examining them, some time since, in Dr. Torrey's herbarium. I give in one column the names attached by Schweinitz, and in the other the more modern names, where I have been able to determine them from the often unsatisfactory examination of the dried specimens.

Schweinitz's labels.	True name.
<i>Conferva serpentinum</i> , Salem, N. Ca.	= <i>Conferva serpentinum</i> , Ag.?
" <i>fugacissima</i> , " "	= " <i>floccosa</i> , Ag.
" <i>bipunctata</i> , " "	= <i>Tydaridæa cruciata</i> , Harv.

Schweinitz's labels.	True name.
<i>Conferva mutabilis</i> , Salem, N. Ca.	<i>Draparnaldia glomerata</i> , Ag.
" <i>pectinatis</i> , " "	<i>Fragilaria pectinatis</i> , Lyngb.
" <i>lubrica</i> , " "	<i>Oscillatoria</i> , sp.
" <i>ruginata</i> , " "	<i>Microcoleus repens</i> , Harv.
" <i>genuflexa</i> , " "	<i>Mougeotia genuflexa</i> , Ag.
" <i>jugalis</i> , " "	<i>Zygnema quiniuum</i> , Ag.
" <i>fluitans</i> , Schweinitz, Salem, N. Ca.	} Not recognized.
" <i>amphibia</i> , " "	
" <i>setiformis</i> , " "	
" <i>varia</i> , " "	
" <i>semistrangulata</i> , " "	" "

It appears from the above, that to Schweinitz is due the credit of being the first to collect and study any of our fluviatile Algae.

Hydrodictyon utriculatum, Roth. This most interesting plant was found by Dr. Paul B. Goddard and myself, growing abundantly in a small pond at the foot of Broad street, in Philadelphia, near the turn of the railroad. I kept living specimens for many months, and watched the singular method of reproduction. I also succeeded in sending living specimens to correspondents in London.

Mougeotia genuflexa, Ag. Providence, R. I. West Point, N. Y. Detroit, Michigan. Fort Winnebago, Ouisconsin.

Tyndaridea cruciata, Harv. Common in the Northern States. Also in Virginia.

Tyndaridea pectinata, Harv. Common with the above.

Zygnema nitidum, Ag. Waterville, Maine, to Culpepper Co., Virginia, and west to Ouisconsin.

Zygnema decimum, Ag. Alabama, Dr. Gates! Very common with the above.

Zygnema quiniuum, Ag. Salem, N. Ca., Schweinitz! Common with the above.

If the numerous forms described and figured by Hassall, are really distinct species, the list of our species of *Zygnema* and *Tyndaridea* might be greatly extended, as I recognize among his figures many forms which are common in the United States, and which appear to me to be merely varieties of the above mentioned very polymorphous species.

Sphaeroplea crispata, Berk. West Point, N. Y.

Vaucheria velutina. Shores of Hudson River, at West Point; in fruit in September. Shores of Seakonk River, near Providence, R. I.

Vaucheria caspitosa, Salem, N. Ca., Schweinitz. Common at West Point, N. Y.; Waterville, Maine; Culpepper Co., Va.

Botridium granulosum, Grev. North Providence, R. I. West Point, N. Y. Very abundant on shores of small ponds, near the Ocean House, Newport, R. I.

Riccularia calcarata, Sm. Niagara Falls, on rocks wet with spray.

Riccularia atra, Roth. Rocky sea shores, Rhode Island. Rocks near low water, in the Hudson River, at West Point.

Riccularia angulosa, Roth. Common on leaves of *Vallisneria* in the Hudson River. Occurs also in Rhode Island, and in the Fourth Lake, Ouisconsin.

Stigonema atrovirens, Ag. Moist rocks at Indian Falls, Putnam Co., N. Y.

Stigonema mammosum, Ag. Abundant in Round Pond, near West Point, covering submerged rocks, &c.

Stigonema ocellatum, Harv. Warden's Pond, R. I. Abundant at Niagara Falls, on rocks wet with spray.

Stigonema contextum, Carm. Foot of Crow's Nest, West Point.

Tolypothrix distorta, Kütz. Warden's Pond, R. I. Reservoir Pond, West Point. Fourth Lake, near Madison, Ouisconsin.

Calothrix confervicola, Ag. Very abundant on marine Algae every where in Narragansett Bay, R. I.

Calothrix scopulorum, Ag. Rocks at Newport and Seaconnet, R. I.

Oscillatoria. The species of this genus are very difficult to identify by the descriptions, and it is even stated by Mayen, that many species undergo manifold changes during their growth. It is therefore with much hesitation that I present the following names.

Oscillatoria tenuissima, Ag. Warm Springs of Washita, Dr. James! v. sp. in herb. Tor.

Oscillatoria tenuis, Ag. Providence, R. I. West Point, N. Y. Culpepper Co., Va.

Oscillatoria decorticans, Grev. On pumps, &c. Common every where.

Oscillatoria muscorum, Ag. On mosses in the ravine on the Crow's Nest, West Point.

Oscillatoria nigra, Vauch. Common at West Point, N. Y.

Oscillatoria Corium, Ag. Mill dams near West Point.

All our species of *Oscillatoria* have a strong and peculiar swamp-like odor, which I have not seen alluded to by writers. Their extraordinary oscillations and radiations, so well described by Carmichael, (See Hooker's Brit. Flor., Vol. v, p. 372.) I have often witnessed, and I feel satisfied that it is impossible to account for these motions by evolutions of gases, currents in the liquid, elasticity of filaments, and other mechanical causes, which have been suggested by some writers in explanation of the phenomena.

Microcoleus repens, Harv. Common in damp earth. West Point, N. Y. Providence, R. I. Hingham, Mass., Rev. J. L. Russell!

Porphyra vulgaris, Ag. Narragansett Pier, S. T. Olney. Seaconnet, R. I. Massachusetts, G. B. Emerson and Rev. J. L. Russell!

Ulva latissima, Linn. Rhode Island. Common, Old Point Comfort, Va. Sullivan's Island, S. Ca.

Ulva lactuca, Linn. Rhode Island.

Ulva bulbosa, Roth. Salem, N. Ca., Schweinitz. Newburgh, N. Y.

Merismopedia punctata, Meyen. Round Pond, near West Point. A larger variety occurs in freshwater pools, near the Pavilion, at Rockaway, Long Island, N. Y.

Bangia fusco-purpurea, Lyngb. Narragansett Pier, George Thurber! Newport and Seaconnet, R. I.

Enteromorpha intestinalis, Link. Hudson River, from Newburgh to New York city. Narragansett Bay, R. I. Common.

Enteromorpha compressa, Link. Common with the above.

Enteromorpha erecta, Hook. Newport and Seaconnet, R. I.

Tetraspora gelatinosa, Desv. Maine to Ouisconsin. Very common.

Tetraspora gelatinosa, var? *perforata*, Bailey. Perhaps a variety of the above, but remarkable for the numerous perforations in its pond. West Point, N. Y. Chautauque Co., N. Y., M. S. Petit!

Palmella hyalina, Lyngb. Rhode Island to Ouisconsin. Common.

Anabaina flos-aqua, Bory. Round Pond, West Point. Hassall thinks that Bory's account of the ambulatory faculty, and vermiform motions of this curious organism, is "fanciful and overstrained." I have, however, frequently watched its active and extraordinary vermiform motions.

Protococcus nivalis, Ag. Red snow plant, forming red stains on gneiss rocks. Kosciusko's garden, in early spring.

Hammatococcus Grevillei? Ag. Common on summit of Crow's Nest, West Point, N. Y.

Nostoc foliaceum? Ag. Wet grounds near mill dams, &c. West Point, N. Y., and Providence, R. I.

Nostoc sphaericum, Vauch. Streams near West Point.

Nostoc cristatum, Bailey. A species apparently new, with flattened fronds resembling a cock's comb; occurs on stones in rivulets, near West Point. I have found it only late in autumn.

Since the publication of the first part of this list, I have referred some of our plants about whose true names I was in doubt, to the practised eye of the eminent British Algologist, W. H. Harvey, and I have to thank him for much useful information with regard to them, which although not sent with a view to publication, may I think be presented now without impropriety.

Laminaria? trilaminata, Harvey, ms. A curious three winged species, of which a fragment was found by Mr. Olney at Narragansett Pier, and of which I also found imperfect specimens at Stonington. Harvey remarks "it is new to me, and must be either a *Laminaria* or an *Alaria*, probably the former, but until perfect specimens are obtained we cannot decide."

Dictyosiphon feniculaceus, Grev. Common at Newport and Seaconnet, R. I.

Gracilaria, n. sp. This species of *Gracilaria* grows in vast quantities in Narragansett Bay, near Providence, R. I. Harvey remarks concerning it, "it is new to me, and as far as I can make out undescribed. Agardh's *Sphaerococcus subulatus* from Canada, seems to come nearest to it. It may be the same."

Chrysinenia, n. sp. Abundant near Providence, R. I. Harvey states, that "it is allied to *C. clavellosa*, but still more nearly to *C. secunda*, Hook. and Harv., (a native of New Zealand,) and it may be identical with it."

Spyridia filamentosa, Harv. A slender variety of this, is the plant which I mistook for an undescribed species of *Griffithsia*. It occurs both at Providence and Newport.

Callithamnion corymbosum, Ag. Harvey thinks that the small *Callithamnion* common near Providence, is of this species, but he has not seen the fruit, which however I have studied myself on the recent plant, and I find it to agree with the description of *C. corymbosum*.

Polysiphonia Olneyi, Harv. ms. This beautiful plant grows in great abundance near Providence, R. I., where it was first found by S. T. Olney, Esq. of that city. I had confounded it with *P. violacea*, to which Harvey remarks it is very near but not exactly the same.

Polysiphonia variegata, Ag. fide Harv. Common near Providence, R. I.

Rhodomela subfusca, Ag. Common at Newport and Seaconnet Point, R. I.

Tetraspora perforata, Bailey. Harvey says, "this is certainly a new species. I have never seen any thing like it." It is common throughout the state of New York, and characterized by perforations of various sizes in all parts of the frond, so that when dried on paper it has a reticulated appearance.

(To be continued.)

ART. XII.—*A few Remarks on the Silurian Classification*;
by SIR RODERICK IMPEY MURCHISON, G. C. St. S., F. R. S.,
Memb. Imp. Acad. Soc. of St. Petersburg, Cor. of the Roy.
Inst. France.

Belgrave Square, March 3, 1847.

TO THE EDITORS.

Gentlemen—I have sent to you, through your booksellers, a copy of my last memoir on the Silurian Rocks of Sweden, which may prove interesting to some of the American geologists on account of the distinctness which it establishes between the lower Silurian strata of the continent of Scandinavia and the isle of Oland, and the upper Silurian of the large island of Gothland, which I have placed in detailed parallel with our Wenlock and Ludlow rocks of England. In calling your attention, and that of your readers, to the concluding observations in that memoir, I must remind you, that when I wrote, I was arguing against a former proposition of my friend, Professor Sedgwick, viz.: to subtract the Wenlock shale from the "upper," and add it to the "Lower Silurian;" and I then showed, that as my original division was founded on clear and typical districts of England, so it was equally applicable to Scandinavia, Russia and North America, where the beds with small Pentameri beneath the Wenlock shale, seemed to form the upper horizon of the lower Silurian division. Since that period, my able coadjutor, M. de Verneuil, has been among you, and after traversing large districts of your country, and inspecting many of your museums, has satisfied me that the broad divisions of lower and upper Silurian are clearly recognizable in North America, as so well developed, indeed, by your own authors. Again, in Europe, Bohemia has been described by M. B*—, to contain (particularly around Prague) a very symmetrical Silurian basin, composed of upper and Silurian rocks, loaded with characteristic fossils, among which are species of trilobites, the lowest fossiliferous beds resting on slaty grauwaacke, without fossils, to which the author applies the term Cambrian.

I call your notice to this last mentioned fact, (intending to visit Bohemia in company with M. de Verneuil, in the ensuing summer,) because I have, in the course of this winter, been compelled for the first time to defend my "Lower Silurian" against a new proposal of Professor Sedgwick, which almost amounts to the suppression of the term, and the substitution, in its place, of the word "Cambrian." To this proposition I am entirely opposed. The latter term was suggested a year after I gave my first general view of the upper and lower Silurian rocks (in 1835) as forming one natural system, and the word Cambrian was afterwards

* The MS. did not enable us to ascertain this name.

applied to the masses lying beneath the "Lower Silurian," which might be found to be characterized by a distinct group of organic remains. Subsequent researches, however, in various parts of Europe and America, have shown that no typical fossils can be detected in any of the lower strata differing from those by which I characterized the lower Silurian, and hence, on the principle of "strata identified by fossils," I have for some years past maintained, in all my publications, that the base line of the Silurian rocks so descended as to embrace the earliest clear traces of organic life. The government geologists of Britain, under Sir Henry De la Beche, have pointed out, that throughout South Wales, the very strata which I had described as "Lower Silurian," fold over and over, and occupy large tracts, to which I had, in my first work, erroneously applied the word "Cambrian;" and now these same surveyors, particularly Mr. Ramsay and that able paleontologist, Professor Edward Forbes, assure me, that throughout all North Wales, from Bala to Snowden, the rocks which I had hoped might be typified by other or "Cambrian" fossils, are charged with the same lower Silurian forms, and often with the very same species which are described by me as occurring in my Caradoc sandstone or Llandeilo Flags. They further confirm my original views of classification, in stating that these North Welsh strata, whether lower or upper Silurian, are so linked together, that they form one natural system; there being found many more species common to the upper and lower division than I had been able to detect, when I completed the Silurian system, in 1839.

Now, whilst my memoir on Gothland demonstrates the identity of its upper Silurian functions with those of Britain, the labors of our government geologists are daily opening out new features of comparison between the "Lower Silurian" of Russia and Scandinavia, as described by de Verneuil, Keyserling and myself, and the North and South Welsh strata. Thus the *Cystidea*, those earliest forms of Crinoids, with which I was unacquainted when the Silurian system was published, and which occur in myriads in the lower Silurian limestone around the Baltic, have been found pretty abundantly near Bala, Harefordwest, &c.; and among them is the very species, *Echino-spharites* (*Spharionites*) *aurantium*, which abounds in Russia and Sweden. It follows, therefore, that the terms which I was the first to propose must be adhered to, particularly as I have myself applied them to very large regions of Europe, on fair inductive evidence, and that North American geologists have honored me by doing the same in their country.

Again, whilst no zoologist has attempted to define any distinct types of life of earlier date than the lower Silurian, so it is impossible (at least in any region which I have seen) to separate

that group physically from the upper Silurian, by any line of general dislocation. If the lower Silurian rocks in America were unconformable to the upper, then it might be contended by those geologists who look rather to great physical phenomena than to organic life, that the Cambrian was one epoch and the Silurian another. But such is not the fact. In North Wales, as in other parts of Europe, the upper and lower Silurian fold over in conformable masses, and the lines of dislocation in that broken and porphyritic region run at one place through parts of the upper, and in others in the inferior fossil beds. There are, it is true, certain tracts, particularly that of the Longmynd in Shropshire, described by me in the year 1835,* where certain lower Silurian strata abut against and repose unconformably on very ancient grauwacke, without fossils, and the same may be said of a limited tract of inferior grauwacke, near St. Davids. To such rocks, lying *unconformably* beneath strata charged with lower Silurian fossils, the term Cambrian may be applied, and in the process of research some few and, perchance, peculiar organisms may be found in them. But I distinctly maintain that the so called Cambrian never having been characterized by any published fossils, cannot now be created into a system at the expense of the larger part of my well recognized and long established Silurian system, the more so as I am supported by every naturalist who has studied the subject, in the opinion that the upper and lower Silurian constitute one natural series only. This view is every day strengthened by new discoveries. Only a few months ago, I firmly believed, that as no remains of vertebrata had been detected in the lower Silurian rocks of any part of the world, there was a period when other classes of marine animals abounded in the seas, without being accompanied by fishes. But I now learn from Prof. E. Forbes, that the defence of an *Onchus* has been found in the lower Silurian rocks, near Bala; whilst it appears that Professor Sedgwick and his companions detected last summer a similar fragment in true Llandeilo flags. It is therefore proved that the same genus *Onchus*, which Agassiz first described for me from the fish bed of the Ludlow rocks,† is now found to range down into the lower Silurian; and as rare portions of ichthyolites have also been found in the intermediate strata of Wenlock shale, &c., I willingly correct a generalization which I attempted, in declaring my belief that the lower Silurian was an invertebrate period. My eminent friend Agassiz, who is now making himself as beloved and admired in the United States, as in England and other countries he has visited, has thus in the end been borne out by the new discoveries. For, whilst I reasoned

* Phil. Mag., June, 1835.

† See Silurian System, page 226, *et seq.*

mainly on the fact that no remains of fishes had ever been found in lower Silurian rocks, among the countless myriads of other marine animals, and that I was also influenced in my views by the proofs afforded by geological enquiry of a progression in creation, Agassiz has proved right in his conjecture that with such associates, fishes would sooner or later be detected. In one respect, indeed, I rejoice in the discovery, as the occurrence of an *Onchus* in upper Ludlow rocks and in Llandeilo flags, unites with other palaeontological evidences to bind all the Silurian rocks together in one natural system.

In conclusion, I would observe that whilst it is impossible, for the reasons above cited, to admit that the Silurian system can be broken into two systems, I might convince you, by another method of reasoning, that the adoption of such a proposition would entirely destroy the very term Silurian, in reference to regions of the continent of Europe, to which it has been applied, such as large parts of Russia, Scandinavia, &c., where the lower Silurian alone is developed. But I have already said more than enough, and will only add, that notwithstanding our recent animated discussions, Professor Sedgwick and myself have still as warm a friendship for each other as ever, and however he may ultimately persist in calling certain rocks of North Wales "Cambrian," (although they are loaded with true lower Silurian fossils,) I must seize this opportunity of declaring that I consider this to be little more than a geographical distinction; and further, I must express my belief that if he should produce a work upon the geological structure of the old and slaty tracts of Britain, upon which he has been long occupied, it will be found to be in every way worthy of his deservedly high reputation, and will throw important new lights on those parts of geological science which his eloquence and memoirs have already adorned.

ART. XLII.—*Hydrate of Nickel, a New Mineral*; by Prof. B. SILLIMAN, Jr.

THIS mineral occurs incrusting the surface of chromic iron from Texas, Lancaster County, Pennsylvania, and has been circulated among American mineralogists during the past year, under the name of green oxyd of chrome. I found it, however, on analysis, to be a hydrous green oxyd of nickel nearly pure. It is found in lustrous emerald green crusts, on the surface of some specimens of the chrome iron from these mines; rarely in stalactites and columnar masses. It is often covered with a thin coating of carbonate of lime or magnesia which obscures its color. Alone it is quite transparent and of the most brilliant emerald green color. Hardness 3 or 3.25, being a little above calc spar. Gravity 3.0523,

as taken in small fragments with the specific gravity bottle. Its lustre is highly vitreous and its fracture uneven and scaly. It is extremely brittle and is readily pulverized, giving a light yellowish green powder; it is very easily detached from the gangue on which it rests. Its pyrognostic character is perfectly decisive. Alone in a close tube it affords a copious yield of water, which is neutral to test paper; and it loses its fine color at a temperature but little above 212° ; with a higher heat it becomes blackish gray and is then quite unchanged by long continued heat. An empyreumatic odor is also found in the tube when it is heated. It forms no bead with carbonate of soda in either flame of the blowpipe; with borax, it readily fuses into a transparent bead, of a dark yellow or reddish color when hot, and nearly colorless when cold. In the reducing flame, with a larger quantity of the mineral, the bead becomes gray and opaque from the presence of numerous particles of finely divided metallic nickel which cannot, by long blowing be fused into a bead. On crushing this borax glass in an agate mortar under water, a gray powder appears, which is strongly attracted by the magnet, and which burnishes under the pestle, showing the reddish white color of metallic nickel. With salt of phosphorus its behavior is precisely like the artificially prepared oxyd of nickel. An examination in the wet way detected only trifling traces of oxyd of iron and perhaps alumina. It dissolves completely and with very slight heat in dilute chlorohydric acid, and the few black particles which collect on the bottom of the flask are minute flakes of chrome iron mechanically entangled in the mineral. The solution has the fine grass green tint which belongs to the salts of nickel. Sulphuretted hydrogen produces no turbidness in the solution, and no traces of oxyd of chrome could be detected. Indeed the blowpipe decisively indicates the absence of this oxyd, since an exceedingly small trace would give the borax glass its characteristic green tint when cold. The beautiful green color of this mineral, as found, led no doubt to the supposition that it was the native green oxyd of chrome, which seemed a plausible conjecture. Its water was determined by ignition of a weighed quantity of the mineral in a carefully counterpoised platinum crucible, cooling after ignition in a desiccator over sulphuric acid. It lost as the mean of four trials 38.50 pr. ct. of water, which is rather more than two atoms. Its constitution will probably be correctly expressed by $\text{Ni} \cdot 2\text{H}_2\text{O}$. It will be remembered that the artificial hydrate of nickel prepared by precipitation with potash from the nitrate is $\text{Ni} \cdot \frac{1}{2}\text{H}_2\text{O}$ or only one atom of water.

The discovery of the composition of this mineral led me to examine the composition of several specimens of carbonate of magnesia from the same mines, which have a green tint more or less

deep. I found in all of them the oxyd of nickel, in quantity proportioned to the depth of color of the specimen. In some of them, the green color seems to be an exterior coating and in others to penetrate the mass uniformly. These specimens of carbonate of magnesia are not crystallized although they appear to be so, but are only a congeries of little spherical grains about $\frac{1}{16}$ of an inch in diameter, which are cracked in radii from the centre. The same appearance, resembling aggregations of crystals, I have observed in one specimen of the hydrate of nickel which led me at first to suppose that I had found it crystallized. The constitution of the chrome iron on which this new mineral is found, now becomes an interesting inquiry. I owe these and many other interesting minerals from the same region, to Mr. L. W. Williams, of Westchester, Pa.

NOTE.—Since these observations were made, I have seen a mention in the Proceedings of the Boston Nat. Hist. Soc., Nov. 12, 1846, from Dr. Jackson, of "a green crust, which he supposed to be a new mineral, adhering to a mass of chrome ore." This mineral, as I learn from Dr. Jackson, is from the same mines as the one described in the foregoing article, and is undoubtedly the same species.

New Haven, March 30th, 1847.

ART. XLIII.—On Cupellation with the Blowpipe; by WILLIAM W. MATHER.

A NOTICE of a new mode of cupellation on mica with the blowpipe, was published by me in this Journal, vol. xxxv, p. 321. A writer has subsequently in vol. xlii, p. 394, mentioned another equally simple, which was taught him by Prof. H. Rose of Berlin. That method consists in pressing moistened pulverized bone ash into cavities in charcoal, and cupelling on that. If the surface of the cupel be not very smooth, almost polished, the grain of silver, if very small, will disappear in the pores of the cupel, or be buried in the excrescences of its surface. This method of cupellation, and that on small cupels, have been long in use and are well known. The bone ash cupels have the advantage of absorbing the oxyd of lead as fast as formed; but they have the disadvantage of absorbing some silver with the litharge. This is a serious inconvenience where a strict quantitative determination of the silver is desired. This may be obviated to a great extent on mica, by keeping the oxydizing metal more or less immersed in the fluid oxyd. When bone earth cupels are used, the globule of lead when reduced to a very small size, should be put upon a fresh cupel, or on a clean place on the one in use, where the surface is very smooth, else if the globule of silver or gold be very small, it will not appear.

SECOND SERIES, Vol. III, No. 2.—May, 1847.

When the cupellation is performed on mica, the oxydation is nearly as rapid as on the bone ash cupel, and the globule is kept partially immersed in the melted oxyd of lead, and thus the silver that would otherwise be lost in the litharge, is mostly taken up by the lead.* A little skill in the operator will enable him when the oxyd has accumulated to some extent around the globule of lead, to slide the melted globule by a slight inclination to another place, without losing it off from the mica. This obviates in a great degree the loss of time, that would otherwise arise from the necessity of cooling to detach the globule, put it in a new place and heat it again to the proper temperature. When the cupellation globule is reduced to the size of a mustard seed, whether bone ash or mica be used for cupelling, it is well to remove it to a new very smooth cupel, or to a fresh piece of good mica, and then, when melted, make the globule slide by inclining the cupel, and by means of the blast, to fresh surfaces, until, finally, the globule of silver or gold remains pure, or as nearly so as cupellation will make it. No silver is lost in this way, except the extremely minute quantity carried off in the litharge, and that which is vaporized if the heat be too high.

The method of cupellation on mica I consider more accurate than that on bone earth, and if the mica be of good quality, so as not to exfoliate at all by heat, or permit the litharge at the proper temperature to pierce it, globules of $\frac{1}{1000}$ grain in weight may be seen on its surface by the naked eye. When good mica cannot be obtained, I use bone earth cupels made compact, smooth, almost polished, flat and discoidal in form, about the size of a wafer and $\frac{1}{16}$ to $\frac{1}{8}$ inch thick. These answer for the last part of the operation of cupelling nearly as well as the mica. Mica is more portable than cupels, or the materials of which cupels are made, and when the surface becomes loaded with oxyd, a thin scale can be split off and leave the surface fresh and ready for new cupellations. The difficulties of this mode of cupellation are, lack of skill in manipulation, and the difficulty of getting the right quality of mica. The advantages are, 1st. avoiding nearly all the loss of silver that is usually carried off by the litharge, and 2d. greater accuracy in the results of quantitative cupellation. It is generally supposed that the detection and quantitative estimation of silver in solution by means of chlorohydric acid in a dilute solution, was more certain than cupellation. I do not find it to be so, but cupellation properly conducted, will not only detect silver, but afford quantitative results, where the most refined methods of analytical research fail to give any indication of its presence. I have found it impracticable, thus far, to obtain

* This is the explanation of the well known fact that the cupellation of lead in the large way, always gives a larger yield of silver, than is indicated by cupellation in the small way on bone ash cupels.

lead entirely free from silver. The German granulated lead prepared expressly for this purpose, contains a notable quantity of silver. Nitrate of lead and acetate of lead when reduced and cupelled yield silver; and I have precipitated lead with zinc, rejecting the half of the lead first precipitated, as being that likely to contain all the silver, and saving only that part precipitated last, and still found it to contain silver. As lead absolutely pure seems to be unattainable, I estimate the difference between the weights of cupellation globules, obtained from the metal or ore, and from an equal quantity of lead cupelled alone of the same kind as that used in the cupellation.

The buttons or cupellation globules of silver or gold, vary in magnitude in lead, lead ores, &c., as usually cupelled with the blowpipe, from $\frac{1}{16}$ grain to $\frac{1}{2}$. It is comparatively rare that their weights can be correctly appreciated, even by our best balances. I use two methods of appreciating their weights.

(1.) By having a series of cupellation globules of known weights from $\frac{1}{16}$ grain down to $\frac{1}{1000}$ grain,* and by means of a microscope, comparing the diameter of the cupellation globule with those of known weight. This method by means of a good micrometer microscope affords approximations to truth, more to be relied on than the balance, when the globules are small.

* These weights are easily made by a little skill in manipulation. To make moderately small weights I have used silver lace, which when unravelled, is a silk thread wound with flattened wire of silver of great tenacity. I found how many inches of this gave 1 grain of silver, and then by means of dividers and a sector scale, cut off such lengths as would make $\frac{1}{16}$, $\frac{1}{100}$, $\frac{1}{1000}$, &c. grains. With the sector scale, $\frac{1}{100}$ and even $\frac{1}{1000}$ of an inch can be measured. One hundred and twenty inches in length of the lace, gave 22 grains of silver. Twelve inches = 22 grain, 1.2 in. = 0.022 grain, 0.12 in. = 0.0022 grain, &c., and generally, 120 in. : 22 grs. :: x length required : y the weight required. If $y = \frac{1}{1000}$ grain, then 120 in. : 22 :: x : $\frac{1}{1000}$ grain, which is easily laid off on the sector scale. Having the length cut off, moisten it with borax water and melt on charcoal. The borax water enables the silver to coalesce without separating into several globules, as it would do, if it was not thus moistened and rolled up into a little pellet. The borax is so small in quantity, where the thread is moistened with borax water, that it does not dissolve any sensible quantity of silver. By rolling the moistened thread into a little pellet, I can easily make all the silver coalesce into a single globule when the thread is ten to twenty inches in length.

For still smaller weights I use fine plated copper wire, and cupel it. That used is from an eapulette, of which by careful analysis, I found 1800 feet in length gave 16 grains of silver, = 1350 inches in length for 1 grain of silver. 13.5 inches then would give $\frac{1}{1000}$ grain of silver; 1.35 inches = $\frac{1}{10000}$ grain of silver, and 0.135 inch = $\frac{1}{100000}$ gr. of silver. This is not strictly accurate, for a little of the silver is lost by the litharge and by vaporization, and a little gained from the lead used in cupellation of the wire. Still, it is sufficiently accurate for use.

For gold weights of comparison, I have used Wollaston's method; enclosing a very delicate wire of gold in a very coarse silver wire, with a hole drilled to let the gold wire in, and then drawing down the silver to its limit, and dissolving the silver by nitric acid, leaving the gold almost as fine as spider's web thread. Then ascertain how many yards weigh a grain, lay off and cut off the lengths for the required weights, and melt into a globule.

(2.) I use also the principle of Harkort's scale,* in measuring the diameters of minute cupellation globules, but applied somewhat differently. In most of the boxes of French mathematical drawing instruments, a brass sector scale is found, which when closed, shuts so as to leave, if well made, a junction that is a mere line to the eye. From the centre of motion, a line is drawn on each arm of the scale six inches in length, divided into two hundred equal parts, and when the scale is completely closed, the two hundredth equal part at the end of one of these lines, is exactly one inch from the two hundredth equal part at the end of the other line.†

If we wish to measure the diameter of cupellation globules, less than $\frac{1}{2}$ inch in diameter, (and most blowpipe globules are smaller,) measure one inch between the points of the dividers, and set their points in the equal parts marked 195; (for $\frac{1}{2}$ inch = $\frac{195}{200}$ and $200 - 5 = 195$.) The arms of the sector scale between the points marked 200 are then $\frac{1}{2}$ inch apart, and approach each other to the centre of motion, where their distance = 0. In this way the scale may be set to any fraction less or greater than an inch that may be desired. The cupellation globule is laid between the diverging arms of the scale, and slidden along by a pin or other convenient instrument, until the globule falls in between the arms of the scale. The width of the opening between the arms at this point, gives the diameter of the globule. Suppose the scale set to measure globules between $\frac{1}{2}$ inch and 0, and the globule falls in opposite the equal parts marked 45. The diameter of the globule is then $\frac{45}{200}$ of $\frac{1}{2}$ inch = $\frac{45}{400}$ inch.

A globule of silver of $\frac{1}{4}$ inch in diameter weighs about 0.00006 grain. This weight is about $\frac{1}{4}$ more than the actual weight of a cupellation globule of that diameter, because the above is calculated for a sphere of silver, and the cupellation globules are always more or less flattened on the lower side, unless they are extremely minute. A globule of silver $\frac{1}{4}$ inch diameter, if a sphere, would weigh 0.298665 grains; but owing to the flattening of the cupellation globule, the actual weight of one of that diameter is only 0.18 grains, or about $\frac{1}{2}$ less. I do not generally permit myself to estimate the weights of cupellation globules by their diameters when greater than $\frac{1}{4}$ inch diameter, in consequence of the rapid variation in the law of the relative weights to the diameters, and globules above that size can be as correctly appreciated by a good balance. The eye can generally unaided by a magnifier see a globule of silver of $\frac{1}{4}$ inch diameter, which weighs about $\frac{1}{10000}$ grain, and this can be

* Vide Whitney's edition of Berzelius on the Blowpipe, p. 104.

† A similar method of mensuration will be found in the Appendix to Masprati's translation of Plattner's work on the blowpipe, by Prof. O. BRÄGGE.—Eds.

measured with considerable accuracy by means of a micrometer microscope. This degree of accuracy is sufficient for all practical purposes, for if ten grains of lead only gave $\frac{1}{10000}$ grain of silver, 312½ tons would be required to produce one oz. of silver. If ten grains of lead or rather alloy cupelled yield $\frac{1}{10000}$ grain of silver or $\frac{1}{10000}$ of its weight, it would contain only 3½ oz. per ton, or if it yielded $\frac{1}{10000}$ grain, it would be 32 ounces of silver per ton of lead or alloy.

Means of estimation like those mentioned are sufficiently accurate for practical purposes, by using one grain weight of the alloy or one mixed with a suitable quantity of lead.

Quantities of silver far more minute can be detected by suitable care in blowpipe cupellation. With a good microscope a globule of silver $\frac{1}{10000}$ inch diameter ought to be visible, which would weigh about $\frac{1}{10000000000}$ of a grain.* A metal that would yield this minute quantity of silver or gold from the weight of one grain would require 5,000,000 tons to produce one pound of silver or gold.

The above theoretical limit of mensuration is perhaps also about the practical limit of detection of silver and gold in bodies suspected to contain them, in consequence of the volatility of these metals at a high temperature in a current of air, and the litharge taking away some. In cupellation the heat should never be raised above a high red heat, until just before the *lightening* of the metal, and then only for an instant, else there will be a loss of silver or gold.

To save trouble in estimating the weights of cupellation globules, a table is subjoined, and the weights of globules of several diameters are indicated, supposing them to be spheres. A deduction of about one-fourth should be made in globules from $\frac{1}{8}$ to $\frac{1}{4}$ of an inch in diameter, about one-fifth in those from $\frac{1}{4}$ to $\frac{1}{2}$, about one-sixth in those from $\frac{1}{2}$ to $\frac{3}{4}$, about one-seventh in those from $\frac{3}{4}$ to 1 , about one-eighth in those from 1 to $1\frac{1}{2}$. Those smaller than $\frac{1}{4}$ inch scarcely differ from a sphere.

The weights of spheres of gold or silver of any other diameters than those in the table, are easily calculated by the formula $W = CD^3$. C is a constant for the same metal, and represents the weight of a sphere of the metal one inch in diameter. This weight

* For 1 cubic inch of distilled water weighs 252.46 grains. If the specific gravity of silver be called 10.5, then 1 cubic inch of silver would weigh 2640.8 grains $\times 10.5$ the sp. gr. of silver = 2640.8 grains. Solids are proportional to the cubes of their like linear dimensions. An angle of 1° , the limit of the visual angle, at a distance of 8 inches subtends $\frac{1}{200000}$ of an inch, = $\frac{1}{250000}$ inch. $\therefore (1 \text{ inch})^3 : (\frac{1}{250000})^3 :: 2640.8 \text{ grains} : x = \frac{2640.8}{156250000000000} = \frac{1}{5895727272727272}$ = about one six thousandth millionth of a grain, or in a spheroidal form, a globule of about one ten thousand millionth of a grain. Small globules may be rendered more distinct by pressure in an agate mortar, which not only gives them a greater area, but a much greater reflecting surface.

for gold is 2577.667 grains, and for silver 1382.72248 grains.* D represents any diameter whether a whole number or fraction, and W the weight required. Logarithms are easily applied, and save much labor. $\log W = \log C + 3 \log D$.

Table exhibiting the Weights of Spheres of Gold and Silver of varied diameters, of fractions of an inch.

Diameters of spheres in inches.	Parts of sector scale set to 25 inch.	Weights of spheres expressed in grains.		Diameters of spheres in inches.	Parts of sector scale set to 25 inch.	Weights of spheres expressed in grains.	
		For gold.	For silver.			For gold.	For silver.
1.000	1	2577.667	1382.72248	.0072	128	0.0009808	0.0005261
0.100	10	2.577667	1.38272248	.0069	123	0.0008814	0.0004728
0.060	16	1.31975	0.705656	.0067	118	0.0007951	0.0004265
0.050	20	0.63931	0.33757	.0065	113	0.0007197	0.0003860
0.040	25	0.55677	0.29866	.0063	108	0.0006533	0.0003455
0.030	30	0.32221	0.17284	.0060	103	0.0005935	0.0003042
0.020	40	0.16427	0.088494	.0057	98	0.0005398	0.0002670
0.010	50	0.065618	0.037333	.0055	93	0.0004847	0.0002311
0.008	60	0.040276	0.021665	.0053	88	0.0004375	0.0002015
0.006	75	0.020611	0.011061	.0050	83	0.0003922	0.0001728
0.005	90	0.011934	0.0064015	.0047	78	0.0003483	0.0001463
0.004	100	0.008557	0.0045305	.0045	73	0.0003055	0.0001263
0.003	125	0.005110	0.003112	.0042	68	0.0002646	0.0001065
0.002	150	0.003377	0.002000	.0040	63	0.0002256	0.0000884
0.001	175	0.002447	0.001394	.0037	58	0.0001886	0.0000734
0.0008	200	0.001955	0.001061	.0035	53	0.0001533	0.0000597
0.0006	250	0.001463	0.000795	.0032	48	0.0001193	0.0000477
0.0005	300	0.001193	0.000640	.0030	43	0.0000890	0.0000374
0.0004	375	0.000980	0.000526	.0027	38	0.0000638	0.0000289
0.0003	450	0.000795	0.000426	.0025	33	0.0000493	0.0000215
0.0002	525	0.000653	0.000345	.0022	28	0.0000366	0.0000160
0.0001	600	0.000539	0.000286	.0020	23	0.0000266	0.0000110
0.00008	750	0.000437	0.000231	.0018	18	0.0000199	0.0000084
0.00006	900	0.000348	0.000188	.0016	13	0.0000146	0.0000063
0.00005	1000	0.000286	0.000153	.0015	10	0.0000111	0.0000047
0.00004	1250	0.000225	0.000126	.0014	8	0.0000086	0.0000037
0.00003	1500	0.000188	0.000106	.0013	6	0.0000066	0.0000028
0.00002	1750	0.000153	0.000088	.0012	5	0.0000050	0.0000021
0.00001	2000	0.000126	0.000073	.0011	4	0.0000038	0.0000016
0.000008	2500	0.000106	0.000063	.0010	3	0.0000028	0.0000011
0.000006	3000	0.000088	0.000050	.0009	2	0.0000020	0.0000008
0.000005	3750	0.000073	0.000042	.0008	1	0.0000015	0.0000006
0.000004	4500	0.000063	0.000037	.0007	0	0.0000011	0.0000004
0.000003	5250	0.000050	0.000030	.0006	0	0.0000008	0.0000003
0.000002	6000	0.000042	0.000023	.0005	0	0.0000006	0.0000002
0.000001	7500	0.000034	0.000019	.0004	0	0.0000004	0.0000001
0.0000008	9000	0.000028	0.000016	.0003	0	0.0000003	0.0000000
0.0000006	10000	0.000023	0.000013	.0002	0	0.0000002	0.0000000
0.0000005	12500	0.000019	0.000010	.0001	0	0.0000001	0.0000000
0.0000004	15000	0.000016	0.000008	.0000	0	0.0000000	0.0000000
0.0000003	17500	0.000013	0.000006				
0.0000002	20000	0.000010	0.000005				
0.0000001	25000	0.000008	0.000004				
0.00000008	30000	0.000006	0.000003				
0.00000006	37500	0.000005	0.000002				
0.00000005	45000	0.000004	0.000002				
0.00000004	52500	0.000003	0.000001				
0.00000003	60000	0.000002	0.000001				
0.00000002	75000	0.000001	0.000000				
0.00000001	90000	0.000000	0.000000				
0.000000008	100000	0.000000	0.000000				
0.000000006	125000	0.000000	0.000000				
0.000000005	150000	0.000000	0.000000				
0.000000004	175000	0.000000	0.000000				
0.000000003	200000	0.000000	0.000000				
0.000000002	250000	0.000000	0.000000				
0.000000001	300000	0.000000	0.000000				
0.0000000008	375000	0.000000	0.000000				
0.0000000006	450000	0.000000	0.000000				
0.0000000005	525000	0.000000	0.000000				
0.0000000004	600000	0.000000	0.000000				
0.0000000003	750000	0.000000	0.000000				
0.0000000002	900000	0.000000	0.000000				
0.0000000001	1000000	0.000000	0.000000				

Jackson C. H., Ohio, March 24, 1847.

* It has been shown in a preceding note, that a cube of silver of 1 inch, would weigh 3540.8 grains. The sphere of the same diameter would weigh 3540.8 X 0.9226 = 1382.72248 grains. The cube of gold of one inch, weighs 4222.57 grains, and a sphere of the same weight 2577.667. The contents of a cube : that of an inscribed sphere, :: 1 : 0.9226, for the contents of a sphere = $\frac{4}{3} \pi R^3$ = when the diameter is unity, $\frac{4}{3} \pi (\frac{1}{2})^3 = 0.5236$.

ART. XLIV.—On the Variation of a Differential Coefficient of a Function of any number of Variables; by A. D. STANLEY, Professor of Mathematics in Yale College.

WHEN a quantity is a function of a single variable, the variations of its differential coefficients are, as is well known, easily determined. But the variations of differential coefficients of a function of two variables have not been ascertained without difficulty. Lagrange, the inventor of the Calculus of Variations, never obtained them by a method duly general. Poisson was the first to do this; which however has since been done in a somewhat simpler manner by Mr. Ostrogradsky. But for the general case in which we have any number of independent variables, or even for the third case in point of complexity, viz. that in which three variables are concerned, the variations in the differential coefficients of a function have not been determined by either of these analysts. To obtain them by the complex methods which they used in dealing with two variables, would be extremely difficult, if not quite impracticable. Indeed Poisson never undertook to extend his investigations beyond the case in which two variables are concerned. Mr. Ostrogradsky, however, abandoning the method which he had pursued successfully in the case of two variables, attempted by a simpler process to determine the variations in question for the general case in which the variables are of any number whatever. But the attempt was unsuccessful, as must we think be evident on carefully examining the principle that is made the basis of his investigations; which is, that the variation of the differential of a function is equal to the differential of the variation of the function; or to state the principle in algebraic language, $\delta dV = d\delta V$. (That this statement is inadmissible, we shall, at another time, attempt to show.) There is however an article on the Method of Variations by Mr. Pagani, published in the fifteenth volume of Crelle's Mathematical Journal, that contains a correct solution, and, as is believed, the only one yet given, of the general problem we speak of. Before meeting with the investigations of Mr. Pagani and Mr. Ostrogradsky, the writer of this article had fallen upon two different methods of procedure, each of which leads directly to a solution of the problem under view, in its most general form. The principles employed in one of them are the same substantially as appear in that of Pagani; though this may not be readily perceived, as we use them in a manner considerably different from his. But the other method is essentially different, and is much more simple and concise. Still as the problem concerned is of fundamental importance in the Calculus of Variations, it may not be useless to state the former as well as the latter method of solution.

Let then $u=f(x, y, z, \&c.)$, and by variation let this equation become $u=f(x, y, z, \&c.)$; also let $\delta u=u-u$, $\delta x=x-x$, $\delta y=y-y$, $\delta z=z-z$, &c. δu , δx , δy , δz , &c. being functions of all the independent variables, x, y, z , &c. These variations being assumed, our object is to determine the resulting variations in the differential coefficients of u ; as for instance, the variation of $\frac{du}{dx}$.

Now by reason of the variations assumed, $\frac{du}{dx}$ becomes $\frac{du}{dx}$; the variation of $\frac{du}{dx}$ therefore, is $\frac{du}{dx} - \frac{du}{dx}$; and if this be denoted by $\delta \frac{du}{dx}$, we have the equation $\frac{du}{dx} - \frac{du}{dx} = \delta \frac{du}{dx}$; but $u=u-\delta u$;

hence, $\delta \frac{du}{dx} = \frac{du}{dx} - \frac{du}{dx} + \frac{\delta u}{dx}$.

Now $\frac{du}{dx} = \frac{du}{dx} \frac{dx}{dx} + \frac{du}{dy} \frac{dy}{dx} + \frac{du}{dz} \frac{dz}{dx} + \&c.$

and $\frac{dx}{dx} = \frac{d(x+\delta x)}{dx} = 1 + \frac{\delta x}{dx}$, $\frac{dy}{dx} = \frac{d(y+\delta y)}{dx} = \frac{dy}{dx} + \frac{\delta y}{dx}$, $\frac{dz}{dx} = \frac{d(z+\delta z)}{dx} = \frac{dz}{dx} + \frac{\delta z}{dx}$, &c.

Hence, $\delta \frac{du}{dx} = \frac{du}{dx} - \frac{du}{dx} + \frac{\delta u}{dx} + \frac{du}{dx} \frac{\delta x}{dx} + \frac{du}{dy} \frac{\delta y}{dx} + \frac{du}{dz} \frac{\delta z}{dx} + \&c.$ and if we consider that $\frac{du}{dx} = \frac{du}{dx} + \delta \frac{du}{dx}$, and neglecting the infinitesimal $\delta \frac{du}{dx}$, substitute $\frac{du}{dx}$ for $\frac{du}{dx}$, and substitute also $\frac{du}{dy}$, $\frac{du}{dz}$, &c. for $\frac{du}{dy}$, $\frac{du}{dz}$, &c.

We obtain the equation

$$(1.) \quad \delta \frac{du}{dx} = \frac{du}{dx} \frac{\delta x}{dx} + \frac{du}{dy} \frac{\delta y}{dx} + \frac{du}{dz} \frac{\delta z}{dx} + \&c.$$

This is easily reducible to the following form, which will be found convenient for purposes of generalization;

$$\delta \frac{du}{dx} = \frac{d}{dx} \left(\delta u - \frac{du}{dx} \delta x - \frac{du}{dy} \delta y - \frac{du}{dz} \delta z - \&c. \right) + \frac{d^2 u}{dx^2} \delta x + \frac{d^2 u}{dx dy} \delta y + \frac{d^2 u}{dx dz} \delta z + \&c. \text{ or}$$

* The objections to which this mode of reasoning, so common in the Calculus, is liable, may be obviated by regarding the sign δ as indicating, not that the two quantities on opposite sides of it are equal, but that the limit of their ratio is unity; and we doubt whether it is possible to present the Method of Variations in a satisfactory light, without employing instead of equations, the other kind of comparisons here alluded to.

$$\delta u' - \frac{du'}{dx} \delta x - \frac{du'}{dy} \delta y - \frac{du'}{dz} \delta z - \&c.$$

$$= \frac{d}{dx} \left(\delta u - \frac{du}{dx} \delta x - \frac{du}{dy} \delta y - \frac{du}{dz} \delta z - \&c. \right);$$

where u' is put for $\frac{du}{dx}$.

Now $\frac{du}{dx} \frac{dx}{dx} + \frac{du}{dy} \frac{dy}{dx} + \frac{du}{dz} \frac{dz}{dx} + \&c.$ is the variation in the function u , that is due to the variations $\delta x, \delta y, \delta z$, &c. independently of any change in the form of that function. And the excess of the whole variation δu above this partial variation, may be regarded as the variation occasioned in the function by its change of form. Let this excess be denoted by $\mathcal{A}u$, and let a similar notation be used in other like cases. Then $\mathcal{A}u' = \frac{d\mathcal{A}u}{dx}$; that is,

$\mathcal{A} \frac{du}{dx} = \frac{d\mathcal{A}u}{dx}$. Hence we readily derive the general equation

$$(2.) \quad \mathcal{A} \frac{d^{i+j+k} u}{dx^i dy^j dz^k} = \frac{d^{i+j+k} \mathcal{A}u}{dx^i dy^j dz^k}.$$

Now for brevity, let D be put for the complex characteristic $\frac{d^{i+j+k}}{dx^i dy^j dz^k}$; then since $\mathcal{A}Du$ is only a substitute for the expression $\delta Du - \frac{dDu}{dx} \delta x - \frac{dDu}{dy} \delta y - \frac{dDu}{dz} \delta z - \&c.$ and, as has just

been proved, is equal to $D\mathcal{A}u$ or $D \left(\delta u - \frac{du}{dx} \delta x - \frac{du}{dy} \delta y - \frac{du}{dz} \delta z + \&c. \right)$ it follows that

$$(3.) \quad \delta Du = D \left(\delta u - \frac{du}{dx} \delta x - \frac{du}{dy} \delta y - \frac{du}{dz} \delta z - \&c. \right) + \frac{dDu}{dx} \delta x + \frac{dDu}{dy} \delta y + \frac{dDu}{dz} \delta z + \&c.$$

which is the general formula required: for it exhibits the value of the variation of any differential coefficient of u , due to the assumed variations $\delta u, \delta x, \delta y, \delta z$, &c. in terms of those variations; in other words, it assigns for the dependent variation δDu , in which δ is separated from u by the characteristic D , an expression in which none but the assumed variations occur, in which the characteristic δ is found, only as immediately preceding one or another of the variables u, x, y, z , &c.

We have now to state a second method of obtaining the same result; the method to be preferred as the most simple and direct. We will begin by showing that when a function varies in con-

sequence of changes in the values of its variables and in its form, the whole variation is equal to the variation due to the change in the form of the function, independently of any change in the variables, added to the variation which is due to the changes in the values of the variables independently of any change in the form of the function: a theorem which though seemingly obvious, is not however to be assumed without proof.

Let $u = F(x, y, z, \&c.)$, and by variation let $x, y, z, \&c.$ become $x, y, z, \&c.$ while u becomes $u + v$, where $u = F(x, y, z, \&c.)$ and $v = f(x, y, z, \&c.)$. Then the whole variation of u which we will denote by δu , is $u + v - u$. But if there were the same change as we have supposed in the form of the function, without any variation in $x, y, z, \&c.$ the variation of u would be $f(x, y, z, \&c.)$, which we may denote by v or $\mathcal{J}u$. And if there were no variation in the form of the function u , but the same variation as has been supposed in the values of $x, y, z, \&c.$ the variation of u would be $u - u$, which we will denote by $\mathcal{I}u$. Then $\delta u = \mathcal{J}u + \mathcal{I}u + (v - v)$. But as v is the same function of $x, y, z, \&c.$ that v is of $x, y, z, \&c.$ ($v - v$) is an infinitesimal of the second order and may be neglected. We have then finally the equation

$$(4.) \quad \delta u = \mathcal{J}u + \mathcal{I}u;$$

a result which verifies the theorem stated above. We now proceed to determine the variation of a differential coefficient of a function. Let u be the function, and Du the differential coefficient; where D is put for $\frac{d}{dx} \frac{dy}{dz} \&c.$. Then when u varies

to $u + v$, Du varies to $D(u + v)$, where D is put for $\frac{d}{dx} \frac{dy}{dz} \&c.$.

And if δDu be put for the variation of Du ,

$$\delta Du = D(u + v) - Du = Du + Dv - Du.$$

But Du is the same function of $x, y, z, \&c.$ that Du is of $x, y, z, \&c.$; then agreeably to the notation already used, $\mathcal{I}Du$ may be put for $Du - Du$. And as Dv is the same function of $x, y, z, \&c.$ that Dv is of $x, y, z, \&c.$, $Dv = Dv + \mathcal{I}Dv$. Hence if the infinitesimal $\mathcal{I}Dv$, which is of the second order, be neglected, and if for v , its equivalent $\mathcal{J}u$ be substituted,

$$(5.) \quad \delta Du = D\mathcal{J}u + \mathcal{I}Du;$$

and if for $\mathcal{J}u$ we substitute its equal $\delta u - \mathcal{I}u$, then

$$(6.) \quad \delta Du = D(\delta u - \mathcal{I}u) + \mathcal{I}Du.$$

Now the meaning of $\mathcal{I}$ is such that if infinitesimals of the second order be neglected,

$$(7.) \quad \mathcal{I}u = \frac{du}{dx} \delta x + \frac{du}{dy} \delta y + \frac{du}{dz} \delta z + \&c.$$

Therefore,

$$(8.) \quad \delta Du = D \left(\delta u - \frac{du}{dx} \delta x - \frac{du}{dy} \delta y - \frac{du}{dz} \delta z - \&c. \right) + \frac{dDu}{dx} \delta x + \frac{dDu}{dy} \delta y + \frac{dDu}{dz} \delta z + \&c.$$

which is the same as the equation (3) before obtained.

If Du be put for u in the equation (4), then

$$(9.) \quad \delta Du = \mathcal{J}Du + \mathcal{I}Du;$$

and if this be compared with the equation (5), it follows that

$$(10.) \quad \mathcal{J}Du = D\mathcal{J}u;$$

which is of the same import with the above equation (2). The equation (8) may be presented in another simple form, that is worthy of notice, when $l + n + m + \&c. = 1$; as for example, when $l = 1$, and $0 = m = n = \&c.$ for then

$$\frac{du}{dx} = \frac{d}{dx} \left(\delta u - \frac{du}{dx} \delta x - \frac{du}{dy} \delta y - \frac{du}{dz} \delta z - \&c. \right) + \frac{d^2u}{dx^2} \delta x + \frac{d^2u}{dx dy} \delta y + \frac{d^2u}{dx dz} \delta z + \&c.$$

or

$$(11.) \quad \frac{du}{dx} = \frac{d\delta u}{dx} - \frac{du}{dx} \frac{d\delta x}{dx} - \frac{du}{dy} \frac{d\delta y}{dx} - \frac{du}{dz} \frac{d\delta z}{dx} - \&c.$$

which is the same as the former equation (1).

Mr. Delaunay, in a paper on the calculus of variations lately published, and which has particular reference to the variations of Multiple Integrals, has thought it sufficient to vary the limits of integration, and the form of the function which the dependent variable is of the independent variables, without assigning to the latter any variations; in which case no investigation is needed to determine the variation of a differential coefficient of the dependent variable; for it is obvious at once, that

$$\frac{d^{l+n+m+\&c.}u}{dx^l dy^n dz^m \&c.} = \frac{d^{l+n+m+\&c.}u}{dx^l dy^n dz^m \&c.}.$$

Now with reference to the variation of a double definite integral, it is plain that if the integral be presented in the following form, $\int_a^A \int_{f(x)}^{F(x)} V$, and be considered a substitute for such an

expression as this, viz., $W \Big|_{x=A}^{x=f(A)} - W \Big|_{x=a}^{x=f(a)} - W \Big|_{y=f(A)}^{y=f(a)} + W \Big|_{y=a}^{y=f(a)}$;

where W is such a function of x and y , that $\frac{dW}{dx} + \frac{dW}{dy} \frac{dy}{dx} = U$,

and U such that $\frac{dU}{dy} = V$, then the method of Delaunay will suf-

fice, and the variation of the integral may be exhibited with entire generality in the following manner,

$$\delta \int_a^A \int_{f(x)}^{F(x)} V = \int_a^A \int_{f(x)}^{F(x)} \delta V + \int_a^A \left(V \delta F(x) - V \delta f(x) \right) \\ (12.) \quad + \delta A \int_{f(A)}^{F(A)} V_{x=A} - \delta a \int_{f(a)}^{F(a)} V_{x=a};$$

where δV denotes the variation in the form of V considered as a function of x and y . But it may at times be necessary or convenient to regard a double or other multiple definite integral as the sum of an infinite number of infinitesimal elements, or more correctly perhaps as the limit of this sum, and variations may need to be attributed to these infinitesimal elements *severally* rather than *in the aggregate*, in which cases, (as has been remarked by Ampère in a paper on the Calculus of Variations applied to mechanics,) it is not sufficient to regard the variations of the independent variables as nothing, but general values must be assumed for them as well as for the variations of the dependent variables. The method of Delaunay is therefore essentially deficient in generality.

By means of the formulæ already stated, it is easy to obtain the proper expression for the variation of any function of both dependent and independent variables. Let V be such a function, whose variation is to be determined; let the independent variables be $x, y, z, \&c.$, and let P be one of the dependent variables. Then as V is a function of $x, y, z, \&c.$, and of quantities which are functions of $x, y, z, \&c.$, it is virtually a function of these independent variables only; and though regarded as a *uniform* function in respect to *all* the variables, dependent and independent, that are contained in it, it may however be considered variable in its form, when viewed as a function of the independent variables, on account of the variations in the forms of the dependent variables.

Then in the general equation $\delta V = \delta V + rV$, δV must be the sum of all the partial variations of V , that are analogous to the following, $\frac{dV}{dP} \delta P$; which sum may be denoted thus $\sum \frac{dV}{dP} \delta P$. But P may be a differential coefficient of a function: we will suppose it such, and put instead of it, Du , that is, $\frac{d^{i+m+n+\&c} u}{dx^i dy^n dz^m \&c.}$. Then,

$$\delta V = \sum \frac{dV}{dP} \delta Du = \sum \frac{dV}{dP} D \delta u = \sum \frac{dV}{dP} D(\delta u - r u).$$

Therefore,

$$\delta V = \sum \frac{dV}{dP} D \left(\delta u - \frac{du}{dx} \delta x - \frac{du}{dy} \delta y - \frac{du}{dz} \delta z - \&c. \right) \\ (13.) \quad + \frac{dV}{dx} \delta x + \frac{dV}{dy} \delta y + \frac{dV}{dz} \delta z + \&c.,$$

where $P = Du$, and $\frac{dV}{dx}, \frac{dV}{dy}, \frac{dV}{dz}, \&c.$, are *complete* or *total* differential coefficients with respect to $x, y, z, \&c.$

One other theorem, which has not, we believe, been elsewhere stated, seems worthy of notice here.

Let V be a function of several variables, $x, y, z, \&c.$, either variable or constant in its form with respect to them; then by virtue of the equation (1), we readily obtain the following,

$$dx \delta \frac{dV}{dx} + dy \delta \frac{dV}{dy} + dz \delta \frac{dV}{dz} + \&c.$$

$$(14.) \quad = d\delta V - \frac{dV}{dx} d\delta x - \frac{dV}{dy} d\delta y - \frac{dV}{dz} d\delta z - \&c.$$

Now regarding dV as a *uniform* function of $\frac{dV}{dx}, \frac{dV}{dy}, \frac{dV}{dz}, \&c.$ $dx, dy, dz, \&c.$, viz., the function $\frac{dV}{dx} dx + \frac{dV}{dy} dy + \frac{dV}{dz} dz + \&c.$, we have the equation,

$$\delta dV = dx \delta \frac{dV}{dx} + dy \delta \frac{dV}{dy} + dz \delta \frac{dV}{dz} + \&c. \\ (15.) \quad + \frac{dV}{dx} \delta dx + \frac{dV}{dy} \delta dy + \frac{dV}{dz} \delta dz + \&c.,$$

which combined with the last gives the following,

$$\delta dV = d\delta V + \frac{dV}{dx} (\delta dx - d\delta x) + \frac{dV}{dy} (\delta dy - d\delta y) + \frac{dV}{dz} (\delta dz - d\delta z) + \&c.$$

and if we put the characteristic θ for $(\delta d - d\delta)$,

$$(16.) \quad \theta V = \frac{dV}{dx} \theta x + \frac{dV}{dy} \theta y + \frac{dV}{dz} \theta z + \&c.$$

which is the theorem that was to be stated.

If either of the variables $x, y, z, \&c.$, as for example x , is a function of the rest, whether variable in its form or not, then

$$\theta x = \frac{dx}{dy} \theta y + \frac{dx}{dz} \theta z + \&c.,$$

and

$$\theta V = \left(\frac{dV}{dx} \frac{dx}{dy} + \frac{dV}{dy} \right) \theta y + \left(\frac{dV}{dx} \frac{dx}{dz} + \frac{dV}{dz} \right) \theta z + \&c.; \text{ or if } \frac{dV}{dy}, \frac{dV}{dz}, \&c.$$

be put for total differential coefficients of V , with respect to $y, z, \&c.$, $\partial V = \frac{dV}{dy} dy + \frac{dV}{dz} dz, \&c.$; the same result that would be obtained by regarding V at first as a function of only $y, z, \&c.$, subject to all the variation of form with respect to these variables, which is due to any variation of form that may have been attributed to it, with respect to $x, y, z, \&c.$, and which is due to any variation of form that may be assumed for x , considered as a function of $y, z, \&c.$

SCIENTIFIC INTELLIGENCE.

I. CHEMISTRY AND PHYSICS.

1. *On the presence of Fluorine in Anthracite*; by GEORGE C. SCHAEFFER, (communicated for this Journal).—But little attention has hitherto been paid to the curious pseudo-sublimate formed in the flues of stoves in which anthracite coal is burned. Several years ago a committee of the Franklin Institute made a report on the corrosion of iron pipe, &c. by the burning of anthracite. This is the only notice of this substance known to us. The committee attributed the corrosion to the action of ammoniacal salts containing sulphuric acid and chlorine.

The substance in question is not wholly a sublimate, being formed partly by the condensation of ammoniacal salts and partly by the direct action of the gaseous products of combustion on the iron; when the fire has been frequently rekindled, there is more or less mixture of carbonaceous matter.

The action of damp air on this substance when cold, increases the corrosion of the pipe, as demonstrated in the report above mentioned. This however is not the sole cause, for large flakes may easily be separated from pipes which have not been exposed to damp air, and these will always be found to contain much iron.

There is another substance found in the pipes; this is formed of the ashes carried up by the draught, and is more or less incrustated and mixed with the condensed products of combustion.

Soon after the report of the committee of the Franklin Institute was published, my attention was drawn to the same subject. I found on subliming even the smallest portion of these flakes in an open glass tube, that the glass was corroded. As I was engaged in determining the presence of another substance, I did not pay much attention to this indication of the presence of fluorine.

I have more recently tried the usual test for fluorine, and find that with a small quantity of the sublimate, the glass is always engraved; even a few grains will suffice to give marks which are visible when the glass is dimmed by breathing on it.* This reaction uniformly takes

* If the leaden vessel in which this experiment has been tried, is allowed to stand for some time, a large quantity of transoerent and perfect octahedrons of iron and ammonia alum will be found. These may be readily freed from the black residue by agitation with a small quantity of water. The crystals however soon become opaque and brown when exposed.

place, and we may therefore add fluorine to the number of elements already found in anthracite.

Since making these experiments, my attention has been directed to a note by the Messrs. Rogers, on the occurrence of fluor spar in anthracite; these gentlemen correctly attribute the fluorine to the vegetation of the coal plants, although no attempt seems to have been made to determine its constant presence in the coal.

A single trial has shown that phosphoric acid is likewise present. I have not repeated the experiment, but there can be no doubt that this constituent of plants of our era, was equally abundant in the coal plants.

It may be remarked, that the sulphur is not altogether found as sulphuric acid in the sublimate, for hydrochloric acid disengages a large quantity of sulphurous acid. The investigation of this curious substance is not yet completed. The results, if worth recording, will be communicated to this Journal.

2. *Arsenate of Magnesia and Ammonia, and its applications*; by M. LEVOL, (Com. Rend., July, 1846; Ann. de Chim. et de Phys., Aug., 1846).—This salt is said to correspond in all respects with the phosphate of magnesia and ammonia; it is formed in the same way and possesses the same sparing solubility in water containing ammonia. The presence of one part of arsenic acid in 56818 of ammoniacal water was rendered evident on the addition of a strong solution of ammoniacal sulphate of magnesia. M. Levöl proposes this salt as a means of estimating arsenic acid when arsenious acid is present. The dried precipitate must be heated to a red heat, care being taken to avoid reduction of the acid, there remains $2MgO, AsO_5$. The insolubility of this salt renders it probable that the ammoniaco-magnesian salts will prove antidotes in cases of poisoning with arsenic acid. G. C. S.

3. *On the Acids of Tobacco*; by M. E. GOUPIL, (Com. Rend., July, 1846; Ann. de Chim. et de Phys., Aug., 1846).—The chief organic acid of the tobacco is the malic. Bimalate of ammonia may be obtained readily from the plant, which in its dry state affords 3 to 4 per cent. M. Goupil has discovered that the conversion of the precipitated malate of lead into a crystalline mass does not take place unless there is free acid present. This is an important fact, as the conversion into crystals is commonly assigned as a distinguishing character.

Citric acid is found in the tobacco plant but in a very small quantity. No other organic acids could be found. G. C. S.

4. *On the Fusion of Phosphorus*; by M. ED. DESAINS, (Comptes Rendus, July, 1846).—The melting point of phosphorus, determined very carefully, was found to be $111\frac{1}{2}^\circ$. The phosphorus should be covered with water and constantly agitated while cooling; without this precaution it may remain liquid even at 72° ; on solidifying, its temperature rises to about 104° . The rate of cooling of the solid and liquid phosphorus between these two points would indicate the same specific heat for the two different states of the substance.

5. *On Coffee*, (third part); by M. PAVEN.—In order to isolate the aromatic substance of the coffee, the usual hot infusion was distilled in a vessel connected with several successive receivers kept at different temperatures. The aromatic principle was found almost entirely condensed in that which had preserved a temperature of about 80° . Sev-

eral purifications are required to separate a solid fat which is entirely inodorous; the true aromatic substance is a mixture of two oils, one probably an alteration of the other. This oil, upon which the flavor of the coffee depends, is but the "0002 of the berry; it is not surprising, therefore, that a single drop diffuses the odor of coffee throughout a room.

M. Payen gives a curious calculation of the value of this aroma, by which it appears that about one thousand dollars per pound is paid for this oil. G. C. S.

6. *Determination of Nitrogen in Organic Bodies*; by GEORGE KEMP, M. D. (Chem. Gaz., Nov., 1846.)—Dr. Kemp cautions us against the following source of error in the manipulation of Varrentrap and Will's process for estimating nitrogen. When the substance to be analyzed contains a small proportion of nitrogen and much hydrogen, a larger quantity of the substance must be taken to obtain a sufficient amount of ammonia. Much water is of course formed, and this condensing in the cooler parts of the tube, forms a pasty mass with the soda-lime, which forms a plug in the front end of the tube, and spoils the analysis, or at the drawn-out end prevents the removal of all the ammonia, so that as much as one-third may be lost. To avoid this difficulty, four parts of lime to one of hydrate of soda are to be used, instead of the usual proportion of two to one. The end, instead of being drawn up abruptly, is to be drawn out for about a quarter of an inch, and then upwards, so as to form a segment of a circle. In loading the tube, about an inch of coarsely powdered lime is to be introduced before the mixture.

Dr. Kemp also points out the ammonia floating in the air, as a source of error, particularly in large laboratories, where several different operations are carried on at the same time, and by different persons; in private laboratories, there is less risk of introducing ammonia in this way. G. C. S.

7. *On the Preparation of Caustic Baryta*; by Dr. E. RIEDEL, (Chem. Gaz., Nov., 1846.)—The author gives the preference to the process with sulphuret of barium and peroxyd of manganese, as described in the books; with oxyd of copper, he states that the product is less pure, as the ley generally contains a slight trace of copper. This is directly contrary to what is commonly asserted of these two methods. G. C. S.

8. *Nitrogen not a Constituent of Picrotoxine*; ERDMANN and MARCHAND, (quoted in Jour. de Pharm. et de Chim., ix, p. 470.)—Liebig has asserted, when speaking of the vegetable alkalies, that "no remedy, devoid of nitrogen, possesses a poisonous action in a similar dose;" and adds that this consideration led to the re-examination of picrotoxine, by Mr. Francis, who ascertained that nitrogen did exist in it.

This being contrary to the analysis of several distinguished chemists, Messrs. Erdmann and Marchand have examined the subject with the greatest care. The test of M. Lassaigne, which, as is well known, is exceedingly delicate, failed to give any indication of the presence of nitrogen. The ordinary mode of combustion was then tried, one gramme of the substance being burned each time. Had the picrotoxine contained half of one per cent. of nitrogen, there would have been collected 4 cub. cent. of that gas. In two experiments, they obtained

.5 and .7 of a cub. cent., in two others, 4 and 5 cub. cent.; this gas, however, was not nitrogen, for it was inflammable. This result shows that caution should be exercised in the determination of nitrogen, and that both carbon and hydrogen may escape combustion and create a loss, falling of course mainly upon the carbon. G. C. S.

9. *On the Influence of Protoxyd of Nitrogen upon Vegetation*; by M. VONK, Jr., (Jour. de Pharm. et de Chim., x, p. 101.)—Seeds of the cress were exposed on a moistened sponge to an atmosphere of pure protoxyd of nitrogen. For the sake of comparison, seeds were placed in the same manner in a jar of common air. At the end of a few days, the latter vegetated and began to form leaves. The seeds in the protoxyd swelled, and were covered with a mucous coat, but remained for two weeks without any other signs of vegetation. On being taken out and exposed to the air, they immediately germinated. The gas was found unaltered.

Plants of the cress were then introduced into the gas; on the third day they became yellow, and at the end of a week they drooped. Brought into the air, they resumed in a few days their green color and erect position.

From these experiments, the author concludes that the protoxyd of nitrogen favors neither the germination of seeds, nor the vegetation of plants already forward, that the gas is not decomposed by the leaves, even under the direct rays of the sun, and that seeds do not lose their vitality by a short exposure to its influence.

These conclusions are true for the pure gas, but it by no means is to be inferred that the gas is altogether unfavorable to vegetation; we are persuaded that the contrary will be found true. In a similar manner, Braconnot, not long since, demonstrated that salt was injurious to vegetation: plants coated with a tolerably strong solution of salt, withered and died; ergo, salt was injurious! G. C. S.

10. *On the Volatile Oils of the Crucifera*; by F. PLESS, (Liebig's Annalen, lviii, p. 36.)—The leaves and seeds of the *Thlaspi arvense* yield, by distillation with water, a volatile oil, which, on examination, proves to be a mixture of oil of mustard and oil of garlic. This oil does not preëxist in the plant.

The leaves and seeds of *Alliaria officinalis* give a similar mixture of these two oils, although the oil of garlic is sometimes absent.

The oil of mustard alone is formed from the leaves of *Iberis amara*, and in very small quantity from the seeds of *Capsella bursa-pastoris*, (shepherd's purse,) *Raphanus raphanistrum*, (charlock,) and *Sisymbrium officinale*, (hedge mustard.)

An essential oil, containing sulphur, is also obtained by macerating in water the seeds of *Lepidium ruderalis*, *L. sativum*, (pepper-grass,) and *L. campestre*.

The same reaction is observed with the roots and seeds of the radish, and the seeds of the *Brassica napus*, *Cochlearia draba* and *Cheiranthus annuus*, (stock jilly.) G. C. S.

11. *On the Oil of Monarda*; by A. E. ARNOLD, (Liebig's Annalen, lviii, p. 41.)—This oil, the product of the *Monarda punctata*, (horsemint,) was brought from the United States. It consists of a fluid oil and a stearoptene. The former is a yellowish-red fluid, with the odor of

thyme; it boils at 435° F. It is apparently a mixture, as the stearoptene boils nearly at the same point. It is easily converted into a resin by contact with the air or any drying substances.

The stearoptene forms fine crystals; its boiling point is 428°. The formula is $C_{10}H_{16}O$. (Gerhardt remarks that this is the formula for stearoptene of caraway oil.) This substance combines with hydrochloric acid gas, but does not form a crystalline compound. G. C. S.

12. *On the Substances contained in Achillea millefolium*, (Yarrow;) by B. ZANON, (Liebig's Annalen, lviii, p. 21.)—This plant possesses much reputation as a febrifuge, both in this country and in Europe. M. Zanon obtained from it a bitter extract, which he calls *Achilleine*, and a crystallized non-volatile acid, which formed salts with potash, soda, ammonia, lime and quinine. No analysis is given, so that we are unable to say whether the *achilleic* acid and the extract are new substances, or are already known. G. C. S.

13. *On the Formation of Caoutchouc from Drying Oils*; by L. E. JONAS, (Archiv. de Pharm., xvi, p. 159.)—Linseed oil, boiled for a long time, yields a brownish varnish; this is to be boiled for a long time in water containing nitric acid, the loss by evaporation must be supplied and the acid not allowed to act too violently. At last a substance is obtained, which gradually solidifies; this is to be washed to free it from acid. This substance does not adhere to the fingers, is plastic, does not melt by itself, and when heated, strikingly resembles caoutchouc.

It dissolves partially in ether and sulphuret of carbon; entirely in oil of turpentine. Walnut and poppy oils furnish the same body, to which the name of oil-caoutchouc is given.

When linseed oil is boiled with half a part of sulphur, as soon as the temperature reaches a certain point, the whole is converted into a gelatinous mass, resembling oil-caoutchouc; dilute nitric acid converts all the sulphur into sulphuric acid; the residue has a brick-red color, which however is not elastic. G. C. S.

14. *Purification of Mercury*; by M. MILLON, (Ann. de Chim. et de Phys., Nov. 1846.)—Mercury may be perfectly purified by agitating it for a considerable time with weak nitric acid. With two pounds of the metal, about an ounce and a half of the acid diluted with twice its volume of water may be employed. The mercury freed from the nitrate thus formed is to be boiled with pure nitric acid sufficient to dissolve about nine-tenths of the metal; the resulting nitrate of mercury is to be reduced to red oxyd by heat, and this is to be calcined in a porcelain retort to reduce it.

By the action of the first portion of nitric acid the more oxydable metals are acted upon; the second portion of acid leaves the metals less oxydable than mercury in the undissolved portion.

As the mercury reduced by this process dissolves a notable quantity of oxyd, this last is to be separated by agitation with sulphuric acid; it is afterwards to be washed with a very large quantity of water, and dried in the receiver of the air-pump over sulphuric acid. Mercury thus purified was employed by M. Regnault in his third determination of its density.

M. Millon states that when a saline solution, such as chlorid of calcium, hydrochlorate of ammonia, nitrate of potash, &c., is added to

mercury in a bottle, the mercury is always divided into rounded globules, which remain separated from each other for a long time; but what is very striking is, that the size of the globules, which varies enormously, is always connected with the nature of the aqueous solution. Some solutions immediately cause extreme division in the mercury; others, on the contrary, produce only very large globules, to whatever extent the agitation may have been carried; and the same effect is always produced with the same solution. It is to this influence of saline solutions that is due the difficulty often witnessed in collecting mercury when it has been reduced in the moist way.

15. *Grove's Galvanic Battery, improved for the use of the Telegraph*.—To increase the power of this battery, it is common to amalgamate the zinc cylinders with mercury. In the use of the battery at the stations of the telegraph, the mercury is soon attacked by the nitric acid which passes through the porous cup or by impurities in the sulphuric acid, and perhaps by both. It thus became necessary to repeat the amalgamation daily or every day or two, at no inconsiderable expense from the oxydation of the mercury. In trying some experiments, Mr. Swan of this city, was led to put crystals of sulphate of soda into the diluted sulphuric acid, when he found the action to be more uniform, and the mercury to be unattacked. On making the trial of the sulphate of soda in the telegraph battery, the experiment was entirely successful and the amalgamation was not repeated for weeks. In the new line on the Canada shore, it is stated by the superintendent, that they began with the use of the sulphate of soda, and that the quicksilver appeared uninjured after weeks of use. Should this fact be established, the saving on the telegraph lines will be some thousands of dollars annually. Indeed the experiments are already conclusive. The result is probably due to the decomposition of the sulphate of soda, by which nitrate of soda is formed and sulphuric acid liberated, while the nitric acid is thus prevented from acting on the quicksilver. There may be other effects; but the advantage gained from the sulphate of soda is very great. The crystals of sulphate of soda must be renewed so often that the dilute sulphuric acid may be a saturated solution. C. D.

Rochester, Feb. 15, 1847.

16. *Maximum Density of Pure Water*, (Phil. Mag., Jan., 1847, xxx, 41.)—Messrs. JOULE and PLAYFAIR, after detailing several series of experiments, give as their final conclusion, which they remark cannot be more than a hundredth of a degree from the truth, that the maximum density of pure water is 39°·1 F. They object to the use of 60° F. as a standard in researches on specific gravity, on account of the high rate of expansion of water at that temperature, and suggest, that there would be greater accuracy if water at its maximum density were taken as the unit. This standard has already been adopted in France under the authority of Arago.*

The result arrived at by Despretz, from a very extensive series of experiments with an apparatus similar to that employed by Hope, was

* This standard was used by Mr. Hassler, in his elaborate investigations during the years 1830-1832, with regard to the weights and measures of the United States, after previously determining, by a long series of experiment, 39°·33 to be the temperature of maximum density.

39° 176, which agrees nearly with the above result. But other results show considerable discrepancy; e. g., Hallström, 39° 33, Blagden and Gilpin, 39°, Hope, 39° 5, Deluc, 41°, Lefebvre Gineau, 40°, Dalton, 38°, Rumford, 38° 8, Müncke, 38° 801, Stampfer, 38° 75 F. The mean of all these observations, is 39° 24.

17. *On a new and practical form of Voltaic Battery of the highest powers, in which Potassium forms the positive element*; by JOHN GOODMAN, Esq. Communicated by S. Hunter Christie, Esq., A.M., Sec. R.S., (Royal Soc., Jan. 11; Phil. Mag., Feb., 1847, xxx, 127.)—The author succeeded in constructing a voltaic arrangement of some power by fixing a piece of potassium to the end of a copper wire, placed in a tube containing naphtha, and bringing it into contact with a small quantity of mercury, held by a layer of bladder closing the lower end of the tube, which was itself immersed in acidulated water immediately over a piece of platinum, and then completing the circuit by establishing a metallic contact between the copper wire and the platinum. This battery acted with energy on the galvanometer, and effected the decomposition of water. A series of twelve pairs of similar plates exhibited a sensible attraction of a slip of gold leaf. Thus it appears that the substance which possesses the highest chemical affinity manifests also the greatest power of electrical tension.

18. *On Photographic Self-Registering Meteorological and Magnetic Instruments*; by FRANCIS RONALDS, Esq., F.R.S., &c., (Royal Soc., Jan. 21; Phil. Mag., Feb., 1847, xxx, 127.)—The apparatus employed by the author at the Kew Observatory, and which he terms the Photo-Electrograph, is described by him in the following words:—"A rectangular box, about sixteen inches long and three square, constitutes the part usually called the body of a kind of lucernal microscope. A voltaic electrometer (properly insulated, and in communication with an atmospheric conductor) is suspended within the microscope, through an aperture in the upper side, and near to the object end. That end itself is closed by a plane of glass, when daylight is used, and by condensing lenses, when a common Argand lamp is employed. In either case an abundance of light is thrown into the microscope. Between the electrometer and the ether, or eye-end of the microscope, fine achromatic lenses are placed, which have the double effect of condensing the light upon a little screen, situated at that eye-end, and of projecting a strong image of the electrometer, in deep *obscurum*, upon it. Through the screen a very narrow slit, of proper curvature, is cut, (the chord of the arc being in a horizontal position,) and it is fitted into the back of a case, about two-and-a-half feet long, which case is fixed to the eye-end of the microscope, at right angles with its axis, and vertically. Within the case is suspended a frame, provided with a rabbet, into which two plates of pure thin glass can be dropped, and brought into close contact by means of six little bolts and nuts. This frame can be removed at pleasure from a line, by which it is suspended, and the line, after passing through a small aperture (stopped with grease) cut through the upper end of the long case, is attached to a pulley (about four inches in diameter) fixed, with capacity of adjustment, on the hour arbor of a good clock. Lastly, counterpoises, rollers, springs, and a straight ruler are employed for ensuring accurate rectilinear sliding of the frame, when the clock is set in motion.

"A piece of properly prepared photographic paper is now placed between the two plates of glass in the movable frame; the frame is removed (in a box made purposely for excluding light) and is suspended in the long case; this is closed, so as to prevent the possibility of extraneous light entering with it; the clock is started, and the time of starting is noted.

"All that part of the paper which is made to pass over the slit in the screen, by the motion of the clock, becomes now therefore successively exposed to a strong light, and is consequently brought into a state which fits it to receive a dark color on being again washed with the usual solution, excepting those small portions upon which dark images of the lower parts of the pendulums of the electrometer are projected through the slit. These small portions of course retain the light color of the paper; and form the long curved lines or bands, whose distances from each other, at any given part of the photograph, i. e. at any given time, indicate the electric tension of the atmosphere at that time.

"By certain additions to the instrument above described, the kind as well as the tension of electrical charge is capable of being registered; and by the employment also of a horizontal thermometer, &c., it is adapted to the purposes of a *Thermograph*, as well as *Photo-barometroph* and *Magnetograph*."

II. MINERALOGY AND GEOLOGY.

1. *Boratite, a new Mineral*; by M. DELESSE, (Comptes Rendus, Oct. 26.)—This mineral is a hydrous carbonate of zinc, copper and lime, in definite proportions; it crystallizes in bluish radiating needles; and has the specific gravity 3.20. According to the analysis of M. Delesse, it consists of carbonic acid 21.45, oxyd of zinc 32.02, lime 8.62, oxyd of copper 29.46, water 8.45. This leads to the formula $2(\text{Zn, Cu, Ca}) \text{C} + \text{aq}$, or admitting the ideas of M. Scheerer on polymeric isomorphism, $\text{CO}^2 (\text{RO})^2$.

Boratite has been found in the copper mines of Lotefskoi in the Altai mountains, at Chessy near Lyons, at Temperino in Tuscany, and at several other localities.

2. *Groppite, a new Mineral*; by L. SVANNERG, (Arab. Berz., 1846, p. 240.)—This mineral, from Groppito, constitutes a rose red to brownish red crystalline mass having much resemblance to rosie. The structure is somewhat foliated. Hardness between that of gypsum and calc spar; specific gravity 2.73. It affords water before the blowpipe, and on analysis gave, silica 45.008, alumina 22.548, oxyd of iron 3.063, lime 4.548, magnesia 12.283, potash 5.227, soda 0.215, water 7.110, undecomposed 0.131=100.213, leading to the formula $\text{rSi}^2 + 2\text{AS} + \text{Ag}$. It is near giantolite in composition.

3. *Herschelite*, (Ann. de Ch. et de Phys., xiv, 97.)—According to Damour, Herschelite is a zeolite with essentially the same composition as chabasite, or $\text{R}^2\text{Si}^2 + 3\text{AlSi}^2 + 10\text{H}$. The analysis agrees very closely with Thomson's analysis of the variety Levyne.

4. *Aspasolite, a new Mineral*; by M. SCHEERER, (Arab. Berz., 1846, p. 241.)—Aspasolite occurs with iolite, quartz, feldspar and mica at Kragerö, in Norway. It resembles iolite in crystalline form, has a greenish color, the hardness of calc spar, and the specific gravity

2-764. In composition it differs little from iolite, affording silica 50.90, alumina 32.38, magnesia 8.01, lime a trace, protoxyd of iron 2.34, water 6.73, manganese a trace.

5. *Castor and Pollux, two new minerals*; by BREITHAUPT and PLATTNER, (Pogg. Ansal. lxi.)—These minerals occur in granite on the Island of Elba. *Castor* has a vitreous lustre and rough surface, and is transparent and colorless, with two axes of double refraction and two cleavages inclined at an angle of 128°, or 129 degrees. Hardness, a little above *adularia*; specific gravity 2.3801—2.401. Fuses with difficulty before the blowpipe to a limpid colorless glass, coloring the exterior flame red. Composition according to Plattner, silica 78.012, alumina 18.856, peroxyd of iron with traces of manganese 1.613, lithia with traces of potash and soda 2.760=100.241.

Pollux resembles *castor* in crystallographic and physical characters, except that there are only traces of cleavage, and it has the specific gravity 2.868 to 2.892. Heated in a tube, water is disengaged. Before the blowpipe the edges are rounded to a blebby enamel, and it colors the exterior flame reddish yellow. It contains 46.2 per cent. of silica, with 16.5 of potash, 10.47 of soda and 2.321 of water. There was a loss in the analysis unaccounted for of 7.25 per cent.

6. *Pleochroism*.—Haidinger has applied the term pleochroism to the property pertaining to many crystals, of presenting different colors in different directions. The terms dichroism and trichroism heretofore used are too limited in signification, as different colors are presented in some species in more directions than three.

7. *Russian Geology*, (Proceedings of the Acad. Sci. of St. Petersburg; L'Institut, No. 681, Jan. 20, 1847.)—M. HELMSEN has ready for publication an extended account of the geological observations which he has made in his different journeys through the departments of Livonia, Estonia, Pskov, St. Petersburg, Novgorod, Tver, Moscow, Toula, Kalouga and Orel; and in the summer of 1845, he made a tour into Sweden and Norway in order to compare his results with the facts there presented and give greater completeness to his description of the palaeozoic and other deposits of Northern Europe.

8. *On Slaty Cleavage in North Wales*; by DANIEL SHARPE, (Geol. Soc., March, 1844; Quart. Journal Geol. Soc., No. 7, p. 309.)—In the course of a valuable article on the geology of North Wales, Mr. Sharpe makes the following statements with regard to slaty cleavages.

In North Wales, not only in the Cambrian but also in the Lower Silurian rocks, slaty cleavage is universal: it is very common in the Wenlock series; and in many localities it runs, in a marked degree, through the whole thickness of the Ludlow shales; but in other localities these shales are wholly exempt from it. The principal epoch of slaty cleavage, however, preceded the formation of the Ludlow beds; for these beds are in many instances undisturbed by the faults which have broken up the planes of cleavage in the older rocks. The author was assiduous in measuring the position of the planes of bedding and cleavage in various parts of North Wales, in the hope of making out some general laws respecting cleavage. In measuring the angles, however, he does not pretend to have approximated nearer than within 5° of the truth, as the surface of the beds is rarely flat enough to allow of greater accuracy.

One law respecting slaty cleavage was announced in 1831 by Professor Sedgwick,* and is now well known: that law is, that the cleavage planes maintain their parallelism over extensive areas, irrespective of the varying position of the beds which they cut through, or of the mineral character of the beds. Another law respecting slaty cleavage was detected by the author† in the progress of his tour, and is the following: viz. that the strike of the cleavage coincides with the strike of the bedding, whenever the latter continues uninterruptedly the same for a considerable distance; but when the strike of the beds is inconstant, and shifts at short intervals, then the cleavage planes hold their course right on, irrespective of the varying position of the planes of bedding; in other words, that the strike of the cleavage coincides with the prevailing strike of the beds in each district, and does not vary with the subordinate and local irregularities in the strike of the beds. Whence it follows, that the strike of the cleavage in a district is far more constant and regular than the strike of the beds.

In order to present, in a succinct form, the evidence from which the author has deduced this second law respecting slaty cleavage, the observations he made, in various parts of North Wales, of the positions of the planes of bedding and cleavage, are arranged in a table. [See Quart. Jour. Geol., p. 315.]

From the author's observations it appears that the district of North Wales in which the parallelism between the strike of the bedding and cleavage appears in the most marked degree, is all that part of Carnarvonshire which lies north of Tremadoc. Throughout this area, on the south of the Holyhead road, the beds as well as the cleavage planes strike northeast. On the west side of the Snowdon anticlinal, the beds are much tossed about and dip at various angles either northwest or southeast, and the cleavage planes are nearly vertical. On the east side of the anticlinal, the beds dip southeast, and the cleavage dips northwest from 60° to 65°. On the eastern side of the Carnarvonshire synclinal, the beds dip northwest, as does also the cleavage, but at an angle which gradually diminishes as you recede from the Snowdon chain. Thus at the Rhiw Brefidr quarries the angle is 55°; at the Diflwy quarries it is 45°, and at Manodmawr 35°. Towards the northern extremity of the county of Carnarvon the strike of the beds changes from northeast to N.N.E., as does also the strike of the cleavage. To the south of Tremadoc the beds change in strike from northeast to east, and the cleavage changes in strike from northeast to E.S.E.

The parallelism in the strike of the planes of bedding and cleavage prevails also, in a marked degree, in the slaty district north of the Dee, and also in the North Berwyns. The common strike of the two planes approaches to east; but it is subject to many local variations; and in

* Geol. Trans., II Ser., vol. iii., p. 68.

† While the author was drawing this conclusion from his observations in Wales, a nearly similar law was announced to the British Association at Cork by Professor Phillips, in the following terms:—"The cleavage planes of the slate rocks of North Wales are always parallel to the main direction of the great anticlinal axis, but are not affected by the small undulations or contortions of these lines. In North Wales they maintain the same direction for fifty miles, not varying more than two or three degrees." [See also, pages 339, 365, 384, of this number.—J. D. D.]

such cases the two planes vary in strike together. The cleavage has a northerly dip at angles varying from 25° to 65° .

In the Barmouth chain the strike of the cleavage is somewhat irregular; but its mean direction is north and south, and its dip is from east 60° to west 60° .

In the district intersected by the great porphyritic eruption of Arenig, Arran Mowdddy, &c., the planes of cleavage have lost their original bearings, and are subject to the greatest irregularity both in respect to direction and dip; and the same observation applies to the district of Lower Silurian rocks extending along the Holyhead road between Bryn-y-ddinas and Corwen.

From the circumstance that the position of the planes of cleavage depends, not on the varying position of the beds at each particular spot, but on their main position, the author infers that slaty cleavage cannot have arisen from any power analogous to that of crystallization; and from the almost mathematical regularity with which those planes are arranged, he concludes that they are not the effect of mechanical force or pressure exerted at the moving or upheaving of the rocks.

The author further concludes from his observations, that in those parts of North Wales where the strata are least disturbed, the planes of bedding and cleavage meet at an angle of from 15° to 30° ; and hence he infers, that in those cases where, at the time of cleavage, the beds were horizontal, such was also the angle at which the cleavage intersected the bedding (15° to 30°). The author further observed, that in the quarries of North Wales which afford the slate of the best quality, the bedding and cleavage rarely meet at an angle less than 25° , and never less than 20° ; and that whenever the angle is less than 20° , the slate is of inferior quality. An increase in the angle at which the planes meet has no injurious effect; for in many instances when the slate is of the best quality, the angle of intersection is 45° and upwards.

9. *On the Salt and Salt Lakes of Algeria*; by H. FOURNEL, (Ann. des Mines, 1846, ix, 541.)—The extended memoir of M. Fournel gives many interesting details and important deductions with regard to the salt deposits of Algeria. Salt lakes or marshes and streams appear to be innumerable; and besides these, banks and even mountains of salt are met with. The salt is associated with gypsum. The most important deposit is that of the salt mountain near Biskra, where the salt is imbedded in the cretaceous formation. The mines five leagues west of Milah are represented as inexhaustible. The lake Zagrez, which is at least twelve leagues long and two broad, was covered throughout, in April, 1844, with a crust of salt having a glistening surface and looking like ice. The crust which is quite thin in some seasons increases to a foot and finally to more than two feet, towards the middle of the lake. The salt is perfectly white and pure, and of good quality, and the quantity not less than 127 millions of cubic meters. There is a mountain of salt near this lake. Lake el Melah, in the province of Oran, is another of the same kind, but less extensive.

10. *Volcanic Peak of the Island of Fogo, Cape Verde*; by C. DEVILLE, (Bull. Soc. Geol. de France, 1846, 2d ser., iii, 656.)—The

peak of Fogo is 2790 meters in height. It stands in the centre of a basaltic crater, rising 1000 meters above its base. The enclosing walls extend entire half way around so as to form a semi-circular crest. On the broken side there are numerous scoria cones thrown up at the eruptions of 1785 to 1799, when all that flank of the island was covered with lavas.

Mr. Deville gives many particulars with reference to the island, and presented to the Geological Society of France a topographical chart of it.

11. *Notice of an Example of apparent Drift Furrows dependent on Structure*; by C. B. ADAMS, State Geologist of Vermont, &c. &c., (communicated for this Journal.)—The attention of geologists having been lately called to the question, whether the grooves and striae commonly attributed to drift agency may not be due to structure,* it may not be improper, in anticipation of the results of the survey of Vermont, to mention an example in which this is undoubtedly the case. Mr. Macintosh, the author of the article which is alluded to, and which was read before the Geological Society of London, particularly suggests that such may be the origin of the examples in the United States described by President Hitchcock, a suggestion, we will venture to add, which must have occasioned much surprise in those who are familiar with these effects of drift agency in the New England States, unless they also may have met with facts of the same nature with those which are the subject of this brief notice.

Not far from the geographical centre of Vermont, in the town of Randolph, on ascending a hill a mile east of the centre village, may be seen a ledge of argillite-mica slate, in which the planes of lamination do not coincide with those of deposit. The former have a direction of north 35° east (true meridian) and a dip of 30° to the north, 55° west. The true strata have a direction of north and south with a dip of 65° west, and although much less conspicuous than the cleavage planes, are distinguished without much difficulty by a slight difference of materials, in consequence of which they weather unequally, so as to form shallow grooves with a well rounded excavation of three to six inches wide and an inch deep. The coincidence of the direction of these grooves with the ordinary cases of drift furrows, and their obliquity to the planes of lamination which are obvious to the passing traveller, who may not without special examination recognize the true stratification of the rock, as well as the well rounded excavation of the grooves, due no doubt to the gradual transition in the characters of the strata, combine to present a case of extraordinary resemblance to genuine drift furrows.

It is proper to add that the examination of several hundred examples of rounded, smoothed, striated and furrowed rocks has brought to light only this case, in which structural grooves bear any resemblance to those which have resulted solely from an external mechanical force. The suggestion of Mr. Macintosh is therefore plainly incapable of general or even common application, although cases may occur in

* See this Journal, ii Ser., Vol. i, p. 277; and Sir R. I. Murchison's *Geology of Russia and the Ural Mountains*, Vol. i, p. 566.
SECOND SERIES, Vol. III, No. 9.—May, 1847. 55

which it is worthy of careful attention. Indeed, President Hitchcock has himself* most scrupulously distinguished the drift furrows from those which are due to structure. Sir R. I. Murchison also remarks that "the greater number of the deviously parallel scratches on the worn surface of the hard crystalline rocks of the north, are, in our opinion, clearly mechanical, and cannot be connected with structural condition."

III. ZOOLOGY.

1. *On the Range of the Beaver in the United States*; by S. B. BUCKLEY, (communicated for this Journal).—In De Kay's *Zoology* of the State of New York, it is erroneously stated that the most southern limit of the beaver within the United States is the northern part of the State of New York. There were beaver living among the mountains of North Carolina in the year 1842, where I saw trees newly cut down by them, and I was informed by my guide that he had seen the beaver. This was in Haywood County, a few miles from Waynesville, on the Big Pigeon River, a wild, rough region, abounding in grand scenery and rarely visited by man, being little known even to the hunters.

2. *On the situation of the Olfactory Sense in the terrestrial tribe of the Gasteropodous Mollusca*; by JOSEPH LEIDY, M.D., (Proceed. Acad. Nat. Sci. of Philadelphia, Dec., 1846, iii, 136).—While no observer of the habits of the terrestrial Gasteropoda doubts the existence of the sense of smell in them, but on the contrary, asserts positively that it does exist, the anatomist has not hitherto been able to point out its precise seat.

Swammerdam, in his *Biblia Naturæ*, speaks decidedly of the existence of this sense in *Helix pomatia*, but offers no conjecture as to its situation. Blumenbach remarks, under the head of *Vermes*, "Several animals of this class appear to have the sense of smelling; as many land-snails (*Helix pomatia*, &c.)" and afterwards adds, "But the organ of this sense is hitherto unknown; perhaps it may be the stigma thoracicum." Cuvier, in his *Mémoire sur la Limace et le Colimaçon*, after remarking on the delicacy of this sense, thinks it probable it may reside "dans la peau toute entière, qui a beaucoup de texture d'une membrane pituitaire."

In investigating the anatomy of this tribe of Gasteropodous Mollusca, I detected an organ which appeared to have been entirely neglected, or has escaped the notice of those who have dissected these animals. It is a depression or cul-de-sac, having its orifice beneath the mouth, between the inferior lip and the anterior extremity of the pedal disk, and which in many species of different genera is elongated backwards into a blind duct, more or less deep, occupying a situation just above the pedal disk within the visceral cavity. In *Balimus fasciatus* it extends backwards as far as the tail, and is several times folded upon itself; in *Glandina truncata* it extends the length of the pedal disk; in the various species of *Helix* it is found from a superficial depression to a sac the length of the pedal disk; in *Succinea obliqua* it is of considerable length; in *Limax* and *Arion* it is a superficial depression; in an unde-

* Final Report on the Geology of Massachusetts, p. 385.

terminated species of *Vaginula*, hereafter to be described, I found it half an inch in length, &c.

It is composed of two laminae; a delicate lining mucous membrane and an external layer, having a whitish or reddish glandular appearance. A large nerve, on each side, from the subesophageal ganglia, is distributed to its commencement, besides which it receives numerous smaller branches along its course from the same ganglia. Its arterial supply is derived from the cephalic branch of the aorta.

This organ, from its situation, relative size to the degree of perfection of the olfactory sense, as in the carnivorous *Glandina truncata*, &c., its structure, and nervous supply, I think, is the olfactory organ.*

3. *Description of a new species of Anser*; by GEORGE N. LAWRENCE, (Annals Lye. Nat. Hist. N. York, iv, 171; read March 16th, 1846).—*Anser nigricans*, Black-bellied Goose. *Specific character*:—

A large white patch on the middle of the neck in front, and extending on the sides; belly brownish black; bill higher than broad at the base.

Bill black, legs and toes black tinged with flesh color, iris dark hazel; head black, tinged with brownish rufous adjoining the bill, with a dirty white line under the eye; neck and fore part of the breast black; a large white patch on the centre of the neck intermixed with black, except at the lower part, where it forms a distinct band of pure white, it is nearly two inches in width, rounding on each side of the neck and almost meeting behind; belly brownish black, sides brownish ash margined with white; back dark brown, each feather margined with a lighter shade; rump-feathers black; axillars and lower wing-coverts greyish black; tail black, consisting of sixteen feathers; upper and lower tail-coverts white; wings black, extending half an inch beyond the tail; second primary one line longer than the first; third half an inch shorter; vent white.

Length 22½ inches; alar extent 44; bill a little higher than broad, measures along the ridge 1½ inches; from gape 1½; lower mandible 1½; tarsus 2½; middle toe 2; outer 1½; inner 1½; weight 3 pounds.

I have taken the above description and figure from an adult female procured at Egg Harbor, N. J., in January. Since then two others have been obtained at the same place, one of which I have in my possession. On dissection it proves to be a male. It agrees in markings with the female, but is evidently a younger bird, being somewhat lighter in the color of its plumage. From this I infer they become darker by age. It is a little larger than the female, the bill being also stouter, measuring ⅝ in. high at the base. When on a shooting excursion some years since, at Egg Harbor, I noticed a bird flying at some distance from us, which our gunner said was a Black Brant. This was the first intimation I had of such a bird. Upon further inquiry of him, he informed me he had seen them occasionally, but they were not common.

* Since writing the above, I have had an opportunity, through the kindness of Mr. Clesin, of examining a specimen of *Helix pomatia*, from Europe, in which I find the organ in question existing as a funnel-shaped depression beneath the mouth, and extending backwards along the pedal disk for the distance of three-fourths of an inch. This I consider particularly interesting, as the same species has been minutely dissected and described by Swammerdam, Cuvier, and others, without any reference whatever to this cul-de-sac.

I have learned from Mr. Phillip Brasher, who has passed much time at that place, that speaking to the gunners about them, they said they were well known there by the name of Black Brant, and one of them mentioned that he once saw a flock of five or six together.

From these facts it appears to be known to gunners, but has heretofore escaped the notice of ornithologists. With all my inquiries I have not been able to procure a specimen before this winter. I think it a good and well-marked species.

4. *A new species of Procellaria from Florida*; by G. N. LAWRENCE, (Lyc. Nat. Hist., N. Y., Feb. 8, 1847.)—*Procellaria brevirostris*. Above brownish black; beneath white. Bill short; upper tail coverts white; lower, white tipped with ash, and very long; tarsi pale yellow, marked with black at their ends for two-thirds their length. Length 16 inches; extent 39 inches.

5. *Food of the Mastodon*; by Prof. A. GRAY, (Proc. Bost. Soc. Nat. Hist., Nov. 1846, p. 92.)—Prof. Gray stated that there had been recently placed in his hands specimens of earthy matter, filled with finely broken fragments of branches of trees, which were said to have been found occupying the place of the stomach in the skeleton of the Mastodon exhumed on Schooley's Mountain, N. J., and lately exhibited in Boston. As similar observations are said to have been made in several instances, Prof. Gray was induced to examine the substance brought to him. The wood evidently consisted of branchlets of one, two and three years old, broken, quite uniformly, into bits of half an inch or so in length, with only, now and then, traces of the bark remaining on the wood. The wood was not at all fossilized, and was but slightly decayed. From the appearance of the branchlets examined, Prof. Gray inferred that they belonged to some coniferous tree or shrub, and, probably, to a kind of spruce or fir, rather than to a true pine. This inference was borne out by the examination of thin slices of the wood by the microscope. The woody fibre was very beautifully and distinctly marked with the circular discs that are characteristic of all coniferous wood. The structure agreed quite perfectly with that in similar branchlets of the common hemlock spruce.

6. *On the Moose and Carabou, and on the American Raven*; by L. AGASSIZ, (Proc. Bost. Soc. Nat. Hist., Nov. 1846, p. 187.)—These species differ from the European species, according to Prof. Agassiz, who consequently has named them anew, designating the Moose (*Cervus alces*) the *C. lobatus*; the Carabou, (*C. tarandus*), the *C. hastalis*; the American Raven, *C. lugubris*.

7. *Pyrranga roseo-gularis, a new species from Yucatan*; by Dr. CABOT, (Proc. Bost. Soc. Nat. Hist., Dec. 2, 1846, p. 187.)—Male, top of head, outer edge of primaries and secondaries, and surface of greater and lesser wing coverts, the tail and its upper coverts, bright brownish-red. Under side of tail and its under coverts, throat and flexures of wings, bright rose-color. Back and posterior part of cheeks dark brownish ash-color; anterior part of cheeks, breast, and belly, bright ash-colored. Twelve tail feathers. Bill strongly toothed, horn-colored at top, lighter beneath. Legs and feet horn-colored. Total length 6½ inches; of bill ½ inch; along the ridge ¼; along the gape ⅞ of an inch; across at base ⅔ through from above down. Tooth situated at ¼ inch

from point of bill. Tarsus rather more than ⅓ inch in length. Tail 2½ inches long. Wings from flexure 3½ inches.

8. *Pygorynchus Gouldii, a new Echinus from the Millstone Grit of Georgia*; by M. BOUVÉ, (Proc. Bost. Soc. Nat. Hist., Dec. 1846, p. 192.)—Above, conico-convex, a little more sloping posteriorly than anteriorly. Margin somewhat rounded, except near and under the anus, where by an excavation or depression it becomes acute. Inferior surface sub-circular. Mouth situated about one-third of longitudinal diameter from the anterior margin. Apex sub-central, a little anterior, but not so much so as the mouth. Ambulacra radiating at unequal angles, the interambulacral spaces dividing the three anterior from the two posterior, being wider than the rest. The pores of each diverge considerably from the apex, becoming quite dilated a short distance from it, then converge as they descend, until about two-thirds the distance from the summit to the margin, where they are very limited in width, and where the double rows become single. On the margin they again slightly dilate, and are readily traceable to their termination about the mouth, where they are prominent. The anterior ambulacrum is much narrower than the rest. Anus transverse, and situated at about one-fifth the distance from the posterior margin to the apex. Whole length, as shown by three individuals examined, 1½ inches, greatest width 1¼ inches, height 1 inch. Locality, Baker County, Georgia. Description of characters from specimens in Cabinet of the Society.

I have named this beautiful species after my respected friend, Dr. Augustus A. Gould.

IV. METEOROLOGY.

1. *Meteorological Observations at Waioli,* on Kauai, one of the Hawaiian Islands: from April 1st, 1845, to March 31st, 1846*; by EDWARD JOHNSON, Missionary of the A.B.C.F.M.—(Communicated.)

Months and date.	FAIR. THER.					WINDS.		WEATHER.				
	Average at 4 A. M.	Average at 1 P. M.	Average at 6 P. M.	Maximum.	Minimum.	N. E. Trades, A. M.	N. E. Trades, P. M.	Variable, A. M.	Variable, P. M.	Clear, A. M.	Clear, P. M.	Cloudy, A. M.
April, 1845,	66.0	73.0	77.0	85.0	66.0	10	11	8	2	11	10	9
May, "	69.6	80.3	84.0	85.0	66.0	7	6	4	1	14	15	1
June, "	71.6	82.7	85.0	86.0	66.0	6	5	3	1	10	10	3
July, "	72.0	83.0	85.0	86.0	66.0	3	3	1	1	6	6	2
August, "	71.6	83.2	85.0	86.0	66.0	3	3	2	2	5	5	3
Sept., "	71.4	82.6	84.0	85.0	66.0	3	3	3	3	5	5	3
Oct., "	69.6	78.5	83.8	84.0	64.0	10	13	15	11	9	10	6
Nov., "	66.7	76.3	82.0	83.0	63.0	4	4	16	12	4	4	3
Dec., "	65.2	75.0	80.8	82.0	62.0	7	7	14	11	6	6	1
Jan., 1846,	65.0	74.8	80.7	82.0	62.0	3	3	12	11	8	8	1
Feb., "	63.3	73.5	78.4	80.0	60.0	10	10	18	16	10	10	1
March, "	63.4	75.6	80.0	82.0	60.0	18	18	13	15	6	6	4

REMARKS.—By an inspection of the above table, it will be seen that the thermometer was noticed three times each day, viz. at 5 o'clock

* Waioli is in about 22° 15' N. Lat., and about 160° W. Long, from Greenwich.

30m. A. M., and 1 and 6½ o'clock, P. M. It was suspended in an open lanai, in the shade.

The highest point of the thermometer was 90° in the month of June, and the lowest 54° on the mornings of the 10th and 11th of January. On the 11th of August it rose to 113°, placed upon a tin water-gauge in the sun.

It will be seen that the greatest fall of rain in any one month, was in October; which was 18.4 inches. The greatest amount noticed in any one day, was on the 17th of the same month; which was 2.39 inches.

There was a squall with thunder on the 19th of April, in which a native schooner with six foreigners and one islander were lost, and another considerable blow from the N.W. on the 26th of the same month. There was also a light squall on the 1st day of May.

On the 10th of October, there was a gale from the N.W. at night, and on the next evening there was vivid lightning skirting the horizon from north to west.

Nov. 27th, wind strong from westward. Also, strong from N.W. on Feb. 18th and 19th, and on the three last days of March; on which latter days the surf rolled heavily into our bay.

By the "Friend," printed at Honolulu, I learn, that the American whale-ship *Luminary* was struck by a severe gale from W.N.W., in N. lat. 33°, long. 177° 20' W., on the afternoon of March 27th, in which a heavy sea was shipped that took off six men from the deck, and mortally wounded another. The ship was so materially injured as to render it necessary to put back to Honolulu for repairs. This disaster occurred between 1 and 2 P. M., and on the morning of the next day the gale reached this place.

The northeast trades have prevailed 219 days out of the 365. These winds purify the air, and render a summer residence, especially in the more sultry parts of the islands, much more agreeable and healthy than it would otherwise be.

Fair days 170. The weather has been more pleasant, for this place, take the year together, and less rain has fallen, than is usual.

In the columns marked fair, cloudy, showers and rain, there is necessarily some error from imperfect estimates. Yet the aim has been to give the prevailing state of the weather each day.

I may here remark that the Sandwich Islands afford every variety of weather according to the position of the place, and its proximity to mountains; the northern and eastern sides being usually rainy and comparatively cool, while the southern and western sides are warm and dry.

All degrees of temperature may here be found, from the ice-clad tops of Mauna Loa and Mauna Kea, to the scorching sun of Honolulu.

The islands are usually considered healthy, yet almost the whole population of the group were visited by a kind of influenza in April, 1845, that continued through the month. Considerable numbers of the natives died from this attack, and in many other cases other diseases appeared to be aggravated, and death was the result.

2. On the Amount of Rain and Snow at St. Louis for the years 1837 to 1846 inclusive; by Dr. G. ENGELMANN, (communicated.)—Mr. Lyell in his interesting essay on the Delta of the Mississippi, in the

January number of the American Journal of Science, has requested observers along the Mississippi to furnish data as to the quantity of rain falling during the year in their respective localities. In accordance with this desire, I here give the result of ten years observation at this place.

Quantity of atmospherical water (rain and snow water) which fell at St. Louis, from 1837 to 1846.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	May, June, July.
1837.	0.97	1.69	2.84	3.27	3.01	4.15	0.86	2.36	2.83	0.43	2.33	2.31	27.00	8.05
1838.	3.72	1.11	1.51	3.30	1.68	3.73	3.13	4.47	0.06	3.65	2.00	0.44	28.36	8.54
1839.	2.21	2.50	2.60	5.45	7.93	7.26	5.71	2.89	2.45	3.95	2.48	2.00	47.45	20.90
1840.	1.80	1.22	2.10	3.31	4.58	6.27	2.36	7.15	3.96	6.30	1.73	0.71	41.49	13.21
1841.	0.84	0.88	4.99	3.85	2.38	1.67	3.09	5.63	3.21	6.81	5.44	3.99	43.73	7.14
1842.	0.43	3.90	2.31	3.58	3.22	5.12	1.96	2.64	2.17	2.57	2.38	1.62	31.69	10.13
1843.	2.34	1.99	3.49	4.87	4.15	3.95	2.49	1.39	2.19	1.55	4.82	1.72	34.79	10.59
1844.	3.26	1.75	4.84	3.80	11.26	6.85	8.13	0.45	0.36	2.25	1.09	1.61	47.75	26.24
1845.	1.83	1.07	3.48	2.26	4.44	9.93	4.75	6.21	1.63	1.16	1.10	0.95	38.19	19.72
1846.	1.92	1.37	1.27	4.84	3.53	5.21	0.84	4.73	4.84	2.72	2.11	10.69	47.23	9.28
Mean of 10 years.	2.050	1.720	2.933	3.866	4.618	5.414	3.315	3.785	2.305	3.080	2.557	2.622	38.265	13.347

Number of days on which it rained or snowed in every month, from 1837 to 1846.

Years.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Total.	May, June, July.
1837.	6	11	6	5	10	10	8	7	8	5	6	9	90	28
1838.	8	11	5	7	6	8	4	7	1	7	9	5	78	18
1839.	9	5	5	9	10	12	9	5	6	7	8	10	95	31
1840.	9	5	8	11	8	9	10	12	5	7	7	3	94	27
1841.	10	6	12	10	4	9	8	4	4	9	9	7	92	21
1842.	3	8	7	10	8	11	10	7	6	4	7	5	87	29
1843.	6	8	10	9	12	8	6	4	9	8	11	7	98	26
1844.	9	8	15	10	16	14	11	3	3	6	6	5	106	41
1845.	5	6	7	11	6	18	6	12	3	4	5	7	90	30
1846.	8	9	9	12	7	11	4	10	9	9	7	10	105	22
Mean of 10 years.	7.3	7.7	8.4	9.4	8.7	11.0	7.6	7.1	5.4	6.7	7.7	6.5	93.5	27.3

It will be observed that the quantity of rain in the first two years is smaller than in any of the following, and it may be that the rain-gauge, then employed, was imperfect; I substituted another one for it, which has been in use ever since. June is almost always the wettest month; and from May to July, not only the greatest quantity of rain is precipitated, but also in the heaviest showers during the shortest time. They are mostly thunder-showers, especially from the middle of May to the middle of June, which is our rainy season. These rains occasion the rise of our streams about that time much more than the melting of the snows in the mountains. They wash away the loose particles of disintegrated rocks and loose soil, and carry them down towards the Gulf. The quantity of rain precipitated in these thunder-showers, frequently amounts to one and even two inches in the space of twenty or thirty minutes to one hour; but by far the greatest quantity which has fallen at any one time, during this period of ten years, was observed on the 21st August, 1841, when 4.60 inches were collected in 75 minutes, from 1½ to 2½ P. M.

"Professor Peirce remarked, that the orbits given by Mr. Walker differ so widely from the predictions, that he has been induced to make a careful reexamination of the observations. He has not only himself verified Mr. Walker's distance of 30, and the consequent angular motion; but Mr. George P. Bond, of the Cambridge Observatory, has also, at his request, verified this distance and motion from the Cambridge observations alone. From these data, without any hypothesis in regard to the character of the orbit, he has arrived at the conclusion, that *the planet Neptune is not the planet to which geometrical analysis had directed the telescope*; its orbit is not contained within the limits of space which have been explored by geometers searching for the source of the disturbances of Uranus; and its discovery by Gallo must be regarded as a happy accident. Mr. Adams, in his "Explanation of the Observed Irregularities of Uranus," considered two hypothetical orbits, in one of which the mean distance is 38.4, or just double that of Uranus, and in the other it is 37.6; while M. LeVerrier, in his "Researches into the Motions of the Planet Herschel, called Uranus," after deriving some rough approximations from the consideration of the mean distance 38.4, proceeds to the accurate examination of the three distances 39.1, 37.6, and 36.2. The extension of the investigations to any other mean distances can be made only by assuming a continuous law to pervade the subject of inquiry, and that there is no important change in the character of the resulting perturbations. Guided by this principle, well established, and legitimate, if confined within proper limits, M. LeVerrier narrowed with consummate skill the field of research, and arrived at two fundamental propositions, namely,—

"1st. That the mean distance of the planet cannot be less than 35, or more than 37.9. The corresponding limits of the time of sidereal revolution are about 207 and 233 years.

"2d. 'That there is only one region in which the disturbing planet can be placed, in order to account for the motions of Uranus; that the mean longitude of this planet must have been, on January 1st, 1800, between 243° and 252°.

"Neither of these propositions is of itself necessarily opposed to the observations which have been made upon Neptune, but the two combined are decidedly inconsistent with observation. It is impossible to find an orbit, which, satisfying the observed distance and motion, is subject at the same time to both of these propositions, or even approximately subject to them. If, for instance, a mean longitude and time of revolution are adopted according with the first, the corresponding mean longitude in 1800 must have been at least 40° distant from the limits of the second proposition. And again, if the planet is assumed to have had in 1800 a mean longitude near the limits of the second proposition, the corresponding time of revolution with which its motions satisfy the present observations cannot exceed 170 years, and must therefore be about 40 years less than the limits of the first proposition. Neptune cannot, then, be the planet of M. LeVerrier's theory, and cannot account for the observed perturbations of Uranus, under the form of the inequalities involved in his analysis.

"It is not, however, a necessary conclusion that Neptune will not account for the perturbations of Uranus, for its probable mean distance

of about 30 is so much less than the limits of the previous researches, that no inference from them can be safely extended to it. An important change, indeed, in the character of the perturbations takes place near the distance 35.3; so that the continuous law by which such inferences are justified is abruptly broken at this point, and it was hence an oversight in M. LeVerrier to extend his inner limit to the distance 35. A planet at the distance 35.3 would revolve about the sun in 210 years, which is exactly two and a half times the period of the revolution of Uranus. Now, if the times of revolution of two planets were exactly as 2 to 5, the effects of their mutual influence would be peculiar and complicated, and even a near approach to this ratio gives rise to those remarkable irregularities of motion which are exhibited in Jupiter and Saturn, and which greatly perplexed geometers until they were traced to their origin by Laplace. This distance of 35.3, then, is a complete barrier to any logical deduction, and the investigations with regard to the outer space cannot be extended to the interior."

2. *New Comet*, (Proceed. Amer. Acad.)—A telescopic comet was discovered near the star 18 Andromeda, on the evening of March 4, 1847, by Mr. Geo. P. Bond, at the Observatory in Cambridge, Mass. Its place March 4^d 8^h 40^m 09^s, was R. A. 23^h 35^m 50^s.5, and decl. $-50^{\circ} 1' 46''$, referred to mean equin., Jan. 1, 1847. It was quite bright, and nearly visible to the naked eye. On the 8th inst. it was visible to the eye as a star of the 5th or 6th magnitude. The elements of this comet have been computed (1) by Prof. Peirce from places of March 4, 5, 6, and (2) by Mr. Geo. P. Bond, from places of March 5, 12, 19, the latter taking into account the small corrections.

	(1.)	(2.)
Per. pass.	Mch. 31-907 Gr. m. s. t.	Mch. 30-3369
dist.	0-04444	0-0445986
Long. of asc. node,	10° 13'	21° 06' 46"
" perihelion,	256 33	275 16 22
Inclination,	48 53	48 41 49
Motion,	direct,	direct.

This comet is supposed to be identical with that detected Feb. 6, 1847, in *Cepheus*, by Mr. J. R. Hind, at London.

3. *Expected Return of the Comet of 1556*.—We are indebted to John Taylor, Esq., of Liverpool, for several interesting astronomical notices published by him during the past year in the public prints of that city. Most of them relate to subjects which have already been brought forward in this Journal; but we have not hitherto referred to the approaching expected return of the comet of 1556, with the discussion of which one of these notices is occupied. As long since as 1751, Mr. Richard Dunthorne, of Cambridge, on computing the elements of the comet of 1264, found them so similar to those of the comet of 1556, that he was led to the conclusion that the two were identical, and that its return might be expected about 1848. Subsequent investigations which have been made by different astronomers, confirm this conclusion; and there is, therefore, good reason to look for the reappearance of this comet during the year 1848, although it would not be surprising if this event should happen even a year earlier or later than this date.

4. *Parallax of a Fixed Star in Ursa Major*, (Comp. Ren., Aug. 31 and Dec. 7, 1846.)—A star of the 7th magnitude, No. 1830 of Groombridge's Circumpolar Catalogue, has according to Argelander a proper motion of seven seconds of arc per annum, which is greater than that hitherto recognized in any other star. M. Faye, of Paris, by a course of careful observations on the positions of this star with reference to a star of 9-10th magnitude, (whose R. A. is about 30° greater, and declination about 40° less)—assuming, on good grounds, that the parallax of the latter is nearly or quite insensible—has determined in a manner which appears quite satisfactory, that the parallax of the former (viz. 1830 Groombridge) is 1".66. The distance of this star from our sun is, therefore, about 195000 times the radius of the earth's orbit;—a space which would require three years for light to traverse.

5. *Planetary Nebulous Masses near the Sun*.—It is well known that in total eclipses of the sun, there have been often seen conical protuberances of a red color, projecting from behind the disc of the moon. This phenomenon was very conspicuous in the total solar eclipse of July 8, 1842,* and M. Arago has collected many cases of the same kind and printed them in the *Annuaire* for 1846. M. Babinet has published a memoir on these phenomena,† in which he explains them by the supposition, that there are very near the sun, planetary masses, revolving around that body with great rapidity. These incandescent, flame-red, vapory masses, having the form of circular trains more or less elongated, with the sun for their centre, cause the different appearances, which are mentioned in the accounts of total solar eclipses, as *fiery mountains*, *shrafs of flames*, &c. The greatest elongation hitherto observed in any of these bodies is 5', which would show that this one must revolve around the sun in about four hours.

This hypothesis, although ingeniously supported by M. Babinet, is open to objection, and many more observations will be needed before it can be considered as any thing more than plausible.

VI. MISCELLANEOUS INTELLIGENCE.

1. *Relative Level of Lake Ontario*; by C. DEWEY.—In 1845, from June 1st to December 31st, the water of this lake fell two feet and three inches. Observations on the level have been continued through 1846, which show that the water gradually rose from February to June, fifteen inches, though it was then fifteen inches lower than in June, 1845. From July it gradually fell to November, when it was two feet lower than in June, 1845, while it was about the same level as in November, 1845. Through November, owing to the fall rains, it gradually rose, but at the end of 1846, it was the same as in December of the previous year, at least two feet lower than in the summer of the year before.

The difference in the quantity of water that falls in snow and rain, must account for the fall of the lake. The water is below its usual level through all the great lakes to Lake Superior.

2. *Inhalation of Ether in Surgery*.—This new discovery, which promises to relieve the world to a great extent of pain in surgery, has

* See Baily and Airy, *Trans. Astr. Soc.*, Vol. xv, pp. 1, 9.
† *Comptes Rendus*, Feb. 16, 1846, pp. 251-256, 410.

found much favor abroad, and we give the following from among the testimonials which have reached us. It is cited from the *Athenæum*, for Jan. 30, 1847, and credited by this paper to the *Lancet*, Jan. 16 and 23, the *Medical Gazette*, Jan. 22, and *Medical Times*, Jan. 16 and 23.

The practicability and utility of the American discovery of the employment of the vapor of ether in surgical operations is no longer a matter of doubt. Since our first notice of the subject, hundreds of operations have been performed in this country without pain. We would point out, incidentally, the very different nature of the evidence on which we pronounce the verdict of success, from that of the testimony brought forward to support the claim of Mesmerism to be regarded as a means of making surgical operations painless. We allude to this because we see that those who still amuse themselves with mesmeric phantasies regard the state induced by the action of ether as analogous to the mesmeric sleep. Surely, it must by this time be evident to all but prejudiced observers, that had there been a particle of truth in the allegation of painless operation under the influence of mesmeric sleep, medical professors would most gladly have availed themselves of its services.

To return, however, to the ether. The inhalation of gases as a means of treating disease is, it appears, not new in the medical profession. It was carried to a great extent by Dr. Beddoes; but has been comparatively little employed in the recent practice of medicine and surgery. That such gases produced various powerful effects on the nervous system has also been well known: and to this day it is a common practice in our chemical lecture-rooms to administer, by way of amusement to the pupils, nitrous oxyd, or laughing gas, on account of its influence on the nervous system. It has also been known for a length of time, that the vapor of ether, when taken into the system, produces an effect upon the nervous system which has been stated to be analogous to the action of the laughing gas. This, however, is now seen to be a mistake; as the amusing influence of the laughing gas is found to arise out of its action on that system of nerves which supply the muscles of the body—occasioning an increase of their activity; so that persons who have breathed it have a tendency to running, jumping, fighting, laughing, and other motions of the muscular system. The action of ether, on the other hand, is chiefly manifested by its influence on those nerves which are devoted to the function of sensation.

For the application of the vapor of ether to the human system for the purpose of producing insensibility we are indebted to Doctors Morton and Jackson,* of Boston, in the United States; and we believe we may congratulate these gentlemen on having made the most important discovery which has been contributed to medicine since that of vaccination by Jenner. The medical journals quoted at the head of this article report a large number of cases which sufficiently attest the value of this agent—not only in the minor operations of surgery, such as the extraction of teeth,—but also in the most tedious and distressing, and those involving the greatest amount of danger from the shock given to

* Dr. Morton, whose name is here mentioned, received his first information on the subject from Dr. Jackson.

the nervous system. Mr. Lawrence gives an account of one which he characterizes as "one of the most painful surgical operations,"—and which consisted in extirpating the eye-ball for the cure of malignant disease. This was performed with so little pain, that the patient, after recovering from the effects of the ether, did not even know that the operation had commenced.

At the same time that the success of this application has been far greater than could have been anticipated, there have, however, been failures; which prove the necessity of attention on the part of those who employ it. The mode of administering the ether hitherto adopted has been that of introducing into the lungs, by means of a tube, the vapor of sulphuric ether mixed with atmospheric air. Now, although at first sight this would seem a very simple process, there are several points which appear to require attention. In the first place, the apparatus may be so imperfectly constructed, or persons may so mismanage it, that too large or too small a quantity of vapor will be supplied to the system. In the first of the cases, the patient becomes choked—in the last, he does not take a sufficient quantity to produce the effect sought. In the second place, atmospheric air becomes saturated with very different quantities of the vapor of ether at different temperatures. Thus, 100 cubic inches of air saturated with ether at 40°, contain 24 cubic inches of ether; but the same quantity of air at 70° contains 49 cubic inches of the same. This demands attention: but the proper temperature of the room for the best success may be easily ascertained, and regulated with a little care. Another point which may interfere with the action of ether, is the presence of alcohol. Ether is formed from the decomposition of alcohol by sulphuric acid: and unless great care be exercised in its preparation, this substance will be present; and the commercial ether is often largely adulterated with alcohol. The effect of the vapor of alcohol is very different from that of ether—if it be not in the early stages of its action of a directly opposite nature. A fourth point demanding caution, arises from the peculiarly inflammable nature of etherous vapor. Should this agent be employed by careless persons during candle light, it may, from its highly inflammable nature, explode; and from the consequences of that explosion it does not appear evident that the person breathing the vapor would escape—although we have heard of no accident of this kind at present.

The effect of the vapor of ether upon the system seems to be the same as that of an overpowering quantity of alcohol; and as a proof that the effects are the same under other influences, Mr. Lawrence relates a case in which he performed amputation of the leg upon a woman who was intoxicated, and who knew nothing of the matter until she became sober. There is, however, this difference between the action of alcohol and that of the vapor of ether—that with the former the stage of insensibility is preceded by a stage of nervous and vascular excitement, whilst in the latter the insensible state comes on almost immediately. In the numerous cases which have been reported, the ether appears to have had different effects upon the nervous system:—and this has probably been owing to the quantities of the vapor inhaled. Thus, in several cases the effect has been to deprive the patients

of the power of feeling and moving; but they have been conscious all the time, and have witnessed every step of the operation performed on them—though without experiencing pain. In one case, this was rather ludicrously illustrated:—the patient during the operation "giving sly winks and facetious nods to those surrounding him. During the intervals of the inhalation his observations were of the most facetious character—forcing from the bystanders involuntary laughter, and converting that which was to the poor fellow a most tragic event into a scene little short of a farce." In other cases, consciousness is less evident,—but not wholly extinguished. One person during the extraction of a tooth imagined that he was contending with a wild beast—which he thought he had overcome when the tooth was extracted. Another, during the amputation of her leg, "thought she had been in a dream; and that we had hurt her leg to see if she could bear the operation which was to be performed the next day." In the majority of cases, however,—and these probably where the ether has been most adroitly administered,—there has been a total loss of consciousness; and the patients on waking up from the slumber produced, have expressed their surprise not only at the operation being over, but at the apparently short time which it has occupied. Thus, in the operation related by Mr. Lawrence, the patient "expressed a fear that he had not had enough of the ether to produce the desired effect. When told that the operation had been performed, he said—'Operation! operation!—what operation?'—and seemed quite puzzled." This is, undoubtedly, the most desirable state to produce.

The question will now occur—"Are any ill effects to be apprehended from the action of this new agent?" As far as we have seen, or been able to inquire, no after consequences have occurred to occasion any fears where the vapor has been administered with proper precautions by an intelligent medical practitioner. Although the effects on the system may be compared to those of a large dose of alcohol, comparatively little of the excitement and consequent exhaustion dependent on the administration of the latter agent are felt with the ether:—so that no patient need have any hesitation in taking it.

There is another interesting field for inquiry to the medical man in relation to the use of ether; and that is in diseases of the nervous system. We cannot but think that an agent so powerful might be applied with success in arresting some of those diseases of that system in which narcotics are found beneficial; and if not capable of curing, it might at least assist the cure by relieving pain.—We have felt it our duty to give our readers this sketch of the history and action of this new remedial agent: in order, on the one hand, to prevent accidents and failure by its use in the management of unskilful persons—and on the other, to remove any unnecessary doubts or alarm which might be felt by those who would seek relief through its employment.

3. *On the Nile*; by Dr. C. T. BEKE, (Geograph. Soc., Dec. 28 and Jan. 11.—Athen., Nos. 1001 and 1004.)—The obscurity which has so long hung over the sources of the Nile, is, to a great extent, dissipated by the trouble which Dr. Beke has taken to clear up the ambiguities of conflicting statements, and re-establish facts long misunderstood. A careful sifting of the writings of both ancient and modern travellers in

regard to the sources of the Nile, together with his own intimate acquaintance with the country watered by a great number of the primitive tributaries of the great river, have enabled him to unravel the entanglement which obscured the subject, and to present a statement so clear and satisfactory as to leave little labor for future investigators. The Doctor first ascends the Takazie—the Arthorobus of Ptolemy—and minutely describes its various affluents; after which, coming back to the Nile, he ascends it to the junction of the Blue and White Rivers. Going up the Bahr el Azrek, or Blue River, he comes to a spot where M. Caillaud speaks of the Hessen as coming from the S.E.—which Dr. Beke proves to be the Abai of Abyssinia; and he, at the same time, shows that the river described by Mr. Russegger as the upper course of Bahr el Azrek, is in fact the Dedhesa,—a stream first made known by Dr. Beke, and which he now identifies with the Takui, described by De Barras as the great western arm of the Nile; under which name the Portuguese understood the Blue River,—since the White River, or Bahr el Abiadh, was entirely unknown to them. After describing all the affluents of the Abai on both sides, Dr. Beke notices a new river which has of late years appeared in the maps under the name of Habahia,—and which has been supposed by some geographers to be either the upper course of the Kilimaney (Quilimane) or of the Bahr el Abiadh; but which Dr. Beke shows clearly to have no separate existence—it being in fact nothing but the Abai of Abyssinia, called by the Gongs Abbaya. Dr. Beke next discusses the subject of the Maleg—a river which was crossed by Fernandes, in 1613, on his way to Guarea; and shows that the route taken by the Jesuit missionary has been altogether misunderstood by Bruce. Leaving the Abai, the Doctor next takes up the Dedhesa; and enumerates its tributaries on both sides,—as he had done with the other great rivers, the Takazie and the Abai. Having thus exhausted the hydrographic basin of the Blue River, the author, before commencing the particular investigation of the course of the White River, enters into a comparison of the two great arms of the Nile—the White and Blue Rivers; and, after minutely examining the evidence, both ancient and modern, on the subject, concludes in these words: "Thus, whether we consider the relative magnitude of the two rivers, the direction of their respective beds, or the volume of their waters—whether we regard the opinions of the ancient geographers, or those of modern travellers, or of natives acquainted with both streams (for the evidence of such as only know one is of course inadmissible) the result is the same. In all and every of these points of view, the Bahr el Abiadh, or White River, is the principal stream—and the Bahr el Azrek, the subordinate or affluent."

The author now took up the White River, or main stream of the Nile. Our knowledge of the upper course of this river has been obtained from the exploring expeditions ordered by the present ruler of Egypt. On its right bank it receives, in about the 9th parallel, a large river called the Teli or Sobat,—which Dr. Beke identifies with the Godjeb; and he then enters into a minute detail of the affluents of this river on both sides. Among these, it will be sufficient to allude to the Baro and Bako, which join it on the right side, and the various streams bearing the common name of Gibbi, which fall into it on the

left bank. The Godjeb has been presumed to be the upper portion of the Jub or Gowind, which falls into the Indian Ocean near the line; but subsequent information shows this opinion, which originated in Dr. Beke's own information, to be untenable: indeed, M. D'Abbadie positively considers it to be the head of the Nile. The second Egyptian expedition ascended the main stream of the Nile as far as $4^{\circ} 42' 42''$ N.—at which point our positive information ceases; but from the information collected by M. d'Arnaud and M. Werne, who accompanied the expedition, Dr. Beke shows the existence of another great arm of the Nile, called the Shoa Berri; which, like the Abai and Godjeb, joins the main stream from the S.E., and exhibits the remarkable spiral course common to those rivers, with many others of the Abyssinian plateau. As regards the main stream, Dr. Beke, from a comparison of various authorities, both ancient and modern, carries the Nile up to the country Mono-Moezi; and, in fact, shows the great probability of its being a continuation of Lake N'Yassi, the Maravi or Zambezi of the old maps. In the name Mono-Moezi, Dr. Beke finds the origin of the name Mountains of the Moon; in which, according to Ptolemy, the Nile has its rise: the word Moezi meaning moon in the language of that country, as well as in those of the whole of Central Africa. The author next proceeds to consider the physical character of the country in which the eastern tributaries of the Nile have their origin; and which he shows to be an elevated table-land, having an abrupt declivity towards the sea-coast, and a very gradual slope landwards down to the Nile, which skirts its base; and the ridge of which has an elevation of from 8,000 to 9,000 feet above the ocean, independent of isolated mountain masses which attain a height of from 11,000 to 15,000 feet.

4. *Water raised by Waves through Valved Tubes*, (Athen., No. 1001.)—A feasible and obvious application of Harvey's grand discovery of the use of valves in raising the blood through the veins, has just been suggested by a correspondent of the *Mechanics' Magazine*; namely, the raising of water from the sea, by the lash of the waves through valved tubes into reservoirs on a high level,—for the acquisition, of course, of an unlimited supply of water power, to be turned to any requisite purpose. The inventor proposes to test the practicability of this kind of Water-Ram on Southsea Beach.

5. *Electric Telegraph*: Facte. Fancy, (Athen., No. 1001.)—A passage in No. 241 of the "Spectator," offers a curious example of a matter treated by an enlightened writer of the time as a piece of fabulous extravagance, yet more than realized in one of the most extraordinary applications of modern science:—"Strada, in one of his productions, gives an account of a chimerical correspondence between two friends by the help of a certain loadstone,—which had such virtue in it that if touched by two several needles, when one of the needles so touched began to move, the other, though at ever so great a distance, moved at the same time and in the same manner." He tells us that two friends, being each of them possessed of these needles, made a kind of dial-plate, inscribing it with twenty-four letters—in the same manner as the hours of the day are marked upon the ordinary dial-plate. They then fixed one of the needles on each of these plates in such a manner that it could move round without impediment, so as to touch any of the

twenty-four letters. Upon their separating from one another into distant countries, they agreed to withdraw themselves punctually into their closets at a certain hour of the day, and to converse with one another by means of this invention. Accordingly, when they were some hundred miles asunder, each of them shut himself up in his closet at the time appointed, and immediately cast his eye upon his dial-plate. If he had a mind to write any thing to his friend, he directed his needle to every letter that formed the words that he had occasion for—making a little pause at the end of every word or sentence, to avoid confusion. The friend, in the meanwhile, saw his own sympathetic needle, moving of itself to every letter which that of his correspondent pointed at. By this means, they talked together across a whole continent and conveyed their thoughts to one another, in an instant, over cities or mountains, seas or deserts."

6. *Dilatation of Ice*; (Proc. of the Acad. Sci. at St. Petersburg; L'Institut, No. 680, Jan. 13, 1847.)—Heinrich, in 1807, determined by direct experiment, that the coefficient of dilatation for ice was 0.00245, or $\frac{1}{408}$ its length, between 0° and 80° R. This result has been adopted in the interesting researches on glaciers, by Agassiz, Forbes, and others. Under the direction of M. Struve, recent experiments have been made with great care by Lieut. Schumacher of Denmark, (then at Pulkova.) They embraced one hundred and fifty three measurements, between the 11th of February and 24th of March, 1845, for all temperatures from -1° to -22° R., and from degree to degree. The observations were divided into three series; and the mean of the three afford for the linear dilatation of ice between 0 and 80° R. $\frac{1}{411}$, which is more than double that obtained at Ratisbonne. It has also been found that between the temperatures stated, the dilatation is perfectly uniform.

7. *Measure of a Degree of a Meridian in Finland*, (Proc. of the Acad. Sci. of St. Petersburg; L'Institut, No. 681, Jan. 20, 1847.)—The measure of a degree of the meridian in Finland between the island of Hochland and Torneo is finally terminated after fourteen years of severe labor. The chief merit of the great work is due to M. Woldstedt, who has had almost the sole charge since 1836, and has consequently devoted to it ten years of his life. At Torneo, they met the Swedish savants charged by government with an examination of the country between Pahlawara and Laponia and the frontier of Norwegian Finmark. They have already completed their triangulation to Kautokeino, and will soon begin a second line and extend along the coast of Norway between Kautokeino and the North Cape.

8. *Middendorf's Siberian Explorations*.—M. Middendorf, aided by learned friends, is actively engaged with the account of his important expedition, and the Academy of Sciences has been charged to advise as to the means and style of publication.

M. Keyserling is occupied with the fossils collected on the late Siberian expedition under Middendorf.

9. *Bear River Springs, Rocky Mountains*, (Expl. Exped. of Capt. Fremont, and this volume, page 198.)—The temperature of the Bear springs, as observed by Capt. Fremont, was 65° F., at sunset, that of the air being 62°-5. The elevation above the Gulf of Mexico was 5840

feet, or about 500 feet lower than the Boiling springs which are of a similar nature at the foot of Pike's peak on the Fontaine-qui-bouit. On the morning of the next day, (July 26,) the temperature of the large Bear spring was 56°, and that of the Steamboat spring 87°; and that of the steam hole, near it, 81°-5. Farther south on the great salt lake, about seven miles from Clear creek, ten or twelve hot saline springs were observed by Capt. Fremont, in one of which the thermometer stood at 136° and in another at 132°-5.

10. *Chalk and Coal Fires*, (Athen., No. 1001.)—The practical utility of chalk as an article of fuel has been tested within the last few weeks, according to a Salisbury paper, and with the most satisfactory results. Surrounded with coal, it gives a strong heat, and a clear fire, at half the usual expense; so that to the poor, in the chalk districts, it must be an invaluable boon.

11. *Paris Academy of Sciences*.—The following vacancies occasioned by death have lately been filled: M. Fontanier, the French consul at Singapore, has been elected in place of Dubois-Aymé; Panofka of Berlin, in place of Ideler; M. Faye, the Astronomer, in place of Damoiseau.

12. *A Society of Naturalists* has been formed at Trieste, with special reference to the zoology of the Adriatic. Count Odono has been appointed President.

13. *New Appointments to Professorships in Harvard and Yale*.—Mr. E. N. HORSFORD has been elected to fill the chair of the Rumford Professorship of Science applied to the Arts, in Harvard University, and Prof. JEFFRIES WYMAN, M.D., has been chosen Hersey Professor of Comparative Anatomy in the same Institution.

Mr. JOHN P. NORTON has been appointed Professor of Agricultural Chemistry and of Vegetable and Animal Physiology, in Yale, and B. SILLIMAN, Jr., Professor of Chemistry applied to the Arts.

14. *Deviation of a Falling Body*.—In the remarks on the deviation of a falling body to the south, in our last number, it was not considered that the deviation to be accounted for, is that south from a plumb line. The cause there assigned, viz. the earth's rotation, makes the plumb itself deviate to the south of the line of the earth's attraction, as much as the falling body.

Corrections.—We have been informed by Dr. Engelmann, that since the publication of his notice of the Melonites (p. 124), he has ascertained that Dr. Prout first directed Dr. Brown's attention to the locality mentioned, and the latter discovered the fine slab now in possession of the Academy.

In the figure of the Marsilea of North America, page 55, of this volume, the body of the capsule of fig. 1, should have been represented as more connected with the stipe so as to make the raphe much longer. All the figures are twice not half the natural size.

On page 299, in the notice of Dr. Peter's work on Urinary Calculi, "Pennsylvania" is inserted incorrectly for "Transylvania."

In Volume 1, of this series, page 427, under "Electric Excitement of Paper," the word *stone* should be substituted for *stone*.

15. *OBITUARY*.—Dr. Amos Binney.—Science has been called upon to lament the loss of one of her most zealous and efficient votaries in America, Dr. AMOS BINNEY of Boston. In New England especially his aid and influence were preëminent.

After concluding his college course at Brown University, he studied Medicine, but never entered upon its practice, his relations in life and his tastes leading him rather to mercantile pursuits, which he prosecuted successfully.

He early manifested a love for natural science, and was one of the first who cultivated the branches of Mineralogy and Conchology among us. But his general researches extended over the whole field of Natural History. He was one of the founders of the Boston Society of Natural History, and his large and valuable collections of minerals and shells formed the basis of its Cabinet. At the time of his death he was its President, and was also chosen to preside over the "Association of American Geologists and Naturalists," at the coming meeting to be held in Boston in September next.

He contributed several papers on Conchology to the "Boston Journal of Natural History," a work which was modelled under his direction. For several years he had been engaged in a work on the Terrestrial Mollusks of the United States, which he had not quite completed; but which is believed to be in such a state as to be readily terminated by some other hand. To render this work as complete as possible, he had employed a skillful collector for two winters in exploring Florida and the Southwestern States, including Texas. He intended that in fullness of detail and in beauty and accuracy of execution, it should not be surpassed by any other work.

He had amassed what he regarded as a competency, and intended to devote his future days more especially to scientific pursuits. His health having become enfeebled during the last summer, he resolved on a tour to Europe for the double purpose of regaining his health and of visiting scientific men and collections, and also of enlarging his library, already the most valuable private library of Natural Science in America. He sailed for Europe in November last; but his malady rapidly gained the ascendancy over him, and he died at Rome, Feb. 18th, aged forty-three years.

His loss will be felt with peculiar severity by his fellow laborers in the common cause in Boston, where from his wealth, liberality and knowledge of human nature, his influence—always on the right side—was very great.

16. *Dory de St. Vincent*, a military officer of distinction, and also a name well known in science for his various contributions, has lately died in the 66th year of his age.

VII. BIBLIOGRAPHY.

1. *Eulogy on John Pickering, LL.D., President of the American Academy of Arts and Sciences, delivered before the Academy, Oct. 28, 1846.* pp. 106. Cambridge University Press.—Never was an eloquent and glowing tribute of admiration and affection to the memory of a great and excellent man better deserved than in the present instance.

It is a beautiful biographical eulogy, replete with interesting facts, relating to the life and labors and achievements of a scholar who has not had his superior, if his equal, in this land; of a jurist and counsellor of a high order of talent and learning; of a patriot and philanthropist whose efforts and aspirations were indeed first for his country and next

for his race—with a purity and perseverance never surpassed; and finally, his moral and social character in all the relations of life presents a noble example for the imitation of youth and age.

Judge White has presented his subject with the chastened elegance and dignity of style and composition which, as a scholar of a high order, he never fails to do when he appears as a writer. His fine classical eulogy upon the late Dr. Bowditch is still fresh in our recollection—and the names of BOWDITCH, PICKERING, STORY, and SALTONSTALL, are honor enough for the good old town of Salem, although she can present others of no small celebrity among both the living and the dead.

The eulogium of Judge White upon the late Dr. Bowditch* called forth from us the following remarks. "The eulogium of Judge White is a delightful composition, replete with eloquence and literary beauty, and warm with affectionate respect for the great man whom it commemorates. Being the production of a townsman and cotemporary, it presents graphic sketches of his life and character both in the forming and mature stages, and does equal honor to the head and heart of the writer and to his noble subject." All this is strictly true in the case of Mr. Pickering. In this brief notice it is impossible to say anything definite of his wonderful labors. They fill us with astonishment, not to say with self-reproach, when we see how much was done and well done by this extraordinary man within the allotted period of human life, for he died in his 70th year. We will venture to present the following extract of a letter from a mutual friend, himself a man of high attainments in science and arts. It is dated Aug. 23, 1846, in reply to one from the senior editor.

"It has been your good fortune to have known and been connected with the 'good of old,' and to have enjoyed the society of their descendants—a rare privilege. You could therefore better judge, whether the noble traits in the character of the father had been diminished in their transmission to the son. I think that those who did not daily mix their walks with his walks would not form a sufficiently high estimation of his character, as a man and influential member of society. His reputation was more decidedly European than American. The studies of his later years called forth the exercise of the highest powers of intellect; yet he went to his books for relaxation, and while incessantly engaged and overtaking his physical strength, always spoke of them as affording amusement. Lepsius addressed him from the foot of the pyramid of Cheops on abstruse points in the Egyptian dynasty history, and he replied with the promptness of one whose knowledge was at instant command. He, in his last hours, was much excited by any new fact, or inferences growing out of investigation now in progress in Egypt, and seemed to feel that a flood of light would soon burst upon us from that quarter. I have for many years enjoyed a familiar intimacy with him, and the great advantage of knowing through him interesting details in connection with his prospects. A few weeks before his death, he placed in my hands papyri from Thebes, which he

* *Am. Jour.*, Vol. XXXV, p. 386.

† The late Col. Timothy Pickering, a companion of Washington in the war of the Revolution and the first Secretary of State under the constitution during the administration of Washington, at Philadelphia.

wished unrolled, as he considered, from the ancient language in which they were written, that they might be important."

We presume they were the papyri mentioned by Judge White, which proved to be an Egyptian deed of land in Thebes, duly signed, sealed and recorded in the Greek language.

2. *Botany of the Northern States*.—Prof. A. GRAY, of Cambridge, will publish in a few days, a Manual of Botany of the Northern States, extending to Ohio and Wisconsin. This work, of which we have had a glance whilst passing through the press, will prove an invaluable acquisition to all students of our indigenous plants. On the one hand, the language employed is so studiously simple and popular as to be almost divested of technicality; whilst on the other, it is as rigidly exact and scientific as the more elaborate works of the well-known author. It has the further great recommendation of being so compendious and portable, that it may be carried in the pocket, for reference in the fields. In schools and colleges, where "The Botanical Text-Book" of Prof. Gray is now becoming generally introduced, this Manual, its indispensable accompaniment, cannot fail to be appreciated alike by teachers and students; as the succinct descriptions of all the wild plants, upon the system and classification of the Text-Book, will at all times enable the learner practically to apply its scientific principles for himself.

3. *Paleontology of New York*; by JAMES HALL.—The sheets of the first volume of Mr. Hall's Report on the Paleontology of New York, have reached us at a late hour, and we have barely space to announce the publication of this important work. It has been looked for with much interest, and we believe that its high character will fully satisfy the expectations that have been excited by the distinguished reputation of the author.

4. *Lyceum of Natural History of New York*, Vol. iv, Nos. 8 and 9.—These numbers conclude the fourth volume of the Transactions of the Lyceum of Natural History of New York. It is occupied with a continuation of the elaborate catalogue of Geodaphnoid Coleoptera of the United States, by M. John L. LeConte of New York. This catalogue is enriched with various annotations, and with detailed descriptions of species of the following genera:—Myas, Stomis, Isopleurus, Percosia, Celia, Amara, Tricena, Acrodon, Bradytus, Curtonotus, Euryderus, Geopinus (n. g.), Agnoderus, Cratacanthus, Pisonia (n. g.), Amphasia, Spongopus (n. g.), Anisodactylus, Eurytrichus (n. g.), Seneloporus, Pangus, Harpalus, Geobaeus, Gynandropus, Stenolophus, Acupalpus, Aegus, Eraphius, Anophthalmus, and Lachnophorus.

5. *Journal of the Boston Society of Natural History*, Vol. v, No. 3.—F. ALGER, Notices of New Localities of rare Minerals, and reasons for uniting several supposed distinct species: p. 297.

H. D. and W. B. ROGERS, On two remarkable Trains of Boulders in Berkshire, Massachusetts: p. 310, with a plate.

J. P. KETLAND, M.D., Description of the Fishes of Lake Erie, the Ohio River, and their Tributaries: p. 330, with four plates.

J. LEIDY, Anatomical description of the animal of the *Littorina angulifera*: p. 344, with figures.

ASA GRAY, Notice of a New Genus of Plants of the Order Santalaceae: p. 348.

N. M. HENTZ, Descriptions and Figures of the Araneides of the United States: p. 352, with two plates and numerous figures.

J. E. TESCHENACHER, On the Fossil Vegetation of America: p. 370, with plates.

J. HALL, On the Geological Position of the Cranium of the Castoroides Ohioensis, and J. WYMAN, M.D., Anatomical Description of the same: p. 385, with three plates.

J. BACON, Jr., Polythalamia in sand from the Sahara Desert: p. 402, with figures.

C. T. JACKSON, M.D., Chemical and Mineralogical Fragments: p. 405.

J. B. FORSYTH, On the Habits of *Salmo fontinalis*: p. 412.

S. CABOT, Jr., M.D., Description of *Pyrauga roseo-gularis*: p. 415.

H. BERGHUIS and A. K. JOHNSTON: The Physical Atlas; a series of maps illustrating the Geographical Distribution of Natural Phenomena,—of races, languages, rain-regions, deserts, mountains, rivers, magnetic phenomena, of volcanic action, and plants and animals over the globe. The Philosophical Magazine closes a detailed notice of this Atlas, a copy of which has not reached us, by saying, "we feel bound both in justice to the editors and our readers, to give it our warmest recommendations."

R. I. MURCHISON: The Silurian Rocks of Parts of Sweden; 48 pp. 8vo. London, 1847.

R. PATTERSON: Introduction to Zoology, for the use of schools. 12mo. London, 1846.

J. NICOL: Guide to the Geology of Scotland. Edinburgh, 1846.

J. C. PRICHARD: Physical History of Man, Vol. v, 8vo. London, 1847. 18s.

C. LYELL: Principles of Geology, 7th ed., 1 vol., 8vo. London, 1847. 18s.

RICHARD OWEN, F.R.S.: Lectures on Comparative Anatomy and Physiology of the Vertebrate Animals. Part I, Fishes; being Vol. ii, of Hunterian Lectures. London, 1846.

G. BISCHOF: Lehrbuch der chemischen und physikalischen Geologie. 1. Bde. 1 Abth. gr. 8. Bonn, 1846.

Dr. G. A. W. HERBICH-SCHÄFFER: Systematische Beschreibung der Schmetterlinge von Europa, als Text, Revision und Supplement zu J. Hübner's Sammlung Europäischer Schmetterlinge. 1 Bd.; Die Tagesschmetterlinge. Mit 75 illum. Kupfert. gr. 4. Regensburg, 1846.

Ph. F. v. SIEBOLD: Fauna Japonica—Pisces: elaborant C. J. Temminck et H. Schlögel. Decus vi, fol. Lugduni-Batav. 1846. 8jzrthl.

SEYMOUR: Vögel Europas, 29 Lief. gr. Lex. 8. Darmstadt. 1jzrthl.

Dr. J. J. v. TACHUDI: Fauna Peruana, viii Lief. (Vögel.) Imp. 4. 2jzrthl.

F. DOZY ET J. H. MOLKENBOER: Mout frondosi Archipelagi Indici, Fasc. ii. Imp. 4. 24 Bog. Lugduni-Batav. 3jzrthl.

LEREBROUX and SECRETAIN: Traité de Photographie, 5th ed., 8vo. 1846.

PROCEEDINGS OF THE ACADEMY OF NATURAL SCIENCES OF PHILADELPHIA, III, No. 6, NOV. and DEC., 1846.—Fossil footprints of the Coenoclitid valley; C. P. WICKERHAM, p. 119.—New genera and species of Insects, (Brachyoptera, n. g.) allied to *Prionus*, *Motorchus tenuipes*, *Enoplus venustus*, *Heterodromia*, n. g., *fam. Dacnidae*, *Trogus nubilipennis*, *Isalia maculipennis*.) S. S. HALDEMAN, p. 124.—On the Cicada septendecim; Miss Morris, p. 132.—On the situation of the olfactory sense in the terrestrial tribe of the Gastropodous Molluscs; J. LEIDY, p. 136.—On an instinct probably possessed by the Herons; J. CASSIN, p. 137.

PROCEEDINGS OF THE BOSTON Soc. NAT. HISTORY, October, November, December, 1846.—Shells of the Exploring Expedition; J. A. GOULD.—*Centarchus fasciatus* and *C. obscurus* of DeKay, identical with *Huro nigricans* of Cuvier; L. AGASSIZ, p. 184.—Shovel fish of Ohio; Dr. CABOT, p. 184.—*Moone* and *Carabon*, and American Ravens, not identical with European species; L. AGASSIZ, p. 187.

—*Pyrauga roseo-gularis*; Dr. CABOT, p. 187.—*Echinos* from the millstone grit of Georgia, *Pygorhynchus Gouldii*; M. BOWEN, p. 192.

PROCEEDINGS OF THE BOSTON Soc. NAT. HISTORY, October, November, December, 1846.—Shells of the Exploring Expedition; J. A. GOULD.—*Centarchus fasciatus* and *C. obscurus* of DeKay, identical with *Huro nigricans* of Cuvier; L. AGASSIZ, p. 184.—Shovel fish of Ohio; Dr. CABOT, p. 184.—*Moone* and *Carabon*, and American Ravens, not identical with European species; L. AGASSIZ, p. 187.

—*Pyrauga roseo-gularis*; Dr. CABOT, p. 187.—*Echinos* from the millstone grit of Georgia, *Pygorhynchus Gouldii*; M. BOWEN, p. 192.

PROCEEDINGS OF THE BOSTON Soc. NAT. HISTORY, October, November, December, 1846.—Shells of the Exploring Expedition; J. A. GOULD.—*Centarchus fasciatus* and *C. obscurus* of DeKay, identical with *Huro nigricans* of Cuvier; L. AGASSIZ, p. 184.—Shovel fish of Ohio; Dr. CABOT, p. 184.—*Moone* and *Carabon*, and American Ravens, not identical with European species; L. AGASSIZ, p. 187.

—*Pyrauga roseo-gularis*; Dr. CABOT, p. 187.—*Echinos* from the millstone grit of Georgia, *Pygorhynchus Gouldii*; M. BOWEN, p. 192.

PROCEEDINGS OF THE BOSTON Soc. NAT. HISTORY, October, November, December, 1846.—Shells of the Exploring Expedition; J. A. GOULD.—*Centarchus fasciatus* and *C. obscurus* of DeKay, identical with *Huro nigricans* of Cuvier; L. AGASSIZ, p. 184.—Shovel fish of Ohio; Dr. CABOT, p. 184.—*Moone* and *Carabon*, and American Ravens, not identical with European species; L. AGASSIZ, p. 187.

—*Pyrauga roseo-gularis*; Dr. CABOT, p. 187.—*Echinos* from the millstone grit of Georgia, *Pygorhynchus Gouldii*; M. BOWEN, p. 192.

PROCEEDINGS OF THE BOSTON Soc. NAT. HISTORY, October, November, December, 1846.—Shells of the Exploring Expedition; J. A. GOULD.—*Centarchus fasciatus* and *C. obscurus* of DeKay, identical with *Huro nigricans* of Cuvier; L. AGASSIZ, p. 184.—Shovel fish of Ohio; Dr. CABOT, p. 184.—*Moone* and *Carabon*, and American Ravens, not identical with European species; L. AGASSIZ, p. 187.

—*Pyrauga roseo-gularis*; Dr. CABOT, p. 187.—*Echinos* from the millstone grit of Georgia, *Pygorhynchus Gouldii*; M. BOWEN, p. 192.

ANNALS AND MAGAZINE OF NATURAL HISTORY, Jan. 1847, No. 122.—Organization of the Polygynous Infusoria; C. Eckhard.—Three new species of British Coleoptera; T. F. Wallengr.—Birds of Calcutta; C. J. Sunderell.—A new British Sponge; Dr. Johnston.—ZOOLOG. Soc., Oct. 13. New species of Brachiopoda and Marginella; G. B. Sowerby.—ENTOMOL. Soc. New Grasshopper from N. S. Wales; W. F. Edwards.—New Paussidae from India; J. O. Westwood.—New Holar Cryptocephala; W. F. Saunders.—BOTAN. Soc. of EDINBURGH. Dr. Balfour on the Alpine Flora of the British Isles.

Jan. 1847, No. 123.—Formation of the Flints of the Upper Chalk; J. Toulmin Smith.—British Rubi; C. C. Babington.—On a peculiar organ in the Rays; C. Roberts.—An Ichthyolite from Sharnsey; R. Owen.—Development of the Lycopodiaceae; K. Müller.—Drafts for a Fauna Indica; E. Blyth.—Habits of the Lampet; G. Roberts.—ENTOMOL. Soc. New Holland Cryptocephala; W. F. Saunders.—Two new Goliath Beetles, and some new Scutelleridae; J. O. Westwood.—Insects from Cape Palmas; Dr. Senege.

Feb. 1847, No. 134.—New species of Gynatocera from N. India; E. Doubleday.—Ornithology of the Island of Tobago; Sir Wm. Jardine.—British Rubi; C. C. Babington.—Birds of Calcutta; C. J. Sunderell.—New species of Actias from N. India; E. Doubleday.—New or rare British Animals; R. M. Andrus and E. Forbes.—Drafts for a Fauna Indica; E. Blyth.—Development of the Lycopodiaceae; K. Müller.—Outline of an Arrangement of Stony Corals; J. E. Gray.—ZOOLOG. Soc. Birds from Malacca; Mr. Strickland.—Three Australian Birds; Mr. Gould.—MICROSCOP. Soc. On the Infinitesimal Structure of Bone; Mr. Quaker.

March, 1847, No. 125.—Reproduction of lost parts in the Articulate; G. Newport.—Notes on Baccharis undatum; A. Hancock.—On a second form of fructification in Peysonellia squamaria; C. Montagne.—New species of Aya; G. Newport.—Birds of Calcutta; C. J. Sunderell.—New Lepidoptera; E. Doubleday.—On the Irish species of Cephaloptera; F. M'Coy.—Drafts for a Fauna Indica; E. Blyth.—LINNEAN Soc. Notes on the Fauna of N. Zealand and the Auckland; d. White.—On the calcifying functions of the Cowrie and Olive; L. Reece.—Structure and Movements of Baccharis paradoxa; G. H. K. Thwaites.

LOVING JOURNAL OF BOTANY, for January, 1847.—Sur le genre Godoya, etc.; Dr. Planchon.—Botanical Information, viz: Thorea ramosissima, found in the Thames.—Account of Gutta Percha, a new vegetable production lately used in the arts as a substitute for Caoutchouc, &c. shown to be yielded by a Sapotaceae plant.—Bourgeois's Canary Island Plants.—Proposed Nat. Hist. Journey to Bosnia.—Mitchell's Expedition in the interior of New Holland.—Letter from Mr. Gardner on the Botany of Ceylon.—Notes of a Continental Tour, continued, (Moscow to Constantinople and Florence).—Review of Gardner's Travels in Brazil.—FERNARIUM, 1847.—Notices of Lindley's "Orchidaceae Lindenienses;" of Martius, "Voyage Botanique le long des Côtes Septentr. de la Norvège;" of Gardner, "On the structure and affinities of Podostemaceae;" of C. H. Schultz, on Hypocheridaceae; of Parlatore's "Flora Palermitana;" and of Monogr. delle Fumarice;" of the "Genera Pl. Florae Germanicae;" continued by Patzsch and Endlicher, (up to fasc. 24); of Miers, "Illustrations of S. American Plants," part I.; of Gray's "Chloris Boreali-Americana;" Silliman's Musci Alleghanienses and "Contributions to the Bryology and Hepatology of North America;" Catalogue of Mr. Greger's Upper Missouri and Oregon Collection of Plants, up to Rhamnus inclusive.—Journal of the Voyage to the Niger; Dr. Vogel—continued.—"Flora Tasmaniae Spicilegium;" Dr. J. D. Hooker—continued.

COMPTES RENDUS, PARIS, Nov. 23.—Chemical Researches on Dyeing; Chevreul.—On the application of the new formula of interpolation to the determination of the orbits described by celestial bodies, and on the direct introduction of observed longitudes and latitudes in Astronomical formulas; A. Cauchy.—On the isolation of Fluorine, and composition of Fluorides; Leuget.—On Gun-cotton; Gaudin, Ferdes and J. Ellis, Becker, Demas.—Nov. 30. On the Potato Disease; Payson.—On the alteration of Beet-sugar; Payson.—Gun-cotton; Payson, Fischer, Pelouze, Merrel.—On the introduction of phosphate of lime into organic beings; Demas.—Relation between the stratification and fertilization of land; Kuhlmann.—Dec. 7. Potato and Beet Disease; Gaudichaud.—On the Silicates; Laurent.—On Fluorine; Quet and Colin.—On Gun-cotton in blasting; Combes and Flamin.—Explosion of Gun-cotton; Figner and Penmaride.—Application of Gun-cotton to Machinery; Riotté.—Dec. 14. On the maxima of effects of the explosion of Gun-cotton; Payson.—On different substances called Gun-cotton; Gaudichaud.—On Metallic Polarization; Jamin.—Dec. 21. On Hydrates; Fresny.—On pyroxylene; Vauquelin.

INDEX TO VOLUME III.

- A.
 Abert, Lieut. J. W., Journal from Bent's Fort to St. Louis, noticed, 301.
 Academy of Sciences at Paris, vacancies filled, 451.
 — of Natural Sciences at Philadelphia, Proceedings of, 151, 455.
 — American of Arts and Sciences, Proceedings of, 311.
 Achilles in the Achilles millefolium, 426.
 Acid, hippuric, affording benzoic, on decomposition, 257.
 Acids, common origin of certain, J. Reichenbach, 254.
 — of tobacco, 423.
 Adams, C. B., Report on the Geology of Vermont, noticed, 144.
 —, furrows on rocks dependent on structure, 423.
 Agassiz on nomenclature, 392.
 —, Moose and Caribou, and American Raven distinct from European species, 436.
 Agriculture, notice of E. N. Horsford's chemical essays relating to, 144.
 —, J. P. Norton's memoir on the cat, 145, 422, 308.
 Alabama coal fields, C. Lyell, 37.
 Align of the United States, J. W. Bailey, 80, 329.
 Algebra, C. W. Hackley's treatise on, 310.
 Algeria, salt and salt springs in, 432.
 Alligators, tracks of living, 123.
 Alluvial deposits of the Mississippi, C. Lyell, 34.
 Alms, trend of, 383.
 Alumina, solubility of, in ammoniated water, 256.
 Ammonia, remarks on, 258.
 Ammoniated water, solubility of alumina in, 256.
 Analyses, formation of two, 258.
 Analysis of the cat, J. P. Norton, 222, 318.
 —, estimation of silver in, 255.
 —, of lead in, 255.
 —, of nitrates, Cassell, 265.
 Analytical researches on sea water, Forchhammer, 269.
 Anemometer, modification of Wood's, 128.
 Angled on the earth's construction, 178.
 Anser nigricans, a new species, G. N. Lawrence, 325.
 Anthracite, fluorine in, C. G. Schaeffer, 422.
 Apatite, origin of, J. D. Dana, 38, 182.
 —, W. B. and H. D. Rogers on, 182.
 Arago, opinion of, respecting foretelling the weather, and the moon's influence, 141.
 Arsenate of magnesia and ammonia, 423.
 Arsenic in mineral waters, 200.
 Artesian wells, on boring for, Fawcett, 125.
 — well in the Duchy of Lauenburg, 142.
 Asia, Coordinates, notices of, springs, mines, &c., 347.
 Asymptote, 254.
 Astronomical observations, M. F. Meary's volume of, noticed, 150, 278.
 SECOND SERIES, Vol. III, No. 2.—May, 1847.
 Astronomical observations, J. M. Gillies', noticed, 149.
 —, memoir on colors of stars, by P. B. Seiss, noticed, 281.
 Atmospheric currents, remarks on the cause of, W. C. Redfield, 281.
 Aurora borealis, Nov., 1846, E. C. Herrick, 126.
 Auroral belt, April 7, 1847, 440.
 Australia, native gold in, 143.
 Avenue, 229, 321.
 Azeotrope, new mineral from, 33.
 B.
 Babinet on planetary nebulous masses near the sun, 444.
 Backe, A. D., report by, on the coast survey, noticed, 300.
 Bachelder, J. M., development of electricity in bands of leather, 350.
 Bailey, J. W., Algae of the U. States, 80, 299.
 Baryta, preparation of caustic, E. Ringel, 424.
 Beaver, range of, in U. States, 434.
 Beke, C. T., remarks on the Nile, 447.
 Benzoic acid, from hippuric, 257.
 — compounds, 257.
 Binney, A., obituary of, 451.
 Birds, hybrids among, S. G. Morton, 203.
 —, spring migrations, Marietta, Ohio, 1846, S. P. Hildreth, 214.
 Blood, researches on, Dumas, 108.
 Blomquist, on copulation with, 409.
 Bolax glebaria, 121.
 Bond, G. P., new comet, 413.
 Bone, growth of, in the hog, Baumgardt, 258.
 Borg de St. Vincent, death of, 452.
 Botanic garden, new, at Cambridge, England, 226.
 Botanical works noticed.
 —, D. J. Browne's Trees of America, 146.
 —, Serpens Petropolitanae of Fischer and Meyer, 146.
 —, Eschlicher and Martin's Flora Brasiliensis, 147.
 —, Trautvetter, Plantarum Imagines, &c., 147.
 —, Hooker's Species Filicum, 147.
 —, Moricand's Plantes Nouvelles, &c., 147.
 —, Ledebour's Flora Rossica, 148.
 —, Drejer's Symbola Carcinologica, 148.
 —, A. Gray's Chloris Boreali-Americana, 302.
 —, A. Gray's Botany of the Northern States, announced, 445.
 —, Beitrage zur Pflanzenkunde des russischen Reiches, 309.
 —, G. B. Emerson on the trees and shrubs of Massachusetts, 310.
 —, W. Hooker's Botanical Magazine, 310.

- Botany of Texas, new genera in, *A. Gray*, 274
 —, North American species of *Isotetes* and *Marsilea*, *A. Gray*, 25
Bout on the structure of the globe, 293.
 Boulders and elevations of Scandinavia.
Deor, 312.
Boussingault on the nutritive power of dry and green fodder, 106.
 —, on the development of vegetable matter in wheat, 106.
 —, growth of bone in the hog, 258.
Boussingault on the nutritive power of dry and green fodder, 106.
Brass, *A. N.* American species of *Isotetes* and *Marsilea*, 52.
Brinkley's Observatory, results of magnetic observations at, 115.
 British Association at Southampton, in 1846, 153.
 —, disbursements of, 124.
 —, notice of *R. I. Murchison's* address before, 124.
Brown's work on organic remains, 311.
Brown, *D. J.*, Trees of America, by, noticed, 146.
Buch, *L. von*, volcanic band in the E. Indies, 308.
Buckley, *S. B.*, on the range of the beaver, 434.
 C.
Cabot on a new Pyrene, 426.
Cahours, *A.*, action of perchlorid of phosphorus on organic substances, 256.
 Calcoli, urinary, in the Transylvania University museum, work on, by *R. Peter*, noticed, 292, 451.
 Cambrian system, objections to, *R. I. Murchison*, 404.
Caoutchouc from drying oils, 426.
Carver, *Dexter* on, noticed, 146.
 Caricography, appendix continued, *C. Deery*, 171, 254.
Cass, *W.*, a new Helix and Planorbis, 101.
Cassini, 229.
Cass, hybrids among, 48, 49.
Cervus, two American species distinct from European, 426.
 Chalk and coal, fires from, 451.
 Chemical analysis, notice of, *C. R. Fremont* on, 149.
 Chemistry of *B. Silliman, Jr.*, noticed, 144.
 —, of the Four Seasons, noticed, 145.
 —, Organic, of *C. Gerhardt*, noticed, 145.
 Choline, a new mineral, 267.
 Chloro-cyanide, 258.
 Chlorophyllite, 265.
Corda septentrionalis, observations on, *S. P. Hildreth*, 216.
 —, —, *T. W. Harris*, 218.
 Classification, general remarks on, *J. D. Dana*, 337.
 —, of zoophytes, *J. D. Dana*, 340.
 —, use of homology and analogy in, 339.
 Cleavage joints in rocks, general course and origin of, 280, 282.
 —, in North Wales, *D. Sharpe*, 420.
 Climate, cold, cultivation in, 288.
 Clouds, method of measuring height of, *W. H. Loomis*, 140.
 Coal of Silesia, origin of, *Göppert*, 119.
 —, of Rocky Mountains, *J. C. Fremont*, 197, 272.
 —, anthracite, fluorine in, 422.
 Coal fires aided by chalk, 451.
 Coast survey, *A. D. Bache's* report on, noticed, 200.
 —, lines, characters of, 282, 385.
 Coffee and caffeine, *M. Payen*, 166, 423.
 Colors of stars, *Societ's* memoir on, noticed, 231.
 Columbite of lime, a new mineral from the Azores, *J. E. Tuckermacher*, 24.
 Columbite, new metals in, 257.
 Columbus, movement in, 142.
 Comet, ancient return of, *Halley's*, 106.
 —, expected return of that of 1556, 443.
 —, new, discovered by *De Vico*, 121.
 —, sixth of 1846, 282.
 —, *Hind's*, 121, 282.
 —, discovered by *G. P. Bond*, 443.
 Comets, *Prof. Peirce's* catalogue of, noticed, 127.
 —, number of, on record, 128.
 Conifers in geyers of Iceland, 289.
 Constants, *Gauss's* magnetic, 140.
 Continents, on the origin of, *J. D. Dana*, 94.
 —, trends of coasts and features of, 282.
 Contracting area in the Pacific, 296.
 Contrivance, a geological cause, *J. D. Dana*, 94, 176, 205.
 —, —, *C. Prevost*, 95, 178.
 —, —, *Leblond*, 176.
 —, —, *Aspidiot*, 178.
 —, —, *Leblond*, 178.
 —, —, *W. W. Mather*, 100, 177, 183.
 —, —, *J. H. Latrop*, 177.
 Copper, method of estimating, *Jacquelin*, 110.
 Corallite, a new mineral, *J. L. Le Conte*, 173.
 Corals, fossil, in New York, 69, 71.
 —, —, *Cyrtophyllum*, *D. D. Owen*, 71.
Corvus leucurus, 428.
 Cretaceous formations of Russia, 156.
 —, on the Rocky Mountains, 157.
 Crustacea, seven, a normal number in, 238.
 Cultivation of wheat, &c., in Russia, 238.
 Cupellation with the blowpipe, *W. W. Mather*, 69.
 Currents, atmospheric, remark on, *W. C. Redfield*, 284.
 Cystophyllite, remark on, *J. D. Dana*, 14.
 D.
Dana, J. D., on zoophytes, 1, 100, 237.
 —, on the origin of continents, 94.
 —, number of islands that have disappeared in the Pacific, 94.
 —, origin of the Appalachians and Rocky Mountains, 98, 99.
 —, —, of the trap dikes of New England, 99.
 —, —, of the grand outline features of the earth, 251.
 —, —, geological results of the earth's construction, 176.
 —, —, cause of folding of strata, 182.
 —, —, position of volcanoes, 186.
Dana, S. L., on force of gun-cotton, 104.
Darwin, C., cause of absence of marine formations from certain regions, 120.
 —, dust falling on vessels in the Atlantic, 141.
 —, —, Geological Observations on America, noticed, 146.
Davis, E. H., footprints and Indian sculpture, 286.
Davis, J., on fossil footprints, 74.
 Delta of the Mississippi, *C. Lyell*, 34, 118.
 Density, maximum, of pure water, 427.
Deor on erratic blocks and elevations in Northern Europe, 312.
Dewar, transformations of hippuric acid, 257.
 Detritus of Mississippi, 26, 118.
Dewey, C., use of sulphate of soda with galvanic battery, for telegraph, 427.
 —, —, Caricography, 171, 254.
 —, relative level of Lake Ontario, 444.
 Differential coefficient of a function of any number of variables, on the variation of, *A. D. Stanley*, 415.
 Diffraction of waves of sound, 140.
 Dikes of trap, in Connecticut, *J. G. Percival*, 290.
 Distillation of ice, 450.
 Dip, magnetic, at Bakerston, 115.
 Dogs, hybrids among, 45.
Dumas, on blood, 108.
 —, on phosphate of lime in organic beings, 261.
 —, on nitrification, 261.
 Dust falling on vessels in the Atlantic, 141.
 —, of Hecla, 272.
 E.
 Earth, remark on age of, from geological evidence, *C. Lyell*, 33.
 —, origin of the outline features of, *J. D. Dana*, 281.
 —, —, of continents of, 94.
 Educational statistics at Oxford, England, 127.
 Electric telegraph, lines of, in United States, 206.
 —, —, fact & fancy, 449.
 —, excitement of paper, 451.
 Electrical current, relation of, to nervous power, 112.
 Electricity, free, *R. Harz*, 334.
 —, atmospheric, induction of, on the telegraph wires, *J. Henry*, 25.
 —, developed in bands of leather, *J. M. Batchelder*, 250.
 Electro-physiology, *Mattucci*, 111.
 Elevation of mountains and continents, *J. D. Dana*, 94, 176.
 —, —, *C. Prevost*, 178.
 Elevations in Scandinavia, bearing of phenomena of erratic blocks on, *M. Deor*, 312.
 Elliptical polarization, *Dale*, 262.
 —, —, *Power*, 264.
Emerson, G. B., Report on Trees and Shrubs of Massachusetts, noticed, 310.
 Encyclopedia Americana, Vol. 14, noticed, 145.
Endlicher and Martius, Flora Brasiliensis, noticed, 147.
Engelmann, G., North American species of *Isotetes* and *Marsilea*, 52, 451.
 —, on the St. Louis limestone, 119.
 —, Melanites multijuga, 124, 151.
 —, observations on rain and snow at St. Louis, 428.
 England, iron manufacture in, 291.
 —, plate glass making in, 272.
Erman, G., *Gauss's* magnetic constants, 140.
 Erratic blocks and elevations in Northern Europe, *Deor*, 312.
 Ether, insulation of, in surgery, 444.

- Ethnological distribution of round and elongated crania, *Retzius*, 128.
 Eureka, a scientific journal, noticed, 146.
 Europe, boulders and elevations in Northern, *Deor*, 312.
 F.
 Fairy rings of pastures, 294.
 Falkland islands, hillocks of *Bolax glabra* at, 121.
 Falling bodies, deviation of, from a perpendicular, *Deor*, 123.
 —, —, *ibid.*, *J. Herschel*, 123.
 —, —, *ibid.*, *W. C. Redfield*, 253.
 —, —, *ibid.*, note on, p. 451.
 Features of the earth, origin of, *J. D. Dana*, 281.
 Finland, Meteorological Society in, 440.
 —, measure of a degree of meridian in, 450.
Fischer and Meyer's Sertum Petropolitanum, noticed, 146.
 Fish of existing lakes in Sweden, formerly salt water, 216.
 Fishes, on the statues of, *J. Müller*, 276.
 Floral calendar for 1846, at Marietta, Ohio, *S. P. Hildreth*, 212.
 Fluo-silicic acid, formation of, 253.
 Florentine, on, *Louet*, 260.
 Folding of strata, *J. D. Dana*, 97, 182.
 —, —, *W. B. and H. D. Rogers*, 182, 183.
 —, —, *W. W. Mather*, 183.
 Footprints, fossil, *J. Deor*, 74.
 —, —, recent, of alligators, 125.
 —, —, recent, of alligators, 125.
 —, —, remark on, 79, 276.
 —, and Indian sculpture, *E. H. Davis*, 286.
Fockhammer, researches on sea water, 289.
 Fossils of N. York, in a review of N. Y. geological reports, 57.
 Fossil vegetation of America, 86.
 —, palaeotheria bone, in the West, 249.
Fremont, J. C., on the Rocky Mountains, their geology, height, hot springs, coal, &c., 197, 273, 454.
 —, Cascade range, Oregon, and hot springs, 250.
 —, coal in the Rocky Mountains, 273.
Fremont, C. R., work by, on chemical analysis, noticed, 149.
 Fucoides graphica, 169.
 Furrows on rocks dependent on structure, *C. B. Adams*, 423.
 G.
Gall, discoverer of Le Verrier's planet, 129.
 —, house conferred on, 283.
 Galvanic battery, use of sulphate of soda with, 427.
 —, —, with potassium, 428.
 Gelatine, sugar of, from hippuric acid, 257.
 —, —, *A. Leuward*, 253.
 —, —, *E. N. Horsford*, 269.
 Geographical features of the globe, origin of, *J. D. Dana*, 281.
 Geology of Vermont, notice of *C. B. Adams's* second annual report on, 144.
 —, —, *Leuward*, noticed, 149.
 —, of Russia, general review of, 153.
 —, —, *Holmes* on, 420.
 —, of Rocky Mountains, *J. C. Fremont*, 192, 273.

- Geology of Rocky Mountains, J. W. Aldert, 301.
— limits of paleozoic period in, *D. D. Owen*, 355.
Geological Report of New York, reviewed, 57.
— marine formations, cause of absence from some regions, *C. Darius*, 130.
— Observations in S. America, by *C. Darius*, noticed, 146.
— Journal, London, noticed, 146.
— Society of France, 271.
— results of the earth's contraction, *J. D. Dana*, 176.
— *ibid.*, *Leblait's* views on, 176.
— *ibid.*, *Prentiss's* views on, 55, 178.
— *ibid.*, *W. W. Mather*, 100, 177.
— 183.
— epochs, cause of, 187.
— forces of former times, energy of, 188.
Gerhardt, C., compounds of phosphorus and nitrogen, 105.
— *Précis de Chimie Organique*, noticed, 145.
Geysers of Iceland, temperature of, at depth, 288.
— *Confervæ* in hot water, 288.
Gillies, J. M., Astronomical Observations, noticed, 149.
Glass, plate, making of, in England, 293.
Glum of the east, 333.
Glycolic acid, and its compounds, *E. N. Horsford*, 269.
Göppert, origin of coal of Silesia, 119.
Gray, A., new genera and species of Compositæ, from Texas, 274.
— on nomenclature, in a notice of *Agassiz's Nomenclator Zoologicus*, 302.
— *Chloris Boreo-Americana* of, noticed, 302.
— food of mastodon, 436.
— Botany of the Northern States, by, announced, 454.
Great Britain, iron manufacture in, 291.
Gun-cotton, 162, 142, 559, 295.
— applied to moving machinery, 296.
Gun-paper and gun-sawdust, 142, 290.
H.
Hackley, C. W., Treatise on, on Algebra, noticed, 310.
Hall, J., Paleontology of New York, noticed, 454.
Halley's Comet, ancient returns of, 156.
Hare, R., on free Electricity, 334.
Harkness americanus, 125.
Herrn, T. W., observations on the seven-teen year locust, 318.
Hessler, maximum density of water used by, for taking up, gravity, 427.
Hetch, volcano that of, 274.
— remarks on, 288.
— temperature of geysers, 288.
Heltzmann, W. C., 101, 276.
Heltzmann, W. C., 101, 276.
Holtzmann, on Russian Geology, 430.
Henry, J., induction of atmospheric electricity on the telegraph wires, 25.
— elected Secretary of the Smithsonian Institution, 153.
Henslow, W. J., superposition of minerals in metalliferous veins, 259.
Herrick, E. C., shooting stars of Aug., 1846, 125.
— of Nov., 1846, 126.
— Aurora borealis of Nov., 1846, 126.
Herrick, E. C., Aurora belt of April, 1847, 440.
Hildrich, S. P., meteorological Journal for 1846, at Marietta, Ohio, 312.
— floral calendar, migration of birds, &c., for 1846, 214.
— observations on the seventeen year locust, in 1846, 216.
Hippopotamus at Sierra Leone, 125.
Hypuric acid, transformation of, into benzoic acid and sugar of gelatine, 257.
Hooker, Species Filicum, 147.
Hopkins, views on the origin of joints in rocks, 303.
Horsford, E. N., Chemical Essays relating to agriculture by, noticed, 144.
— on Glycolic acid and its compounds, 269.
Hot springs, Rocky Mountains, 198, 450.
— in Cascade range, 300.
— sulphur, in Koordistan, 349.
Hubbard, O. P., notices of Koordistan, 347.
Hunt, R., influence of light on the growth of plants, 112.
Hybrid quadrupeds, 39.
— birds, 302.
— reptiles, fishes, and molluscs, 308.
— plants, 309.
Hybridity, *S. G. Morton*, 28, 303.
Hydrodynamics, memoir on, read before the British Association, 140.
I.
Ice, dilatation of, 450.
Ilimenium, 116.
Indian mounds and relics, *E. G. Squir*, 27.
— sculpture and artificial footprints, *E. H. Davis*, 286.
Iron manufacture in Great Britain, 291.
Islands, trends of groups of, 383.
— Galapagos, trend of, 384.
Icterus, species of, *A. Brown*, 22.
Italian seven, eighth congress of, 142.
Italy, fall of meteorites in, 141.
J.
Jackson, C. T., inhalation of ether producing insensibility to pain, 445.
Jacquinot, estimation of copper, 110.
Johannes, E., meteorological observations at Sandwich Islands, 437.
Joints in rocks, origin of, 302.
Journal of Natural History of Boston, contents of, 454.
K.
Koordistan, springs, salt, mines, &c., of, 347.
L.
Lacustrine deposits near the great lakes, *J. A. Lehigh*, 93.
Lake, Pyramid, Cascade range, N. California, 301.
— Great Salt, or Timpanogus, Rocky Mountains, 198.
— Ontario, relative level of, *C. Dewey*, 444.
Lehigh, J. A., Lacustrine deposits near the great lakes, 93.
Laurent, A., on sugar of gelatine, 258.
— formation of chloro-cyanide, 458.
Lawrence, G. N., a new species of *Ataxer* and *Procellaria*, 433, 436.
Lead, carbonate of, at Russia, N. Y., 117.
— cupreous sulphate-carbonate of, in Missouri, 117.
Lead, method of estimating, *F. Domonte*, 255.
— mines of Koordistan, 353.
Le Conte, J. L., on Cornelia, 117.
— plumbic-resinite and cupreous sulphate-carbonate of lead in Missouri, 117.
Leblait's Flora Rossica, noticed, 148.
Leguminæ, 229.
Leblait, extract from Protegea of, 176.
Leidy, J., wings of Locustæ, 125.
— olfactory sense in mollusca, 431.
Leopard's Taschenbuch für Freunde der Geologie, noticed, 149.
LeVerrier, lessons conferred on, 282.
— planet of, see *Neptune*.
Lichen, Lecanora, mass from, 352.
Life, duration of, in the several professions, 297.
— (mortality) of children, 297.
Light, influence of, on the growth of plants, *R. Hunt*, 112.
Lighting, effect on telegraph wires, 25.
Light-houses, *T. A. Jenkins's Report* on, noticed, 301.
Limestone of St. Louis, *G. Engelmann*, 119.
Literary World, a weekly gazette, noticed, 311.
Litharge, solution of oxygen in fused, 255.
Locust, seventeen-year, *S. P. Hildrich*, 216.
— *T. W. Harris*, 218.
Locustæ, wings of, *J. Leidy*, 125.
Lycæum of Natural History of New York, Transactions of, 454.
Lyell, C., on the delta and alluvial deposits of the Mississippi, 34.
— coal fields of Alabama, 37.
— remark on the antiquity of the earth, 38.
— on the alleged coexistence of man with the Megalotherium, 307.
M.
Magnet, revolution, without visible support, *C. G. Page*, 252.
Magnets, on best kinds of steel for, and mode of operation in making, *W. Petrie*, 112.
Magnetic condition, on the mode of developing, *Scoreby*, 114.
— observations at Makerston, results of, 115.
— constants, *Gauss's*, 140.
— instruments, photographic self-registering, 428.
Man, on the alleged coexistence of, with the Megalotherium, *C. Lyell*, 267.
Manna, of Koordistan, and views on different kinds of, 350.
— of Mt. Sinai, 351.
Marsden, species of, *A. Brown*, 55.
— *G. Engelmann*, 56, 431.
Mastodon, food of, *A. Gray*, 436.
Mathematical problem, *O. Root*, 50.
Mather, W. W., on cephalopods, 409.
— effects of earth's contraction, 100, 177, 183.
Mather, W. W., on electro-physiology, 111.
Mauy, M. F., Astronomical Observations, noticed, 150, 278.
Megalotherium, on the alleged coexistence of man with, *C. Lyell*, 267.
Melomys multiplex, *G. Engelmann*, 124, 451.
Mercury, purification of, *Miller*, 428.
Meridian, measure of a degree of, in Finland, 450.
Metal, new, pelopium, *H. Rose*, 357.
— niobium, *H. Rose*, 357.
— ilmenium, 116.
Metallic lastra, cause of, 264.
— veins, superposition of minerals in, *W. J. Henslow*, 259.
Meteorites, fall of, in Italy, 141.
Meteorology, *Arago's* opinion as to predictions respecting the weather, and the moon's influence, 141.
Meteorological instruments, photographic self-registering, 428.
— observations at Sandwich Islands, *E. Johannes*, 437.
— at St. Louis, *G. Engelmann*, 428.
— Society in Finland, 440.
Midland, notice of, 134, 450.
Mississippi valley, St. Louis, rain and snow of, *G. Engelmann*, 428.
— amount of detritus, delta, and alluvial of, *C. Lyell*, 34, 118.
Mineral, new, from the Azores, *J. E. Tschermak*, 32.
— hydrate of nickel, *R. Sillman, Jr.*, 407.
Minerals: Apasolite, 429; Burnite, 429; Carbonate of lead at Russia, 117; Castor and Pollex, 430; Chiolite, 307; Cornelia, 117; Cupreous sulphate-carbonate of lead in Missouri, 117; Groggite, 429; Herschelite, 427; Nematite, analysis of, *C. Coswell*, 265; Orpiment, sulphur and lead ores of Koordistan, 353; Pinite, chlorophyllite, &c., identical with lillie, 266; Plumbic-resinite in Missouri, 117.
Minerals, on the superposition of certain, in some of the metalliferous deposits of Cornwall in Devon, *W. J. Henslow*, 262.
Mineral waters, arsenic in, 350.
Mines and mining industry of Belgium, 293.
— of Koordistan, 353.
Molecular phenomena of the voltaic arc, 119.
Mollusca, olfactory sense in, *J. Leidy*, 431.
Monachi, T., obituary of, 143.
Monument to Columbus, 142.
— to Thomas Say, 298.
Moon's influence on the weather, *Arago*, 141.
— on the projection of a star on, *Powell*, 277.
Moose, American, a new species of, 426.
Moussé, Plantes Nouvelles, &c., of, noticed, 147.
Mortality of children, 297.
Morton, S. G., hybridity, considered in reference to the question of the unity of the human species, 28, 303.
Mounds of the West, *E. G. Squir*, 27.
Mountains, characters of ranges of, *J. D. Dana*, 385.
— origin of, *J. D. Dana*, 96, 98, 176, 290.
— *E. de Beaumont's* theory of, objection to, 384, 290.
— Rocky, origin of, 98.
— account of geology, &c., 102, 273, 301.
— section of, 196.
— Cascade, of Oregon and N. California, with notice of hot springs and lakes, 200.
— Wind river, ascent of, *J. C. Fremont*, 192.

- Mountains, Altai, trend of, 353.
 —, Ural, geology of, 158.
 Murchison, R. L., on Silurian Classification, 101.
 —, Geology of Russia by, noticed, 153.
 N.
 Natchez, human bone from the bluff at, 307.
 Nader on parallelism in the strike of strata, 303.
 Nematite, analysis of, Cowell, 365.
 Neptune, new planet, 128, 441.
 —, Prof. Peirce's discussion of, 441.
 —, Lieut. Maury's and S. C. Walker's *ibid.*, 441.
 New York, geological reports, reviewed, 57, 164.
 Nickel, hydrate of, native, B. Silliman, Jr., 407.
 Nile, remarks on the river, C. T. Beke, 447.
 Niobium, H. Rose on, 357.
 Nitrogen and phosphorus, compounds of, 105.
 —, in organic bodies, determination of, 424.
 —, not a constituent of picrotoxine, 424.
 —, influence of protoxyd of, on vegetation, 425.
 Nitrification, Dumas, 561.
 Nomenclature Zoologica of Agassiz, and laws of nomenclature, A. Gray, 502.
 North pole, mode of reaching proposed, 141.
 Newton, J. F., analysis of the soil, 145, 232, 318.
 —, appointment to a professorship in Yale, 451.
 Nutritive power of green and dry fodder, Boussingault, 106.
 O.
 Oat, J. P. Norton on, 145, 232, 318.
 Obinary, of T. Monticelli, 143.
 —, of M. Aimé, 143.
 —, of Insular Lakes, 144.
 —, of A. Bunney, 451.
 —, of J. Pickering, 452.
 —, of Bory de St. Vincent, 452.
 Observatory at Washington, observations at, M. F. Maury, 154, 378.
 —, J. M. Gilliss, 149.
 Ocean, origin of depressions of, 94, 178, 181, 326.
 —, Pacific, why surrounded by higher mountains than the Atlantic, and by a volcanic band, 185, 326.
 Oils, volatile, of the Cruciferae, 425.
 —, drying, caustic from, 426.
 —, of Monarda, 425.
 Oolite of Rocky Mountains, 197.
 Organic substances, action of perchlorid of phosphorus on, 250.
 —, determination of nitrogen in, 424.
 Ormichimities, see Footprints.
 Orpiment mine of Kooristan, 353.
 Ours, of Scandinavia, 312.
 Owen, D. D., review of New York Geological Reports, 37, 164.
 —, review of Geology of Russia, 155.
 —, limits of Paleozoic period, 365.
 Owen, R., on the veretbrate structure of the skull, 122.
 —, on homology, 339.
 Oxygen, solution of, in fused litharge, 355.

P.

- Pacific, ranges of islands in, 383.
 —, even, almost encircled by a volcanic band, 398.
 Page, C. G., revolution of a magnet without visible support, 292.
 Palaeontology of New York, work on, by J. Hall, 451.
 Palaeothermal bone, in the West, H. A. Pratt, 248.
 Palaeozoic period, extent of D. D. Owen, 365.
 Paper, explosive, 142.
 Parallax of a fixed star in Ursa Major, 444.
 Paris Academy of Sciences, vacancies in, filled, 451.
 Pastures, fairy rings of, 394.
 Papes, on coffee and caffeine, 106, 423.
 Peirce, Prof., remarks on Le Verrier's plan, 441.
 Peliget, E., new saccharimetric process, 109.
 Pelopium, H. Rose on, 357.
 Percival, J. G., on trap dikes of Connecticut, 330.
 Permian System, 155.
 —, relations of, 365.
 Peris, lake Oronomi, height of, above the sea, 347.
 Peter, R., Memoir by, on Urinary Calculi, noticed, 322.
 Petrie, W., on making magnets, 112.
 Phosphate of lime in organic beings, 261.
 Phosphorus and nitrogen, compounds of, C. Gerhardt, 105.
 —, action of perchlorid, on organic substances, A. Cahen, 256.
 —, fusion of, E. Dumas, 423.
 Photographie self-registering meteorological and magnetic instruments, 428.
 Pickering, J., eulogy on, by Judge White, noticed, 423.
 Picrotoxine contains no nitrogen, 424.
 Pinite, 356.
 Planet, Le Verrier's, 128, 441.
 —, Prof. Peirce's remarks on, 441.
 Planetary nebulous masses near the sun, 444.
 Planorbis multivolvus, W. Case, 101.
 Plants, influence of light on the growth of, R. Hunt, 112.
 —, hybrid, S. G. Morton, 309.
 —, influence of protoxyd of nitrogen on, 425.
 Plate glass making in England, 232.
 Pleochroism, 420.
 Pleosaurus megacephalus, 276.
 Polarization, on elliptic, Dale, 302.
 —, by reflection, Powell, 264.
 Potassium, voltaic battery with, 423.
 Potato disease, discussion on, at the British Association, 136.
 Precost, C., results of the earth's contraction, 95, 178.
 —, remark on volcanic action, 180.
 Precelestia levirostris, G. N. Lawrence, 436.
 Prout, H. A., fossil palaeothermal bone, 248.
 Pygostichus Gouldi, Bower, 427.
 Pyrrhus ramos gallica, 436.
 Pyroxylite, 250, 255.
 R.
 Railways in Italy, 142.
 Rain and snow, at St. Louis, G. Engelmann, 433.

- Ray Society, 295.
 Redfield, W. C., on the deviation of a falling body from a perpendicular, and on the cause of atmospheric currents, 283, 284.
 Redtschko, J., common origin of certain acids, 254.
 Refraction of waves of sound, 140.
 Retina, on the ethnological distribution of, 123.
 River, de la, molecular phenomena of the voltaic arc, 110.
 River, Mississippi, detritus and delta of, C. Agall, 34, 118.
 —, Nile, remarks on, C. T. Beke, 447.
 Rocky Mountains, origin of, 98.
 —, observations on geology, height, hot springs, &c., J. C. Fremont, 192, 273, 450.
 —, J. W. Alvert, 301.
 —, ascent of Wind river chain, by J. C. Fremont, 192.
 —, section of, J. C. Fremont, 196.
 Root, O., solution of a mathematical problem, 50.
 Rose, H., new metal in Tantalite, 357.
 Russia, review of geology of, 153.
 —, cultivation of cereal grains in, 238.
 S.
 Salt Lake, Rocky Mountains, or Lake Timpanogos, 198.
 —, and saline springs in Kooristan, 353.
 —, in Algeria, 421.
 Say, Thomas, monument to, 298.
 Scandinavia, on erratic blocks and elevations of, M. Deur, 313.
 —, primitive race of, 317.
 Scouring, on developing the magnetic condition, 124.
 Seawater, comparative analytical researches, Forkhamer, 289.
 Sharp, D., on slaty cleavage in North Wales, 420.
 Shells, Helix annulata and Planorbis multivolvus, W. Case, 101, 276.
 Shooting stars of August, 1846, E. C. Herrick, 125.
 —, of November, 1846, E. C. Herrick, 126.
 Siberia, cultivation of cereal grains in, 238.
 Siberian Explorations by Middendorf, 124, 450.
 Silesia, origin of coal of, Gippert, 119.
 Silica, on, Kapp, 261.
 Silliman, E. J., First Principles of Chemistry, noticed, 144.
 —, hydrate of nickel, native, 407.
 —, appointed to a professorship in Yale, 451.
 Silurian classification, remarks on, R. I. Murchison, 404.
 Silver, estimation of, when mercury is present, 255.
 Skulls, veretbrate structure of, R. Owen, 122.
 Slaty cleavage in North Wales, D. Sharpe, 420.
 Smithsonian Institution, 132, 254.
 Society, Ray, 295.
 —, of Naturalists at Trieste, 451.
 —, Russian, of Natural History, contents of Journal, 454.
 —, Proceedings of, 455.
 Specific gravity, water at maximum density used for taking, 427.
 Springs, Beer, and thermal, Rocky Mountains, with analysis of waters, 198, 450.
 —, hot, Cascade range, N. California, 200.
 —, mineral, arsenic in, 350.
 —, hot sulphur, in Kooristan, 349.
 —, saline, in Kooristan, 353.
 Squier, E. G., monads of the West, 227.
 St. Louis limestone, G. Engelmann, 119.
 Stanley, A. D., on the variation of a differential coefficient of a function of any number of variables, 415.
 Stars, Memoir on colors of, by P. B. Sestini, noticed, 281.
 Statistics of iron trade in Great Britain, 291.
 —, of plate glass making in England, 232.
 —, of mines in Belgium, 295.
 —, of deaths among children, 297.
 Steam Navigation, first Atlantic, 141.
 Strickland, H. E., use of the words analogy, homology and iconism, 339.
 Structure, furrows dependent on, C. B. Adams, 423.
 Sugar, E. Peliget's method of estimating the quantity, 109.
 —, of gelatine, from hippuric acid, 257.
 —, A. Laurent, 255.
 —, E. N. Horsford, 369.
 Sulphur spring, hot, in Kooristan, 347.
 —, masses of Kooristan, 353.
 Sun, planetary nebulous masses near, 444.
 T.
 Tantalite, new metals in, 357.
 Telegraph, electric, lines of, in U. States, 328.
 —, fact v. fancy, 449.
 Tertiary of Russia, 157.
 Tschakauer, J. E., new mineral from the Azores, 32.
 —, fossil vegetation of America, 56.
 Tobacco, seeds of, E. Goupil, 423.
 Tracks, see Footprints.
 Trap dikes of New England, origin of, J. D. Dana, 99.
 —, J. G. Percival, 390.
 Trautvetter, Plantarum Imagines, &c., of, noticed, 147.
 Trieste, Society of Naturalists at, 451.
 Trilobites in New York, 61, 64.
 Trout of Swedish lakes, a salt water species, 316.
 Tucker, E., proposed work on Liebens, 146.
 Turkey, Kooristan, mines, springs, &c. of, 347.
 U.
 United States coast survey, Report on, by A. D. Roche, noticed, 339.
 Ural mountains, geology of, 158.
 Uranium, carbonate a new ore of, J. L. Le Conte, 172.
 Urinary Calculi in the Transylvania University museum, work on, by R. Peter, noticed, 299, 451.
 V.
 Variation of a differential coefficient of a function of any number of variables, A. D. Stanley, 415.

- Vegetation, influence of protoxyd of nitrogen on, 425.
 Vermont, report on Geology of, *C. B. Adams*, noticed, 144.
Vernauil, E. de, review of Geology of Russia, 153.
 Volatile oils of the Cruciferae, 425.
 Volcanic action, *Persoo's* views on, 180.
 — dust of Hecla, 272.
 — band nearly encircling the Pacific, 298.
 — peak of Popo, Cape Verde, 432.
 Volcano in the Red Sea, 273.
 —, probable submarine, in China Sea, 273.
 —, Hecla, remarks on, 288.
 Volcanoes, cause of position of, *J. D. Dana*, 186.
 Vulture arc, molecular phenomena of, *de la Raze*, 110.
- W.
- Walker, *S. C.*, conclusion, respecting *Le Verrier's* planet, 411.
 Washington, Observations at the National Observatory, Washington, noticed, 150, 278.
 Water, sea, analytical researches, *Forchhammer*, 289.
 —, maximum density of pure, 427.
 —, raised by waves, 449.
 Waves of sound, refraction and diffraction of, 140.
 —, sea, water raised by, through valved tubes, 449.
 Weather, on forecasting, and on the moon's influence on, *Arago*, 141.
 Weights, minute, mode of making, 411.
 — of minute spheres of gold and silver, 414.
 Wheat, development of vegetable matter in, *Deussing*, 106.
 Whewell, method of measuring the heights of clouds, 140.
 —, anemometer of, modified, 128.
 —, refraction and diffraction of waves of sound, 140.
- X.
- Xyloidine, 102, 259, 295.
- Y.
- Yale, *J. P. Norton* and *B. Silliman, Jr.* appointed to professorships in, 451.
- Z.
- Zoology.
 Alligator, tracks of, 125.
 Animals, hybridity of, 39, 203.
Anser nigricans, 425.
 Beaver, range of, in United States, 434.
Cervus lobatus and *C. hastalis*, 436.
Cicada septendecim, 216, 218.
Corvus lugubris, 436.
 Cyathophyllidae, remarks on, 14.
Harlans, new genus, 125.
Helix annulata, 101, 276.
Hippopotamus at Sierra Leone, 125.
 Locusts, wings of, 125.
 Mastodon, food of, 436.
Nelontes multipora, 124.
 Mollusca, olfactory sense in, 434.
 Palaeotherium in the West, 248.
Planorbis multivolvus, 101.
Plesiosaurus megacephalus, 276.
Procellaria brevirostris, 436.
Pygosternus Gouldii, a fossil Echinid, 437.
Pyranga roseo gularis, 436.
 Shells and trilobites, fossil, in New York, 57, 61, 64, 170, 171.
 Trout of Swedish lakes a salt water species, 216.
 Zoophytes, observations on, *J. D. Dana*, 1, 160, 237.
 —, Geographical distribution of, *J. D. Dana*, 160.
 —, classification of, 237.

ADDITIONAL ERRATA.

- P. 370, 8 lines from bottom, after "copper," insert "and nitric acid."
 P. 371, in note, for "Aq" in formula, read "Ag."
 P. 376, 9 lines from bottom, for "fine," read "fire."

THE

AMERICAN JOURNAL

OF

SCIENCE AND ARTS.

CONDUCTED BY

PROFESSORS B. SILLIMAN AND E. SILLIMAN, JR.,

AND

JAMES D. DANA.

SECOND SERIES.

VOL. III.—MAY, 1847.

NEW HAVEN:

PRINTED FOR THE EDITORS BY E. L. HALEN,
 Printer to Yale College.

Sold by H. DAY, New Haven.—LITTLE & BROWN, and W. H. S. JORDAN, Boston.—C. S. FRANCIS & Co. and WILEY & PUTNAM, New York.—CAREY & HARTY, Philadelphia.—N. HICKMAN, Baltimore, Md.—WILEY & PUTNAM, London.—HECTOR BOSSANGE & Co., Paris.—NESTLER & MELLE, Hamburg.

AMERICAN JOURNAL

SCIENCE AND ARTS

CONTENTS OF VOLUME III.

NUMBER VII.

	Page.
ART. I. On Zoophytes, No. III; by JAMES D. DANA, . . .	1
II. On the Induction of Atmospheric Electricity on the Wires of the Electrical Telegraph; by Prof. JOSEPH HENRY, . . .	25
III. A New Mineral from the Azores; by J. E. TESCHEMACHER, . . .	32
IV. On the Delta and Alluvial Deposits of the Mississippi, and other points in the Geology of North America, observed in the years 1845, 1846; by C. LYELL, . . .	34
V. Hybridity in Animals, considered in reference to the question of the Unity of the Human Species; by SAMUEL GEORGE MORTON, M.D., . . .	39
VI. Solution of a Mathematical Problem; by O. ROOT, . . .	50
VII. On the North American Species of Isoetes and Marsilea; by Prof. A. BRAUN,—Communicated by Dr. G. ENGELMANN, . . .	52
VIII. Review of the New York Geological Reports, . . .	57
IX. Notice of New Fossil Footprints; by JAMES DEANE, . . .	74
X. Notes on the Algae of the United States; by J. W. BAILEY, Professor of Chemistry, &c., at the U. S. Military Academy, . . .	80
XI. On the Fossil Vegetation of America; by J. E. TESCHEMACHER, . . .	86
XII. On the existence of certain Lacustrine Deposits, in the vicinity of the Great Lakes, usually confounded with the "Drift;" by I. A. LAPHAM, . . .	90
XIII. On the Origin of Continents; by JAMES D. DANA, . . .	94
XIV. Description of two New Species of Shells; by WILLIAM CASE, Cleveland, Ohio, . . .	101

SCIENTIFIC INTELLIGENCE.

Physics and Chemistry.—Gun-Cotton, 102.—On the Compounds of Phosphorus and Nitrogen, by C. GERHARDT, 105.—Experimental Researches on the Nutritive Power of green and dry Fodder, by M. BOUSSINGAULT; On the progressive development of Vegetable Matter in Wheat, by M. BOUSSINGAULT; Memoir on Coffee, by M. PAVES, 106.—Researches on Blood, by M. DEMAS, 108.—New Saccharimetric Process, by M. EUG. PELIGOT, 109.—Rapid Method of estimating Copper, by means of a Colorimeter, by M. JACQUELIN; On the Molecular Phenomena of the Voltaic Arc, by M. DE LA RIVE, 110.—On Electro-Physiology, by Prof. MATTEUCCI, 111.—Notices of the Progress of Experiments on the Influence of Light on the Growth of Plants, by R. HERT; On the Results of an extensive series of Magnetic Investigation, including most of the known varieties of Steel, by W. PETRIE, 112.—On the Mode of Developing the Magnetic Condition, by Dr. SCORESBY, 114.—On some Results of the Magnetic Observations made at General Sir T. M. Brisbane's Observatory, Makerstown, by J. A. BRADY, 115.—New Metal, Hsenium, 116.

Mineralogy and Geology.—Crystallized Carbonate of Lead, at Rossie, New York, by G. HADLEY; On Coracite, a new ore of Uranium, by JONAS L. LACOSTE,

- M.D.: Plumbo-resinite and Cupreous Sulphato-carbonate of Lead in Missouri, by J. L. LeCOSTE, M.D., 117.—On the Mississippi Delta, by C. LYELL, 118.—On the Origin of the Coal of Silesia, by Prof. GÖPFFERT: Remarks on the St. Louis Limestone, by G. ENGELMANN, M.D., 119.—Cause of the absence of Ancient Marine Formations from certain regions, by CHARLES DARWIN, 120.
- Botany and Zoology.*—Hillocks of *Belax globaria*, of the Falkland Islands, 121.—On the Vertebrate Structure of the Skull, by Prof. OWEN, 122.—Remarks on the *Melomys multipora*, by G. ENGELMANN, M.D., 124.—*Hippopotamus* at Sierra Leone: Tracks of Alligators: Wings of Locusts: *Harlanus*, a new genus of fossil *Pachyderms*, 125.
- Astronomy.*—Observations on Shooting Stars, August 10, 1846, 125.—Ancient returns of Halley's Comet, 126.—Prof. Peirce's Catalogue of Comets, 127.—Le Verrier's Planet, 128.—New Comets, 132.
- Miscellaneous Intelligence.*—Smithsonian Institution, 132.—British Association, 133.—On boring for Artesian Wells, by M. FAUVELLE, 135.—Discussion on the Potato Disease, 136.—On the Educational Statistics of Oxford, 137.—Modification of Dr. Whewell's Anemometer, for measuring the Velocity of the Wind, by Dr. ROBERTSON: On the Ethnological Distribution of Round and Elongated Crania, by Prof. RETZSCH: On the Deviation of Falling Bodies from the Perpendicular, by Prof. ORNSTEDT, 138.—Method of measuring the Height of Clouds, by Dr. WHEWELL: Gauss's Magnetic Constants: Hydrodynamics: Refraction and Diffraction of Waves of Sound, 140.—Weather: North Pole: Dust falling on Vessels in the Atlantic: The first Atlantic Steam Navigation: Fall of Meteorites, 141.—Footmarks in the New Red Sandstone of Storeton, near Liverpool, by JOHN CUSWINGHAM: Explosive Paper: Gun-Cotton: Railways in Italy: Opening of the Eighth Congress of Italian Savants: Monument to Columbus: Depth of the Artesian Well in the Grand Duchy of Luxemburg, 142.—Native Gold in South Australia, 143.
- Obituary.*—T. MONTICELLI: M. AIMÉ, 143.—ISAIAH LUKENS, 144.
- Bibliography.*—First Principles of Chemistry, for the use of Colleges and Schools, by BENJAMIN STILLMAN, JUN., M.A.: Second Annual Report on the Geology of Vermont, by Prof. C. B. ADAMS: Chemical Essays relating to Agriculture, by E. N. HORTON, 144.—On the Analysis of the Oat, by JOHN P. NORTON. *Encyclopædia Americana*, by HENRY VETTER: Chemistry of the Four Seasons: *Precis de Chimie Organique*, by M. CHARLES GERNARDT, 145.—Geological Observations on South America, by CHARLES DARWIN, M.A., F.R.S., F.G.S.: The Trees of America, by D. J. BROWNE: *Eureka*, or the Journal of the National Association of Inventors: The London Geological Journal and Record of Discoveries in British and Foreign Palæontology: *Lichenes Exsiccati Amer.*, by E. TUCKERMAN: *Sertum Petropolitum*, Acad. P. E. L. FISCHER et C. A. MEYER, 146.—ESDLICHER and MARTIUS, *Flora Brasiliensis*: TRAUTVETTER, *Plantarum, Imagines et Descriptiones Florum Russicarum Illustrantes*: HOOKER, *Species Filicum*: *Plantes Nouvelles ou Rapports d'Amérique*, par STEPH. MORICAND, 147.—LEDBETTER, *Flora Rossica Symbola Cartographicæ* of DALZIEL, 148.—Instruction in Chemical Analysis, [Quantitative,] by Dr. C. RENIGES PRESENTE: *Taschenbuch für Freunde der Geologie*, von KARL CÄSAR V. LEONHARD: Astronomical Observations made at the Naval Observatory, Washington, by Lieut. J. M. GILLES, U. S. N., 149.—Astronomical Observations made during the year 1845, at the National Observatory, Washington, under the direction of M. F. MAURY, A.M.

List of Works, 150.

NUMBER VIII.

- AST. XV. A general Review of the Geology of Russia; by M. E. DE VERNEUIL, 153
- XVI. On Zoophytes, No. IV; by JAMES D. DANA, 160
- XVII. Review of the New York Geological Reports, 164

- XVIII. Cartography; by Prof. C. DEWEY, M.D., 171
- XIX. On Cornicite, a new Ore of Uranium; by JOHN L. LE CONTE, M.D., 173
- XX. Geological Results of the Earth's Contraction in consequence of Cooling; by JAMES D. DANA, 176
- XXI. Notes on the Herbaria, Gardens and Botanists of Upsal, St. Petersburg, &c., gathered from the letters of a distinguished botanist during a continental tour, 189
- XXII. Observations on the Rocky Mountains and Oregon; from Reports of the Exploring Expeditions of Capt. J. C. FREMONT, 192
- XXIII. Hybridity in Animals, considered in reference to the question of the Unity of the Human Species; by SAMUEL GEORGE MORTON, M.D., 203
- XXIV. Abstract of a Meteorological Journal, for the year 1846, kept at Marietta, Ohio; by S. P. HILDEBETH, M.D., 212
- XXV. On the Analysis of the Oat; by Prof. JOHN PITKIN NORTON, 222
- XXVI. Observations on the uses of the Mounds of the West, with an attempt at their Classification; by E. G. SQUIRE, 237
- XXVII. Description of a Fossil Maxillary Bone of a *Palæotherium*, from near White River; by HIRAM A. PROUT, M.D., 248
- XXVIII. Observations upon the Development of Electricity in Bands of Leather; by JOHN M. BATCHELDER, 250
- XXIX. Revolution of a Magnet on its own Axis without the use of Mercurial Conductors, and also without visible Support; by CHAS. G. PAGE, M.D., 152

SCIENTIFIC INTELLIGENCE.

- Chemistry and Physics.*—On a Common Origin of the Acids (CH)₂O, with a boiling point below 300° Centigrade, by Dr. JOS. REDTENBACHER, 254.—On the Solution of Oxygen in fused Litharge, and the circumstances attendant upon the production of Litharge on a large scale, by M. FEL. LE BLANC: On the Estimation of Silver, by Gay Lussac's Process, when Mercury is present, by M. A. LEVOL: A new Method of estimating Lead, by M. FLORES DOMESTIC, 255.—On the Solubility of Alumina in Ammoniated Water, by F. MALAGUTI and J. DEROGIER: Action of Perochlorid of Phosphorus on Organic Substances, by AUG. CAHOUS, 256.—On the transformation of Hippuric acid into Benzoic acid and Sugar of Gelatine, by M. DESHAIGNES: Benzoic Compounds, 257.—On Sugar of Gelatine, &c., by AUG. LAURENT: On the Amides, from a letter of M. LAURENT: Asparagine: On the Formation of Chloro-cyanilide and Fluoro-silicilide, by AUG. LAURENT and J. DELON: On the Growth of Bone in the Hog, by M. BOESINGHAUT, 258.—Gun-cotton, 259.—Arsenic in Mineral Waters: On Fluorine, by M. LOUDET, 260.—Silica: Nitric Acid: Phosphate of Lime in Organic Beings, 261.—On Elliptic Polarization, by Mr. DALE, 262.—On certain cases of Elliptic Polarization of Light by Reflection, by Prof. POWELL, 264.
- Mineralogy and Geology.*—Analysis of the American Mineral Newsletter, by Prof. COVELL, 265.—Reclamation respecting the Identity of Pinite, Chlorophyllite, and other Minerals, with the species Iolite, by CHARLES UPHAM SHEPARD, M.D., 266.—Chiolite, a new mineral from Minsk, by FR. V. WÖRTH: On the alleged Coexistence of Man and the Megatherium, by C. LYELL, 267.—Notices of the Superposition of certain Minerals in some of the Metalliferous Deposits of Cornwall and Devon, by WILLIAM JORY HEWWOOD, F.R.S., 269.—Geological Society of France, 271.—Volcanic Dust of Hecla, by Dr. TRAILL, 272.—Volcano in the Red Sea: Probable Submarine Volcano: Coal on the Rocky Mountains, discovered by Capt. Fremont, by JAMES HALL, 273.

Botany and Zoology.—The Characters of some New Genera and Species of Composites from Texas, by ASA GRAY, M.D., 274.—*Helix annulata*: Ornithichnites; *Plesiosaurus megaloccephalus*, by S. STUTCHERY: Physiological Remarks on the Status of Fishes, by JOHN MÖLLER, 276.

Astronomy.—On the Attempts to explain the Projection of a Star on the Moon, during an Occultation, by Prof. POWELL, 277.—Astronomical Observations made under the direction of M. F. MAURY, Lieut. U. S. Navy, during the year 1845, at the U. S. Naval Observatory, Washington, 278.—*Memoria sopra i colori delle Stelle del Catalogo di Baily*, osservati dal P. Benedetto Sestini della compagnia di Gesù; *Stelle del Catalogo di Baily dal polo boreale fino a 30° di Decl. Australe contrassegnate secondo i loro diversi colori osservati nella specola del Collegio Romano*, 281.—Sixth Comet of 1846: Hind's Comet: Le VERRIER, 282.—M. GALLÉ, 283.

Miscellaneous Intelligence.—Effects of the Earth's Rotation upon Falling Bodies and upon the Atmosphere, by W. C. REDFIELD, 283.—Smithsonian Institution, 284.—Footprints and Indian Sculpture, 286.—Hecla: Cultivation of Cereal Grains in Cold Climates, by A. T. KUPFFER, 288.—On Comparative Analytical Researches on Sea Water, by Prof. FORCHHAMMER, 289.—On the Iron Manufacture of Great Britain, by Mr. G. R. PORTER, 291.—On Plate Glass making in England in 1846, contrasted with what it was 1827, by Mr. H. HOWARD: A Review of the Mines and Mining Industry of Belgium, by R. VALTY, Esq., 293.—On the Fairy-rings of Pastures, by Prof. J. T. WAY, 294.—Gun-Cotton, 295.—Lines of Electric Telegraph in the United States and Canada. The New Botanic Garden at Cambridge, Eng.: Ray Society, 296.—On the Duration of Life in the Members of the several Professions, founded on the Obituary Lists of the Annual Register, by Dr. GUY: On the Mortality of Children, by Mr. WIGGLESWORTH, 297.—Monument of the late THOMAS BAY, 298.

Bibliography.—Chemical Examination of the Urinary Calculi in the Museum of the Medical Department of Pennsylvania, by ROBERT PETER, M.D., 299.—Coast Survey: Report of Prof. A. D. BACHE, 300.—Light Houses: Report of the Secretary of the Treasury on the Improvements in the Light House System and Collateral Aids to Navigation, embracing a Report from Lieut. THORNTON A. JENKINS, U. S. N., and Lieut. RICHARD BACHE, U. S. N.: Journal of Lieut. J. W. AVERY, from Bear's Port to St. Louis, in 1845, 301.—*Chloris borealis-Americana*, by ASA GRAY, M.D.: *Nomenclator Zoologicus*, continens Nomina Systematica Generum Animalium, tam viventium quam fossilium, etc., Auctore L. AGASSIZ, 302.—*Beiträge zur Pflanzenkunde des Russischen Reiches*; herausgegeben von der Kaiserl. Acad. der Wissenschaften, 302.—Report on the Trees and Shrubs growing naturally in the Forests of Massachusetts, by Geo. B. EXMERSON: Botanical Magazine, for January, 1847: A Treatise on Algebra, containing the latest Improvements, by CHARLES W. HACKLEY, S.T.D., 310.—Organic Remains: The Literary World; a Gazette for Authors, Readers and Publishers, 311.

List of Works, 311.

NUMBER IX.

ART. XXX. On the Relations which exist between the Phenomena of Erratic Blocks in Northern Europe and the Elevations of Scandinavia; by M. DESOR, 313
XXXI. On the Analysis of the Cat; by Prof. JOHN FITZKIN NORTON, 318
XXXII. On Free Electricity; by ROBERT HARE, M.D., 334
XXXIII. On Zoophytes, No. V; by JAMES D. DANA, 337
XXXIV. Notices of Koordistan.—Hot Sulphur Spring—Manna—Mines of Lead—Sulphur and Orpiment—Rock Salt and Saline Springs—Ruins, &c., derived chiefly from the letters of Rev. A. H. WRIGHT, M.D., of the Mission of the

A.B.C.F.M., at Oroomiah, Persia; communicated by OLIVER P. HUBBARD, M.D., 347
XXXV. Caricography; by Prof. C. DEWEY, M.D., 354
XXXVI. On a New Metal, Pelopium, contained in the Bavarian Tantalite; by Prof. H. ROSE, 357
XXXVII. Termination of the Paleozoic Period, and Commencement of the Mesozoic; by D. D. OWEN, M.D., 365
XXXVIII. Glycocoll (Gelatine Sugar) and some of its Products of Decomposition; by E. N. HORSFORD, 369
XXXIX. Origin of the Grand Outline Features of the Earth; by JAMES D. DANA, 381
XL. Notes on the Algae of the United States; by Prof. J. W. BAILEY, 399
XLI. A few Remarks on the Silurian Classification; by Sir ROBERT IMPEY MURCHISON, G.C.S.S., F.R.S., &c., 404
XLII. Hydrate of Nickel, a New Mineral; by Prof. B. SILIMAN, Jr., 407
XLIII. On Cupellation with the Blowpipe; by Wm. W. MATHER, 409
XLIV. On the Variation of a Differential Coefficient of a Function of any number of Variables; by Prof. A. D. STANLEY, 415

SCIENTIFIC INTELLIGENCE.

Chemistry and Physics.—On the presence of Fluorine in Anthracite, by GEORGE C. SCHAEFFER, 422.—Arseniate of Magnesia and Ammonia, and its applications, by M. LÉVEL: On the Acids of Tobacco, by M. E. GOUPIL: On the Fusion of Phosphorus, by M. ED. DESAINS: On Coffee, (third part), by M. PAYEN, 423.—Determination of Nitrogen in Organic Bodies, by GEORGE KEMP, M.D.: On the Preparation of Caustic Baryta, by Dr. E. RINGEL: Nitrogen not a Constituent of Pterocline, EUDOMYNS and MARSHALL, 424.—On the influence of Protoxyd of Nitrogen upon Vegetation, by M. VOGEL, Jr.: On the Volatile Oils of the Crucifers, by F. PLESS: On the Oil of Monarda, by A. E. ARFFE, 425.—On the Substances contained in Achillea millefolium, (Yarrow), by B. ZANDON: On the Formation of Cassiothene from Drying Oils, by L. E. JORAY: Purification of Mercury, by M. MILLON, 426.—Grove's Galvanic Battery, improved for the use of the Telegraph: Maximum Density of Pure Water, 427.—On a new and practical form of Voltaic Battery of the highest powers, in which Potassium forms the positive element, by JOHN GOODMAN, Esq.: On Photographic Self-Registering Meteorological and Magnetical Instruments; by FRANCIS RONALDS, Esq., F.R.S., &c., 428.

Mineralogy and Geology.—Burnito, a new Mineral, by M. DELESEQUE: Gropite, a new Mineral, by L. SVANBERG: Herschelinite, Aspasolite, a new Mineral, by M. SCHREKER, 429.—Castor and Pollox, two new Minerals, by BENEDICT and PLATTNER: Pleochroism: Russian Geology: On Slaty Cleavages in North Wales, by DANIEL SARGENT, 430.—On the Salt and Salt Lakes of Algeria, by H. FOURNEL: Volcanic Peak of the Island of Fogo, Cape Verde, by C. DEVILLE, 432.—Notice of an Example of apparent Drift Furrows dependent on Structure, by C. B. ADAMS, 433.

Zoology.—On the Range of the Beaver in the United States, by S. B. BECKLEY: On the situation of the Olfactory Sense in the terrestrial tribe of the Gasteropoda Mollusca, by JOSEPH LEIDY, M.D., 434.—Description of a new species of Anser, by GEORGE N. LAWRENCE, 435.—A new species of Procellaria from Florida, by G. N. LAWRENCE: Food of the Mastodon, by Prof. A. GRAY: On the Moose and Carabou, and on the American Raven, by L. AGASSIZ: *Pyrenaea roseo-gularis*, a new species from Yucatan, by Dr. CABOT, 436.—*Pyrenobrychus Gouldii*, a new Echinus from the Millstone Grit of Georgia, by M. BEUVÉ, 437.

Meteorology.—Meteorological Observations at Waialeale, on Kauai, one of the Hawaiian Islands, by Rev. EDWARD JOHNSON, 437.—On the amount of Rain and Snow at St. Louis, for the years 1837 to 1846, inclusive, by Dr. G. ENGELMANN, 438.—Meteorological Society in Finland: Auroral Belt, 440.

Astronomy.—The new Planet Neptune, 441.—New Comet: Expected return of the Comet of 1556, 443.—Parallax of a Fixed Star in Ursa Major: Planetary Nebulous Masses near the Sun, 444.

Miscellaneous Intelligence.—Relative Level of Lake Ontario, by C. DEWEY: Inhalation of Ether in Surgery, 444.—On the Nile, by Dr. C. T. BEKE, 447.—Water raised by Waves through Valved Tubes: Electric Telegraph, 449.—Dilatation of Ice: Measure of a Degree of a Meridian in Finland: Middendorf's Siberian Explorations: Bear River Springs, Rocky Mountains, 450.—Chalk and Coal Fires: Paris Academy of Sciences: Society of Naturalists at Trieste: New Appointments to Professorships in Harvard and Yale: Deviation of a Falling Body: Corrections, 451.—Obituary.—Dr. Amos Binney, 451.—Bory de St. Vincent, 452.

Bibliography.—Eulogy on John Pickering, LL.D., 452.—Botany of the Northern States: Palaeontology of New York: Lyceum of Natural History of New York: Boston Journal of Natural History, 454.

List of works, 455.

Index, 457.

ERRATA.

Page 55, over figures, for half, read twice.—P. 96, dele first foot note.—P. 103, 13 lines from bottom, for 272, read 273.—In part of the edition, p. 116, 9 lines from bottom, for 'clearer,' read deeper.—P. 117, 2 lines from top, for 'its specific gravity,' read The specific gravity of this acid.—P. 139, 21 and 22 lines from top, for 305 and 309, read 3-95 and 3-99.—P. 147, 22 lines from top, for *Concorado*, read *Corcorado*. 18 lines from bottom, for *Borgard*, read *Bongard*.—P. 148, 2 lines from top, for *Islander*, read *Berlander*.—P. 149, 7th line from bottom, and p. 159, 21 lines from top, for *promising*, read *persevering*.—P. 229, 12 lines from bottom, for *Pennsylvania*, read *Transylvania*.—P. 301, 23 lines from bottom, for *catoptric*, read *dioptric*.

Vol. I, p. 427, under *Electric excitement of paper, for stone*, read *rice*.

CARE OF THE SICK

WITH REFERENCE TO THE

DUTIES OF SISTERS AND NURSES

BY

GUY'S HOSPITAL.

LONDON:

PRINTED BY WILLIAM MACKENZIE, 23 PATERNOSTER ROW.

TABLE OF CONTENTS.

	PAGE
Order and Discipline in the Wards,	5
Cleanliness,	7
Washing and Bathing Patients,	7
Changing Beds and Bed Linen,	8
Method, Routine of Daily Occurrences,	9
Time Table for the Administration of Medicines,	10
Ventilation, Warmth, and Light,	11
Rules to be followed in Ventilating Wards,	13
Importance of proper Diet,	15
Diet Table in use in Guy's Hospital,	16
Hospital Pests,	19
Contagion, Erysipelas, Gangrene, and Pyæmia,	20
Foul Smells, how to be Counteracted and Destroyed,	22
Bed Sores, how to be Treated and Prevented,	23
Poisoned Wounds—Caution to attendants,	24
Special duties of a Sister and Nurse,	25
The Symptoms of Disease and their Observation,	25
The Pulse, its Characters in Health and Disease,	25
The Respiration, its Characters in Health and Disease,	28
The Skin, its Characters in Health and Disease,	28
The Tongue, its Characters in Health and Disease,	29
Pain, its Character and varieties,	31
Medicines furnished to the Wards,	33
Explanation of the Actions of Medicines,	35
Hospital Regulations referring to Sisters,	38
Hospital Regulations referring to Day Nurses,	43
Hospital Regulations referring to Night Nurses,	46
Hospital Regulations referring to Patients,	48

GUYS HOSPITAL.

THE CARE OF THE SICK.

SISTERS AND NURSES.

BEFORE entering on the important and responsible occupation of attendance on the sick in this Hospital, it is incumbent on the sister and nurse to consider seriously the nature of the trust about to be confided in them; and to use every available means to inform themselves respecting the usages of the Hospital, not merely in their application to discipline and administration, but also with reference to the nature, symptoms, and treatment of the diseases which will come under their more immediate care. In proportion to the attention paid to these matters at the outset of her career, the female attendant, besides familiarizing herself with her work, and gaining confidence in it, will acquire an amount of interest in it, which will go far to reward her for the care and anxiety which must always be associated with the right performance of her duties.

Order and Discipline.—Without the exercise of a judicious authority with your patients, it is hopeless to expect to pursue your vocation with comfort or success. There are few positions in life which demand a greater amount of self-control, than that of attendant on the sick in an Hospital. You have to deal with persons (chiefly from the lower ranks of life), whose ideas, tastes, and sympathies may be very different from your own, and whose dispositions it is often difficult to conciliate. It is necessary also to make allowance for the influence which disease very frequently exerts on the mental faculties, by rendering the sufferer discontented, capricious,

and unreasonable, in spite of every advance made in the way of kindness. To meet these difficulties it will be necessary to combine in your work firmness with forbearance, and sound discretion with kindness, and to cherish a due amount of confidence in your own judgment. The knowledge that your efforts will be supported by the authorities of the Hospital, will diminish the weight of responsibility, and encourage resolution. Nor is it desirable while enforcing attention to the regulations concerning the duties of patients, that you should adopt a too authoritative manner. You will find that your influence over them will be best obtained by practising a kindly and cheerful demeanour. Endeavour in your intercourse to gain their confidence by such means, in preference to the harsher expedient of official authority.¹ Avoid by all means the mistake of making confidants of special patients, or of showing partiality in any way. There is nothing so injurious to discipline as favouritism, for it makes the neglected jealous and unhappy, and usually defeats its own end.

Among the more common failings that you will have to contend with among the male patients, may be mentioned the habit of loud talking, improper conversation, a disregard of cleanliness, and an aversion to mental and bodily occupation on the part of many who are able enough to pursue both. The shortcomings of the females are of a similar kind, but usually of a more moderate character. It occasionally happens, however, that much annoyance and disturbance are caused to the inmates of a female ward, by cases of hysterical excitement and bad temper. Much firmness is required to deal with such cases; but after the sister has once established her authority, she will have little difficulty in maintaining order among the most excitable. Mental

¹ See Page 38, Rule iv.

occupation and harmless amusement will also contribute greatly to this end. Needlework among the females, and assisting in the ward work among the males, ought to be encouraged and enforced when their bodily health permits it.¹

Cleanliness.—Strict attention to the personal cleanliness of patients is indispensable in the Hospital, as it contributes most materially to the successful treatment of the sick. Among the numerous persons weekly received into the Hospital, there are few who would be injured by being washed with soap and water. It is the general rule of the Hospital to have every patient placed in a warm bath, before being taken into the wards.² There are, of course, cases of great exhaustion, and of bodily injury, where such a practice would be inadmissible; but in these cases much may be done to insure cleanliness, by sponging the skin with soap and water.

Insist upon all who are able to leave their beds, the necessity for daily ablution, provision for which has been amply furnished in all the wards; and see that the same is performed for such as are incapacitated from doing it themselves.³ Use the warm bath freely, especially with dirty patients, and do not wait for special instructions about its employment; your own judgment will soon discover in what cases it might possibly be injurious.

Along with cleanliness of the person, it is equally important to combine attention to the state of the bed-clothes, bedding, dressings, utensils, and ward furnishings generally. When a patient is admitted, his body clothes should be folded and carefully put away in the compartment of the clothes press, marked with the respective number of his bed; or, in the event of his not being able to use them for a considerable time, it is often better to

¹ Page 41, Rule xiii. Page 43, Rule xii. Page 44, Rule viii.

² Page 41, Rule xiv.

³ Page 48, Rule i.

have them taken home by his friends. In cases of infectious disease, or when the clothes are infested with vermin, it is necessary that they should be left first to be disinfected, and purified by exposure in the oven at the bath-house.¹ Patients, when admitted, ought to be furnished by their friends with a change of body linen, and it is the sister's duty to see that this rule is adhered to, as far as practicable.

The bed linen is to be changed once a week, and oftener if necessary; and care must be taken that it be well aired before being used. In all the wards, but especially in those devoted to surgical purposes, the bedclothes are very liable to become soiled by discharges, which, if not provided against, very often tell disastrously on the health of the patients. To remedy any bad effect from this cause, waterproof cloth and draw sheets are liberally supplied, and tow and cotton may be used freely for soaking and cleansing purposes.² Care should be taken that all used dressings, soiled sheets, and fragments of food, be removed from the wards daily after the dressings are finished, and oftener if necessary. See that the beds are made regularly every morning after breakfast, whether the patients are confined to them or not; and that in ordinary circumstances the flock is changed every two months, and that the canvas sackings are renewed at least once every year. When the beds have been occupied by persons who have suffered from fever, erysipelas, gangrene, pyæmia, or any other disease of a supposed infectious nature, the bedding, bedclothes, and sackings, must be removed, and the bedsteads well scrubbed with soap and water, and allowed to remain out of use until they are again urgently required.

Be particularly careful that the ward presses, sculleries,

¹ Page 39, Rules vi. and vii.

² Page 41, Rule xiv. Page 39, Rule vi.

water-closets, and patients' lockers, are well scrubbed out, and that they are free of all superfluous articles. In scrubbing the ward floors twice a week with soap and water, caution should be given that the parts scrubbed be well dried with a cloth, lest injury arise from moist exhalations. Stains on the boards from grease, blood, or chemical materials, can generally be prevented by immediate removal, and when this cannot be done recourse must be had to potash water, or other cleansing fluids.

Combine neatness with cleanliness in all your arrangements. The general appearance of a ward usually reflects the character of its superior; and a female who is neat and orderly in her own person, rarely fails to extend the same good qualities to her charge. While it is always objectionable to have any articles of superfluous furniture retained in the ward, much may be done by a person anxious to promote the welfare of her patients, by the introduction of flowers, pictures, and such other ornamental additions, which are often presented by visitors on application, and which always contribute to domestic comfort and cheerfulness.

Method.—Attention to this is half the battle, and neglect of it will render your best efforts abortive. An observance of punctuality in your daily engagements is necessary to facilitate the general arrangements of the Hospital, which must suffer less or more from individual inattention. It will economize time, render your duties less irksome and laborious, and leave you more opportunities for leisure and recreation. The following Time Table, which it is desired should be rigidly adhered to, indicates the more important daily occurrences :—¹

Breakfast.	Attend Office.	Chapel.	Dinner.	Medical Visit.	Tea.	Prayers.	Supper.	Change Nurses.
7 A.M.	9 to 10	9.30	12.30	1.30	4	5	7	8 P.M.

¹ Page 44, Rule viii.

During the intervening periods there will be ample time found for attending to the medical wants of the patients, as well as for your own special requirements, which latter, however, should be made subordinate to the varying exigencies of the ward. It is of importance that the dressings of the surgical patients, the administration of medicine, and the ministrations of the chaplain, should interfere as little as possible with each other, or with the duties defined in the Time Table.

When wines and medicines are ordered at regular intervals, you must not rely on your own memory for guidance in administering them. The following Table contains the directions to be followed in each case, and sisters and nurses are requested to see that the hours specified in the Table for medicine to be given are strictly adhered to, unless specially ordered otherwise, which will very rarely happen.¹

When ordered every Four Hours.	When ordered Four Times Daily.	When ordered Three Times Daily.	When ordered Twice Daily.	When ordered Morning and Evening.	When ordered Daily.
10 o'clock Forenoon.	10 o'clock Forenoon.	10 o'clock Forenoon.	10 o'clock Forenoon.	10 o'clock Forenoon.	10 o'clock Forenoon;
2 o'clock Afternoon.	2 o'clock Afternoon.	2 o'clock Afternoon.			or at
6 o'clock Evening.		6 o'clock Evening.	6 o'clock Evening.		
10 o'clock at Night.	Bed-time.			Bed-time.	Bed-time.
2 o'clock Morning.					
6 o'clock Morning.	6 o'clock Morning.				

¹ Page 40, Rule x.

Method is also of urgent importance in the arrangement of the ward furniture, medicines, and other accessories in daily use. The homely injunction—"to have a place for every thing, and to keep every thing in its proper place"—is nowhere more necessary than in Hospital work, where at any moment some article may be required to meet a pressing want. The common ward medicines and apparatus, as well as bandages, lint, strapping, and pads, should be so arranged that the surgeons and dressers should not be under the necessity of having to wait until all or any of these articles can be discovered.¹ Avoid having more articles in your ward than are absolutely needed; these occupy space, require cleaning, waste time, and interfere with methodical arrangements.

Ventilation, Warmth, and Light.—A knowledge of the best mode of using whatever means of ventilation a ward may afford, ought to be among the first studies of the female attendant, as she has it in her power, by a judicious application of this knowledge, to render her ward sweet and wholesome, notwithstanding the numerous sources which disseminate atmospheric impurities. The main object aimed at in ventilation is to render the air of an inhabited room as free from impurities as the atmosphere outside, without at the same time creating drafts or currents either of hot or cold air. In certain favourable conditions of the weather during the spring, summer, and autumn months, a perfect and natural ventilation may be attained in the wards, by having the windows wide open during the day and partially open during the night. These favourable conditions assume, that the temperature of the ward atmosphere averages about 60° Fahr. during the day, and that it does not fall below 55° in the course of the night, and also

¹ Page 40, Rule xi.

that the force of the air should not be disagreeably felt. You must make it your endeavour, in spite of the numerous obstacles you have to contend with, to approach as nearly as possible to the above standard by a proper application of the means at your disposal.

The chief causes of an impure atmosphere in a ward arise from air already respired by the inmates; exhalations from unhealthy secretions, from wounds and dressings, and from soiled bedclothes. The most effectual remedy is free ventilation by means of open windows; and to meet the continually recurring changes of temperature and capricious currents of the air, it is necessary that fires should be kept in the wards during the colder months of the year, and that attention should be paid to the direction of the wind. To obtain a ready access to the fresh, and egress to the impure air, every available method has been adopted in the wards. Windows are placed betwixt the beds, and ventilating panes are placed in the upper sash of each window, to facilitate a change of air when it is unsafe to open the windows. The larger windows, extending from floor to ceiling, have been fixed at the ends of the wards so as to open freely without seriously incommoding the inmates, and fireplaces have been placed at convenient distances with the double object of heating and ventilating, when it would be dangerous to persist in keeping the windows continually open. Even in the coldest weather it is desirable that the air of the ward should be entirely renewed several times in the course of the day. This object can be conveniently enough accomplished by simply opening the large window at the extremity of the ward, and the ward door facing it, and retaining them both open for a few minutes; care being taken at the same time that patients are thoroughly protected by the bedclothes from the inevitable currents of fresh

air which this process involves. Complaints are often made by patients, who have been accustomed to live in close rooms, respecting the cold atmosphere which they are frequently obliged to submit to in the Hospital; but less harm accrues from cold than is generally supposed, and its existence is more compatible with a healthy condition of the wards than a warmer atmosphere would be. It is well to bear in mind, however, that this rule applies chiefly to the surgical wards, where the patients are comparatively free from diseases that might be aggravated by atmospheric changes.

In medical wards where it is more desirable to employ a higher temperature during the cold season, ventilation must be encouraged by open fires, and other auxiliary means for the escape of impure air, and it becomes a matter of importance that every facility be given to their operation. Care should be taken that the fireways are not obstructed with clothes' screens, and that convalescents are not permitted to group so closely round the hearth as to interfere with radiation. The windows cannot be kept open so freely in the medical as in the surgical wards without injury, and considerable experience and caution is required in managing them judiciously. Windows opening outwards and inwards, by means of the iron rod and pivot, can be more freely used than other windows at all seasons of the year, from the slanting preventing any down drafts, and a sufficient amount of night ventilation is obtained from them when shut by the permanent open panes fixed in the upper sashes.

As the continuous ventilation of a ward is more immediately under the care of the sister and nurses, a few rules for guidance will be found practically useful:—

1. Prohibit the patients from interfering in any way with the ward ventilation.
2. Let as many of the windows as possible be opened

every morning in all weathers before breakfast, so that the night atmosphere may be entirely removed; and if the weather will at all permit, allow a certain number to remain open during the day.

3. Repeat the same process after the dressing is finished in the forenoon, again for a few minutes after dinner, and again in the evening after bedtime.

4. Notice carefully the direction of the wind, as it is frequently possible even in very inclement weather to ventilate a ward pretty freely by opening the windows on the sheltered side, provided those on the windward side are kept closed.

5. Avoid placing patients in strong currents of air generally, and be especially careful that patients suffering from diseases of the lungs and air-passages are not placed in beds which may happen to be more exposed than others to the influence of the weather.

6. In favourable seasons allow a certain number of windows to remain fully open during the day, and slightly open during the night; but avoid (except so far as is necessary for removing the close atmosphere of the night) admitting the cold raw air of the morning in winter and spring.

The ward fires perform such an important part in the ventilation, that a considerable amount of care may be profitably bestowed on their management. Your chief aim ought always to be to combine the greatest amount of heat with the least expenditure of fuel, and the smallest amount of smoke and dust. As it is not necessary for health that an equable temperature should be maintained in a sick-room night and day, there is no occasion for the smaller fires being kept up during the night, except in the very coldest weather; the large fires in each ward will be found sufficient to meet all domestic as well as most sanitary requirements.

Natural light is of such essential importance to the sick, that it is now usually spoken of in connection with ventilation; but as ample provision has been made for its introduction in the wards of this Hospital, it is only alluded to here for the purpose of insisting on its not being too much interfered with by the window-blinds, which should only be used to moderate the direct rays of the sun. With artificial light it is very different, as the combustion of gas contributes more to the deterioration of the ward atmosphere than almost anything else, and, unless absolutely required, it is better to preserve the ward in comparative darkness. It is of importance therefore to limit your gaslight to your urgent necessities, and the night nurse is especially enjoined never to keep more than one jet alight,¹ which should be provided with a screen or reflector, to prevent its glare from interfering with the sleep of the patients.

Diet.—Next in importance to free air comes the subject of the diet of the sick. The female attendant will soon discover from her Hospital experience, that a nourishing and judicious dietary, in the treatment of the sick, is often of greater importance than the administration of medicine; and that she cannot consult the wishes of her medical superiors, or the comfort and health of her patients, in any better way than by catering for their capricious or jaded appetites. And as it is impossible for the Physician or Surgeon to notice every change of symptom, or to discover for himself the varying desires of his patient, a discretionary power has been given to the sister to make such minor alterations in the diet prescribed, as may best meet the requirements of individual cases. To do so satisfactorily, or in fact to superintend the daily distribution of food to your patients a knowledge of cookery is not only desirable but necessary;

¹ Page 47, Rule vii

not a mere acquaintance with roasting and boiling, but a practical experience in the preparation of such accessory aliments as beef tea, arrow-root, jellies, sago, rice, and the multiplicity of ways in which they may be combined with other substances to gratify a weak appetite.

For the general purposes of the Hospital, it is indispensable that a scale of diet containing varieties in the quantities and character of rations daily issued should be made the basis of the general diet Table. It is of importance, therefore, that the sister should make herself thoroughly conversant with this Table, and the extent of its allowances. It is found that on an average four-fifths of the patients are placed on one or other of the following diets:

FULL DIET.	MIDDLE DIET.	MILK DIET.	LOW DIET.	FEVER DIET.
Fourteen ounces of Bread.	Twelve ounces of Bread.	Twelve ounces of Bread.	Ten ounces of Bread.	
One Pint of Porter—Males.	Half Pint of Porter		Tea and Sugar.	Tea and Sugar.
Half Pint do.—Females.		Two Pints of Milk,		
Six ounces of Dressed Mutton, Roasted and Boiled alternately; with Potatoes.	Seven or ten ounces of Dressed Mutton, Roasted and Boiled alternately; with Potatoes.	or One Pint, with a Pound of Pudding made of Rice, Sago, or Arrow-root.		One Pint of Beef Tea.
Mutton Broth with Boiled meat, and Rice Pudding with Roast meat.	Mutton Broth with Boiled meat, and Rice Pudding with Roast meat.	Half Pint of Beef Tea when ordered.		Sago, Arrow-root, or Barley Water as required.
One ounce of Butter.	One ounce of Butter.	One ounce of Butter.	Three-fourths ounce of Butter.	
Porridge, Gruel, and Barley Water as required.	Porridge, Gruel, and Barley Water as required.	Gruel or Barley Water.	Gruel or Barley Water.	

The extra articles allowed for special cases, include

fish, chops, chicken and chicken soup, eggs, oysters, and other foods.

The above diet Table has been drawn up with the view of combining as much as possible the vegetable and animal elements of food in the proportions best adapted for the repair of the wasted tissues of the body, as well as for the ordinary purposes of life. In making out her ward list of diets, it will be the sister's duty daily to collect all the patients' diet papers after the visit of the medical officer, and to ascertain the collective numbers that have been placed on the respective scales of diet, and afterwards to enter them on the score for the following day. When it is considered necessary that any patient should have a particular article of diet not mentioned in the Table, the bed number of the person must be distinctly entered on the list alongside of the article of food ordered. To avoid confusion in the diet list, it is desirable that all persons placed on extra articles of food, not comprised in the full and middle diets, should be placed on the low diet column of the scale, and that their respective bed numbers should be placed after the total in the daily diet list. The sister must then attach her signature to the list as a guarantee of its correctness, and leave it with the clerk at the superintendent's office, before four o'clock p.m. if possible, or as soon after the medical visit as circumstances will permit.

The hours of diet have been already tabulated under the head of Method, and it is advisable that these should be adhered to, but it will be found frequently necessary to proportion the food differently to meet the special requirements of individual patients. The influence of previous habits, morbid cravings, moral influences, as well as an alteration in symptoms, all contribute more or less to render a slight departure from the fixed rations and routine of the diet Table at times advisable. The

natural tastes and inclinations of the patients is another subject that must not be overlooked. Although not alluded to in the diet hours, it is a matter of experience, that the greater number of patients prefer a meal of some kind about eleven o'clock in the forenoon; and as it is a good maxim for the sick to eat frequently, and little at a time, it is as well not to interfere with this wholesome inclination.

As a rule, the diets of the patients in the surgical wards are more uniformly of a fuller and simpler character than in the medical; the patients in the former being generally speaking in a better condition of health to partake of ordinary meals. In cases of surgical operations, and in others of severe injury, abscess, and the like, it is often necessary to depart from the recognized diet, and to have recourse to one or more of the various articles defined as extras. It is here chiefly that an experienced nurse can assist the surgeon by her ingenuity and suggestions. In extreme cases occurring either in medical or surgical wards, the patients will be limited almost entirely to fluid food, such as beef tea, milk, arrow-root, chicken broth, and stimulants; and it is nearly as easy to combine one or other of these ingredients in a palatable form, as it is to nauseate with their continuous monotony. If variety and change of diet are usually recommended as being beneficial to those in comparatively fair health, they are of essentially more importance to persons in an exhausted condition from injury or disease. Such patients are usually allowed a certain amount of wine or spirits, in addition to the food prescribed for them; and it should always be the aim of the female attendant to suggest how such may be relished in combination with other fluid forms of food, so as to combine the largest amount of nourishment with the smallest bulk, and in the most palatable form. The brandy mixture in

such frequent use in the wards, is a happy combination of ingredients prescribed with this object, comprising brandy, yolk of egg, sugar, and spice, and it may be looked upon as the model of stimulating foods. Combination for a similar purpose may be obtained by the addition of wine to arrow-root, sago, or any of the farinaceous materials that are furnished by the diet Table.

Besides the ordinary and extra articles of food mentioned, there are others in which patients are very liable to indulge; and although not considered as strictly falling within the rule which forbids the introduction of provisions by visitors, it is the duty of the female attendants to see that the latitude permitted is not abused. The most harmless of these articles are sponge cake, biscuits, and ripe fruit, and it must be seen that the friends or relatives do not convey anything else to the wards, as well as that superfluous food is not secreted in the lockers of the patients.¹ Finally, the necessity of doing all in your power to check extravagance and waste of food, cannot be too strongly insisted on; for it is here, more than in any other department of the service, that abuses are prone to occur. Be careful in making up your diet score, that you do not draw more food than your patients absolutely require,² and if from exceptional reasons this occasionally cannot be helped, let it be returned without unnecessary loss of time to the proper quarter. It is better to draw less than you require rather than more, as the deficiency can be readily made up on application.

Hospital Pests.—All hospitals containing mixed diseases are subject to certain local influences, which complicate and retard recovery, and sometimes produce death. It is now proved that disease caused in this way is for the most part avoidable; and as the female attendant has the more immediate control over the actions of her

¹ Page 56, Rule xvi.

² Page 46, Rule ix. Page 49, Rule viii.

patients, it is incumbent on her to use every available precaution to guard against the hazards they are liable to incur. The morbid influences in question are contagion, purulent infection (including erysipelas, gangrene, and pyæmia), bedsores, poisoned wounds, and foul smells.

1. *Contagion*.—The laws of prevention which apply to contagion in its more restricted sense, as signifying the extension of a disease like fever from a patient admitted with the malady to one under treatment for another affection, obtain with equal force when applied to the other diseases enumerated as occurring from purulent infection. Fever, is therefore, a type of these diseases, and may be considered as illustrative of their tendency to spread. When several persons suffering from fever are placed together in the same ward, other patients admitted with ordinary diseases become more susceptible of the contagious influence. This fact points out the necessity for isolating individual fever patients, so as to preclude the possibility of their poisoning the atmosphere breathed in common with others. To do so perfectly, it would be necessary that each fever patient should be placed in a separate apartment, with separate nurses and appliances. But as such an arrangement is impracticable, the next best thing is to place persons so affected as far apart as possible, and to prevent the others from communicating with them. In the smaller wards it is desirable that not more than one fever patient should be resident at one time, and in the larger wards the number should never be allowed to exceed two. Care in the selection of beds for fever cases, is a point that should not be lost sight of. Preference should be given to those placed in the most airy situations, betwixt two large windows if possible, and away from communication with sculleries, fire-places, and closets. Other patients must be cautioned against communicating too freely

with fever cases. If these instructions are strictly adhered to, little danger need be apprehended from the extension of the disease to patients or attendants.

2. *Erysipelas and Gangrene* in their contagious form occasionally attack persons suffering from open wounds, resulting either from disease, injury, or from surgical operations. Their origin in a ward may in most instances be traced to the admission of a patient suffering from either affection; but it occasionally happens that they appear of their own accord, and their occurrence in such cases indicates something essentially wrong with the ward atmosphere, or with the appliances of treatment. Hence the necessity for a freer ventilation than might be considered consistent with comfort, and a more scrupulous attention to cleanliness in every detail of ward management. Basins, mugs, night chairs, in fact all vessels which can in any way retain foul odours, should be thoroughly cleansed and sweetened, and cast-off dressings immediately burnt or taken away. Sponges should never be used except for operations, and when used should be thoroughly soaked in boiling water, and afterwards put aside till the surgeon requires them. Discharges from wounds may be soaked by tow and cotton and the copious use of cold water. Sponges are never to be used for this purpose. Experience shows that Erysipelas and Gangrene are more prone to occur in proportion to the number of severe wounds and surgical operations placed together in a ward, in contiguous beds. Common foresight will indicate the desirability of separating such cases, so as to neutralize the contaminating influence by excessive atmospheric diffusion. If the weather will at all permit, the affected will be afforded better chances of recovery if they are placed in the open air, and no trouble or inconvenience should be allowed to interfere with this most important means of treatment.

3. *Pyæmia*.—This disease is the most fatal scourge of the surgical wards. It occurs chiefly after the more important surgical operations, especially where bones are injured, is almost irremediable, and is the cause of death in one-fourth of the persons who die after operation. The attention to cleanliness and ventilation, insisted on with reference to other Hospital diseases, is more than ever necessary with regard to pyæmia. The only known preventive or remedy is fresh air, used unsparingly.

4. *Foul Smells*.—Whether offensive smells be always indicative of an unhealthy condition of the atmosphere or not, the necessity of getting rid of them is paramount. They are not only excessively disagreeable, but are in some way intimately associated with decomposition, filth, and disease. To prevent their originating in any ward, the sinks, waste, service, and soil pipes, are all thoroughly trapped, and a report should be made at once if they are not entirely free from impurity. The noxious effluvia from fetid discharges, sloughing wounds, and diseased secretions, may be rendered comparatively harmless by the numerous agents employed in the Hospital for purifying the ward atmospheres, and known as disinfectants and deodorants. The chief of these are, chlorated soda, Condy's fluid, carbolic acid, charcoal, and the several preparations of chloride of lime. The oldest and best of these air purifiers is chloride of lime, and, when mixed with water and placed in earthenware vessels in the vicinity of offensive cases, it is generally sufficient to neutralize the bad odour. For local application, cleansing foul sores, and destroying effluvia absorbed by bedclothes, nothing is now found so generally useful as the carbolic acid lotion, which may be used plentifully without injury to the linen, and may be sprinkled freely on floors without staining the boards. Charcoal is

perhaps the most powerful destroyer of smells we possess; but its use, for Hospital purposes, is limited in consequence of the inconvenience of its application. Powdered charcoal, however, can conveniently be sprinkled over the surface of poultices applied to foul sores. In very offensive cases, in which there is a possibility of the nurse suffering from the noxious odour during the dressing and changing, use ought to be made of the charcoal respirators provided, which effectually prevent the disagreeable odour from being felt.

5. *Bedsores*.—These troublesome complications, as their name indicates, arise from undue pressure of the bed on a particular part of the body, chiefly the back, and are most liable to occur in bedridden persons, and others who are forced to remain in the recumbent position for an unusual length of time. In most instances they can be prevented by proper care and watchfulness on the part of the attendants. If a patient be unable to attend to his own wants or unconscious, it is the duty of the sister or nurse to see that he is moved on his side, from time to time, to discover whether there are any appearances of redness or inflammation of the skin of those parts most liable to pressure. Pain and uneasiness are first usually complained of, and these symptoms ought to give warning to the nurse that matters are not going on satisfactorily. The patient should be immediately transferred to a spring bed, and the camphor liniment applied with slight friction over the inflamed part. If the pressure be still complained of, recourse must be had to the felt plaster, which ought to be applied of a size sufficient to cover rather more than the extent of the inflamed surface. The air or water pillow may also prove beneficial in relieving pressure, care being taken that it is covered with some absorbing material, such as old blanket, to prevent injury from

perspiration. If, notwithstanding these precautions, the parts take on a sloughing action, and where patients have been admitted suffering from bedsores, it will be found necessary to employ small cushions with a hole in the centre of each, of sufficient extent to protect the sore from pressure, and made so as not to interfere with the application of the prescribed dressings. It is always convenient to have a supply of these cushions in a ward, ready for use. They can be stuffed with tow or cotton, and should be changed frequently to prevent contamination. Moisture in the bedding from cutaneous exhalation or urinary secretion, or in whatever way produced, has a tendency to cause chafing of the skin most exposed to its influence, especially in persons of weak circulation who are forced to remain in the recumbent position. The necessity for guarding against injury from this source in fevers, burns, and all diseases attended with loss of power cannot be too strongly inculcated.¹ Nor should it ever be forgotten, that the appearance of a bed sore in a patient indicates an inexcusable neglect on the part of the female attendant.

6. *Poisoned Wounds.*—These wounds are noticed only in their effect on the immediate attendants. Nurses and helpers engaged in dressing the patients and in cleaning the wards are peculiarly susceptible of injury from the absorption of animal poison by cuts or scratches of the fingers, and conveyed either by direct contact with unhealthy wounds, or in the course of their various ward duties. These casualties are so troublesome and tedious to get rid of, that the greatest pains should be taken to guard against their occurrence, consequently, persons suffering from injured hands cannot be too careful in handling the dressings, or in exposing their fingers to the contact of putrid matters. Washing the

¹ Page 41, Rule xiv.

hands frequently with soap and water should also be scrupulously attended to.

Various Special Duties of a Sister or Nurse.—Besides the general administration of the wards, there are various duties which come under the special province of the sister, and which it is necessary that she should make herself familiar with, before permanently undertaking the charge of the sick. These consist mainly in the art of dressing wounds and applying bandages, in making poultices and fomentations, in the application of leeches, in the administration of injections and suppositories, in the employment of the hot air and vapour bath, and in the application of electricity as a remedial agent. A knowledge of these, and similar details of service, are only to be learnt from practical experience, and with the large field of practice which the Hospital affords, the probationer possessed of ordinary industry and intelligence will in a few weeks feel herself competent to undertake the more onerous duties of her calling.

Special Medical Observations.—Exclusive of the ordinary routine work of nursing, the sister will derive interest, benefit her patients, and assist the efforts of her medical superiors, by devoting a certain amount of attention to the symptoms and signs of the diseases daily falling under her notice.¹ The chief points recommended for her consideration and study, are the pulse, the respiration, the skin, the tongue, the various characters of pain, and the actions of the more important remedies.

The Pulse is the great indicator of the amount of vital force inherent in the circulation, and consequently

¹ Page 40, Rule x.

it is of great importance that its progress should be watched in acute and severe maladies, attended with sudden and often alarming alteration of symptoms. It can be most conveniently felt at the wrist, by pressing gently the two fore fingers of the right hand over the inner side of the wrist, about an inch from the ball of the thumb. The beats of the pulse in a healthy grown up person range from 70 to 80 in a minute, and as a rule are more frequent in the female than in the male. In infants, and children under five years, the mean range is rather more than 100 beats per minute; after this it diminishes gradually till the middle period of life, and then remains nearly stationary. Many causes independent of disease tend to modify the impulse and frequency of the pulse. These need not interfere with observations made by the female attendant, whose attention ought chiefly to be directed to the marked characters of the pulse, as they are presented in certain diseased conditions. These characters may be summed up under the following heads:—Diminished frequency, increased frequency, irregularity in the intervals betwixt the beats, hardness, softness, or thrilling character conveyed to the fingers in compressing the artery. They combine with each other, and change their relative proportions in certain stages of the same disease, and are influenced by cold, heat, stimulants, and the actions of medicines. Diminished frequency of the pulse is met with among patients suffering from debility, caused by want, overwork, hæmorrhage, and during convalescence from severe injuries, surgical operations, and fevers. Among the same class of cases, when the debility becomes extreme, it is not unusual to meet with a pulse of increased frequency, which must always be noted as an alarming symptom. The quick pulse is also the usual accompaniment of all inflammatory diseases, fevers, and of most

affections of the heart and bloodvessels. The irregular and intermittent pulse is generally a marked symptom of diseases of the heart, but it may also be found in certain low conditions of the nervous system, in fevers, and in cases of great debility, and among hysterical females. The pulse is said to be hard when it offers resistance to compression, and conveys a strong and sharp impulse to the fingers, while a soft pulse denotes a yielding and compressible condition, the reverse of the other. A knowledge of these different gradations of the pulse, if properly appreciated, will be found of great value to the female attendant in the administration of stimulants. It may be her lot during the night watch, and in the absence of the medical attendant, to relieve critical symptoms, and even to save life by a judicious watchfulness in ascertaining when to give or to withhold the prescribed stimulant. But in all cases of doubt or difficulty the attendant must at once apply to the Resident Medical Officer.¹ The cases in which stimulants are usually called for, are those of great exhaustion of the vital powers, induced by loss of blood, profuse discharges, and by fevers of a low and depressing character. The pulse in such patients may occasionally be sharp and full, but it is more usual to find it frequent, small, compressible, and sometimes irregular. In fevers especially, it is of importance to watch the effect of each dose of stimulant on the circulation, for on this matter depends the expediency of increasing, diminishing, or entirely withholding the remedy. By counting the pulse prior to and shortly after administering the stimulant, the medical man is able to judge whether it would be advisable to continue the same treatment. If, for instance, the pulse becomes quicker and harder, there is an indication that the wine or brandy is uncalled for; but when, on the contrary, it shows a

¹ Page 40, Rule x.

tendency to slowness and softness, he feels justified in persevering in its employment. In the fainting state, the pulse becomes imperceptible to the fingers, and, of course, indicates the necessity for such stimulants as will diffuse their action promptly throughout the system. These we possess in ammonia, æther, and strong spirits.

The Respiration is to be considered chiefly in connection with the pulse, with which, as a rule, it increases and diminishes in frequency. It consists of two acts, inspiration and expiration, and varies in frequency, in infancy and manhood, during sleep and waking, and during exercise and when the body is in a state of repose. An adult healthy person makes on an average from eighteen to twenty respirations in a minute, or one respiration for every four beats of the pulse. The main character of the respiration in disease is its increased frequency; but we have also numerous varieties of breathing indicative of altered conditions of the system, such as the feeble, the laboured, the catching, and the gasping character of respiration. Noisy breathing accompanies and becomes a characteristic symptom of such diseases as croup, hooping cough, and asthma; while the term stertorous, or snoring, is applied to the breathing noticed in apoplexy, congestion, concussion, and compression of the brain. Sighing, hiccough, sobbing, yawning, and coughing, all originate from some irregularity in the action of the respiratory organs, and it is important to observe their occurrence in connection with other symptoms of disease.

The Skin performs an important function in health, by regulating the temperature of the body, and in part purifying the blood. It exhibits as in health, so in disease, at one time an increased at another a diminished action. In health, perspiration is promoted by a high temperature, by dry currents of air, by taking exercise,

and by the process of digestion; while it is diminished by a damp atmosphere, inactivity, cold weather, and in certain conditions of the nervous system not incompatible with good health.

The diseases attended with increased action of the skin, are chiefly fevers of a mild character, the sweating stage of ague, acute rheumatism, severe colds, and numerous inflammatory affections; and as a rule, its advent is to be looked forward to as a hopeful symptom. Perspiration is also very abundant in the latter stages of consumption, especially during the night, and in cases of great vital exhaustion, where previous to death it is marked by its cold and clammy character. A hot and dry skin, indicative of arrested secretion, is common at the outset of all fevers, and continues so in proportion usually to the severity of the disease; while in numerous affections, comprising diarrhoea, dropsy, and diabetes, the skin is dry without being much altered in temperature. The skin is sometimes made the medium through which medicines are introduced into the system, examples of which are afforded by the action of mercurial ointment, or the sulphur vapour bath. A more frequent use to which the skin is applied is the production of counter-irritation by means of blisters and stimulating liniments. It is also made the medium through which medicines are introduced into certain parts of the body to relieve pain and to promote absorption. A practical knowledge of the methods of rubbing, of dressing blisters, and of the application of poultices and fomentations, is indispensable to every one intrusted with the care of the sick.

The Tongue.—As the pulse is the index by which we are taught the measure of the circulation, the tongue is the organ which affords corresponding facilities for ascertaining the condition of the alimentary canal, of

which, in fact, it forms a most important part. It also furnishes indications, though in a less degree, of the state of the circulation, the nervous system, and of the condition of the secretions generally. When taken with other symptoms, these indications afford an invaluable guide in the study of disease. In health the tongue is usually clean, moist, florid, and tolerably firm, while in disease it partakes every variety of appearance, altering in size, form, colour, external coating, temperature, moisture, and dryness. As its condition can be easily determined at sight, the nurse interested in the welfare of her patient will examine it from time to time, to judge whether there are signs of amendment or not. A few of the more important aspects which the tongue assumes in disease, are here alluded to with a view to guidance and reference. In inflammation of the organ itself, and in cases of profuse salivation, it becomes enlarged, sometimes to the extent of filling the cavity of the mouth, and of interfering materially with swallowing and respiration. On the other hand, a diminished size and shrivelled appearance of the tongue accompanies a condition of extreme constitutional debility and emaciation. Its colour becomes pale and bloodless after a long continuance of wasting disease, such as cancer, chronic abscess, and repeated attacks of hæmorrhage; whereas, in inflammation of the throat, stomach, and bowels, it partakes of a bright red colour, especially at the tip and edges. The more important alterations, however, in the tongue, relate to the coating, or fur, which forms on its surface, together with the amount of moisture or dryness associated therewith. This fur is present in nearly all severe diseases, varying in its intensity from a white creamy coating of a moist and almost healthy character, to a dry blackness and incrustation indicative of a total arrest in the secretions. The outset of fevers, rheu-

matism, inflammatory diseases of the lungs and air tubes, and in fact, of all acute diseases, is marked by a white furred tongue, which may undergo a variety of changes of colour and moisture in proportion to the mild or severe progress of the disease. As the secretions diminish, the colour becomes of a browner hue, and in the worst cases of fever it changes to black, and is associated with dry blackish brown scales which form on the teeth and gums, and which a careful nurse will remove with a moist cloth. A dry brown fur exists in nearly all persons suffering from severe local irritation accompanied with fever, while a partial fur of the same colour, occupying generally the back part of the tongue, is characteristic of many forms of indigestion. The return of moisture to a parched tongue should be carefully noted by the attendant, as it is always a hopeful symptom. It commences at the tip and edges, and gradually extends over the surface till it reaches the centre, the colour at the same time returning to the condition of health. Besides the peculiarities mentioned, there are others to which the tongue is occasionally subject. Such are the glazed tongue, common to typhoid fever and to other affections of the stomach and bowels; the strawberry tongue indicative of scarlet fever; the dark yellow tongue peculiar to jaundice; and the black tongue of scurvy, which derives its colour from the effusion of blood beneath its surface.

Pain is the poignant expression of bodily suffering. It is therefore desirable that the female attendant should possess a sufficient knowledge of its nature and varieties, to enable her to form an estimate of its importance as a sign of disease. In this way she may have it frequently in her power to alleviate the distressing symptom by very simple means, without trespassing on the province of the medical officer or resident surgeon. By a change

in the position of a limb, or of any affected part of the body, by the temporary loosening of a bandage, by friction of the pained part with the hand, or by the application of a warm fomentation, much relief may be temporarily afforded without the apprehension of danger to the patient, provided the attendant is sufficiently alive to the nature of the particular case. The characters and descriptions of pain, however, are very various, and by no means indicate, by their severity, an equally alarming extent of disease. In fact, as a rule, the reverse generally obtains, the sharpest kind of pain being generally of a temporary character, while the dull, aching, continuous pain is symptomatic of numerous diseases which are fatal to life. It ought also to be remembered, that the expression of pain manifests itself very differently in individual patients, according to their sensibilities and power of moral control. Thus we have the expression of pain morbidly exaggerated by hysterical females, and by men of undisciplined and irritable tempers. The varieties of pain are best illustrated by reference to the ordinary cases of disease admitted to the wards. Thus an acute pain always marks the onset of pleurisy, and from its poignancy is frequently likened to a stitch in the side. An acute throbbing pain is usually attendant on the formation of abscess in any part of the body. In cancerous affections, and in numerous diseases of the brain and nerves, pain becomes excruciating, and is spoken of as sharp, shooting, and lancinating. A dull aching pain, usually increasing in severity during the night, is a general accompaniment of diseases of the bones and joints, as well as of inflammation of the kidneys and liver. The onset of nearly all fevers is marked by headache, and pains in the back and loins of a dull and lasting character. In dysentery, diarrhoea, and in some affections of

the bowels, the pain is often of a gripping or twisting character, while in chronic rheumatism, and in numerous affections of the nerves, it is described as shifting and wandering. The term sympathetic is used to denote a form of pain complained of as occurring at a distance from the seat of malady, but connected with it by nervous communication. Thus in disease of the hip joint we have pain referred to the knee; in affections of the heart to the left arm and shoulder; and diseases of the stomach and liver are often associated with pains in the back, particularly betwixt the shoulders. Pain is also said to be remittent, intermittent, or paroxysmal, in proportion to its periodical character and severity.

Medicines.—As each ward of the Hospital is furnished with a variety of medicines for domestic use, it is desirable that the female attendant should possess a sufficient knowledge of their action and doses, not for the purpose of administering them on her own account, but to prevent any accident occurring from an incautious administration. A list of these medicines is given below, with their Latin and English names. It is strictly enjoined that no others be retained for the ordinary purposes of the wards, and that a separate prescription from the medical officer be obtained when other medicines not mentioned in this list are specially required.

The symbols are—gr. i. = one grain; gr^{ss} = one drop; ʒi = one drachm; ʒi = one ounce.

1. *Mistura Ammoniae*—Julep of Ammonia.—Dose, an ounce and a half (ʒiiss) 2 or 3 times daily. A diffusible stimulant.
2. *Mistura Ammoniae Effervescens*—Effervescing draughts.—An ounce and a half (ʒiiss) from each bottle every 3 or 4 hours. Refrigerant and Diaphoretic.
3. *Mistura Magnesiae cum Magnesiae Sulphate*—White Mixture.—Two ounces (ʒij) to be repeated when necessary Cathartic and Antacid.

4. *Mistura Sennæ Composita*—House Medicine or Black Draught.—From 2 to 4 ounces (ʒij. ad ʒiv.) as required. Saline Purgative.
5. *Linctus Opiatus*—Opiate Linctus.—A teaspoonful (ʒi.) when the cough is troublesome. Sedative or Anodyne.
6. *Tinctura Opii*—Laudanum.—From 10 to 30 drops (gtt. x. ad gtt. xxx.). Anodyne and Narcotic.
7. *Oleum Jecoris Aselli*—Cod Liver Oil.—Two teaspoonsful to an ounce (ʒij. ad ʒi.) 3 times daily. Alterative and Tonic.
8. *Oleum Ricini*—Castor Oil.—Two teaspoonsful to an ounce (ʒij. ad ʒi.) as required. Purgative.
9. *Pilulæ Colocynthis cum Calomelane*—Colocynth and Calomel Pill.—1 to 3 for a dose. A useful Purgative.
10. *Pilulæ Doveri*—Dover's Pills.—1 or 2 for a dose. Diaphoretic and Sudorific.
11. *Pilulæ Opii*—Opium Pills.—Dose, from half a pill to 2 pills. Anodyne and Narcotic.
12. *Pulvis Cretaceus*—Chalk Powder.—Half a teaspoonful (gr. xxx.) mixed with water and repeated if necessary. Astringent and Antacid.

In addition to the above, the following remedies for external use, are kept in stock in the Surgical Wards:—

13. *Lotio Acidi Nitrici*—Nitric Acid, or Caustic Lotion.
14. *Lotio Ætheris Sulphurici*—Evaporating and Refrigerant Lotion.
15. *Lotio Plumbi Subacetatis*—Sugar of Lead Lotion.—Refrigerant and Astringent.
16. *Linimentum Saponis*—Soap and Camphor embrocation for ordinary use.

The actions of medicine on the system are distinguished by names bearing a relation to the effects produced. A few of the more important groups of remedies, with examples, in daily use are here given.

Alteratives.—Remedies which, by a continued course of administration, and in comparatively small doses, produce a healthy change in the secretions, and alter disordered functions. Examples—Change of air, Mercury, Sarsaparilla, Cod liver oil.

Antispasmodics.—Medicines employed to relieve pain and uneasiness, resulting from irregular muscular contractions, such as are met with in asthma, hysteria, and spasms generally. Examples—Æther, Ammonia, Camphor, Assafetida, Henbane, and Opium.

Astringents.—Remedies employed, both externally and internally, for the purpose of contracting muscular fibre, and consequently of diminishing relaxation of the parts to which they are applied. Examples—Ice, Acids, Chalk, Alum, and Sugar of lead.

Cathartics.—Medicines which have the power of increasing the ordinary movement of the bowels, and of promoting the flow of mucus. Under this head are comprised aperients, laxatives, and purgatives, the terms distinguishing the comparative properties of the remedies. Examples of the milder kind are to be found in Magnesia, Epsom salts, Senna, and Castor oil. Colocynth, Scammony, Rhubarb, Aloes, and Calomel are frequently employed in partial combination, and act in a more powerful manner, while to produce copious watery evacuations Gamboge, Elaterium, and Croton oil are had recourse to.

Diaphoretics.—Remedies which promote perspiration, and sometimes profuse sweating, in which case they are termed Sudorifics. Their action is increased by hot drinks and warm clothing. Examples—Active exercise, the Warm, Vapour, and Dry air bath, Dover's powder, the preparations of Antimony, and Saline diaphoretic mixture.

Diuretics.—Medicines which act on the kidneys by augmenting the secretion of urine. Their action is greatly promoted by diluent drinks. Examples—Squills, Digitalis, Colchicum, Acetate and Bitartrate of Potash, and Spirits of Nitric Æther.

Expectorants.—Medicines which allay irritation and relieve cough by favouring the expulsion of mucus from the lungs and air-passages. Examples—Squills, Antimony, Ipecacuan, Gum, Liquorice, and Opiate linctus.

Narcotics.—Medicines which, by their peculiar action on the brain and nervous system generally, first produce excitement, and afterwards relieve pain and promote sleep. Their action varies much with the nature of the remedy employed. The chief narcotics are the various preparations of Opium, Hops, Henbane, and Belladonna.

Sedatives.—Medicines which relieve pain and irritation, and also produce sleep, without however exciting the nervous system. In other respects they are closely allied to the group of Narcotics. The most familiar examples are Chloroform, Conium, Prussic acid, Aconite, and Antimony.

Stimulants.—Remedies which act by increasing the action of the heart and exalting the nervous power. When their action is rapid and general they are called diffusible, but when limited to a particular part or organ they are defined as local stimulants. Examples of the former have been already given in the instances of Wine, Spirits, Æther, and Ammonia. Heat and electricity act both locally and generally. Strychnia and Ergot of rye are the best examples of local stimuli.

Tonics.—Remedies which derive their name from their supposed power of improving the tone and vigour of the body, when weakened by disease. Their action

is somewhat akin to that of small and continued doses of stimulants, but more permanent in its operation and unattended with any corresponding depression. The best examples are fresh air and exercise, cold bathing, good food, Quinine, Iron, Cod liver oil, and bitter infusions.

REGULATIONS FOR THE GOVERNMENT
OF THE
SISTERS IN GUY'S HOSPITAL.

I.

Applicants for the office of Sister must produce evidence of previous good character and ability to undertake the duty. They will be appointed permanently by the Treasurer, after six months' probation.

II.

At the period of appointment, Sisters shall not be under thirty years of age, nor above forty. They shall be unmarried, or widows without incumbence. They will be required to subscribe quarterly to the Superannuation Fund, and will be held responsible by the Treasurer, Superintendent, and Matron, for the good order of the Patients, and the cleanliness of their respective Wards.

III.

They shall devote their whole time and attention to the duties of their office, and shall not absent themselves from the Hospital without the permission of the Matron. It is specially required that they do not quit the Hospital after eight o'clock p.m. in winter, and nine o'clock p.m. in summer; and that they be present on duty when the Superintendent and Medical Officers visit the Wards.

IV.

They are strictly enjoined to preserve order, silence, and decorum among the Patients; to prohibit loud talking, and improper conduct and conversation; and to behave with kindness, forbearance, and discretion, to all under their care. They shall see that such Patients as may be able to do so, take their meals at the public table of the Ward; that grace be said regularly before and after meals; and that all Patients retire to bed not later than eight o'clock in winter, and before nine o'clock in summer.

V.

They shall keep an accurate and daily record of the movement among the Patients of their respective Wards, noting carefully the numbers Admitted, Discharged, or Dead, as the case may be; and they shall endeavour to have the bed cards filled up by the Dressers or Clinical Reporters, either before, or shortly after the Patients have left the Hospital.

VI.

They shall have charge of all Linen, Bed-clothing, Earthenware, and all appliances used in their respective Wards, and will be held responsible by the authorities of the Hospital for the correct keeping of the same, making up at their own expense such deficiencies as may occasionally occur. They shall be particularly attentive to the state of the bedding, and shall see that it be kept clean, in repair, and that it be well aired before being used. They shall attend at the Laundry every Tuesday, between the hours of nine and eleven, a.m., for the purpose of signing the Laundry-book, and of communicating with the Laundress; and they shall enter into their respective washing-books a note of all articles delivered to the Laundress, and check the same when returned by the Bathmen.

VII.

They shall be careful to admit no Patients into their respective Wards, unless such as have previously been presented with a bed-card at the Superintendent's Office, this being considered as a guarantee that their admission has been sanctioned by the Superintendent. In cases of Accident, or of extreme urgency, the Patients may be removed to the Ward without delay, and an intimation of the same shall be made at the Office by the Surgery-man.

VIII.

In the event of Patients being brought to the Hospital in a filthy condition, the Sisters shall direct that they be properly bathed and cleansed, that their clothes be taken to the disinfecting oven, and that they be provided with clean linen before being warded. If the Sisters can show reason why a Patient

should not be admitted to the Hospital, or if she have any cause of complaint against a Patient, she will represent the same to the Superintendent in the course of his daily visit.

IX.

The Sisters shall see that the Diets, properly cooked, along with the Wines and Liquors, shall be administered to the Patients at the stated intervals, and in the quantities prescribed; and that such articles of food, as may not be required, be returned to the kitchen. They are also required to attend daily at four o'clock at the Store, to receive their Wines and other Liquors.

X.

They shall pay particular attention to the state and symptoms of the Patients, especially if these be of an uncommon nature, that they may be able to report them distinctly to the Physician or Surgeon. They shall superintend the administration of the Medicines, noting accurately the prescribed doses and the proper intervals of administration, and shall on no account give Medicine to a Patient without the sanction and concurrence of the Medical Attendant. If any threatening symptom occur, or if a Sister be at all in doubt with respect to her instructions concerning the Medicines appointed to be given, she shall apply at once to the Resident Medical Officer or House Surgeon for advice.

XI.

The Sisters shall see that the beds be made regularly every morning, and that all foul clothes and dressings be removed from the Wards each day before ten o'clock, a.m. They shall be particularly careful that the presses, sculleries, and water-closets be kept clean and well aired, and that no soil or bed-furniture be allowed to accumulate therein. In the Surgical Wards they are expected to have always in readiness, on the Ward table, a proper assortment of bandages, as well as lint, strapping, and other ordinary dressings.

XII.

In the event of the death of a Patient, the Sister shall, within an hour thereafter, take the bed-card to, and intimate the same

at the Superintendent's Office; she shall also inform the Bathman of the circumstance, that the body may be removed to the Mortuary, without further delay. She shall send the friends or relatives of the deceased to the Superintendent's Office, that arrangements may be made relative to the Funeral or Inspection of the body. Any property that a deceased Patient may have possessed, shall be retained by the Sister until after the Funeral, when it may be delivered to the friends; but in the event of the body being unclaimed, the property must be immediately handed over to the Superintendent.

XIII.

Sisters are at liberty to employ the Patients to assist in the work of the Ward, provided always such employment be certified by the Medical Attendant as not inconsistent with their recovery.

The Sisters of the Female Wards will take charge of the Needle-work received from the Linen Store, and distribute it amongst the Patients who are capable of sewing; they shall also see that the work be neatly and efficiently done.

XIV.

The Sisters shall endeavour as far as possible, by the use of waterproof sheeting, to prevent the bedding from being soiled by discharges; and they shall be careful that in cases of contagious diseases, the sheeting and bedding be aired and changed frequently. They shall see that the Patients wash themselves regularly before breakfast in the basins provided for that purpose, and that such as are unable to leave their beds be attended to by the Nurse; that the baths prescribed are regularly given and in all other respects, they shall enforce upon the Patients the propriety and necessity of personal cleanliness.

XV.

They shall, immediately after the admission of Patients, ascertain whether they have money or articles of value in their possession; and in the event of such being the case, they shall cause the same to be delivered and handed over to the Superintendent,

who will grant a receipt to be retained by the Patient till he is able to leave the Hospital, when, on presentation, the property will be restored.

XVI.

They shall have the control of the Nurses in their respective Wards, and they shall report to the Matron if they do not perform their duties with punctuality and faithfulness. They shall see that no Nurse receive fee or reward from Patients or their friends. The infraction of this Regulation on the part of any Official of the Hospital, shall subject them to immediate dismissal.

XVII.

They shall be careful that no Visitors be admitted to the Wards except on the days and hours appointed, unless they have a written permission to the contrary from the Superintendent. But in cases of serious illness, they shall send the names of the Patients to the Gate Porters, who have authority to admit the relatives or friends to visit such Patients at irregular hours.

XVIII.

Sisters are required to attend Chapel regularly on Sundays, and to enforce the propriety of religious observance on the Patients, not only with respect to the attendance at Chapel, but also in their attention to private worship in the Wards, which service the Sisters are earnestly requested to encourage by their authority and example.

N.B.—It is intended that the foregoing Rules should be held chiefly as a summary of a Sister's duties; in addition, it is expected that she will assist in promoting, by every means in her power, the well-being of the Patients; that especially she will be careful that the Nurses do not neglect their duties, and that she will use her utmost exertions to prevent extravagance and waste.

THE DAY NURSES.

I.

The Day Nurses shall be engaged and discharged by the Matron, and shall be under the immediate control of the Sister of the Ward to which they are appointed. They shall devote their whole time and attention to the duties of their respective offices; and shall not absent themselves from the Hospital without the permission of the Matron.

II.

They shall enter upon their duties each morning at six o'clock, and retire to rest not later than ten o'clock in the evening; they are required to keep their own apartments neat and clean, as well as to have their beds made before nine o'clock in the forenoon. They must also see that their clothes presses are locked, and that the windows are left partially open.

III.

They shall remove from the Ward to which they are specially attached, all dust and filth every morning before ten o'clock. They must be careful that the sculleries, water-closets, and presses be regularly scoured each day, and that no dirt, foul clothes, or cast-off dressings be allowed to accumulate therein.

IV.

They shall make the beds of the Patients in their respective Wards every forenoon, and remove all foul bedding, and the bedding of Patients that may have died during the night, that it may be taken away by the Flockman before ten o'clock forenoon. They must be ready to assist and shift all infirm and helpless Patients; and they shall take care that those

Patients who are incapable of leaving bed be either washed by them, or supplied with washing materials, when able to assist themselves.

V.

They shall behave with kindness to the Patients under their care, and pay attention to their state and symptoms, especially if these be of an uncommon character, that they may be able to report, if required, to the Physician or Surgeon. If any threatening symptom should manifest itself, the Nurse must give immediate notice to the Sister of the Ward, that further aid may be obtained.

VI.

Under the Sister's directions, and, occasionally, under the Medical Officer's, the Nurses shall attend to the application, administration, and to the operation, of all remedies prescribed; and they are particularly enjoined, if they are at all doubtful with respect to their instructions, to apply at once to the Sister for advice. They are strictly forbidden to prescribe Medicines for Patients on their own responsibility.

VII.

They must accompany the Medical Officers in the course of their daily visits, and be ready to give information respecting the action of the Medicines, and the previous condition and symptoms of the Patients. In the Surgical Wards, the Nurses must have their trays, dressing pans, and other appliances, in readiness at the hour of visit, and give whatever assistance is required of them by the Surgeons.

VIII.

They shall attend at the following hours, with as many convalescent Patients as may be required, at the distribution of the Diets in the Kitchen.

Eight o'Clock a.m.	-	-	-	for Milk.
Nine o'Clock a.m.	-	-	-	for Bread.
Half-past Ten o'Clock a.m.	-	-	-	for Porter.
Half-past Eleven o'Clock a.m.	-	-	-	for Extra Diet.
Half-past Twelve o'Clock p.m.	-	-	-	for Dinner.
One o'Clock p.m.	-	-	-	for Beef Tea.

IX.

They will take the Medicine Bottles to the Dispensary each day at 4 o'clock p.m.; and they shall be particularly careful that when any Patient's Medicine is stopped, or when a Patient dies or leaves the Hospital, that the Medicines that had been in use are not thrown out, but that they be returned to the Dispensary.

X.

In the evening, before leaving the Wards, the Nurses shall see that each Patient is furnished with a clean utensil, and that all soil and offensive matter be carried away.

XI.

They shall neither borrow money nor clothes from Patients, nor accept of any remuneration from Patients or their friends. An infraction of this Regulation will subject a Nurse to the loss of her situation.

XII.

They are strictly prohibited from conveying spirituous liquors into the Hospital; any Nurse found guilty of intemperance will be dismissed the Hospital, and the wages due to her forfeited.

XIII.

The Nurses are required to attend Chapel on Sundays, unless prevented by necessary duties; and they must endeavour by their example, to enforce the propriety of religious observance on the Patients.

THE NIGHT NURSES.

I.

The Night Nurses shall be engaged and discharged by the Matron, and shall be under the immediate control of the Sister of the Ward to which they are appointed. They shall devote their whole time and attention to the duties of their respective offices, and shall not absent themselves from the Hospital without the permission of the Matron.

II.

They shall enter upon duty at 8 o'clock, p.m., in winter, and at 9, p.m., in summer; and shall retire to rest not later than 1 o'clock in the afternoon.

III.

They shall see that all soil and dirt that may have accumulated during the night be removed, and that the utensils be cleansed before 8 o'clock each morning. They must see that their own apartments be kept neat and clean, and that the beds be made and the clothes presses locked.

IV.

They shall preserve order and quiet in the Wards during the night. They are not permitted to sleep or lie down; nor to occupy their time with business apart from a Nurse's duties. They are not permitted to leave their Wards during the night, except for very urgent reasons.

V.

At the ringing of the Dinner Bell, they must accompany the Day Nurses to receive the food from the kitchen, and assist in

carrying the Diets to the Wards. They must be careful that no grease is spilt on the stairs, corridors, or any of the passages of the Hospital; if this is done inadvertently by a Patient or Nurse, he or she must take means to have it effaced without delay.

VI.

They shall pay particular attention to the state and symptoms of the Patients; and be carefully attentive to severe and urgent cases, visiting them frequently, and administering the Medicines and Wines at regular intervals in the manner prescribed. If any sudden change takes place in the condition of a Patient, they must make it known without delay to the Sister of the Ward.

VII.

They shall see that the gas be kept low, that no more than one burner be lighted, except in cases of accident or emergency, and that the gas in the staircases and passages adjoining their respective Wards be turned off at daylight.

VIII.

They will be allowed to leave the Hospital for one hour each day, from 12 a.m. to 1 p.m. The Gatekeeper has instructions to refuse admission to Night Nurses who return after 2 o'clock. They are strictly prohibited from conveying spirituous liquors into the Hospital. Any Nurse found guilty of intemperance will be dismissed the Hospital, and the wages due to her forfeited.

IX.

They shall neither borrow money nor clothes, nor accept of any remuneration from the Patients or their friends. An infraction of this Regulation will be followed by the immediate dismissal of the Nurse from the Hospital.

X.

The Night Nurses are required to attend Chapel on Sunday; and, by their example, to impress the propriety of religious observance upon the Patients.

REGULATIONS RESPECTING THE PATIENTS.

I.

On the admission of Patients, the Sister is instructed to see that they are properly bathed and cleansed before they enter the Ward, and that they are furnished with clean linen.

II.

Patients while in the Hospital must submit to the Regulations as explained by the Sister of the Ward in which they are placed. They are, in all matters, subject to the Sister, and should they have any cause of complaint, they are requested to state the same to the Superintendent or Matron, in the course of their daily visits.

III.

No Patient shall leave the Hospital on any pretence whatever without the permission in writing of the Superintendent; it being understood that this permission is granted with the previous sanction of the Physician or Surgeon, under whose care the Patient is placed.

IV.

They must not conceal any disease, nor any circumstance relating to it, and must take their Medicines regularly at the stated intervals, and in the manner prescribed. Patients refusing to obey the instructions of the Medical Officers, will be immediately dismissed.

V.

Such Patients as are able to do so, are required to wash themselves regularly every morning before breakfast, in the lavatories or basins provided for that purpose; and in all other respects they must pay the utmost attention to personal cleanliness.

REGULATIONS RESPECTING THE PATIENTS.

49

VI.

They are strictly prohibited from disturbing the Ward by improper conduct or conversation; and are forbidden to swear, quarrel, talk loud, or smoke Tobacco.

VII.

The Patients shall breakfast at 7 o'clock, and dine at half-past 12 o'clock; and such as are able will take their meals at the public table of the Ward. They must be orderly and quiet during their meals; and it is requested that grace be said regularly by one of their number.

VIII.

If a Patient be unable to use all the Hospital allowance, the portion not used must be returned to the Sister. Any person giving away food furnished by the Hospital, or exchanging it for any article, shall be immediately discharged.

IX.

Patients having money in their possession on admission, are required to deliver up the same to the Sister of the Ward, that it may be returned to them in safety when they are discharged.

X.

Patients must retire to rest before eight o'clock p.m.

XI.

Patients must be silent and respectful when the authorities or Medical Officers visit the Wards.

XII.

If able to do so, they shall keep in order their own beds, presses, and lockers; they must also assist their fellow Patients, and perform any kind of work at the request of the Sister, provided it is not considered by the Medical Attendant to be inconsistent with their recovery.

XIII.

They shall be particularly careful of every thing belonging to the Hospital; and shall be held responsible, by the Sister,

for any deficiency or breakage in the contents of their respective lockers.

XIV.

They shall be careful not to soil the Ward floors, passages, or staircase of the Hospital, when assisting the Nurses to remove the Diets from the Kitchen; and they are likewise enjoined to protect the Furniture of the Wards.

XV.

Patients are forbidden to offer or promise any remuneration to the Officials, either with the view of gaining particular attention or for any other object. An infringement of this Regulation subjects the person implicated to the loss of her situation, and the Patient offering the bribe will be immediately dismissed, and shall on no account be allowed to re-enter the Hospital.

XVI.

The friends of Patients will be allowed to visit them on Wednesdays and Fridays betwixt the hours of 3 and 4 p.m., and on Sundays from 2 till 4 p.m.; it being understood that not more than two visitors are permitted to remain at the bedside at one time. Visitors are prohibited from conveying provisions and spirituous or other liquors into the Hospital.

XVII.

As a general rule, visitors are not admitted at other times than those above stated, unless they have a written permission from the Superintendent; but in dying or very urgent cases, the Porter is authorised to pass the friends or relatives of Patients whose names have been previously given him by the Sister of the Ward.

XVIII.

The authorities expect that all Patients who are considered by their Medical Attendants capable of attending the daily service in the Chapel of the Hospital, shall take advantage of the privilege thus afforded them.

RÈGLEMENT

SUR LE

SERVICE DU CASERNEMENT.

30 JUIN 1856.

(Extrait du Journal militaire officiel, 2^e sem. 1856, n^o 43.)

PARIS,

LIBRAIRIE MILITAIRE.

J. DUMAINE, LIBRAIRE-ÉDITEUR DE L'EMPEREUR,

RUE ET PASSAGE DAUPHINE, 30.

1857

Le Ministre Secrétaire d'Etat de la guerre à MM. les Généraux commandant les divisions militaires; les Intendants divisionnaires; les Directeurs des fortifications. (3^e Direction, Service du Génie, 2^e Section, Matériel et Comptabilité.)

Paris, le 18 août 1856.

(Envoi d'un nouveau Règlement du 30 juin 1856, sur le service du casernement.)

Messieurs, le règlement du 17 août 1824, sur le casernement des troupes, qui, lors de sa promulgation, répondait suffisamment aux besoins du service, a dû être, depuis cette époque, modifié ou complété par de nombreuses décisions concernant, soit des améliorations apportées au régime du logement des troupes ou des autres établissements militaires, soit le mode d'administration de ces établissements et la réglementation des rapports entre les autorités chargées de cette administration.

Il importe, en outre, de consacrer et de généraliser, en raison des avantages qu'ils présentent, certains usages qui se sont introduits dans plusieurs localités, et qui jusqu'à présent n'ont pas fait l'objet de prescriptions générales.

Ces considérations m'ont déterminé à faire reviser le règlement du 17 août 1824, en vue d'en retrancher les dispositions qui aujourd'hui ne seraient plus applicables, et de fonder avec celles à conserver toutes les dispositions éparses dont il vient d'être parlé.

Il est résulté de ce travail un projet de règlement sur le service du casernement, projet que j'ai définitivement approuvé le 30 juin dernier, après l'avoir successivement soumis au contrôle des divers services intéressés de mon ministère, et dans lequel vous remarquerez quelques additions importantes, notamment en ce qui concerne les fonctions de l'officier de casernement, l'occupation et l'évacuation des logements, les réparations au compte des corps, les soins à donner au casernement, et les rapports que les inspecteurs généraux du génie doivent faire à ce sujet.

Je vous recommande de tenir la main, chacun en ce qui vous concerne, à l'exécution de toutes les dispositions que renferme ce nouveau règlement, et de vous assurer par vous-mêmes de leur stricte observation lors des tournées que vous aurez à faire dans les places de vos divisions ou directions respectives.

Recevez, etc.

*Le Maréchal de France,
Ministre Secrétaire d'Etat de la guerre,
Signé: VAILLANT.*

SOMMAIRE DU RÈGLEMENT.

	N° des art.
TITRE I^{er}.	
DISPOSITIONS GÉNÉRALES; ATTRIBUTIONS.	
Établissements affectés au service du casernement.	1
Bâtiments pris à loyer par le service militaire ou mis à sa disposition.	2
Fonctionnaires chargés du service du casernement.	3
Attributions des commandants de place.	4
Attributions des officiers du génie.	5
Attributions des fonctionnaires de l'intendance militaire.	6
TITRE II.	
GADE ET CONSERVATION DES ÉTABLISSEMENTS MILITAIRES.	
Concierges des bâtiments militaires.	7
A qui les concierges sont subordonnés.	8
Les concierges sont dépositaires des clés des locaux non occupés.	9
Les concierges ne donnent pas l'entrée dans les établissements militaires.	10
Les concierges entretiennent la propreté des établissements ou des bâtiments non occupés.	11
Les concierges sont chargés de la visite des locaux occupés et en rendent compte.	12
Garde et conservation des établissements affectés aux services administratifs.	13
Garde et conservation des établissements de la justice militaire.	14
Établissement des projets d'états de l'assiette du logement.	15
Remise de ces états aux directeurs des fortifications ou aux inspecteurs généraux.	16
États généraux dressés par les directeurs des fortifications et envoyés aux intendants divisionnaires.	17
Envoi de ces divers états au général commandant la division et au ministre.	18
Époques des envois des divers états de l'assiette et du logement.	19
Assiette du logement arrêtée par le ministre.	20
Cas de modifications à proposer à l'assiette du logement.	21
Changements autorisés pour les cas d'urgence.	22
TITRE IV.	
ORGANISATION DES LOGEMENTS ET DES ACCESSOIRES DU CASERNEMENT DANS LES PAVILLONS ET DANS LES CASERNE.	
Les logements des divers corps sont distincts.	23
Bases de l'organisation des logements et des accessoires dans les pavillons et dans les casernes.	24
Logements d'officiers.	25
Logements des chevaux des officiers montés.	26
Chambre de soldats.	27
Ecuries.	28
Logements des concierges.	29
Couloirs.	30
Magasins des corps.	31
Magasins de munitions et hangars pour la confection des cartouches.	32
Écoles régimentaires.	33
Salles d'escrime et de danse.	34
Locaux disciplinaires.	35
Champs de manœuvre et de tir.	37

	N° des art.
TITRE V.	
AMEUBLEMENT DES PAVILLONS ET DES CASERNE.	
Aménagement des logements d'officiers.	38
Couchage de la troupe.	39
Mobilier des chambres de soldats.	40
Mobilier des chambres de sous-officiers.	41
Mobilier des chambres des enfants de troupe et des logements de Manchisseuses.	42
Mobilier des écuries.	43
Porte-cells.	44
Mobilier des cuisines.	45
Mobilier des pensions.	46
Requets de propreté.	47
Aménagement des ateliers.	48
Matériel des forges des maréchaux ferrants et des hangars au ferrage.	49
Aménagement des magasins.	50
Mobilier des écoles régimentaires.	51
Mobilier de la salle d'hygiène.	52
Matériel pour le service des manèges.	53
Matériel pour la voltige.	54
Matériel des gymnases et des écoles de salacité.	55
Matériel de tir.	56
Mobilier des infirmeries régimentaires.	57
Aménagement des locaux disciplinaires.	58
Aménagement des corps de garde.	59
Goûtes.	60
Outils et matériaux nécessaires pour l'entretien des cours.	61
Appareils des puits.	62
Matériel pour la fourniture de l'eau potable.	63
Chariots porte-fourrages.	64
Trançais.	65
Poëles.	66
Pompes à incendie.	67
Draps.	68
Fuschettes pour le nettoyage des buffets.	69
Balances.	70
Appareils d'éclairage.	71
Id pour les illuminations.	72
Les effets mobiliers ne doivent pas être déplacés.	73
Cas de fournitures autres que celles qui sont prescrites au présent règlement.	74
TITRE VI.	
OCCUPATION DES PAVILLONS ET DES CASERNE PAR LES TROUPES.	
Avis de l'arrivée d'un corps de troupe.	75
Mesures à prendre à l'arrivée de l'officier du casernement.	76
Désignation des locaux à occuper.	77
Prise de possession du logement.	78
État descriptif des lieux.	79
Investiture des objets qui ne sont pas entreteus par le service du génie.	80
Difficultés concernant la prise de possession du casernement.	81
Remise des clés et responsabilité des corps.	82
Formalités à remplir en cas de mutations dans le logement.	83
Evacuation de locaux par suite d'une réduction d'effectif.	84
Réception des corps de garde; responsabilité des chefs de poste.	85
TITRE VII.	
POLICE DES BÂTIMENTS MILITAIRES OCCUPÉS PAR LES TROUPES.	
Police des commandants de place.	86
Police des chefs de corps.	87
Les personnes non militaires ne peuvent loger dans les bâtiments militaires.	88
Formalités exigées pour entrer dans les établissements militaires.	89
Les corps sont chargés de la propreté intérieure et extérieure des casernes.	90
Inscription des numéros et des conteneurs des chambres.	91
Affiches dans les casernes.	92

	Dépôts de familles.	N° des art.
TITRE VII.	Police des casernements par les inspecteurs; registre des observations.	93
POLICE DES BATIMENTS MILITAIRES, ETC. (Suite.)	Suite à donner aux observations des inspecteurs.	94
	Rapport des inspecteurs généraux du génie au sujet de la tenue du casernement.	96
TITRE VIII.	Formalités à remplir pour la reprise du casernement par le service du génie.	97
ÉVACUATION DES PAVILLONS ET DES CASERNES.	Les locaux doivent être remis propres et en ordre.	98
	Cas de départ précipité.	99
	Nettoyage effectif d'office.	100
	Vérification de l'état des lieux et de l'inventaire.	101
	Certificat de bon état des lieux.	102
	Les corps ne peuvent, à leur départ, conserver sur un local.	103
	Constatactions des dégradations et des pertes.	104
	Cas de refus de signer le procès-verbal des dégradations et des pertes.	105
TITRE IX.	Réparation des dégradations et remplacement des objets perdus.	106
DÉGRADATIONS ET PERTES DANS LES PAVILLONS ET DANS LES CASERNES.	Certificat d'exécution des réparations et des remplacements.	107
	Paiement des frais de réparation et de remplacement lorsque le corps est présent.	108
	Paiement des frais de réparation et de remplacement quand le corps est absent.	109
	Réclamation contre les imputations.	110
	Dégradations et pertes dans les logements d'officiers sans troupes ou d'employés militaires.	111
	Registre des dégradations et des pertes.	112
TITRE X.	Services administratifs en gestion directe.	113
ÉTABLISSEMENTS DES SERVICES ADMINISTRATIFS ET DE LA JUSTICE MILITAIRE.	Services administratifs confiés à l'entreprise.	114
	Tribunaux militaires.	115
	Pénitenciers, prisons, ateliers de condamnés.	116
	Formalités préliminaires pour les locations.	117
	Établissements des baux.	118
	Expéditions et ampliations des baux.	119
	Enregistrement des baux.	120
TITRE XI.	Prise de possession; état de lieux ou inventaire.	121
LOCATIONS.	Les baux sont soumis aux dispositions du Code.	122
	Fonctionnaires chargés de l'exécution des baux.	123
	Paiement des loyers.	124
	Travaux au compte des bailleurs.	125
	Cas d'impossibilité de trouver de gré à gré des bâtiments ou des terrains à prendre à loyer.	126
	Remise au propriétaire de la chose louée.	127
TITRE XII.	Formalités préliminaires.	128
BATIMENTS ET TERRAINS MIS TEMPORAIREMENT À LA DISPOSITION DU SERVICE DU CASERNEMENT PAR LES ADMINISTRATIONS CIVILES.	Travaux au compte des administrations civiles.	129
	Prise de possession et remise.	130
TITRE XIII.	Constructions, appropriations et améliorations.	131
TRAVAUX CONCERNANT LES ÉTABLISSEMENTS MILITAIRES.	Réparations dites locales.	132
	Entretien des bâtiments.	133
	Ramonnages.	134
	Réparations d'urgence ou de convenance.	135
	Réparations d'urgence.	136
	Ordres et demandes des inspecteurs.	137
	Aucun empiètement ne doit être apporté à l'exécution des travaux.	138
	DISPOSITION FINALE.	139

RÈGLEMENT

sur

LE SERVICE DU CASERNEMENT.

(Voir les deux modèles n° 1 et 2 et le tableau A ci-annexés.)

TITRE PREMIER.

DISPOSITIONS GÉNÉRALES. — ATTRIBUTIONS.

Etablissements affectés au service du casernement.

Art. 1^{er}. Le casernement comprend tous les établissements affectés, soit au logement, au service et à l'instruction des troupes, soit aux divers services administratifs de la guerre ou à celui de la justice militaire (1), savoir :

- 1° Les casernes d'infanterie;
- 2° Les casernes et les autres établissements de cavalerie;
- 3° Les gymnases et les écoles de natation;
- 4° Les manèges;
- 5° Les pavillons d'officiers;
- 6° Les hôtels et les bureaux des tribunaux militaires;
- 7° Les prisons et les pénitenciers militaires;
- 8° Les champs de manœuvres et les champs de tir;
- 9° Les hôpitaux;
- 10° Les magasins centraux des hôpitaux;
- 11° Les manutentions des vivres;
- 12° Les magasins des vivres;
- 13° Les magasins aux fourrages;

(1) Les arsenaux, les salles d'armes, les magasins à poudre, les pavillons et autres bâtiments affectés spécialement au service de l'artillerie et à celui du génie, quoique faisant partie des bâtiments militaires, n'ont rien de commun avec le casernement; et leur administration est exclusivement dans les attributions respectives de ces deux services. Les hôtels des généraux, par suite de leur affectation toute spéciale, ne sont pas soumis aux règles tracées pour les autres bâtiments du casernement. Le casernement de la gendarmerie, qui est à la charge des administrations départementales, reste également en dehors du présent règlement.

- 14° Les magasins de l'habillement, du harnachement et du campement;
- 15° Les magasins et les buanderies des lits militaires, quand ces locaux sont fournis par l'Etat;
- 16° Les magasins du chauffage, quand l'Etat les fournit;
- 17° Enfin les corps de garde (1).

Bâtiments pris à loyer par le service militaire ou mis à sa disposition.

2. Lorsque les ressources du casernement sont insuffisantes, il est pourvu aux besoins de ce service par des locaux pris à loyer. Ces locaux, pendant toute la durée des baux, sont considérés comme établissements militaires, et sont, par suite, généralement soumis aux dispositions du présent règlement.

Les mêmes dispositions sont également applicables aux locaux qui sont mis gratuitement à la disposition du département de la guerre par les administrations départementales ou communales, mais sous la réserve des conventions stipulées dans les actes de cession y relatifs.

Fonctionnaires chargés du service du casernement.

3. Les établissements militaires sont dans les attributions respectives des commandants de place, des officiers du génie et des fonctionnaires de l'intendance militaire.

Attributions des commandants de place.

4. Les commandants de place titulaires, ou les officiers qui en remplissent les fonctions, sont chargés de la police militaire des casernes occupées par la troupe; ils concourent à l'établissement de l'assiette du logement; ils désignent les locaux à affecter aux corps; ils participent à la rédaction des procès-verbaux relatifs aux bâtiments consacrés au logement des troupes; enfin ils sont responsables de l'observation des dispositions de l'assiette du logement arrêtée par le ministre, et donnent tous les ordres nécessaires pour l'assurer.

Attributions des officiers du génie.

5. Les officiers du génie sont chargés :

- 1° De la police administrative de tous les établissements militaires occupés, conjointement avec les fonctionnaires de l'intendance militaire;
- 2° Des propositions à faire et des travaux à exécuter pour la construction, la réparation et l'entretien des établissements du casernement;

(1) Les corps de garde qui ont exclusivement pour objet la police urbaine ou la garde des établissements civils ne font pas partie des bâtiments militaires.

3° De la garde et de la surveillance exclusive des bâtiments non occupés;

4° De la fourniture et de la conservation des parties de l'ameublement qui sont spécialement placées, par le présent règlement, dans les attributions du service du génie;

5° De concourir à la rédaction des procès-verbaux pour tout ce qui intéresse les établissements du casernement, de concert avec les fonctionnaires de l'intendance militaire, et, lorsqu'il y a lieu, avec les commandants de place.

Les officiers du génie ont sous leurs ordres, pour le service du casernement, des gardes du génie : ces employés, dont la fonction spéciale consiste dans la surveillance et la conservation de la partie du domaine militaire placée dans les attributions du service du génie, sont, en outre, chargés des opérations de détail de la remise et de la reprise des logements militaires et de toutes les dépendances du casernement qui ressortissent à ce service.

Attributions des fonctionnaires de l'intendance militaire.

6. Les fonctionnaires de l'intendance militaire sont chargés :

- 1° Conjointement avec les officiers du génie, de la police administrative de tous les bâtiments militaires occupés;
- 2° De la désignation des logements que les corps doivent occuper dans les bâtiments qui leur sont affectés par le commandant de place, en se conformant à ce qui est prescrit à cet égard pour l'assiette du logement;
- 3° Des opérations relatives tant à la location des bâtiments nécessaires au service du casernement, à défaut d'établissements militaires, qu'à la passation, à la rédaction et à l'exécution des baux dressés à cet effet, le tout avec le concours des officiers du génie;
- 4° Enfin de la fourniture et de la conservation des objets de casernement, qui sont spécialement placées dans leurs attributions par le présent règlement et par d'autres dispositions ministérielles.

TITRE II.

GARDE ET CONSERVATION DES ÉTABLISSEMENTS MILITAIRES.

Concierges des bâtiments militaires.

7. Des concierges nommés par le ministre de la guerre, sur la proposition des directeurs des fortifications, sont chargés de veiller à tout ce qui intéresse la garde et la conservation des bâtiments et des objets d'ameublement affectés au logement des troupes.

A qui les concierges sont subordonnés.

8. Les concierges sont sous les ordres immédiats des chefs du génie; ils rendent compte néanmoins aux sous-intendants de tout

ce qui survient dans la distribution des logements, ainsi que de tout ce qui est relatif à la conservation des objets de casernement placés dans les attributions du service de l'intendance et déposés dans les casernes.

Les concierges sont dépositaires des clefs des locaux non occupés.

9. Les concierges sont dépositaires de toutes les clefs des chambres et des parties des bâtiments non occupés; ils sont responsables de la conservation du mobilier déposé dans ces locaux.

Les clefs sont placées en ordre, chez les concierges, dans un clavier numéroté, sous une porte treillagée fermant à clef.

Il est expressément défendu aux concierges de délivrer des clefs sans l'ordre écrit du chef du génie ou du sous-intendant militaire.

Les concierges ne donnent pas l'entrée dans les établissements militaires.

10. Il est interdit aux concierges de donner entrée, dans les établissements dont ils ont la garde, aux personnes étrangères au service militaire; ils exécutent, à ce sujet, les consignes que leur donnent, soit les commandants de place, soit les chefs du génie, soit les sous-intendants militaires, chacun pour ce qui le concerne.

Les concierges entretiennent la propreté des établissements ou des bâtiments non occupés.

11. Les concierges, aidés au besoin par des manoeuvres, doivent entretenir la propreté, tant à l'intérieur des établissements ou des bâtiments non occupés, qu'à leurs abords. Les ustensiles nécessaires à ces soins leur sont fournis sur les fonds du service du génie.

Les concierges sont tenus, en outre, d'ouvrir et de fermer les fenêtres, pour le renouvellement de l'air, dans les locaux dont ils ont les clefs.

Les concierges sont chargés de la visite des locaux occupés et en rendent compte.

12. Les concierges visitent, au moins une fois par jour, tous les locaux occupés; préviennent les officiers chargés du casernement des dégradations qu'ils découvrent, et rendent compte sur-le-champ de ces dégradations au chef du génie et au sous-intendant militaire, selon que les dégradations concernent des objets placés dans les attributions de l'un ou de l'autre.

Garde et conservation des établissements affectés aux services administratifs.

13. Pour les établissements dépendant des divers services administratifs du département de la guerre, la garde et le soin de la propreté à entretenir, tant à l'intérieur qu'à l'extérieur, sont confiés aux officiers d'administration ou aux entrepreneurs de ces services. Ces agents sont dépositaires des clefs et sont responsables de la conservation des bâtiments ainsi que des objets appartenant à l'Etat qu'y sont déposés.

Ils sont astreints à rendre compte, selon les cas, aux sous-intendants militaires ou aux chefs du génie, des dégradations survenues.

Garde et conservation des établissements de la justice militaire.

14. Les concierges des prisons et des autres établissements de la justice militaire ont, en ce qui concerne la garde et la conservation des bâtiments, les mêmes fonctions et la même responsabilité que les concierges des casernes: comme ces derniers, ils sont astreints à rendre compte, selon les cas, aux sous-intendants ou aux chefs du génie, des dégradations survenues.

TITRE III.

ASSIETTE DU LOGEMENT.

Établissements des projets d'états de l'assiette du logement.

15. La destination de tous les établissements du service du casernement est déterminée, pour chaque place, par décision du ministre de la guerre.

Le chef du génie, dès qu'il en a connaissance, rédige un projet d'état d'assiette détaillée du logement dans tous les établissements de la place (modèle A). Cet état indique pour chaque bâtiment les dimensions, la contenance et l'affectation de tous les locaux, et doit comprendre, dans l'ordre indiqué par l'article premier :

Les bâtiments appartenant à l'Etat et ceux dont le département de la guerre a la jouissance indéfinie :

Les immeubles pris à loyer par l'Etat, à quelque titre que ce soit; Les locaux mis par les administrations civiles à la disposition du service du casernement.

Lorsqu'il y a lieu d'établir l'assiette du logement, le chef du génie et le sous-intendant militaire se réunissent chez le commandant de place titulaire ou chez l'officier qui en remplit les fonctions, pour examiner et pour discuter avec ce dernier l'état détaillé (modèle A), préparé comme il vient d'être dit. Ce travail, une fois arrêté de concert, est rédigé définitivement par le chef du génie. Il est signé par les parties qui ont concouru à sa formation, et qui conçoivent, s'il y a lieu, leurs observations respectives au-dessus de leurs signatures.

Le chef du génie dresse en même temps un état d'assiette du casernement (modèle n° 1) présentant la récapitulation sommaire de l'état détaillé (modèle A). Il inscrit sur ce nouvel état (modèle n° 1) toutes les observations qui peuvent éclairer la question. L'état (modèle n° 1) est signé par le chef du génie, par le sous-intendant militaire et par le commandant de place.

Remise de ces états aux directeurs des fortifications ou aux inspecteurs généraux.

16. L'état sommaire (modèle n° 1) mentionné à l'article précédent est adressé par le chef du génie au directeur des fortifications. L'état détaillé (modèle A) est remis par le chef du génie à l'inspecteur général du génie, qui l'adresse au ministre avec ses observations.

États généraux dressés par les directeurs des fortifications et envoyés aux intendants divisionnaires.

17. Aussitôt que le directeur des fortifications a réuni tous les états sommaires d'assiette du logement (modèle n° 1) pour les diverses places de sa direction, il en forme, par division militaire, un état général (modèle n° 2) qu'il adresse à l'intendant divisionnaire avec les états sommaires (modèle n° 1), après avoir d'ailleurs consigné ses observations sur ces divers états.

Envoi de ces divers états au général commandant la division et au Ministre.

18. L'intendant divisionnaire inscrit son avis sur l'état général (modèle n° 2), donne connaissance de cet avis au directeur des fortifications, et envoie ensuite toutes les pièces au général commandant la division. Cet officier général transmet le tout, avec ses observations, au ministre de la guerre (3^e direction, service du génie).

Epoques des envois des divers états de l'assiette du logement.

19. Les états sommaires (modèle n° 1) doivent être adressés, le 10 novembre, aux directeurs des fortifications. L'état général (modèle n° 2), accompagné des états sommaires, doit parvenir à l'intendant divisionnaire le 1^{er} décembre; et ces divers états, envoyés au commandant de la division le 15 décembre, sont adressés au ministre le 25 du même mois.

Assiette du logement arrêtée par le Ministre.

20. Le ministre de la guerre fixe, pour chaque place, l'assiette du logement dans les établissements militaires, et renvoie les états généraux (modèle n° 2), approuvés ou modifiés s'il y a lieu, à l'officier général commandant la division, qui en notifie les dispositions aux directeurs des fortifications et aux intendants militaires. Ceux-ci portent respectivement à la connaissance des chefs du génie et des sous-intendants chargés du service du casernement l'approbation donnée par le ministre aux assiettes du logement qui les concernent, et, lorsqu'il y a lieu, les modifications à y apporter. Les commandants de place reçoivent également, de leur côté, par les soins des généraux commandant les divisions, des extraits certifiés du travail arrêté par le ministre.

Cas de modifications à proposer à l'assiette du logement.

21. Du 1^{er} au 15 novembre de chaque année, le commandant de place, le chef du génie et le sous-intendant militaire se réunissent, dans chaque place, pour reconnaître s'il y a lieu de proposer des modifications à l'assiette du logement; et, lorsqu'il y a des changements à faire à cette assiette, il y est procédé conformément aux prescriptions des articles 15, 16, 17, 18, 19 et 20 ci-dessus.

Changements autorisés pour les cas d'urgence.

22. Il ne peut être apporté de changements à l'assiette du logement qu'en vertu d'ordres du ministre de la guerre, si ce n'est lorsqu'il y a urgence.

Dans ce cas, les généraux commandant les divisions donnent les autorisations nécessaires, à charge par eux d'en rendre compte au Ministre (3^e direction, service du génie).

TITRE IV.

ORGANISATION DES LOGEMENTS ET DES ACCESSOIRES DU CASERNEMENT, DANS LES PAVILLONS ET DANS LES CASERNES.

Les logements des divers corps sont distincts.

23. Dans les bâtiments militaires désignés pour être occupés par les troupes, les logements des différents corps sont, autant que possible, distincts et séparés.

Bases de l'organisation des logements et des accessoires dans les pavillons et dans les casernes.

24. Dans les pavillons et dans les casernes, le logement des officiers, des sous-officiers, des maîtres ouvriers, des caporaux ou brigadiers et des blanchisseuses vivandières, etc., doit, ainsi que les divers accessoires nécessaires au casernement des troupes, être établi, autant du moins que les localités le permettent, conformément au tableau de répartition qui suit :

ACCESSOIRES.	NOMBRE ET COMPOSITION DES LOGES.	OBSERVATIONS.
Pensions de sous-officiers. de cavalerie.	Une pièce pour les adjudants. Une pièce pour les sous-officiers. Trois pièces pour les maréchaux des logis et les fourriers. Une pièce pour les sous-officiers d'ordonnance.	En dehors des heures des repas des sous-officiers, les pièces affectées à leur pension doivent être tenues, pour l'hygiène, dans un état de propreté absolue, et les sous-officiers d'ordonnance doivent y faire passer, au moins, deux fois par semaine, un petit local pour le dépôt des bagages de la troupe.
Lavoirs de la troupe.	Un pour les officiers. Un pour les sous-officiers. Un pour les hommes logés au quartier. Un pour les femmes logées au quartier.	
Cabarets d'habitation.	Une pièce pour l'officier. Une pièce pour le sous-officier. Une pièce pour le fourrier.	Ces locaux sont installés, autant qu'il est possible, à proximité des magasins.
Bureau de l'officier d'habillement.	Une pièce pour l'officier. Une pièce pour le sous-officier. Une pièce pour le fourrier.	
Atelier des armuriers.	Un pour les armuriers. Un pour les armuriers logés au quartier.	
Atelier des tailleurs.	Un pour les tailleurs. Un pour les tailleurs logés au quartier.	
Atelier des cordonniers ou des bottiers.	Un pour les cordonniers ou bottiers. Un pour les cordonniers ou bottiers logés au quartier.	
Magasin d'armement.	Un pour les armes. Un pour les munitions. Un pour les effets d'habillement.	Le magasin d'armement doit être tenu, en trois catégories distinctes : 1. Les armes. 2. Les munitions. 3. Les effets d'habillement. Ces de grands équipements, il doit, toujours s'y trouver, en outre, autant qu'il est possible, un compartiment séparé par une barrière, pour les effets d'habillement destinés à être distribués aux hommes pour leur tenue et pour essayer leurs vêtements.
Magasin d'habillement.	Magasin d'habillement proprement dit. Magasin des effets des hommes absents.	

Magasin aux munitions régimentaires et hanger pour les armes.	Magasin des effets d'habillement.	Le hanger est séparé du magasin aux munitions.
Salle de rapport et de blâmes.	Magasin des effets d'habillement.	
Boite réglementaire.	Magasin des effets d'habillement.	
Salle d'écriture.	Magasin des effets d'habillement.	
Salle de dans.	Magasin des effets d'habillement.	
Salle de musique.	Magasin des effets d'habillement.	
Infirmerie régimentaire.	Magasin des effets d'habillement.	
Locaux disciplinaires.	Magasin des effets d'habillement.	
Corps de garde de police.	Magasin des effets d'habillement.	
Dépôt d'entrainement et d'apprentissage.	Magasin des effets d'habillement.	

Logements d'officiers.

25. Lorsque les bâtiments militaires sont susceptibles de fournir des logements convenables pour les officiers supérieurs et autres, les logements sont établis d'après les bases indiquées au tableau ci-dessus. Les chambres à réserver spécialement, dans les casernes, pour l'adjudant-major et le médecin de semaine sont distinctes des logements permanents d'officiers.

Logement des chevaux des officiers montés.

26. Les officiers montés, lors même qu'ils n'ont pas de logements dans des bâtiments militaires, peuvent placer leurs chevaux dans les écuries disponibles des casernes jusqu'à concurrence d'un nombre égal à celui des rations de fourrages auxquelles ils ont droit d'après les règlements.

En cas d'insuffisance d'écuries dans les quartiers, la préférence est accordée et doit être assurée aux chevaux des officiers le moins élevés en grade, et, dans tous les cas, à ceux des officiers dont la troupe occupe la caserne, avant ceux des autres corps ou fractions de corps.

Chambres de soldats.

27. La contenance des chambres de soldats est calculée de manière à ménager l'espace nécessaire pour le placement des lits et du mobilier, ainsi que pour la facilité de la circulation, et à donner à chaque homme un volume d'air de au moins 12 mètres cubes dans les casernements d'infanterie, et 14 mètres cubes dans ceux de cavalerie.

La tête de chaque lit est, autant qu'il est possible, adossée à un mur ou à une cloison sans y toucher. L'intervalle entre deux lits doit être de 25 centimètres au moins.

Écuries.

28. Les chevaux sont espacés entre eux de 1^m,45 dans les écuries. Les écuries simples ont au moins 5 mètres de largeur, et les écuries doubles au moins 8^m,50. Les unes et les autres ont 3^m,50 de hauteur au minimum. Dans tous les cas, il doit être réservé à chaque cheval un volume d'air de 20 mètres cubes au moins.

Logement des concierges.

29. Les concierges ont leur logement dans l'établissement dont ils ont la garde. S'ils ont plusieurs établissements sous leur surveillance, ils logent dans celui où leur présence est jugée la plus utile.

Cuisines.

30. Quand les localités le permettent, il doit y avoir une cuisine munie de fourneaux pour chacun des bataillons d'un régiment d'infanterie, et deux cuisines pour chaque régiment de cavalerie.

Les cuisines sont toujours au rez-de-chaussée, dans des locaux pavés ou dallés.

Ateliers.

31. Les ateliers des cordonniers ou des bottiers, et ceux des selliers, ainsi que la forge de l'armurier, doivent être placés dans des pièces bien éclairées et situées au rez-de-chaussée ou immédiatement au-dessus de locaux voûtés.

Magasins des corps.

32. Le magasin d'armement doit toujours être installé dans un local bien sec.

Les magasins d'habillement sont organisés de manière que les effets y soient suffisamment préservés de la chaleur et de l'humidité.

Magasins de munitions et hangars pour la confection des cartouches.

33. Les magasins de munitions sont toujours placés loin des bâtiments d'habitation et dans des endroits bien secs.

On les dispose de manière à en rendre la surveillance facile, et on les isole des murs de clôture par des couloirs de 1 mètre de largeur au moins.

Quand on ne peut pas affecter, sans danger, à la confection des cartouches, un local existant, on établit pour cette opération un petit hangar de construction légère en planches à recouvrement.

Écoles régimentaires.

34. L'école régimentaire doit avoir une contenance de 150 élèves pour un régiment d'infanterie de trois bataillons; de 130 pour deux bataillons; de 80 pour un bataillon détaché ou formant corps; de 80 pour un régiment de cavalerie, et de 70 pour une section d'ouvriers d'administration.

Dans les garnisons où se trouvent plusieurs corps, chaque corps a son école régimentaire séparée, si les ressources du casernement le permettent.

Tout détachement de la force de deux compagnies doit, autant que possible, avoir une école régimentaire.

Salles d'escrime et de danse.

35. Les salles d'escrime et de danse sont toujours établies au rez-de-chaussée ou immédiatement au-dessus de locaux voûtés.

Locaux disciplinaires.

36. Les locaux disciplinaires des hommes gradés sont distincts de ceux des simples soldats.

Les caporaux et les brigadiers sont séparés des sous-officiers toutes les fois que les localités le permettent.

Champs de manœuvre et de tir.

37. Dans les localités où le champ de tir ne peut pas être établi dans le champ de manœuvre, on affecte à cet usage un terrain spécial.

Les travaux d'appropriation dans les champs de manœuvre et de tir sont exécutés, autant que possible, par les corps.

TITRE V.

AMEUBLEMENT DES PAVILLONS ET DES CASERNES.

Ameublement des logements d'officiers.

38. L'ameublement des logements militaires d'officiers est fourni entretenu et renouvelé, au compte de l'Etat, par les soins de l'administration militaire, soit directement, soit par l'intermédiaire d'une entreprise dite des lits militaires, fonctionnant conformément aux clauses d'un marché passé avec le département de la guerre.

Toutefois, le service du génie fournit, entretient et renouvelle les glaces affectées à ces logements, savoir :

Dans chaque logement de sous-lieutenant, de lieutenant ou de capitaine, une glace d'environ 0^m,80 de hauteur sur 0^m,60 de largeur, encadrée dans une bordure en acajou ;

Dans chaque logement d'officier supérieur, trois glaces, dont deux du modèle ci-dessus, et une troisième d'environ 1 mètre de hauteur sur 0^m,80 de largeur, encadrée dans une bordure dorée.

Il n'est fait, d'ailleurs, aucune fourniture d'ameublement de bureau aux officiers qui reçoivent une indemnité pour frais de bureau.

Couchage de la troupe.

39. L'administration militaire pourvoit, soit directement, soit par l'entremise d'une entreprise dite des lits militaires, au couchage des troupes dans les casernes.

Mobilier des chambres de soldats.

40. Les chambres de soldats sont garnies du mobilier suivant :

1^o Objets fournis, entretenus et remplacés par le service du génie : Planches à bagages, de 0^m,30 de largeur, à simple rang pour l'infanterie de ligne, à double rang pour tous les corps de la garde impériale et pour toute la cavalerie ;

Cheilles, crochets ou boutons pour porter l'armement et l'équipement ;

Crochets porte-souliers ;

Râteliers porte-brides ;

Râteliers d'armes ;

Tables de 2 mètres de longueur sur 0^m,70 de largeur (une table par 16 hommes) ;

Bancs de deux mètres de longueur (2 bancs par 16 hommes) ;

Planches à pain de 0^m,60 de largeur, et d'un développement total calculé à raison de 0^m,12 au moins par homme de l'effectif ; elles sont élevées à 2 mètres au-dessus du sol, et placées au-dessus des tables ;

Planchettes destinées à recevoir l'extrait de l'état des lieux et de l'inventaire du mobilier dressé par les soins des corps.

2^o Objets fournis, entretenus et remplacés par les corps, sur la masse générale d'entretien :

Planchettes destinées à recevoir les instructions, les règlements, les listes et les consignes qui doivent être affichés dans les chambres ;

Etiquettes à placer à la tête des lits et au-dessus de chaque arme au râtelier.

Les chambres des musiciens reçoivent le même ameublement que les chambres des soldats.

Mobilier des chambres de sous-officiers.

41. Les chambres de sous-officiers sont meublées comme celles de la troupe, avec cette différence, qu'il est accordé à chaque sous-officier, pour placer ses bagages, un développement de planches double de celui qu'on donne à chaque soldat.

Il est placé, en outre, dans la chambre de chaque sergent-major ou maréchal des logis chef, un râtelier pour 6 armes, un développement de planches à bagages suffisant pour porter les bagages de 12 hommes, et une table à tiroir fermant à clef.

Tout cet ameublement est fourni, entretenu et remplacé par le service du génie.

Mobilier des chambres des enfants de troupe et des logements de blanchisseuses.

42. Les chambres des enfants de troupe reçoivent le même ameublement que les chambres de soldats, à l'exception du mobilier destiné à l'armement et à l'équipement.

Il n'est fourni par le service du génie, dans les logements des blanchisseuses-vivandières, qu'une planche à bagages.

Mobilier des écuries.

43. Les écuries sont pourvues du mobilier suivant, savoir :

1^o Objets fournis, entretenus et remplacés par le service du génie.

Râtelier continu ;

Mangeoires individuelles ;

Chânes d'attache munies de leurs tiges ou anneaux fixés aux mangeoires ;

Une ou plusieurs cuves-abreuvoirs, d'une contenance totale calculée à raison de 20 litres par chaque cheval de l'effectif à loger ;

Coffres à avoine, établis sur des dés en pierre et munis de cadenas, à raison d'un coffre par escadron ;

Anneaux de pansage fixés à l'extérieur dans les murs des écuries, à 1^m,45 de distance les uns des autres, et scellés dans des dés en pierre.

2° Objets fournis pour le service du génie, et entretenus à la charge de la masse d'entretien du harnachement et du ferrage :

Bat-flancs, avec leurs chaînes de suspension, pour la séparation des chevaux par un ;

Mesures à avoine, 2 par escadron ;

Vannettes à avoine, 2 par escadron ;

Hache-paille, 1 par corps de troupes à cheval ;

Civrières, à raison de 4 par escadron, et, en outre, de 5 par régiment de cavalerie, dont deux pour les jeunes chevaux, 2 pour l'infirmerie et un pour l'état-major ;

Seaux, 8 par escadron ;

Baquets, 2 par escadron ;

Planchettes à consignés, 1 par escadron ;

Planchettes pour inscrire le nom des chevaux ;

Augets, 2 par escadron ; ils ne sont fournis que lorsque les mangeoires ne sont pas à cuvettes ;

Ces divers objets ne peuvent être renouvelés par le service du génie qu'en vertu d'une décision du ministre, prise sur la production d'un procès-verbal dressé par le sous-intendant militaire, de concert avec le chef du génie, pour constater la nécessité de leur renouvellement.

Quant aux ustensiles et aux outils non compris dans les deux catégories précédentes et nécessaires à l'entretien de la propreté des écuries, à l'enlèvement du crotin, etc., ils sont fournis, entretenus et renouvelés par les corps, sur la masse d'entretien du harnachement et du ferrage.

Porte-selles.

44. Les selles et les autres objets de harnachement sont placés sur des porte-selles dont la fourniture, l'entretien et le remplacement incombent au service du génie.

Mobilier des cuisines.

45. Les cuisines reçoivent l'ameublement suivant, qui est fourni, entretenu et remplacé par le service du génie :

Marmites, à raison d'une par compagnie ou par demi-escadron (1) :

Tables de 0^m,90 de largeur sur 0^m,75 de hauteur, à raison de

(1) Quand les marmites ne sont pas de dimensions suffisantes pour servir chacune à l'ordinaire d'une compagnie ou d'un demi-escadron, on en augmente le nombre à raison de l'écu.

2^m,40 de développement par compagnie, et de 3^m,50 par escadron ;

Tablettes de 0^m,30 de largeur, entièrement semblables aux planches à bagages, placées en nombre suffisant, à 0^m,50 au-dessus des tables ;

Chevalet pour scier le bois.

Il est placé, par le service du génie, en dehors et à portée de chaque cuisine, un billot en bois qui est enfoncé en terre de manière à y rester à demeure. Il est défendu de fendre le bois ailleurs que sur ce billot.

Les scies et les haches sont achetées, entretenues et renouvelées par les corps, sur la masse générale d'entretien.

Mobilier des pensions.

46. Les pensions de sous-officiers sont garnies :

1° De tables, en quantité suffisante pour que chaque sous-officier y occupe une place de 0^m,50 à 0^m,60 de largeur ;

2° De bancs, à raison de 0^m,50 de longueur par sous-officier ;

3° D'une rangée de tablettes entièrement semblables aux planches à bagage.

Cet ameublement est établi, entretenu et remplacé par le service du génie, qui n'a, d'ailleurs, rien à fournir pour les cantines.

Baquets de propreté.

47. Des baquets de propreté sont placés dans les cours des casernes, à raison de 4 par bataillon et de 2 par escadron, ainsi que dans les infirmeries et dans les locaux de punition, en nombre suffisant.

Les corps sont chargés de les vider et de les laver avec soin au moins une fois par jour.

La fourniture, l'entretien et le remplacement des baquets de propreté incombent au service du génie.

Ameublement des ateliers.

48. Il est placé :

1° Dans l'atelier des armuriers :

Une forge ;

Une enclume fixe avec son billot ;

Un soufflet avec sa chaîne de tirage ;

Un établi ;

Une auge pour l'eau nécessaire à la trempe ;

Un râtelier pour les armes.

2° Dans l'atelier des tailleurs :

Des porte-manteaux à chevilles, tant dans l'atelier des ouvriers que dans la salle de coupe ;

Des tablettes de 0^m,40 à 0^m,50 de largeur sur 5 à 6 mètres de longueur, placées au-dessus des porte-manteaux ;

Un établi monté sur tréteaux.

3° Dans l'atelier des cordonniers ou bottiers et dans celui des selliers :

Des porte-manteaux à chevilles et des tablettes en quantité suffisante.

Ces divers objets sont fournis, entretenus et remplacés par le service du génie.

Matériel des forges des maréchaux ferrants et des hangars au ferrage.

49. Les forges des maréchaux ferrants sont munies chacune :

D'enclumes pesant 75 à 80 kilogrammes, à raison d'une enclume par feu ;

D'une bigorne du poids de 50 kilogrammes environ ;

D'étaux, à raison d'un pour deux feux, et de deux pour trois feux ;

D'un billot spécial pour le perçement des fers ;

De porte-manteaux à chevilles pour suspendre les vestes et les bonnets des ouvriers ;

De tablettes pour les fers préparés.

Dans les hangars au ferrage, on place des anneaux d'attache, espacés entre eux de 1^m, 10 à 1^m, 30, au nombre de 18 environ pour un régiment de cavalerie.

Ces divers objets sont établis, entretenus et remplacés par le service du génie.

Ameublement des magasins.

50. Il est fourni à chaque corps, par les soins et à la charge du service du génie :

1° Dans les magasins d'habillement,

Trois tables de 2 mètres de longueur sur 1 mètre de largeur, ou une seule table d'une surface équivalente, avec les casiers et les bancs nécessaires pour y placer les effets d'habillement et d'équipement ;

Une autre table de 2 mètres sur 1 mètre, pour le mesurage des étoffes, laquelle est étalonnée par les soins des corps, sur les fonds de la masse générale d'entretien ;

Un rouleau pour la vérification des étoffes ;

Une échelle double, s'il est nécessaire.

2° Dans les magasins d'armement,

Une table ;

Un râtelier pour 600 fusils, dans le casernement de l'infanterie, ou pour 300 armements complets, dans le casernement de la cavalerie.

3° Dans le magasin de harnachement,

Une table, des tablettes et des râteliers disposés pour recevoir les divers objets de harnachement.

Il est pourvu, par le service du génie, à l'entretien et au remplacement de tous les objets susmentionnés ; tous les autres meubles et ustensiles des magasins devant rester à la charge des corps.

Mobilier des écoles régimentaires.

51. Le mobilier de chaque école régimentaire est composé comme il suit :

1° Objets fournis, entretenus et remplacés par le service du génie :

Une estrade avec bureau pour l'officier directeur ;

Trois chaises ;

Un nombre suffisant de bancs et de tables munies d'encriers, ainsi que des montants destinés à recevoir une corde pour suspendre les modèles ;

Un ou plusieurs tableaux noirs, suivant le nombre des élèves ;

Un rang de liteaux à crochets pour suspendre les tableaux et les modèles d'enseignement ;

Un rang de porte-manteaux à chevilles pour recevoir la coiffure des élèves ;

Une armoire à deux battants fermant à clef et garnie de ses rayons.

2° Objets achetés, entretenus et renouvelés par les corps et à leur charge :

Tableaux de lecture, de grammaire et du système métrique ;

Modèles ;

Cartes géographiques,

Et tous autres objets non compris dans la nomenclature précédente.

Lors des changements de garnison, les corps n'emportent avec eux, de tous ces différents objets, que ceux qui sont d'un transport facile, savoir :

Les évangiles, les syllabaires, les crayons, les porte-crayons et les méthodes d'écriture.

Ils remettent les autres au service du génie, d'après un inventaire dressé par le service de l'intendance militaire et signé par l'officier de casernement. A chaque nouvelle occupation de la caserne, cet inventaire est remis à l'officier directeur des écoles, pour que la vérification en soit faite de nouveau.

Mobilier de la salle d'hippiatrique.

52. Chaque salle d'hippiatrique est munie du matériel d'enseignement nécessaire, lequel est fourni par le ministre de la guerre, sur les fonds du service du harnachement.

Le corps occupant est responsable des effets mobiliers de cette salle, dont la garde est confiée à un agent du service du génie quand le corps ne doit pas en faire usage.

Lors des changements de garnison, la remise de ce matériel est faite par le corps au service du génie, avec les formalités qui sont prescrites par le dernier paragraphe de l'article qui précède.

Matériel pour le service des manèges.

53. Il est fourni, par les soins et aux frais du service du génie, les objets mobiliers nécessaires au service et aux exercices du manège, tels que barrières, piliers, chandeliers, têtes, arrosoirs, pics à boyaux, pelles et râtaux.

Ces objets sont entretenus par les corps, sur les fonds de la masse d'entretien du harnachement et du ferrage.

Leur renouvellement total ou partiel ne peut avoir lieu qu'en vertu d'une décision du ministre de la guerre, prise sur la production d'un procès-verbal dressé par le sous-intendant militaire, de concert avec le chef du génie, pour constater la nécessité de ce renouvellement.

Lors des changements de garnison, ce matériel est laissé par les corps à la garde du service du génie, avec les formalités qui sont prescrites par le dernier paragraphe de l'article 51 du présent règlement.

Le corps occupant est chargé de l'entretien du sol du manège.

Matériel pour la voltige.

54. Il est établi, dans les casernes de cavalerie, un cheval de bois et des barres parallèles, pour les exercices de la voltige. Ces objets sont fournis, entretenus et renouvelés aux frais des corps, par les soins du service du génie.

Matériel des gymnases et des écoles de natation.

55. Le matériel des gymnases régimentaires et celui des écoles de natation sont établis par les soins du service du génie, d'après les ordres du ministre de la guerre.

La dépense des fournitures et des travaux relatifs à ces matériels est imputée, à la diligence des fonctionnaires de l'intendance, sur les fonds des allocations spéciales accordées pour cet objet aux divers corps ou établissements.

Matériel de tir.

56. Le matériel de tir est acheté, entretenu et renouvelé par les corps, sur les fonds de la masse générale d'entretien.

Lors des changements de garnison, il est laissé par les corps à la garde du service du génie, avec les formalités qui sont prescrites par le dernier paragraphe de l'article 51 du présent règlement.

Mobilier des infirmeries régimentaires.

57. Les salles des infirmeries régimentaires sont garnies de tables, de bancs, de planches à pain et d'un rang de planches à bagages, dans la proportion du nombre de malades qu'elles peuvent contenir. On y place également des chaises à raison d'une par malade.

La salle de visite reçoit une ou deux armoires et une table à tiroir fermant à clef.

Il est fourni, en outre, un poêle en fonte à deux trous pour les tisanes, ainsi que deux marmites; l'une pour la tisanderie, l'autre pour les bains.

Tout cet ameublement est établi, entretenu et renouvelé par les soins et à la charge du service du génie.

Les baignoires, les bains de siège, les bains de pied, les bains de bras, les cylindres, quand il n'y a pas de fourneaux, les pots à tisane en fer battu, les gobelets en fer battu, les cuillers à distribution en fer battu, les passoires pour les tisanes, les mémoires de médecine, de chirurgie et de pharmacie militaires, et les instructions relatives au service des infirmeries régimentaires, sont fournis par le service de l'intendance. Le nombre de ces objets est subordonné à l'importance numérique des corps pour lesquels l'infirmerie est instituée.

Lors des changements de garnison, les divers objets mentionnés au paragraphe précédent sont laissés par les corps à la garde du génie, avec les formalités qui sont prescrites par le dernier paragraphe de l'article 51 du présent règlement.

Tous les autres objets mobiliers et ustensiles, tels que cuiviers, cruches, pots, tasses, etc., sont achetés, entretenus et renouvelés par les corps.

Ameublement des locaux disciplinaires.

58. Les locaux de punition sont garnis de lits de camp et de baquets de propreté d'un modèle particulier.

Cet ameublement est fourni, entretenu et renouvelé par les soins et à la charge du service du génie.

Ameublement des corps de garde.

59. Les corps de garde établis dans un intérêt militaire reçoivent des lits de camp, des tables, des bancs, des planches à bagage, des planches à pain, des planchettes à consignes et des râteliers d'armes, dans la proportion du nombre d'hommes qu'ils doivent contenir.

On place des tables et des porte-manteaux dans les corps de garde d'officiers.

Il est posé, près du corps de garde de police de chaque caserne, une boîte aux lettres, dont le vaguemestre a la clef.

Tous ces objets sont établis, entretenus et renouvelés par les soins et à la charge du service du génie.

Le reste de l'ameublement des corps de garde est fourni par l'administration militaire, soit directement, soit par l'intermédiaire d'une entreprise dite des lits militaires.

Guérites.

60. Le département de la guerre ne fournit les guérites que pour les sentinelles placées dans un intérêt militaire.

Ces guérites sont établies, entretenues et remplacées par les soins et à la charge du service du génie.

Outils et matériaux nécessaires pour l'entretien des cours.

61. Les corps sont chargés de l'entretien des parties non pavées des cours dans les établissements qu'ils occupent, et ils doivent laisser ces établissements en bon état lorsqu'ils les évacuent.

Le service du génie fournit les matériaux et les outils nécessaires pour cet entretien; les corps sont responsables des outils, qui sont entretenus et remplacés par le service du génie.

Appareils des puits.

62. Les puits doivent être munis de pompes ou de poulies avec chaînes ou cordes et seaux en bois.

Ces appareils sont établis, entretenus et remplacés par les soins et aux frais du service du génie.

Matériel pour la fourniture de l'eau potable.

63. Dans les bâtiments éloignés de plus de 500 mètres de toute eau potable, le service du génie fournit aux troupes, entretient et remplace les tonneaux à eau nécessaires. Ces tonneaux sont établis sur des chantiers, munis de robinets et fermés avec des couvercles cadenassés, dont la clef est remise au concierge.

Lorsque, d'après une décision du ministre, les corps doivent aller chercher eux-mêmes l'eau qui leur est nécessaire, il est mis à cet effet à leur disposition des voitures munies de tonneaux, qui sont fournies, entretenues et renouvelées par le service du génie.

Lorsqu'il y a lieu de recourir à des marchés pour la fourniture et pour le transport de l'eau potable, ces marchés sont passés à la diligence des fonctionnaires de l'intendance et à la charge du budget des subsistances militaires.

Chariots porte-fourrages.

64. Les chariots porte-fourrages, ainsi que les harnais de trait, sont achetés, entretenus et renouvelés par les corps, sur les fonds de la masse d'entretien du harnachement et du ferrage. Lors des changements de garnison, les chariots et leurs accessoires sont remis à la garde du service du génie, avec les formalités qui sont prescrites par le dernier paragraphe de l'article 51 du présent règlement.

Brancards.

65. Les brancards pour le transport à l'hôpital des hommes malades ou blessés sont fournis par le service du génie, en vertu d'une décision du ministre de la guerre, prise sur la production d'un procès-verbal dressé par le sous-intendant militaire, de concert avec le chef du génie, pour constater la nécessité de cette fourniture.

Les brancards sont entretenus et remplacés par le service du génie, et déposés dans les corps de garde de police des casernes.

Poêles.

66. La fourniture des poêles dans les casernes, pour le chauffage des chambres, des ateliers et des infirmeries, est à la charge du service du génie, ainsi que leur entretien et leur remplacement.

Le nombre des poêles à fournir est déterminé par un procès-verbal dressé par le sous-intendant militaire, de concert avec le chef du génie. Ce nombre est réglé principalement sur celui des rations de chauffage allouées au corps, et dans la proportion moyenne de trois poêles par ration collective de l'ordinaire.

Le montage, le démontage et le transport des poêles sont effectués sans frais par la troupe, sous la direction d'un agent du service du génie.

Pompes à incendie.

67. Lorsqu'il existe des pompes à incendie dans la place, les soins relatifs à leur conservation et à leur entretien sont confiés spécialement à un garde du génie; ce garde assiste aux exercices que l'on doit faire faire à la troupe pour la former au maniement de la pompe, dont il dirige la manœuvre en cas d'incendie.

Les pompes sont remises dans un hangar ou local couvert.

Drapeaux.

68. Il est pourvu, par les soins et aux frais du service du génie, à la fourniture, à la pose et à l'entretien des drapeaux ou pavillons à placer sur les édifices militaires, sur les forts et dans les citadelles.

La fourniture, ainsi que le renouvellement des drapeaux, n'a lieu qu'en vertu d'une décision du ministre de la guerre, prise sur la production d'un procès-verbal dressé par le sous-intendant militaire, de concert avec le commandant de place et avec le chef du génie.

Les drapeaux à placer à la porte des casernes, sur les forts et dans les citadelles, ne sont arborés qu'aux jours de fêtes publiques. En dehors de ces circonstances, ils sont conservés dans les magasins du génie.

Planchettes pour le nettoyage des buffeteries.

69. Les planchettes destinées au nettoyage des buffeteries noires sont fournies aux troupes à pied par le service du génie, à raison de 8 par compagnie dans les régiments d'infanterie de ligne, et de 12 par compagnie dans les bataillons de chasseurs à pied.

Le remplacement et l'entretien des planchettes sont à la charge de la masse générale d'entretien des corps, qui, lors des changements de garnison, remettent ces objets à la garde du service du génie, avec les formalités prescrites par le dernier paragraphe de l'article 51 du présent règlement.

Il est expressément interdit aux troupes de nettoyer les buffe-

teries sur les tables et sur les bancs, sans l'interposition des planchettes.

Balances.

70. Les corps sont pourvus de balances à bras égaux, pour peser les denrées destinées aux ordinaires. Ces balances sont au nombre de trois dans les régiments d'infanterie de ligne; de deux dans les bataillons de chasseurs à pied, et de deux dans les régiments de cavalerie. Leur achat et leur remplacement sont à la charge de la masse générale d'entretien, et les réparations sont payées sur les fonds des ordinaires.

Lors des changements de garnison, les balances sont remises par les corps au service du génie, avec les formalités prescrites par le dernier paragraphe de l'article 51 du présent règlement.

Appareils d'éclairage.

71. La dépense de l'éclairage intérieur des établissements du casernement est généralement à la charge des corps, des administrations ou des fonctionnaires qui les occupent, tant pour l'achat et l'entretien des appareils que pour la consommation du combustible.

Dans les chambres de la troupe, l'éclairage est au compte de l'ordinaire; dans les corridors, les escaliers, les écuries, les infirmeries, les écoles régimentaires et autres locaux accessoires du casernement, il est au compte de la masse générale d'entretien pour les troupes à pied, et au compte de la masse d'entretien du harnachement et du ferrage pour les troupes à cheval.

Les appareils d'éclairage à la charge de la masse des corps sont, lors des changements de garnison, laissés à la garde du service du génie, avec les formalités prescrites par le dernier paragraphe de l'article 51 du présent règlement.

La dépense de l'éclairage extérieur des établissements affectés au logement des troupes incombe au service du génie pour l'achat et l'entretien des appareils. Le service de l'intendance militaire assure la fourniture du combustible et des mèches, ainsi que les opérations journalières de nettoyage.

Lorsque les établissements des services administratifs doivent être éclairés à l'extérieur, ces services restent chargés de la fourniture, de la pose et de l'entretien des appareils, et assurent, d'après les règlements spéciaux, la fourniture du combustible, ainsi que les soins de nettoyage et d'allumage; toutefois, les frais de la pose incombent au service du génie, quand il en est ainsi décidé par le ministre, à raison de l'importance des travaux de maçonnerie, de charpente, etc., que cette pose peut exiger.

Le matériel nécessaire à l'éclairage des corps de garde est fourni, entretenu et renouvelé au compte de l'Etat, à la diligence du service de l'intendance militaire.

En ce qui concerne particulièrement l'éclairage au gaz, dans tout établissement du casernement, quelle que soit son affectation, la

fourniture et la pose des conduits sont opérées par les soins et à la charge du service du génie; quant à la fourniture et à la pose des appareils, tels qu'applicques, becs, compteurs, etc., ainsi qu'à la fourniture du gaz, tant pour l'éclairage intérieur que pour l'éclairage extérieur, elles incombent, soit au service de l'intendance militaire, soit aux occupants, suivant ce qui est déterminé par des règlements spéciaux ou par des décisions ministérielles particulières.

Ils pour les illuminations.

72. Le service du génie est chargé de fournir et d'entretenir les ifs destinés aux illuminations des établissements affectés au logement des troupes.

Les frais d'illumination et ceux de transport, de pose et de déplacement des ifs, sont à la charge des corps, des services, des officiers ou des employés qui occupent les établissements.

Les effets mobiliers ne doivent pas être déplacés.

73. Les chefs de corps doivent tenir la main à ce que les objets d'ameublement ne soient, sous aucun prétexte, transportés d'une chambre dans une autre, ni détournés de la destination qui leur est affectée.

Cas de fournitures autres que celles qui sont prescrites au présent règlement.

74. Toutes fournitures autres que celles qui sont explicitement prescrites ou autorisées par le présent règlement ne pourront être faites que sur un ordre spécial du ministre.

TITRE VI.

OCCUPATION DES PAVILLONS ET DES CASERNES PAR LES TROUPES.

Avis de l'arrivée d'un corps de troupe.

75. Aussitôt que le commandant de place reçoit l'avis de l'arrivée d'un corps de troupes, il en informe le sous-intendant militaire et le chef du génie, en leur faisant connaître l'effectif du corps et le jour de son arrivée, et il désigne les bâtiments militaires qui doivent être occupés par ce corps.

Le sous-intendant militaire et le chef du génie prennent, chacun en ce qui le concerne, les dispositions nécessaires pour assurer l'installation de la troupe à son arrivée.

Mesures à prendre à l'arrivée de l'officier de casernement.

76. L'officier de casernement qui précède le corps se présente, à son arrivée, chez le commandant de place, pour connaître les bâtiments assignés à la troupe.

Il se rend ensuite chez le sous-intendant militaire, qui, sur le vu de l'ordre dont il est porteur, prend les mesures nécessaires pour que le corps soit mis immédiatement en possession du logement qui lui est assigné, ainsi que des objets de couchage et de mobilier alloués par les règlements.

Désignation des locaux à occuper.

77. Le nombre des chambres et des autres locaux à livrer est réglé par le sous-intendant militaire sur l'effectif du corps ou de la fraction de corps à loger, et en se conformant aux dispositions des titres III et IV du présent règlement.

Cette fixation ne doit pas être dépassée, quel que soit d'ailleurs le nombre des chambres et autres locaux restant disponibles.

Prise de possession du logement.

78. L'officier de casernement, dans la visite qu'il fait de tous les locaux affectés au corps pour en prendre possession, est accompagné d'un garde du génie, avec lequel il vérifie l'état descriptif des lieux et l'inventaire des effets mobiliers.

L'officier sans troupe ou l'employé militaire opère de la même manière que l'officier de casernement, pour la prise de possession du logement qui lui est affecté.

État descriptif des lieux.

79. Le chef du génie fait établir pour chaque bâtiment, et conserve dans les archives du génie de la place, un état descriptif des lieux, détaillé par chambre et contenant l'inventaire des objets d'ameublement entretenus par le service du génie.

A chaque nouvelle occupation des bâtiments, une expédition de cet état est remise au garde du génie, qui la présente à l'officier de casernement, pour la vérification de l'état des lieux et des objets ci-dessus mentionnés. Cette expédition, après avoir été rectifiée au besoin, et complétée par l'inscription, à la suite, des outils et des ustensiles entretenus par le service du génie qui, sans faire partie des chambres ou autres locaux, sont mis à la disposition du corps, est signée par l'officier de casernement et par le garde du génie, visée par le sous-intendant et déposée au bureau du génie; une copie en est donnée à l'officier de casernement.

Inventaire des objets qui ne sont pas entretenus par le service du génie.

80. Les objets et les ustensiles que possèdent les corps, mais qu'ils n'emportent pas avec eux, et qui, lors des changements de garnison, sont confiés momentanément à la garde des agents du génie, tels que le matériel des écoles régimentaires, celui de tir, celui des infirmeries régimentaires, les chariots à fourrages, etc., et plus généralement, tous les objets et ustensiles qui ne sont pas entre-

tenus par le service du génie, donnent lieu à un inventaire dressé à la diligence du sous-intendant militaire.

A chaque nouvelle occupation des établissements, une expédition de cet inventaire est remise au garde du génie, qui la présente à l'officier de casernement, pour la vérification des objets qui s'y trouvent portés. Après cette vérification, l'expédition, rectifiée s'il y a lieu, est signée par l'officier de casernement, et déposée au bureau du sous-intendant militaire, qui la vise; une copie en est délivrée à l'officier de casernement.

Difficultés concernant la prise de possession du casernement.

81. En cas de difficultés dans la prise de possession du casernement, l'officier de casernement consigne ses observations, soit sur l'état des lieux, soit sur l'inventaire, suivant les cas, et appose sa signature à la suite.

S'il s'agit de l'installation de la troupe, le sous-intendant militaire, après s'être concerté avec le major, ou, à son défaut, avec un délégué du chef de corps, fait droit aux observations de l'officier de casernement, ou décide qu'il y a lieu de passer outre.

Si les difficultés concernent l'état d'entretien des bâtiments ou du mobilier fourni par le service du génie, l'officier du génie doit être appelé pour donner son avis; il signe alors l'état des lieux ou l'inventaire, et, après s'être concerté avec le major ou avec le délégué du chef de corps, il admet les observations de l'officier de casernement, ou il décide qu'il y a lieu de passer outre.

Dans ces deux cas, les corps sont tenus de se conformer aux décisions prises; mais ils ont le droit de faire valoir leurs réclamations auprès de l'autorité supérieure.

Remise des clefs et responsabilité des corps.

82. Immédiatement après la signature de l'état des lieux et de l'inventaire, les clefs sont remises à l'officier de casernement, qui en donne un reçu, et les corps deviennent responsables des dégradations et des pertes résultant de leur fait, tant pour les bâtiments militaires que pour les objets mobiliers qui leur ont été remis.

Formalités à remplir en cas de mutations dans le logement.

83. Si, pour quelque cause que ce soit, sans qu'il y ait de changement dans la composition de la garnison, le commandant de place juge à propos de faire opérer quelques mutations dans le logement des troupes, il en prévient le chef du génie et le sous-intendant militaire, afin que les formalités prescrites par les articles 77, 78, 79, 80, 81 et 82 ci-dessus soient remplies pour ces mutations, comme elles l'ont été pour les premières occupations.

Évacuation de locaux par suite d'une réduction d'effectif.

84. Lorsqu'un corps éprouve quelque réduction par le départ ou par l'absence, soit de quelques officiers, soit d'une partie du corps, l'officier de casernement doit remettre sur-le-champ au service du génie les locaux devenus vacants, en se conformant aux dispositions du titre VIII ci-après.

Le sous-intendant militaire est spécialement chargé de veiller à l'exécution de cette prescription.

Réception des corps de garde. — Responsabilité des chefs de poste.

85. Les corps de garde sont remis aux adjudants de place par les gardes du génie, de la même manière que le casernement est remis aux officiers de casernement.

En cas de contestation, le chef du génie se consulte avec le commandant de place, et, s'ils ne tombent pas d'accord, ils ont recours à l'autorité supérieure.

Le chef de poste de chaque garde montante vérifie l'état du corps de garde et de tous les objets dont l'inventaire est affiché à côté de la consigne, et il fait, immédiatement après cette visite, le rapport au commandant de place, sur les dégradations et sur les objets manquants; faute de quoi, il en devient responsable.

La réparation des dégradations et le remplacement des objets manquants ont lieu aux frais du chef de poste de la garde descendante, sauf recours contre qui de droit, dans les formes indiquées ci-après au titre IX, concernant les dégradations et les pertes.

Les officiers de ronde et les adjudants de place doivent vérifier, chaque jour, l'état des corps de garde et des objets consignés, et assurer leur bon entretien.

TITRE VII.

POLICE DES BÂTIMENTS MILITAIRES OCCUPÉS PAR LES TROUPES.

Police des commandants de place.

86. Les commandants de place donnent tous les ordres nécessaires pour la police des établissements occupés par la troupe.

Ils visitent eux-mêmes ces établissements et les font visiter fréquemment par leurs adjudants, afin de s'assurer que les prescriptions relatives à l'assiette du logement et à la propreté sont exactement observées.

Lorsque les commandants de place jugent que les défauts habituels de propreté tiennent au manque d'ustensiles ou à la nécessité de faire exécuter des réparations au compte de l'Etat, ils en préviennent les chefs du génie, qui, dans ce dernier cas, opèrent comme il est dit au titre XIII ci-après.

Police des chefs de corps.

87. Il est expressément enjoint aux chefs de corps, d'une part, d'empêcher le manègement des armées, les exercices et les leçons d'escrime et de danse dans les chambres, dans les corridors et dans les pièces autres que celles qui sont destinées à cet usage; et, d'autre part, de ne changer ni laisser changer la destination d'aucun local.

Les personnes non militaires ne peuvent loger dans les bâtiments militaires.

88. Nul individu qui n'est point militaire en activité de service, ou qui ne fait pas partie d'une administration de la guerre, ne peut occuper un local quelconque dans un bâtiment militaire, à moins d'une autorisation spéciale du ministre de la guerre.

Formalités exigées pour entrer dans les établissements militaires.

89. L'entrée dans les établissements militaires est interdite à tout individu non militaire qui n'est pas porteur d'une permission du chef de corps, à moins qu'il ne soit muni d'un laissez-passer signé par le commandant de place, par le sous-intendant militaire ou par le chef du génie.

L'entrée desdits établissements ne peut être toutefois refusée aux agents de l'autorité civile, lorsqu'elle est réclamée dans les formes légales.

Les corps sont chargés de la propreté intérieure et extérieure des casernes.

90. Les corps entretiennent dans un parfait état de propreté l'intérieur de tous les locaux qu'ils occupent, ainsi que les escaliers, les corridors, les cours, etc., conformément aux prescriptions des règlements sur le service intérieur. Ils sont tenus à prendre les mêmes soins devant les façades des casernes, le long de la voie publique en se conformant à cet égard aux règlements de la police locale.

Les corps doivent également entretenir la plus grande propreté dans les latrines; à cet effet, des hommes de corvée sont commandés chaque jour pour nettoyer ces locaux et pour les laver avec soin aussi souvent qu'il est nécessaire.

Lorsque l'emploi des matières désinfectantes a été prescrit pour ces soins de propreté, la fourniture de ces matières est faite par le concierge des bâtiments militaires, conformément aux ordres qu'il reçoit du service du génie.

Inscription des numéros et des contenances des chambres.

91. Le numéro de chaque chambre, sa destination et le nombre de lits qu'elle peut contenir, quand elle est affectée au logement des hommes, sont inscrits au-dessus de la porte d'entrée. Cette inscription ne peut être changée que dans le cas où quelque mutation dans l'assiette du logement est autorisée par le ministre.

Affiches dans les casernes.

92. L'extrait du présent règlement, en ce qui touche la police et la propreté des établissements militaires occupés, doit, afin que nul n'en ignore, être affiché par les soins du chef du corps, et, au besoin, du commandant de place, dans les lieux les plus apparents des bâtiments, au moyen d'imprimés fournis en nombre suffisant par le service du génie.

Dépôts de fumiers.

93. Les dépôts de fumiers ne doivent jamais être placés près des portes, ni contre les murs des écuries. Ils sont éloignés, autant que possible, des logements.

Les fumiers sont enlevés au moins une fois tous les huit jours.

Visite du casernement par les inspecteurs; registre des observations.

94. Dans la visite des locaux occupés par les corps ou par les services dont ils ont l'inspection, les inspecteurs généraux d'armes et les intendants militaires, ainsi que les inspecteurs des divers services dépendant du département de la guerre, sont accompagnés par le chef du génie, ou, à son défaut, par l'officier ou l'agent qui le supplée, et ils consignent toutes les observations et toutes les propositions que leur a suggérées la visite du casernement, sur un registre tenu *ad hoc* dans chaque place, et qui leur est présenté par le chef du génie.

Suite à donner aux observations des inspecteurs.

95. Le tableau des observations et des propositions faites dans l'année de l'inspection, conformément aux dispositions de l'article précédent, est remis, par le directeur des fortifications, avec tous les renseignements nécessaires, à l'inspecteur général du génie, qui le transmet au ministre, en faisant connaître son opinion sur chaque point.

Pour toutes les places non visitées par l'inspecteur général du génie, et pour toutes celles où cet officier général aurait précédé les autres inspecteurs, ce tableau est transmis au ministre, avant le 31 décembre, par le directeur des fortifications, qui y joint les renseignements nécessaires.

Rapports des inspecteurs généraux du génie au sujet de la tenue du casernement.

96. Tous les ans, les inspecteurs généraux du génie, après avoir visité les établissements militaires et examiné le registre des dégradations et des pertes dont il sera parlé ci-après à l'article 112, titre IX, signalent au ministre la manière dont les corps occupent leurs casernements et les soins qu'ils apportent à la conservation et à la bonne tenue des bâtiments et des objets mobiliers qui leur sont confiés.

Le ministre fait connaître aux généraux commandant les divisions les observations auxquelles ces renseignements peuvent donner lieu.

TITRE VIII.

ÉVACUATION DES PAVILLONS ET DES CASERNES.

Formalités à remplir pour la reprise du casernement par le service du génie.

97. Aussitôt que l'ordre de départ d'un corps ou d'un détachement lui est parvenu, le commandant de place en prévient le chef du génie et le sous-intendant militaire, qui prescrivent, chacun en ce qui le concerne, les dispositions nécessaires pour la reprise des logements et de tous les objets qui ont été remis en charge au corps occupant.

Les locaux doivent être remis propres et en ordre.

98. Tout corps de troupe qui évacue un logement, pour quelque motif et avec quelque précipitation que ce soit, doit rendre la totalité des chambres, des corridors, des escaliers, des écuries et des autres locaux qu'il a occupés, dans un état de propreté tel, qu'on puisse les livrer immédiatement à un autre corps.

Le commandant du corps ou du détachement doit donc ordonner que le balayage et le nettoyage des chambres et des autres locaux soient opérés la veille du départ aussitôt après que les fournitures de couchage sont sorties des casernes.

Cet officier reste, d'ailleurs, responsable de l'exécution des mesures qu'il a prescrites.

Les officiers sans troupes et les employés militaires sont pareillement tenus de rendre leurs logements propres et en état d'être habités sur-le-champ.

Cas de départ précipité.

99. Dans le cas d'un départ précipité, le nettoyage s'opère en même temps que la remise des fournitures de couchage; et, si la troupe est obligée de partir avant que cette opération ne soit faite, le commandant du corps ou du détachement laisse toujours, pour y procéder, un officier ou un sous-officier avec des hommes de corvée.

Nettoyage effectué d'office.

100. Lorsqu'un corps de troupe, des officiers ou des employés de l'armée quittent un logement militaire sans l'avoir mis en état de propreté, le garde du génie en rend compte immédiatement au chef du génie, qui en informe le commandant de place et le sous-intendant militaire, en les prévenant qu'il va employer les ouvriers nécessaires pour que le logement soit remis en état d'être occupé.

La dépense résultant du nettoyage d'office est constatée et remboursée ainsi qu'il est prescrit au titre IX ci-après.

Vérification de l'état des lieux et de l'inventaire.

101. Lorsqu'un corps de troupes, des officiers ou des employés de l'armée, quittent un logement, le garde du génie fait, avec l'officier de casernement ou avec les officiers et employés partants, la visite de tous les locaux qui doivent lui être remis; et il vérifie, contradictoirement avec eux, l'état descriptif des lieux et l'inventaire mentionnés aux articles 79 et 80 ci-dessus, pour reconnaître, en les rapprochant, au besoin, des copies remises à l'officier de casernement, les dégradations et les pertes qui peuvent exister.

Si un corps vient à partir sans qu'il ait été procédé à la visite des bâtiments évacués et sans qu'il ait été désigné un officier du corps pour y assister, l'état des lieux et l'inventaire sont vérifiés d'office. A cet effet, sur l'invitation du sous-intendant militaire, le corps est représenté, dans cette vérification, par le commandant de place ou par un officier désigné par ce dernier, et, à défaut d'officier, par le maire de la localité ou par son délégué.

Certificat de bon état des lieux.

102. Le sous-intendant militaire, lorsque le chef du génie l'a informé de la remise des clefs, délivre un certificat en vertu duquel le corps est déchargé de toute responsabilité relative à son logement, sauf le paiement des dégradations et des pertes régulièrement constatées.

Les mêmes formalités ont lieu lors de l'évacuation des logements des officiers et des employés militaires.

Les corps ne peuvent, à leur départ, conserver aucun local.

103. A leur départ d'une garnison, les corps ne peuvent conserver à leur disposition aucun local, sous quelque prétexte que ce soit.

TITRE IX.

DÉGRADATIONS ET PERTES DANS LES PAVILLONS ET DANS LES CASERNEES.

Constatation des dégradations et des pertes.

104. Une visite générale des bâtiments occupés est faite par l'officier de casernement et par le garde du génie, au moins une fois par trimestre, indépendamment de celle qui a lieu à chaque évacuation d'un bâtiment ou d'une partie de bâtiment.

Les dégradations résultant du fait des occupants, ainsi que les détériorations et les pertes d'objets de casernement, d'ustensiles et d'outils remis à la troupe, sont à la charge des corps.

Le chef du génie établit immédiatement et en détail l'état de ces dégradations et de ces pertes, en indiquant approximativement la dépense des réparations et des remplacements à la charge du corps.

et il transmet cette pièce au sous-intendant militaire, qui en dresse un procès-verbal auquel il annexe l'état, et fait présenter le tout à la signature de l'officier de casernement.

Cas de refus de signer le procès-verbal des dégradations et des pertes.

105. Si l'officier de casernement refuse de signer le procès-verbal des dégradations et des pertes, le sous-intendant militaire, après vérification sur les lieux, de concert avec le chef du génie et avec le major, ou, à son défaut, avec l'officier délégué par le chef de corps, constate sur cette pièce le résultat de cette vérification; et il est passé outre.

Réparation des dégradations et remplacement des objets perdus.

106. Le procès-verbal des dégradations et des pertes est adressé par le sous-intendant militaire au chef du génie. Celui-ci en envoie sur-le-champ une expédition, avec l'état y annexé, à l'entrepreneur des travaux militaires, et lui donne l'ordre de faire les réparations et les remplacements nécessités par les dégradations et par les pertes portées sur cet état.

Ces réparations et ces remplacements sont exécutés le plus tôt possible, d'après ce même état, aux prix et suivant les conditions du marché approuvé par le ministre de la guerre pour les travaux de la place.

Certificat d'exécution des réparations et des remplacements.

107. Lorsque toutes les réparations sont achevées et que tous les remplacements sont faits, le chef du génie le certifie au bas de l'expédition du procès-verbal des dégradations et des pertes, remise à l'entrepreneur. Une déclaration semblable est demandée à l'officier de casernement.

Si cette déclaration était refusée, ou si cet officier était parti, le chef du génie et le sous-intendant militaire, de concert avec le major ou tout autre délégué du corps, s'il y en avait dans la place, mentionneraient les circonstances de cette vérification à la suite du certificat précité.

Paiement des frais de réparation et de remplacement lorsque le corps est présent.

108. L'entrepreneur présente au sous-intendant militaire le procès-verbal revêtu du certificat d'exécution et une copie certifiée du règlement de compte des réparations et des remplacements.

Le sous-intendant annexe ces pièces à un mandat de paiement qu'il délivre sur le corps au profit de l'entrepreneur.

Ce mandat est acquitté par le trésorier ou par le payeur, qui le remet en compte au corps lors du premier paiement de la solde.

La retenue sur chaque paiement de la solde du corps, pour cause

de dégradations ou de pertes, ne peut toutefois excéder le cinquième du chiffre auquel se monte ce paiement.

Paiement des frais de réparation et de remplacement quand le corps est absent.

109. Si le corps est absent, le sous-intendant militaire de la place dans laquelle les dégradations et les pertes ont été faites transmet le procès-verbal, revêtu du certificat d'exécution, et la copie certifiée du compte des réparations et des remplacements, au sous-intendant militaire de la nouvelle garnison, lequel fait payer l'entrepreneur, par le corps, du montant de ces réparations et de ces remplacements, comme si les dégradations ou les pertes avaient eu lieu dans cette dernière localité.

Réclamations contre les imputations.

110. Les corps ont six mois pour se pourvoir auprès du ministre de la guerre contre les imputations qui leur sont faites. Passé ce temps, les réclamations ne sont plus admises.

Dégradations et pertes dans les logements d'officiers sans troupe ou d'employés militaires.

111. Les dégradations et les pertes faites dans des logements d'officiers sans troupes ou d'employés militaires sont constatées, réparées ou payées, en suivant des règles pareilles à celles qui font l'objet des articles 104 et suivants pour le cas de dégradations ou de pertes concernant la troupe.

Registre des dégradations et des pertes.

112. Le chef du génie tient un registre spécial des dégradations et des pertes au compte des corps, des officiers et des employés. On y indique la date des procès-verbaux qui constatent ces dégradations et ces pertes, et on y copie les comptes définitifs des réparations et des remplacements, ainsi que les certificats d'exécution.

Ce registre est présenté aux inspecteurs généraux du génie en tournée; il peut être consulté par les chefs de corps et par les inspecteurs généraux d'armes, s'ils en font la demande.

TITRE X.

ÉTABLISSEMENTS DES SERVICES ADMINISTRATIFS ET DE LA JUSTICE MILITAIRE.

Services administratifs en gestion directe.

113. Les bâtiments affectés aux services administratifs en gestion directe sont, sauf les dispositions particulières contenues dans le présent règlement et dans les règlements spéciaux qui concernent ces services, soumis aux mêmes règles que les bâtiments affectés au lo-

gement de la troupe, en ce qui concerne l'aménagement, la prise de possession des locaux et des objets mobiliers, l'entretien de la propreté, l'évacuation des bâtiments et la réparation des dégradations et des pertes; seulement, il faut appliquer aux agents comptables de ces services les prescriptions qui, dans les titres précédents, se rapportent aux corps occupants.

L'ameublement fixe qui garnit les établissements dont il s'agit est fourni, posé, entretenu et remplacé par le génie dans les limites prescrites par les règlements spéciaux qui concernent ces services; toutefois, les mécanismes des usines sont, pour les dépenses de premier établissement et d'entretien, à la charge des services qui les utilisent, sauf à faire exécuter, au besoin, ces travaux par le service du génie, moyennant remboursement. Tous les autres objets mobiliers sont à la charge des services occupants.

Services administratifs confiés à l'entreprise.

114. Lorsqu'un service administratif est fait à l'entreprise, l'adjudicataire se procure, à ses frais, les locaux nécessaires à son exploitation.

Toutefois, lors de la passation d'un marché ou dans le cours de son exécution, l'entrepreneur peut être mis, par mesure exceptionnelle, en possession des locaux et du mobilier de l'Etat aux diverses conditions qui sont stipulées dans des règlements spéciaux ou fixés particulièrement par le ministre de la guerre.

Aucune concession gratuite de locaux ni de mobilier ne peut être faite aux entrepreneurs des services administratifs, en augmentation des locaux et du matériel dont ils sont appelés à jouir d'après les clauses de leurs marchés.

Tribunaux militaires.

115. Il est affecté, autant qu'il est possible, aux conseils de guerre et aux conseils de révision, les pièces suivantes:

- 1° Une salle d'audience;
- 2° Une salle de délibération;
- 3° Une salle d'attente pour les témoins;
- 4° Une salle pour les prévenus.

En général, ces quatre pièces sont communes aux tribunaux militaires qui siègent dans la même ville.

Il est affecté, en plus:

A chaque conseil de guerre, une salle pour les archives et pour le greffe, et deux bureaux, l'un pour le rapporteur, et l'autre pour le commissaire impérial;

Et à chaque conseil de révision, une salle pour les archives et pour le greffe, et un bureau pour le commissaire impérial.

Enfin, il doit y avoir un logement de gardien ou concierge, et, autant qu'il est possible, un corps de garde.

La confection, l'entretien et le remplacement de l'ameublement fixe des conseils de guerre sont à la charge du service du génie.

Les frais d'achat, d'entretien et de remplacement des autres objets mobiliers des conseils de guerre sont à la charge du budget de la justice militaire.

Pénitenciers, prisons, ateliers de condamnés.

116. L'organisation des pénitenciers, des prisons et des ateliers de condamnés est réglée, autant que les localités s'y prêtent, d'après les bases posées par les règlements spéciaux arrêtés par le ministre de la guerre.

Pour les fournitures et l'entretien du mobilier, le service du génie se conforme à ce que les décisions spéciales du ministre prescrivent à cet égard.

Il est pourvu à la réparation des dégradations et des pertes, ainsi qu'au paiement de la dépense, de la manière prescrite par le titre IX du présent règlement pour le cas des établissements affectés au logement des troupes.

TITRE XI.

LOCATIONS.

Formalités préliminaires pour les locations.

117. Aucune location n'est faite pour les besoins du service du casernement que sur une autorisation du ministre de la guerre, sauf les cas d'urgence.

La nécessité de cette mesure doit être constatée, au préalable, par un procès-verbal qui est dressé par le sous-intendant militaire de concert avec le chef du génie, et, s'il s'agit du logement des troupes, avec le concours du commandant de place, lorsqu'il est titulaire.

Ce procès-verbal indique le but de la location, la désignation de la chose à louer, le degré de convenance qu'elle offre pour la destination qu'elle doit remplir, le prix du loyer et toutes les conditions à insérer dans le bail, soit à la charge du preneur, soit à celle du bailleur.

Il est transmis au ministre par l'intendant de la division, qui y joint ses observations ainsi que l'avis du directeur des fortifications.

Les formalités qui précèdent s'appliquent aussi au renouvellement et à la prorogation des baux de location.

Etablissement des baux.

118. Les baux sont passés de gré à gré entre l'administration de la guerre et le propriétaire de la chose louée. Ils sont dressés sous le sceau privé par les sous-intendants militaires, de concert avec les officiers du génie.

Ils doivent exprimer :

1° La date du procès-verbal prescrit par l'article 117 ;

2° La décision ministérielle approbative de la proposition de location ;

3° La description sommaire de la chose louée ;

4° Le service pour lequel la location est faite, et la destination particulière de la chose louée ;

5° La durée du bail ;

6° Le prix de loyer, l'époque des paiements et toutes les conditions de la location.

L'époque des paiements est fixée par mois, par trimestre, par semestre ou par année, et combinée de façon à correspondre à chaque exercice d'année.

Il est expressément mentionné dans la rédaction des baux qu'ils sont passés sous réserve de l'approbation du ministre, sans laquelle ils ne peuvent sortir leur effet.

Expéditions et ampliations des baux.

119. Les baux sont dressés en trois expéditions originales et signées par le sous-intendant militaire, par le chef du génie et par le bailleur ou son représentant légal. Dans ce dernier cas, ils mentionnent spécialement la procuration du fondé de pouvoirs et la justification de son titre.

Ils sont revêtus du visa de l'intendant divisionnaire.

Une des trois expéditions est destinée au ministre de la guerre, à qui elle est transmise par l'intendant divisionnaire ;

Une autre au bailleur,

Et la troisième au sous-intendant militaire, qui en délivre deux ampliations, l'une à l'intendant divisionnaire, l'autre au chef du génie.

Si la location est contractée pour les besoins d'un service administratif, le sous-intendant délivre une troisième ampliation à l'agent comptable chargé de ce service.

Enregistrement des baux.

120. Après que les baux ont été approuvés par le ministre, ils sont soumis par le sous-intendant militaire à la formalité du timbre et de l'enregistrement.

Le visa pour timbre et l'enregistrement sont gratuits, lorsqu'ils sont laissés par le bail à la charge de l'Etat ; quand, au contraire, ils sont mis à la charge du propriétaire, l'enregistrement est soumis au droit fixe de deux francs, décimes en sus. (Loi du 15 mai 1850, article 8.)

Prise de possession. — Etat de lieux ou inventaires.

121. La prise de possession s'effectue au moyen d'un état de lieux ou inventaire, dressé contradictoirement par un garde du génie et par le bailleur. Cet état ou inventaire est reconnu par l'agent militaire préposé à la conservation de la chose louée, et soumis au contrôle et au visa du sous-intendant militaire et du chef du génie.

S'il s'agit d'une location contractée pour le service du casernement, l'état des lieux ou l'inventaire est dressé en deux originaux, l'un est délivré au bailleur, l'autre est conservé dans les archives du chef du génie, qui en remet une ampliation au concierge responsable.

S'il s'agit d'une location contractée pour les besoins d'un service administratif, l'état des lieux ou l'inventaire est également dressé en deux originaux, qui sont délivrés, l'un au bailleur, et l'autre au sous-intendant militaire, qui en remet une ampliation à l'agent comptable chargé de ce service.

Les baux sont soumis aux dispositions du Code.

122. L'exécution des baux, leur résiliation quand il y a lieu, et leur tacite reconduction, sont soumises à toutes les dispositions prescrites par le Code Napoléon.

Fonctionnaires chargés de l'exécution des baux.

123. Les fonctionnaires de l'intendance sont exclusivement chargés de surveiller et d'assurer l'exécution de toutes les conditions des baux passés pour l'exploitation des services administratifs. Ils partagent ce soin avec les officiers du génie, en ce qui concerne les locations contractées pour toute autre partie du service du casernement.

Paiement des loyers.

124. Les intendants militaires sont exclusivement chargés de tout ce qui est relatif au paiement des loyers; ils dressent et expédient les mandats pour l'acquittement de ces dépenses.

Ils transmettent au ministre les bordereaux mensuels de ces paiements, conformément à l'article 99 du règlement du 1^{er} décembre 1838, et, à la fin de chaque année, les états de comptabilité y relatifs pour servir à leur liquidation.

Les loyers, pour tout ce qui est relatif au casernement des troupes, sont payés sur les fonds du service du génie; mais chacun des services administratifs pourvoit, sur ses propres fonds, à la dépense des locations faites dans son intérêt spécial.

Au renouvellement de chaque année, l'état, arrêté à la date du 1^{er} janvier, des baux contractés par l'administration de la guerre, est adressé par l'intendant militaire au ministre de la guerre (3^e direction, service du génie) pour les baux passés à la charge du génie, et (4^e direction, administration) pour ceux qui sont à la charge de l'administration de la guerre.

Travaux au compte des bailleurs.

125. Les travaux de réparation ou d'amélioration de la chose louée, dont la charge incombe au bailleur d'après les stipulations du bail, sont réclamés par le service occupant, et effectués à la requête

des fonctionnaires de l'intendance, sous la surveillance des officiers du génie. Lorsque l'exécution de ces travaux est refusée ou mal faite par le bailleur, le sous-intendant militaire, de concert avec le chef du génie, le constate par un procès-verbal, qui est transmis au ministre par l'intendant militaire, pour être statué ce que de droit.

Cas d'impossibilité de trouver de gré à gré des bâtiments ou des terrains à prendre à loyer.

126. Lorsque les sous-intendants militaires ne peuvent trouver de gré à gré les locaux nécessaires au logement des troupes de la garnison ou aux différents services du département de la guerre, ils s'adressent aux autorités civiles, qui doivent intervenir pour les leur procurer, conformément à ce qui est prescrit par les dix premiers articles non abrogés du titre V de la loi du 10 juillet 1791.

En cas de non-conciliation sur le prix du loyer, il y est pourvu par une fixation judiciaire.

S'il y a urgence, l'autorité civile désigne les locaux qui doivent être mis à la disposition du département de la guerre, sous la condition d'acquitter le prix de location qui sera ultérieurement déterminé.

Remise au propriétaire de la chose louée.

127. Lorsqu'il y a lieu de rendre la chose louée à son propriétaire, la remise en est faite d'après l'état des lieux.

Les dégradations et les pertes provenant du fait des occupants sont réparées au préalable, et l'imputation de la dépense est faite à qui de droit, d'après les dispositions du titre IX du présent règlement.

La décharge du garde du génie, du comptable ou du fonctionnaire occupant individuellement, s'opère au moyen de la déclaration inscrite au bas dudit état par le bailleur, et portant que la remise lui a été faite et qu'il n'a aucune réclamation à exercer.

TITRE XVII.

BÂTIMENTS ET TERRAINS MIS TEMPORAIREMENT À LA DISPOSITION DU SERVICE DU CASERNEMENT PAR LES ADMINISTRATIONS CIVILES.

Formalités préliminaires.

128. Les bâtiments et les terrains que les administrations civiles offrent de mettre temporairement à la disposition du département de la guerre sont reconnus au préalable par le sous-intendant militaire, de concert avec le chef du génie, et, en outre, s'il s'agit du logement des troupes, par le commandant de place, lorsqu'il est titulaire. Le résultat de cette reconnaissance est consigné dans un procès-verbal faisant connaître le degré de convenance des locaux

proposés pour le service auquel ils sont destinés, et les conventions réglant les conditions de l'occupation.

Lorsque les locaux satisfont aux exigences du service, l'assiette du logement est établie sur l'ordre du général commandant la division, en se conformant aux prescriptions des articles 15, 16, 17 et 18 du présent règlement, et elle devient exécutoire avec l'approbation de cet officier général, qui transmet au ministre le procès-verbal de convenance, l'assiette du logement et les conventions faites avec les administrations civiles.

Travaux au compte des administrations civiles.

129. Les travaux de réparation à exécuter dans les établissements prêtés, lorsqu'ils ne sont pas, par convention, à la charge du département de la guerre, sont effectués par l'administration civile, sur la demande et sous la surveillance du service du génie.

Les demandes d'améliorations par suite de besoins survenus dans le service militaire sont faites également par le chef du génie, après que ces besoins ont été constatés dans une conférence entre cet officier et le sous-intendant militaire, et, en outre, s'il s'agit du logement des troupes, avec le commandant de place, lorsqu'il est titulaire.

Prise de possession et remise.

130. La prise de possession et la remise des établissements prêtés ont lieu avec les mêmes formalités que pour les établissements loués, suivant les prescriptions des articles 121 et 127 ci-dessus, mais en attribuant à l'agent de l'administration civile les dispositions qui, dans ces articles, concernent le bailleur.

TITRE XIII.

TRAVAUX CONCERNANT LES ÉTABLISSEMENTS MILITAIRES.

Constructions, appropriations et améliorations.

131. Le ministre de la guerre seul donne des ordres pour la construction, l'appropriation et l'amélioration des bâtiments militaires.

Les chefs du génie rédigent et présentent les projets de ces travaux et sont chargés de leur exécution.

Tous les travaux ayant pour objet des changements de distribution à exécuter dans les établissements existants des services administratifs donnent lieu à des procès-verbaux de convenance dressés par les soins des sous-intendants militaires, de concert avec les chefs du génie, après avoir entendu au besoin les agents des services intéressés, ainsi que les médecins militaires lorsqu'il s'agit d'établissements hospitaliers.

Dans le cas de constructions neuves concernant ces mêmes établissements, il est aussi dressé des procès-verbaux ayant pour objet de faire connaître les besoins et les demandes des services intéressés.

Réparations dites locatives.

132. Les réparations dites locatives ou de menu entretien dans les établissements militaires sont, sauf les exceptions ci-après, à la charge du service du génie.

Elles peuvent être effectuées immédiatement, par les ordres du chef du génie, sur les fonds alloués annuellement pour les entretiens.

Dans les bâtiments affectés au service hospitalier, elles sont à la charge de ce service et sont effectuées par ses agents, d'après les ordres du sous-intendant militaire.

Dans les hôtels et dans les bureaux des tribunaux militaires, les réparations locatives sont à la charge du budget de la justice militaire.

Enfin, elles sont au compte des entrepreneurs, dans les locaux affectés aux services administratifs confiés à l'entreprise.

Blanchissage des bâtiments.

133. Les bâtiments habités sont blanchis régulièrement tous les trois ans.

Lorsque le blanchissage a besoin d'être exécuté après un laps de temps moindre, la nécessité en est constatée par un procès-verbal dressé par le sous-intendant militaire, de concert avec le chef du génie.

Dans les casernes, le blanchissage est exécuté par les troupes, sous la direction des agents du génie.

Les soldats employés au blanchissage sont payés à raison de un quart de centime par mètre carré et par couche. Cette dépense et celle de la chaux, des ustensiles et des vêtements de toile pour les travailleurs, sont à la charge du service du génie.

Toutes les écritures et toutes les saletés tracées par les soldats sur les murs des chambres et des autres parties des bâtiments sont comptées parmi les dégradations, et la dépense de la remise des murs en état de propreté est imputée à la troupe, conformément aux dispositions du titre IX ci-dessus.

Les salles de police, les prisons et les cellules sont échaudées et blanchies à la chaux au moins une fois par an; les latrines le sont au moins une fois tous les six mois.

Les mangeoires, les râteliers, les murs et les pavés des écuries sont passés à l'eau de chaux, par les soins des corps, tous les six mois, et en outre, par les soins du service du génie, à chaque changement de garnison.

Dans les hôpitaux militaires, le blanchissage des salles, des corridors, etc., est effectué au compte du service hospitalier, par les

soins des agents de ce service, à la diligence des sous-intendants militaires.

Ramonages.

134. Les ramonages des cheminées sont exécutés à la diligence et à la charge du service du génie.

Réparations d'entretien ou de convenance.

135. Les travaux qui ont pour objet la conservation des bâtiments ou les convenances du service ne peuvent être exécutés qu'après avoir été proposés ou autorisés dans les formes prescrites par les règlements sur le service du génie.

Toute demande de travaux de réparation ou d'entretien peut être adressée par écrit au chef du génie par les commandants de place, par les sous-intendants militaires ou par les chefs de corps. Lorsque la demande des chefs de corps est transmise par l'intermédiaire du sous-intendant militaire, ce fonctionnaire doit y joindre son avis.

Sont exceptés des dispositions qui précèdent :

1^o Les travaux à la charge des bailleurs ou des administrations civiles, suivant les cas prévus aux articles 125 et 129 du présent règlement ;

2^o Les travaux d'aménagement et de réparation dans les bâtiments ou locaux pris à loyer pour les services administratifs. Ces travaux sont faits par les soins des agents de ces services, à la diligence des sous-intendants militaires.

Réparations d'urgence.

136. Lorsqu'une demande a pour objet d'obtenir l'exécution immédiate de travaux, et que le chef du génie ne croit pas devoir y donner suite, parce que les fonds disponibles ne le permettent pas ou qu'il n'en reconnaît pas l'urgence, cet officier adresse cette demande au directeur des fortifications.

Le directeur apprécie le degré d'urgence des travaux réclamés.

Si ces travaux lui paraissent de nature à ne pouvoir pas être différés, il donne l'ordre de les faire exécuter immédiatement, et il rend compte au ministre dans le plus bref délai, en lui adressant au besoin une demande de fonds.

Si l'urgence ne semble pas absolue au directeur, il prend les ordres du ministre, en lui faisant connaître le montant présumé de la dépense des travaux, et en lui transmettant, en même temps, les pièces qui ont été produites à ce sujet.

Ordres et demandes des Inspecteurs.

137. Les inspecteurs généraux d'armes et les inspecteurs des services administratifs peuvent réclamer, conformément aux instructions spéciales qui leur sont données par le ministre, l'exécution des

réparations locatives ou des menues réparations qu'ils jugent indispensables. Ces travaux sont exécutés immédiatement, dans la limite des fonds disponibles, sur le crédit des entretiens.

Aucun empêchement ne doit être apporté à l'exécution des travaux.

138. Les corps, les administrateurs et les fonctionnaires occupant les bâtiments militaires ne peuvent, sous aucun prétexte, arrêter, retarder ou gêner l'exécution des travaux confiés au service du génie.

DISPOSITION FINALE.

139 et dernier. L'exécution du présent règlement est spécialement placée sous le contrôle des intendants militaires et des directeurs des fortifications, et sous la haute surveillance des généraux commandant les divisions territoriales.

Approuvé, le 30 juin 1856.

Le Maréchal de France,

Ministre Secrétaire d'Etat de la guerre,

VAILLANT.

MODÈLES.

— 52 —

— 52 —

— 52 —

— 52 —

— 52 —

GÉNIE.

INSPECTION GÉNÉRALE

de 485

DIRECTION d

Place d

TABLEAU ⁽¹⁾ DÉTAIL

De la contenance et de l'emploi, chambre par chambre, de tous les Bâtimens dressé pour servir de base à l'état de l'assiette du logement à établir règlement du 30 juin 1856, sur le service du casernement ⁽²⁾.

La garnison a été fixée, par décisions ministérielles du 28 janvier 1844 et du 47 octobre 1845, à 2 bataillons avec l'état-major d'un régiment d'infanterie 4 régiment d'artillerie, soit

EFFECTIF TOTAL à loger en principe

Mais actuellement la garnison ordinaire se compose de (4) :

2 bataillons avec l'état-major d'un régiment d'infanterie
4 régiment de cavalerie
4 batterie de parc d'artillerie

TOTAL

La contenance totale des bâtimens affectés au logement des troupes (3) étant, d'après le présent

Ces bâtimens présentent { un déficit de
un excédant de

INSPECTION GÉNÉRALE
de 485

DIRECTION d

Place d

MODÈLE A.

CONTENANCE DES ÉTABLISSEMENTS.

TABLEAU ⁽¹⁾ DÉTAILLÉ

De la contenance et de l'emploi, chambre par chambre, de tous les Bâtimens militaires de la place de ⁽²⁾
dressé pour servir de base à l'état de l'assiette du logement à établir chaque année, en exécution de l'article 15 du
règlement du 30 juin 1856, sur le service du casernement ⁽³⁾.

La garnison a été fixée, par décisions
ministérielles du 28 janvier 1854 et
du 47 octobre 1855, à

2 bataillons avec l'état-major d'un régiment d'infanterie
1 régiment d'artillerie, soit

HOMMES.	CHEVAUX.
4,580	7
4,922	4 049
3,502	4,056
4,580	7
4,460	990
73	52
2,813	4,049
2,946	4,021
"	28
433	"

EFFECTIF TOTAL à loger en principe.

Mais actuellement la garnison ordinaire se compose de ⁽⁴⁾ :

2 bataillons avec l'état-major d'un régiment d'infanterie
1 régiment de cavalerie
4 batterie de parc d'artillerie

TOTAL

La contenance totale des bâtimens affectés au logement des troupes ⁽²⁾ étant, d'après le présent tableau, de

Ces bâtimens présentent
un déficit de
un excédant de

(1) Un tableau par place.

(2) Y compris les bâtimens et les terrains pris à loyer au compte du budget de la guerre, et ceux qui sont prêtés par la ville.

(3) Ce tableau ne sera fourni qu'aux inspections pour lesquelles il sera prescrit de le refaire. Pour les autres inspections, il sera remplacé par un tableau complémentaire de même forme ou modèle, donnant seulement les mutations survenues depuis la rédaction du tableau principal, avec une nouvelle récapitulation générale des contenances.

(4) Cette annotation n'est à mettre que dans les cas exceptionnels pour lesquels il existe des différences essentielles entre les fixations ministérielles et les garnisons effectives, notamment quand un casernement affecté à une arme se trouve occupé par une autre arme.

ÉTABLISSEMENTS.	BATIMENTS.	ESCA- LIERS. (1)	ÉTAGES.	NU- MÉROS des PIÈCES.	DIMENSIONS DES LOCAUX.				CAPACITÉ CUBIQUE		CON- TENANCE absolue en lits.
					LON- GUEUR.	LARGEUR.	SURFACE.	HAUTEUR.	totale.	par homme ou cheval.	
QUARTIER D. (Des Visitandines ou du Cloître.) A la ville en une propriété. Contenance: Infanterie... } 466 hommes. } 5 chevaux. Cavalerie... } 273 hommes. } 483 chevaux. Magasins à grains et à farine.	a.....	4	Rez-de-chauss.	4	44,70	7,20	403,84	4,62	488,984	48,898	"
	"	"	Idem.	2	8,76	7,28	63,73	4,62	294,433	49,072	"
	"	5	3 ^e	72	5,80	6,44	37,18	3,32	423,438	43,715	9
	"	"	Rez-de-chauss.	4	6,90	5,90	40,74	4,20	470,982	"	4
	d.....	"	Idem.	2	3,38	5,90	49,94	4,20	83,756	"	5
	"	"	Combles.....								
TOTAUX..	"	"	"	"	"	"	"	"	"	"	"
CASERNE F. (De Vauban ou de l'Espérance.) Vedette à l'épreuve de la bombe. A l'Etat en toute propriété. Contenance : Infanterie... } 2 officiers. } 570 hommes. Manutention de siège. Magasin aux liquides et aux salaisons. Citerne.	Unique. . .	"	Rez-de-chauss.	25	17,00	6,50	440,50	3,90	430,950	43,467	32
	"	"	"	"	"	"	"	"	"	"	"
	"	"	"	"	"	"	"	"	"	"	"
	"	"	"	"	"	"	"	"	"	"	"
	"	"	"	"	"	"	"	"	"	"	"
TOTAUX..	"	"	"	"	"	"	"	"	"	"	"
CHAMP DE MANŒUVRE T. (De Neuville.) A la ville en toute propriété, loué à l'Etat.	"	"	"	"	435,00	437,00	5,96	"	"	"	"
CHAMP DE TIR V. (Du Cours.) A l'Etat en toute propriété.	"	"	"	"	270,00	52,00	4,40	"	"	"	"
GRAND POLYGONE X. A l'Etat en toute propriété.	"	"	"	"	519,00	473,00	24,55	"	"	"	"

ÉTABLISSEMENTS.	BATIMENTS.	ESCA-	ÉTAGES.	NU- MÉROS des PIÈCES.	DIMENSIONS DES LOCAUX.						CON- TENANCE absolue en lits.
		LIERS. (1)			LON- GUEUR.	LARGEUR.	SURFACE.	HAUTEUR.	CAPACITÉ CUBIQUE		
									totale.	par homme.	
PRISON MILITAIRE B. (Des Augustins.) A la ville en toute propriété, prêtée gratuitement à l'Etat. Contenance: 88 prisonniers.	a	"	"	"	mèt. 2	mèt. 2	mèt. carr. 2	mèt. 2	mèt. cub. 2	mèt. cub. 2	"
TOTAUX.		"	"	"	"	"	"	"	"	"	"

(1) Cette colonne ne sera employée que dans le cas où les chambres seraient numérotées par escalier.

Logement des Troupes.

CON-
TINANCE
solde
n lit.

DESTINATION.

OBSERVATIONS.

(2)

ARMES.	OFFICIERS	TROUPES A PIED.			TROUPES A CHEVAL.			ACCESSOIRES.
		Sous-officiers.	Caporaux et soldats.	Chevaux.	Sous-officiers.	Brigadiers et soldats.	Chevaux.	
Artillerie.	»	»	»	»	»	»	40	»
Idem.	»	»	»	»	»	»	6	»
Infanterie.	»	»	»	»	»	9	»	»
Idem.	»	»	»	»	»	»	»	Salle de rapport.
Idem.	»	»	»	»	»	»	»	Logement de blanchisseuse.
Sur mémoire.	(Voir bâtiments des subsistances.)							»
»	»	8	458	5	46	227	483	»

Cette caserne est fort ancienne et en mauvais état. Il est admis en principe, par décision du 7 février 1855, que l'on y fera prochainement de nombreuses améliorations, et qu'on élèvera d'un étage la partie dont la ville n'a que la nue propriété; sa contenance serait alors portée à 553 hommes au lieu de 420.

Sur mémoire.	(Voir bâtiments des subsistances.)							Magasins aux liquides.
Infanterie.	»	»	32	»	»	»	»	»
»	»	»	»	»	»	»	»	»
»	»	»	»	»	»	»	»	»
»	2	38	532	»	»	»	»	»

Cette caserne, construite de 1842 à 1845, est en parfait état. Elle est occupée habituellement. En cas de siège, on pourrait au besoin porter sa contenance en hommes au chiffre de 980.

Infanterie.	»	»	»	»	»	»	»	»
Infanterie.	»	»	»	»	»	»	»	»

Le département de la guerre tient ce terrain en location au prix annuel de 1,250 fr. Le bail, de 3, 6 ou 9 années, date du 1^{er} avril 1847.

Artillerie.	»	»	»	»	»	»	»	»
-------------	---	---	---	---	---	---	---	---

Ce champ de tir a été acquis, en 1843, par le département de la guerre, au prix de 11,500 francs.

Ce terrain fait depuis longtemps partie du domaine militaire.

militaires.

CONTENANCE.		OBSERVATIONS. (2)
OFFICIERS.	Sous-officiers et soldats.	
»	»	Ce bâtiment n'est occupé que par mesure provisoire, et jusqu'à ce que l'on ait achevé la prison neuve, dont la construction, évaluée à 425,000 fr., est arrêtée en principe par décision ministérielle du 47 mai 1847.
»	»	

(2) Indiquer dans cette colonne l'état actuel des bâtiments et l'accroissement de logement qui résultera des projets admis en principe par le ministre pour être exécutés prochainement.

ETABLISSEMENTS.	BATIMENTS.	ESCA- LIERS.	ÉTAGES.	des PIÈCES.	DIMENSIONS DES LOCAUX.						CAPACITÉ CUBIQUE	
					LON- GUEUR.	LARGEUR.	SURFACE.	HAUTEUR.	totale.	par homme.		
											mètres.	mètres.
HÔPITAL MILITAIRE M. (De Marengo.) A la ville en nue propriété. Contenance : 4 officiers de santé et d'administration, 26 infirmiers, 8 officiers malades, 200 sous-officiers et soldats malades.	a. (Principal.)	»	Rez-de-ch.	4	5,00	4,00	20,00	3,00	60,000	»	2	
			Idem. . .	2	4,00	4,00	16,00	3,00	48,000	»	2	
			Idem. . .	3	4,00	4,00	16,00	3,00	48,000	»	2	
			Idem. . .	4	3,50	4,20	14,70	3,00	44,100	»	2	
			Idem. . .	5	8,00	5,00	40,00	4,00	160,000	»	6	
			Idem. . .	6	5,00	5,00	25,00	4,00	100,000	»	4	
			Idem. . .	7	6,00	5,00	30,00	4,00	120,000	»	4	
			1 ^{er} étage.	47	3,00	2,70	8,10	3,30	31,830	»	4	
			Idem. . .	48	42,60	8,00	100,80	4,30	432,440	36,120	4	
			Idem. . .	49	46,00	42,60	204,60	4,30	866,880	36,120	2	
			Idem. . .	20	42,60	8,00	100,80	4,30	432,440	48,000	4	
			Idem. . .	4	7,00	5,00	35,00	4,00	140,000	»		
			Idem. . .	2	7,00	5,00	35,00	4,00	140,000	»		
			d. (Des accessoires.)									
			Rez-de-c.	8	5,00	5,00	25,00	3,60	90,000	»		
			Idem. . .	9	5,00	4,00	20,00	3,60	72,000	»		
			Idem. . .									
			»	»	»	»	»	»	»	»	»	»
En vertu de conventions approuvées par décisions du 22 décembre 1830 et du 30 janvier 1847, 55 places sont département de la guerre, à raison, par jour de 2 fr. 05 cent. par un officier, et de 4 fr. 30 cent. pour un sous- officier												
HOSPICE CIVIL. (Sainte-Anne). Aux hospices. BUANDERIE O. (Du gué de la Corderie.) A l'État en toute propriété.	Bâtiment unique. . .	»	Rez-de-c.	4	12,00	6,00	72,00	4,00	288,000	»		
			Idem. . .	2	5,00	3,00	15,00	4,00	60,000	»		
			Idem. . .	3	5,00	3,00	15,00	4,00	60,000	»		
			Étage. . .	4	47,50	6,00	405,00	4,50	472,500	»		
			Enclos.	4	80,00	30,00	2,400,00	»	»	»		
TOTAUX.												

(1) Cette colonne ne sera employée que dans le cas où les chambres seraient numérotées par escalier.

des Hôpitaux.

CON- TENANCE ABSOLUE en lits d'hôpital.	DESTINATION.						OBSERVATIONS.
	OFFICIERS de santé ou d'adminis- tration.	INFIRMIERS.		MALADES.		ACCESSOIRES.	
		Sous- officiers.	Soldats.	Officiers.	Sous- officiers et soldats.		
2	"	"	"	"	"	Corps de garde.	
2	"	"	"	"	"	Logement de concierge.	
2	"	"	"	"	"	Bureau des entrées.	
2	"	"	"	"	"	Chirurgien de garde.	
6	"	"	"	"	"	Salle de bains.	
4	"	"	"	"	"	Tisserie.	
4	"	"	"	"	"	Pharmacie.	
4	"	4	"	"	"	Cabinet d'infirmier-major.	
12	"	"	"	"	"	"	
24	"	"	"	"	"	"	
12	"	"	"	"	"	Chambre des infirmiers.	
5	"	"	"	"	"	Magasin aux sacs des malades.	
5	"	"	"	"	"	Idem aux fournitures de literie.	
3	"	"	"	"	"	Lingerie.	
2	"	"	"	"	"	Atelier des lingères.	
"	4	2	24	8	200	"	
"	"	"	"	"	"	Buanderie et lavoir.	
"	"	"	"	"	"	Chambre de blanchisseuse.	
"	"	"	"	"	"	Dépôt de linge.	
"	"	"	"	"	"	Séchoir couvert.	
"	"	"	"	"	"	Séchoir découvert.	
"	"	"	"	"	"	"	

Préservées dans cet établissement pour les malades militaires, qui y sont traités par abonnement aux frais de l'officier ou un soldat.

Ancienne maison, située sur le bord de la rivière, acquise par l'Etat en 1846. Elle vient d'être appropriée à sa destination actuelle.

Préserveries dans cet établissement pour les malades militaires, qui y sont traités par abonnement aux frais de médecin ou un soldat.

Ancienne maison, située sur le bord de la rivière, acquise par l'État en 1546. Elle vient d'être appropriée à sa destination actuelle.

ÉTABLISSEMENTS.	BÂTIMENTS.	ESCALIERS (°).	ÉTAGES.	NUMÉROS DES PIÈCES.	DESTINATION.	DIMENSIONS DES LOCAUX (2).					LOGEMENTS.		
						LONGUEUR.	LARGEUR.	SURFACE.	HAUTEUR.	CAPACITÉ cubique.	OFFICIERS en emploi.	SOUS-OFFICIERS et soldats d'administration.	CHEVAUX.
MANUTENTION D. (Des cordeliers.) A la ville en nue propriété. Contenance : 3 fours pour 4,230 rations, 42,000 rations de pain, 4,571 quintaux métriques de grains ou farines. 210 hectolitres de liquides.						mètres.	mètres.	mètres car.	mètres.	mètres cub.			
			Cave.	4	Magasin pour les liquides.	5,55	5,30	29,24	3,50	402,970			
			Rez-de-ch.	44	Boulangerie.	45,20	10,30	456,56	4,07	637,379			
	TOTAUX.										4	6	
MAISON X. Au St Robert. Contenance : 2 fours pour 480 rations, 5,000 rations de pain, 450 quintaux métriques de grains ou farines.	Unique.		Rez-de-ch.	4	Boulangerie.	40,00	7,00	70,00	3,60	252,000			
	TOTAUX.												
QUARTIER D. (Des Visitandines ou du Cloître.) A la ville en nue propriété. Contenance : Casernement. 439 hommes. 188 chevaux. 4,504 quintaux métriques de blé ou farine. 777 quintaux métriques d'avoine.			Comblés.	49	Magasin aux grains.	20,00	44,45	223,00	2,87	640,040			
				20	Magasin aux farines.	44,20	44,45	424,88	2,87	358,406			
				34	Magasin aux avoines.	8,80	44,45	98,42	2,87	284,604			
	TOTAUX.												
CASERNE F. (De Vanban ou de l'Espérance.) Voûtée à l'épreuve de la bombe. A l'Etat en toute propriété. Contenance : Casernement. 2 officiers. 570 hommes. 2 fours pour 860 rations, 3,450 rations de pain, 678 hectolitres de liquides, Citernes, 441 kilolitres.			Cave.	4	Magasin aux liquides.	5,50	3,80		3,05				
				2	Idem.	46,70	6,20		3,05				
	Unique.			7	Boulangerie.	46,70	6,20		3,05				
				43	Citernes.								
MAGASIN AUX FOURRAGES G. (Du bastion 6.) Au St Bernard. Contenance : 8,600 quintaux métriques de foin et paille. 3,096 quintaux métriques d'avoine.			Rez-de-ch.	4	Hangar au foin.	44,85	43,50	605,61	7,10	4,299,831			
				2	Hangar à paille.	53,45	43,50	721,58	7,10	5,423,248			
				3	Bureau du comptable.	4,57	3,89	47,78	3,25	57,785			
			Entresol.	4	Grénier aux avoines.	62,00	47,00	4,403,60	2,70	2,978,720			
CITERNES 7. (Casernes du Sud.) A l'Etat en toute propriété.													
						46,70	42,40	207,08	4,52	936,002			
FONTAINE MILITAIRE 83. A l'Etat en toute propriété.													
TERRAIN 91. (Jardin du Cloître.) A l'Etat en toute propriété.													
					Magasin de fourrages en meules.	54,65	31,50	472,00					

(1) Cette colonne ne sera employée que dans les cas où les chambres seraient numérotées par escalier.

(2) Les locaux affectés aux approvisionnements doivent être divisés en compartiments permanents par les soins des sous-intendants militaires, en présence des officiers du génie, au moyen de lignes à la peinture à l'huile, tracées sur les planchers et sur les murs, et desquelles résultent des cubages déterminés d'avance quand les compartiments sont remplis. (Circulaire ministérielle du 18 décembre 1845.)

(3) Les farines ne devant être tenues en couches qu'accidentellement, aux termes du règlement du 17 septembre 1827, on supposera, pour calculer la contenance normale des magasins, qu'elles sont en sacs de 100 kilogrammes, tenues debout. L'espace libre réservé pour les communications et la manœuvre sera de 20

Substances.

FOURS.	CONTENANCE RÉGLEMENTAIRE DES MAGASINS.	OBSERVATIONS.												
CA- PACITÉ par four.	PAIN.	FARINE.	BLÉ.	LI- QUIDES.	SALAISSONS et approvisi- onnements divers de siège.	BOIS.	PAGOTS.	HOUILLE.	FOEN.	PAILLE.	AVOINE.	CI- TERNES.	PUITS ou fontaines.	
Rations.	Rations.	Quint. métr.	Quint. métr.	Hectol.		Sières.	Nombre.	Quint. métr.	Quint. métr.	Quint. métr.	Quint. métr.	Capacité en kilolitres.	Nombre.	
(3)	(4)													
150 330				450										Cet établissement est en bon état; cependant, l'un des fours de 450 rations doit être prochainement reconstruit et disposé pour le chauffage à la houille.
													4 pompe.	
	42,000	647	954	210	252 fûts.	654	2,000	427						
300 280													4 pompe.	Cet établissement est tenu en location par le département de la guerre; le loyer est payé sur les fonds de l'intendance.
	5,000	460	200				600							
		(A) 843												(A) Ces grains sont en garenne.
		(B) 452												(B) Ces farines sont en sacs. Si l'on affectait ce magasin à un approvisionnement de grains en coches, il pourrait en contenir 467 quintaux métriques.
											(C) 777			(C) Ces avoines sont en garenne.
		452	843								777			
550 310													4 pompe.	
												87		
												54		
	3,450			678										
									4,300					
										4,300				
											3,096			Ce magasin est tenu en location par le département de la guerre; le loyer est payé sur les fonds de l'intendance.
									4,300	4,300	3,096			
														Cette fontaine est alimentée par une source située à 12,150 mètres de la place. Les conduites sont en poterie. Elle débite 21 litres d'eau par minute.
									2,000	3,000				
moins 1/6 de la superficie totale. On indiquera dans la colonne des observations le maximum du nombre de sacs de farine à déposer dans chaque pièce, surtout lorsque le peu de solidité des planchers obligera de se tenir au-dessous de la fixation réglementaire. (4) Ces contenances seront établies dans la supposition que les couches de blé et d'avoine auront la hauteur réglementaire de 0^m,60 pour le blé et de 0,80 pour l'avoine, et que l'on ménage 1/6 environ de la superficie totale pour les communications et la manœuvre. Si les planchers étaient trop faibles pour qu'on pût admettre les hauteurs réglementaires, on prendrait pour le calcul des contenances le maximum de hauteur susceptible d'être adopté sans inconvénient pour la solidité des planchers, et l'en indiquerait ce maximum dans la colonne des observations.														

moins 1/6 de la superficie totale. On indiquera dans la colonne des observations le maximum du nombre de sacs de farine à déposer dans chaque pièce, surtout lorsque le peu de solidité des planchers obligera de se tenir au-dessous de la fixation réglementaire.

(4) Ces contenances seront établies dans la supposition que les couches de blé et d'avoine auront la hauteur réglementaire de 0^m,60 pour le blé et de 0,80 pour l'avoine, et que l'on ménage 1/6 environ de la superficie totale pour les communications et la manœuvre. Si les planchers étaient trop faibles pour qu'on pût admettre les hauteurs réglementaires, on prendrait pour le calcul des contenances le maximum de hauteur susceptible d'être adopté sans inconvénient pour la solidité des planchers, et l'on indiquerait ce maximum dans la colonne des observations.

harnachement, du campement et du chauffage.

DIMENSIONS DES LOCAUX.					LOGEMENTS D'OFFICIERS ou d'employés.	CONTENANCE.		OBSERVATIONS.
Longeur.	Largeur.	Surface.	Hauteur.	Capacité cubique.		BOIS.	BOUILLE.	
mètres.	mètres.	mét. car.	mètres.	mét. cub.		mètres.	quint. mét.	
6,00	2,00	12,00	3,00	36,000	"	"	"	
9,00	6,00	54,00	3,00	162,000	"	"	"	
6,00	6,00	36,00	3,00	108,000	"	"	"	
15,40	7,00	107,80	2,00	215,600	"	"	"	
16,00	7,60	121,60	4,40	535,040	"	"	"	
16,00	7,60	121,60	4,00	486,400	"	"	"	
"	"	"	"	"	"	"	"	
6,00	4,00	24,00	3,00	72,000	"	"	"	
6,00	6,00	36,00	3,00	108,000	"	"	"	
9,00	6,00	54,00	5,00	270,000	"	"	"	
4,50	4,00	18,00	3,00	54,000	"	"	"	
4,00	3,20	12,80	3,00	38,400	"	"	"	
6,00	6,00	36,00	3,00	108,000	"	"	"	
15,00	7,40	111,00	5,00	555,000	"	"	"	
18,00	8,00	144,00	3,40	761,600	"	"	"	
9,00	6,00	54,00	5,00	270,000	"	"	"	
"	"	"	"	"	"	"	"	
17,50	25,00	4,187,50	"	"	"	4,920	"	
20,00	6,40	128,00	3,50	448,000	"	450	"	
8,00	6,40	51,20	3,50	134,400	"	"	4,900	
6,00	5,00	30,00	3,00	90,000	"	"	"	
6,00	5,00	30,00	3,00	90,000	1	"	"	
3,00	4,00	12,00	3,00	36,000	"	"	"	
"	"	"	"	"	1	2,370	4,900	

Intercol. 4..

6° Magasins à poudre.

DÉSIGNATION des MAGASINS.	INDICATION des PIÈCES.	DIMENSIONS DES LOCAUX.					CONTENANCE (1).				OBSERVATIONS.
		LON- GUEUR.	LAR- GEUR.	SURFACE.	HAUTEUR.	CAPACITÉ cubique.	RÉGLEMENTAIRE.		MAXIMUM.		
							en barils de 50 kilog.	en barils de 100 kilog.	en barils de 50 kilog.	en barils de 100 kilog.	
MAGASIN A POUVRE 43. A l'Etat en toute propriété.	Rez-de-ch.	mét. 44,20	mét. 6,30	mét. car. 69,44	3 ^m ,50 sous clef.	mét. cub. 496,224	kil. 42,900	kil. 43,600	kil. 42,900	kil. 43,600	Ce magasin, visité à l'épreuve de la bombe, est en bon état.
MAGASIN A POUVRE 47. (Du bastion 4.) A l'Etat en toute propriété.	Rez-de-ch.	48,49	8,30	453,47	2 ^m ,70	444,369	34,800	39,600	39,000	51,600	Ce magasin, visité à l'épreuve de la bombe, vient d'être construit.
	Entresol.	48,49	8,30	453,47	4,15 sous clef.	499,970	29,000	35,000	33,800	43,000	
	TOTAUX.	"	"	"	"	"	60,800	74,600	72,800	94,600	
CASEMATES 52. A l'Etat en toute propriété.	Deuxième.	43,20	5,00	66,00	naissance, 2,30 sol, 3,60	4,065,900	42,400	46,500	44,700	49,400	Ces casemates sont à l'épreuve de la bombe.
TOUR 63. A l'Etat en toute propriété.	Rez-de-ch.	3,80	3,80	44,44	moyenne, 3,40	49,096	2,400	3,000	2,700	3,800	Ce magasin visité n'est pas à l'épreuve de la bombe.

(1) Cette contenance devra être calculée conformément à l'instruction du 49 mars 1818, sur les magasins à poudre.

(1) Cette contenance devra être calculée conformément à l'instruction du 49 mars 1848, sur les magasins à poudre.

7° Corps de garde isolés, indépendants des autres établissements militaires.

DÉSIGNATION des BATIMENTS.	NUMÉROS des pièces.	DESTINATION.	DIMENSIONS DES LOCAUX.					CON- TENANCE.		OBSERVATIONS.
			LON- GUEUR.	LAR- GEUR.	SUR- FACE.	HAU- TEUR.	CAPACITÉ cubique.	OFFI- CIERS.	SOL- DATS.	
CORPS DE GARDE 39. (De la porte de secours.) A l'Etat en toute propriété.	1	Vestibule.	mét. 8,00	mét. 2,50	mét. car. 20,00	mét. 4,00	mét. cub. 80,000	"	"	La fosse a une capacité de 14 mètres cubes. La fosse commune à ces deux latrines contient un système diviseur. La fosse aux liquides a une contenance de 2 ^m 250 et la fosse aux solides a une capacité de 4 ^m 875.
	2	Porte de soldats.	7,00	6,00	42,00	4,00	468,000	"	20	
	3	Porte d'officier.	3,00	2,50	7,50	4,00	30,000	4	"	
	4	Violon.	3,80	3,70	44,06	4,00	56,216	"	"	
	5	Aub-tte du portier consigne.	3,00	2,60	7,80	4,00	31,200	"	"	
	6	Logement du portier consigne.	6,00	3,80	22,80	4,00	91,200	"	"	
	7	Latrines des soldats.	4,80	4,40	4,98	4,00	79,200	"	"	
	8	Latrines d'officier.	4,40	0,90	0,99	4,00	3,960	"	"	
	9	Latrines du portier consigne.	2,00	0,80	4,60	4,00	6,400	"	"	
TOTAUX.			"	"	"	"	"	4	20	
.....										
CORPS DE GARDE 48. (De la place d'armes.) A la ville, prêt gratuitement à l'Etat.	1	Corps de garde des soldats.	10,00	6,00	60,00	4,00	240,000	"	30	La fosse a une contenance de 7 ^m 575. La fosse a une contenance de 5 ^m 485.
	2	Corps de garde de l'officier.	4,00	3,00	42,00	4,00	48,000	4	"	
	3	Violon.	3,00	3,00	9,00	4,00	36,000	"	"	
	4	Cachot.	3,00	2,50	7,50	4,00	30,000	"	"	
	5	Latrines des soldats.	2,70	2,00	5,40	3,00	46,200	"	"	
	6	Latrines de l'officier.	2,00	4,00	2,00	3,00	6,000	"	"	
TOTAUX.			"	"	"	"	"	4	30	

RÉCAPITULATION GÉNÉRALE PAR ÉTABLISSEMENTS.

1^o Logement des troupes.

DÉSIGNATION DES BATIMENTS.	CONTENANCE PAR ÉTABLISSEMENT.			CONTENANCE PAR CATÉGORIE.		
	Officiers.	Sous-officiers et soldats.	Chevaux.	Officiers.	Sous-officiers et soldats.	Chevaux.
§ 1 ^{er} . — Bâtimens à l'Etat.						
Quartier D (des Vislandières)	"	439	488			
.....	"	"	"			
.....	2	4,592	449			
§ 2. — Bâtimens pris à loyer.						
Caserne H (des Cordeliers)	"	390	"	2	2,034	607
Quartier E (d'Asfeld)	2	615	354			
.....	2	945	354			
§ 3. — Bâtimens prêtés par la ville.						
Écurie S (du Marché)	"	"	60	"	"	60
CONTENANCE TOTALE des casernes et quartiers.				4	2,946	4,021

2^o Prisons militaires.

DÉSIGNATION DES BATIMENTS.	CONTENANCE PAR ÉTABLISSEMENT.		CONTENANCE PAR CATÉGORIE.	
	Officiers.	Sous-officiers et soldats.	Officiers.	Sous-officiers et soldats.
§ 1 ^{er} . — Bâtimens à l'Etat.				
Prison militaire R (des Augustins)	3	88	3	88
§ 2. — Bâtimens pris à loyer.				
Néant.				
§ 3. — Bâtimens prêtés par la ville.				
Néant.				

3^o Bâtimens des hôpitaux.

DÉSIGNATION DES ÉTABLISSEMENTS.	CONTENANCE PAR ÉTABLISSEMENT.			CONTENANCE PAR CATÉGORIE.		
	MALADES.			MALADES.		
	Officiers.	Sous-officiers et soldats.	Infirmiers.	Officiers.	Sous-officiers et soldats.	Infirmiers.
§ 1 ^{er} . — Bâtimens à l'Etat.						
Hôpital militaire M (de Marengo)	8	200	26	8	200	26
§ 2. — Bâtimens pris à loyer.						
Hospice civil (de Sainte-Anne)	"	55	"	"	55	"
§ 3. — Bâtimens prêtés par la ville.						
Néant.						
CONTENANCE TOTALE des établissemens.	8	255	26	8	255	26

4^o Bâtimens des subsistances.

DÉSIGNATION DES ÉTABLISSEMENTS.	CONTENANCE PAR ÉTABLISSEMENT.						CONTENANCE PAR CATÉGORIE.					
	QUINTAUX MÉTRIQUES.			RATIONS.			QUINTAUX MÉTRIQUES.			RATIONS.		
	Blé ou farine.	Foin ou paille.	Avoine.	Blé ou farine.	Foin ou paille.	Avoine.	Blé ou farine.	Foin ou paille.	Avoine.	Blé ou farine.	Foin ou paille.	Avoine.
§ 1 ^{er} . — Bâtimens à l'Etat.												
Manutention B (des Cordeliers)	4,571	"	"	253,387	"	"						
Quartier D (des Vislandières ou du Cloître)	4,504	"	777	242,589	"	20,447						
Terrain 94 (jardin du Cloître)	"	5,000	"	"	50,000	"						
.....	3,075	5,000	777	495,967	50,000	20,447	3,075	5,000	777	495,967	50,000	20,447
§ 2. — Bâtimens pris à loyer par l'Etat.												
Maison X, au sieur Robert.	450	"	"	72,580	"	"						
Magasin aux fourrages G, au sieur Bernard.	"	8,600	3,096	"	86,000	84,474						
.....	450	8,600	3,096	72,580	86,000	84,474	450	8,600	3,096	72,580	86,000	84,474
§ 3. — Bâtimens prêtés par la ville.												
Néant.												
CONTENANCE TOTALE des établissemens.	3,525	43,600	3,873	568,547	436,000	404,921						

Suite de la RÉCAPITULATION GÉNÉRALE PAR ÉTABLISSEMENTS.
5^e Magasin des lits militaires, de l'habillement, du harnachement, du campement et du chauffage.

DÉSIGNATION DES ÉTABLISSEMENTS.	CONTENANCE.
§ 1 ^{er} . — Bâtimens à l'État.	4,520 fournitures complètes de soldat. 500 demi-fournitures. 40 fournitures complètes d'officier.
Magasins des lits militaires L (des Carmélites)	20,000 draps. Ustensiles pour 20 corps de garde. Effets d'habillement pour 3,650 hommes. Effets pour l'habillement de 12,000 hommes. Effets de campement pour 45,000 hommes. — de harnachement pour 4,550 chevaux.
Magasins de l'habillement, du harnachement et du campement N (des Capucins)	2,370 stères de bois.
Magasin du chauffage S, dans l'enclos du terre-plein bas du bastion 4.	4,900 quintaux métriques de houille.
§ 2. — Bâtimens pris à loyer par l'État.	
Néant.	
§ 3. — Bâtimens prêtés par la ville.	
Néant.	

6^e Magasins à poudre.

DÉSIGNATION DES ÉTABLISSEMENTS.	CONTENANCE			
	NORMALE,		MAXIMUM,	
	en barils de 50 kilogr.	en barils de 400 kilogr.	en barils de 50 kilogr.	en barils de 400 kilogr.
§ 1 ^{er} . — Bâtimens à l'État.				
Magasin à poudre 43.	42,900	43,600	42,900	43,600
— 47 (du bastion 4)	60,800	74,600	72,800	94,600
Casemates 52.	42,400	46,500	44,700	49,400
Tour 63.	2,400	3,000	2,700	3,800
Magasin à poudre 72 (du bastion 5)	31,800	39,200	41,400	53,200
— 73.	49,500	54,000	49,500	54,000
TOTAUX.	469,500	200,900	494,000	238,600
§ 2. — Bâtimens pris à loyer.				
Néant.				
§ 3. — Bâtimens prêtés par la ville.				
Néant.				

7^e Corps de garde.

DÉSIGNATION DES CORPS DE GARDE.	CONTENANCE PAR CORPS DE GARDE.		CONTENANCE PAR CATÉGORIE.	
	Officiers.	Soldats.	Officiers.	Soldats.
§ 1 ^{er} . — Bâtimens à l'État.				
Corps de garde 39 (de la porte de secours)	4	20		
— 40 (de la demi-lune 27)	4	40		
— 42 (de la porte de Villars)	4	42		
	3	42	3	42
§ 2. — Bâtimens pris à loyer par l'État.				
Néant.				
§ 3. — Bâtimens prêtés par la ville.				
Corps de garde 48 (de la place d'armes)	4	30	4	42
CONTENANCE TOTALE des corps de garde.				
			4	72

A

le

185 .

Le Commandant de place,
Signé N.

Le

du génie, en chef,
Signé N.

Vu par le Colonel Directeur des fortifications,

Le Sous-intendant militaire,
Signé N.

A le Signé N. 185 .

Vu : A

le Signé N. 185 .

Vu par l'intendant militaire,

Le Général d'Inspecteur général
du génie, en tournée,
Signé N.

A le Signé N. 185 .

2° PRISONS MILITAIRES.

CONTINENCE.		OBSERVATIONS.
Officiers.	Sous-officiers et soldats.	
3	88	

DESIGNATION DES RÂTIMENTS.		OBSERVATIONS.
§ 1 ^{er} . — RÂTIMENTS A L'ÉTAT.		
Prison militaire B. (des Argentin).		
§ 2. — RÂTIMENTS PRIS A LOUER PAR L'ÉTAT.		
Nant.		
§ 3. — RÂTIMENTS PRIS PAR LA VILLE.		
Nant.		
RECAPITULATION.		
—		
§ 1 ^{er} . — Bâtimens à l'état.	3	88
§ 2. — Bâtimens pris à louer par l'état.	0	0
§ 3. — Bâtimens pris à louer par la ville.	0	0
Totaux ordinaires.	3	88

3^e BATIMENTS DES HOPITAUX.

DÉNOMINATION DES BATIMENTS.		OBSERVATIONS.	
8 4 ^{re} . — BATIMENTS A L'ÉTAT.			
Hôpital militaire M (de Metzger).		8	200
8 2. — BATIMENTS PRIS A LOUER PAR L'ÉTAT.			
Hospice civil (de Sainte-Anne).		1	85
8 3. — BATIMENTS PRÊTÉS PAR LA VILLE.			
Néant.			
BÉCAPITULATION.			
4 ^{re} . — Bâtimens à l'État.		8	200
— Bâtimens pris à louer par l'État.		1	85
— Bâtimens prêtés par la ville.		0	0
TOTAL GÉNÉRAL.		9	285

4° BATIMENTS DES SUBSTANCES.

DÉSIGNATION DES BATIMENTS.	CONTENANCE.				
	QUINZAUX MÉTROQUES.		BATISSA.		
	Bled ou fenne ou paille.	Avance.	Bled ou fenne, ou paille.	Avance.	
§ 1 ^{er} . — BATIMENTS A L'ÉTAT.					
Maison B (des Carabites).	4,574	"	253,287	"	20,447
Quartier D (des Vétérinaires ou de l'Artillerie).	4,504	"	242,580	"	20,447
Terrain 91 (Jardin du Centre).	"	5,000	"	50,000	"
TOTAL.	3,775	5,000	495,867	50,000	20,447
§ 2. — BATIMENTS PRIS A LOUER PAR L'ÉTAT.					
Maison X au sieur Robert.	450	"	72,580	"	81,474
Magasin aux fourrages G, au sieur Bernard.	450	3,096	72,580	86,000	81,474
TOTAL.	450	3,096	72,580	86,000	81,474
§ 3. — BATIMENTS PRÊTÉS PAR LA VILLE.					
Néant.					
RÉCAPITULATION.					
4 ^{es} . — Batiments à l'état.	3,775	5,000	495,867	50,000	20,447
— Batiments pris à louer par l'état.	450	3,096	72,580	86,000	81,474
— Batiments prêtés par la ville.	"	"	"	"	"
TOTAL GÉNÉRAL.	3,325	43,096	3,873	368,517	136,000

5° MAGASINS DES LITS MILITAIRES, DE L'HABILLEMENT, DU HARNACHEMENT, DU CAMPEMENT ET DU CHAUFFAGE.

DÉSIGNATION DES BATIMENTS.	CONTENANCE.	OBSERVATIONS.
§ 1 ^{er} . — BATIMENTS A L'ÉTAT.		
Magasin des lits militaires L (des Carabites).	4,500 Canapettes complètes de soldat. 200 dormitoires complètes d'officier. 20,000 draps. Etoffes pour 20 corps de garde.	
Magasin de l'habillement, du harnachement et de l'équipement N (des Carabites).	Etoffes d'habillement pour 3,000 hommes. Etoffes pour l'habillement de 12,000 hommes. Etoffes pour l'équipement de 12,000 hommes. Etoffes de harnachement pour 1,200 chevaux.	
Magasin du chauffage S (dans l'enceinte des terrains).	2 370 ardens de bois. 3 800 quintaux métriques de bouillie.	
§ 2. — BATIMENTS PRIS A LOUER PAR L'ÉTAT.		
Néant.		
§ 3. — BATIMENTS PRÊTÉS PAR LA VILLE.		
Néant.		

6^e MAGASINS A Poudre.

OBSERVATIONS.

CONTENANCE

	NORMALE,		MARCHÉ,	
	en barils de 50 kl.	en barils de 400 kl.	en barils de 50 kl.	en barils de 400 kl.
Magasin à poudre 43	42,900	42,900	42,900	43,000
— 47 (de bastion 4).	69,800	79,600	72,800	94,600
Caserne 52	4,100	4,100	4,100	4,100
Magasin à poudre 72 (de bastion 5).	31,800	39,200	41,700	53,200
— 73	49,500	54,000	49,500	54,000
TOTAL.	169,500	200,500	191,000	238,600

DÉSIGNATION DES BÂTIMENS.

§ 1^{er}. — BÂTIMENS À L'ÉTAT.

Magasin à poudre 43

— 47 (de bastion 4).

Caserne 52

Magasin à poudre 72 (de bastion 5).

— 73

TOTAL.

§ 2. — BÂTIMENS PRIS À LOYER PAR L'ÉTAT.

Néant.

§ 3. — BÂTIMENS PRIS À LOYER PAR LA VILLE.

Néant.

RECAPITULATION.

§ 1^{er}. — Bâtimens à l'État.

§ 2. — Bâtimens pris à loyer par l'État.

§ 3. — Bâtimens pris par la ville.

TOTAL GÉNÉRAL.

169,500	200,500	191,000	238,600
49,500	54,000	49,500	54,000
31,800	39,200	41,700	53,200
42,900	42,900	42,900	43,000
69,800	79,600	72,800	94,600
4,100	4,100	4,100	4,100
49,500	54,000	49,500	54,000
169,500	200,500	191,000	238,600

7^e CORPS DE GARDE ISOLÉS.

Désignation des Corps de Garde.	CONTENANCE.				OBSERVATIONS.
	OFFICIERS.		SOLDATS.		
§ 1 ^{er} . — Bâtimens à l'État.					
Corps de garde 39 (de la porte de secours).	4	20	4	20	
— 40 (de la demi-lune 27).	4	40	4	40	
— 42 (de la porte de Villars).	4	42	4	42	
TOTAL.	3	42	3	42	
§ 2. — Bâtimens pris à loyer par l'État.					
Néant.					
§ 3. — Bâtimens pris par la ville.					
Corps de garde 48 (de la place d'armes).	4	20	4	20	
RECAPITULATION.					
§ 1 ^{er} . — Bâtimens à l'État.	3	42	3	42	
§ 2. — Bâtimens pris à loyer par l'État.					
§ 3. — Bâtimens pris par la ville.	4	20	4	20	
TOTAL GÉNÉRAL.	4	72	4	72	

Vu par le Sous-Intendant militaire, Vu par le Commandant de place,
 Signé N. Signé N.
 Vu par le Commandant de place, Signé N.

• DIVISION MILITAIRE.

ÉTAT général de l'assiètte du logement qui doit être assigné aux troupes, aux officiers et aux différents services administratifs, dans les bâtiments militaires des places de la direction d
à l'article 17 du règlement du 30 juin 1856, sur le service du casernement.

Modèle n° 2.

1° LOGEMENT DES TROUPES.

PLACE.	DÉSIGNATION DES BÂTIMENTS.	DESTINATION.	CONTENANCE.		OBSERVATIONS.	OBSERVATIONS DE CARACTÈRE des fortifications.
			Hommes.	Chevaux.		
A.	§ 1 ^{er} . — BÂTIMENTS À L'ÉTAT.					
	Quartier D (des Vitandinos).	Infanterie et cavalerie.	439	188		
						
						
	TOTAL.		2,031	607		
B.	§ 2. — BÂTIMENTS PRIS À LOYER.					
	Casernes H (des Cordeliers).	Infanterie.	390	354		
	Quartier E (l'Aloué).	Cavalerie et artillerie.	535	354		
						
	TOTAL.		915	354		

— 72 —

— 73 —

§ 3. — BÂTIMENTS PRÊTÉS PAR LA VILLE.

S.	Exercice S (de la Marche).					
						
	TOTAL.					
	§ 4 ^{er} . — BÂTIMENTS A L'ÉTAT.					
S.	Casernes 39 (des Dominicains).					
						
	Quartier 48 (des Irénies).	Cavalerie.	984	718		
	TOTAL.		2,230	4,012		
S.	§ 2. — BÂTIMENTS PRIS A LOYER.					
						
	Néant.					
	§ 3. — BÂTIMENTS PRÊTÉS PAR LA VILLE.					
S.	Casernes V (de la Ville).					
						
	Pavillon 92 (de l'Esplanade).	Cavalerie.	983	62		
	TOTAL.		983	62		

PLACES.	DÉSIGNATION DES BATIMENTS.	DÉSIGNATION.	CONTENANCE.		OBSERVATIONS.	OBSERVATIONS de direction des fortifications.
			HOMMES.	CHEVAUX.		
§ 1 ^{er} . — BATIMENTS A L'ÉTAT.						
	Caserne A (de Saint-Simon).	Infanterie et cavalerie.	4,274	304		
	Pavillon B (des Fours).	Infanterie et artilleur.	450	30		
	Quartier C (de Saint-Clément).	Cavalerie.	848	346		
		"	"	"		
		"	"	"		
		"	"	"		
T.	Total.		3,857	4,405		
§ 2. — BATIMENTS PRIS A LOYER.						
	Caserne O (d'Orléans).	Infanterie.	228	"		
	Ecuries R (de Coëlo).	Cavalerie.	"	460		
	Total.		228	460		
§ 3. — BATIMENTS PRÊTÉS PAR LA VILLE.						
	Néant.					

RÉCAPITULATION.

§ 1^{er}.

BÂTIMENTS À L'ÉTAT.

Places R.
— S.
— T.

3,840

40,880

3,840

4,012

2,530

4,405

607

354

460

930

220

43,888

§ 2.

BÂTIMENTS PRIS À LOYER.

Places R.
— S.
— T.

930

2,530

930

228

60

62

2

263

608

220

43,888

4,990

§ 3.

BÂTIMENTS PRÊTÉS PAR LA VILLE.

Places R.
— S.
— T.

220

608

220

60

62

2

263

608

220

43,888

4,990

43,888

Total général.

43,888

4,990

2° PRISONS MILITAIRES.

PLACES.	DÉSIGNATION DES BATIMENTS.	CONTENANCE.		OBSERVATIONS.	OBSERVATIONS DU DIRECTEUR des fortifications.
		Officiers.	Sous-officiers et soldats.		
R.	§ 4 ^{re} .—BATIMENTS A L'ÉTAT. Prison militaire R (des Augustins)	3	88		
	§ 2.—BATIMENTS PRIS A LOTER.				
	Néant.				
	§ 3.—BATIMENTS PRÊTÉS PAR LA VILLE. Néant.				
S.	§ 4 ^{re} .—BATIMENTS A L'ÉTAT. Néant.				
	§ 2.—BATIMENTS PRIS A LOTER.				
	Néant.				
	§ 3.—BATIMENTS PRÊTÉS PAR LA VILLE. Prison civile (de Saint-Marguerite)	2	34		
T.	§ 4 ^{re} .—BATIMENTS A L'ÉTAT. Prison militaire X (des Carmes)	4	72		
	§ 2.—BATIMENTS PRIS A LOTER.				
	Néant.				
	§ 3.—BATIMENTS PRÊTÉS PAR LA VILLE. Néant.				

RÉCAPITULATION.

	CONTENANCE PAR PLACE.		CONTENANCE PAR CATEGORIE.	
	Officiers.	Sous-officiers et soldats.	Officiers.	Sous-officiers et soldats.
§ 4 ^{re} . BATIMENTS A L'ÉTAT.	3	88		
§ 2. BATIMENTS PRIS A LOTER.	4	72		
§ 3. BATIMENTS PRÊTÉS PAR LA VILLE.	42	518	42	518
Total général.	49	608	49	608

3- BATIMENTS DES HOPITAUX.

PLACES.	DESIGNATION DES BATIMENTS.	CONTENANCE.			OBSERVATIONS.	OBSERVATIONS DU DIRECTEUR des fortifications.
		MAILLES.	Sous-off. et soldats.	INFIRMES.		
B.	§ 1 ^{er} . — BATIMENTS A L'ÉTAT. Hôpital M (de Maréchal)	8	200	25	27	
	§ 2. — BATIMENTS PRIS A LOUER. Hôpital civil (de Saint-Aune)	"	55	"	30	
	§ 3. — BATIMENTS PRIS A LOUER. Hôpital militaire F (de Saint-François)	42	250	31		
	§ 4 ^{er} . — BATIMENTS A L'ÉTAT. Hôpital militaire F (de Saint-François)	42	250	31		
S.	§ 1 ^{er} . — BATIMENTS PRIS A LOUER. Hôpital militaire F (de Saint-François)	"	"	"	27	
	§ 2. — BATIMENTS PRIS A LOUER. Hôpital militaire F (de Saint-François)	"	"	"	27	
	§ 3. — BATIMENTS PRIS A LOUER. Hôpital militaire F (de Saint-François)	"	"	"	27	
	§ 4 ^{er} . — BATIMENTS A L'ÉTAT. Hôpital militaire F (de Saint-François)	"	"	"	27	
T.	§ 1 ^{er} . — BATIMENTS PRIS A LOUER. Hôpital militaire F (de Saint-François)	4	420	46		
	§ 2. — BATIMENTS PRIS A LOUER. Hôpital militaire F (de Saint-François)	"	"	"		
	§ 3. — BATIMENTS PRIS A LOUER. Hôpital militaire F (de Saint-François)	"	"	"		
	§ 4 ^{er} . — BATIMENTS A L'ÉTAT. Hôpital militaire F (de Saint-François)	"	"	"		

RÉCAPITULATION.

PLACES.	DESIGNATION DES BATIMENTS.	CONTENANCE PAR PLACE.			CONTENANCE PAR CATEGORIE.		
		MAILLES.	Sous-off. et soldats.	INFIRMES.	MAILLES.	Sous-off. et soldats.	INFIRMES.
§ 4 ^{er} . BATIMENTS A L'ÉTAT.	Place B.	8	200	25			
	— S.	42	250	31			
	— T.	"	"	"			
	TOTAL	30	650	80	30	650	80
§ 2. BATIMENTS PRIS A LOUER.	Place B.	"	55	"			
	— S.	"	420	46			
	— T.	"	"	"			
	TOTAL	40	250	31	40	250	31
§ 3. BATIMENTS PRIS A LOUER.	Place B.	"	"	"			
	— S.	"	90	"			
	— T.	"	"	"			
	TOTAL	2	400	12	2	400	12
TOTAL GENERAL		12	4,100	126	12	4,100	126

4. BATIMENTS DES SUBSTANCES.

PLACES.	DÉSIGNATION DES BATIMENTS.	CONTENANCE.						OBSERVATIONS de directeur des fortifications.
		CENTAUX MÉTRIQUES.			RATIONS.			
		Bât en ferme ou paille.	Foin ou paille.	Arrière.	Bât en terre ou paille.	Foin ou paille.	Arrière.	
B.	§ 1 ^{er} . — BATIMENTS À L'ÉTAT.							
	Maintenance B (des Cordeliers)	4,574	"	233,387	"	"	28,147	
	Quartier D (des Cordeliers) du Collège.	4,504	"	777	"	"	"	
	Terrain 91 (ancien du Collège)	3,275	5,000	777	455,967	50,000	30,447	
	TOTALS	12,748	13,000	2,873	1,341,614	135,000	139,665	
S.	§ 2 ^e . — BATIMENTS À LOUER.							
	Maison X (au sieur Bérard)	419	"	72,280	"	"	81,471	
	Maison aux fourrages G (au sieur Bérard)	450	8,000	3,096	72,280	35,000	81,471	
	TOTALS	869	8,000	6,176	144,560	35,000	162,942	
S.	§ 3 ^e . — BATIMENTS PRÊTÉS PAR LA VILLE.							
	Maintenance C (des Cordeliers)	4,520	"	204,250	"	"	26,037	
	Quartier 15 (des Cordeliers)	2,012	"	990	323,932	"	70,000	
	Maison aux fourrages U (du Gens)	3,262	7,000	990	525,482	70,000	26,037	
	TOTALS	9,794	7,000	2,980	853,664	70,000	52,074	
S.	§ 4 ^e . — BATIMENTS PRÊTÉS A LOUER.							
	Maison Y (au sieur Duvet)	8,400	2,150	"	81,000	60,433	"	
	TOTALS	8,400	2,150	"	81,000	60,433	"	
		TOTALS	18,194	9,150	5,160	1,315,268	165,433	304,718
T.	§ 5 ^e . — BATIMENTS PRÊTÉS PAR LA VILLE.							
	Maintenance D (des Cordeliers)	3,920	"	531,250	"	"	21,459	
	Quartier C (de Saint-Gilles)	850	"	930	436,350	"	90,000	
	Maison aux fourrages K (du Polygone)	4,100	9,000	5,130	691,200	90,000	134,319	
	TOTALS	8,870	9,000	5,130	1,218,800	180,000	345,768	

5. BATIMENTS PRÊTÉS A LOUER.

NET.

§ 3. — BATIMENTS PRÊTÉS PAR LA VILLE.
Mégasin Q (du Fort).

75,000

7,000

		CONTENANCE PAR CATEGORIE.									
		CONTENANCE PAR PLACE.		CENTAUX METRIQUES.		RATIONS.					
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.
		Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât en ferme, en paille.	Bât			

— 83 —

6° MAGASINS A POUDRE.

PLACE.	DESIGNATION DES BATIMENTS.	CONTENANCE				OBSERVATIONS.	OBSERVATIONS DU DIRECTEUR des fortifications.
		NORMALE.		MAJORE.			
		en barils de 50 kil.	en barils de 100 kil.	en barils de 50 kil.	en barils de 100 kil.		
R.	§ 1 ^{er} .—BATIMENTS A L'ÉTAT.						
	Magasin à poudres 43.	42,500	42,500	42,500	42,500		
	Magasin à poudres 47 (du bassin 4).	42,500	42,500	42,500	42,500		
	Caserne 52.	42,500	42,500	42,500	42,500		
	Tour 63.	2,400	2,400	2,700	3,800		
	Magasin à poudres 72 (du bassin 5).	42,500	42,500	42,500	42,500		
	Magasin à poudres 76.	42,500	42,500	42,500	42,500		
	TOTAL.	400,000	390,500	404,000	438,500		
	§ 2.—BATIMENTS PRÊTS A LOTER.						
	Néant.						
S.	§ 3.—BATIMENTS PRÊTS PAR LA VILLE.						
	Néant.						
	§ 1 ^{er} .—BATIMENTS A L'ÉTAT.						
	Magasin à poudres R (de l'Écluse).	31,500	30,000	41,408	53,200		
	Magasin à poudres S (du bassin 2).	2,400	2,400	2,400	2,400		
	Magasin à poudres T (de la Caselle).	42,500	54,000	47,500	54,000		
	Magasin à poudres U (du bassin 9).	42,100	46,000	49,000	49,000		
	TOTAL.	120,900	132,700	139,308	159,000		
	§ 2.—BATIMENTS PRÊTS A LOTER.						
	Néant.						

	CONTENANCE PAR PLACE.				CONTENANCE PAR CATEGORIE.			
	NORMALE.		MAJORE.		NORMALE.		MAJORE.	
	En barils de 50 kil.	En barils de 100 kil.	En barils de 50 kil.	En barils de 100 kil.	En barils de 50 kil.	En barils de 100 kil.	En barils de 50 kil.	En barils de 100 kil.
§ 1.—BATIMENTS PRÊTS A LOTER.								
Néant.								
§ 2.—BATIMENTS PRÊTS PAR LA VILLE.								
Néant.								
RECAPITULATION.								
§ 1 ^{er} .	460,500	200,800	491,000	233,600	420,900	337,000	509,208	631,200
BATIMENTS A L'ÉTAT.	460,500	200,800	491,000	233,600	420,900	337,000	509,208	631,200
§ 2.								
	BATIMENTS PRÊTS A LOTER.							
§ 3.								
BATIMENTS PRÊTS PAR LA VILLE.								
TOTAL GÉNÉRAL.	420,900	337,000	509,208	631,200	420,900	337,000	509,208	631,200

7^e CORPS DE GARDE ISOLÉS.

PLACES.	DÉSIGNATION DES CORPS DE GARDE.	CONTÉANCE.		OBSERVATIONS.	OBSERVATIONS DU DIRECTEUR DES FORTIFICATIONS.
		OFFICIERS.	SOLDATS.		
R.	§ 1 ^{er} . — BATTIMENTS A L'ÉTR.				
	Corps de garde 39 (de la porte de secours).	4	20		
	— 40 (de la porte de Paris).	4	12		
	— 42 (de la porte de Villars).	4	12		
	TOTAL.	12	44		
S.	§ 2. — BATTIMENTS PRIS A LOTER.				
	Néant.				
	§ 3. — BATTIMENTS PRIS PAR LA VILLE.				
	Corps de garde 48 (de la place d'armes).	4	20		
T.	§ 4 ^{er} . — BATTIMENTS A L'ÉTR.				
	Corps de garde 56 (de la place de la Bastille).	4	20		
	— 57 (de la place de la Bastille).	4	20		
	— 58 (de la lunette 24).	4	12		
	TOTAL.	12	52		
S.	§ 2. — BATTIMENTS PRIS A LOTER.				
	Néant.				
	§ 3. — BATTIMENTS PRIS PAR LA VILLE.				
	Corps de garde 64 (maison au sieur Estienne).	4	9		
T.	§ 4 ^{er} . — BATTIMENTS A L'ÉTR.				
	Corps de garde 65 (de la place du Marché).	4	12		
	— 66 (de la place de Paris).	4	12		
	— 67 (de la place de Paris).	4	12		
	TOTAL.	12	36		

PLACES.	DÉSIGNATION DES CORPS DE GARDE.	CONTÉANCE.		OBSERVATIONS.	OBSERVATIONS DU DIRECTEUR DES FORTIFICATIONS.
		OFFICIERS.	SOLDATS.		
R.	§ 1 ^{er} . — BATTIMENTS A L'ÉTR.				
	Corps de garde N (de l'Hôtel-de-Ville).	4	21		
	— 485 (de la place de la Bastille).	4	21		
	— 486 (de la place de la Bastille).	4	21		
	TOTAL.	12	63		
S.	§ 2. — BATTIMENTS PRIS A LOTER.				
	Néant.				
	§ 3. — BATTIMENTS PRIS PAR LA VILLE.				
	Corps de garde N (de l'Hôtel-de-Ville).	4	21		
T.	§ 4 ^{er} . — BATTIMENTS A L'ÉTR.				
	Corps de garde N (de l'Hôtel-de-Ville).	4	21		
	— 485 (de la place de la Bastille).	4	21		
	— 486 (de la place de la Bastille).	4	21		
	TOTAL.	12	63		

RÉCAPITULATION.

PLACES.	DÉSIGNATION DES CORPS DE GARDE.	CONTÉANCE.		OBSERVATIONS.	OBSERVATIONS DU DIRECTEUR DES FORTIFICATIONS.
		OFFICIERS.	SOLDATS.		
R.	§ 1 ^{er} . — BATTIMENTS A L'ÉTR.				
	Corps de garde N (de l'Hôtel-de-Ville).	4	21		
	— 485 (de la place de la Bastille).	4	21		
	— 486 (de la place de la Bastille).	4	21		
	TOTAL.	12	63		
S.	§ 2. — BATTIMENTS PRIS A LOTER.				
	Néant.				
	§ 3. — BATTIMENTS PRIS PAR LA VILLE.				
	Corps de garde N (de l'Hôtel-de-Ville).	4	21		
T.	§ 4 ^{er} . — BATTIMENTS A L'ÉTR.				
	Corps de garde N (de l'Hôtel-de-Ville).	4	21		
	— 485 (de la place de la Bastille).	4	21		
	— 486 (de la place de la Bastille).	4	21		
	TOTAL.	12	63		

A L'Intendant de la division militaire,
Signé N.

485 A

Le Directeur des fortifications,
Signé N.

485

Lately Published, price 10s. 6d. cloth.

PRODROMUS FAUNÆ ZEYLANICÆ, Vol. I.

CONTENTS:

Natural History of Newera Ellia.
Description of Ceylon Mammalia.
Catalogue of Ceylon Birds.
Description of New Species of Ceylon Birds.
Description of Ceylon Reptiles.

APPENDIX.

Dr. Gardner on the Flora of Ceylon.

Sold in Ceylon by

Messrs. Clarke Romer and Co., Colombo; Messrs. Milne Cargill and Co., Galle;

And in London by J. Van Voorst, 1, Paternoster Row.

"The zeal and industry of Staff-Surgeon Kelaart has, in this 'Prodromus,' opened to us almost a new field in Natural History, and the Ceylon press, the best missionary that has ever gone to the East, has given it form and shape. It is, indeed a gratifying task for us to welcome such a work from the pen of an Army Surgeon, composed amidst the excitements and temptations of Indian life; and we could wish that other Officers would follow so good an example. The work contains a descriptive account of Ceylon Mammalia, of the Saurian, Chelonian, and Emydosaurian reptiles; of the Amphibia, and the Ornithology, besides a catalogue of the Birds of the Island, and a sketch of the Natural History of Newera Ellia. The Appendix is enriched with observations on the Flora of Ceylon, and additional remarks on its animals, which form altogether a most valuable contribution to the lore of the Naturalist."

United Service Mag., November, 1853.

PRODROMUS
FAUNÆ ZEYLANICÆ;

BEING

CONTRIBUTIONS TO THE ZOOLOGY

OF

CEYLON.

BY

E. F. KELAART, M.D., F. L. S., ETC., ETC.

STAFF SURGEON TO THE FORCES.

"Nihil est aliud magnum quam multa minuta."

VOL. II.—PART I.

COLOMBO:

PRINTED AT THE GOVERNMENT PRESS.

M.DCCC.LIII.

[From the Journal of the Asiatic Society of Ceylon, 1853.]

NOTICE.

IN presenting to Naturalists a more complete Synopsis of Ceylon Reptiles, which the continued kindness of friends in various parts of the Island has enabled me to form, I have much pleasure in expressing my best thanks to the Members of the Asiatic Society of Ceylon, and to Sir George Anderson, Dr. Fergusson, P.M.O., and the Hon'ble C. J. MacCarthy, Esq., Colonial Secretary, for the facilities they have afforded me in my further researches in the Natural productions of the Island.

The joint labours of Mr. Edgar Layard and myself have nearly completed the examination of the Mammals, Birds, Shells, Reptiles and Insects of this Island. The fresh water Fishes are now engaging my attention, and any specimens of this Class will be thankfully received. Dr. Schmarla, Professor of Zoology of the University of Prague, is now on a visit to the Island for the chief purpose of examining the Infusoria, and Professor Harvey of Trinity College, Dublin, is also, I believe, at present engaged in examining into the Echinodermata and Crustacea of the Island, so that it may be hoped, it will not be very long before the neglected Fauna of Ceylon is completely worked out.

SYNOPSIS
OF
CEYLON REPTILES.

ORDER. SAURA. *Lizards.*

SUB-ORDER. I. LEPTOGLOSSÆ.

Slender-tongued Lizards.

FAM: MONITORIDÆ. *Monitors.*

- 1 Monitor Dracena, Gray. Guana. Talla Goya, Sing.
- 2 Hydrosaurus Salvator, Wagler. Water Guana. Cabara Goya, Sing.

FAM: SCINCIDÆ. *The Scincs.*

- 3 Riopa punctata, Gray. Puchee Bramin, Port.
- 4 Riopa Hardwicki, Gray. do.
- 5 Mabouia elegans. (?) Gray. do.
- 6 Taliqua rufescens, Gray. Large do.

FAM: ACOTIIDÆ.

- 7 Nessia Burtoni. (?) Gray. Ground Bramin.
- 8 Acontias (?) Layardi, n. z., nobis. Layard's do.

FAM: TYPHLOPSIDÆ. *Typhlops.*

- 9 Argropyphis Bramicus, Daud. Silver snake.
- 2 varieties.

FAM: UROPELTIDÆ. *Rough tails, or False snakes.*Dapatnaya, *Sing.*

- 10 Uropeltis grandis, *n. s., nobis.*
 11 Uropeltis Pardalis, *n. s., nobis.*
 12 Uropeltis Saffragamus, *n. s., nobis.*
 13 Rhinophis Blythii, *n. s., nobis.*
 14 Daptnaya Lankadivana, *n. s., nobis.*
 15 Daptnaya Trevelyana, *n. s., nobis.*
 16 Silaboura Ceylonicus, *Gray.*

SUB-ORDER II. PACHYGLOSSÆ.

*Thick-tongued Lizards.*FAM: GECKOTIDÆ. *The Geckoes.*Cheechas, *Port.* Hoona, *Sing.*

- 17 Hemidactylus trihedrus, *Lesson.* The triangular tubercled Gecko.
 18 Hemidactylus maculatus, *Dum.* The spotted do.
et Bib.
 19 Hemidactylus Piersii, *n. s., nobis.* Piers' Gecko.
 20 Hemidactylus Coctei, *Dum. et Bib.* Cocto's do.
 21 Hemidactylus frenatus, *Schlegel.* The streaked Gecko.
 22 Hemidactylus Leschenaultii, (?) Leschenault's do.
Dum. et Bib.
 23 Boltalia sublaevis, *Gray.* The Boltalia.
 24 Peripia Peronii, *Dum. et Bib.* Peron's Gecko.
 25 Gymnodactylus (?) Kandianus, The diurnal Gecko.
n. s., nobis.

FAM: AGAMIDÆ. *The Agamas.*Blood-suckers, *Valg.* KattooSah, *Sing.*

- 26 Sitana Ponticereana, *Cuvier.* The Sitana.
 27 Lyriocephalus scutatus, *Wagler.* Lyre-headed Lizard.
 28 Ceratophora Stoddartii, *Gray.* The needle-nosed Lizard.
 29 Salea Jerdonii, *Gray.* Dr. Jerdon's Salea.
 30 Calotes Ophiomachus, *Gray.* Red headed Green Lizard.
 31 Calotes Rouxi, *Gray. Blyth.* } Green Lizard.
 vel C. Viridis, Gray. apud nos. }
 32 Calotes mystaceus, *Dum. et Bib.* Red spotted Green Lizard.
 33 Calotes versicolor, *Dum. et Bib.* The common Blood-sucker.

FAM: CHAMELEONIDÆ. *Chameleons.*

- 34 Chameleo vulgaris, *Daud.* The true Chameleon.

ORDER. OPHIDIA. *Serpents.*Cobras, *Port.* Saroopeya, Satta, *Sing.**Innocuous Serpents.*

FAM: BOIDÆ.

BURROWING.

- 35 Cylindrophis maculata, *Wagler.* The red and black netted Snake.

TERRESTRIAL.

- 36 Python molurus, *Gray.* The Rock Snake.

FAM: COLUBERIDÆ. *Boaspartes.**TERRESTRIAL.*

- 37 Calamaria Scytale ?
 38 Lycodon, 2 or more species.
 39 Xenodon purpurascens, *Schlegel. var.*
 40 Coluber Korros, *Reinwardt.*

ARBORIAL.

- 41 *Dipsas multimaculata* (?) *Schlegel*.
 42 *Dryinus Prasinus*, *Reinwardt*. The Whip Snake.
D. nactus 2 or more varieties.

- 43 *Leptophis pictus*, *Gmelin*.
 44 *Leptophis ornatus*, *Shaw*.
 45 *Leptophis* sp.

AQUATIC. Deye Naya, *Sing*.

- 46 *Tropidonotus umbratus*, *Daudin*. (var.) Large blackish water Snake.
 47 *Tropidonotus stollatus*, *Linn*. The speckled do.
 48 *Tropidonotus schistosus*, *Daudin*. The olive brown do.
 49 *Cerberus cinereus*, *Cuvier*. The black do.

Venomous Serpents.

FAM: VIPERIDÆ. *Vipers*.

TERRESTRIAL.

- 50 *Bungarus candidus*, *Linn*.
 51 *Naja lutescens*, *Daudin*. var. Cobra de Capello.
 —var. *Nigra*.

ARBORIAL.

- 52 *Trigonocephalus Hymale*, *Wagler*. Caravilla.
 53 *Trimesurus gramineus*, *Shaw*. The green Caravilla.
 54 *Trimesurus Ceylonensis* (?) *Gray*. *apud Gray*.
 55 *Megaera trigonocephala*, *Wagler*. Palagolla.
 56 *Daboia elegans*, *Gray*. } Polanga.
 57 *Daboia Russellii*, *Gray*. }

N.B.—There are about six or eight more Ceylon Snakes, which have not yet been identified.

ORDER. CHELONIA. *Tortoises*.Cowdoo, *Port*. Ibba, *Sing*.

FAM: TESTUDINIDÆ.

- 58 *Testuda Indica*, *Gmelin*. The large land Tortoise.
 59 *Testuda stellata*, *Schweig*. The yellow starred do.

FAM: EMYDIDÆ.

- 60 *Emys trijuga*, var. *Schweig*. Marsh Tortoise. Gal Ibba. *Sing*.
 61 *Emys Seba*, *Gray*, *apud Blyth*. do.
 62 *Emyda punctata*, *Gray*. River Tortoise. Keeree Ibba. *Sing*.

FAM: CHELONIDÆ.

- 63 *Caretta imbricata*, *Gray*. Sea Turtle. Kokooloo koooomba, *Sing*.
 64 *Chelonia virgata*, *Schweig*. Edible do. Gal koooomba, *Sing*.

ORDER. EMYDOSAURI. *Crocodiles*.Lagartoo, *Port*. Kimboola, *Sing*.

- 65 *Crocodilus porosus*, *Schweig*. { The Indian river Crocodile.
 { Allie Kimboola, *Sing*.
 66 *Crocodilus palustris*, *Lesson*, male. { Marsh Crocodile.
 { Halle Kimboola. *Sing*.
 * *Crocodilus Bombifrons*, female. *apud Blyth*.

AMPHIBIA.

ORDER. BATRACHIA, *Frogs*.Madookoo, *Port*. Attykitta, *Sing*.FAM: RANIDÆ. *Water Frogs*.

- 67 *Rana cutipora*, *Dum. et Bib*. Large green bull Frog.
 68 *Rana Malabarica*, *Dum. et Bib*. The green spotted bull Frog.
 69 *Rana Bengalensis*, *Gray*. The small green do.
 70 *Rana Tigrina*, *Daudin*. The golden Frog.
 71 *Rana Newera Elliana*, *nobilis*. The blackish Frog.
 72 *Rana Kandiana*, *nobilis*. The red bellied Frog.
 73 *Rana Leschenaultii* (?) *Dum. et Bib. apud Blyth*. Leschenault's Frog.

FAM: HYLIDÆ. *Tree Frogs.*Ghas Gemba. Attykitta, *Sing.*

- | | |
|--|------------------------------------|
| 74 Polypedates leucomystax, | } The common tree Frog. |
| <i>Gruzenhorst.</i> | |
| 75 Polypedates cruciger, <i>Blyth.</i> | The cross-backed do. |
| 76 Polypedates stellata, <i>nobis.</i> | The white spotted green tree Frog. |
| 77 Limnodytes mutabilis, <i>nobis.</i> | The changeable tree Frog. |
| 78 Limnodytes maculata, <i>nobis.</i> | The brown spotted do. |

FAM: BUFONIDÆ. *Toads.*Gemmadca, *Sing.*

- | | |
|--|------------------------|
| 79 Bufo melanostictus, <i>Schneider.</i> | The common house Toad. |
| 80 Engystoma marmorata, <i>Gray.</i> | The green spotted do. |
| 81 Engystoma cinnamomea, <i>nobis.</i> | The red do. |

ORDER. PSEUDOPHIDIA.

FAM: CÆCILIIDÆ.

- | | |
|---|--------------------------|
| 82 Ichthyophis glutinosus, <i>Gray.</i> | The glutinous Slow worm. |
|---|--------------------------|

N. B.—Mr. Blyth in his last Report, J.A.S.B. No. 4 of 1853, enumerates among the Reptiles I sent him, the following new species, *Limnodytes lividus*, *L. macularis*, *Engystoma rubrum*, Jerdon. *Physicophalus Fodiens*, Jerdon, and *Rana robusta*.

DESCRIPTION

OF

NEW OR LITTLE KNOWN SPECIES

OF

REPTILES.

ORDER. SAURA.

TRIBE. GEISSOSAURA.

FAM. ACONTIAS, (ACONTIADÆ.)

Head small, shielded. Muzzle conical. Rostral rather large, cup-shaped, internasal short, frontal large, frontoparietal none, interparietal triangular, moderate. Eyes distinct. Eyelids, lower well developed, upper small or wanting. Nostrils in the middle of the side of the rostral shield, with a slit to its hinder edge. Tongue scaly, imbricate, nicked at the point. Ears very small or hidden. Femoral pores none. Body cylindrical. Limbs 4, very short, or none. Scales smooth.—*Gray.*

GENUS. NESSIA. *Gray.*

Muzzle conical. Ears very small, dotlike. Body cylindrical, elongate, sides rounded. Scales smooth. Legs 4, very short, far apart. Toes 3-3, subequal, clawed.

NESSIA BERTONI? *Gray.*

Dark rufous-brown above, and spotted longitudinally with darker brown spots. Dark grey beneath, clouded and indis-

tinctly spotted. Tail cylindrical, rounded at the end, and coloured and spotted like the body. Limbs 4, very small, each with 3 subequal toes.

Length $5\frac{1}{2}$ inches.

Habitat. Allagalla (3000 feet.)

The only specimen which I have examined is one obtained from vegetable soil in a Coffee Estate under the superintendence of Dr. Marshall.* I am informed that this reptile is common at Ambegammoa.

If my identification is correct, it would appear probable that the only specimen in Europe, found in the Army Medical Officers' Museum at Fort Pitt, was sent from Ceylon. The specimen was named after Staff Surgeon Burton, who was the Curator of the Museum when Dr. Gray visited that establishment.

GENUS. *ACONTIAS*. *Cuvier*.

Head conical. Nostrils lateral. Internasal broad, 6 sides, frontal large, 6 sided, frontonasals and frontoparietals none; interparietals small, triangular, parietal moderate. Tongue flat, scaly, nicked at the tip. Teeth conical, blunt. Palate not toothed, with a longitudinal groove. Eyes very small. Upper eyelid wanting, lower short, scaly, opaque. Ears hidden under the skin. Body cylindrical, elongate. Scales smooth. Limbs none, exerted. Tail cylindrical, short rounded at the end.—*Gray*.

ACONTIAS (?) *LAYARDI*. *n. s., nobis*.

Light olive, and spotted longitudinally with brown spots, paler beneath.

Length of young 4 inches.

Habitat. Soil of the Cinnamon Gardens of Colombo.

* I have since received several smaller specimens from Kadinganaya.

The form of this reptile is distinguished from that of *Nessia*, above described, by the absence of limbs; in other respects it is very like the outline characters of *Nessia*. Mr. Layard procured me the specimens (apparently young) of this curious lizard.

The only other species described in Gray's Catalogue, is one from the Cape of Good Hope.

Mr. Blyth writes that he has described an allied Genus, from Rangoon, by the name of *OPHISEPS*.

FAM. *UROPELTIDÆ*.

ROUGH TAILS. *DAPAT-NAYA*, *Sing.*

Head conical, compressed, shelving and acute in front, flat above, behind. Crown covered with regular shields. Rostral produced, moderate, convex, horny, subtriangular, erect, produced, and acute behind. Nostrils roundish, lateral, simple, in the middle of the front of an erect subtriangular band-like nasal. Internasal none, frontonasal subtriangular, truncated below, contiguous above, frontal and frontoparietal distinct. Nape scaly. Labial shields 1 distinct. Eyes distinct, lateral, in the middle of the front of an erect eye-shield, and covered by the shield without any eyelids. Eyebrow shield none. Tongue elongate, flat, forked at the tip. Body cylindrical. Scales 6 sided, smooth, those of the hinder part and above the tail sometimes 2-keeled. Vent with three scales in front. Tail cylindrical, obliquely truncated above.

This family is intermediate between the Lizards and the Snakes; following Cuvier and others, I was induced to refer it to the latter order, and therefore did not insert it in the Synopsis of the Families: but on re-examination and comparison with the various modifications presented by the genera of *Typhlopsida*, I have been induced to place it in the order of Lizards. Cuvier seems to have been in doubt, for though he placed the

genus with the Snakes, he also regarded the species as a section of the Typhlopes. Schlegel names the group *Pseudo Typhlops*.—(*Gray's Synopsis*.)

This curiously formed family of Reptiles is known in the Island as *Dapat Nayas*, or double headed snakes. The natives consider them poisonous, but my experience of their habits makes me believe that they are perfectly harmless, and that they are timid creatures, seldom making their appearance above ground; living chiefly in ant-hills or dung-hills, sometimes also several feet deep in rich loamy soil. They feed on ants, small earth-worms and larvæ of insects.

It appears from Dr. Gray's Catalogue, that in the Museums of Europe there are only three species, and of these three only one is from Ceylon, viz., *Siluboura Ceylonicus*,* many specimens of which I have found in the Kandyan Hills since my work on the Fauna of Ceylon was published. I have also, since the publication of that work, collected four other species, making in all six distinct undescribed or new species of Rough Tails (*Uropeltidae*) in the Island of Ceylon, which I shall now describe in a connected form.

Dr. Gray subdivides the family into three groups, and I have added a fourth, to admit of two species, only one of which I have described in the *Prodromus*.

GENUS. RHINOPHIS. *Hempr.*

Tail obliquely truncated, upper part rather convex, covered with a small oblong shield, lower edge rounded, simple, rather produced. Head acute, tapering in front. Vent shields in one marginal row.

RHINOPHIS BLYTHII. *n. s., nobis.*

Dark yellowish brown above, with darker brown spots on the anterior third of scales. Paler beneath. Rostrum

* *Vide Prodromus Faunæ Zeylanicæ.*

yellow. Sides of nape and neck waved with angular marks of a yellowish hue; yellow spots on each side of vent. Tail thick, slightly truncated, conical, upper part near termination has a small subtriangular nearly smooth shield, lower surface covered with broad scales. Vent shields 1-2.

Length 16 inches, circumference of the middle of body 1.3-10 inches. Tail and neck rather thicker.

Habitat. Mountains of Ceylon.—Three specimens found 3 or 4 feet below the surface soil of Coffee plantations.

GENUS. UROPELTIS, (part). *Cuvier.*

Tail obliquely truncated, flattish, and covered with a flat roundish radiating granular shield, lower edge rounded, the under side of tail with 6 series of small scales.

UROPELTIS SAFFRAGAMÆ. *n. s., nobis.*

Head dark olive brown, the rest of the upper surface of a blackish brown colour, with bluish bronze reflections. Beneath white. A pale white spot on each side of neck near the head. Tail deeply truncated and nearly covered with a large flat circular blackish granular shield, white and rounded beneath, and lower part covered with five series of small scales, the central series broader than the lateral ones. Vent shields 1-2. The neck and forepart of the body much thicker.

Length 9 inches.

Habitat. District of Saffragam, near Adam's Peak.

The only specimen of this species, which I have as yet seen, is one sent by Mr. Barnes De Silva from Ratnapoorn.

UROPELTIS GRANDIS. *n. s., nobis.*

Above dark brown with a bluish metallic lustre, anterior part of each scale with a blackish spot. Beneath of a pale yellow colour, spotted brown on the anterior part of scale.

Head of a light olive brown colour. Tail short, abruptly truncated; the truncated surface entirely covered with a large circular, granular shield. Vent scales 1-2.

Total length superiorly, 1 foot 7 inches. Inferiorly, 1 foot 8 inches. Tail shield nearly the size of a shilling piece. Head 8-10 inch in length.—Greatest circumference $2\frac{3}{4}$ inches, near the neck.

Habitat. Southern Province.

The only specimen I have seen of this very large Rough Tail, is one procured by Mr. Balkhuysen of the Colonial Medical Service, from Kerinday near Matura.

UROPELTIS PAEDALIS. n. s., nobis.

Head small, dark olive. Upper parts black with beautiful bluish bronze reflections, irregularly spotted white. Beneath yellowish white, marked with large and small black spots, variously shaped; some pale eyed. Tail very short, obliquely truncated, and with a large flat orbicular granular shield. Length, $6\frac{1}{4}$ inches; circumference $\frac{3}{4}$ inch.

Habitat. Matura. I am indebted to the Rev. Mr. Ondaatje for the only specimen I have examined of this species. The black spots on the lower parts occupy more than one scale, generally two or three contiguous scales; and they are placed without any order in various directions. The chin and throat immaculate.

GENUS. *DAPATNAYA. n. g.*

Tail obliquely truncated, upper part and tip covered with a large semiconical granular shield. Vent shields 1-2.

DAPATNAYA LANKADIVANA. n. s., nobis.

Above dark brown, beneath paler. Scales with pale margins. Head yellowish in some. Rostrum yellow. Shield

of tail sloping down to the lower surface. Vent scales yellow; in some the yellow spot extends beyond the vent.

Length, from 1 to 2 feet.

Thickness nearly the same throughout, about 1 inch.

Habitat. Common at Trincomalie, and in the Kandyan Province. Found 2 or 3 feet under ground, and in ant-hills. The young is of a dark olive brown colour.

DAPATNAYA TREVELYANA. n. s., nobis.

Black above, margin of scales pale. White beneath, with longitudinal series of black spots, formed of central spots on each scale. A line of triangular white spots, with their apices directed upwards, along each side. Vent white. A white line rising from this spot runs over the tail, and another whitish line extends forwards from the vent for about $\frac{3}{4}$ inch. Tail short, and nearly covered with a white semi-conical granular shield, tip ridged, a little produced.

Length from 12 to 18 inches; nearly of the same thickness throughout, about 1 inch.

Habitat. Kandyan Hills, 3 or 4 feet under ground, and in the soil near the roots of Coffee trees and Cane.

Some of the young are of a bluish colour, others are spotted on the back.

TRIBE. NYCTISAURA.

FAM. GECKOTIDÆ.

BOLTALIA.

Toes free, ovate and dilated towards the end, with two series of straight narrow nearly transverse closely adpressed plates beneath, divided by a deep narrow groove, last joint compressed, free, rather exerted, clawed. Thumb dilated, and with a compressed last joint, like the toes, but clawless. Back with granular scales and a few scattered larger granules.

Sides simple. Tail rather depressed, tapering, ringed, with a central series of broad scales beneath.

BOLTAIA SUBLEVIS. Gray.

Above dark rufous brown; beneath sulphureous yellow, sometimes clouded with black. Back granular, with two or more longitudinal lines of larger granules on each side. Scales of chin large. Tail armed with adpressed spines in rings. Femoral pores in males only, from 16 to 20.

Length $5\frac{1}{2}$ inches.

Habitat. The Central and Southern Provinces.

This Gecko I obtained in great abundance in Galle; I have also seen a few at Kaduganava, after the publication of the *Prodromus*. It is rarely seen on the walls of houses, generally on trees, and on the roofs of houses. The rufous brown colour changes at times into a dark grey, mottled with black. When immersed in spirits the rufous brown colour is entirely lost.

This Gecko has been mistaken for *Hemidactylus Leschenaultii*, and also, for a large variety of *H. frenatus*, but the clawless compressed last joint of the thumb will distinguish this Lizard from others. From *Peripia Peronii* it is sufficiently removed by its granular back and armed tail. This Lizard cannot be confounded with *Hemidactylus Coctai*. It has very little resemblance to it, and the thumb of *H. Coctai* is clawed. (*Vide Prodromus Faunæ Zeylanicæ*, vol. I.)

ORDER. BATRACHIA.

SUB-ORDER I. SALIENTIA.

FAM. RANIDÆ. *Frogs. ATTY KITTA. Sing.*

GENUS. RANA. *Linn.*

Skin smooth, hinder extremities very long, formed for leaping; toes palmated, teeth in the upper jaw, and in the palate.

RANA KANDIANA. *n. s., nobis.*

Beautiful grass green above, beneath orange red; inside of limbs slightly vermiculated with yellow. Skin of upper parts rather rough, coriaceous; a white granular ridge on each side. Length $3\frac{1}{2}$ inches.

Habitat. Kaduganava, Kandyan Province.

I have only seen two specimens of this rare frog.

FAM. HYLIDÆ. *Tree Frogs. CHAS ATTY KITTA. Sing.*

GENUS. LIMNODYTES. *Dum. et Bib.*

Tongue long, narrowed in front, widened, forked, free behind; the teeth on the vomer forming two groups, between the internal openings of the nostrils; tympanum distinct; Eustachian tubes middling, fore fingers free; toes completely or partly webbed; subdigital disks slightly dilated; process of the first os cuneiforme blunt, very minute; males with vocal sacs; sacral transversal processes not dilated.

LIMNODYTES MUTABILIS. *n. s., nobis.*

Upper parts very changeable; generally, of a bright green above and yellow beneath; a red line on the outer edge of limbs; sometimes of a dark chestnut on the upper parts, and variegated with yellow and green on the sides and limbs.—Of a more slender form than the common tree Frogs *Polypedates cruciger*, and *P. Leucomystax*. About 2 inches long.

Habitat. Cinnamon gardens; Cotta near Colombo. If not mistaken, we have also seen this elegant frog at Nuwera Ellia. In spirits the colours fade into a pale leaden hue; the red streak on the limbs disappears last.

LIMNODYTES MACULATA. *n. s., nobis. **

Brown, spotted and streaked with black or dark brown; beneath pale, seldom spotted. About $1\frac{1}{2}$ inch long.

* I have received from Dr. Webb a Tree frog, $2\frac{1}{2}$ inches long, having the diagonal black marks of *Polypedates cruciger* of Blyth; but, unlike it,

Habitat. Galle, Southern Province.

I believe this species to be generally distributed, but have before mistaken it for the young of *Polypedates leucomystax*.

FAM. BUFONIDÆ. *Toads.* GAMEDEA, *Sing.*

GENUS. ENGYSTOMA. *Gray.*

No tympanum nor parotid visible externally; an oval body; the head and mouth very small, and feet but slightly palmated.

ENGYSTOMA RUBRUM. *n. s., Jerdon.*

Synon. Engystoma cinnamomea. *m. s. n. b.*

Cinnamon red, spotted black; limbs also spotted; belly whitish. Length (young) $1\frac{1}{2}$ inch.

Habitat. Southern India (?) Ceylon.—

this frog is maculated above and beneath, and the posterior sides of thighs are also spotted. White granular spots around the anus. Sides of body yellowish, spotted. Throat white, dotted with black. If Dr. Webb's specimen is of a distinct species, the two other (young) specimens of a very dark brown colour, spotted, with a pale back, are perhaps of the same species. In another (also young) the space, marked like an hour glass, on the back, is of a jet black colour. I am more inclined to believe that all these are different phases of the new species, named by Mr. Blyth, *Polypedates cruciger*.

ADDENDA.

ORDER. SAURA.

TRIBE. GEISSOSAURA.

FAM. SCINCIDÆ, *Scinc.*

EUMECES TAPROBANENSIS, *nobilis.*

Above dark brown, with 6 lines of black dots on the back. Sides of neck and body of a darker brown, minutely dotted white; a few white dots also on the limbs. Beneath whitish. Upper surface of tail of the same colour as the body; under surface dark grey, each scale with a large blackish spot. Head short, subtriangular; muzzle narrow, rounded. Nostril pierced on the upper edge of nasal plate. Eyes large, eyelids scaly, edges lightly granular; lower lid with a series of larger scales. Ears small, circular, dentated anteriorly by two or three scales. Body rather short, subcylindrical. Tail elongated, rounded, tapering, pointed. Limbs 4, small, not wide apart. Toes 5-5, short, unequal, tubercular beneath, clawed. Palms and soles granular.

Head and body, 1. 7-10 inches.

Tail, 2. 6-10 inches.

Found at Newera Ellia by Dr. Webb, Staff Assistant Surgeon. This Scinc resembles in colour and in its elongated form the Lizard which I have identified with *Nessia burtonii*.

ORDER BATRACHIA.

FAM. HYLIDÆ.

POLYPEDATES(?) SCHMARDANA, *n. s., nobis.*

Above brownish grey; beneath white, posterior half of abdomen marbled with black. Eye-brows armed with spines. Back and sides tuberculated. Limbs studded with tubercular sharp pointed spines. About $1\frac{1}{2}$ inch long.

Hab. Adam's Peak.

This novel form of Tree Frog was first found on Adam's Peak by Dr. Schmarda, Professor of Zoology in the University of Prague, to whom I have dedicated this species. It has no resemblance to any other found in Ceylon or Southern India.

Mr. Blyth has recently described three new species of Frogs from my Ceylon collection. J. A. S. B., vol. 1854.

RANA ROBUSTA, *n. s., nobis.*

A moderately large Frog from Ceylon. Limbs exceedingly thick and massive; the third-digits fully webbed. Skin sub-granulose, especially on the lower parts. A slight transverse fold on the breast. Colour dusky above, with a large black patch on the back, another on the croup, and smaller lateral patches. Lower parts yellowish-white, with a V-like mark on the lower surface of the thigh in one of two specimens, both males. The same individual has dusky spots or imperfect streaks on the lower surface of the thigh, and its posterior surface is marked with longitudinal streaks of alternating black and yellowish white. Digital membrane speckled with black. Length from snout to vent 3 in., and of hind limb 4 in., of which the foot is half. Presented by Dr. E. F. Kelaart.

LYMNODYTES MACULARIUS, n. s., nobis.

Differs from *L. ERYTHREUS* by the slightly but distinctly papillose skin of the back, and non-verrucose posterior surface of thighs; by its shorter and stouter limbs, and short anterior digits, the two outermost of which have their terminal disks smaller than in *L. ERYTHREUS*. There is a broad black band from nostril to loin, bordered above and below by narrow pale yellow streaks. Entire lower parts spotless light yellow, as also the upper lip. A black spot at the shoulder, and line along the posterior surface of the fore limb. One or more similar lines on the hind limbs; the thighs beautifully mottled with black; and a black medial line along the back, which becomes double over the loins. Length of male from muzzle to vent $2\frac{3}{4}$ in.; of hind limb $3\frac{1}{2}$ in.; of which the foot measures $1\frac{1}{4}$ in. Hab. Ceylon. Dr. E. F. Kelaart.

LYMNODYTES LIVIDUS, n. s., nobis.

A large species with short and remarkably fleshy thighs. Colour dusky above, paler and tinged with ruddy on the sides which are spotted with black. Chin, throat, and breast, minutely variegated pale and dusky. Belly and thighs underneath, sullied whitish. Above, the thighs and shanks are paler than the back and tinged with ruddy, having several dusky cross-bands. Posterior surface of thigh smooth or non-verrucose. Length from muzzle to vent $3\frac{1}{4}$ in., and of hind leg $4\frac{1}{4}$ in., of which the foot is $2\frac{1}{4}$ in. From Colombo. Dr. E. F. Kelaart.

CEYLON ORNITHOLOGY.

IN order to place before the Ceylon student of Natural History a systematic account of the Genera of Birds, I have extracted for their use descriptions of the Genera of Ceylon Birds from the celebrated work of GRAY and MITCHELL, which from its costly character is beyond the reach of many.

My descriptions of Ceylon Birds formed originally part of a work contemplated by Mr. Layard and myself: the former undertaking to write an account of the habits of the birds. But owing to Mr. Layard's unexpected departure from Ceylon in search of health, we are not able to work together. Therefore, I can only promise to bring before the public, descriptions of birds which I have either seen or examined. And with a view of making the paper more complete, I shall add from authentic sources descriptions of other birds, of which I have not at present any specimens to describe from.

It will also be my endeavour to describe the habits of some of the birds which have come within the limited field of my own observation, trusting that at no distant time some Field Naturalist will finish the work now begun.

Gray's Genera of Birds adapted to Ceylon Ornithology.

ORDER. I. ACCIPITRES.

This order embraces the Birds of Prey; they have the *bill* of various length and form, more or less compressed, with the *culmen* suddenly hooked at the tip, and acute: the base more or less covered with a *cere*, in which are pierced the variously formed nostrils; the *wings* lengthened and pointed; the *feet* strong, with *tarsi* moderate, generally rounded and covered with scales of different shapes; the *toes* three before and one behind, all armed with strong *claws*, and their soles invariably rough.

The first Sub-Order

ACCIPITRES DIURNI, or Diurnal Birds of Prey,

are distinguished from those that pursue their food in the twilight or at night, by the lateral position of their *eyes*: the base of the upper mandible covered for nearly half its length with a prominent *cere*, in which the nostrils are placed: the *tarsi* moderate, scaled, and rarely covered with plumes.

FAM: FALCONIDÆ.

SUB-FAM: AQUILINÆ, or EAGLES.

GENUS. AQUILA. *Mahr*.

Bill strong at the base, and with the apical portion of the *culmen* much curved to the tip, which is greatly hooked and acute: the sides much compressed, and the lateral margins festooned; the *nostrils* placed at the *cere*, large, and rather oblique. *Wings* lengthened and acute, with the fourth and fifth quills equal and longest. *Tail* long and wedge-shaped, or rounded at the end. *Tarsi* rather longer than the middle toe, robust, and entirely clothed to the base of the toes with feathers. *Toes* moderate, strong, lateral ones unequal, and all armed with strong, curved, acute claws: the inner the strongest.

GENUS. SPIZAETUS. Vieill.

Bill moderate, the *culmen* straight at the base, and much arched to the tip, which is acute and compressed, and the lateral margins festooned; the *nostrils* large and rather rounded. *Wings* moderate, reaching to half the length of the tail, with the fourth and fifth quills equal and longest. *Tail* long and slightly rounded at the end. *Tarsi* slender, much longer than the middle toe, and plumed to the base of the toes. *Toes* long, strong, the inner one much longer than the outer, which is united to the middle one by a membrane: all covered above with small scales except at the apex, where there are a few transverse ones, and each toe armed with a long, strong, curved and acute claw.

GENUS. CIRCAETUS. Vieill.

Bill moderate, *culmen* at the base straight, and much curved to the tip, which is hooked and acute, the lateral margins festooned; the *nostrils* large, oblique, and suboval. *Wings* lengthened and acute, with the third and fourth quills equal and longest. *Tail* long and even. *Tarsi* much longer than the middle toe, feathered below the knee, and entirely reticulated. *Toes* short, strong, and covered with small scales, except at the tips; the outer united to the middle by a membrane; the *claws* long, curved, and acute.

GENUS. HALIAETUS. Sav.

Bill large, *culmen* straight at the base, and curved to the tip, which is hooked and acute, the sides compressed, the lateral margins slightly festooned, and the lores naked; the *nostrils* moderate, linear, and oblique. *Wings* lengthened and acute, with the third, fourth, and fifth quills nearly equal and longest. *Tail* moderate and rounded, *Tarsi* short, strong,

covered in front with transverse narrow scales, and with small irregular ones posteriorly, and on the sides. *Toes* long, mostly covered above with transverse scales; the *claws* long, curved, and acute.

GENUS. PONTOAETUS. Kaup.

The characters of *Haliaetus*, except that the *tarsi* are covered in front with transverse scales, posteriorly with large irregularly placed scales, and on the inner side with small ones. *Toes* almost entirely covered above with transverse scales.

GENUS. HALIASTUR. Selby.

Most of the characters are similar to those of *Haliaetus*; but the *tarsi* are covered in front with large obliquely placed scales, posteriorly with large irregular scales, and the sides with small ones.

SUB-FAM: FALCONINÆ, TRUE FALCONS.

GENUS. FALCO. Linn.

Bill short, strong, with the *culmen* much arched from the base to the tip, which is acute: the sides compressed, the lateral margins strongly toothed near the tip; the *nostrils* placed in a short cere, naked and rounded, with a central tubercle. *Wings* lengthened and acute, with the second and third quills the longest, and the first and second notched near the tip. *Tail* long and rounded. *Tarsi* short and strong, covered with small irregular scales, and the tibial feathers covering the knee. *Toes* lengthened and strong, the lateral ones unequal; the hind toe long, armed as well as the inner with a strong, hooked, acute claw.

GENUS. HYPOTRIORCHIS. *Balc.*

The characters in common with *Falco*; but the *tarsi* more or less lengthened, somewhat slender, and covered in front with large hexagonal scales. *Toes* very long and slender.

GENUS. TINNUNCULUS. *Vieill.*

The forms agree with those of *Falco*. But the *tarsi* are more or less lengthened, strong, and covered in front with large transverse hexagonal scales. *Toes* moderate and strong.

SUB-FAM: MILVINE, or KITES.

GENUS. BAZA. *Hodgson.*

Bill moderate, elevated at the base, which is broad, the sides compressed, the *culmen* much arched, and the lateral margins furnished with two small teeth near the tip, the lower mandible also furnished with small teeth near the tip; *lores* clothed with small feathers; the *nostrils* placed in the *cere*, in the form of an oblique slit. *Wings* lengthened, nearly reaching to the end of the tail, with the third and fourth quills the longest. *Tail* long and broad. *Tarsi* thick and very short, longer than the middle toe; basal half plumed, and the other part covered with small scales. *Toes* thick, free at their base, the inner longer than the outer; the claws small and acute.

GENUS. MILVUS. *Cuv.*

Bill laterally compressed, the *culmen* straight at the base, and then much curved to the tip, which is acute, the lateral margins somewhat straight; the *nostrils* oval, and placed rather obliquely in the *cere*. *Wings* very long, with the third and fourth quills the longest. *Tail* very long, broad, rounded, or more or less forked at the end. *Tarsi* very short, partly

plumed from the base, and the rest covered with scales. *Toes* rather short, with the outer united at its base to the middle one, the *claws* long and curved.

GENUS. ELANUS. *Sac.*

Bill short, very broad at the base, and compressed towards the tip, which is hooked and acute; the *nostrils* large and suboval. *Wings* very long, pointed, and reaching beyond the tail, with the second quill the longest. *Tail* long, and slightly emarginated. *Tarsi* short, nearly the length of the middle toe, with the basal part plumed, and the other covered with reticulated scales. *Toes* moderate, broad, and free at the base, with the outer much shorter than the inner toe; the *claws* strong and curved.

SUB-FAM: ACCIPITRINE, or SPARROW HAWKS.

GENUS. ASTUR. *Lacép.*

Bill short, broad at the base, and with the sides gradually compressed to the tip; the *culmen* elevated, and much arched to the tip, which is acute, and the lateral margins festooned in the middle; the *nostrils* large and suboval, and placed in the basal *cere*. *Wings* long, reaching to the middle of the tail, with the third, fourth, and fifth quills nearly equal, and longest. *Tail* long and broad. *Tarsi* rather longer than the middle toe; the anterior and posterior sides covered with broad transverse scales. *Toes* more or less lengthened, strong, and padded beneath each joint; the lateral toes unequal; the inner and hinder ones equally long and strong, and armed with long, strong, and curved claws.

GENUS. ACCIPITER. *Kriss.*

Bill very short with the *culmen* much arched to the tip, which is acute; the sides much compressed, and the lateral

margins festooned; the *nostrils* placed anteriorly in the cere, large and suboval, partly concealed by the projecting hairs of the lores. *Wings* moderate, with the fourth and fifth quills nearly equal, and longest. *Tail* long, ample, and nearly square at the end. *Tarsi* longer than the middle toe, covered in front with nearly obsolete scales. *Toes* more or less lengthened, and padded beneath the joints; the lateral ones unequal, and the inner and hind toes equal in length, and both with a strong curved claw.

SUB-FAM: CIRCINÆ, or HARRIERS.

GENUS. CIRCUS. *Lacép.*

Bill moderate, elevated at the base of the culmen and arched to the tip, which is hooked; the sides compressed, and the lateral margins festooned; the *nostrils* large, oval, and partly concealed by the curved hairs of the bases. *Wings* long, with the third and fourth quills nearly equal and longest. *Tail* long and rounded on the sides. *Tarsi* long, slender, and compressed, the outer side covered with transverse scales, and the inner with small scales. *Toes* moderate, with the outer one longer than the inner; the *claws* long, slender and acute.

SUB-ORDER. ACCIPITRES NOCTURNI.

Nocturnal Birds of Prey.

FAM: STRIGIDÆ, or OWLS.

SUB-FAM: SURNINÆ, or HAWK OWLS.

GENUS. ATHENE. *Boie.*

Bill short, partly concealed by the projecting plumes, the sides compressed, the *culmen* much arched to the tip,

which is hooked and acute; the *nostrils* basal, lateral and hidden by the frontal plumes. *Wings* rather long and rounded, with the third and fourth quills the longest. *Tail* moderate and nearly even. *Tarsi* longer than the middle toe, and covered with plumes. *Toes* short, and covered with scattered hairs; the *claws* long, arched and acute.

SUB-FAM: BUBONINÆ, or HORNED OWLS.

GENUS. EPHIALTES, *Keys, and Bl.*

Bill moderate, the base concealed and broad, the sides compressed, with the *culmen* flattened at the base, and curved to the tip, which is hooked; the lateral margins curved; the *nostrils* rounded, placed in the forepart of the cere, and covered by the basal plumes. *Wings* long, with the second, third and fourth quills nearly equal and longest. *Tail* short, and more or less even. *Tarsi* rather long, and covered with short plumes to the base of the toes. *Toes* long, covered with small scales at the base, and with three or four transverse scales at the tip; the *claws* moderate, strong and curved.

GENUS. KETUPA. *Less.*

Bill large, broad at the base, compressed towards the tip, which is hooked, the lateral margins slightly arched; the *nostrils* lateral, placed in the anterior part of the cere, and hidden by the projecting plumes. *Wings* moderate, with the third and fourth quills equal and longest. *Tail* short, and nearly even at the end. *Tarsi* rather long, covered at the base with down, and towards the tips with minute scales. *Toes* moderate, strong, covered with small scales, except at the tips which are furnished with three or four transverse scales, the lateral toes unequal, the *claws* long, strong and curved.

SUB-FAM: SYRNIINÆ, or OWLETS.

GENUS. SYRNIUM. *Sav.*

Bill moderate, strong, with the base broad, and concealed by the frontal plumes; the sides compressed, and the culmen arched to the tip, which is hooked; the *nostrils* basal, lateral, and medial, with the opening large and oval. *Wings* long and rounded, with the fourth and fifth quills equal and longest. *Tail* long, broad, and more or less rounded. *Tarsi* short, strong, thick, and densely clothed with plumes. *Toes* moderate, densely plumed to the end of each toe, the *claws* long, acute, and slightly curved.

SUB-FAM: STRIGINÆ, or OWLS.

GENUS. STRIX. *Linn.*

Bill long, mostly concealed at the base by the projecting plumes; the sides much compressed, and the culmen arched to the tip, which is acute and hooked; the *nostrils* large, partly covered by a membrane, with the opening oval, and slightly hidden by the hairs. *Wings* very long, with the second quill the longest. *Tail* short and generally even. *Tarsi* much longer than the middle toe, slender and covered with short soft plumes. *Toes* long, and covered with scattered hairs; the lateral ones unequal, the outer much shorter than the inner; the hind toe short and thick; the *claws* long, curved and acute.

DESCRIPTION

OF

BIRDS OF CEYLON.

ORDER. ACCIPITRES.

SUB-ORDER. ACCIPITRES DIURNI.

Diurnal Birds of Prey.

FAM: FALCONIDÆ.

a. AQUILINÆ.

AQUILA BONELLII, *Temm.* The Genoese Eagle.*Syn.* Aquila intermedia, *Bonelli.*Aquila fasciata, *Vieill.*Nisaetus grandis, *Hodgson.*

Uniform dark brown above, white beneath with dark brown longitudinal streaks on the chin, throat and breast; upper part of inner web of primaries streaked and spotted with white. Tail slaty blue with darker transversal bands, tip palish; under tail coverts white, irregularly barred with rufous brown. Thighs barred with rufous brown. Bill horn colour, cere yellow, tarsi yellow, claws black.

The only specimen of this Eagle examined is one found by Dr. Templeton, it measured 2 feet 3 inches; closed winged, 1 foot 6 inches. *Habitat* not known.

AQUILA PENNATA, *Gmel.* The Pennated Eagle.

Syn. *Aquila minuta*, *Brehm.*

Spizaetus milvoides, *Jerdon.*

Head and neck light rufous brown with dark medial streaks. Back, wings, and upper surface of tail dark brown. Under parts white, breast and lower part of neck streaked with rufous brown; shafts of feathers of a darker shade. Under wing coverts white, shafts brown, a few brown spots on the outer ones. Upper tail coverts rufous with whitish tips and margins. Extreme tip of tail pale. Thighs and legs white, indistinctly spotted light rufous. Bill slaty blue; toes yellow; claws black. Length 1 foot 6 inches. Wing 1 foot 3 inches.

Shot at Point Pedro by Mr. Edgar Layard. This is one of our rarest indigenous birds of prey.

AQUILA MALAYENSIS, *Reinw.* The Black Eagle.

Syn. *Aquila pernigra*, *Hodgson.*

Neopus perniger, *Hodgson.*

Nisaetus? ovivorous, *Jerdon.*

Ictinaetus Malaicensis, *Blyth.*

Uniform black above, rather dusky below (a few white spots scattered on the body and tail of the specimen examined). Tail barred with broad brownish bands. Bill blue with black tip, cere yellow. Toes yellow, claws black. Irides brown. Occipital crest black. About 2 feet 6 inches long.

This is also a rare bird of prey in the Island. One or two only are occasionally seen on the Kandyan Hills. The specimen we have examined was procured by Mr. Charles Kelaart, at Kaduganava.

SPIZAETUS NIPALENSIS, *Hodgson, Gray.* The Beautiful Crested Eagle.

Syn. *Nisaetus Nipalensis*, crested var. young. *Hodg.*

Nis. pulcher, adult, *Hodg.*

Falco orientalis? } *Temm. et Schlegel.*
Falco lanceolatus?

Head and neck brown; the cheeks and chin have a triple longitudinal marking of brown. Thighs, tarsi and inferior tails coverts transversely barred with dark fawn. A graceful pendant crest, composed of plumes of a brown colour. Bill blue at the base, black at the tip; the cere greenish yellow, the iris golden; the toes yellow, and the nails black. *Hodgson.**

The above description is evidently of a young bird. An adult specimen which I sent to Mr. Blyth has been identified by that Naturalist with *Sp. Nipalensis*. This beautiful Eagle is rarely seen, and that, too, only on the Alpine parts of the Island. The only specimen I was so fortunate as to secure is now in the Museum of the Asiatic Society of Bengal. It is 30 inches long.

SPIZAETUS LYMNAETUS, var. *Horsf.* The Common Crested Eagle.

Syn. *Falco cirrhatius*, *Gmel.*

Falco cristatellus, *Temm.*

Falco caligatus, var. *Raffles.*

Falco niveus, var. *Temm.*

Nisaetus Nepalensis, crestless var. *Hodgson.*

This Eagle is seen of several shades of colour and markings. Two most distinct varieties are seen in Ceylon, one much darker than the other and with a more developed crest. The darker variety may be thus described.

* The whole of the under parts, from the head downwards, were beautifully barred rufous in the Ceylon specimen.

Hair brown above, white beneath. Head and neck of a rufous brown with narrow blackish mesial streaks. Chin, throat, and under part of body marked with broad dark rufous brown longitudinal streaks. Tail barred broadly. Under surface of alar and tail quills white and barred with dark brown. Under tail coverts rufous. Under wing coverts white and spotted dark brown. Thighs rufous and barred with pale white. Tarsi white and freckled with brown. Occipital crest black with white tips, 4 inches long. Length 1 foot 10 inches. Wing 13 inches.

The above characters correspond closely with Mr. Blyth's description of a specimen of this Eagle received from Midnapore. (J. A. S. B. vol. 1845, page 175).

The paler and more numerous variety, is not unlike *Falco niveus*, Temm.

White predominating. Head and neck pale white or rufous with narrow mesial streaks of a more or less dark rufous colour. Base of dorsal feathers white and the tips of some of the longer ones also white. The cheeks, chin and throat immaculate. Breast and abdomen with a few rufous spots and mesial streaks. Thighs indistinctly spotted with light rufous. Tarsi white, immaculate. Occipital crest composed of white and black plumes, some of the latter also white tipped. Rather smaller than the dark variety.

There is also a crestless variety of this species, in colour resembling the last described bird.

The crested variety is rather abundant at certain seasons of the year in all the Maritime provinces and lower Kandyan Hills. It is a bold and powerful bird, attacking full grown fowls in the native villages. In the Northern provinces they are frequently seen on the topmost branches of the Banyan tree, where the nests of crows furnish them with dainty food. At Kaduganava this Eagle is often seen soaring above Dawson's monument, sometimes alighting on its summit to devour its prey; it is not however a very common bird on the Kandyan Hills. I procured only a few specimens from

Kandy and Trincomalie, whereas, as many as seven were shot by Mr. Layard on one tree in the Court yard at Point Pedro.

PONTOÆTUS LEUCOGASTER, Gmel. The White Bellied Sea Eagle.

Syn. *Falco leucogaster*, Gmel.

Falco Blagrus, Daudin.

Falco dimidiatus, Raffles.

Falco albicilla, var. Latham.

Ichthyætus cultrungis, Blyth.

Haliaëtus sphenurus, Gould.

Head, neck, and abdomen white. Back and wings ashy brown, primaries nearly black; most part of the inner web of secondaries white. Anterior two-thirds of tail dark brown, the rest white. Upper tail coverts brown, slightly tipped with white; lower white throughout; shorter lower wing coverts white, with a few ashy splashes; longer ones ashy brown. Thighs white. Tarsi and toes yellow, claws black. Bill bluish. Length 3 feet 5 inches. Wing 1 foot 9 inches.

This is the largest of our Ceylon Birds of prey, common on the Northern Coasts, rarely seen on the South-Western parts of the Island; very abundant at the Salt lakes of Hambantotte, and the Bay of Calpentyn. Mr Layard writes, "In fact, wherever there is much shallow salt water, particularly if the receding tide leaves bare a large extent of mud, there will this Sea Eagle be found fishing in company with *Haliastur Indicus* and *Milvus Gorinda*. Unlike them, however, the Fish Eagle prefers living prey to garbage, and is particularly destructive among the sea snakes, which are very abundant in the sea between Point Pedro and Point Calamanar on the opposite coast. We have frequently seen this bird capturing its prey. It keeps soaring very high, and then descends very rapidly,

with its wings half closed and upraised, its legs pendant, and its body swaying to and fro, like the weight attached to a parachute. When close to the object of its pursuit, the legs are suddenly darted out, the prey seized near the head, the fall arrested, and without touching the mud or water, the noble bird soars upwards with its victim writhing in its claws. If it fails to kill the eel or snake when on high, the booty is dropped, and we have often secured a good specimen of marine snake from this mishap of the bird."

"The Sea Eagle constructs a large nest (to which it adds yearly) among the branches of some large tree, generally an aged Bo-tree (*Ficus religiosa*) is selected, and owes its security to the superstitious fears of the ignorant natives, who, in spite of all our promised reward, have invariably refused to ascend the trees, alleging that the guardian demons of the sacred tree would hurl them headlong down if they attempted to climb the tree for such profane purpose as robbing a bird's nest. We have, therefore, as our own climbing days are over, never been able to procure the eggs of this species." [Mr. Layard in MS.]

PONTOAETUS ICHTHYAETUS, Horsf. Brown Tank Eagle.

Syn. Falco Ichthyaetus, Horsf.

Plumage in general brownish; quills deep brown; head grey; chin whitish; neck brownish grey; breast and belly pale ferruginous brown; lower part of the latter, the vent and thighs white; tail dusky at the tip. Length 2 feet 4 inches. Latham.

The only specimen secured by Mr. Layard is now with Mr. Blyth.

Found in the large tanks in the Northern parts of the Island.

CIRCAETUS CHEELA, Latham. The Undulated Bacha.

Syn. Falco cheela, Latham and Gmelin.

Hematornis undulatus, Vig.

Circaetus Nepalensis, Hody.

Falco albidus, Temm.

Falco Bacha, Daudin. (African Race.)

Falco Bido, Horsf. (Malabar Race.)

Head black, occipital crest tipped white or fulvous. Back fuscous brown. Small wing coverts spotted white. Upper tail coverts tipped white. Neck and breast dark rufous brown with palish tips. Abdomen, lower wing and tail coverts rufescent and spotted with small round white spots, (a blackish ring round some of the white spots). Wings and tail barred broadly with black and cream colour. Tip of tail feathers whitish. Thighs rufescent and spotted with white ocelli. Length 1 foot 10 inches. Wing 1 foot 2 inches.

Very common in the Northern parts of the Island. Rarely seen on the Kandyan Hills. There is a lighter coloured allied species, found at Trincomalie, which Mr. Blyth has named

HĒMATORNIS SPILOGASTER, Blyth.

In this species the tips of all the feathers of the head and neck are more broadly tipped with fulvescent white. The breast and abdomen of a lighter rufous colour, and more thickly spotted with white. Mr. Blyth in describing this new species, which I considered only a local variety of *C. Cheela*, observes, that "it is rather smaller than *H. Cheela*, (Latham, vel *H. undulatus*, Vigors) and remarkable for having the under parts as in the adult of that species, while the upper parts, throat and tail retain in the adult the same colouring as that of the young of *H. Cheela*, a phase of plumage which we have never seen among the multitude of Bengal specimens of *H. Cheela* examined, but which is exhibited in the two now received from different parts of Ceylon." Irides yellow.

There is another specimen in my possession which cannot be referred to either *H. Cheela* or *H. Spilogaster*, and which I shall now describe.

CIRCAËTUS, (?) *Sp.*; probably new.

Upper parts like *H. Spilogaster*. Breast with broad dark rufous brown drops, and rufous mesial lines on the outer abdominal feathers. Ventral, lower tail coverts and thigh feathers barred with rufous. Lower wing coverts brown, and ocellated with white. Tail and wing quills as in *H. Cheela*. Bill yellow, with blackish tip. Feet yellow. Irides golden. Length 2 feet 1 inch. Wing 1 foot. Found at Trincomalie in company with *H. Spilogaster*.

HALIASTUR INDUS. *Bodd.* Shiva's Fishing Eagle.

Syn. *Falco Indus*, *Boddaert*.

Falco Ponticerianus, *Gmelin*.

Haliaëtus girrenara, *Veillot*.

Haliaëtus garruda, *Lesson*.

Milvus rotundicaudatus, *Hodg.* (young.)

Head, neck, and breast white with narrow brown mesial streaks. Back, tail, legs, and under tail and wing coverts bright rufous chesnut. Shafts of dorsal feathers, and upper wing coverts black. Wing rufous, with the exception of the outer quills, which are blackish. Bill pale yellow at the tip. Irides pale yellow. Tarsi and toes pale yellow. Claws black. Length 1 foot 5 inches. Wing 1 foot.

This handsome Eagle is found with the common Fishing Kite (*Milvus Govinda*) in all the Maritime provinces, and very abundant at Trincomalie and Jaffna; as many as twenty or thirty are sometimes seen together. Although fish is their favourite food, they are not unfrequently seen to eat carrion, or even to carry away poultry.

SUB-FAM: FALCONIDÆ.

FALCO PEREGRINUS, *Linn.* The Peregrine Falcon.

Syn. *Falco barbarus*, *Linn.*

Falco communis, *Brisson*.

Falco calidus, *Latham*.

Falco lunulatus, *Daudin*.

Upper parts ashy. Head and neck shaded with white; a black patch under the eye. Beneath white with brown or blackish streaks. Wings ashy, inner web of quills barred with white, or rufescent white, upper wing coverts and scapularies, white or rufescent. Under wing coverts white, and barred with brown. Tail and upper tail coverts, ashy brown with white transverse bars; tip white. Bill bluish. Tarsi and toes yellow; claws black. *Female*.

Males are darker throughout and blackish on the head. Dorsal feathers spotted and barred with black.

Length 1 foot 4½ inches. Wing 1 foot.

This widely distributed Falcon is found in the Northern and North-Eastern Provinces. Seldom more than a pair seen at a time. They are generally found on open plains in search of birds and small reptiles.

FALCO PEREGRINATOR, *Sundeval*. The Shaheen Falcon.

Syn. *Falco shaheen*, *Jerdon*.

Falco sultaneus, *Hodgson*.

My indefatigable friend Mr. Edgar Layard obtained a specimen of this elegant Falcon in Saffragam near the foot of Adam's Peak, but which I have not had the pleasure of inspecting.

The young male of this bird is thus described by Dr. Jerdon.

Young male. Plumage above generally of a dark cinereous or dusky blackish hue, darkest on the head, hind neck and cheek striped; most of the feathers are narrowly edged with rufous, those on the lower part of the back and rump more broadly so. There is some rufous on the forehead, and on the back of the head where it forms a sort of crucial mark. Tail paler than the rest of the body, faintly barred with rufous, and tipped the same. Chin and throat pale rufous yellow, unspotted; cheeks of the same tint, with narrow dark stripes. The rest of the plumage beneath bright rufous or chestnut, with longitudinal dark brown markings on the centre of the body, oblong spots on the sides, and arrow-shaped markings on the lower part of the abdomen. Under wing coverts, rufous, barred with brown; quills barred with rufous on their inner webs. Bill bluish, darker on the tip; cere and orbital skin pale yellow; irides dark brown; legs and feet yellow. Length 15 inches. Wing 11 inches. Tail $5\frac{1}{2}$ inches. Tarsus nearly 2 inches. Centre toe and claw $2\frac{1}{2}$ inches. Weight 1lb.

The young female "differed from the male in having the chin, throat and cheeks white, in the rufous edgings to the feathers being very indistinct, and the plumage generally being of a darker hue."

"After the first moult, the markings of the lower surface disappear, except a few on the lower part of the abdomen and leg feathers, the plumage above becomes more of a bluish tinge, and the edgings and barrings disappear; with further moultings, the shade of the plumage above becomes still lighter, and of a slaty blue, the markings beneath vanish entirely, and the rufous tint of the breast becomes paler."

This handsome Falcon "is found throughout the whole of India, from the Himalayas to the extreme south of the Peninsula. It is well known to native Falconers." In Ceylon we presume it is a rare bird, as Mr. Layard only met with one specimen during his eight years' residence in the Island.

TINNUNCULUS ALAUDARIUS, *Brisson.* The Kestrel Falcon.

Syn. Falco alaudarius, *Brisson.*
Falco Tinnunculus, *Linn.*
Falco fasciatus, *Reszlius.*
Falco bruneus, *Bechotum.*
Falco rufescens, *Swainson.*
Falco interstinctus, *McClelland.*

Head and neck pale ash with blackish shafts. Cheek paler, a darker streak from the mouth downwards. Back and upper wing coverts cinnamon brown with triangular black spots at the terminal edge of feathers. Wing quills brown, inner web dentilated with white. Under parts of body pale rufous, with black streaks and spots. Under wing coverts white with brown spots. Tail ashy grey with black subterminal band and white tip. Bill bluish, tip black. Irides yellow. Tarsi and toes yellow. Claws black. Length 1 foot 2 inches. Wing $9\frac{1}{2}$ inches. The female is a more elegant bird and differently maculated.

Upper parts rufescent with dark brown streaks on the head, and blackish bars on dorsal feathers and upper wing coverts. Breast and abdomen rufescent white with brown mesial streaks. Wings dark brown or blackish above and whitish beneath; inner web of quills barred, zigzag white or rufous; lower wing coverts white with small brown spots. Tail rufous, with blackish bars, and a broad black subterminal band; tip whitish. Rather smaller than the male.

The Kestrel, a well known bird of Europe and America, is also very common in India and Ceylon. I have found it in all the Maritime provinces, and also at Kandy and Newera Ellia. They are frequently seen in pairs on open plains in search of field rats, toads, and the young of *Monitor Dracana*. I have found the Kestrel's nest on the rocks of Trincomalie, and also on the sea-girt batteries of that old Fort.

HYPOTRIORCHIS CHICQUERA, *Shaw*. The Small Red-Headed Falcon.

Syn. *Falco ruficollis*, *et* } *Sewainson*.
Falco macrodactylus. }
Falco cirrhatus, *var.* } *Latham*.
Fasciated Falcon. }

Head and upper parts of neck dark rufous, under parts of neck white. Back ashy grey. Breast, abdomen, lower tail coverts and thighs white, with dark ashy bars. Wing dark ashy brown; inner web of quills white with ashy bars. Upper wing coverts ashy and minutely barred brown; lower wing coverts white and barred with brown. Tail ashy above with narrow transverse streaks, paler beneath. Tip whitish and a broad subterminal band. Bill yellow, with black tip. Tarsi and toes yellow; claws black.

Length $11\frac{1}{2}$ inches. Wing $7\frac{1}{2}$ inches. A pair of this beautiful Falcon were seen by Mr. Layard at Point Pedro, where even it is a very rare bird.

SUB-FAM: MILVINE.

ELANUS MELANOPTERUS, *Daudin*. Black-Winged White Kite.

Syn. *Falco clamorus*, *Shaw*.
Falco melanopterus, *Daudin*.
Falco vociferus, *Latham*.
Elanus caerius, *Savigny*.

Above ashy white. Beneath white. Upper wing coverts and ridge black. Tail white, middle feathers greyish. Bill black. Tarsi and toes yellow. Claws black. Irides orange, a black superciliary streak.

Length 1 foot. Wing 10 inches.

This dove-like Falcon is very rare in the Island. I have only one specimen of it from Kandy, and Mr. Layard shot only one near Jaffna.

MILVUS GOVINDA, *Sykes*. The Cheela or Govinda Kite.

Syn. *Milvus cheele*, *Jerdon*.
Milvus melanotus, *Temm*.
Haliaeetus lineatus, *Gray*.
Falco ater? *Gmelin*.
Falco niger? *Brisson*.

Dark brown, with a rufescent shade, edge of feathers pale. Beneath with darker mesial streaks. Tail slightly forked, indistinctly barred blackish. Bill black. Tarsi and toes yellow. Claws black.

Length 1 foot 10 inches. Wing 1 foot 4 inches.

This Kite is very common in all the Maritime provinces. I have not seen it on the hills. It feeds chiefly on fish, and the fishermen with difficulty keep these rapacious birds from stealing fish from their nets. As the fishing boats draw near the shore, hundreds of these Kites are sometimes seen to hover around and manage to get a good feed, with very little exertion on their part, in spite of all the resistance the industrious fishermen can offer.

BAZA LOPHOTES, *Temm*. The Coby Falcon.

Syn. *Baza syama*, *Hodgson*.
Falco lophotes, *Temm*.
Lophotes indicus, *Lesson*.

Head black with a crest composed of a few long black feathers. Chin and neck black. Breast rufous, white barred. Abdomen and vent black. The whole of the upper parts black. Wing black with a greenish shade; scapularies rufous and partly white and black. Bill greenish yellow. Tarsi and toes greenish.

Length $12\frac{1}{4}$ inches. Wing 9 inches.

The only specimen I have seen of this small black crested Falcon was a preserved one in Mr. Layard's collection, which he shot, I believe, in the Wannay district.

SUB-FAM: ACCIPITRINÆ.

ASTUR TRIVIRGATUS, *Temm.* The Indian Goshawk.

Syn. *Astur cristatus*, *G. R. Gray.*

Astur Indicus, *Hodgson.*

Astur palumbarius, *Jerdon.*

Spizaetus rufistinctus, *McClell.*

I do not remember seeing a specimen of this bird in Ceylon. Mr. Layard says he saw a live one at Anarajapoor, and I believe, Mr. Blyth received a preserved specimen of this Hawk from Ceylon.

The following is the original description of McClelland's bird. (*Spizaetus rufistinctus*), which Mr. Gray makes a synonym of *Astur trivirgatus* of *Temm.*

Upper part of the body dark brown, with slight undulations of a deeper tint, breast and throat longitudinally striped with brown; belly and under surface of the wings white, transversely barred with brown; tarsi feathered to the lower third, each feather marked with five transverse bars, the rest shielded; the beak short, much hooked and sharp; claws and toes strong and formidable.

ACCIPITER BADIUS, *Gmel.* Brown's Sparrow Hawk.

Syn. *Falco badius*, *Gmelin.*

Falco Brownii, *Shaw.*

Falco Dussumieri, *Temm.*

Accipiter Dukkenensis, *Sykes.*

Dark rufous brown above, with pale edges to the feathers. Beneath white with brown drops. Wings darker brown on the upper surface; primaries white beneath and barred. Tail ashy and barred with black; lower tail coverts white. Thighs white and spotted slightly. (Young). In the adult, the breast is rufous and barred with white. Bill blue, tip black; irides yellow. Legs yellow. Length 14 inches.

This hawk is known in Ceylon as the "Sparrow Hawk." It is not an uncommon bird in the Kandyan hills and in the Northern Provinces.

ACCIPITER NISUS, *Linn.*

I had once a small live hawk sent from the Kandyan country, but which flew away before I had positively determined the species; it had a close resemblance to the European Sparrow Hawk. Mr. Layard says he has not seen this hawk in the Island. To enable others to identify this bird in Ceylon the following description from Stark's Elements of Natural History is here added:

"Bluish, cinereous above; a white spot on the neck; white beneath, with brown undulations; tail ashy grey, with five bars of blackish cinereous; cere yellowish green; feet and iris yellow. About 12 inches long."

SUB-FAM: CIRCINÆ.

CIRCUS SWAINSONII, *A. Smith.* Swainson's Hen-Harrier.

Syn. *Circus pallidus*, *Sykes.*

Circus albescens, *Lesson.*

Circus Dalmaticus, *Ruppel.*

Falco equipar, *Cuv., M.S.*

Falco cyaneus, *var. A. Lesson.*

Pale ashy above; white beneath. Inner web of some of the primaries dark brown. Upper tail coverts white, with transverse ashy bars. Tail ashy, indistinctly barred; outer rectrices whitish speckled and barred with ash. Bill blackish. Tarsi and toes yellow; claws black. Length 1 foot 1 inch. Wing 1 foot 2 inches.

Generally found on the plains of the low country, and rarely in the Kandyan provinces. It feeds on small birds, frogs and lizards.

Circus cinerascens, *Gould*. The Ashy Brown Harrier.

Syn. *Falco cinerascens*, *Mont*.
Circus Montagui, *Vieil*.

Ashy brown above. Under part of the neck and breast ashy, with rufous mesial streaks to the feathers of the latter. Abdomen, under surface of tail, lower wing and tail coverts white. Upper surface of tail rufous brown and broadly barred; tip white. Thighs white, streaked. Bill blackish; irides light yellow. Tarsi and toes yellow, claws black.

Length 1 foot 6 inches. Wing 13 inches.

Females are more or less of a rufous brown on the back; they have also a nuchal ring and broader black bars on the tail, and the whole of the abdomen of a light rufous colour. Head rufescent. In young birds the upper tail coverts are white. Probably the latter characters are also present when the bird is moulting. This species in its ashy plumage is not unlike the darker varieties of *Circus Seacinsonii*.

The species is common in Kandy and Trincomalie. Reptiles and birds are its chief food.

Circus melanoleucos, *Pennant*. The White and Black Indian Harrier.

I obtained several specimens of this bird from the open plains in Minery, none of which, however, I now have for description, and therefore give its characters from Latham's work.

Length 16 inches; bill black; irides yellow; head, throat, hind part of neck, and back black; breast, belly, thighs, and rump white; lesser wing coverts white, the middle ones black; the greater and secondary quills silvery ash colour; primary quills black. Tail pale silvery grey; legs rufous.

The female is somewhat bigger; general colour silvery grey; on the wing coverts three round black spots, and three others on the outer webs of the second quills; primaries black; sides of the belly, thighs and vent white, transversely striated with rufous red."

Like the other species of Ceylon Harriers, it is reported to feed on birds, reptiles, and small rats and squirrels.

ORDER. ACCIPITRES.

SUB-ORDER. ACCIPITRES NOCTURNI.

Nocturnal Birds of Prey.

FAM: STRIGIDÆ.

SUB-FAM: SURNINÆ.

Athene castanotus, *Blyth*. Ceylon Chestnut-winged Hawk Owl.

Syn. *Athene Castanopterus*, *apud Blyth*.

Head, neck and breast barred with brown and rufescent white. A white spot under the ears. Back and wings bright chestnut and faintly barred with brown. Abdomen white, maculated with brown spots and streaks. Under wing coverts white, with a few brown spots. Vent and lower tail coverts white. Tail and upper tail coverts dark brown and streaked with narrow whitish bars. Thighs whitish and freckled with brown. Bill yellow. Tarsi yellow. Length 7½ inches. Wing 5 inches.

This Hawk-Owl was added to the Ceylon Fauna by Dr. Templeton. It feeds on small lizards and insects. Not uncommon at Colombo. I have also seen it at Newera Ellis, Galle and Kandy.

ATHENE SCUTELLATA, *Raffles*. The Hairy-legged Owl.

Syn. *Ninox Nepalensis*, *Hodgson*.

Strix scutellata, *Raffles*.

Strix hirsuta, *Temm*.

Strix lugubris, *Tickell*.

Athene Malayensis, *Eyton*.

Upper part of head and neck ashy brown; chin white. Back, scapularies and upper tail coverts rufous brown; dorsal feathers have palish edges and white spots. Primaries have brown above, with pale rufous bars, under surface white barred. Under wing coverts fulvescent and streaked with brown. Under surface of neck and breast rufous brown, with fulvescent white edges to the feathers. Abdomen white with large rufous brown spots. Tail dark ashy brown, with broad blackish bars; tip whitish. Upper tail coverts rufous brown and spotted white; under tail coverts white. Thighs rufous. Bill bluish black, with a yellowish culmen. Irides greenish yellow. Toes yellow, curved, with yellow bristly hairs. Claws black. Length 11 inches. Wing $5\frac{1}{2}$ inches.

Not uncommon in the Cinnamon gardens at Colombo. Feeds on insects and lizards.

SUB-FAM: BUBONINÆ.

EPHIALTES LEMPIJII, *Horsf*. The Lempiji Owl.

Syn. *Strix noctula*, *Reinn*.

Scops Javanicus, *Lesson*.

Scops Lempiji, *Horsf*.

Brown spotted with fulvous and black. Breast and abdomen fulvous with blackish mesial streaks and inconspicuous bars and specks. Vent whitish. Outer web of primaries barred with light fulvous, inner web clouded dusky. Tail

clouded with pale fulvous brown. Tarsi pale, freckled. Bill brown; irides reddish brown. Toes brown, claws brown.

Length $7\frac{1}{2}$ inches. Wing $5\frac{1}{2}$ inches.

Some of the specimens are less fulvescent than others, and the blackish spots more numerous, and with a more distinct black patch on the top of the head.

This is the most common of all Ceylon Owls; less common, however, in the higher parts of the Island than in the Maritime provinces. It feeds chiefly on Coleopterous insects.

EPHIALTES SCOPE, *Linn*. The Scops Eared Owl.

Syn. *Scops pennata*, *Hodgson*.

Scops Aldrovandi, *Ray*.

Scops Europeanus, *Lesson*.

Rufous brown, minutely speckled and streaked with dusky brown and rufous. Lower parts paler; abdomen, vent and lower tail coverts more white spotted; small white spots on the outer web of primaries; inner web of secondaries white barred. Tail barred and speckled with white and rufous. Bill brown. Irides yellow. Toes brown; claws dark brown.

Length $5\frac{1}{2}$ inches. Wing 4 inches.

This elegant little owl is rare in Ceylon. I met with only one specimen (alive) at Trincomalee which Mr. Blyth has seen and identified with *Scops Pennata*, *Hodg*. Mr. Layard has not been so fortunate as to meet with this species, nor has he seen the next.

EPHIALTES SUNIA, *Hodgson*. The Yellowish Red Eared Owl.

Syn. *Ephialtes scops*, *apud Blyth*.

General colour, a bright ferruginous red, with black shafts

to most of the plumage. It is less speckled and barred than *Scops pennata*. An albescent line on the scapularies, with black tips. Abdomen whitish yellow. Rather smaller than the last.

I have not seen this beautiful owl lower than Dimboola (4000 feet). It is not common. Mr. Layard has not met with it in Ceylon. The specimen I sent Mr. Blyth was identified by him with *Scops sunia* of Hodgson, which he still thinks is only a variety of *Ephialtes scops*, Linn.

KETUPA CEYLONENSIS, Gmel. The Large Eared Owl.

Syn. *Strix Ceylonensis*, Gmel.
Strix Leschenaultii, Temm.
Strix Hardwickii, Gray.
Strix dumeticola, Tickell.
Cultrunguis nigripes, Hodgson.

Above light ferruginous brown, with dark brown mesial streaks and pale spots on the dorsal feathers. Under part of neck whitish. Breast and abdomen light rufescent, minutely barred; each feather with a blackish longitudinal streak. Wing quills freckled and barred white and brown. Tail brown, with narrow ferruginous bars; tip rufescent. Bill blackish. Irides bright yellow. Length 1 foot 7 inches.

This large owl is very abundant in the Island, particularly in the Maritime provinces. It feeds on fish, rats, mice, &c.

SUB-FAM: SYRNINÆ

SYRNium INDRANI, Sykes? The Devil Bird.

I have not seen this bird alive, though it is common enough

in the forests. A specimen of this was many years ago in the Museum at Colombo. Above dark brown, barred. Abdomen whitish, barred. Toes densely covered with plumage. Irides yellow. Claws black. Length about 1 foot.

SUB-FAM: STRIGINÆ

STRIX JAVANICA. De Wormb? The Yellow Barn Owl.

Syn. *Strix flammeus*, var.
Strix candida, Tickell.

Upper parts ochry yellow, speckled with grey, white and brown spots. Face white, margined with a rufous circle. Under parts yellowish white and spotted with brown. Inner web of primaries indistinctly barred. Tail speckled with dark grey, and slightly streaked. Thighs white. Bill horn colour. Irides pale yellow. Tarsi and toes yellowish brown; claws pale yellow. Length 1 foot 2½ inches. Wing 11 inches.

Found by Mr. Layard in the old Fort at Jaffna. The above description is taken from the only specimen he procured.

APPENDIX.

ALPHABETIC

In order to keep the Ceylon student of Natural History up to other departments of Zoology, in addition to those which the Author is more particularly engaged in, it is his intention to republish in each part of the Prodromus now in progress of publication, the labours of Naturalists in Europe as they appear in periodical publications of the day. With this object in view, he has much pleasure in adding to this Part characters of new species of Land Shells (collected in Ceylon by Mr. Edgar Layard) from the pen of the celebrated Malacologist W. H. Benson, Esq., and also descriptions of a new species of Mungous by Dr. Gray.

From the Proceedings of the Zoological Society of London.
Annals and Magazine of Natural History, No. 67, July 1853.

Notice of two VIVERRIDÆ from Ceylon, lately living in the Gardens. By J. E. GRAY, Esq., F.R.S., &c.

The specimens here noticed were brought from Ceylon by Alexander Grace, Esq., (late Deputy Queen's Advocate, Southern Province).

The first is the species which I described some years ago under the name of *Herpestes Smithii* (Mag. Nat. Hist. 1837, II.) from a specimen which was living in the Surrey Zoological Gardens, now preserved in the collection of the British Museum: that specimen was said to have been sent from the Cape of Good Hope, but this must have been a mistake, as it is quite unknown to Dr. Burchell, Dr. A. Smith, Mr. Sweet, Dr. Wahlberg, or other Zoologists who have written on the animals of South Africa. Mr. Grace informs me that it is an inhabitant of the interior part of Ceylon. It is by far the most beautiful species of the genus.*

The second is a new species of CYNICTES, which I propose to call CYNICTIS MACCARTHIE.

Teeth normal. Red brown; hair elongate, flaccid, pale brown, with a broad, black subterminal band, and a long whitish brown tip; of hands and feet shorter. Feet blackish brown, hair white tipped. Claws elongate, slender, compressed, especially of the two middle toes of the fore feet. Tail redder; hair elongate, one coloured red. Ears rounded, hairy.

Habitat. Ceylon; Jaffna, North of Ceylon, (A. Grace, Esq.)

* This Mungous I have named in the Prodrômus Faune Zeylanicæ, *Herpestes Rubiginosa*, and doubtfully cited *H. Smithii* of Gray as a Synonym. It is now clear that *H. Smithii* is a native of Ceylon, and not of Africa. I have found it common in the Northern and Southern Provinces of the Island.—E. F. K.

This species somewhat resembles *Cynictis Melanura* in general colour, but the hairs are much longer, not so adpressed, and when the individual colour of the hair is examined, most distinct.

I have proposed to name this interesting animal after Mrs. MacCarthy, the wife of the Secretary of the Colony, and the daughter of Mr. Hawes, the Assistant Secretary to the Colonies, who is much interested in the study of Natural History, and has kindly sent me several very interesting natural productions of Ceylon.

The skull differs from all the other *Herpestes* that I have examined, in the back of the nape being deeply and sharply notched instead of transversely truncated, the notch in the living animal being filled up with a cartilaginous septum.*

* *See non vidi*, E. F. K.

Characters of new Land Shells, collected by EDGAR L. LAY-
YARD, Esq., in Ceylon. By W. H. BENSON, Esq.

1. *Streptaxis Layardiana*, nobis.

Testa arcuato-rimata, depresso-ovata, abbreviata, lata, leviter striata, albido-cornea; spira subelevata, apice planulato, excentrico; sutura crenulata: anfractibus 5, convexiusculis, ultimo ad latus deviante, basi convexiuscula, levi; apertura straminea, subtriangulari uniplicata, marginibus callo lamellam intrantem validam emittente junctis, dextro expanso reflexiusculo, antrosum arcuato, superne profunde sinuato, columbellari et basali reflexis, umbilico intus rugoso-striato. Diam. major 10½, minor 8, alt. 4 mill.

Hab. inter lapides ad verticem rupis Melhiatali Insule Ceylon.

In one or two specimens the callus near the upper margin is inclined to form an obtuse tooth at the side of the sinus, which is much deeper than in *H. Perrotetiana*, Petit, from the Nilgherries.

A graphic account of the discovery is contained in Mr. Layard's Journal in page 235, vol. xi. of the 'Annals.' This and the following curious species, of a singular genus, capriciously distributed through the tropical regions of the globe, are the first which have been found in Ceylon. The headquarters of the genus are in South America and Western Africa. The remaining species, of which the locality is known, are solitary in the Nilgherry Hills of South India, at Tavoy on the Tenasserim coast of the Bay of Bengal, in Cochin China, and in the Seychelles and Rodriguez, islands of the Southern Indian Ocean.

M. Petit de la Saussaye objects (Journ. de Conchyl. 1851, p. 369) to the reception of *Streptaxis* as a genus, considering it to be inadmissible in a zoological point of view; and he adduces as an argument for rejection the circumstance of its gradual change into *Helix*, through species which belong to the group, although deficient in the principal character of distortion. The same argument might be used against the reception of most other genera. *Bulinus* and *Achatina* have as little title to separation as this genus and *Helix*; and *Streptaxis* has equal claims to acceptance with Lamarck's genus *Anostoma*, like which the mollusk, to use M. Petit's words, "arriving at a certain stage of growth, abandons in the formation of the shell the regular course followed by the animals of the genus *Helix*."

The separation of such a singular group is, at all events, a great convenience in conchological research.

2. *Streptaxis Cingalensis*, nobis.

Testa arcuatim rimato-perforata, depresso-ovata, solida, abbreviata, lata, obsolete costulato-striata, albido-cornea, subtus polita; spira elevatiuscula, sutura crenulata, apice convexiusculo; anfractibus 6 convexis, ultimo ad latus deviante, basi convexa; apertura subtriangulari, 3-dentata, marginibus callo lamellam intrantem validam emittente junctis, dextro reflexo, antrorsum arcuato, unidentato, superne profunde sinuato, columellari reflexo, ad basin unidentato; umbilico intus striato, linea impressa circumscripto.

Diam. major 11, minor 8, alt. 5 mill.

Hab. in pago Hewagum Corle Insule Ceylon, inter rimas saxorum.

Nearly allied to the last, but differing in the dentition of the aperture, in the umbilicus, and in the less flattened form. The replication of the sinus at the top of the aperture simulates another tooth at right angles with the laminar plait on the parietes, a character observable also in *S. Perroteti*, and to which *S. Layardiana* also shews a tendency. It is intermediate between those two species in the dentition of the aperture, but wants the additional tooth which occurs at the base, within the aperture, in the first-named species, from which it is moreover much further removed in form than from *S. Layardiana*.

Mr. Layard has communicated the following note on the animal:—"Epiphragm glassy, animal yellow, with a red line on the back, extending up the two superior tentacles, at the tip of which the eyes are situated: all four tentacles clubbed; when crawling the shell is carried nearly level with the back."

The colouring of the animal reminds me of the hues observable in the *Pupa* of the Isle of France, as well as in the Indian and Galle species, *P. bicolor* of Hutton. It has already been remarked by others that *Streptaxis* has an obvious affinity with the Mauritian *Pupa Pagoda* in the formation of the shell.

3. *Helix ceraria*, nobis.

Testa obtecte perforata, depressa, nitidula, cerea, radiatim rugoso-striata, stris spiralibus remotiusculis decussata, luteo-fulvida, versus apicem rubescente, spira convexiuscula, apice obtusato; anfractibus 4, superne planulatis, ultimo lato, carinato, subtus convexo; apertura magna, late lunata, peristomate simplici, acuto, marginibus callo tenuissimo junctis, columellari arcuato, superne breviter reflexo, perforationem inconspicuam fere tegente.

Diam. major 20, minor 16, alt. 10 mill.

Hab. in agris altis Insule Ceylon "Horton Plains" dictis.

4. *Helix Puteolus*, nobis.

Testa perspective umbilicata, orbiculato-depressa, lenticulari, supra spurca, albida, subremote radiato-lirata, subtus cornea, radiatim striata; spira planiuscula apice vix prominulo, sutura impressa; an-

fractibus 5½, angustissimis, convexiusculis, arete convolutis, omnibus filoso-carinatis, superne sulco carinaque secunda parallelibus munitis, ultimo subtus planiusculo, ad marginem umbilici mediocri profunde excavati, cyathiformis, valde compresso; apertura angusta, securiformi, peristomate recto, acuto.

Diam. major 5½, minor 5, axis 2½ mill.

Hab. in saxis ad portas "Balcadua" dictas, Insule Ceylon.

This little shell is singular on account of its sculpture, the narrowness of the whorls, and the sudden and deep excavation of the well-like umbilicus. Vide 'Annals,' vol. vii. p. 305.

5. *Helix Mononema*, nobis.

Testa angustissime perforata, trochiformi, radiato-striata, corneo-albida, glabra, non nitida, translucens, spira conoidea, apice obtuso, sutura distincta; anfractibus 6½-7, superne convexiusculis, filo unico, elevato, tenui, mediano cinctis, ultimo acute filoso-carinato, subtus subplanulato; apertura verticali, securiformi, peristomate recto, acuto, margine columellari brevi, verticali, reflexo, perforationem subtegente.

Diam. major 5, minor 4½, axis 4 mill.

Hab. ad Heneratgodde.

Allied to the Himalayan *H. fastigata*, Hutton, and to the Bengal *H. Barrackporensis*, Pfeiffer, but well-distinguished by its more depressed form and by the filiform line, which in addition to the keel on the last whorl, runs along the central part of each of the upper whorls. Mr. Layard had not been able to procure a second specimen.

6. *Helix marcida*, nobis.

Testa subobtecte perforata, depressa, solida, superne oblique regulariter costulata, subtus leviori, sub epidermide fulvido-cornea albida; spira vix elevata, sutura impressa, apice obtusiusculo; anfractibus 6, lente accrescentibus, ultimo rotundato, subtus planulato, apertura sublate lunata, obliqua, peristomate recto, tenui, margine columellari oblique descendente, crassiusculo, superne breviter reflexo, perforationem subtegente.

Diam. major 14, minor 12, axis 8 mill.

Hab. in Insula Ceylon.

7. *Helix vilipensa*, nobis.

Testa aperte perforata, perversa, depressa, solidiuscula, pellucida, cornea, polita; spira convexiuscula, sutura vix marginata, apice obtuso; anfractibus 5, subplanatis, lente accrescentibus, ultimo rotundato, subtus convexiusculo; apertura late lunata, subobliqua, peristomate recto, acuto, margine columellari oblique descendente, expansiusculo, superne breviter reflexo; umbilico pervio.

Diam. major 8, minor 7, axis 4 mill.

Hab. ad rupem Mehintali.

A little Nanineform *Helix* with no very prominent character, differing from Pfeiffer's *H. Perroteti*, and other small *Helices* of the same group, with the exception of a small un-

named Nilgherry shell which is slightly larger, but otherwise not easily to be distinguished from it. From *H. Perrotti* it differs by its more convex spire, rounder periphery, and more open perforation.

8. *Helix perfucata*, nobis.

Testa vix perforata, depressa, translucida, purpureo-fusca, politissima, spira elevatiuscula, sutura submarginata, apice obtuso; anfractibus 4, convexiusculis, arcte convolutis, ultimo rotundato, subtus convexo; apertura lunata, vix obliqua; peristomate recto, acuto, margine columellari verticali, leviter reflexo, umbilico non pervio.

Diam. major 5, minor 4, axis 3 mill.

Hab. in pago Gallensi, inter saxa.

Remarkable for its deep clear purple-brown colour.

9. *Vitrina Edgariana*, nobis.

Testa valde depressa, tenuissima, subtus membranacea, politissima, pellucida, superne obsolete oblique striatula, lineis nonnullis spiralibus impressis ornata, lutescente-cornea; spira planiuscula, apice prominulo, sutura impressa; anfractibus 3 celeriter accrescentibus, planiusculis, ultimo ad peripheriam valde convexo; apertura obliqua, ovato-lunata.

Diam. major 10, minor 8, alt. 4 mill.

Hab. ad Columbo, Hangwelle, et Ratnapoora, insuper folia arbutorum.

Mr. E. Layard remarks, that "the mollusk is very long and attenuated, yellow and white. On touching it, it throws itself off the spot where it crawls, and twists and springs about in a most singular manner, often propelling itself several inches from its starting point." I have recorded elsewhere a similar habit in a little freshwater shell, *Planorbis rotula*, nobis.

10. *Vitrina membranacea*, nobis.

Testa valde depressa, submembranacea, obsolete oblique striatula, striis versus apicem confertissimis pellucida, virente-cornea, polita, superne convexiuscula, apice planato, sutura vix marginata; anfractibus 3½, rapide accrescentibus, ultimo antice lato, subtus planulato, ad peripheriam angustam rotundato; apertura obliqua, ovata, margine superioris prorsus arcuato.

Diam. major 11, minor 8, alt. 4 mill.

Hab. ad portas montanas Balcadua dictas, lapidibus adherens.

11. *Achatina Veruina*, nobis.

Testa cylindraceo-turrita, valde elongata, sordide albida, inaequaliter striata, spira superne sensim attenuata, sutura impressa, crenulata, apice obtuso; anfractibus 12½-13 angustis cylindricis, ultimo ½ longitudinis vix aequante; apertura verticali, truncato-ovali, peristomate recto, acuto, margine columellari leviter arcuato.

Long. 25, diam. 5 mill.

Hab. ad Nalande.

12. *Achatina pachycheila*, nobis.

Testa ovato-oblonga, striatula, striis exilissimis confertis, obsolete, spiraler sub lente decussata, nitida fusciscente-cornea, translucida, spira elongata, subconica, apice obtuso, sutura leviter impressa; anfractibus 6, vix convexiusculis, ultimo ⅔ longitudinis vix aequante; apertura verticali, oblongo-ovata, peristomate intus albido-marginata, columella prearcuata, margine basali incrassato.

Axis 11, diam. 5 mill.

Hab. ad Heneratgodde.

This little species of a group, which has so many representatives in Ceylon, the Nilgherries, and the damp woody mountains of North-eastern India, with a more slender form than *A. Oreas*, nobis, is well distinguished from the allied forms by its peculiar sculpture under the lens, and by the internal incrassation of the peristome, a feature which is also observable in the species *A. crassilabris*, nobis, from North-eastern India.

13. *Bulimus Panos*, nobis.

Testa rimata, ovato-oblonga, subrugose striata, cornea, spira elongato-conica, sutura mediocri, apice obtuso; anfractibus 6½ convexiusculis, ultimo ⅔ longitudinis vix aequante, antice subascendente, apertura ovata, edentula; peristomate expansiusculo, acuto, marginibus conniventibus, columellari breviter dilatato, albido.

Long. 11, diam. 5 mill.

Hab. ad Nalande.

This shell has a Pupiform aspect.

14. *Pupa Muscerda*, nobis.

Testa rimata, ovato-oblonga, striatula, cornea, spira elongata, apice obtuso; anfractibus 5½-6, convexiusculis, ultimo tertiam partem testae aequante, vix ascendente; apertura ovata, tridentata, peristomate expanso, acuto, marginibus conniventibus, columellari dilatato, albido, plica parietali 1, columellari 1, profundiusculis, dente palatali 1, depresso, obtuso.

Long. 4, diam. 1½ mill.

Hab. ad promontorium "Pedro" dictam.

Found by Mr. E. Layard in old posts, and on Palmyra trees (*Borassus flabelliformis*).

15. *Pupa Mimula*, nobis.

Testa rimata, ovato-oblonga, subcylindracea, oblique tenuiter plicatula, pallide cornea, apice obtuso, sutura profundiuscula; anfractibus 5, convexis, ultimo vix ascendente; apertura ovata, verticali, 5-plicata, peristomate tenui, expanso, marginibus callo tenui expanso junctis, plica 1 intrante, majuscula, parietali, 1 columellari, 1 basali profunda, 2 palatalibus profundis.

Long. 2, diam. 1 mill.

Hab. in vitibus ad Promontorium Pedronis.

A minute species nearly allied to, and somewhat larger than the Himalayan *P. Huttoniana*, nobis. It was taken in abundance by Mr. Layard.

16. *Catulus Austenianus*, nobis.

Testa subperforata, ovato-pyramidata, solidiuscula, eleganter oblique costulato-striata, sericea, diaphana, saturate rubro-castanea, spira turrita, sutura impressa, apice acutiusculo; anfractibus 8, convexiusculis, ultimo antice subascendente, carina basali compressa, prominente, subfuniculata, antice non dilatata; apertura subcirculari, obliqua, sursum spectante, peristomate duplici, incrassato, saturate fusco-aurantiaco, interno continuo, breviter adnato, externo fornicatim patente reflexo, superne et ad columellam subauriculato-dilatato, canali basali aperto, intus vix strictiore, ad sinistram perforato; operculo spiralliter laminato, anfractus multos appressos reconditos exhibente, facie exteriori anfractus plures angustos mentiente.

Diam. 13½, alt. 25 mill.

Hab. ad Heneratgoddie in rimis saxorum.

Allied in form and size to *Catulus pyramidatus*, Pfeiffer, but differs in sculpture, position of the canal, colour of aperture, &c. It was taken by Mr. Edgar L. Layard in the deep fissure of a limestone rock, among the vegetable mould, where it lay concealed under the surface, with the mouth downwards, among the roots of an ancient *Ficus Indica*. In some specimens the last whorl is more swollen than in others.

Mr. Layard has communicated the following description of the animal in a letter written on the spot:—

"The animal is dark brown, mottled, about 9 lines long, 5 broad; tentacles two, brilliant scarlet tipped with brown, 3 lines long, sharp pointed; eyes two, black, situated at the outside of the tentacles. The mollusk is very slow in its motions, crawling with the shell plane over its back, resting on the operculum; this is round and fits into the mouth; it is retractile when the animal is much irritated, but does not close the siphon and canal; when crawling, the flesh of the mollusk does not touch the canal. After placing them in boiling water to clean, I thrust a needle into one and pierced the operculum accidentally; judge of my astonishment, when in attempting to withdraw the instrument, the operculum unfolded revolution after revolution till I counted nine!" Subsequently Mr. Layard counted nineteen whorls in one operculum; and he has aptly likened it to the horn toy, made to resemble a snake by slicing it spirally from end to end, so as form a laminar centreless screw.

At the request of the discoverer, I have much pleasure in dedicating the species to his brother, the enterprising Oriental archaeologist and traveller Dr. Austen Layard.

17. *Catulus decorus*, nobis.

Testa subperforata, elongato-turrita, solida, confertim costulato-striata, nitidiuscula, rufo-castanea, apice acutiusculo; anfractibus 8, convexiusculis, ultimo ad basin compresso-carinato, carina valde prominente versus marginem funiculata, incrassata, antice vix dilatata; apertura verticali, circulari, peristomate incrassato, reflexo, breviter adnato, late aurantiaco, ad basin subproducto, deorsum recedente; canali extus lato perforato; perionophalo magno; operculo ut in precedente.

Diam. vix 10, axis 21 mill.

Hab. ad Ratnapoora.

Mr. Layard wrote regarding this species—"This was found under a rock with two others; animal brownish gray, foot livid. Tentacles pale orange, two; eyes sessile, two, black."

Mr. Layard has, since his return to England, detected in the operculum of *Megalomastoma altum* a structure similar to that which obtains in these *Catuli*, and I have, since the communication of that circumstance, also observed it in the operculum of the Himalayan *Meg. funiculatum*, nobis.

18. *Cyclophorus Parapsis*, nobis.

Testa late et perspective umbilicata orbiculato-depressa, tenui, confertim striatula, olivacea, sub epidermide tenui alida; spira planiuscula, apice vix prominulo, sutura profunda; anfractibus 4 convexiusculis, ultimo cylindrico, leviter descendente, non dilatato; apertura subverticali, subcirculari, intus glaucescente; peristomate continuo, breviter adnato, recto, simplici, acuto; operculo tenui, corneo, arete spirato, medio concaviusculo, intus obtuse umbonali.

Diam. major 13, minor 10, alt. 5 mill.

Hab. ad Damboul, ad verticem rupis, in rimis saxorum.

It differs from *C. lorostoma*, Pfeiffer (a large and handsomely marked variety of which was found on the same rock), in colouring, epidermis, depth of suture, narrower and deeper umbilicus, and the more circular and vertical aperture, which exhibits nothing of the diagonal departure from the axis observable in Pfeiffer's shell. The peristome also is acute and single, instead of being double, slightly expanded and thickened, as in that species, of which Mr. Layard's specimen is variegated with radiate and undulated chestnut stripes, and with a single band on a fulvous ground.

Annals and Magazine of Natural History, Vol. xii. p. 90.

CATALOGUE
OF
CEYLON MAMMALIA.

. Doubtful species have been removed from this new Catalogue.
For descriptions see PRODRONUS FAUNE ZÉLANIQUE, VOL. I.

ORDER.
QUADRUMANA.

FAM: SIMIADÆ.

- 1 Presbytis Cephalopterus,
Zimm.
- var. P. Albinus, Kelaart.
- 2 Presbytis Urinus, Blyth.
- 3 Presbytis Priamus, Elliot and
Blyth.
- 4 Presbytis Thersites, Elliot and
Blyth.
- 5 Macacus Sinicus, Linn.

FAM: LEMURIDÆ.

- 6 Stenops gracilis, Geoff.

ORDER. CARNARIA.

FAM: CHEIROPTERA.

a. INSECTIVORA.

- 7 Megaderma Lyra, Geoff. Desm.
- 8 Megaderma Spasma, Geoff.
Desm.
- 9 Taphozous longimanus,
Harde.
- 10 Rhinolophus affinis, (?) Horsf.
apud Blyth.
- 3 varieties. R. rubidus, R.
cinereus, and R. Ram-
manika, Kelaart.
- 11 Hipposideros Murinus, Elliot.
and 2 var. H. fulvus, Gray.
H. atratus, Kel.
apud Blyth.

- 12 Hipposideros Specios, Gray,
Geoff. and var. H. aureus,
Kelaart.
- 13 Hipposideros vulgaris, Horsf.
and 2 var. H. Templetonii,
Kel. H. Blythii, Kel. apud
Blyth.
- 14 Hipposideros nobilis (?) Horsf.
vel. H. Lankadivana, Kel.
H. armiger, Hodgson.
- 15 Scotophilus Coromandelicus,
Blyth.
- 16 Vespertilio adversus,
vel. Scotophilus Ceylonicus,
Kelaart.
- 17 Nycticejus Henthii, Horsf.
- 18 Nycticejus Belangeri, Zimm.
- 19 Nycticejus Tickelli, Blyth.
- 20 Kerivouha picta, Gray.

b. FREGIVORA.

- 21 Pteropus Edwardsii, Geoff.
- 22 Pteropus Leschenaultii, Dum.
- 23 Cynopterus marginatus, F.
Cuv. and var. C. Horsfieldii,
Gray.

FAM: INSECTIVORA.

- 24 Sorex Murinus, Linn.
- 25 Sorex Kandianus, Kelaart.
- 26 Sorex montanus, Kelaart.
- 27 Sorex ferrugineus, Kelaart.
- 28 Feroculus macropus, Kelaart.

FAM: CARNIVORA.

- 29 Prochilus labiatus, Blaine.
- 30 Lutra Nair, F. Cuv.
- 31 Canis aureus, Linn.
- 32 Viverra Malaccensis, Gmel.
- 33 Paradoxurus typus, F. Cuv.

- 34 *Paradoxurus Zeylanicus*,
Schreb. and var. *Fuscus*, Kel.
35 *Herpestes griseus*, Sykes.
36 *Herpestes vitticollis*, Benoit.
37 *Herpestes Smithii*, Gray.
vel *H. rubiginosus*, Kel. H.
Elliottii, Blyth.
38 *Herpestes fulvescens*, Kelaart.
39 *Cynictis MacCarthiae*, Gray.
40 *Felis Leopardus*, Schreb.
var. *F. melas*, Peron.
41 *Felis ciliogaster*, Temm.
vel *F. viverrinus*, Benoit.
42 *Felis rubiginosa*, Geoff.
43 *Felis Chaus*, Guldens.

ORDER. RODENTIA.

FAM: SCIURIDÆ.

- 44 *Sciurus Macrourus*, Forster.
45 *Sciurus Tenuantii*, Lagard.
46 *Sciurus tristriatus*, Water-
house, and 3 var. *S. Brodei*,
Blyth. *S. Layardii*, Blyth.
and *S. Kelaartii*, Lagard.
47 *Sciurus trilineatus*, Water-
house.
48 *Pteromys Oral*, Tuckel.
49 *Sciuropterus Layardii*, Kel.

FAM: MURIDÆ.

- 50 *Mus giganteus*, Hordae.
51 *Mus Rattus*, Linn.
52 *Mus decumanus*, Pallas.
53 *Mus Ceylonus*, Kelaart.
54 *Mus flavescens*, Elliot.
2 var. *Rufoflavescens*, Kel.
Kandianus, Kel.
55 *Mus memorialis*, Blyth.
56 *Mus Asiaticus*, Gray.
57 *Mus musculus*, Linn.
58 *Mus menci*, Gray.
59 *Mus fulvidiventris*, Blyth.
60 *Nesokia Hardwickii*, Gray.
61 *Nesokia Kok*, Gray.
62 *Golunda Elliottii*, Gray.
63 *Golunda Newara*, Kelaart.
vel *Golunda melinda*, Gray.
apud Blyth.
64 *Gerbillus Indicus*, Desm.

FAM: HYSTRICIDÆ.

- 65 *Hystrix leucurus*, Sykes.

FAM: LEPORIDÆ.

- 66 *Lepus nigricollis*, F. Cur.

ORDER. EDENTATA.

- 67 *Manis crassicaudata*, Geoff.

ORDER.

PACHYDERMATA.

- 68 *Elephas Indicus*, Linn.
69 *Sus Indicus*, Gray.
70 *Sus Zeylonicus*, Blyth.

ORDER.

RUMINANTIA.

FAM: MOSCHIDÆ.

- 71 *Memina Indica*, Gray.

FAM: CERVIDÆ.

- 72 *Axis maculata*, H. Smith.
73 *Axis Oryzus*, Kelaart.
vel *Axis porcinus*, var.
74 *Rusa Hippelaphus*, Cur.
75 *Styllocerus Muntjacus*, H.
Smith.

FAM: BOVIDÆ.

- 76 *Bos Taurus*, var. *Indicus*, Linn.
77 *Bubalus Buffelus*, Gray.

ORDER. CETACEA.

- 78 *Helicore Indicus*, Desm.
79 *Delphinus velox*, Duxum.
80 *Delphinus longirostris*, Dus-
sum.
81 *Delphinus plumbeus*, Des-
sum.
82 *Phoca communis*, Lesson.

MÉMOIRE

ADRESSÉ PAR LE

COMITÉ INTERNATIONAL

DE

SECOURS POUR LES MILITAIRES BLESSÉS

A

MM. LES PRÉSIDENTS ET LES MEMBRES

DES

COMITÉS CENTRAUX

DANS LES DIVERS PAYS



GENÈVE

IMPRIMERIE SOULLIER, LANDSKRON & WIRTH, CITÉ, 19-21

1868

MÉMOIRE
DU
COMITÉ INTERNATIONAL
DE
SECOURS POUR LES MILITAIRES BLESSÉS

A MM. les Présidents et les Membres des Comités centraux

DANS LES DIVERS PAYS

MESSEURS,

Les idées sur lesquelles nous venons rappeler votre attention ont surgi l'année dernière au sein de la Conférence de Paris, laquelle a jugé à propos de les grouper, pour en faire l'objet d'un examen simultané. Elles se rattachent toutes en effet à l'action commune que les comités nationaux peuvent exercer, sans toutefois porter atteinte à leur autonomie hautement reconnue et proclamée, comme un principe essentiel, par la Conférence de 1863. On conçoit en effet que, poursuivant tous le même but, ils puissent, dans certains cas ou pour certains travaux, trouver avantageux de s'associer.

La Conférence de Paris, prise un peu au dépourvu par les propositions relatives à ces rapports internationaux, ne s'est pas trouvée assez éclairée pour statuer à leur égard. De là le mandat conféré par elle, le 31 août 1867, au Comité international, de s'enquérir jusqu'à quel point les

innovations projetées trouveraient faveur auprès des divers Comités nationaux ⁽¹⁾.

Tel a été le but de notre circulaire du 21 septembre 1867 ⁽²⁾.

Grâce aux réponses qui nous sont parvenues, nous possédons aujourd'hui les éléments d'une enquête à peu près complète. Mais est-ce à dire que tout le monde soit d'accord, et que nous soyons en mesure de proclamer des opinions universellement admises? Nullement. Les communications que nous avons échangées avec nos honorables correspondants nous ont au contraire convaincus qu'il existe entr'eux une assez grande divergence de vues. Dès lors il ne nous appartenait pas de trancher, dans un sens ou dans un autre, des questions controversées, et de prendre des décisions que nous n'avions ni le droit ni le désir d'imposer à personne. Comme il n'y avait pas d'ailleurs péril en la demeure, la sagesse la plus élémentaire nous conseillait de ne pas nous hâter, et de saisir la première occasion qui se présenterait, pour faire du sujet de notre enquête l'objet d'un débat contradictoire.

Le Comité central prussien, en acquiesçant au vœu de la Conférence de Paris et en annonçant l'intention de convoquer prochainement à Berlin une nouvelle réunion internationale, a été au-devant de nos souhaits. Nous nous sommes donc adressés à lui pour le prier, ainsi que nous vous le faisons pressentir dans notre circulaire du 30 mars dernier, de réserver dans son programme une place aux questions dont il s'agit. Cette demande a été favorablement accueillie, et nous sommes heureux de penser que la cause que nous avons été chargés d'instruire, pourra être bientôt portée devant ses juges naturels.

⁽¹⁾ Compte rendu de la Conférence de Paris. T. II, p. 250^{ter}.

⁽²⁾ Ibid. p. 256.

Néanmoins nous supposons que vous nous saurez gré de ne pas attendre l'époque de la Conférence de Berlin, pour vous faire connaître la manière dont les Comités des différents pays ont envisagé les questions que nous leur avons posées, et c'est pourquoi nous venons dès à présent vous en rendre compte. Vous saurez ainsi d'avance sur quoi vos délégués auront à statuer à Berlin, et vous pourrez les munir à cet effet d'instructions précises.

L'enquête a porté sur quatre points principaux que nous allons aborder, dans l'ordre qui nous paraît le plus favorable à la discussion.

I. Création d'un musée international de matériel sanitaire

La proposition de créer un musée international de matériel sanitaire, due à M. le comte Sérurier, a été faite à la Conférence de Paris par M. de Luck, de Berlin, au nom d'une commission spéciale ⁽¹⁾. Partant de l'idée très-juste que de semblables institutions peuvent servir utilement la cause du progrès, et admettant qu'on ne peut guère songer à les multiplier, notre honorable collègue n'en voulait qu'une seule, installée à Paris, propriété indivise de tous les Comités qui l'enrichiraient de leurs dons, la soutiendraient de leur argent et l'administreraient par l'entremise de délégués spéciaux.

Nous savons aujourd'hui que 10 Comités, sur 20, souscrivent sans réserve à ce programme. Ce sont ceux de *Berne, Bruxelles, Carlsruhe, Darmstadt, Dresde, Hambourg, Lisbonne, Paris, Stockholm et Stuttgart*.

⁽¹⁾ Compte rendu. T. II, p. 183 et suiv.

Le projet auquel ils se sont ralliés reviendrait à perpétuer, en la rendant permanente, notre exposition de 1867 au Champ de Mars, et certes le succès de ce premier essai était bien de nature à justifier une telle pensée. Toutefois, pour qu'elle se réalise, il ne suffit pas que quelques uns d'entre nous soient disposés à y concourir, il faut que tous y participent, autrement l'entreprise ne serait pas véritablement internationale, dans le sens large que nous attachons à ce mot. Or cet accord nous paraît difficile, pour ne pas dire impossible à obtenir.

Si, parmi les Comités que nous n'avons pas encore nommés, il en est dont nous ignorons complètement la manière de voir, tels que ceux de *Copenhague*, *Madrid*, *Milan*, *New-York* et *Schwerin*, nous avons rencontré chez d'autres des dispositions peu encourageantes. Deux d'entr'eux, par exemple, tout en donnant leur approbation au plan de M. le comte Sérurier, et en favorisant même dans une certaine mesure sa réalisation, ont décliné toute responsabilité financière, et déclaré que l'on ne devait pas compter sur des subventions de leur part. Ces Comités, qui sont ceux de *La Haye* et de *Vienne*, se tiendraient donc à l'écart et leur abstention serait très-préjudiciable au succès de l'œuvre, même dans l'hypothèse où l'on trouverait ailleurs des ressources pécuniaires suffisantes.

Munich a réservé son jugement sur le fond de la question, mais il a annoncé qu'en tout cas il ne pourrait donner ni matériel ni argent.

Le préavis de la Prusse est encore plus franchement négatif, et nous ne devons attendre de ce côté aucun appui. Le Comité de *Berlin*, considérant comme son premier devoir de donner satisfaction aux intérêts locaux qui lui sont confiés, songe à créer un musée dans le lieu même

de sa résidence, ce qui exclut en ce qui le concerne toute participation au musée de Paris.

Le Comité de *Munich* a beaucoup insisté auprès du Comité international, pour que celui-ci fit connaître la manière dont lui-même estime que la question doit être résolue. Au début, nous nous sommes fait un devoir de ne pas manifester notre opinion, soit qu'elle ne fût pas encore suffisamment mûrie et éclairée, soit que, dans une affaire où nous étions nous-mêmes désintéressés, il nous semblât plus convenable de ne pas chercher à influencer les décisions des Comités nationaux. C'est donc dans un esprit de complète impartialité que nous avons conduit l'enquête jusqu'à ce jour; nous espérons que vous en reconnaîtrez la trace dans nos actes et tout particulièrement dans notre circulaire du 21 septembre. Mais au point où en sont les choses, nous n'avons plus les mêmes motifs d'abstention, et il nous est même difficile de rester plus longtemps en dehors du débat; si notre intérêt n'y est pas en jeu, celui de l'œuvre que nous avons contribué à fonder y est fortement engagé, et il ne nous trouvera jamais indifférents.

Qu'il nous soit donc permis de déclarer que la décision qui nous paraît préférable est celle que propose timidement le Comité d'*Oldenbourg*. Ce Comité, sans méconnaître ce qu'il y a de grandiose et de séduisant dans le projet de M. le comte Sérurier, tout en se déclarant même prêt à s'y rallier, lui onzième, insinue qu'il serait peut-être mieux encore de créer plusieurs musées au lieu d'un, et d'en doter, non seulement Paris, mais les principales villes de notre réseau.

Nous aussi nous nous sommes demandé jusqu'à quel point la centralisation absolue est ici désirable, et si ce serait vraiment une bonne chose de concentrer en quelque

sorte toute l'activité technique des Comités autour d'un seul musée. L'étude des perfectionnements à apporter au matériel sanitaire, constitue l'une de nos principales occupations en temps de paix, et il nous a paru que si l'on donnait aux uns, en cette matière, un rôle prépondérant, les autres se trouvant frustrés risqueraient de se décourager. Nous craignons que la création d'un foyer central, au lieu de faire progresser la science, ne lui nuise en affaiblissant le mobile fécond de l'émulation.

La conscience des services rendus par l'Exposition universelle, à la réussite de laquelle il avait tant contribué, a dû suggérer naturellement à M. le comte Sérurier la proposition dont nous nous occupons. Mais, à y regarder de près, n'est-ce pas se faire quelque peu illusion que de prendre pour mesure de l'utilité d'un musée international, celle de cette exposition? Quoique Paris soit, en tout temps, très-fréquenté par les étrangers, ils n'y afflueront certainement pas toutes les années comme en 1867. Le musée de Paris ne profitera jamais qu'à un très-petit nombre d'entr'eux, quelque peine que l'on se donne d'ailleurs pour l'enrichir, pour y attirer des visiteurs et pour lui faire porter des fruits. L'immense majorité de ceux qui auraient intérêt à l'explorer ne pourront l'aller voir, par le fait de leur éloignement, et devront se contenter de ce que les journaux leur en feront connaître. Il est vrai que, quoi que l'on fasse, on ne satisfera jamais tout le monde et que toutes les villes où résident nos Comités, ne sont pas suffisamment qualifiées pour devenir le siège d'institutions de cette nature, mais, entre les mesures extrêmes il y aurait un moyen terme qui est celui que nous avons indiqué. Ce serait, nous l'avons dit, de provoquer l'établissement de quelques musées, quatre ou cinq par exemple, dans les centres les plus importants. Chacun d'eux ne serait peut-

être ni aussi riche, ni aussi complet que l'aurait été un musée international vers lequel tous les efforts auraient convergé, mais établis sur une échelle plus modeste, ils n'exigeraient pas des frais aussi considérables et les Comités des grands pays, les prenant sous leur direction immédiate et sous leur responsabilité, feraient plus volontiers des sacrifices en leur faveur.

Nous recommandons avec d'autant plus de confiance ce système à l'adoption de la Conférence de Berlin, que celui du musée unique n'a pas trouvé jusqu'à présent beaucoup d'écho.

Pour s'en rendre bien compte, il convient de supputer non-seulement le nombre des adhérents, mais leur importance. Or voici ce que dit la statistique : Les pays sur lesquels s'étend l'action de nos Comités représentent une population de 199,574,990 individus, ou, en nombre rond, 200 millions; d'où il résulte que, tandis que le projet en question n'a réuni encore par l'organe de 11 Comités que

37,386,000 suffrages français et
10,824,000 suffrages étrangers, soit au total
48,210,000 suffrages,

il lui reste à gagner les sympathies de 9 Comités qui ne représentent pas moins de 151,365,000 habitants, soit plus des trois quarts de la population totale.

Il est vrai que la question ne se présentera pas à la Conférence de Berlin sous une forme aussi simple que celle sous laquelle nous l'avons envisagée. On y apportera dans la discussion des faits dont nous n'avons pas tenu compte, et qui pourraient peser d'un certain poids sur les décisions de l'assemblée. — Il ressort des procès verbaux de la Conférence de Paris ⁽¹⁾ que la formation dans cette ville d'un sous-Comité international chargé de la direction d'un musée

(1) T. II, p. 190.

a été agréée, et M. le comte Sérurier s'appuyant sur cette manifestation, ne voulant pas non plus laisser échapper l'occasion propice qu'offrait l'Exposition de 1867 de lui donner un commencement d'exécution, a déjà réuni à Paris une certaine quantité de matériel. Certes nous rendons justice à son zèle et à son initiative, et nous ne voudrions pas que tant d'efforts eussent été déployés en vain. Néanmoins il est certain que le vote de la Conférence ne peut être considéré que comme un vœu. Ce qui le prouve bien c'est que lorsque, dans une séance subséquente, (1) un orateur rappela que la question du musée n'était point définitivement résolue, personne ne contesta son dire, et la circulaire du 21 Septembre ne souleva pas davantage d'objections. La puissance des faits accomplis ne nous semble donc pas suffisante pour lutter ici victorieusement contre la raison. — Pour tout concilier, ne devrait-on pas considérer la collection formée par M. le comte Sérurier comme le germe d'un musée français? Cela se justifierait soit par la faible proportion de soutiens étrangers sur lesquels il peut compter, soit parce que, au point de vue financier, le programme primitif a été modifié, et que M. Sérurier est prêt à assumer toute la responsabilité financière de l'entreprise, sans la faire peser sur aucun comité.

II. Fondation d'un Journal international

C'est dans un rapport de M. le colonel Huber-Saladin, présenté à la 3^e section préparatoire de la Conférence de Paris, que se trouve exposé le projet de la fondation d'un journal international (2). Les conclusions de ce rapport ont

(1) Compte rendu. T. II, p. 244.

(2) Ibid. T. I, p. 321.

été approuvées par la section, mais la Conférence n'en a pas délibéré.

Nous avons donc interrogé sur ce point tous les comités centraux, et ceux qui n'ont pas gardé le silence à notre égard se sont déclarés unanimement en faveur du journal projeté; 15 voix, sur 20, se sont prononcées dans ce sens. Les cinq autres sont douteuses, savoir celles de *Copenhague*, *Madrid*, *Milan*, *New-York* et *Schwerin*.

Nous ne sommes pas surpris que l'on ait applaudi à la pensée d'utiliser la presse périodique dans l'intérêt de l'œuvre, car nous sommes nous-mêmes convaincus de la puissance de cet instrument de progrès. Déjà d'ailleurs trois Comités y ont eu recours : ceux de *Berlin*, de *Paris*, de *Bruxelles* ont chacun leur feuille spéciale, et les hommes dévoués qui ont pris cette excellente initiative méritent tous nos éloges.

Le fait de l'existence de ces trois journaux aurait pu être cependant un argument contre la fondation d'un journal international, et nous n'aurions pas été surpris qu'à ce point de vue ce dernier fût l'objet de quelques critiques. Mais il n'en a rien été. Les Comités dans la bouche desquels l'objection aurait été la plus naturelle, les Comités prussien, belge et français, se sont rangés au contraire parmi les plus chauds partisans d'une publication collective. Nous nous croyons dès lors en droit d'en conclure que, de l'avis unanime, ni la *Charité sur les champs de bataille*, ni le *Kriegerheil*, ni le *Bulletin français*, quel que soit le talent de leurs rédacteurs, ne répondent à l'idéal que l'on se forme d'un organe général de l'œuvre.

Ce dont on paraît généralement sentir le besoin, c'est d'un recueil qui centralise tous les renseignements importants, historiques, administratifs, techniques, bibliographiques, etc., et qui soit assez complet pour tenir ses lecteurs

au courant de tout ce qui peut intéresser les membres de nos associations. On veut encore qu'il puisse être utilisé comme moyen de correspondance entre les divers Comités, de manière à stimuler leur zèle et à consolider leur faisceau par un fréquent échange de nouvelles et d'idées. On demande de plus que ce recueil soit publié en langue française et paraisse à intervalles rapprochés (tous les mois par exemple). Il devrait être aussi, on le comprend, rédigé sans aucune préoccupation ou préférence de nationalité. Tel est, sauf erreur, le programme auquel de toute part on semble disposé à se rallier. Toutefois pour que sa réalisation soit possible, il faut que l'on se mette d'accord sur quelques détails d'exécution, notamment sur le choix des rédacteurs et sur les moyens de pourvoir aux frais de cette publication.

Dans la Conférence de 1867, il a été proposé que l'on s'en remit pour la direction au Comité international, par l'entremise duquel doit s'opérer, en thèse générale, la transmission des messages de Comité à Comité, et qui, ne représentant aucun intérêt local, a par cela même un caractère d'universalité. C'était aussi l'opinion du rapporteur, M. Huber, ainsi que de la 3^e section préparatoire. Plus tard les Comités de *Bruzelles* et de *Paris* ont témoigné le désir que le journal se publiât à Paris, et ils ont motivé leur opinion sur ce que le musée et le journal devant se prêter un mutuel appui, on aurait tout à gagner à en concentrer la double administration dans les mêmes mains, ou tout au moins dans la même ville. C'est donc entre Paris et Genève que le choix est indécis.

Nous sentons tout ce qu'il y a de délicat à nous immiscer dans ce litige, où nous avons été mis en cause à notre insu, mais notre position nous oblige à ne pas nous arrêter à ce scrupule. De plus, ce qui met notre conscience

à l'aise, c'est que nous n'ambitionnons en aucune manière l'honneur et la responsabilité que la plupart des Comités songent à faire peser sur nous, car nous ne nous faisons pas d'illusions sur la difficulté que nous éprouverions à nous acquitter dignement de ce mandat. Si l'on nous estime mieux qualifiés que d'autres pour conduire l'entreprise, nous nous efforcerons, par dévouement pour l'œuvre, de répondre à la confiance qu'on nous aura témoignée, mais nous tenons à déclarer que nous ne la sollicitons en aucune manière.

Nous n'insisterons pas sur les considérations à l'aide desquelles les partisans de Genève soutiennent leur opinion et qui ne rencontrent guère de contradicteurs. Toute la controverse reposant sur l'hypothèse de l'existence à Paris d'un musée international, ce point seul appelle l'examen.

Et d'abord, il est probable que si cette hypothèse ne se réalise pas, les partisans de la rédaction parisienne se rangeront sans peine à l'avis de la majorité, puisque leur principal ou pour mieux dire leur unique argument leur fera défaut. C'est pourquoi nous désirons que, dans la Conférence de Berlin, la question du musée soit résolue avant celle du journal.

Dans le cas où, contrairement à nos prévisions, la formation d'un musée international à Paris serait décrétée, il resterait à se demander si les deux institutions doivent être nécessairement juxtaposées. Que le journal serve d'organe à la direction du musée pour tous les avis qu'elle jugera bon de livrer à la publicité, cela ne peut faire l'objet d'aucun doute; nous estimons même que ces sortes de communications devront y tenir une large place, mais elles ne constitueront pas toute la matière du journal, et il faut bien tenir compte du reste qui aura aussi son importance. Or, pour cette dernière partie, les informations ne viendront

pas de Paris seulement, mais de partout, et nous ne voyons pas quelle difficulté il y aurait à ce que la Direction du musée envoyât, à l'instar de tous les Comités nationaux, ses notes à Genève pour y être livrées à l'impression. Nous ne sommes pas convaincus que la simplification qui résulterait de leur publication à Paris, compensât les avantages généraux que l'on a fait valoir en faveur de la rédaction genevoise. Il semble d'ailleurs logique, du moment que l'on institue un Comité international, de placer dans ses attributions les services généraux, afin de permettre aux Comités nationaux de se consacrer entièrement au soin des intérêts qui leur sont spécialement confiés.

Disons enfin que, dans notre pensée, on ne conférerait point au Comité international une prérogative inquiétante en l'investissant du droit de présider à la rédaction du journal, attendu que les véritables rédacteurs devraient être les Comités nationaux eux-mêmes. Nous voudrions que chacun d'eux fût tenu de collaborer et de fournir, pour tout ce qui concerne son pays, des informations ou même des articles au Comité de Genève, qui lui, ne ferait que les provoquer, les recueillir, les coordonner et les publier. Le travail serait ainsi plus également réparti et offrirait de sérieuses garanties d'impartialité.

Financièrement parlant, un journal international ne serait pas d'une exécution très-difficile. Evaluant approximativement à 4,000 fr. par an le coût de cette publication, nous avons demandé à tous les Comités, par notre circulaire du 21 septembre dernier, dans quelle mesure ils consentiraient à la subventionner, ajoutant que chacun aurait droit à un nombre d'exemplaires proportionnel à sa contribution. Dans le système des abonnements, préconisé par plusieurs, cela revenait à demander aux Comités de se porter garants pour un minimum d'environ 500 abon-

nements à 8 fr. Or, d'après les promesses que nous avons reçues, le placement de 315 exemplaires serait déjà assuré, du moins pour la première année, car les Comités de Berlin, de Hambourg et de Stockholm ne se sont pas engagés au-delà. C'est ce qui résulte du tableau suivant, où nous avons indiqué, pour chaque Comité, soit la somme précise pour laquelle il a souscrit, soit la taxe proportionnelle qu'il est disposé à accepter. Nous devons seulement faire observer que, pour Carlsruhe la somme indiquée serait probablement dépassée. La souscription a été établie sur la base de 1 fr. pour 50,000 habitants.

COMITÉS	Répartition proportionnelle à la population		Chiffre de la souscription	
	Sommes	Exemplaires	Sommes	Exemplaires
Berne.....	Fr. 50	6	Fr. 240	30
Berlin.....	470	58	500	62
Carlsruhe.....	28	3	28	3
Darmstadt.....	17	2	17	2
Dresde.....	47	5	80	10
Hambourg.....	4	1	200	25
Lisbonne.....	86	10	86	11
Munich.....	96	12	96	12
Oldenburg.....	6	1	25	3
Paris.....	748	93	748	93
Stockholm.....	116	14	116	14
Stuttgart.....	35	4	100	12
Vienne.....	650	81	300	38
	Fr. 2353	290	Fr. 2536	315

Les Comités qui n'ont pris aucun engagement positif sont les suivants :

COMITÉS	Répartition proportionnelle à la population	
	Sommes	Exemplaires
Bruxelles.....	Fr. 99	12
Copenhague.....	35	4
La Haye.....	75	9
Madrid.....	303	37
Milan.....	484	60
New-York.....	629	78
Schwerin.....	11	1
	Fr. 1636	201

On voit par le premier des tableaux ci-dessus que nous avons recueilli 2536 fr. là où nous n'en espérons que 2353, et qu'au lieu de 290 abonnements nous en avons placé 315. Il en résulte que si les Comités qui figurent dans le deuxième tableau acceptaient la part de responsabilité qui leur incomberait, on pourrait mettre la main à l'œuvre. En effet, on aurait alors une somme de fr. 4472 pour 516 abonnements. Mais il n'est pas dit que les souscriptions futures atteignent la moyenne que nous prévoyons, ni que les efforts des Comités qui, à l'instar de ceux de *Bruxelles* et de *La Haye*, ont promis seulement leur concours pour la recherche des abonnés, soient couronnés de succès.

Il est cependant évident que, si l'on veut un journal, il faut que quelqu'un en garantisse les frais, et il est naturel que cette garantie soit donnée par ceux auxquels il profitera, c'est-à-dire par tous les Comités nationaux. Aussi,

bien que nous n'ayons pas encore réuni des promesses de fonds suffisantes, nous espérons qu'à Berlin, les délégués présents à la Conférence trouveront les ressources nécessaires, soit que leurs Comités respectifs leur aient conféré des pouvoirs pour prendre des engagements en leur nom, soit que quelque bonne fortune inattendue vienne aplanir les obstacles qui subsistent encore.

III, Organisation d'une agence internationale en temps de guerre

Une troisième proposition, faite à la Conférence de Paris, par M. le général Renard, concerne les relations internationales en temps de guerre ⁽¹⁾. Dans un pareil moment, les communications de Comité à Comité sont entravées, en même temps que leur utilité s'accroît, et le rôle d'un intermédiaire peut être alors tout particulièrement précieux. Non seulement, en effet, il est opportun et désirable que ces communications soient facilitées, mais leur objet acquiert une grande importance, soit qu'il s'agisse de mettre en rapport entr'eux les Comités belligérants, qui ont besoin de se tendre la main, soit que les Comités neutres, se conformant à l'esprit comme à la lettre des Résolutions de la Conférence de Genève, veuillent seconder les belligérants.

De là est né le projet d'une agence qui établirait momentanément son siège sur un territoire convenablement choisi, à proximité du théâtre des hostilités, et qui remplirait les fonctions d'office général de renseignements et de correspondance. L'un des devoirs essentiels de cette agence serait de se tenir parfaitement au courant des nécessités des Comités engagés dans la lutte, pour en

⁽¹⁾ Compte rendu. T. II, p. 116.

instruire les autres, leur apprendre quelles sont les choses dont le besoin se fait le plus sentir, où les offrandes doivent être adressées et par quelle voie il faut les y acheminer.

La manière dont nous avons exposé cette idée dans notre circulaire du 21 septembre, a fait craindre à quelques-uns de nos honorables correspondants, qu'il ne fût question d'imposer des contributions à tous les neutres au profit des belligérants et même d'en fixer le montant. Mais jamais cette pensée ne nous a abordés, et nous regrettons d'avoir été mal compris. Nous n'avons jamais eu en vue que des dons volontaires, que chaque Comité demeurerait entièrement libre d'offrir ou de ne pas offrir, suivant les circonstances plus ou moins favorables dans lesquelles il se trouvera.

Il ne faudrait pas non plus se figurer que les Comités neutres seraient obligés de faire passer leurs secours, en argent ou en nature, par les mains de l'agence projetée. Celle-ci offrirait, il est vrai, ses services pour cela, mais chacun conserverait le droit d'expédier directement ses envois à destination, s'il le préférerait. Il est pourtant incontestable qu'en centralisant les renseignements, on assurerait une beaucoup plus judicieuse répartition des secours, que si chacun de nos Comités agissait à l'insu des autres, et nous croyons qu'en fait on recourra très-volontiers à l'office international, pour lui demander tout au moins des directions, auxquelles en définitive on sera toujours libre de ne pas se conformer. Aussi l'organisation proposée par M. le général Renard a-t-elle rencontré partout, sauf auprès du Comité de *Paris*, un accueil favorable, et nous nous plaisons à espérer que la Conférence de Berlin la sanctionnera.

Il a été dit que ce serait au Comité international qu'incomberait le soin du service de cette agence, et le Comité

de *Munich* a même affirmé que ce serait là notre tâche principale. Nous n'avons rien à objecter à cette opinion, qui n'implique pas pour nous-mêmes une lourde responsabilité. En effet, nous ne supposons pas que l'on veuille imposer au Comité international l'obligation de se déplacer, pour aller, aux premiers bruits d'une guerre quelconque, s'installer dans le lieu le plus propice à l'exercice de ses fonctions passagères. Tout ce qu'on peut raisonnablement attendre de lui, c'est qu'il pourvoie à la création d'un bureau de renseignements, qu'il le prenne sous son égide et en surveille la marche, mais on doit admettre qu'il fera appel à tel ou tel de ses correspondants, à tel ou tel comité, pour lui confier l'exécution de ses desseins.

IV. Constitution du Comité international

Dans les pages qui précèdent, nous avons eu souvent à mentionner le Comité international, et c'est de lui maintenant qu'il nous reste à parler, au point de vue de sa propre constitution.

Nous devons rappeler à ce sujet que le Comité genevois a pris le nom de Comité international, lorsque la Conférence de 1863 eût fait de lui l'organe central et provisoire de tous les Comités nationaux pour l'échange de leurs communications, et que c'est en cette qualité qu'il a travaillé jusqu'à ce jour. Mais lorsque la période de maturité de l'œuvre eût succédé à sa période de formation, notre ministère ne fut plus aussi fréquemment réclamé, et pour conserver le droit de soutenir les rapports que nous avions noués avec les Comités nationaux, nous sentions le besoin d'être investis de nouveau de leur confiance. Ce fut ce qui

nous engagea à provoquer une manifestation dans ce sens de la part de la Conférence de Paris, en l'invitant à statuer sur notre sort. Son vote, accompagné de considérations bienveillantes et flatteuses, nous a confirmés dans nos fonctions et maintenus définitivement au rang que nous occupions ⁽¹⁾.

Mais ce n'était pas là tout ce que nous demandions. Nous avions cru donner satisfaction à des désirs qui nous avaient été exprimés plus d'une fois, en proposant que le personnel du Comité international fût modifié et que chaque nation pût y avoir un représentant. Il ne s'agissait pas de représentants domiciliés à Genève, quoique cela eût été préférable, car on en eût trouvé difficilement de bien qualifiés en nombre suffisant; aussi la participation de ces nouveaux membres aux travaux du Comité n'aurait-elle pu être qu'accidentelle, mais il n'aurait pas été impossible de prendre leur avis par correspondance, dans les cas graves. Au fond, il est certain que leurs fonctions auraient été plutôt honorifiques qu'actives, mais elles nous eussent néanmoins créé un lien de plus avec les Comités nationaux, et notre offre elle-même était un témoignage de nos sentiments fraternels, comme de notre désir de contenter chacun dans la mesure du possible.

Aujourd'hui, après la Conférence de Paris, les choses ne se présentent plus tout-à-fait sous le même aspect, car jadis nous n'avions pu tenir compte d'aucune des attributions du Comité international que nous avons examinées dans ce mémoire. Il n'est donc pas superflu de considérer l'influence qu'elles doivent exercer à leur tour sur la composition du Comité.

Et d'abord la création d'un musée à Paris serait sans conséquences à cet égard, puisqu'il a été décidé que, si elle

⁽¹⁾ Compte rendu. T. II, p. 184 et suiv.

avait lieu, le Comité international n'aurait à intervenir que pour instituer un Comité directeur spécial ⁽¹⁾.

Il n'en est pas de même de la fondation d'un journal. Si le Comité international est chargé de sa rédaction, il faudra qu'il ait des moyens de se renseigner en tous pays, et il lui sera précieux d'avoir des correspondants ad hoc, avec lesquels l'échange des communications puisse s'opérer plus activement que de Comité à Comité, car nous savons par expérience que ce dernier mode d'informations est d'ordinaire excessivement lent. Or il serait très désirable que les membres genevois pussent s'adresser pour cela, non seulement à des personnes de bonne volonté, mais encore à des collègues qui, partageant leur responsabilité, prissent à cœur la réussite du journal auquel ils devraient collaborer. Cet arrangement constituerait une garantie de succès pour notre future publication.

Enfin, lorsqu'il s'agira d'organiser en temps de guerre un office de renseignements, la présence d'un membre du Comité international dans le pays où il devra être établi, facilitera singulièrement son installation.

Si donc les décisions de la Conférence de Berlin sont telles que nous les pressentons, elles confirmeront nos vues par de nouveaux arguments, en prouvant que la charge de membre du Comité international ne sera point une sinécure, et que l'adjonction d'un nouveau personnel puisera au besoin sa raison d'être dans son incontestable utilité.

Voici maintenant ce qu'en pensent les Comités nationaux.

Nous pouvons compter sur l'adhésion de 13 Comités, sur 20. Sept d'entr'eux ont même déjà désigné leurs représentants au sein du Comité international; ce sont ceux de

⁽¹⁾ Ibid. T. II, p. 184 et suiv.

Berlin, Berne, Carlsruhe, Milan, Munich, Stuttgart et Vienne. Les autres, quoique non moins affirmatifs, ont cru devoir, par divers motifs, surseoir à cette nomination; à cette catégorie appartiennent ceux de Darmstadt, Dresde, Hambourg, Lisbonne, Oldenbourg et Stockholm. Le Comité de *La Haye* a craint de compromettre son indépendance par une adhésion sans réserves, mais nous ne pouvons le considérer comme un opposant, et, d'après la connaissance que nous possédons des dispositions qui l'animent, nous avons tout lieu d'espérer qu'il se laissera persuader par les débats de Berlin. Les quatre Comités de Copenhague, de Madrid, de New-York et de Schuerin nous ont laissés dans l'ignorance de leurs intentions, et deux Comités seulement, ceux de Bruxelles et de Paris, ont repoussé notre proposition comme impraticable. Il semble impossible à ces derniers que le Comité international fonctionne, s'il est obligé, pour chacun de ses actes, de recueillir préalablement les votes de tous ses membres dispersés, et qu'assembler ces mêmes membres pour les consulter est également inadmissible. Ces remarques sont parfaitement justes, et c'est pour cela que nous croyons qu'on ne saurait faire droit à la demande du Comité de Munich, qui voudrait que, même pour les affaires courantes, tous les membres fussent mis en demeure d'opiner. Aussi ne ferons-nous aucune difficulté d'admettre, si on le juge bon, que le Comité genevois conservera sa pleine liberté d'allures, renonçant ainsi à ce que nous n'avions indiqué que par déférence pour les Comités nationaux. Les attributions de nos collègues étrangers seraient alors restreintes soit à la collaboration au journal de l'œuvre, soit à la transmission des secours de nation à nation en temps de guerre, et leur mandat ainsi compris et limité ne prêterait plus le flanc à la critique.

Les Comités de Bruxelles et de Paris ont joint à leur préavis négatif quelques considérations qui méritent d'être relevées.

Les Belges donnent à des Congrès périodiques et à une feuille se prêtant à des discussions publiques, la préférence sur le changement proposé dans la composition du Comité international. Il nous sera permis, à notre tour, de faire observer qu'il n'y a pas d'incompatibilité entre ces diverses institutions, dont le but n'est point identique, qui se complètent plutôt qu'elles ne s'excluent mutuellement, et auxquelles la Conférence de Berlin pourrait, sans inconvénience, donner simultanément l'impulsion.

En France on nous a suggéré une autre idée, propre à appeler successivement les divers Comités à s'occuper des intérêts généraux de l'œuvre. Ce serait, dans l'hypothèse où chaque Conférence fixerait le lieu de la Conférence suivante, de charger le Comité de la nation désignée pour cette réception de s'entendre avec le Comité de Genève, et de travailler de concert avec lui à la préparation des programmes. Ici encore nous répétons que ce vœu pourrait être exaucé, sans que l'utilité de l'accroissement du Comité international en fût modifiée, et que par conséquent préconiser le système français ce n'est pas se déclarer hostile au nôtre.

Notre argumentation demeure donc entière, et nous présumons que lorsque Bruxelles et Paris se seront convaincus que ce que nous désirons peut se concilier avec ce qu'ils désirent eux-mêmes, que de plus nous ne demandons qu'une chose possible et utile, ils se rallieront à l'opinion de la majorité.

Conclusion

Comme nous l'avons dit en commençant, nous nous proposons de faire vider à Berlin toutes les questions pendantes que nous venons d'étudier. Mais, comme il s'agira de prendre des résolutions qui engageront jusqu'à un certain point la responsabilité des Comités, on ne saurait s'en rapporter à une assemblée nombreuse, où les diverses nationalités seront inégalement représentées, et où peut-être plusieurs des assistants n'auront qu'un intérêt indirect dans le débat. Ce qui nous semblerait le plus équitable et ce dont nous ferons la proposition formelle, ce serait de s'en remettre à une Commission spéciale pour laquelle chaque pays désignerait un délégué. Ces délégués y figureraient en qualité de fondés de pouvoirs de leurs Comités respectifs et y voteraient conformément aux instructions de leurs commettants, comme dans un Congrès diplomatique. Sans ces mesures de précaution les résolutions prises auraient peu de valeur, puisqu'il faudrait encore les soumettre à l'approbation des Comités. Ajoutons, pour rassurer tout le monde, qu'on ne contraindrait personne, que la minorité ne serait point liée par le vote de la majorité, et que les décisions ne deviendraient obligatoires que pour ceux qui y auraient souscrit de leur plein gré.

Nous prenons donc la liberté d'insister, d'une manière très-pressante, auprès de tous les Comités nationaux, pour qu'ils obtiennent à notre désir. Nous les prions de discuter encore les points qui font l'objet du présent mémoire, et de délivrer ensuite à quelqu'un de leurs membres des pouvoirs réguliers pour voter en leur nom à Berlin.

Voici pour nous résumer, les deux projets d'arrêtés que nous voudrions soumettre à l'approbation de la Conférence de Berlin.

PREMIER ARRÊTÉ

(Conforme à la solution proposée dans la 1^{re} partie de ce mémoire.)

LA CONFÉRENCE

Considérant que la proposition faite par M. le comte Sérurier à la Conférence de Paris, pour la création dans cette ville d'un musée international de matériel sanitaire, n'a pas l'agrément de tous les comités nationaux ;

Considérant d'autre part qu'on peut suppléer avantageusement à cette institution au moyen de collections du même genre, formées dans les principales villes par l'initiative des Comités locaux ;

Passé à l'ordre du jour.

DEUXIÈME ARRÊTÉ

(Conforme aux solutions proposées dans les 2^e, 3^e et 4^e parties de ce mémoire, avec un article final concernant des attributions reconnues sans conteste au Comité international, mais qui n'ont fait jusqu'à présent l'objet d'aucune résolution.)

LA CONFÉRENCE.

Vu l'existence à Genève d'un Comité international, institué par la Conférence de Genève (1863) et confirmé par celle de Paris (1867).

Arrête :

ART. 1. Le Comité international est chargé de publier un recueil mensuel, en langue française, pour servir de Moniteur général à l'œuvre des secours aux militaires blessés, et de moyen de correspondance entre les Comités nationaux.

ART. 2. Si le chiffre annuel des frais de cette publication est supérieur à celui des recettes, la dépense sera répartie entre les Comités nationaux et supportée par eux, proportionnellement au chiffre de la population qu'ils représentent, mais sous déduction des sommes qu'ils auront payées à titre d'abonnements ou de subventions.

ART. 3. En cas de guerre, le Comité international organisera, dans une localité convenablement choisie, un bureau de corres-

pondance et de renseignements qui facilitera de toutes manières, entre les Comités, l'échange des communications et la transmission des secours.

ART. 4. Chaque Comité national adjoindra un de ses membres au Comité international genevois, pour le seconder dans l'exécution du mandat qui lui est conféré par les articles 1 et 3 ci-dessus.

ART. 5. Indépendamment des fonctions qui lui sont attribuées par les articles précédents, le Comité international continuera à être chargé de faire, au nom de l'œuvre, toutes les démarches d'intérêt général.

LES MEMBRES DU COMITÉ INTERNATIONAL :

DUFOUR, Général, *Président honoraire.*

MOYNIER, Gustave, *Président.*

APPIA, Louis, Dr méd., *Secrétaire.*

MAUNOIR, Théodore, Dr méd.

FAVRE, Edmond, Colonel fédéral.

Genève, le 20 Juin 1868.

PROCEEDINGS

OF THE

Thirty-Seventh Anniversary Meeting,

ON MARCH 7, 1868,

WITH

ADDITIONS TO THE LIBRARY AND MUSEUM.

AND

LIST OF MEMBERS CORRECTED TO THE
1ST JANUARY, 1868.

THE THIRTY-SEVENTH ANNIVERSARY MEETING of the Members was held in the Theatre of the Institution, on Saturday, the 7th March, 1868.

Major-General the Right Hon. Sir HENRY K. STOKES, G.C.B., G.C.M.G.,
Comptroller-in-Chief, War Office, in the Chair.

I. The Secretary read the Notice convening the Meeting.

II. The Minutes of the Proceedings of the Thirty-sixth Anniversary Meeting were read.

III. The Annual Report of the Council was read as follows :

1. THE COUNCIL have the pleasure of submitting their Thirty-seventh Annual Report.

MEMBERS.

2. One hundred and forty-one Members joined the Institution during the past year. The Council regret to record the loss by death of ninety-three, and by withdrawal of sixty-three. The names of fifty-three Members have been struck off the lists in consequence of the non-payment of their subscriptions due for two years and upwards, notwithstanding repeated applications. A detailed statement of the changes in the list of Members, and a tabular analysis of the past and present state of the Institution, will be found on pages 12 and 13.

FINANCE.

3. The usual Abstract of the Accounts for the Year, as audited on the 29th January, will be found on the following page.

In consequence of the large expenditure on the Journal, and in making arrangements for the protection of the building against fire, besides certain expenses for repairs, &c., the expenditure has exceeded the income, the balance of £53 6s. 11d. at the Bankers' being a portion of the Life Subscriptions which have since been invested.

GENERAL ABSTRACT OF THE ACCOUNTS OF THE ROYAL UNITED SERVICE INSTITUTION,
FROM 1st JANUARY TO 31st DECEMBER, 1867.

EXPENDITURE.		RECEIPTS.	
£	s. d.	£	s. d.
Secretary's Salary	250 0 0	Balance at Bankers, 31st December, 1866, Income	153 13 0
Do do	100 0 0	Annual Subscriptions	1,531 15 0
Librarian's Salary	100 0 0	Do do	15 0 0
Accountant's	100 0 0	Entrance Fees	240 0 0
Clerk's	62 0 0	Dividends	153 13 0
Servants' Wages	400 0 0	Donations	35 4 0
Ditto Clothing	50 0 0	Gifts	55 4 0
Insurance	20 5 0	Sale of Library Catalogues	10 12 0
Fuel	55 0 0	Gifts from Government	600 0 0
Lighting	45 0 0	41,400 Exchange Bills sold (May 1st to December 31st)	1,531 15 0
Ground Rent	205 0 0	Interest on	3 18 0
Annuity to Sergeant Pitt, late Porter	20 0 0	Balance of Petty Cash returned to Bankers	21 0 0
Assessed Taxes & Income Tax 100 0 0			
Parish and Water Rates, including half-year for 1867	150 0 0		
Artificers, Repairs, &c.	150 0 0		
Library	150 0 0		
Journals	700 0 0		
Postage thereof	145 0 0		
Museum	150 0 0		
Topographical Room	5 0 0		
Advertisements	50 0 0		
Lectures	50 0 0		
Printing Annual Report and List of Members	90 0 0		
Printing Circulars & Stationery	50 0 0		
Postage	45 0 0		
Sandries	45 0 0		
Balance	152 15 0		
Total	£2,450 0 0		

Examined and found correct, 27th January, 1868.
J. E. A. HOLLEY, Cash.
THOS. SMITH, Ck.

PROCEEDINGS OF THE THIRTY-SEVENTH ANNIVERSARY MEETING. III
ESTIMATE OF PROBABLE RECEIPTS AND EXPENDITURE FOR 1868.

EXPENDITURE.		RECEIPTS.	
Amount.	£ s. d.	Amount.	£ s. d.
Secretary's Salary and Lodging allowance	300 0 0	Annual Subscriptions:	
Librarian's Salary	100 0 0	At 10s.	560 0 0
Accountant's	100 0 0	Above	1,840 0 0
Clerk's	62 0 0	Entrance Fees	2,400 0 0
Servants' Wages	400 0 0	Dividends and Interest	150 0 0
Ditto Clothing	50 0 0	Sale of Journals	80 0 0
Insurance	20 5 0	Grant from Government	£2,850 0 0
Fuel	55 0 0		600 0 0
Lighting	45 0 0		
Ground Rent	205 0 0		
Annuity to Sergeant Pitt, late Porter	20 0 0		
Assessed Taxes & Income Tax 100 0 0			
Parish and Water Rates, including half-year for 1867	150 0 0		
Artificers, Repairs, &c.	150 0 0		
Library	150 0 0		
Journals	700 0 0		
Postage thereof	145 0 0		
Museum	150 0 0		
Topographical Room	5 0 0		
Advertisements	50 0 0		
Lectures	50 0 0		
Printing Annual Report and List of Members	90 0 0		
Printing Circulars & Stationery	50 0 0		
Postage	45 0 0		
Sandries	45 0 0		
Balance	152 15 0		
Total	£2,450 0 0	Total	£2,450 0 0

4. £208 were received during the year 1867, and there was a balance of £36 at the end of 1866, making a total of £244. Of this sum, £104 were invested in Three per Cent. Consols during 1867, and £110 (the balance) since 1st January, 1868.

5. The funded property of the Institution was £5,485 19s. 3d. on the 1st of January, 1867. £246 11s. 11d. were added during that year, making a total of £5,732 11s. 2d. on the 1st January, 1868, since which date £151 11s. 2d. have been added, making the total at the present time, £5,884 2s. 4d.

LEASE OF THE PREMISES.

6. The arrangement for the approaches to the Thames Embankment being still incomplete, the COUNCIL are unable to give the Members any definite information on this subject. There appears little probability that any change will be made during the present year.

LECTURES AND JOURNAL.

7. To those Officers and Gentlemen who by their Lectures and Papers during the past Session so ably contributed to the advancement and diffusion of professional knowledge, the COUNCIL tender their best thanks.

A glance at the contents of Vol. XI. of the Journal, will show how numerous and varied were the subjects discussed in the Theatre of the Institution. That Volume exceeds those of any former years in the amount of its matter and the number of its illustrations. The COUNCIL have in consequence spent on the Journal a larger sum than usual, larger perhaps than the state of the finances of the Institution might appear to warrant. They do not, however, regret that expenditure, being firmly convinced that the objects of the Institution are best promoted, and its advantages most widely extended, by the circulation of carefully edited and liberally illustrated Papers and Discussions.

These facts induce the COUNCIL to hope that the Journal may receive from the two Services, as also from the general public, continued and increased support.

LIBRARY.

8. In the selection of books for purchase, no work of professional interest has, it is believed, been overlooked.

Among the valuable donations to the Library may be mentioned—

The Russian Military Journal, presented by the Minister-at-War at St. Petersburg; two Military Works from the Prussian Government; one from that of the United States, and one from that of the Netherlands. The Italian Minister-at-War has presented two additional volumes of the *Giornale Militare* and the *Annuario Militare*; the Swedish Government, their Journal of the Military Sciences for the years 1864 and 1865. The exchange of Journals with the French and Austrian Governments has been continued.

The Secretaries of State for War, and for India, and the Lords Commissioners of the Admiralty, have kindly consented to supply for the Library of the Institution all Blue Books of interest relating to Naval and Military matters. The first-named Minister has forwarded a large number of Photographs, in continuation of the series presented last year, and of the Breech-loading Rifles submitted to Government for competition, as well as Lithographic Plates of articles manufactured at the Royal Arsenal, Woolwich.

The Lords of the Admiralty have granted a copy of all the Circulars issued by that Department for the years 1865-66-67, with instructions

that they are to be supplied for the future. The Naval Members of the Institution will find these of much value for reference.

Through the kindness of the Lord Chancellor, an exchange of the Journal since its first publication, for the Series of Specifications of Patents of Firearms from 1617 to 1863 inclusive, has been effected with the Commissioners of Patents. These Specifications have been bound in forty volumes, and form a valuable addition to the Library.

The Committee of the United Service Club have presented a copy of the *London Gazette*, from 1687 to 1701, and from 1772 to 1796; and Major-General Black, R.A., (Madras,) the Madras Artillery Records, from 1838 to 1862, bound in seventeen volumes.

The Library now contains 13,800 volumes.

TOPOGRAPHICAL DEPARTMENT.

9. The utility of this department has much increased, as evidenced by the fact that more frequent reference is made by Members to the valuable collection of Maps, Charts, and Plans.

The Secretary of State for War has presented the Institution with the compilation entitled, "Routes in Abyssinia," together with the Maps relating thereto, executed at the Topographical Department of the War Office. These and other Maps of the country have been hung up on the walls in the Topographical Room, and the position of the expeditionary force marked off as usual from time to time for the convenience of the Members. Forty-three Books and Charts have been received from the Admiralty.

The Belgian Minister-at-War has forwarded three sheets of the Topographical Map of Belgium, for which the COUNCIL have expressed their thanks.

Captain Hope, R.N., has presented Four Maps of portions of New Zealand; and Major Wright, A.D.C. to General von Moltke, a valuable Series of Plans (twenty-three in number) of the Battle-fields of the late War in Germany, together with the first two parts of the official work on the campaign.

Major Wright had previously been elected an Honorary Member of the Institution.

MUSEUM.

10. The following additions by presentation to the Museum require special notice:—From the Secretary of State for War, a series of common shell, whole, and in section, for the 9, 8, and 7-inch muzzle loading guns; specimens of double shell, whole and in section; of shell, whole and in section, for the 64-pounder; and of 9, 8, and 7-inch Palliser chilled shell, with specimens of castings, chilled and in sand; from the proprietors, the Cockran breech-loading rifle; from Major-General Sir Vincent Eyre, K.C.S.I., a coat of quilted armour, taken in action from Koer Sing, the famous Rajpoot Chief of Jugdeespoor; from Captain Trotter, three topographical models, two of which,—the celebrated pass of the Simplon, and the city of Geneva with the old fortifications, are of much interest.

The following additions have been made by purchase—Specimens of breech-loading rifles, viz.: the Burton, Albini Braendlin, Montstorn and Solwyn, Henry, Fosbery, and Chassepot. The collection of breech-loaders in the Museum now numbers forty-nine different patterns. A quarter-size model of a 10-inch Woolwich gun has been added to the other models of heavy ordnance.

A complete list of the additions to the various departments will be found in the Appendix to Vol. XI. of the Journal.

By the kind assistance of Colonel Walker, Military Attaché to the British Embassy at Berlin, the Council have secured a correct and well-executed copy of the model of "The Battle-field of Königgratz," which was completed last year under the superintendence of the Prussian War Department. The horizontal scale of the model is $\frac{1}{125,000}$, the vertical $\frac{1}{1000}$. The positions of the contending armies will be marked out as soon as all the official accounts of the battle have been published. The Council congratulate the Members on this valuable acquisition to the Model Room of the Institution.

The thanks of the Council have been tendered to the Secretaries of State for War and for India, and to the Lords of the Admiralty, for their respective contributions to the Institution.

CORRESPONDING MEMBERS.

11. The number of Corresponding Members on the 1st January, 1868, was 213, as compared with 218 on the 1st January, 1867. The Council would again suggest, that in each Regiment and Ship in which there is no Corresponding Member, one of the Members of the Institution should volunteer his services to fill that post.

CONCLUSION.

12. The Council observe with regret a decrease of sixty-eight in the number of the Members during the past year. The income of the Institution has not suffered up to the present time; but the Council feel that they have only as yet obtained the support of a small proportion of the officers of both services who might reasonably be expected to join the Institution. They have had under their anxious consideration various schemes for adding to its utility and increasing its popularity. They hope to be able to report further on this subject at the next Annual General Meeting. In the meantime they invite the hearty co-operation of individual Members who may do good service by making known as widely as possible the objects and advantages of the Institution.

General The Hon. Sir EDWARD CUST, G.C.L., K.C.H.—

Sir Henry Storks and Gentlemen. The duty that has been assigned me to perform is to move:—

"That the Report now read be adopted and printed for circulation among the Members."

The first matter that comes before us for observation is not a very gratifying one, viz., a diminution in the number of Members. Why it should have occurred to the extent it has done, seems to me to be rather inexplicable. At all events, the circumstance ought to be a further inducement to us to exert ourselves among our friends, our young friends especially, to endeavour to get them to join the Institution. The next paragraph in the Report to which I would call attention, is one that is also not very favourable, viz., the state of the finances. However, I am told, that that is to a certain extent to be explained by the additional expense which has been incurred in connection with the *Journal*, and other matters that are named in the Report. I would here especially allude to the *Journal*, because I do not think that the expense, as incurred by the Institution, bears anything like a proportion to the value of the *Journal* to the public. (Hear, hear.) It is not only the papers that are read, and which are drawn up with admirable ability, but it is the discussions which frequently follow the reading of the papers, which give so much value to the *Journal*. The discussions very much illustrate the paper read, and bring out information that may be of great advantage hereafter; and the *Journal*, as a record of what has been introduced in military and naval science, may prove of great service when we come to test the question of the priority of any given invention. There is no other mode existing that I know of which provides for this; and this prevents our discussions being idle and profitless ones. With reference to the *Journal* of last year, my attention was attracted to a paper by Major Fosbery, on the Umboiyah Campaign. I am ashamed to confess that I was ignorant of the name of the Umboiyah Campaign until I began to read that paper. I see that Major Fosbery, who is one of the gallant possessors of the Victoria Cross, makes an apology for introducing a campaign that might be so little known. It is the advantage of the *Journal* that it perpetuates a record of these minor events, but which are really of great importance to military history. It reminds me of an instance that occurred to myself lately, in connection with my own pursuit in writing the Lives of the great campaigners of former days. I was engaged with Field-Marshal Schomberg's Campaigns, and I could not find in any English history notice of a campaign in which Marshal Schomberg acted in command of English troops, who behaved with such great distinction, as to make us really proud of them. The first notice that I got of it, was in conversation with a foreign gentleman, who lent me a Portuguese history. I also found that another foreigner, a celebrated man, General Dumouriez, who had been long resident in England, had written an account of this campaign in which English troops had so distinguished themselves, but it had slipped altogether out of English history, and I was obliged to collate the facts from the State Paper Office. In the prodigality of our glory, there seems little disposition of care to preserve the records of these little wars. It was, however, an exceedingly remarkable one. It lasted five or six years, and took place just at the close of the Commonwealth, and at the time of the Restoration of Charles II. To such an extent did our national reputation gain by those campaigns, that have been so little recorded by ourselves, that I may allude to a circumstance, and rather a comical one, which may interest you. The English were so successful in the south, and the Portuguese so unsuccessful in the north, that a happy idea struck the Portuguese Commander in the north. He put his soldiers into scarlet flannel, in order that they might appear to be British troops, and I am happy to say that the *ruse* succeeded. The Spaniards, under the apprehension of an assault from the British, gave up the post.

I will not further allude to any part of the Report, except to one paragraph, which affords us some comfort under the loss of Members, and the diminution of finances. I am glad to observe that we do not lose the kindness of our friends; the gifts that have been made to us by persons in authority, Naval and Military, and the assistance given to us by others in contributing to the Museum and Library is a gratifying circumstance, as showing that this Institution is held in high estimation, and that it will continue to prosper.

Commander COLOMB, R.N.—

I have very much pleasure in seconding the resolution. I myself do not think that we need be very much surprised at the diminution of Members, because we

must recollect that there has been a tightness in the money market this year, and prospective Members have no doubt suffered like everybody else; the small subscription also, small as it is, affects the pockets of many men who would be glad to become Members of the Institution. In speaking of the Lectures and the *Journal*, I think that the publication of the *Journal*, in one way affects the joining of Members, because existing Members lend the *Journal* to their friends; and these say, "It is no use our belonging to the Institution, we can get all the information we want from the *Journal*." At the same time the *Journal* has the effect of raising the status of the Institution generally, not only in England, but abroad. I have communications from time to time with Foreign Officers, especially of late, and I have been quite surprised to see what a very high standing the *Journal* of this Institution enjoys abroad. A curious circumstance came under my notice recently, viz., that papers published in the *Journal* of this Institution are translated into foreign languages, and are being sold on the continent in the form of separate pamphlets. No doubt the publishers make a good thing of it. This fact shows the value of the *Journal*, and the great standing that the Institution has gained. As regards the lectures and discussions, I have been a constant attendant at them, and one thing has struck me forcibly of late years, viz., the increased value of the discussions. Members recently have been in the habit of preparing themselves better for the discussions than they did when I first joined the Institution. The consequence is, that at these discussions we get a number of most valuable remarks,—remarks which you can carry away, and think over afterwards. I think it also speaks well for the Institution, that a collection of breech-loading rifles should have been so well got together and also so well looked after: the collection is really a most valuable one; and you seldom come into the Museum without seeing a crowd of inquiring minds surrounding the glass cases in which the rifles are kept, and inspecting them carefully. I will not make any further remarks, but will conclude by seconding the resolution.

The Motion was put from the Chair and carried unanimously.

The names of the eight Members retiring from the Council by rotation, were read as follows:—

Captain E. PACKE, late Royal Horse Guards.	Lieut.-Colonel J. H. LE COQUEUR, Coldstream Guards.
Captain H. W. TYLER, late Royal Engineers.	Captain R. HALL, R.N.
Rear-Admiral Sir John C. D. HAY, Bart., M.P.	W. F. HIGGINS, Esq.
Lieut.-Colonel A. C. COOKE, Royal Engineers, C.B.	Rear-Admiral E. G. FANSHAWE.

Major-General the Right Hon. F. PLUNKET DUNNE, M.P.—

General Storks, My Lords and Gentlemen. I have been entrusted with a motion which I am sure you will all agree to. It is:—

"That the thanks of this Meeting be given to the Members of the Council who retire by rotation, and that the following Members be elected to fill the vacancies:—

Rear-Admiral Sir John C. D. HAY, Bart., M.P.	Colonel H. F. PONSOMBY, Grenadier Guards.
Lieut.-Colonel A. C. COOKE, Royal Engineers.	Rear-Admiral A. C. KEY, C.B.
W. F. HIGGINS, Esq.	Major G. H. A. FORES, R.A.
JOHN BARROW, Esq., F.R.S.	Captain J. D. MACQUEEN.

And that the following names be adopted, from which to select in the event of vacancies occurring in the Council:—

Captain Lord FREDERICK H. KERR, R.N.	Lieut.-Colonel The Hon. E. LEOG, Coldstream Guards.
Captain H. W. TYLER, late Royal Engineers.	

Without the exertions of the Members of the Council, you could not have that

efficiency in the Institution which has increasingly marked its career for many years past, unless you paid for it in some way very seriously indeed. I think you have had a most satisfactory explanation from the gallant Officer who seconded the first Resolution, that taking it altogether, there is nothing more in the statements of the Report than may be attributable to those alterations which will happen with all Societies as with individuals. There are two points that have not been mentioned, which I will just say a word upon. One is the Topographical Department. That has been greatly improved. A few years ago, such a Department did not exist in the Society; now it seems to be becoming a most useful part of the Institution. The other point is "the Corresponding Members." I believe if the system of Corresponding Members were to be extended, it would prove of great utility. Small plans of positions, and of the contour of the country in distant lands in which military men are employed, would be of great service. Take Abyssinia for instance; if some of our Officers had been in that country, how closely every plan or position of theirs would have been looked into. I think we ought to impress upon the Officers of the Two Services the necessity and the advantage of sending home even the slightest plans and sketches that can be made. Whenever I have had the opportunity of addressing the Members of this Institution, I have always pointed out the value of this practice. It is stated that the Army is to be filled with highly educated men. I hope that we shall see more of these men in the army; at present I confess I am disappointed that our highly educated young men have not joined the Army in the numbers that I expected they would do. I will conclude by moving the Resolution that I have read.

Admiral Sir E. BELCHER, K.C.B.—

I have great pleasure in seconding this motion. I do not know that I can add anything to what the gallant mover has said, except that the Public Offices should give us copies of the military and naval records that they receive. I think we are more likely to get them in that manner than from Officers themselves.

The Motion was put from the Chair and carried unanimously.

Lieut.-Colonel GOSSET, R.E.—

Sir,—When funds have to be expended, it is right and proper, towards those gentlemen who have the control of the expenditure, and towards the Members of the Institution, that the most rigid scrutiny should be exercised, and that the accounts should be audited with the greatest precision. The duties of an auditor are not particularly agreeable; they are rather of a troublesome character, and require care. They are, however, most valuable and important duties, and it is but right and proper that they should be duly recognized and acknowledged. I have therefore the honour to move:—

"That the thanks of this Meeting be given to the auditors for their valuable services, and that the following gentlemen be elected for the ensuing year:—

H. F. DOWNS, Esq., for Re-election.
THOMAS SMITH, Esq.
Captain J. E. A. DOLBY."

MONTAGUE CHAMBERS, Esq., Q.C., M.P.—

I rise with very great pleasure to second this resolution, by the permission and direction of the Council. These words I utter, because probably I am little known to many of the veterans and to but few of the younger officers here present. The only apology I can make is this, that from my earliest youth I have had an attachment to the two Services. My connections and relationships have blended all my ideas with their prosperity; and I have been for some time a Member of this great, rising, and national Institution. When I had the pleasure, upon a former occasion, of addressing a similar Meeting, I suggested that we had begun, as all great institutions, if they intend to prosper, should begin. We began with modesty, we began with resolution, we began with determination by our own exertions if pos-

sible, to achieve success. Success we have achieved, but we have not reached the very pinnacle of our greatness; there is still much to be done. I have listened with the deepest interest to the observations that have been made with reference to the Report that has been presented to-day. It is not altogether favourable, yet we may not be without hope that that which occurs to-day will give a new zest to those who are Members of the Institution, and be a great inducement to others, who hear how we are getting on, to become Members. It ought to be an Institution which every Officer, Naval and Military, should struggle, if possible, to support in every possible way. Now, there is one subject that I think is very fairly *proprio* to the motion that I second; I mean the subject of finances. Some observations have been made with reference to what is called "the tightness of the money market," and it is said that even we have been affected by it, in consequence of subscriptions not coming in so readily as might have been expected, and new subscribers not being obtained. I hope the effort has not gone so far, as to intimidate those who would have become Members from doing so, but that when they hear of our generally prosperous condition they will be prepared to enrol their names during this current year. But perhaps I may be forgiven if I allude to a subject which is to us of the deepest possible importance. I have read in one of the paragraphs of this Report that we are but uncertain tenants at will of this very useful building; that upon very short notice we may be required to quit. Therefore, as coupled with our financial arrangements, although we have a very considerable balance invested, surely it would be desirable, if I may adopt a naval expression, "to look ahead," to anticipate what may come, to be prepared when the occurrence takes place; so that we may not sink suddenly or be unable to find any resting place. I merely suggest that it would be desirable at the present moment—I hope the Members will take into their consideration whether I am right or wrong—to look out for some spot, whilst we can obtain it, where we may erect a new building, or get some old building into which we may move. I have it from a suggestion that has been made to me by an authority, whom I am not at liberty to name, and perhaps it might be followed out by those who manage this Institution so extremely well, that if we are to build a new building, we might get a spot in front of the river, near to the embankment. The spot that we have now is very eligible, very excellent indeed; but if by possibility we could enter into some negotiations for the purpose of obtaining a spot,—if we are compelled to remove, perhaps the Council would not consider a site on the banks of the Thames an inappropriate one for any new building we may have to erect. As to the management of our finances, it is with great pleasure that I am able to refer to the account presented to us, and to contrast it with certain accounts that one occasionally reads of in the newspapers. Unfortunately, all Auditors have not the same high character, nor have they so well earned the high character as careful Auditors as those gentlemen to whom we are about to give our thanks. These gentlemen seem most carefully to have investigated the accounts, and I dare say we shall never be shown up in public except in those words of praise which I hope all who are present will now join in, namely, a vote of thanks to the Auditors for their services to this Institution.

Major-General The Hon. JAMES LINDSAY—

Before you put the motion, Sir, it would be right that I should say a few words on the subject which the hon. gentleman has just now mentioned. It might be as well that the Members of the Institution should understand—I will not say, exactly, for I do not know that my memory can carry me back into the whole transaction—at any rate should have a tolerably fair understanding as to the position of this Institution with respect to the Government and the Thames Embankment. What has been done is this—about five or six years ago, when the Thames Embankment was suggested, and the Committee which sat upon the question, made their Report to both Houses of Parliament, a deputation from the Committee of this Institution waited upon the Chancellor of the Exchequer—I think it was—with the view of securing to ourselves the site where we are at present located. And though I believe that nothing is really settled now, with regard to the approaches to the Thames Embankment, yet the general understanding was this, that Whitehall Yard would be

one approach to the Thames Embankment, and that by the removal of Lord Carington's house there would be a grand approach to the Thames Embankment opposite to the Horse Guards. The Government received our deputation in a way satisfactory to ourselves. We communicated also with the architect to the Government, who lives next door. Though I cannot exactly say that any direct and decided pledge was absolutely given, yet, at any rate, it is a fair understanding between us and the Government that we are to remain where we are; and further than that, that we can have more ground towards the river, supposing that we want it; but upon the understanding that we erect a new front to our building that shall be an ornament to the new street, and generally acceptable to those who have the management of public affairs. I may therefore safely say, I think in this public way, that we have an understanding with the Government, that we are to remain where we are, subject, of course, to the production of a building that shall be creditable to the Institution as well as to the Metropolis.

The Motion was then put from the Chair and carried unanimously.

The CHAIRMAN then announced that the business of the Meeting was concluded.

The Chair having been taken by Major-General LINDSAY.

Colonel SYKES, M.P., said—

I have a very agreeable duty imposed upon me, viz., to offer the thanks of this Meeting to the distinguished Officer who has presided over us on this occasion. I hope it is a good augury for the future consideration, support and patronage of one now placed in a situation of high responsibility and trust, and which cannot fail to be advantageous to us, if exercised with kindly feeling on his part towards the objects of this Institution. That our objects are useful I think my right hon. friend will be disposed to admit, without the slightest hesitation. During thirty-six years, we have gone on accumulating Models, a professional Library, and various specimens of professional art, which have been most useful for reference and for study, not only by the Two Services, but by the Public at large. Setting aside the advantages which the services have derived from the comparatively recently established *Journal*, which you have heard has obtained not only an English, but an European reputation, I think that these coincident circumstances will have satisfied my right hon. friend that really the Institution is deserving of his future support and consideration. And as on this occasion we have had the advantage of his presidency, so we also hope that on some future occasion we shall have proofs that his attendance here this day has been operative upon his own mind with regard to the future advantage and prospects of the Institution. I therefore ask you, gentlemen, to give a unanimous vote of thanks to an Officer who has distinguished himself equally in his profession and in his civil duties as an Officer of the State, for having presided upon this occasion.

Rear-Admiral OMMANNEY, C.B.—

I have great pleasure in seconding the motion. I can only reiterate the hope just expressed by the gallant Colonel, that the services of Sir Henry Stokes, so well known to the country, may in his more leisure time be extended to the encouragement and promotion of the interests of this Institution.

The Motion was carried with acclamation.

Major-General Sir H. STOKES—

Gentlemen. I beg to return you my best thanks for the honour you have done me in passing the Resolution that has been put from the chair. I can assure you it was with very great satisfaction that I accepted the invitation of the Council to preside over this General Meeting to-day, because I wish to take an active part in the transaction of the business of this Institution, which I have hitherto been precluded from doing by a long period of foreign service; and also because I wish to express

TABULAR ANALYSIS OF THE STATE OF THE INSTITUTION,
To 31st of December, 1867.

Year. Jan-Jan.	to Annual Dec.	Income received.	Ex- pendi- ture.	Income from sources. ^a	Life Savings received.	Amount of Stock received.	Invested in the purchase of Bonds, &c.	No. of Lit. Library.	No. of Mem- bers at the 1st Dec.	Visitors Number
£	s	£	s	£	s	£	£			
1831	654	..	..	1,194	..	..	..	..	1,437	..
1832	1,416	..	..	1,146	973	..	..	..	2,699	..
1833	1,405	..	..	1,450	692	..	..	..	3,341	..
1834	1,405	..	..	1,500	650	1,100	..	..	3,748	767
1835	1,408	..	..	1,674	366	2,430	40	..	4,155	8,537
1836	1,579	..	..	1,682	330	3,747	45	..	4,069	8,521
1837	1,540	..	..	1,747	222	4,747	189	..	4,164	10,097
1838	1,462	..	..	1,634	230	5,500	246	..	4,175	15,758
1839	1,399	..	..	1,520	168	5,590	292	..	4,248	16,747
1840	1,365	..	..	1,525	195	5,500	440	5,500	4,257	13,900
1841	1,450	..	..	1,643	185	6,000	243	5,850	4,243	19,421
1842	1,373	..	..	1,565	144	6,400	373	6,450	4,127	21,552
1843	1,393	..	..	1,484	140	6,780	327	7,080	4,078	20,567
1844	1,274	..	..	1,374	130	6,900	388	7,247	3,985	21,627
1845	1,315	..	..	1,466	238	5,500	127	8,100	3,858	21,627
1846	1,298	..	..	1,455	138	1,500	74	8,410	4,031	32,885
1847	1,314	74	..	1,502	132	1,700	37	..	4,017	38,669
1848	1,175	37	..	1,375	48	1,700	85	9,641	3,947	37,140
1849	1,176	82	..	1,375	84	1,150	58	..	3,970	38,333
1850	1,141	166	..	1,294	193	600	35	..	3,998	37,773
1851	1,136	131	..	1,292	65	696	34	10,160	3,188	32,613
1852	1,134	133	..	1,381	114	200	43	10,390	3,073	30,769
1853	1,243	130	..	1,684	254	528	41	10,420	3,251	25,952
1854	1,309	138	..	1,368	126	612	95	10,587	3,171	22,961
1855	1,159	107	..	1,289	120	653	55	10,780	3,311	14,778
1856	1,216	107	..	1,519	156	761	47	10,832	3,304	16,184
1857	1,258	176	..	1,637	78	1,033	40	10,960	3,168	17,535
1858	1,313	231	..	1,628	132	1,488	31	11,162	3,252	18,544
1859	1,235	195	..	2,272	612	948	70	11,320	3,244	28,719
1860	1,918	298	..	3,577	927	2,178	114	11,517	3,518	28,801
1861	2,122	305	..	2,899	266	2,848	99	11,812	3,689	23,296
1862	2,296	242	..	3,127	239	3,190	109	12,025	3,797	21,161
1863	2,375	218	..	3,403	265	3,383	143	12,266	3,892	22,256
1864	2,275	115	..	3,253	222	4,516	116	12,700	3,902	17,256
1865	2,435	214	..	3,467	235	4,804	137	13,000	3,895	18,273
1866	2,435	157	..	3,488	299	5,486	150	13,357	3,801	17,067
1867	2,431	141	..	3,467	208	5,732	140	13,860	3,823	17,161

* Including Annual Subscriptions, Entrance Fees, Donations, Legacies, and Interest on Funded Property and also the Grant from Government commencing in 1857.

DONATION IN 1867.

Doughty Chester, Captain 23rd R. W. Fusiliers, £1.

NAMES OF MEMBERS

WHO JOINED THE INSTITUTION BETWEEN THE 24th JUNE AND 31st DECEMBER, 1867.

LIVE.

Smith, N. Bowden, Commr. R.N., 91.
Stewart, Duncan, Lieut. R.N., 91.
McNelle, Alexr., Capt. h.p. Indian Army, 91.

Keppel, Edw. Geo., Ens. 74th Highrs., 91.
Cooke, Wm., Ens. 10th Regt., 91.
Rudge, John, Capt. 10th Regt., 91.
Johnson, Geo. V., Col. R.H.A., 91.

ANNUAL.

Wilson, Fred. W., Capt. R.N., 11.
Aveland, Lord, Lord-Lieut. Lincolnshire, 11.
Whalley, J. L., Capt. 1st Royal Lancashire Mili., 11.
Sanders, C. D., Commr. R.N.
Litchford, E. B., Lieut. late 48th B.N.I.
Marsden, Richd., Lieut. R.N.R., 11.
Boyle, E. R., Lieut. Coldm. Gds., 11.
Cooper, J. C., Capt. 8th or King's, 11.
Streetfield, S. R., Lieut. late R.N., 11.
Boys, Henry, Capt. R.N., 11.
Smith, Michael W., C.B., Major-Gen. unaff., 11.
Cheesey, G. T., Major R.E., 11.
Villiers, Hon. G. P. H., Lieut. Gr. Gds., 11.
Montgomerie, Hon. G. A., Lieut. Gr. Gds., 11.
Henderson, Joseph, Cornet 12th Roy. Lancers, 11.
Parker, Francis, Cornet 12th Roy. Lancers, 11.
Stephens, Cecil J., Cornet 12th Roy. Lancers, 11.
Frobruce, F., Lieut. R.E., 11.
Phillipps, W. C., Capt. R.E.
Hall, Richd., M.D., Asst.-Surg., 33rd Regt., 11.
Andee, Hilary G., Lieut. R.N., 11.
Whimot, W. A. Eardley, Lieut. 5th Fus., 11.
Thomas, W. H., Ens. 1st Surrey Rifle Vols., 11.
Ross, W. Alexr., Major Royal Art., 11.
Doughty, Chester, Capt. 23rd R. W. Fus., 11.
Heyland, Herbert, Mid. R.N., 11.
Chichester, H. A., Ensign 25th K. O. Bors., 11.

Thurlow, H. H., Ens. 13th L. I.
Lloyd, The Revd. W. V., M.A., F.R.G.S., Naval Instructor, 11.
Grenall, Fred. H., Lieut. 15th Regt.
Mush, John, Lieut. 17th Regt., 11.
Clater, Sidney, Surg. London Rifle Brigade Vols., 11.
Hare, R. D., Lieut. late 9th Regt., 11.
Harding, Charles, F.R.S.L., F.R.G.S., F.S.S., F.A.S.L., Capt. 19th Surrey Rifle Vols., 11.
Mackey, H. A., Lieut. R.A., 11.
Seton, J. L., Capt. 102nd Royal Mal. Fus., 11.
Cleland, Wm., Lieut. 102nd Royal Mal. Fus., 11.
Sandeman, J. E., Lieut. Beng. Staff Corps, 11.
Bland, J. Fox, Capt. 70th Regt., 11.
Lawler, D. A. S., Lieut. 13th L. I., 11.
Corcoran, J. F., Capt. Queen's West. Rifle Vols., 11.
McGund, G. J. Viscount, Lieut. Soc. Fus. Gds., 11.
Scott, Beauchamp H. J., Lieut. Soc. Fus. Gds., 11.
Clarke, J. H. C., Ens. 7th Fus. 11.
Boswell, G. L. H., Lieut. Gr. Gds.
Langford, H. E. Lord, Lieut. Gr. Gds.
Cotes, C. J., Lieut. Gr. Gds.
Pearce, George G., Major R.A., 11.
Carmichael, J. D., C.B., Col. 94th Regt.
Phillips, E. B., Capt. late 63rd Regt.
Richards, John, Navigating Lieut. R.N., 11.
Hawes, Geo. H., Lt.-Col. 9th Regt., 11.
Tulloch, J. S., Major R. H. A., 11.
Frymoe, John B., Major R. M. L. I., 11.

ADDITIONS TO THE LIBRARY AND MUSEUM DURING 1867.

LIBRARY.

BOOKS PRESENTED.

ARTESIAL. Routes in Abyssinia, with two Appendices. Pamph. 8vo. 1867. 2 copies.

ADMIRALTY Circulars for 1865-66 and 1867.

The Lords Commissioners of the Admiralty.

ALCOCK, T., Lieut.-Colonel. The Militia, the Nucleus of our Defensive Force. Pamph. 8vo. London, 1867.

The Author.

ANNUAL Report on the Instruction carried on at the Schools of Musketry at Hythe and Fleetwood, and of the progress of Musketry Instruction in the Army, during the year ending 31st March, 1866. 8vo. London.

Lieut.-General C. C. Hay.

ANNUARIO Militare del regno d'Italia, 1867. 8vo. Firenze, 1867.

Italian Minister at War.

ARMY of Great Britain, Strength, Composition, and Organization of. 1867-68. 6th Ed. 2 copies.

The Secretary of State for War.

ARMY List, Official Annual, for 1867-68. 8vo. London.

The Secretary of State for War.

ARTILLERIE-Unterricht für die Mannschaft der Festungen und Küsten Artillerie Compagnien. 2 Parts. 12mo. Wien, 1866.

Unterricht für die Mannschaft der Batterien und Park-Compagnien. 12mo. Wien, 1866.

Instruktion über die Beschaffenheit, und die Ausrüstung der 4 und 8 poundigen Feldgeschütz vom Jahre 1863. 8vo. Wien, 1864.

Provisorische Instruktion über die Einrichtung und den Gebrauch der Rotations Raketen. Pamph. 8vo. 1865.

Captain Müller, I. Austriae Ingenieur.

Ueber die von der Artillerie-Prüfungs-Kommission ausgeführten

ARTILLERIE—continued.

Schießversuche gegen Schiffpanzer.

8vo. Berlin, 1867.

Bericht über die Schießversuche gegen den gepanzerten Schutzhelm.

sehen Geschützstand. 8vo. Berlin, 1867.

The Prussian Government.

ATHENÆUM Club. Supplement to the Catalogue of the Library of the Athenæum, printed in 1845; with a Classified Index of Subjects. 8vo. London, 1851.

The Committee.

BAKEWELL, F. C. A Dynamical Theory of the Figure of the Earth. Pamph. 8vo. London, 1867.

The Author.

BAITOUR, G., Major-General, C.B., R.A.

The Military Description of France.

From the Journal of the Statistical Society of London. June, 1867. Pamph. 8vo. London, 1867.

The Author.

BEDFORD, E. J., Captain R.N. Code of Uniformity in the Colour of Buoy.

Pamph. Folio. 1867.

The Author.

BENGAL Military Repository. 5 vols. 8vo. Calcutta, 1822.

Major-General Sir F. Eyre.

K.C.S.I., C.B.

BEKENGER, R., Reg. The History and Art of Horsemanship. 2 vols. 4to. 1771.

Colonel Wigram.

BETHUNE, Admiral, C.B. Instructions for using Admiral Bethune's Night Signals. Pamph. 8vo. 1861. 2 copies.

Memorandum on Signals for the use of the Merchant Service. 4to. 1855.

The Author.

BREWSTER, B., Lieutenant, late I.N., Surveyor in Mesopotamia. Memoir on Part of Mesopotamia contained between Sheriat-el-Beythia on the Tigris to Tel Ushim. Pamph. Folio. 1865.

Chart of Trigonometrical Survey of above. 1 sheet.

The Author.

BIGSBY, Robert, LL.D. A Tribute to the Memory of Scanderbeg the Great. Pamph. 8vo. London, 1893.

The Author.

BLUE BOOKS:

Jamaica. Copy of Extracts of Correspondence between the Horse Guards and General O'Connor, on the Conduct of Military Officers during the recent deplorable occurrences in Jamaica. Folio. 1867.

Army. Report of the Commissioners appointed to enquire into the Recruiting for the Army. Folio. 1867.

Army, Ordnance and Navy. Return of the number of men voted for the Army and Navy in each year from 1816 to 1858, both inclusive, of the sums voted for the Army, Ordnance, and Navy, for those years, also of the actual Expenditure in each year. Folio. 1859.

Report on the Discipline and Management of the Military Prisons, 1867, by Lieut.-Colonel Henderson, R.E. Pamph. 8vo. 1866.

Report of the Progress made in the Construction of the Fortifications for the Defence of the Dockyards and Naval Armaments, &c., of the United Kingdom. Folio. 1867.

Navy. Statistical Abstract of the Health of the Royal Navy, between the 1st July, 1865, and the 30th June, 1868. 8vo. 1867.

Return of the Number of Ships added to the Royal Navy, by building or purchase, from 1860 to 1866 inclusive. Also a similar Return for all Ships withdrawn by Sale, Loss at Sea, &c., during the same years. Folio. 1867.

Statistical Abstract relating to British India from 1840 to 1865. 8vo. 1867.

Army Medical Department. Statistical, Sanitary, and Medical Reports. Vol. VI, for the year 1864. 8vo. London, 1865.

Reports showing the present state of H.M. Colonial Possessions. Part II, for 1864. Folio. 1867.

Army. Return of the Annual Accounts of the several Manufacturing Establishments under the War Office for the year 1865-6. Folio. 1867.

Navy. Copy of the Report of the Admiral in Command of the Channel Fleet, as to the Trials of the Ships comprising the Fleet under his Command in 1864; with any remarks of

BLUE BOOKS—continued.

the Comptroller of the Navy thereon. Folio. 1867.

Robert Sim. Copy of the Depositions of the Witnesses and Verdict of the Jury upon the Inquest held on the 11th February last upon the body of Robert Sim, a Private of the 74th Highlanders. Folio. 1867.

Navy. Return of the Services and Sea Time of Commanders Wood, Grahame, Fitzclarence, and Yorke, at the time of their respective Promotions. Folio. 1867.

Index to the Report of the Select Committee on Mortality of Troops (China). Folio. 1866.

East India Military Finance. Copy of the Memorandum to the Government of India from the Accountant-General, Military Department. 1864. Folio. 1866.

Correspondence with Her Majesty's Minister in Japan respecting British troops in that country. Folio. 1867.

East India. Statement of the Moral and Material progress and condition of India during the year 1865-66. Folio. 1867.

Report of the Progress of the Ordnance Survey and Topographical Department to the 31st December, 1866.

Report of a Committee to enquire into the administration of the Transport and Supply Department of the Army (Lord Strathnairn's Committee). Folio. 1867.

Return of Detail of the Material of War for the year 1867-68. Folio. 1867.

Copy of the Statutes regulating the Ordinances of the Military Knights of Windsor. Folio. 1867.

Statistical Abstract for the several Colonial and other Possessions of the United Kingdom from 1851 to 1864. 2nd number. 8vo. London 1866.

3rd number. 1852 to 1865. 8vo. London, 1867.

Return. The Ship "North." Folio. 1867.

Return for Copy of Correspondence between the Royal Society, the Board of Trade, the Admiralty, and the Committee of Lloyd's Register with respect to the Deviation of Compasses. Folio. 1867.

Navy. Report on the causes of reduced Mortality in the French Army serving in Algeria. Folio. 1867.

Return. East India (Madras and Orissa) Famine. Folio. 1867.

BLUE BOOKS—continued.

Report on the Sanitary Condition of Malta and Gozo with reference to the Epidemic Cholera in 1865. By Dr. Sutherland. Folio. 1867.

Abyssinia. Papers relating to the Imprisonment of British subjects in Abyssinia. Folio. 1865.

Do. Further Correspondence. Folio. 1866.

Do. Further Correspondence. Folio. 1867.

Statistical Report of the Health of the Navy for 1864. 8vo. 1867.

Report of the Past and Present of Her Majesty's Colonial Possessions for 1862. Part I, 1859. Part I, 1861. 2 parts, 1862. Part I, 1863. 2 parts, 1864. 2 parts, 1865.

W. F. Higgins, Esq. Report relative to the Penetration of Iron Armour Plates by Steel Shot, to which is added a Memorandum on the penetration of Iron-Clad Ships by Steel and other Projectiles. By Captain Noble, R.A. Folio. 1866.

Copy of an Account of the Receipts and Expenditure for Army and Militia Services for the Year ending 31st March, 1866. Folio. 1867.

Statement of the Savings and Deficiencies upon the Grants for Army Services in the Year ended 31st March, 1866. Folio. 1867.

Copy of a Report made by the Inspector-General of Musketry, relative to the Shooting of the Enfield Musket altered to the Snider Breech-loading system. Folio. 1867.

Copy of Correspondence between the Treasury and the War Office, relative to the Increase in the Retirement of General Officers of the Royal Artillery and Royal Engineers. Folio. 1867.

Return respecting the Steel of which the Whitworth Rifle Barrels, which have been issued to the Army, were made, and Copy of Reports of Officers Commanding Regiments or Battalions to whom the Whitworth Rifles were issued, respecting the Efficiency of these Rifles for the Service. Folio. 1867.

Copy of the Proceedings of the Courts Martial recently held in Jamaica, upon Ensign Cullen and Assistant-Surgeon Morris, of Her Majesty's Service, including the Findings of the Court and the Nature of the Sentences, if any, awarded to the Accused. Folio. 1867.

BLUE BOOKS—continued.

Correspondence respecting the Trial of the Whitworth Guns, between the War Office, the Admiralty, and the Whitworth Company, with the Report of the Ordnance Select Committee, June, 1867. Folio.

Copy of all Reports received by the War Office, Horse Guards, and Admiralty, on the Ammunition for the Snider Rifle since the Presentation to Parliament of the Report on that Ammunition by General Hay, June, 1867. Folio.

Report from the Select Committee on Army System of Retirement. Folio. 1867.

Simla Court-Martial. Copies of a Despatch, dated 17th January, 1867, from the Field Marshal Commanding-in-Chief to the Commander-in-Chief in India, with the Answers thereto, and of any Correspondence relating to the proposed grant to Captain Jervis. Folio. 1867.

Copy of the Proceedings of the Simla Court-Martial. Folio. 1867.

Return showing the Distribution of the Duties of all Officers now Consolidated under the Secretary for War. Report. Army in India and the Colonies. Folio. 1867.

Secretary of State for War. BOSSÉ, A. Traité des Manières de dessiner les Ordres de l'Architecture Antique en toutes leurs parties. Folio. Paris.

BOURNE, John, Esq., C.E. On the proper Form of Ships. Pamph. 4to. 1867.

CAPTAIN, J. C., Rear-Admiral, C.B. Director of Stores. Observations by the Director of Stores, War Office, on Lieut.-Colonel Reilly's Memorandum on the Prussian Campaign in 1866, as far as it relates to the Regulations for the Supply of Stores to a British Army in the Field. Pamph. 8vo. London, 1867. 2 copies.

The Author. CATALOGO de la Real Armeria a Madrid. 8vo. 1854.

J. M. Drachs, Esq., F.R.A.S., F.R.G.S.

CATALOGUE of the Hebrew Books in the Library of the British Museum. 4to. London, 1867.

The Trustees. CATALOGUE of Books in the Library of the Anthropological Society of London. Pamph. 1867.

Anonymous. CLARKE, A., Captain, R.E., F.R.S. Comparisons of the Standards of

- Length of England, France, Belgium, Prussia, Russia, India, Australia, made at the Ordnance Survey Office, Southampton, under the direction of Colonel Sir Henry James, R.E., F.R.S. &c. 4to. London, 1866.
- The Secretary of State for War.*
- COLONEL, P. H., Commander R.N., Col-
lisions at Sea: How they occur.
Pamph. 8vo. London, 1867. 2 copies.
- COOKE, A. C., C.B., Lieut.-Colonel R.E.
Short Sketch of the Campaign in Aus-
tria in 1866. Pamph. 8vo. London,
1867. *The Author.*
- COOKE, W. Fothergill, Esq. The Elec-
tric Telegraph: was it invented by
Professor Wheatstone? 2 vols. 8vo.
London, 1859-67.
- Ditto 4th ed. Pamph. 8vo. Lon-
don, 1866.
- Major Anderson, R.A.*
- CRAYFORD, Andrew, Major. Bombay
Army. Remarks on the Indian Army.
Pamph. 8vo. London, 1867.
- W. F. Higgins, Esq.*
- CURT, General, the Hon. Sir Edward,
K.C.H., D.C.L. Lives of the War-
riors of the Civil Wars of France and
England. 8vo. London, 1867.
- The Author.*
- DER FELDZUG von 1866, in Deutsch-
land. 2 parts. 8vo. Berlin, 1867.
- Plans, 23 in number.
- Major Wright, Aide-de-camp to
General Von Moltke.*
- DICKSON, Walter, Esq., M.D. On Scoury
in the Mercantile Marine. Pamph.
8vo. London, 1867. *The Author.*
- DIRECTORY:
- The China Sea Directory. Vol. I. 8vo.
1867.
- The Lords Commissioners of the
Admiralty.*
- EDWARDS, Bevan, Major R.E. An
Organization for the Army of Eng-
land. Pamph. 8vo. London, 1867.
- The Author.*
- EXPERIMENTS with Naval Ordnance.
H. M. Ship "Excellent," 1866. 8vo.
London, 1866.
- The Lords Commissioners of the
Admiralty.*
- EXTRACTS from the Reports and Pro-
ceedings of the Ordnance Select Com-
mittee.
- Vol. I. 1863-64.
- " 2. 1864-65.
- " 3. 1865-66.
- " 4. 1866-67.
- " 5. Parts I and II,
1867. 8vo.

- FREMANTLE, Captain R.N. The Pro-
posed alterations in Steering and Sail-
ing Rules. Pamph. 8vo. London,
1867.
- The Author.*
- GARTRELL, Lieut.-Colonel, and Bland-
ford, Henry, Esq. Report on the
Calcutta Cyclone of the 5th October,
1864 (official). 8vo. Calcutta, 1866.
- The Lieut.-Governor of Bengal.*
- GRAHAM, Colonel Lumley. A New Sys-
tem of Infantry Tactics. Pocket Ed.
12mo. London, 1867. *The Author.*
- GRAY, Thomas, Esq. On the Value of
Coloured Side Lights as a means for
Preventing Collisions at Sea. Pamph.
8vo. London, 1867. 13 Copies.
- The Author.*
- HALSTED, E. P., Vice-Admiral. Plan of
Arrangement at the Paris Exhibition
for the Series of Models, showing the
Turret and Tripod systems of Captain
C. Coles, R.N. From the Plans of
Vice-Admiral Halsted. 1 Sheet. 12
Copies.
- The Author.*
- Text Book to the Turret and Tripod
Systems of Capt. C. P. Coles, R.N.,
C.B., as designed for future Turret
Navies. By C. F. Henwood, Esq.,
Naval Architect, from the Plans of
Vice-Admiral Halsted. 4to. London,
1867. 12 copies.
- HAND BOOK for Field Service, 1867.
Pocket Edition.
- Royal Artillery Institution.*
- HARPER, J. A. W., Esq. Rule of the
Road for Steamers. Pamph. 8vo.
London, 1867.
- The Author.*
- HUNT, James, Esq. Farewell Address
delivered at the Fourth Anniversary
of the Anthropological Society of Lon-
don, January 21st, 1867. Pamph. 8vo.
1867.
- Anonymously.*
- INDIAN ARMY. The Truth about the
Indian Army and its Officers. By
Hydaspes. Pamph. 8vo. London,
1861.
- Anonymously.*
- ITALY. Giornale Militare for 1866. With
Supplement. 2 vols. Torino, 1867.
- Italian Minister at War.*
- KONIGL. Kriegsveterinär-akademie
Handb. Ar. 1864.
- Ditto ditto Ar. 1865.
- 2 vols. 8vo. 1864-65.
- The Secretary of the Swedish Military
Academy of Science.*
- LIBRARY of the War Office. Index to

- the several Articles in Periodical Pub-
lications received in the War Office
Library for the year 1867. 4to. Lon-
don, 1867. 2 copies.
- LIGHTS. The Admiralty List of Lights,
corrected to January, 1867. 1. The
British Islands.
2. South Africa, East Indies, China,
Australia, Tasmania, and New Zealand.
3. The North and West Coasts of
France, Spain, and Portugal.
4. The Mediterranean, Black Sea,
and Sea of Azof.
5. The West India Islands and ad-
jacent Coasts.
6. The West Coast of Africa.
7. The Coast and Lakes of British
North America.
8. South America and Western Coast
of North America.
9. The United States.
10. The North Sea, Baltic, and
White Sea.
- The Lords Commissioners of the
Admiralty.*
- LONDON Gazette, from 1687 to 1701, and
1772 to 1796. 25 vols. Folio.
- Committee of the United Service Club.*
- LONGMORE, T. C.B., Professor. Cata-
logue of Articles contained in the Mu-
seum of Military Surgery attached to
the Army Medical School at Netley.
Pamph. 8vo. London, 1867.
- The Author.*
- LORD, W., Lieut. R.N. A Telegraphic
Vocabulary adapted for the line of
Semaphoric Telegraphs from Liverpool
to Holyhead. 8vo. 1848.
- Admiral Bithams, C.B.*
- MACKEY, Jas., Esq. The Mackay Wind-
age Gun and Projectiles. Pamph.
8vo.
- Anonymously.*
- MACKENZIE, Murdock, Esq. A Treatise
of Maritime Surveying. 4to. London,
1774.
- Major-General Baileys, R.E., F.R.S.*
- MADRAS Artillery Records. 1839 to 1862.
17 vols. 8vo. Madras.
- General Black, R.A. Madras.*
- MEYER, V. D., Captain R.A. Ammu-
nition; a descriptive Treatise on
the different Projectiles, Charges,
Fuzes, Rockets, &c., at present in use
for Land and Sea Service. Part I.
Ammunition for Smooth-bore Ordi-
nance. 8vo. London, 1867.
- Secretary of State for War.*
- On Military Breech-loading Small
Arms. Pamph. 8vo. 1867.
- The Royal Institution.*
- MALCOLM, Major-General Sir John,

G.C.B., K.L.S., Governor of Bombay.
The History of Persia from the most
early period to the present time; con-
taining an account of the Religion,
Government, Usages, and Character
of the Inhabitants of that kingdom.
2 vols. 8vo. London, 1829.

*Major-General J. T. Baileys, R.E.,
P.R.S.*

MALTON, W. D., Captain Scottish Bor-
ders Militia. Manual of Brigade
Drill; in accordance with "The Field
Exercise and Evolutions of Infantry,
1867." 2nd ed. 1 vol. 8vo. Lon-
don, 1867.

The Author.

MANUSCRIPT (Chinese). Names of Offi-
cers and Non-Commissioned Officers
of the Yuen Battalion when under
Musketry Instruction at the camp
Fong-wan-show, under Major Jebb,
67th Regiment. Single Sheet.

Dr. Lempereur, 67th Regiment.

MARSHALL, Captain R.N. A Code of
Signals for the use of vessels employed
in the Merchant Service. 11th ed.
8vo. London, 1861.

Admiral Bellhouse, C.B.

MATHEMATICS. An Elementary Course
of Mathematics prepared for the use of
the Royal Military Academy. 3 vols.
8vo. London, 1853.

The Secretary of State for War.

MERCANTILE MARINE. The "Lancet"
Reports on the present Sanitary Con-
dition of. Pamph. 8vo. London,
1867.

The Author.

MILITARY Education. Fourth Report
of the Council. 8vo. London, 1866.

The Council of Military Education.

MILLER, Lieut.-Colonel R.A., U.C. The
Comparative Advantages of Breech-
loading and Muzzle-loading Systems
for Rifled Field Artillery. Pamph.
8vo. Woolwich, 1867.

 Ditto. A Lecture on the Campaigns
of 1866 in Germany. Pamph. 8vo.
Woolwich, 1867.

The Author.

MITTHEILUNGEN über Gegenstände der
Artillerie und Kriegswissenschaften.
2 numbers for 1866, and 4 numbers
for 1867. 8vo. Wien.

 Ditto. Der Ingenieur. 3 numbers
for 1867.

The Austrian Minister at War.

MORRISON, B. J. Walker. A short, sim-
ple system of Nautical Signals for the
use of Merchant Vessels of all nations.
Pamph. 12mo. Edinburgh, 1867.

 Ditto. Outline Chart of the eastern

- portion of the English Channel, 1867. *The Author.*
- MUSKETRY INSTRUCTION. Annual Report on the Instruction carried on at the Schools of Musketry at Hythe and Fleetwood, and of the Progress of Musketry Instruction in the Army, during the year ending 31st March, 1866. Svo. London, 1866.
- Lieut.-General Hay, Commandant School of Musketry, Hythe.
- MÜLLER, Friedrich, Captain (Imperial Austrian Engineers), Vervandungslehre der Feld- und Gebirgs-Artillerie. 12mo. Wien, 1866.
- NAUTICAL ALMANAC for 1871. Svo. London, 1867. *The Author.*
- The Lords Commissioners of the Admiralty.
- NAVY LIST for 1874. 16mo. *Lady Duncraig.*
- Instructions to Naval Officers relating to Matters affecting the British Mercantile Marine (prepared by the Board of Trade). Pamph. Svo. London, 1862. *The President of the Board of Trade.*
- NEW ZEALAND. A short, synoptical View of New Zealand of to-day. 12mo. London. *Anonymously.*
- NEWCASTLE, The Duke of. A General System of Horsemanship. 2 vols. Folio. 1743. *Colonel Wygram.*
- OBSERVATIONS respecting the Admeasurement of Tonnage. Svo. London, 1867. *The Board of Trade.*
- OBSERVATIONS Météorologiques faites à Nijne-Taguilsk, 1865. Pamph. Svo. Paris, 1866. *Anonymously.*
- PALLISER, Major. Trial of a 32-pounder cast-iron gun converted into a 64-pounder Rilled gun of 60 est.; and tested to destruction, at Shoeburyness on the 15th August, 1866. Pamph. Svo. London, 1866. *The Author.*
- PATENTS. Specifications of (Fire Arms) from the year 1617 to 1865. For Inventions. Abridgments of the Specifications relating to Fire Arms and other Weapons, Ammunition, and Accoutrements. 12mo. London, 1859. Abridgments of the Specifications relating to Ship Building, Repairing,
- PATENTS—continued.
- Sheeting, Launching, &c. Svo. London, 1863. *Relating to Electricity and Magnetism, their Generation and Applications. Svo. London, 1859.*
- Relating to Marine Propulsion. 3 parts. Svo. London, 1857-58. *Relating to Plating, or Coating Metals with Metals. Svo. London, 1862.*
- Relating to Metals and Alloys (excepting Iron and Steel). Svo. London, 1861. *Relating to the Manufacture of Iron and Steel. Svo. London, 1858.*
- Relating to India Rubber and Gutta Percha. Svo. London, 1859. *Relating to Watches, Clocks, and other Time-keepers. Svo. London, 1858.*
- PATENT OFFICE LIBRARY. Index to Foreign Scientific Periodicals contained in the Patent Office Library. Vol. I, June-December, 1866. Vol. II, Nos. 17 to 38. 4to. *The Commissioners.*
- PLANS of Buildings in Russia. General Tottleben, Imperial Russian Engineers.
- POEM. An Anonymous Nautical Poem, entitled the FAME. Svo. London, 1809. *J. M. Druche, Esq., F.R.A.S., F.R.G.S.*
- POPHAM, Admiral Sir Homo, K.C.B. A Book of Signals and Instructions for the use of His Majesty's Fleet. 4to. 1816. *Admiral Bithams, C.B.*
- PROMPT, P., Lieutenant de Vaisseau. Tactique des Abordages en Mer, et moyens de les prévenir. Pamph. Svo. 1867. *The Author.*
- RANDOLPH, Captain R.N. The Rule of the Road at Sea. Pamph. Svo. London, 1867. *The Author.*
- RATES of Chronometers on Trial for Purchase by the Board of Admiralty, at the Royal Observatory, Greenwich. Pamph. 4to. *The Lords of the Admiralty.*
- REGULATIONS for Preventing Collisions at Sea. Pamph. Svo. 1867. 2 copies. *Thomas Gray, Esq.*
- REILLY, Lieut.-Colonel R.A., C.B. Memorandum on the Prussian Army, in

- relation to the Campaign of 1866. Svo. London, 1867. 2 copies. *The Secretary of State for War.*
- REPORT of the Committee for the Prevention of Venereal Diseases, July 1st, 1867. Pamph. Svo. *Anonymously.*
- REPORT of the Committee of the Society for Improving the Condition of Merchant Seamen. Pamph. Svo. London, 1867.
- Rear Admiral A. P. Roper.
- REUTHER, A. E., Kapitein der Artillerie. Het IJzer meer bepaaldelijk beschouwd als gronststof, bestemd tot vervaardiging van vuurmonden. Pamph. Svo. Gravenhage, 1867. *The Netherlands Minister of War.*
- REVUE Maritime et Coloniale for 1867. Svo. Paris. *The Minister of the Marine and the Colonies, Paris.*
- RHODE, J. L., Captain Royal Danish Navy. The Universal Sea Language; being a complete Code of Signals for Day and Night for Vessels of all Nations. In English, French, Danish, and German. 4 vols. Svo. 1835. *Admiral Bithams, C.B.*
- ROUSE, Rollo, Major. Practical Geometry. 12mo. London, 1867. *The Author.*
- RUSIAN MILITARY JOURNAL. 9 numbers for 1866, and 10 numbers for 1867. Svo. *Russian Naval Review.* Nos. 9 to 12 for 1866. Svo.
- RUSIAN ARTILLERY JOURNAL. 12 numbers for 1866. Svo.
- RUSIAN ENGINEERING JOURNAL. 7 numbers for 1866, and 2 numbers for 1867. Svo. *The Minister of War, St. Petersburg.*
- SAILING DIRECTIONS for the Coast of Ireland. Part I. Svo. 1866. *The Lords Commissioners of the Admiralty.*
- SIGNALS. Night and Fog Signals for the use of H. M. Fleet. 4to. 1839. Universal Telephrase or Signal Book for Seamen of all nations. 4to. 1853. Of the Royal Western Yacht Club. Svo. Plymouth. 1845. *Admiral Bithams, C.B.*
- SMYTH, W. H., Admiral F.R.S., D.C.L., &c. The Sailors' Word-Book; an alphabetical digest of nautical terms. Svo. London, 1867. *Mrs. Smyth.*
- SOLDIER. How the British Soldier is armed. Pamphlet. Svo. London, 1867. *Anonymously.*
- STAFF COLLEGE. Report on the Final Examination at the Staff College, held in December 1865, with copies of the Examination Papers. Pamph. Svo. London, 1867. *The Council of Military Education.*
- STATEMENT of the relative pecuniary position of the Soldier and Agricultural and Town Labourer. Pamphlet. Svo. London, 1867. 2 copies. *Secretary of State for War.*
- STEWART, Harding, Capt. R.E. Notes on Submarine Mines. Pamph. Svo. Woolwich, 1866. *The Author.*
- THE NEW GUNPOWDER invented by G. A. Neumeyer. Pamphlet. 4to. London, 1867. *Major-Gen. J. T. Bullen, R.E., F.R.S.*
- THE PROTECTION of our Commerce, and distribution of our Naval Forces considered. Pamphlet. Svo. London, 1867. *Anonymously.*
- TIDE TABLES for the British and Irish Ports for 1867. Svo. 1866. *The Lords Commissioners of the Admiralty.*
- TOYKREE, Henry, Captain, F.R.A.S., and F.R.G.S. On Mercantile Marine Legislation, as affecting the number and efficiency of British Seamen. Reprinted from the Journal of the Society of Arts, 18th January, Pamph. 1867. Svo. 1867. 6 copies. *The Author.*
- TURENNE, Histoire de. 2 vols. 4to. Paris, 1735. *Col. Wygram.*
- TWYFORD, Lieut.-Col. Hants Rifle Vols. How to obtain the Recruit, and how to retain the trained Soldier. Pamph. 12mo. 1867. 4 copies. *Sketch of an Army of Reserve.* Single sheet, 6 copies. 4to. *The Author.*
- VOLUNTEER ARMY, the true History of the origin and formation of, by F. G. Pamph. Svo. London, 1867. *Anonymously.*
- UNITED STATES. Report from a Select Committee of the House of Representatives, on the overland route from Minnesota to British Oregon. Svo. Saint Paul, 1858. *Annual Report of the Secretary of War for 1866.* Svo. Washington, 1866. *The United States Government.*
- WAR OFFICE Library Catalogue, Addenda Corrigenda, since the issue of the Catalogue in 1864, corrected to the

5th June, 1867. Pamph. Svo. War Office, 1867.

The Secretary of State for War.
WATSON'S Code of Signals, 1841. 6th ed. Svo. London, 1842.

Admiral Bethune, C.B.
WHITWORTH, Joseph, Esq. LL.D., F.R.S.
The Report of the Armstrong and Whitworth Committee, with a letter

thereon, to Earl de Grey, and Appendices, by Joseph Whitworth, Esq. 4to. Manchester, 1866.

The Author.
WILSON, Capt. R.N. A few observations on the deterioration of our Iron Navy. Pamph. Svo. Lympington, 1867.

The Author.

JOURNALS AND TRANSACTIONS.

INSTITUTIONS.

ASSOCIATION, BRITISH. Report of the 36th Meeting held at Nottingham in August, 1866. Svo. London, 1867.

The Association.
ASSOCIATION, EAST INDIA. Journal. Nos. 1 and 2. Svo. London, 1867.

The Association.
CIVIL ENGINEERS, Proceedings of. Vol. XXVI, for 1866-67. Svo. London, 1867.

Charter, Bye-laws, and List of Members. Svo. London, 1867.
The Institution.
ENGINEER ESTABLISHMENT, ROYAL. Lectures. Drainage, Sewage, Irrigation, Water Supply, and Water Works, delivered at the Royal Engineer Establishment at Chatham, Autumn Session, 1867, by Baldwin Latham, Esq., C.E. Folio. Chatham, 1867. 2 copies.

On the Penetration of Iron Armour-plates by Steel Shot, by Captain W. H. Noble, R.A. Folio. Chatham, 1867.

Papers of the Corps of Royal Engineers. Vol. XV. New Series. Svo. Woolwich, 1866.

The Establishment.
MECHANICAL ENGINEERS, Proceedings of, for 1867. Svo. Birmingham.

The Institution.
NAVAL ARCHITECTS, Transactions of. Vol. VII. 1866. 4to. London, 1866.

The Institution.
ROYAL, of Great Britain, Proceedings of. Nos. 45 and 46 of Vol. V. Svo. 1867.

The Institution.
ROYAL ARTILLERY, Proceedings of. Nos. 6 to 11, Vol. V. 1866.

The Institution.
ROYAL NATIONAL LIFE BOAT, Journal of. Nos. 54 to 66 of Vol. VI.

Annual Report for 1867, with List of Committee, Officers, and Contributors. Svo. 1867.

The Institution.

SOCIETIES.

ANTHROPOLOGICAL REVIEW. Nos. 16 and 17. Svo. 1867.

Farewell Address delivered at the Fourth Anniversary of the Anthropological Society, January 1st, 1867, by James Hunt, President. Pamph. Svo. London, 1867.

The Society.
ANTIQUARIES, Proceedings of. Vol. III. Parts I, II. Nov. 1864 to Nov. 1865.

Archæologia. Vol. XL. Part I. Folio, 1866.

ASTR. Journal of. 739 to 782 of Vol. XV. Svo. London, 1867.

The Society.
ROYAL, Proceedings of. Nos. 88 to 93 of Vol. XV. No. 94. Svo.

Transactions for 1866, with List of Members.

Ditto for 1867. Part I. 4to.

ROYAL, of Edinburgh, Proceedings of. Session for 1865-66. Svo.

Transactions. Part II, Vol. XXIV. 4to.

The Society.
ROYAL AGRICULTURAL, Journal of. Parts I and II of Vol. III.

The Society.
ROYAL ASIATIC, Journal of. Part II. Vol. II.

The Society.
ROYAL ASTRONOMICAL, Memoirs of. Vol. XXXV. 4to. London, 1867.

The Society.
ROYAL GEOGRAPHICAL, Proceedings of. Vol. XI. Nos. 1 to 6. Svo.

Journal of. Vol. XXXVI. 1866. Svo.

Catalogue of the Library. Svo. 1865.

The Society.
ZOOLOGICAL SOCIETY of London, Proceedings of. Parts I to III for 1866.

Ditto. Parts I to II for 1867. Svo.

Transactions. Parts I to IV of Vol. VI. Folio. 1867.

The Society.

BOOKS PURCHASED.

ADYE, Colonel John, C.B., R.A. Sitana; a Mountain Campaign on the borders of Afghanistan. Svo. London, 1867.

AIRY, G. B., A.M., &c. Gravitation. Svo. London, 1834.

ALCOCK, Sir Rutherford, K.C.B. The Capital of the Tycoon; a Narrative of three years' Residence in Japan. 2 vols. Svo. London, 1865.

ALMANACH DE GOtha for 1868. 32mo. Gotha, 1867.

ALMANAC. The British Almanac and Companion for 1868. Svo. London, 1867.

ANTWERP. Etude critique; considérations historiques et politiques sur les Fortifications d'Anvers, par un ancien Officier du Génie. Svo. Paris, 1867.

ARCYLL, Duke of. India under Dalhousie and Canning. From the Edinburgh Review of January and April, 1865. Svo. London, 1865.

ARMY ESTIMATES of Effective and Non-effective Services for 1867-68. Folio. February, 1867.

ARTILLERY. Instruction for Heavy Artillery, prepared by a Board of Officers for the use of the Army of the United States. 12mo. New York, 1863.

ANNUAIRE DES DEUX MONDES, 1864-65. 4to. Paris, 1866.

BAKER, Samuel White, M.A., F.R.G.S. The Albert-Nyanza, great basin of the Nile. 2 vols. Svo. London, 1866.

BARNATTYNE, J. M., Major. Royal Warrants, Circulars, General Orders, and Memoranda. By the War Office and Horse Guards, from August, 1856, to November, 1866. Svo. London, 1867.

BENES, George. American Neutrality; its honorable past, its expedient future. Svo. Boston, 1866.

BLACKER, Valentine, Lieut.-Colonel. Memoir of the operations of the British Army during the Mahatta War of 1817-1819. 4to. London, 1821.

BLUE BOOK. Copy of Admiral Yelverton's and Admiral Warden's Report on the Trials of the Channel Fleet in 1866, with observations of the Controller of the Navy thereon. Folio. 1867.

BOXTON, Charles B., D.D. The History of the Navy during the Rebellion. Vol. I. Svo. New York, 1867.

BRACKENBURY, C. B., Captain R.A. European Armaments in 1867. Svo. London, 1867.

BURTOS, Richard F., Captain Bombay Army. Abeokuta and the Cameroons Mountains. 2 vols. Svo. London, 1863.

Personal Narrative of a Pilgrimage to El Medinah and Meccah. 2nd edition. 12mo. London, 1857.

BYRNE, Oliver, Esq. The Essential Elements of Practical Mechanics. 12mo. London, 1867.

CANOT de Sauvetage, Description du. Pamph. Svo. Paris, 1867.

CARTER, Thomas, Esq. Historical Records of the 13th or Prince Albert's Regiment of Light Infantry (with Illustrations). Svo. London, 1867.

CATALOGUE des Collections composant le Musée d'Artillerie, par O. P. L'Héritier. Svo. Paris, 1862.

CIVIL SERVICE GUIDE. By Henry White, B.A. Svo. Edition. 12mo. London, 1867.

CLARENCE, Carl von, General. Der Feldzug von 1812 in Russland, der Feldzug von 1813, bis zum Waffenstillstand, und der Feldzug von 1814, in Frankreich. Svo. Berlin, 1863.

COLOMB, P. H. and Bress, H. W., Commanders R.N. The Law of Port Helm. Svo. London, 1866.

COMBERMER, Viscount, Field-Marshal, G.C.B., &c. Memoirs and Correspondence, from his family papers. By the Right Hon. Mary, Viscountess Combermere, and Captain W. W. Knollys, 93rd Sutherland Highlanders. 2 vols. Svo. London, 1866.

CONSIDERATIONS sur les défenses naturelles de la France en cas d'une invasion Allemande. Traduit de l'Allemand par A. Bacharach. Svo. Paris, 1867.

D'ARELLO MASSEMO. Precis of the Operations of General Durando in Venetia. Translated by Captain Kinloch. Pamph. Svo. London, 1867.

DIXON, Hepworth, Esq. The Life of Admiral Blake. 12mo. London.

DOUGLAS, General Sir Howard, Bart., G.C.B., &c. On the Defence of England, Naval, Littoral, and Internal. Pamph. Svo. London, 1860.

- DUPONT, Henry. Narrative of a Journey through Abyssinia in 1862-63. 8vo. London, 1867.
- FAY, Ch., Chef d'Escadron. Souvenirs de la Guerre de Crimée, 1854-56. Svo. Paris, 1867.
- FITZGERALD, Colonel Coldstream Guards. Memoir on the Duty of Picquets. 4th edition. Pamph. 32mo. London, 1854.
- FLACIAT, Eugene, Ingénieur. Navigation à Vapeur transocéanique. 2 vols. Svo. (with an Atlas). Paris, 1866.
- FOURTH, James, Lieut. Bengal Staff Corps. The Sporting Rifle and its Projectiles. 2nd edition. Svo. London, 1857.
- FRANCE. Les Institutions Militaires de la France. Svo. Paris, 1867.
- FRANCE. L'Armée Française en 1867. 9th edition. Svo. Paris, 1867.
- FREDERICK CHARLES, Prince of Prussia. A Military Memorial. Pamph. Svo. London, 1866.
- GROSS, Francis, Esq. Military Antiquities respecting a History of the English Army from the Conquest to the present time. 4to. 2 vols. London, 1801.
- GUYARD, J. Etude sur la Formation en carré. Svo. Paris, 1867.
- HALL, Charles Francis, Captain of the Whaling Barque "George Henry." Life with the Esquimaux. Svo. London, 1865.
- HAKLEY SOCIETY'S PUBLICATIONS. The Three Voyages of Martin Frobenius in search of a Passage to Cathala and India by the North West, A.D. 1570-8. By Rear-Admiral R. Collinson, C.B. Svo. London, 1867.
- HAYLOCK, Sir Henry M., Bart., C.B., &c. Three Main Military Questions of the Day. Svo. London, 1867.
- HERRSCH, Sir John F. W., Bart., K.H. Familiar Lectures on Scientific Subjects. 12mo. London, 1867.
- HISTORICUS. Letters by Historicus on some questions of International Law. Reprinted from the "Times" with considerable additions. Svo. London, 1863.
- HOZIER, H. M., F.C.S., F.G.S. The Seven Weeks' War. Its Antecedents and its Incidents. 2 vols. Svo. London, 1867.
- JACKES, Capitaine. Les Armes à feu portatives se chargeant par la Culasse. Les fusils Classepot et Abbin. Pamph. Svo. Aversa, 1857.
- JOHN, Major, R.M., and Lieut. P. H. Nicolas, R.M. The Naval and Military Heroes of Great Britain; or, Calendar of Victory from the Reign of William the Conqueror to the Battle of Invermarch. 12mo. London, 1850.

- JOTT, Theodore. Catalogue des Collections composant le Musée Royal d'Antiquités, d'Armures et d'Artillerie, Bruxelles. 2nd edition. Svo. Bruxelles, 1867.
- KÄRCHER, Theodore, Professor at Woolwich. Les Ecrivains Militaires de la France. Svo. Londres, 1866.
- KAYE, John William. Lives of Indian Officers. 2 vols. Svo. London, 1857.
- KENNEDY, R. H., M.D. Narrative of the Campaign of the Army of the Indus in 1838-39, in Sind and Kutch. 2 vols. 12mo. London, 1840.
- KIRBY, W. M.A., Chaplain. The History of Lord Seaton's Regiment, the 52nd, at the Battle of Waterloo, together with various incidents connected with that regiment. 2 vols. Svo. London, 1866.
- LIVINGSTONE, David and Charles. Narrative of an Expedition to the Zambesi and its Tributaries, 1858-61. Svo. London, 1865.
- LELLIER, C., Officier de Marine. Essai sur l'histoire de la tactique navale et des évolutions de mer. Svo. Paris, 1867.
- MCNAIR, Robert. The Colours of the British Army. Parts II and III. 4to. Pamph.
- MARTIN, Charles, Lieut.-Colonel French Army. Constitution et Puissance Militaires comparées de la France et de l'Angleterre. Svo. Paris, 1863.
- MEMORIAL de l'Artillerie. Rédigé par les soins du Comité. No. 8. Svo. Paris, 1867. With Atlas. Oblong folio. 1867.
- MERCHANT SHIPPING ACT, 1854. Folio.
- AMENDMENT ACT, 1855. Folio.
- MERIAN, Colonel Swiss Army. Les Progrès de l'Artillerie dans les six dernières Années. Pamph. Svo. Paris, 1866.
- MILLER, William Allen, M.D., LL.D. Elements of Chemistry, Theoretical and Practical. 3 vols. Svo. London, 1863.
- MOTLEY, John Lothrop, D.C.L. History of the United Netherlands. Vols. III and IV. Svo. London, 1867.
- NAPOLEON Ier. Correspondence de. Tmes 21 and 22. Svo. Paris, 1867.

- NAYL. The Naval Expenditure from 1800 to 1866, and its Results. Pamph. Svo. 1867.
- Estimates of Effective and Non-Effective Services, for the year 1867-68, with Appendix. Folio. 1867.
- NEWTON, C. J., M.A. Travels and Discoveries in the Levant. 2 vols. Svo. London, 1865.
- NGUYEN, Lord. Some Memorials of John Hampden, his Party, and his Times. 2 vols. Svo. London, 1832.
- ORDENANCE. Dienst-Vorschriften der Königlich Preussischen Armee. Herausgegeben und redigirt von Karl von Heffordt, Major Prussian Army. 2 vols. Svo. 1865-67.
- OUTRAM, James, Major 23rd Bombay N.I. Rough Notes of the Campaign in Scinde and Afghanistan in 1838-39. 12mo. London, 1840.
- PARIS, Vice-Admiral. L'Art Naval à l'Exposition Universelle de Paris en 1867. Première Partie. Svo. Paris, 1867.
- Atlas to Ditto, oblong folio.
- PARRY, Edward, Rev. Memoirs of Rear-Admiral Sir W. Edward Parry, Knt., F.R.S., 7th ed. 12mo. London, 1860.
- PROBST, Wilhelm von. Neue Hinterladungs-Geschütze. Pamphlet. Svo. Darmstadt, 1867.
- PORTER, Whitworth, Major. A History of the Knights of Malta, or the Order of the Hospital of St. John of Jerusalem. 2 vols. Svo. London, 1858.
- PENJAB. History of the Punjab, and of the rise, progress, and present condition of the sect and nation of the Sikhs. 2 vols. Svo. London, 1846.
- RAFFORTAUX Autorités Fédérales Suisses sur les Essais de Fusils se chargeant par la Culasse. Pamph. Svo. Paris, 1867.
- RECHERCHES, The Annual, for 1866. New Series. Svo. London, 1866.
- RENNIE, Surgeon, M.D. Bhotan, and the story of the Doogar War. Svo. London, 1866.
- RENTA, History of (Cabinet Encyclopedia). 3 vols. 16mo. London, 1831.
- REUTOW, B., Brigadier Prussian Army. Die Ersten Feldzüge Napoleon Bonaparte in Italien und Deutschland, 1796 und 1797. Svo. Zurich, 1867.
- REUTOW, W., Colonel. La Guerre de 1866, en Allemagne et en Italie. Svo. Paris, 1865.
- SARIS, Robert, Esq., F.R.A. The Electric Telegraph. Svo. London, 1867.
- SCHOTT, Capitaine du Génie Prussien. Des Forts Détachés. Pamph. Svo. Paris, 1867.

- SLADE, Sir Adolphus, Rear-Admiral, K.C.B. Turkey and the Crimean War, a Narrative of Historical Events. Svo. London, 1867.
- SMITH, M. W., Major-General, C.B. Cavalry Outpost Drill. Svo. London, 1867.
- STEINACKER, F. F. Histoire des Ordres de Chevalerie, et des Distinctions Honorifiques en France. 4to. Paris, 1867.
- STEVENS, Sir Edward, Bart. The Conquerors, Warriors, and Statesmen of India. Svo. London, 1866.
- TIMES, John, F.S.A. The Statesman's Year Book for 1867. Svo. London, 1867.
- TIPING TIEN-KWON; the History of the Tiping Revolution. By Liu-Le (Special Agent of the Tiping General-in-chief). 2 vols. Svo. London, 1866.
- TROTTER, Lionel James, late 2nd Bengal Fusiliers. The History of the British Empire in India, from the appointment of Lord Hastings, to the political extinction of the East India Company, 1844 to 1862. 2 vols. Svo. London, 1866.
- UNITED STATES. Army Meteorological Register for 12 years, from 1843 to 1854 inclusive, compiled by the Officers of the Medical Department of the Army, at the Military Posts of the United States. 4to. Washington, 1855.
- The Official Correspondence on the Claims of the United States in respect of the Alabama. Svo. London, 1867.
- The Rebellion Record. A Diary of American Events. Edited by Frank Moore. Vol. X. Svo. New York, 1867.
- Report of the Quartermaster-General of the United States Army to the Secretary at War, for the year ending 30th June, 1865. Svo. Washington, 1865.
- WARRINGTON, Elliot. Memoirs of Prince Rupert and the Cavaliers. 3 vols. Svo. London, 1849.
- WELLINGTON, Arthur, Field-Marshal Duke of, K.G. Despatches, Correspondence, and Memoranda. Edited by his son, the Duke of Wellington, K.G. (In continuation of the former Series). Vol. I. January 1819, to December 1822. Vol. II. 1823 to 1825. Svo. London, 1867.
- WILSON, Horace Hayman, Esq. Documents illustrative of the Burmese War. 4to. Calcutta, 1827.
- WITZLEREN, A. V., General, Prussian Army. Heerwesen und-Infanterie-

dienst der Königlich Preussischen Armee. Svo. Berlin, 1867.
 WRIGHT, Robert, Esq. A Memoir of General James Ogilthorpe. Svo. London, 1867.

WYSE, Thomas, The Right Hon., K.C.B. An Excursion in the Peloponnesus in the year 1858. 2 vols. Svo. 1865.

PERIODICALS PURCHASED.

ALLEN'S INDIAN MAIL.
 ANNALES DU CONSERVATOIRE.
 ANNUAL REGISTER.
 ARMY LISTS—HART'S.
 ARTISAN.
 ATHLETIC.
 CIVIL ENGINEER.
 ENGINEER.
 GAZETTES—ARMY AND NAVY.
 NAVAL AND MILITARY.
 UNITED SERVICE.
 WOOLWICH.
 JOURNALS—DES ARMES SPÉCIALES.
 DES SCIENCES MILITAIRES.
 UNITED SERVICE.
 KELLY'S POST OFFICE DIRECTORY FOR 1867.

LE SPÉCTATEUR MILITAIRE.
 MAGAZINES—GENTLEMAN'S.
 LONDON, EDINBURGH, AND DUBLIN PHILOSOPHICAL MECHANICS.
 NAVY LIST, QUARTERLY.
 NOTES AND QUERIES.
 REVIEWS—EDINBURGH.
 QUARTERLY.
 WESTMINSTER.
 STATESMAN'S YEAR-BOOK.
 THE LANCET.
 THE TIMES.
 THOM'S IRISH ALMANAC AND OFFICIAL DIRECTORY.
 TIME'S YEAR BOOK OF FACTS.

MAPS, PLANS, CHARTS, SKETCHES, &c.

Presented.

Portrait of Earl Howe, K.G.
John Barrow, Esq., F.R.S.
 New Zealand.
 Map of the Province of Otago, 1856.
 Stanford's Atlas of the Provinces of Nelson and Marlborough.
 Map of the Province of Canterbury, 1866.
 Sketch Map of the Province of Southland, 1865.
Captain Hope, R.N.
 Abyssinia, Route Maps of. 2 copies.
Secretary of State for War.
 Berghaus Hermann and F.V. Stülpenagel.
 Chart of the World, containing the lines of oceanic Mail Steam Communication, Telegraphs, &c. Gotha, 1867.
Anonymously.
 Topographic Map of Belgium. 3 sheets (in continuation).
The Minister at War, Brussels.
 Plan of the Fortified Camp of Antwerp. 4 sheets.
The Minister at War, Brussels.
 Charts, 43 in number.
The Lords Commissioners of the Admiralty.
 Photographs of Captain Faucett's Boat for Passenger Ships.
 Ditto of Model of his Pontoon Trains. 4 views.
Captain Faucett.
 Photographs of the Gates of Antwerp. 8 in number.
Colonel Scrutton, R.E.
 MANUFACTURING Departments of the Royal Arsenal. Series of Lithographic Plates of. Total 30.
 Ditto, ditto. Series of Lithographic Plates of the Royal Laboratory Department. Nos. 1 to 36.
 Ditto, ditto. Series of Lithographic Plates of the Royal Gun Carriage Department. 111 Sheets.
 Ditto, ditto. Lithographic Plate of Boxer Ammunition for Snider Rifle. 1 Sheet.
 Selection of Photographs of Guns and Breech-loading Small Arms, &c., taken at the Royal Arsenal, Woolwich. 135 in number.
The Secretary of State for War.

MAPS PURCHASED.

India, Allen's Map of. 1867. Mounted on spring roller.
 Africa, Keith Johnstone's Map of, with latest discoveries. 1 sheet.
 Kiepert, H. Neuer Handatlas, Die Nilländer. Berlin.
 Papal States. Carte de la Partie sud-ouest des États de l'Eglise, exécutée par les Officiers du Corps d'Etat-Major. Paris, 1856.
 Suez, Carte de l'Isthme de. Paris, 1866.
 Abyssinia, Wyld's Map of. 1867.

MUSEUM.

MILITARY.

Presented.

- "Schenkl" 10-lb. shell fired at the battle of Gettysburg, July 3rd, 1863. Also the Concussion Fuze used with the above, comprising fuze case, plug for reversing jumper previous to loading; jumper to be fitted with copper cap.
Lieut. H. A. Dillea, Rifle Brigade.
- Part of a Turkish Cannon, on the coil principle, brought from Sinope after the Crimean War.
W. Woodcroft, Esq., Office of Patents.
- Dagger of Oriental manufacture.
Dr. McCosh.
- Specimens illustrating the manufacture of Boxer Ammunition.
Pattern II. Naval.
Pattern III. Enfield.
- Cartridges for Snider's Breech-loading Rifle.
Colonel Rorer, R.A.
- Cockran's Breech-loading Rifle.
Owners of the Patent.
- Model of a 32-pounder Gun, throwing a sharp-edged discoidally-formed shot.
Lieut. General Hutchinson.
- Section of 12-pounder Gun, showing his mode of strengthening by means of an internal wrought-iron tube.
- Small Model of 12-inch Gun, showing mode of inserting tube.
- Specimen showing flaws in casting over-tube.
Ditto, showing the effects of chilling.
- 9-inch Palliser Shell.
1 do. do. broken open to show grain of metal.
- 1 Screw Bolt for attaching armour plates, adopted in iron shields for permanent fortifications.
Major W. Palliser, unattached, late 18th Hussars.
- Series of Common Shell, whole and in section, for the 9, 8, and 7-inch muzzle-loading guns.
- Specimens of Double Shell, whole and in section.
Do. of Shell, whole and in section, for the 64-pr. gun.
- Do. of 9, 8, and 7-inch Palliser Chilled Shell.*
- Do. of Castings in Chill and in Sand.*
- The Secretary of State for War.*
- Coat of quilted Armour taken in Action from Koor Singh, the famous Rajpoot Chief of Jugdeespyee in Behar, on the 12th August, 1857.
Major General Sir F. Eyre, K.C.S.I., C.B., who commanded the Field Force that relieved Arrah.

ARMS

Purchased.

- 1 Short African Spear.
4 Long do. do.
4 Short do. Clubs.
1 Long do. do.
Breech-loading Arms.
Burton—rim ignition.
- Montstorm and Selwyn—Central fire.
Albini and Braendlin—do.
Henry—do.
Fosbery—do.
Chasepot—do.

TOPOGRAPHICAL MODELS

Presented.

- Model of the Simplon Pass.
Model of Geneva, with the old fortifications.
Model of a Swiss Lake.
Captain Trotter.

MODEL OF GUN

Purchased.

- Quarter-size Model of a 10-inch Woolwich Gun, with Shot.

MISCELLANEOUS.

Presented.

- No. 1. Small Ordinary Screw Bolt.
" 2. Do. do. broken off by first blow of 28 lbs. weight, falling through 2 feet.
- No. 3. Screw Bolt with reduced shank before testing.
- Screw Bolt with reduced shank after test. This bolt withstood nine blows of the 28 lbs. weight, falling through 2 feet 6 inches. Before being tested, its length was the same as that of Nos. 1 and 3.
- Major W. Palliser, unattached, late 18th Hussars.*
- Steel Model of a Mackay solid shot.
77-lb. shot fired on 13th November, 1867, from the Mackay 8-1/2 Windage Gun, with a charge of 30 lbs. of powder at a 6-inch back-plate at a range of 75 yards.
- 82-lb. shot fired from the Mackay 6-inch Windage Gun with 22 lbs. of powder at a 6-inch rolled plate at a range of 75 yards.
- Shot fired with 14 lbs. of powder from the Mackay 8-1/2 Gun, at a 5-inch rolled plate at 75 yards.
- Muzzle of the Mackay 12-pounder Windage Gun, which competed at Shoeburyness in June, 1865. This gun fired 1,300 rounds previous to the muzzle being cut off. Weight of projectile, 11 lbs. 10 oz.; charge, 1 1/2 and 2 lbs. of powder. The extreme range of the gun before the muzzle was cut off, was at 25° elevation from 6,500 to 6,800 yards, with 2 lbs. of powder and 12-lb. shot.
- James Mackay, Esq.*
- Military Figures on a Mechanical Base, for the Practice of Company Drill.
Captain Riviere, Hon. Art. Co.
- The Mangersbury Battering Ram; an instrument intended to perforate stone or brick walls. It may be used either to enable troops to obtain possession of houses held by an enemy, or to facilitate the escape of persons in the upper part of a house when the staircase is on fire. Invented by the donor.
J. Chamberlayne Chamberlayne, Esq.

NAVAL.

Miscellaneous.

Presented.

- A Gun dropped overboard during the Siege of Gibraltar and recovered a short time since.
Captain H.R.H. the Duke of Edinburgh, K.G., R.N.

LIST OF MEMBERS

OF THE

ROYAL UNITED SERVICE INSTITUTION,

CORRECTED TO THE

1st JANUARY, 1868.



WHITEHALL YARD, LONDON.
[APRIL, 1868.]

LIST OF ANNUAL SUBSCRIBERS.

* Denotes Corresponding Member of Council.

ABBOTT, Sir F. CB. Maj.-Gen. (ret.) Beng.
Engs. Member of Coun. of Mil. Edn. (11.)
Abbott, Saunders A. Maj.-Gen. (ret.) E.
Army (11.)
Abercromby, Hon. John Lieut. Rifle Bri-
gade (11.)
Abinger, Lord W. F. Col. S.F.Gds.
Ackers, G. H. Lieut.-Col. Staffd. Yeo. Cav.
late Lieut. R. H. Gds. (11.)
Acland, F. G. Dyke Ens. Rifle Brigade
*Acland, T. Dyke, MP. Lt.-Col. 1st Dev.
Rifle Volunteers, (11.)
Adair, Alex. W. Capt. (ret.) 32nd Light
Inf. (11.)
Adair, J. W. D. Major (ret.) 31st Regt. (11.)
*Adair, R. A. Shafte Col. Suffolk Mil.
Artillery, ADC. to the Queen (11.)
*Adams, Cadwallader Col. 49th Regt. (11.)
Adams, C. Maj. Instr. Mil. Hist. R. M.
Coll. (11.)
Adams, E. Col. Sec. R. M. Asylum (11.)
Adams, Fred. Lieut. H.M. Bom. Staff Corps
Adams, F. B. Ens. Hon. Art. Co. (11.)
Adams, W. H. Col. late unatt. Prof. of For-
tification at the R. M. Acad. Sandhurst
(11.)
Adderley, Mylles B. B. Capt. (ret.) R.H.Gds.
Addington, Hon. Leonard A. Capt. R.A.
Brigade
*Addison, T. CB. Col. 2nd Q. Ry. R. (11.)
Adye, John M. CB. Col. Roy. Art. (11.)
Ade, T. F. Capt. (ret.) 16th Lancers (11.)
Ade, Wm. Lieut.-Col. 51st K.O.L.I. (11.)
Agnew, C. Major late 11th Regt. (11.)
Ainslie, C. P. Maj.-Gen. Commanding
the Troops, Barbadoes
Ainslie, Henry F. Col. (ret.) 83rd Regt.
(11.)
Airey, Sir Rich. GCB. Lt.-Gen. Col. 17th
Rgt. Gov. and Com. in Chief Gibraltar (11.)
Aitchison, Sir John, GCB. Gen. Col.
72nd Highlanders (11.)
Aitchison, W. Lt.-Col. Sec. Fus. Gds.
Albermarle, G. T. Esq. of Lieut.-Gen.
Alcock, Nathaniel Asst.-Surg. 35th Roy.
Sussex Regiment
Alldridge, R. Capt. late 60th Roy. Rifles
Alldworth, R. W. Col. (ret.) 7th Roy. Fus.
(11.)
Alexander, Claud Lieut.-Col. Gren.Gds. (11.)
Alexander, James Major General H.M.
Indian Army
Alexander, Sir J. E. Colonel (ret. h. p.) (11.)
Alexander, J. H. I. CB. Capt. R.N. (11.)
Allardice, G. J. C. Lieut. 50th Regt. (11.)
Allen, E. M. Lieut. 21st R.N.B. Fus.
Allinson, A. C. Lieut. 1st W. I. Regt. (11.)
Allix, Noel C. Lieut. Gren. Gds. (11.)
Ames, H. M. Cornet late Glouc. Yeo.
Ames, Lionel Lt.-Col. late Herts. Mil. (11.)
Anniel, F. J. T. Capt. 4th Mon. Rifle Vols. (11.)
Amsinck, William Major late 53rd Regt.
Anderson, A. MD. Insp. Gen. of Hosps. (11.)
Anderson, David Col. 22nd Regt.
Anderson, Geo. Dep.-Insp. Gen. of Hosps. (11.)
Anderson, W. CB. Col. (ret.) H. M. Beng. Art.
(11.)
*Anderson, W. F. Major H.M. Bom. N.I. (11.)
Anderson, W. I. Capt. Lanc. Hus. late 17th
Lancers
Andoe, Hilary G. Lieut. R.N. (11.)
Andrews, Wm. Geo. Lieut.-Col. E.A. (11.)
Angelo, E. A. KH. KW. Col. late 30th Regt.
(11.)
Angelo, J. A. Lieut.-Col. R.A.
Capt. (ret.) Rifle
Brigade
Anstruther, P. R. Capt. 94th Regt.
Anstruther, Philip, CB. Maj.-Gen. late
H.M. Madras Art. (11.)
Anstruther, Sir Robt. Bart. Lt.-Col. (ret.)
Gren. Gds. MP. (11.)
Arbuckle, E. H. Vaughan Lieut.-Gen. (ret.)
R.A. (11.)
Arbuthnot, Hon. Sir Hugh, KCB. Gen.
Col. 70th Highlanders
Arbuthnot, H. T. Major R.A. (11.)
Archdall, Mervyn Capt. late 6th Dr. M.P.
Archer, D. Col. late H.M. 3rd Bengal
Europeans (11.)
Archer, W. H. Major late 16th Lancers
Arkwright, A. P. Comr. R.N. (11.)
Arkwright, Ferd. W. Capt. 2nd Derby Mil.
late 4th Dr. Gds. (11.)
*Armistead, Rev. C. J. M.A. Chap. R.N. (11.)
Armstrong, C. Major (ret. h. p.) 35th Roy.
Sus. Regt.
D

LIST OF ANNUAL SUBSCRIBERS.

Armstrong, C. A. Capt. (ret.) 10th Regt. (11.)
 Armstrong, J. W. CB. Col. unatt. (11.)
 Armstrong, Sir W. Geo. CB. late Engineer War Depart. for rifled Ordnance (11.)
 Armitage, H. Lt.-Col. Cold. Gds. (11.)
 Arthur, Thos. Lt.-Col. late 3rd Drag. Gds. (11.)
 Arthur, Wm. Capt. R.N. (11.)
 Arundell, Hos. E. J. J. Lieut. 12th Roy. Lancers (11.)
 Ashby, Geo. Ashby Capt. late 11th Hussars (11.)
 *Ashley, Lord Lt. Col. Dorset Mil. M.P. (11.)
 Askwith, W. Harrison Col. R.A. Sup. Gunpowder Factory, Waltham Abbey (11.)
 Astley, J. Dugdale Lt.-Col. late Sco. Fus. Gds. (11.)
 Atcherley, W. A. Capt. 8th or King's (11.)
 Atchison, T. Lt.-Col. R. Lane. Mil. Art. late R.A. (11.)
 Atkinson, John Capt. Qua-Master h.p. late Gr. Gds. (11.)
 Atkinson, R. H. Lieut. 14th Regt. (11.)
 Atkinson, Thos. Capt. 63rd Regt. Aschmutz, Sir Sam. Benj., G.C.B. General, Col. 7th Royal Fusiliers (11.)
 Auerer, Geo. Capt. late 20th Light Dns. (11.)
 Aylmer, J. E. F. Lieut. 8th or King's (11.)
 Aynsley, C. M. Capt. R.N. (11.)
 Aytoun, Jas. Major h.p. (unatt.) (11.)
 BACK, Sir George, DCL. FRS. Adm. (11.)
 Bacon, H. Commander R.N. (11.)
 Baigrie, R. Major H.M. Bom. Staff Corps (11.)
 Bailey, Lucius C. Staff Commander R.N. (11.)
 Bailey, William Capt. R.E. (11.)
 Baillie, Duncan J. Lt.-Col. R. H. Gds. (11.)
 Baillie, George Clement Col. (ret.) R.E. (11.)
 Baillie, Hugh S. Col. (ret.) R. H. Gds. (11.)
 Baillie, J. Major H. M. Bengal Staff Corps and late Lt.-Col. Turkish Service (11. 1a.)
 Baily, T. F. Capt. Kent Art. Mil. (11.)
 Bain, George late Dep. Assist. Com. Gen. (11.)
 Baker, Francis B. Asst.-Surg. Sco. Fus. Gds. (11.)
 *Baker, T. D. Major 18th Royal Irish (11.)
 Baker, T. K. Lieut. (ret.) 12th Regt. (11.)
 Baker, T. R. Major late 7th Fusiliers (11.)
 *Baker, Valentine Col. 10th Huss. (11.)
 Baker, W. E. Maj.-Gen. R.E. Beng. (11.)
 Baker, W. T. Capt. 12th Regt. (11.)
 Baker, Wyndham Col. (ret.) F.P. R.A. (11.)
 *Balacombe, James Capt. and Adj. S. Down Mil. (11.)
 Balders, C. W. M. CB. Major-Gen. Col. 17th Lancers (11.)
 Baldwin, Charles F. Lieut. R.E. Bombay (11.)
 Baldwin, F. C. Lieut. Ceylon Rifles (11.)
 Balfour, H. L. Capt. R.A. (11.)
 Balfour, T. G. MD. Dep. Insp. Gen. of Hospes (11.)
 *Balguy, C. Y. Capt. (ret.) Derby Mil. (11.)
 Ballard, John Arch. CB. Col. R.E. Bombay (11.)

Ballin, Geo. Qua-Mast. Hon. Art. Co. (11.)
 *Bancroft, W. C. Lieut.-Col. 16th Regt. (11.)
 Banister, Thomas Capt. late 15th Regt. Banks, Chas. Esq. late Asst. Sec. Roy. Hosp. Kilmainham (11.)
 Barber, Harby Capt. Leicester Mil. late H.M. Madras Army (11.)
 Barkworth, Thos. Lieut. 2nd Roy. Surrey Mil. (11.)
 Baring, Charles Lt.-Col. Coldm. Gds. (11.)
 Baring, Francis Lt.-Col. Scots. Fus. Gds. (11.)
 *Barker, G. D. Major 64th Regt. (11.)
 Barker, John Capt. West Essex Mil. (11.)
 Barker, John B. Capt. 75th Regt. (11.)
 Barlow, F. W. Lieut. 20th Regt. (11.)
 Barlow, Henry W. Capt. late R.E. (11.)
 Barlow, Maurice Lieut.-Gen. Col. 3rd W.I. Regt. (11.)
 Barlow, W. R. Capt. R.A. (11.)
 Barnard, W.A.M. Lieut.-Col. 96th Regt. (11.)
 Barnes, C. H. Surgeon late H.E.I.C.S. (11.)
 Barnes, C. H. Capt. Royal Horse Art. (11.)
 Barnett, Edward Res.-Adm. (11.)
 Barrett, Saml. Capt. 3rd Huss. (11.)
 Barringer, T. S. MD. Surg. Hon. Art. Co. (11.)
 Barrington, J. T. Capt. R.A. (11.)
 Barron, Fenwick Boyce Lt.-Col. (ret.) 3rd Dr. Gds. (11.)
 Barron, N. J. Lieut. 5th Fus. (11.)
 Barrow, John, FRS. Capt. 36th London R. Vols. late Admiralty (11.)
 Barry, Philip Maj.-Gen. R.E. (11.)
 Barstow, Geo. Lieut.-Col. R.A. (11.)
 Barstow, T. A. A. Lieut. 72nd Highlrs (11.)
 Barton, William Capt. late Gren. Gds. (11.)
 Bassano, Philip H. Esq. late War Office (11.)
 Bassett, W. W. Capt. (ret.) 56th Regt. (11.)
 Bastard, Baldwin J. P. Lieut. late 9th Regt. (11.)
 Bastard, J. Stokes Lieut.-Gen. (ret.) R.A. (11.)
 Bateman, Richard S. Commander R.N. (11.)
 Bates, Henry Major-Gen. unatt. (11.)
 Bateson, Rich. H. Capt. 1st Life Gds. (11.)
 Bathurst, F. T. A. H. Lieut.-Col. Gren. Gds. (11.)
 Bathurst, Henry Lieut.-Col. late Sco. Fus. Gds. (11.)
 *Battersby, J. P. Major 3rd Batt. 60th Royal Rifles (11.)
 Battersby, Rt. Dep. Insp. Gen. of Army (11.)
 Battine, W. A. Capt. 17th Lancers (11.)
 Battiscombe, W. B. Maj. 91st Highlrs (11.)
 Baxter, Stafford Squire Capt. (ret.) 1st Warwick Mil. (11.)
 Bayley, C. J. Esq. late Gov. of the Bahamas (11.)
 Bayly, Vere T. Capt. 54th Regt. (11a.)
 Baynes, Geo. E. Lieut.-Col. h.p. unatt. (11.)
 Baynes, R. S. Lieut.-Col. unatt. (11.)
 Baynes, Sir R. L. KCB. Admiral (11.)
 Bazalgette, S. A. Capt. Royal Art. (11.)
 Beadnell, H. C. T. Lieut. Royal Montgomery Rifles Militia (11.)

Beeson, O. A. Lieut. R.M.L.E. (11.)
 Beale, L. Esq. late Staff Surgeon (11.)
 Beale, P. Capt. (ret.) 10th Regt. (11.)
 Beames, P. T. Lieut. 11th Regt. (11.)
 Beamish, H. H. Capt. R.N. (11.)
 Beauchamp, Sir T. W. B. P. Capt. Norfolk Rifle Vols. late Maj. Suffolk Mil. (11.)
 Beaumont, G. W. Lt.-Col. (ret.) Sco. Fus. Gds. (11.)
 Beaumont, R. H. J. B. Colonel unatt. (11.)
 Becher, A. B. Capt. R.N. late Hydro. Office Admiralty (11.)
 Beekwith, W. KH. Lieut.-Gen. Col. 14th Hussars (11.)
 Bedford, G. A. Capt. R.N. (11.)
 Bedford, R. T. Capt. R.E. (11.)
 Belfield, Edward Capt. R.E. (11.)
 *Bell, J. C. Lieut. 53rd Regt. (11.)
 Bell, Richard Capt. late Hon. Art. Comp. (11.)
 Bell, Lynden Major 1st Batt. 6th Regt. (11.)
 *Bell, W. H. M.D. Asst.-Surg. R.N. (11.)
 *Bell, W. M. Major 3rd Huss. (11. 1a.)
 *Bellamy, P. L. Capt. 55th Regt. (11.)
 Bellers, R. B. Capt. & Adj. White Mil. (11.)
 Bennett, Thos. Admiral (11.)
 Bennetts, W. C. Burton Capt. (ret.) 6th Regt. (11.)
 Bent, Charles Lieut. R.A. (11.)
 Bent, H. W. Lieut. 6th Surrey Art. Vols. (11.)
 *Bent, W. H. Capt. R. East Mid. Mil. (11.)
 Bentinck, A. Cavendish Col. h.p. I.F.O. Dublin (11.)
 Bentinck, Sir H. J. W. K.C.B. Lieut.-Gen. Col. 28th Regt. (11.)
 Bentinck, H. C. A. F. W. A. Capt. Coldm. Gds. (11.)
 Benyon, W. H. Lieut. 23rd R. W. Fus. (11.)
 Beresford, D. W. Pack, Capt. late R.A. MP. (11.)
 Beresford, E. M. Capt. Sco. Fus. Gds. (11.)
 Beresford, G. R. Capt. h.p. 7th Fus. (11.)
 Beresford, Rt. Hon. William Major late 12th Lancers (11.)
 Berger, Ernest A. Capt. 10th Regt. (11.)
 Berkeley, G. S. Capt. Roy. Engs. (11.)
 *Bertram, C. P. Major 41st Regt. (11.)
 Berthom, Alderson Lieut. Isle of Wight Art. Mil. (11.)
 Best, M. G. Major (ret.) 25th Regt. (11.)
 Best, Hos. R. B. Capt. late Gren. Gds. (11.)
 Best, Thomas Capt. late Hampshire Mil. (11.)
 Bethune, C. R. Drinkwater, CB. Adm. (11.)
 Biddle, G. F. Lt.-Col. Eng. Railway Vol. Staff Corps (11.)
 Biddulph, R. M. Capt. Denbigh Yeo. Cav. late Lieut. 1st Life Gds. (11.)
 Biddulph, Sir T. M. K.C.B. Maj.-Gen. (11.)
 Biden, John Capt. Hon. Art. Co. (11.)
 Biggs, T. S. Major, 5th Fus. (11.)
 Biggs, W. M. Lieut.-Col. Northum. L. I. Mil. (11.)
 Biggs, James Paymaster R.N. (11.)
 Bingham, G. M. Capt. 6th Inn. Drags. (11.)
 Binney, C. B. Lieut.-Col. (ret. h.p.) R.E. (11.)
 Birch, Thomas F. Capt. R.N. (11.)
 *Birch, W. B. Lieut. H.M. B. S. Corps. (11.)

LIST OF ANNUAL SUBSCRIBERS.

Bird, Edward J. Rear-Adm. (11.)
 Bird, G. Golding Esq. 106th Regt. (11.)
 Black, Wilsone Cap. 6th Regt. (11.)
 Black, W. T. Surgeon-Major 15th Depot Battalion (11.)
 Blackburne, J. Ireland Lt.-Col. 4th Roy. Lanc. Mil. (11.)
 Blacker, Wm. Capt. (ret.) 12th Royal Lancers (11.)
 Blackett, C. F. Lieut. Rifle Brigade (11.)
 Blackett, C. E. Lt.-Col. Coldm. Gds. (11.)
 Blackett, E. W. Major 7th Dep. Battr. (11.)
 Blair, J. Capt. R.A. Madras (11.)
 Blair, Jas. B. Lieut. (ret.) 6th Regt. (11.)
 Blair, Stopford Col. h.p. Roy. Art. (11.)
 Blake, Edgar H. Commr. R.N. (11.)
 Blake, G. F. Capt. Royal Marine L. I. (11.)
 Blake, Patrick John Vice-Adm. (11.)
 Blakeney, Right Hon. Sir Edward, GCB. GCH. Ed.-Marsh. Col. 1st Rls. Gov. Chel. Hosp. (11.)
 Bland, James Fox Capt. 76th Regt. (11.)
 Bland, J. Loftus Lt. 6th Innis. Drags. (11.)
 Blane, C.G. Capt. 23rd Roy. Welch Fus. (11.)
 Blane, Robert, CB. Col. unatt. (11.)
 Blane, Seymour J. Lt.-Col. Rifle Brig. (11.)
 Mil. Sec. to Gov. Gen. of India (11.)
 Blanford, Thos. Lieut. Lond. Rifle Brig. Vols. (11.)
 Blantyre, C. W. Lord late Lieut. Gren. Gds. (11.)
 Blayney, G. D. Lord Capt. late 80th Regt. (11.)
 *Blewitt, Charles Capt. 65th Regt. (11.)
 Blockley, John Capt. Hon. Art. Comp. (11.)
 Bloomfield, H. J. Capt. R.N. (11.)
 Blood, Bindon Lieut. R.E. (11.)
 Bloomfield, Hy. Keane Maj.-Gen. Col. 64th Regt. (11.)
 Bloomfield, Sir John, KCB. Lt.-Gen. Col. Commr. R.A. (11.)
 Blowers, W. H. Major H.M. Bom. Staff Corps (11.)
 Blundell, Richd. Capt. 3rd Huss. (11.)
 Blyth, W. d'Urban Cap. (ret.) 14th Huss. (11.)
 Blythe, J. D. Capt. Paymr. (ret.) h.p. 45th Regt. (11.)
 Bognhurst, Edward Lieut. h.p. R.A. (11.)
 Borthon, A. J. M. Col. Roy. Engs. Mad. (11.)
 Bouleau, J. T. FRS. Maj.-Gen. (ret.) Royal Bengal Engns. (11.)
 Bouleau, W. S. Capt. h.p. R.E. (11.)
 Boland, R. S. Capt. late 59th Regt. (11.)
 Bolders, H. G. Lt.-Col. late 39th Regt. M.P. (11.)
 Bolders, G. N. Lieut.-Col. late Depot Batt. Asst. Insp. of Vols. (11.)
 Bolton, F. J. Capt. 12th Regt. (11.)
 Borough, Sir Edw. Bt. Dep.-Lieut. Co. Dublin (11.)
 *Bosquet, C. J. Rear Adm. (11.)
 *Bosquet, G. S. Commr. R.N. (11.)
 Boscawen, Hos. E. T. Lieut. Coldm. Gds. (11.)
 Bostick, J. A. Surg.-Maj. Sco. Fus. Gds. (11.)
 Boswell, Geo. L. H. Lieut. Gren. Gds. (11.)
 Boteler, J. H. Capt. R.N. (11.)

Bouchier, Claude T. E. C. Lieut.-Colonel
Rifle Brigade
Bousfield, Henry Surg. (ret.) Beng. Army
Bouverie, Everard W. Lieut.-Gen. Col. 15th
Hussars (11.)
Bowden, H. G. Major (ret.) 22nd Regt. (11.)
Bowden, H. G. Capt. Scots Fus. Gds. (11.)
Bowditch, E. H. S. Lt.-Col. H. M. 7th Bomb.
N.I. (11.)
Bowdoin, Jas. Temple Capt. late 4th Drag.
Gds. (11.)
Bowers, E. R. S. Lieut.-Gen. (unatt.)
Bowers, Henry Dep. Comr.-General
Bowles, Sir George KCB. Gen.
Col. 1st W.I.R. Lt.-Gov. Tower (11.)
Bowles, R. F. Capt. late Roy. Berks Mil.
(11.)
Bowles, Sir William, K.C.B. Admiral, Vice-
Adm. of the United Kingdom (11.)
Bowly, J. A. Lieut. R.E. (11.)
Bowyer, Edward Capt. late 1st W.I. Regt.
Bowyer, H. A. Capt. (ret.) 10th Huss.
Boyer, E. M. Col. Royal Art. Supt.
Royal Laboratory, Woolwich (11.)
Boyce, A. W. Capt. 34th Regt.
Boyce, E. R. D. Capt. 14th Huss.
Boyd, A. Major late 11th Regt. (11.)
Boyd, Jas. P. Capt. Roy. Can. Rifles (11.)
Boyle, Alex. Capt. R.N. (11.)
Boyle, E. R. Lieut. Coldm. Gds. (11.)
Boyle, Gerald E. Lieut. Rifle Brig. (11.)
Boyle, R. H. Lieut. R.N. (11.)
Boyle, Hon. W. G. Lt.-Col. (ret.) Coldm.
Gds.
Boys, Henry Capt. R.N. (11.)
Brabant, Edw. Yewd Lieut. Cape Mtd.
Rifles
Brabazon, J. P. Capt. Gren. Gds. (11.)
Bracken, E. D. C. Capt. 2nd Sikh Inf.
(11.)
Brackenbury, C. B. Capt. R.A. (11.)
Brackenbury, Henry Capt. R.A. Asst.
Instructor in Artillery, Woolwich (11.)
Bradford, Ralph Lt.-Col. (ret.) Gr. Gds.
Bradford, Wilmet H. Col. h.p. Canad.
Rifles
Bramston, Thos. H. Lt.-Col. Gr. Gds.
Brand, H. B. Capt. (ret.) Coldm. Gds. (11.)
Branding, Charles Lieut. late Gren. Gds.
Bravo, A. Capt. 1st W.I. Regt.
Braybrooke, S. Maj.-Gen. Col. 99th Regt.
Breen, H. Esq. Esq. late Administrator
Government St. Lucia (11.)
Brest, H. W. Commr. R.N. (11.)
Bridge, Cyprian Col. (ret.) 58th Regt.
Bridges, E. S. Capt. Gr. Gds. (11.)
Bridges, W. W. S. Commr. R.N. (11.)
Bridgman, J. W. Major, W. Mid. R. Vois.
(11.)
Brien, C. R. MD. Dep. Insp.-Gen.
R.N. (11.)
Briggs, John, FR.S. Gen. H.M.'s Madras
Army (11.)
Briggs, John, Capt. 82nd Regt. (11.)
Bringham, J. H. Major late 90th Regt.
Brinjes, J. F. Lieut. 1st Eng. Tower Hamlet
Vois. (11.)
Brisley, W. P. Capt. and Paym. R.A. (11.)
Brook, Thomas S. CB. Rear-Admiral
*Brodrigan, Fras. Capt. 28th Regt. (11.)
Broderip, Edm. Lieut. 57th Regt. (11.)
Brooke, E. B. Major-Gen. unatt. (11.)
Brooke, E. T. Major R.N. (11.)
Brooke, H. Bt.-Major 94th Regt. (11.)
Brooke, T. W. Lt. Lieut. Roy. Horse Gds.
(11.)
Brooker, G. A. C. Capt. R.N. (11.)
Broughton, W. E. D. Col. R.E. Commanding
R. E. Northern District (11.)
Brown, Langton Capt. R.N.
Brown, A. H. Cornet (ret.) 5th Drag. Gds.
(11.)
*Brown, C. B. Capt. 8th or King's
Brown, Fred. Capt. 3rd Royal Sur. Mtd. (11.)
Brown, G. A. Cap. H. M. 1st B. N.I. (11.)
Brown, J. H. Lieut. R.N. Reserve (11.)
Brown, R. A. O. Comr. R. N.
Brown, Thomas Chief Engineer R.N. (11.)
Brown, James Capt. 94th Regt.
Browne, W. P. Lieut. (ret.) 7th Royal Fus.
(11.)
Brownlow, Hon. Edw. Capt. late Soc.
Fus. Gds. Hon. Col. Armagh Mtd. (11.)
Brownlow, E. F. Lieut. 71st Highld. L.I.
(11.)
Brownrigg, Stadhofme, CB. Col. h.p. unatt.
Brigadier-Gen. Shorncliffe (11.)
Bruce, A. C. Capt. 91st Highlanders
Bruce, Lord Chas. W. B. MP. Capt. (ret.)
1st Life Gds. (11.)
Bruce, Edw. J. Capt. R.A.
Bruce, Harvey J. L. Lieut. Coldm. Gds.
Bruce, Michael Col. Gren. Gds.
Bruce, Robert Col. (ret.) 2nd Queen's Royals
(11.)
Bruce, R. C. Dalrymple Capt. h.p. 8th Regt.
Staff Officer of Pensioners (11.)
Brumell, William Maj. Paym. 25th Regt.
Brydon, L. A. Capt. late 74th Highld.
Buchanan, D. C. R. Carrick Lt.-Col. 2nd
Royal Limerick Mtd. (11.)
Buchanan, J. R. G. Lieut. 26th Regt.
(11.)
Buckingham and Chandos, DUKE of, KG.
Colonel Royal Bucks Yeo. (11.)
Buckland, F. T. Esq. late Asst.-Surg. 2nd Life
Gds. (11.)
Buckle, C. H. M. CB. Rear-Adm. Senior
Officer Cork (11.)
Buckle, C. M. Capt. R.N.
Budd, Ralph Col. late 14th Regt. I.F.O.
Belfast (11.)
Bulger, C. O. Lieut. 4th W.I. Regt. (11.)
*Bulger, G. E. Capt. 10th Regt.
Bull, Fred. G. Lieut.-Col. h.p. 60th Royal
Rifles
Bulter, E. W. Lieut. (ret.) R.A. (11.)
Buller, F. C. Capt. Coldm. Gds.
Buller, Reginald J. Capt. Gr. Gds.
Bullock, C. J. Comr. R.N. (11.)
Bulwer, E. G. CB. Col. (ret.) 23rd Roy.
Wel. Fus. Asst. Insp. of Volunteers (11.)
Dunbury, Hon. W. CB. Col. (ret.) 24th
Regt. (11.)

Dunn, Rich. Capt. unatt. (11.)
Dunyon, C. S. Lieut. unatt. (11.)
Burdan, Geo. Qr. Master (ret.) 23rd R.
W. Fus.
Burdett, Chas. Sedley Lieut.-Col. (ret.)
Colds. Gds. (11.)
Burgess, Ardwick Capt. Queen's Own L. I.
Mil. (11.)
Burgess, H. M. Lt. R. A. Bengal (11.)
Burgess, H. W. Capt. late Q. O. L. I. Mil.
(11.)
Burgoyne, Hugh T. E. C. Capt. R.N. (11.)
Burgoyne, Sir John Fox, Bart., GCB. Gen.
Col. Comt. R.E. Director of Works (11.)
Burgoyne, R. dhu H. G. Lieut. 93rd High-
landers (11.)
Burke, H. P. Capt. 8th Huss. (11.)
Burkinyoung, H. H. Lieut. 12th Royal
Lancers (11.)
Burton, Wm. CB. Col. (ret.) Bengal
Army (11.)
Burn, John M. Capt. Roy. Art.
Burn, Robert Major-Gen. R.A. (11.)
Burnaby, E. S. Lieut.-Col. Gr. Gds.
Burnaby, F. G. Capt. Roy. H. Gds. (11.)
Burnaby, R. B. Major-Gen. late R.A. Col.
Commt. Hants. Mil. Art. (11.)
Burnand, N. Capt. Coldm. Gds.
Burnell, E. S. P. Capt. Coldstream Guards
(11.)
*Burney, H. S. S. Maj. Paym. 6th Dep.
Bn. (11.)
Burrard, Sir Geo. Bart. Dep. Lieut.
Hants. (11.)
Burrongs, F. W. Lieut.-Col. 93rd High-
landers (11.)
Barton, J. E. Capt. 91st Highld. (11.)
Bary, W. C. VISCOUNT Capt. late Edm.
Ride Mtd.
Butler, Henry, Esq. Admiralty (11.)
Butt, T. Bromhead Col. (ret.) 86th Regt-
ment (11.)
Buttashaw, W. H. Paym. 12th Royal
Lancers (11.)
Byham, W. R. Esq. late War Office (11.)
Byng, A. M. Capt. Gren. Gds. (11.)
Byng, Hon. H. W. J. Maj. Wilts Yeo.
Cav. Lieut.-Col. (ret.) Colds. Gds.
Byrne, Tyrell M. Lieut.-Col. late 1st
Royals
Byron, George Anson, Lord, Admiral
Bythell, R. Capt. and Adj. H.M.'s Bombay
Sappers and Miners (11.)
Bythess, J. S. C. E. C. Capt. R. N. (11.)
CADELL, Thos. E. C. Capt. H.M.'s Beng.
Staff Corps (11.)
Cadogan, Hon. Geo. C.E. Maj.-Gen.
Cade, Haydon, L. Maj. 94th Regt.
Cafin, James C. B. Rear-Admral Dir. of
Stores and Clothing (11.)
Caldbeck, William Lieut. late Limerick
Mtd. (11.)
Calderson, C. M. Lieut. 60th Royal Rifles
(11.)
Caldwell, W.B. Lieut.-Col. late 76th Regt.
(11.)
Caldhorpe, Hon. Somerset J. G. Col. 5th
Drag. Gds.
Cameron, Sir D. A. KCB. Maj.-Gen. Col.
42nd Royal Highlanders (11.)
Cameron, Jno. Lieut.-Col. R.E. (11.)
Cameron, W. Gordon Lt.-Col. 4th Regt.
Campbell, Achibaid Col. late Renfrew Mtd.
Campbell, Arch. G. Capt. Lanark Yeo. Cav.
late Lieut.-Col. Soc. Fus. Gds. (11.)
Campbell, C. A. Capt. R.N. (11.)
Campbell, Duncan Major h. p. unatt.
Campbell, Sir George Bart. Capt. Lanark
Yeo. Cav. late 1st Drags.
Campbell, G. H. F. Col. Staff Officer of
Pensioners, h.p. R. Staff Corps
Campbell, Hon. H. W. Lieut.-Col. Coldm
Gds.
Campbell, J. A. Lieut. R. H. Art. (11.)
*Campbell, John R. Capt. Hants Art. Mtd.
(11.)
Campbell, Patk. John Capt. R.H.A.
Campbell, Walter Col. Staff Officer of
Pensioners (11.)
Campbell, W.M.T. Capt. R.E. (11.)
Cannon, R. Lieut.-Gen. (11.)
Cannon, Requier J. Capt. (ret.) R.A. (11.)
Capel, Sidney A. Major. Staff Officer of
Pensioners, h.p. 51st Light Infantry
Cargden, G. Major 5th Fus. (11.)
Carew, Walter P. Capt. 1st Devon Yeo.
Cavalry
Carey, Constantine P. Capt. Roy. Eng.
(11.)
Carey, Geo. Jackson, CB. Col. h.p. 18th R.
Irish. Brigadier-General, Aldershot (11.)
Cary, T. A. Lt.-Col. H. M. Beng. Staff
Corps (11.)
Carey, W. N. Lieut. 21st R.N.B. Fus. (11.)
Cargill, Sidney Lieut. 55th Regt. (11.)
Carrington, Hon. W. H. P. Capt. Gren.
Gds.
Carleton, Dudley W. Col. Coldm. Gds.
Carleton, W. H. Capt. 21st R. N. B. Fus.
(11.)
Carmichael, J. D. CB. Col. 94th Regiment
Carnao, John Rivett Vice-Admiral (11.)
Carpenter, F. S. Dep. Comr. General
Carpenter, G. W. W. Major (ret.) 32nd Lt.
Inf. (11.)
Carr, Ralph Capt. h.p. R.M.L.I. (11.)
Carrick, S. A. EARL of Capt. (ret.) Gren.
Gds.
Carter, H. Bonham Capt. Coldm. Gds. (11.)
Carter, T. Wren, C.B. Adm. (11.)
Carter, Jas. M. Lieut.-Col. late Adj. Roy.
Monmouthshire Militia
Cartwright, H. Col. late Gr. Gds. M.P. (21.)
Cartwright, J. T. Capt. 7th Roy. Fus. (11.)
Cartwright, R. Lieut. 15th Regt. (11.)
Case, John, Esq. Navy Agent
Casson, B. T. Capt. 5th W. York Mtd. (11.)
Cawwell, W. Lieut.-Col. Eng. Railway Vol.
Staff Corps (11.)
Cauffman, Alex. Capt. (ret.) Gren. Gds.
*Cauffman, J. A. Major Royal Tyrone Fus.
late Capt. Coldm. Gds.
Cautley, Henry Lieut. R.E. (11.)

Cavendish, Jas. Charles Capt. (ret.) R.A. (11)
 *Cavendish, W. H. F. Lieut.-Col. Comm. 2nd Derby Rifles, late 52nd L.I. (11)
 Chads, Sir H. D. GCB. Admiral
 Chads, Henry Rear Admiral (11)
 Chamberlain, Sir Henry O. R. Capt. late Hon. Corps Gent.-at-Arms (11)
 Chamberlayne, D.T. Capt. late 13th Hussars (11)
 Chamberlayne, J. Chamberlayne Lieut. h.p. R.A. (11)
 Channer, A.W. Lieut. late 21st R.N.B. Fus. (11)
 Chaplin, Edw. Capt. Cold. Gds. (11)
 *Chapman, A. T. L. Capt. 34th Regt. (11)
 Chapman, Sir P. E. KCB. Maj.-Gen. R.E. Governor of Bermuda (11)
 *Chapman, W. E. Lieut. 1st Drag. Gds. (11)
 Chapman, W. H. Capt. Leicester Mil. (11)
 Charlton, T. H. Capt. 69th Regt.
 Charteris, H. R. Lieut.-Col. (ret.) Seco. Fus. Gds.
 Chase, C. R. Cornet 21st Huss. (11)
 Chase, Morgan C. Lieut.-Colonel (ret.) Madras Army
 Chatter, Sidney Surg. London Rifle Brig. Vols. (11)
 Chatterton, Sir James Charles, Bart. KCB. KH. Gen. Col. 5th Lancers (11)
 Chatto, W. J. P. Esq. 23rd Midd. Rifle Vols. (11)
 Chelmsford, Lord, FRS. late Mid. R.N. (11)
 Chernside, H. L. Lieut.-Col. R.A. (11)
 Chesney, Charles Cornwallis Capt. R.E. Prof. Mil. History Royal Mil. Col. Sandhurst
 Chesney, F. R. DCL. FRS. Lieut.-Gen. Col. Comm. R.A. (11)
 Chesney, G. T. Major Roy. Eng. (11)
 Chester, G. M. Maj. late R. Sussex Art. Chetwynd, Hon. C. C. Capt. (ret.) 10th Reg. (11)
 *Chichester, C. R. Major 13th Dep. Batt. (11)
 Chichester, George Maj. late 88th Regt. (11)
 Chichester, Geo. Lieut. late 6th Regt.
 Chichester, H. A. Capt. 81st Regt. (11)
 Chichester, H. A. Esq. 25th King's O. Bords. (11)
 Childers, J. W. Esq. Dep.-Lt. Yorkshire
 Childs, James Capt. 4th Midd. Rifle Vols. (11)
 Chinn, Edw. Capt. 4th K.O. Regt.
 Chisholm, A. B. Capt. 25th Regt. (11)
 Cholmondeley, Lord Hy. Dep.-Lt. Norfolk
 Christie, Fred. Gordon Lieut.-Col. (ret.) late Staff Officer of Pensioners
 Chrystie, T. Commr. R.N.
 Churchill, C. H. S. Lieut.-Col. h. p. 60th Royal Rifles
 Clark, A. Major-Gen. (ret.) H. M. Madras Army (11)
 Clarke, Andrew Lieut.-Col. R.E. (11)

Clarke, C. K. late Lieut. 2nd West York Yeomanry Cavalry (11)
 Clarke, C. M. Capt. 57th Regt. (11)
 Clarke, H. S. Capt. Royal Art. (11)
 Clarke, J. H. Courtney Esq. 7th Fus. (11)
 Claxton, Christopher Capt. R.N. (11)
 *Clay, T. S. Capt. 100th Roy. Bom. Fus. (11)
 Clay, Wm. Lt.-Col. 8th Lan. Art. Vols. (11)
 Clayton, Emilius Capt. late Seco. Fus. Gds. (11)
 Clayton, F. A. T. Lt.-Col. Gren. Gds. (11)
 Clayton, Fran. S. Lieut. Royal Navy (11)
 Clayton, J. W. Capt. late 13th Lt. Drs. (11)
 Clayton, Y. G. Capt. R.E. (11)
 Cleather, E. J. Lt.-Col. h. p. R.N. Corps (11)
 Cleland, Wm. Lieut. 102nd Roy. Mad. Fus. (11)
 Clements, Hon. C. S. Capt. late 37th Regt. (11)
 Clements, F. W. R. Capt. R.E. (11)
 Clementson, C. Lieut.-Col. Northumberland Art. Mil. (11)
 Clerk, H. Col. R.A. Supt. Royal Carr. Depart. Woolwich (11)
 Clerk, John Capt. (ret.) 4th Dr. Gds. (11)
 Clarke, Sir J. A. KH. Gen. Col. 75th Regt. (11)
 Clifford, Sir A. W. J. Bart. CB. Admiral (11)
 Clifford, R. S. C. Col. late Gr. Gds. (11)
 Clifton, Sir A. B. GCB. KCH. Gen. Col. 1st Royal Drags.
 Clive, E. H. Lieut.-Col. Gr. Gds. (11)
 Clode, C. M. Esq. Solicitor to the War Office
 Cloete, Sir A. Josias, KCB. Lieut.-Gen. Col. 19th Regt. (11)
 Clonmell, J. H. R. Esq. of Cornet Gloucestershire Yeo. Cav. late Lieut. 1st Life Gds.
 Clowes, G. G. Major late 8th Hussars
 Cochrane, Sir Thomas J. GCB. Adm. of the Fleet (11)
 Cochrane, W. M. Lieut.-Col. 2nd Adm. Batt. Surrey Rifle Vols. Capt. 1st Laurak Mil. (11)
 Cockburn, C. V. Major-Gen. (ret.) R.A.
 Cockburn, Sir Francis Gen. Col. 95th Regt. (11)
 Cockburn, J. E. Lieut. R.A. (11)
 Cockle, G. M. A. Capt. Royal Westmerland Mil. (11)
 Cocks, Charles Lygon Lieut.-Col. late Coldm. Gds. (11)
 *Cocks, Oct. York. Major (ret.) 4th K.O. Regt. (11)
 Cold, Edward Rear-Adm. (11)
 Codrington, Sir H. J. KCB. Admiral (11)
 Codrington, Sir W. J. GCB. Gen. Col. 23rd R. W. Fus. (21)
 Codrington, W. Wyndham Lieut. late 17th Lancers
 Coe, E. O. Lieut. late Edmonstone R. Rifle Regt. (11)
 *Cooley, J. A. Capt. 1st Tower Hamlets Engr. Vols. (11)
 Coke, Hon. E. K. W. Capt. late Coldm. Gds.

Coke, Hon. W. C. W. Lieut.-Col. Seco. Fus. Gds.
 Cole, J. A. Col. (ret. h.p.) 15th Regt.
 Cole, J. W. Lieut. h.p. 21st R.N.B. Fus. (11)
 Cole, R. M. Comm. R.N. (11)
 Colebrooke, Sir W. M. G. CB. KH. Gen. Col. Comm. R.A. (11)
 Coles, Cowper P. CB. Capt. R.N. (11)
 Coles, W. L. Esq. Pay.-Gen. Office (11)
 Colless, H. H. Lieut. R.A.
 Colley, G. P. Major 2nd Queen's, Major of Brigade Western District (11)
 Collin, Geo. Esq. late War Office
 Collins, Caleb Esq. Cape M. Rifles (11)
 Collins, Wm. Louis Capt. 1st Exeter and South Devon Rifle Volunteers (11)
 Collinson, Richard, CB. Rear-Adm. (11)
 *Collinson, T. B. Col. R.E. (11)
 Collis, W. Asst.-Surg. Roy. H. Art. (11)
 Colman, J. B. T. Lt.-Col. late unatt. (11)
 Colomb, G. T. Lt.-Gen. Col. 4th W. I. Regt. (11)
 *Colomb, P. H. Comm. R.N. (11)
 *Colthart, D. L. Major 17th Regt.
 Colvill Hugh G. Capt. late 29th Regt. (11)
 Colvin, W. B. Capt. 7th Roy. Fus. (11)
 Comber, H. W. Comm. R.N.
 Combermere, Wellington H. S. Viscount Col. (ret.) 7th Dragoon Gds. (11)
 Commerell, J. E. CB. & C. Capt. R.N. (11)
 Comyn, T. R. Capt. 1st Eng. Tower Hamlet Vols. (11)
 Conroy, Richard Major late 17th Lancers
 Congreve, William Capt. (ret.) 4th K. O. Regt.
 Conolly, Jas. Col. Asst. Quar.-Master-Gen. Aldershot
 Conolly, J. A. & C. Lieut.-Col. Coldm. Gds. (11)
 Conway, T. S. CB. Col. (ret.) Gr. Gds. (11)
 Conway, W. S. Capt. late 2nd Life Gds.
 Conyers, Charles E. Lieut.-Col. unatt. (11)
 Conyngham, Francis N. M.A. Esq. of K.P. GCH. Lieut.-Gen. (11)
 Coode, H. Comm. R.N.
 Cook, Henry Major 100th Regt. (11)
 Cooke, A. C. CB. Lieut.-Col. R.E. Executive Officer Topo. Dept. (11)
 Cooke, Thomas C. Lieut. R.A. (11)
 Cooke, W. B. Lieut. late 85th L.I.
 Cooper, Edw. H. Lt.-Col. (ret.) Gren. Gds.
 Cooper, Egbert W. Capt. 2nd W. I. Regt. (11)
 Cooper, Henry Major Q.O.L.I. Mil.
 Cooper, J. C. Capt. (ret.) 8th or King's (11)
 Cooper, W. Cooper Maj. late Bedford Mil. (11)
 Cooper, W. S. Capt. R.N.
 Coote, C. C. Capt. late 1st Royals (11)
 Corbally, J. B. Capt. (ret.) 10th Regt. (11)
 Corbett, W. A. Capt. 62nd Regt. (11)
 Corkran, C. S. Lieut. Gren. Gds. (11)
 Cormick, Jno. Col. 20th Regt. (11)
 Cornes, J. E. Capt. R.E. (11)
 Corncaden, John F. Capt. Queen's West. Rifle Vols. (11)

Cosby, T. P. Capt. 14th Regt.
 Costin, C. Capt. late 14th Regt. (11)
 Cotes, Charles James Lieut. Gren. Gds.
 Cotton, George F. Comm. R.N. (11)
 Cotton, Corbet Major-Gen. (unatt.)
 Cotton, Thos. F. Staff Surgeon h.p.
 Costello, T. M. Surgeon R.N. (11)
 Coulson, J. B. B. Capt. Rifle Brig.
 Cooper, H. E. Capt. 70th Regt. (11)
 Court, H. M. Major (ret.) Madras Army (11)
 Cousins, William Capt. late R. M. Asylum
 Cowell, Sir J. C. KCB. Major R.N.
 Cowen, Morris Commr. R.E.
 Cox, A. C. W. Cornet 12th Roy. Lancers
 Cox, C. H. Lieut. (ret.) 60th Roy. Rif. (11)
 Cox, Francis Edward Major R.E.
 Cox, R. Sneyd Capt. Hereford Mil.
 Craigie, Sir Patrick E. KCB. Lt.-Gen. Col. 35th Regt. (11)
 Cramer, J. H. Lt.-Col. (ret.) Madras Army
 *Crawford, F. A. B. Capt. R.N. (11)
 Crawford, J. R. Lieut.-Gen. Col. 27th Regt. (11)
 Craven, J. A. Lieut. late Roy. H. Gds. (11)
 Craven, Wm. George Lieut. Gloucestershire Yeo. Cav. late Lieut. 1st Life Gds.
 Crawford, Thos. MD. Staff Surg. (11)
 Crawford, H. P. R. F. Capt. Madras Staff Corps (11)
 Crawley, H. Owen Major-Gen. R.E. (11)
 Crawley, Henry Lt.-Col. (ret. f.p.) 20th Regt.
 Crawley, T. G. Capt. 8th or King's
 Crawley, T. R. Col. 6th Inniskilling Drags. (11)
 Crough, James Major-Gen. (ret. h.p.) 86th Regt. (11)
 Crough, John Capt. 5th Northumb. Fus. (11)
 Crough, W. Major H. M. Bombay Staff Corps
 Creed, Henry Lt.-Col. 1st Midd. Art. Vols. late Capt. Bombay Army (11)
 Cressmore, Vesey Lord, MP. Capt. Coldm. Gds. (11)
 Cresser, Thomas Comm. R.N. (11)
 Croyke, A. S. Capt. R.E.
 Crichton, Hon. C. E. Capt. Gren. Gds. (11)
 Crickmer, Charles J. Capt. Durham Art. Mil. (11)
 Croft, C. P. late Asst.-Surg. Victoria Rifle Vols.
 Croft, W. Esq. late Asst.-Acet.-Gen.
 *Crofton, Stephen S. L. Capt. R.N.
 Croker, Wm. Capt. 27th Regt. (11)
 Crombie, T. Major-Gen. (unatt.)
 Crosse, Joshua G. Major (ret.) 62nd Regt. (11)
 *Crossman, William Major R.E. (11)
 Crowe, Robert Lieut. h.p. unatt.
 Crowe, S. M. Lieut. Kent Art. Mil.
 Crozier, Rawson, J. Col. (ret.) Bomb. Army (11)
 Crozier, Richard Vice-Adm. (11)
 Cruikshank, A. R. Lieut. R.A.
 Cubitt, T. Lt.-Col. Eng. and Railway Vols. Staff Corps (11)
 Cuffe, O. W. Capt. Roy. Marine Art. (11)

Culpepper, J. R. Capt. late 14th Lt. Drags. (11)
 Cumberland, C. E. Major R.E.
 Cumbridge, N. Capt. late R. E. Mid. Mil.
 Cuning, W. H. Com. R.N. (11)
 Cuning, Wm. Capt. 48th Regt. (11)
 Cuningham, A. F. Capt. 13th Light Inf. (11)
 Cuningham, W. J. M. & C. Major h.p. Rifle Brig. (11)
 Cunningham, H. D. P. Paymr. R.N. (11)
 Cunningham, J. W. H. Capt. late 2nd Life Gds.
 Cunningham, J. Capt. (ret.) 12th Royal Lancers (11)
 Cuppage, Burke Major-Gen. R.A. Lieut.-Governor of Jersey
 Cure, Alfred C. Col. (ret.) Gren. Gds. (11)
 Curran, C. T. Capt. R.N. (11)
 Currie, A. D. Lieut. 41st Regt. (11)
 Currie, M. J. Rear-Adm. (11)
 Currie, Raikes Dep.-Lt. Warwickshire
 Curtis, A. G. Comr. R.N. (11)
 Curtis, James D. Comr. R.N. (11)
 Curtis, Reginald Bt.-Major R.A. (11)
 Curtis, Seymour Comr. R.N. (11)
 Carzon, H. E. G. Major 52nd L. I.
 Carzon, H. R. W. P. CB. Col. h.p. late Gren. Gds.
 Cast, Hon. C. H. Major North Salop Yeo. Cav. late R. H. Gds.
 Cast, Henry Francis Capt. North Salop Yeo. Cav.
 Cast, John Francis Lt.-Col. late Gr. Gds.
 Custance, P. H. Capt. Gren. Gds. (11)
 DACRES, Sir R. J. KCB. Lt.-Gen. Col. Comma. R.A. (11)
 Dakyn, J. H. Surg. late St. Vincent Mil. (11)
 Dalhousie, EARL of, KT. GCB. late Capt. 79th Highlanders
 Dalrymple, Sir H. Bart. Lt.-Col. late 71st L.I.
 Dalrymple, J. H. E. Maj.-Gen. (ret.) Sco. Fus. Gds. (11)
 Dalton, Charles Maj.-Gen. R.A. (11)
 Dalton, C. J. Col. R.A. (11)
 Dalzell, Hon. A. A. Lieut.-Gen., Col. 48th Regt. (11)
 Dalzell, R. A. Capt. (ret.) Sco. Fus. Gds. (11)
 Damer, S. L. Dawson Lieut. Dorset Yeo. Cav. late Capt. S. F. Gds. (11)
 Dames, T. L. Capt. late R.A. (11)
 Dames, W. L. Lieut.-Gen. Col. 5th Fus.
 Dampier, C. L. M. Ensign 29th Regiment K.O.B. (11)
 Dangpan, LORD Lt.-Col. (ret.) Coldm. Gds.
 Daniel, R. H. Capt. 18th Royal Irish
 Daniell, C. F. T. Lt.-Col. 28th Regt. (11)
 Daniell, Henry Col. late Coldm. Gds. (11)
 Daniell, John Major late 66th Regt.
 *Darling, Sydney Major 9th Foot (11)
 Darroch, D. G. A. Major Unatt. (11)
 *Dartmouth, EARL of Capt. Staff. Rifle Vols.
 *Daubeny, A. G. Capt. 7th Fusiliers (11)
 Daubeny, E. Capt. (ret.) 58th Regt. (11)
 Daubeny, James CB. Col. (ret.) 62nd Regt.
 Daubeny, W. A. Capt. 3rd Buffs (11)

Daubuz, J. T. Capt. R.A. (11)
 Davidson, C. R. T. Capt. R.E. (11)
 *Davidson, D. Major (ret.) Bom. Army, Lt.-Col. City of Edin. Vols. (11)
 Davidson, Jno. Surg. (ret.) Beng. Army (11)
 Davis, Sir H. R. Ferguson, Bart. MP. Gen. Col. 73rd Regt.
 Davies, Francis John Gen. Col. 67th Regt.
 Davies, Geo. S. Capt. h.p. 6th Drag. Gds.
 Davies, Henry F. Lt.-Col. Gren. Gds. (11)
 Davis, Hugh Lieut. R.N. (11)
 Davison, Sir W. K.H. Lt.-Col. h.p. 2nd Queen's (11)
 Dawes, E. A. Capt. and late Adj. 2nd Royal Surrey Mil. (11)
 Dawkins, W. G. Lt.-Col. h.p. Coldm. Gds.
 Dawson, H. E. S. Lieut. R.N. (11)
 Dawson, G. A. Lieut. 23rd R. W. Fus.
 Dawson, Rob. N. Cap. R.E. (11)
 *Day, H. J. Lt.-Col. H.M. 19th Bombay N.I.
 Deane, H. M. Major 19th Regt. (11)
 De Bathe, H. Percival Col. Sco. Fus. Gds. (11)
 De Blaquiere, LORD late Capt. 41st Regt. (11)
 De Butte, J. C. B. Lieut.-Col. R.E. (11)
 De Cetto, M. H. E. Lt. 72nd Highlanders
 De Grey and Ripon, EARL (21)
 *De Horsey, A. F. R. Capt. R.N. (11)
 De Horsey, W. H. Besumont Lt.-Col. Gr. Gds. (11)
 De la Condamine, T. Capt. h.p. unatt. (11)
 De Laey, John Col. (ret.) 30th Regt.
 Denison, G. R. Lt. E. Kent Mil. (11)
 Denman, Hon. Joseph Vice-Admiral Commander-in-chief, Pacific
 Dennis, James B. Major-Gen. (ret.) R.A.
 *De Robeck, Hastings St. J. Comr. R.N. (11)
 De Ros, Hon. D. C. F. Col. 1st Life Gds. (11)
 De Ros, Wm. L. L. P. Lord Lt.-Gen. Col. 4th Huss. (11)
 De Salis, Rodolph, CB. Col. (ret. h.p.) 8th Huss. (11)
 Desborough, John Col. R.A.
 De Tessier, J. F. H. Lieut.-Colonel Invalid Depdt. Chatham (11)
 De Thoren, O. W. Lieut. 45th Regt. (11)
 Deverell, T. Josephus Major-gen. (ret. I.p.) 77th Regt.
 Dewar, J. R. J. Lieut. R.A. (11)
 De Winton, F. W. Capt. R.A. (11)
 De Winton, Walter Capt. late 1st Life Gds. (11)
 De Winton, Wm. Lt.-Col. (ret.) Bomb. Army (11)
 D'Eyre, W. R. Capt. 91st Regt. (11)
 Dickens, C. H. Col. R.A. Beng. (11)
 Dickenson, P. de M. Lieut. Roy. Sussex L. I. Mil. (11)
 Dickinson, W. Lieut. late R. E. I. Vols. (11)
 Dickins, C. R. S. Capt. late R. Sussex L. I. Mil.
 Dickson, Chas. Sheffield Col. late British Swiss Legion
 *Dighton, T. D. Capt. Lond. Rifle Brigade Vols. (11)

*Digweed, W. H. Maj. Hants Mil. (11)
 Dillon, Hon. Arthur Dep.-Lieut. Co. Mayo
 Dillon, H. A. Lieut. Rifle Brig. (11)
 Dillon, Martin Lieut.-Col. Rifle Brig. (11)
 Disney, E. J. Capt. Essex Rifles late 7th Fus. (11)
 Dixon, George Lt.-Gen. Col. 104th Regt.
 Dixon, John Lt.-Col. late Gren. Gds. (11)
 Dixon, John Capt. h.p. unatt. (11)
 Dixon, Wm. Manly Hall Col. R.A. Supt. Roy. Small Arms Factory, Enfield (11)
 Dobbs, W. A. Capt. (ret.) 12th Roy. Lancers (11)
 Dobson, G. Rear-Adm.
 Docker, E. S. Dep. Insp.-Gen. of Hosp.
 Doherty, D. H. Lieut. 2nd Huss. (11)
 Dolby, J. E. A. Capt. late N. York Rifles (11)
 Downie, Sir Charles C. W. Major late Dublin Co. L. I. Militia
 Downie, W. Capt. Worcester Militia
 Downie, J. W. Col. R.A. (11)
 Donnelly, Thos. Lieut.-Col. (ret.) Bombay Army (11)
 *Dooley, M. Pay Mas. 4th W.I. Regt.
 Dormer, Hon. J. B. J. Capt. Warwicksh. Yeo. Cav. late Capt. 74th Highlrs. (11)
 Dorville, John W. Capt. R.N.
 Doughty, Chester Capt. 23rd R. Welsh Fus. (11)
 Douglas, A. K. Lieut. 57th Regt. (11)
 Douglas, Henry J. Rear-Adm. (11)
 Douglas, Jas. Stoddart Com. R.N. (11)
 Douglas, Sir John, KCB. Col. late 79th Highlanders
 Douglas, John, CB. Col. h.p. 11th Huss.
 Douglas, Robert, CB. Gen. R.A.
 Douglas, Sir Rob. Percy, Bart. Lt.-Gen. Col. 98th Regt. Lieut.-Gov. Cape of Good Hope (11)
 Douglas, R. S. S. Lieut. late 60th Royal Rifles (11)
 Douglas, Sir Robert, Bart. Capt. (ret.) 57th Regt. (11)
 Douglas, Sholto Capt. R.N. (11)
 Douglas, Sir T. Montdeath, KCB. Gen. H.M. Bengal Army (11)
 Dowdswell, J. M. Capt. 12th Royal Lancers
 Downes, H. F. Esq. Army Agent
 Durant, Charles J. Lieut. R.N. (11)
 Doyle, C. Hastings Lieut.-Gen. Commanding Troops Nova Scotia
 *Drake, J. Mervin C. Capt. R.E. (11)
 Drake, Thomas George Capt. R.N.
 Drayton, Alfred Wilkes Capt. R.A. Asst. Instr. of Surveying Roy. Mil. Acad. Woolwich
 Drew, Andrew Rear-Adm. (11)
 Drummond, Alfr. M. Capt. late Rifle Brig. (11)
 Drummond, Edgar A. Lieut. late R.N. (11)
 Drummond, John Lieut. late 10th Huss. (11)
 Drummond, John Gen. (11)
 Drury, Byron Capt. R.N.
 Duberly, Wm. Capt. (ret.) Gren. Gds. (11)

Ducane, E. F. Capt. R.E. (11)
 Ducane, F. Major (ret.) R.E. (11)
 Dudge, EARL of Lord Lieut. Gloucestershire (11)
 Dudgeon, R. C. Major h.p. 61st Regt. (11)
 Duff, A. M. Capt. (ret.) 74th Highlrs. (11)
 Duff, James Maj. late 23rd R. W. Fus. (11)
 Duff, R. W. Capt. R.E. (11)
 Duff, R. W. Lieut. R.N. (11)
 Dumaresque, Henry Capt. R.N.
 Dumbreck, David, CB. Inspector-General of Army Hospitals
 Dunbar, W. M. Capt. 24th Regt.
 Duncan, P. Capt. R.A. (11)
 Duncan, P. Capt. W. Cork Art. Mil.
 Duncombe, Hon. A. Adm. M.P.
 Duncombe, Hon. Cecil Lieut. Yorksh. Huss. Yeo. Cav. late Capt. 1st Life Gds.
 Duncombe, G. W. Capt. 1st Life Gds.
 Duncombe, George T. Capt. late 16th Regt.
 Dundas, Lawrence Cornet Roy. Horse Gds. (11)
 Dundas, P. Colonel (ret. f.p.) 47th Regt. (11)
 Dundas, Thomas Major (ret.) 12th Regt. (11)
 *Dooley, M. Pay Mas. 4th W.I. Regt.
 Dunlevy, W. S. H. Lieut. (ret.) 12th Regt. (11)
 Dunlop, Franklin, CB. Col. R.A.
 Dunmore, EARL of late Lieut. Sco. Fus. Gds. (11)
 Dunne, Right Hon. F. Plunkett, Major-Gen. unatt. Lt.-Col. Com. Queen's County Mil. MP. (11)
 *Dunne, J. H. Lieut.-Col. 99th Regt.
 Dunsany, Edw. Lonn Rear-Adm.
 Dupuis, Sir J. E. KCB. Lieut.-Gen. Col. Comt. R.A. (11)
 D'Urban, Wm. J. Major-Gen.
 Darham, P. F. Capt. late 37th Regt. Adj. Royal Cardigan Rifles
 Durie, Charles Major unatt.
 Durnford, F. A. Lieut.-Col. 2nd Sur. Art. Vols. (11)
 Dynevor, G. R. LORD Col. R. Carmar. Mil. ADC. to the Queen (11)
 Dyson, Edward Major late 3rd Dr. Gds. (11)
 Dyson, J. D. Col. late 3rd Drag. Gds.

EARDENSHON, J. G. Lieut. late West Kent L. I. Mil. (11)
 East, Cecil J. Capt. 41st Regt. (11)
 Eastwick, W. J. Capt. (ret.) Bomb. Army (11)
 Eckford, Rob. Capt. 23rd R.W. Fus. (11)
 Eden, Charles, CB. Vice-Admiral
 Eden, John, CB. Lt.-Gen. Col. 34th Regt.
 Eden, J. Capt. late 14th Lt. Dr.
 Eden, Walter D., Esq. Admiralty
 Eden, Wm. Hassall Lieut.-Gen. Col. 90th Light Inf. (11)
 Edmonborough, Horatio Capt. W. Essex Mil.
 Edgar, Joseph Haythorne Lieut. late R.A.
 Edgecombe, Hon. C. E. Capt. Gr. Gds. (11)
 Edgell, Harry E., CB. Rear-Adm.
 Edmeades, H. Capt. R.A. (11)
 Edmunds, Henry Staff Surgeon R.N. (11)
 Edmunds, Charles Rear-Adm.

Edwards, C. A. CB. Brigadier-General
Inspecting-Gen. of Recruiting
Edwards, J. B. Major R.E.
Edwards, Nathaniel F. Capt. R.N.
Edwards, Peter. Lieut.-Gen. (11)
Edwards, Hon. W. Lieut.-Col. Coldm. Gds.
*Egerton, Caledon. Rich. Col. Dept. Adj.
Gen. to the Forces (11)
Egerton, C. R. Capt. R.N. (11)
*Egerton, Hon. Francis Capt. R.N. ADC.
to the Queen (11)
Egerton, F. P. Capt. R.N.
*Egerton, F. W. Lieut. R.N. (11)
Egerton, Sir P. de Malpas Grey, Bart. MP.
FRS. Lt.-Col. Cheshire Yeomanry (11)
Egerton, P. de R. Capt. late Coldm. Gds.
(11)
Egerton, Hon. S. J. G. Capt. 1st Life Gds.
Egerton, W. W. Ens. 8th or King's
Eggle, Joseph. Capt. Hon. Art. Co. (11)
Elcho, Loup, MP. Col. Lond. Soc. E. Vols.
(11)
Elderton, E. H. P. Capt. (ret.) 26th Regt.
Elderton, Edw. M., Esq. late Hon. Art. Co.
(11)
Elgee, C. W. Capt. R.A. (11)
Eliot, Hon. C. G. C. Capt. Gr. Gds.
Elkington, A. G. Surg.-Major Gren. Gds.
*Elles, W. K. Capt. 38th Regt. (11)
Eliscombe, Sir Chas. Greene, KCB. Gen.
Col. Comm. R.E.
Elliott, George Rear-Adm. (11)
Elliott, Sir W. H. KCB. KH. Lieut.-Gen.
Col. 51st K.O.L.I.
Elliott, Hon. Charles G. J. CB. Vice-Adm.
Ellis, C. D. C. Major 60th Roy. Rifles (11)
Ellis, C. H. Fairfax Lieut. R.A. (11)
Ellis, Fred. Capt. late 9th Lancers (11)
Ellis, J. H. Chief Engr. R.N. (11)
Ellis, Nelson Capt. 101st Roy. Bengal
Fus. (11)
Ellis, William Capt. R.N. (11)
Ellis, W. B. E. Capt. R.A.
Ellison, R. G. Major h.p. 47th Regt. (11)
Elphinstone, Hon. J. F. B. Lieut.-Col. Sco.
Fus. Gds.
Elrington, F. R. Col. Rifle Brig.
Elrington, W. F. Lt.-Col. late Sco. Fus. Gds.
Elwes, W. C. C. Capt. (ret.) 71st High. L.
Inf. (11)
Elwyn, Thomas Col. Comd. R.A. South
Eastern District (11)
Enfield, Vascour, MP. Col. Edmonton
R. Rifles
England, Sir Rich. GCB. KH. Gen. Col.
41st Regt.
England, Richd. Lieut.-Col. (ret.) 55th Regt.
(11)
Enniskillen, W. W. EARL of, FRS. Col. Fer-
managh Militia (11)
Errington, A. C. Col. (ret. f.p.) 51st K.O.L.I.
Inf. (11)
Errington, A. J. Lieut. R.N. (11)
Erskine, J. Elphinstone Vice-Adm. (11)
Espie, Robert, Esq. Surgeon R.N.
*Espinasse, James W. Major 12th Regt. (11)
Estridge, Geo. Lt.-Col. St. Kitts M.L. (11)

Evans, Sir De Lacy, GCB. Gen. Col. 21st
R.N.B. Fus.
Evans, E. T. Ens. 56th Regt. (11)
Evans, George Vice-Adm. (11)
Evans, H. D. Lieut. (ret.) 10th Huss. (11)
Evans, John Capt. (ret.) 6th Innis. Drs. (11)
Eveleigh, G. C. Capt. h.p. R.A.
Evelyn, C. F. Capt. 3rd R. Surrey Mil. (11)
Everard, Walling Capt. late 60th Roy. Rifles
Ewart, Henry P. Capt. 2nd Life Gds.
Ewart, W. S. Lt.-Col. Gren. Gds. (11)
Exeter, Marquis of Lt.-Col. Northampton
Mil. ADC. to the Queen
Eyre, Henry Lieut.-Gen. Col. 59th Regt. (11)
Eyre, Henry E. Capt. Coldm. Gds. (11)
Eyre, Sir Vincent, K.C.S.I. CB. Major-Gen.
(ret.) R.A. Bengal (11)
FABER, W. Raikes Major-General
Fairfax, T. E. Capt. Gr. Gds.
Fairfield, Charles Lieut. (ret.) Rifle Brig. (11)
Fairclough, J. W. Col. (ret.) 63rd Regt.
Falls, John Paym. 8th or King's
Fane, Mildmay Gen. Col. 54th Regt. (11)
Fanning, John Major (ret.) f.p. 1st W.I.
Regt.
Farnshaw, Charles Col. R.E.
*Farquhar, Arthur Rear-Adm. (11)
Farquharson, Henry Capt. 8th or King's (11)
Farquharson, J. R. Lt.-Col. Sco. Fus. Gds.
*Farquharson, M. H. Lieut. R.M.L.I. (11)
Farrell, J. Sidney Major (ret.) R.A.
Farrell, Sidney B. Capt. R. E. Prof. of M.L.
Topography Roy. Staff Col. Sandhurst
Farrington, M. C. Capt. 51st K.O.L.I. Inf.
(11)
Fawcett, R. H. Capt. 33rd Regt. (11)
Fearnley, Fairfax Capt. (ret.) 18th Roy.
Irish (11)
Feilden, Henry Lieut. 21st R.N.B. Fus. (11)
Feilden, H. M. Capt. 1st Royal Lanc. Mil.
Rifles (11)
Feilden, Randle J. Lieut.-Col. 60th Royal
Rifles (11)
Feilding, Geo. Col. (ret.) Beng. Army
Fellows, Edward Col. late 11th Huss.
Fellows, P. H. Col. R. Marine L.I.
Fennings, S. W. Lieut.-Col. unatt. (11)
Ferguson, G. A. Lieut.-Col. (ret.) Gren. Gds.
Ferguson, Sir Jas. Bart. MP. Col. Ayr-
shire Rifles, late Capt. Gren. Gds.
Ffolliott, P. H. Lieut. 90th Regt. (11)
Field, Esculapian, Esq. late Hon. Corps
Gent.-at-Arms
Field, Rev. E. B. BCL. late Act. Chaplain
to the Forces
Field, G. T. Lieut.-Col. R.A. (11)
Field, J. W. P. Capt. Hon. Art. Co. (11)
Fulgate, T. P. H. M. Capt. (ret.) 2nd R.N.B.
Dragoons
Fulkin, R. MD. Surgeon late N. Gloce. Mil.
Filmer, Sir Edm. Bart. Cornet Royal East
Kent Yeo. Cav.
Finch, J. W. Capt. R.N. (11)
Finucane, George Col. (ret. f.p.)
Firebrace, Frederick Lieut. Roy. Eng. (11)
Fisher, A. A'Court, CB. Lieut.-Col. R.E.
(11)

Fitzgerald, E. Lieut.-Col. late 98th Regt.
Fitzgerald, M. G. B. Capt. 16th Lancers (11)
Fitzgerald, P. S. Capt. 2nd Roy. Lanc. Rifles
Fitzgerald, C. C. P. Lieut. R.N. (11)
Fitzhugh, H. T. Major R.A. (11)
Fitzjames, Arthur Chas. Major late
93rd Highs.
Fitzroy, Lord A. C. Lennox Col. unatt. (11)
Fitzroy, C. C. Capt. 68th Light Inf. (11)
Fitzroy, Lord F. J. Lieut.-Col. late Gren.
Gds. (11)
Fitzroy, Philip Capt. 5th Fus. (11)
Fitzroy, Robert O'B. Comr. R.N. (11)
Fletcher, Alex. Capt. 12th Roy. Lancers (11)
Fletcher, Sir Henry Bart. Major Surrey Rifle
Vols. late Lieut. Gren. Gds.
Fletcher, Henry C. Lieut.-Col. Sco. Fus.
Gds. (11)
Fletcher, T. C. Capt. R.A. (11)
*Flower, Lamrock Capt. 3rd Roy. Sur. Mil.
(11)
Flodder, C. Capt. Gren. Gds.
Folch, S. V. Lieut. 3rd West York Mil. (11)
Foley, Hon. A. E. Col. late Gren. Gds.
Foley, Hon. St. Geo. Gerald CB. Col. h.p.
44th Regt. (11)
Follett, R. W. Webb Lt. Coldm. Gds. (11)
Fonblanque, B. A. Ens. (ret.) 8th or King's
Fonblanque, E. B. de Asst. Com. Gren. (11)
Foot, Alfred G. Lieut. Roy. Eng. (11)
Forbes, G. H. A. Capt. Deputy-Assistant
Adjutant-General R.A.
Forbes, J. Lieut.-Col. late Coldm. Gds.
Forbes-Lealie, Jonathan Lieut.-Col. late 78th
Highlanders
Forbes, Stewart Major 1st Roy. Surrey Mil.
Forbes, Thos. John Gen. Col.-Comm. R.A.
(11)
Forbes, Sir William, Bt. Major Aberdeen
Rifle Vols. late Lieut. Coldm. Gds.
*Forbes, Hon. W. F. Maj. Leirtrim Rifles (11)
Ford, Chas. Erskine Col. Comd. R.E. Canada
Ford, Edmund Twiss Major-Gen. (ret.) R.E.
Ford, James E. Capt. Sco. Fus. Gds.
Forester, Hon. H. T. Lt.-Col. late Gren. Gds.
Forester, R. L. Major Roy. Art.
Forester, F. R. Lt.-Col. h.p. 4th R. I. Dr.
Gds.
Forester, J. Fitz E. Lieut. 4th W. I. Regt.
Forsyth, James Lieut. H.M. Beng. Staff Corps
Fortescue, Francis Capt. late Sco. Fus. Gds.
Fortescue, H. G. Capt. (ret.) Coldm. Gds.
Fosbery, Geo. V. & C. Major H. M. Bengal
Staff Corps (11)
Fosbery, W. T. E. Capt. h.p. 77th Regt. (11)
Fowler, G. C. Commr. R.N.
Fowler, Robert Dashwood Capt. R.N.
Fox, Augustus H. Lane Col. h.p. Gren.
Gds. (11)
Fox, Edwin Lieut. Hon. Art. Co.
Fox, J. T. R. Lane Capt. Gren. Gds. (11)
Fox, Maxwell Commr. R.N. (11)
Frampton, W. J. Capt. 59th Regt. (11)
Frank, P. late Asst. Staff Surg.
Frankland, Colvill Capt. 103rd Royal Bo.
Fus. (11)
Franklin, C. R. Capt. Roy. Art.

Fraser, Hon. Alex. E. Lt.-Col. late Sco. Fus.
Gds. (11)
Fraser, Daniel Col. (ret. f.p.) 42nd Royal
Highlanders (11)
Fraser, J. Keith Capt. 1st Life Gds. (11)
Fraser, Thomas Vice-Adm. (11)
Fraser, W. Col. unatt. (11)
Fraser, W. J. Lieut. late 1st Tower Hamlets
Eng. Vols. (11)
Frederick, Charles Vice-Adm. (11)
Frederick, Sir R. Bt. Lt.-Col. late 2nd
Sur. Mil. (11)
Freeland, Russell G. Ens. 4th K.O. (11)
Freer, C. T. Lieut. late 7th Fus.
Froese, J. N. A. CB. Maj.-Gen. (ret. f.p.) R.A.
Freeth, Walter, Esq. Com.-in-Chief's office
(11)
Fremantle, A. J. Lieut.-Col. Coldm. Gds.
Fremantle, Sir Charles Howe, GCB. Adm.
Fremantle, E. R. Capt. R.N. (11)
Fremantle, Fitzroy W. Capt. Coldm. Gds.
(11)
Fremantle, J. C. S. Lt. (ret.) 2nd Life Gds.
(11)
French, H. J. Major-Gen. Col. 80th Regt.
French, P. T. Lt.-Col. (ret.) Bomb. Army
Frobisher, W. M. Capt. 34th Regt. (11)
Frome, Edw. Major-Gen. R.E. (11)
Fugion, Edw. Major unatt. (11)
Fullford, Wm. Major (ret.) R.A.
Fuller, F. G. A. Capt. R. H. Gds.
Fullerton, A. G. Major late 2nd Life Gds.
Fullton, J. J. Major H.M. Mad. Staff Corps
Furlong, Geo. W. Capt. 21st R.N.B. Fus. (11)
*Fyres, Henry Thomas Major h.p. R.A.
Col. E. and N. York Art. Mil. (11)
Fyres, W. A. Col. Rifle Brig. (11)

GAGE, E. Major late Sco. Fus. Gds.
Gage, Hon. E. T. CB. Col. Roy. Art. (11)
Gage, Hon. H. E. Hall Lieut.-Col. R. Sussex
L. I. Mil. (11)
Gage, Vascour Major late Sco. Mil. (11)
Gahan, Henry Col. late 5th W. I. Regt.
Galbraith, W. Capt. 85th K. L. I. (11)
Galloway, T. J. Maj.-Gen. (11)
Gallon, Douglas, FRS Capt. (ret.) R.E.
Asst. Under Secretary of State for War
Gambier, Gloucester, CB. Col. Deputy Adjutant-General R.A.
Gammell, A. Major late 43rd Regt.
Gammell, J. H. H. Capt. 9th Regt. (11)
Gandy, F. Brandreth Lieut.-Col. late R.
Cumb. Mil.
Gardiner, Richard Col. I.F.O. Glasgow (11)
Gardiner, T. Esq. late Purser H. E. L. C.S.
(11)
Gardiner, W. Commr. R.N.
Gardiner, G. H. Capt. R.N. (11)
Gardiner, R. O. Lieut.-Col. H.M. Mad. Army
(11)
Gardiner, W. B. Major-Gen. (ret.) Roy.
Art. (11)
Gardyne, C. Greenhill Lieut.-Col. Coldm.
Gds. (11)
Garforth, W. Commr. R.N. (11)
Garlick, J. W. Capt. 109th Regt.

Garnham, R. E. W. Capt. 6th W. York Militia (11.)
 Garlick, Alan P. Lord Capt. R.H. Gds.
 Garrett, A. P. Capt. 11th Hussars
 Garrett, J. A. T. Capt. Gren. Gds. (11.)
 Garrett, Francis Lieut. Roy. 1st Devon Yeo. Cav. Capt. late 3rd Regt. Gds. (11.)
 *Garsia, M. C. Lieut. 58th Regt. (11.)
 Garstin, R. L. Col. (ret.) R.A.
 Garrook, Sir John, KCB. Major-Gen. Comg. Northern District
 Gascoigne, Chas. Lieut.-Gen. Col. 89th Regt. (11.)
 Gascoigne, Clifton Lt.-Col. (ret.) Gren. Gds.
 Gascoigne, Ernest F. Gen. Col. 69th Regt. (11.)
 Gascoigne, W. J. Capt. Sec. Fus. Gds. (11.)
 Gawler, Geo. K.H. Col. late 52nd L. I. (11.)
 Geary, H. Lieut. R. A. (11.)
 Geary, H. L. Capt. R.A. (11.)
 George, Christopher Commr. R.N. (11.)
 George, G. T. Lieut.-Col. late Paym. 4th Huss.
 German, James Capt. 3rd Roy. Lan. Mil. (11.)
 Gibbins, Thos. Lt.-Col. (ret.) 2nd W. I. Regt. (11.)
 Gibbon, Arthur, Esq. Accountant-Gen's. Depart. War Office (11.)
 *Gibbons, Charles Commr. R.N. (11.)
 Gibbons, John Surgeon Roy. Art.
 Gibbs, Charles Capt. 2nd Queen's (11.)
 Gilbard, Geo. J. Capt. 71st Highl. Light Inf. (11.)
 Giles, John C. Captain R.N.
 Gilford, Viscount Capt. R.N. (11.)
 Gillett, Henry Capt. 13th Light Inf. (11.)
 Gilmore, A. H. Lieut. R.N. (11.)
 Gilpin, Rich. T. Col. Bedford Mil. M.P.
 Gipp, F. B. Lieut. late 35th Roy. Sussex Regt. (11.)
 Gippe, H. Capt. 9th Regt.
 Gippe, Reginald Lt.-Col. Sec. Fus. Gds.
 Gladstones, H. B. Capt. Cape Mounted Rifles (11.)
 Gleig, A. C. Lieut.-Col. R.A. Asst. Insp. of Schools
 Gleig, C. E. S. Bt.-Major h.p. 14th Regt.
 Gleig, Rev. G. R. M.A. Chaplain-General to the Forces (11.)
 Glyn, Rich. G. Capt. late 1st R. Drags.
 Glyn, Sidney Carr Capt. Rifle Brig. (11.)
 Godbold, G. B. Capt. late Adj. 1st Batt. Renfrewshire Rifle Vols.
 Godman, A. F. Capt. 6th Drag. Gds. (11.)
 Godwin, A. A. Lieut. 103rd Roy. Bomb. Fus. (11.)
 Godwin-Austen H.H. Capt. H.M. Beng. Staff Corps (11.)
 Goff, Robert Charles Capt. 15th Regt.
 Goff, Thos. Wm. Capt. late 7th Drag. Gds. (11.)
 Gold, W. Geo. Major-Gen. Col. 53rd Regt. (11.)
 Goldney, Rev. J. K. M.A. Chaplain R.N. (11.)

Goldsmith, George, CB. Vice-Adm. (11.)
 Goldsworthy, W. T. Bt.-Major 91st Highlanders (11.)
 Gomme, Sir Wm. M. GCB. Gen. Col. Coldm. Gds. (11.)
 Good, H. Lieut.-Col. late Coldm. Gds. (11.)
 Goodenough, W. H. Major of Brigade R.A., Aldershot (11.)
 Goodfellow, W. R. Major-Gen. R.E. (11.)
 Goodlake, G. L. E. Lt.-Col. Coldm. Gds.
 Goodliffe, F. G. Capt. London Rifle Brigade Vols. (11.)
 Goodman, David Lieut.-Gen. (11.)
 Goodlen, G. B. Lieut. R.N.
 Gordon, Sir Jas. A. GCB. Admiral (11.)
 Gordon, Alex. CB. Major-Gen. (11.)
 Gordon, F. A. Lieut. 60th Royal Rifle
 Gordon, G. Grant Lieut.-Col. Sec. Fus. Gds.
 Gordon, George Hamilton Capt. R.E. (11.)
 Gordon, Henry W. Esq., CB. Principal Superintendent of Stores Woolwich
 Gordon, Hon. John Admiral
 Gordon, J. J. H. Major H. M. Bengal Staff Corps (11.)
 Gordon, John Lt.-Col. late 47th Regt. (11.)
 Gordon, J. S. Capt. (ret.) 3rd Buffs (11.)
 Gordon, Robert Rear-Adm (11.)
 Gordon, William Vice-Adm.
 Gordon, W. F. F. Capt. 20th Regt. (11.)
 Gore, Hon. Sir Charles, GCB. K.H. Gen. Col. 6th Regt.
 Goss, W. R. O. Major late 18th Light Drags.
 *Gori, Viscount S. P. Major-Comm. Lin. Mil.
 Gosling, Geo. Capt. Sec. Fus. Gds. (11.)
 Gosset, Charles Commr. R.N.
 Gosset, W. D. Lieut.-Col. R.E. (11.)
 Gough, Hugh, Viscount, KP. GCB. GCSE. Field-Marshal, Col. Royal Horse Guards
 Goulburn, Edward Col. late Gren. Gds.
 Gould, F. A. Lt.-Col. late 2nd Drags. (11.)
 Gould, Henry O. Capt. Gren. Gds. (11.)
 Gould, H. C. Capt. (ret.) Dorset Mil. (11.)
 Gould, R. F. Lieut. late 31st Regt. (11.)
 Gould, T. T. Capt. 4th W. I. Regt. (11.)
 Gower, Erasmus Capt. late 12th Roy. Lenc.
 Grosse, C. H. Major-Gen. (ret.) H.M. Indian Army
 Grame, Rev. G. late Mil. Chap. H.E.I.C. Ser. (11.)
 Graham, Allan Hamilton Col. R.A. (11.)
 Graham, C. S. Lieut. R.A. (11.)
 Graham, Gerald, E. C. CB. Lieut.-Col. Roy. Eng. (11.)
 Graham, H. A. Lieut. late 7th Fus. (11.)
 Graham, H. L. Cornet (ret.) 12th Royal Lancers (11.)
 Graham, H. Oliver Capt. H. M. Madras Staff Corps (11.)
 Graham, Jas. John Col. Staff Officer of Pensioners, Regent's Park Barracks
 Graham, Lemley Col. 18th Royal Irish (11.)
 Graham, T. P. Capt. Sec. Fus. Gds. (11.)
 *Grange, Chas. Walter Major R. Can. Rifles
 Grant, Edward Fitzherbert Col. (ret.) R.A.
 Grant, Geo. Fox Capt. 62nd Regt. (11.)

Grant, Henry D. Capt. R.N. (11.)
 Grant, Sir James Hope Lieut.-Gen. GCB. Col. 9th Royal Lancers, Quar.-Mast-Gen. to the Forces (11.)
 Grant, John Capt. (ret.) R.A. (11.)
 Grant, John M. Lieut.-Col. Assistant Quar. Master-Gen. R. E. (11.)
 Grant, J. M. Lieut. (ret.) 25th K. O. Bords.
 *Grant, J. M. Maj. H.M. Mad. Staff Corps (11.)
 Grant, J. Thornton, CB. Col. (ret.) 18th Royal Irish
 Grant, J. W. Surg. (ret.) Bengal Army (11.)
 Grant, Wm. Lieut. 91st Highlanders
 Grant, W. F. Col. (ret.) Bengal Army (11.)
 Grant, W. J. C. Lieut.-Col. R. A. (11.)
 Grant, W. L. Lieut.-Col. K.O. Lt. Inf. Mil.
 Gratton, A. O. D. Lt.-Col. (ret. f.p.) R.E. (11.)
 Gray, Basil Capt. unatt. (11.)
 Gray, W. J. Capt. R. A. (11.)
 Graydon, Geo. Major-Gen. (ret. f.p.) Roy. Art. (11.)
 Greathead, Sir E. H. KCB. Col. unatt. (11.)
 Greathead, W. W. H. CB. Lieut.-Col. R. E. Bengal (11.)
 Graves, G. R. Col. late 70th Regt. (11.)
 Graves, R. Lieut.-Gen. Col. 40th Regt.
 Green, Andrew Major Rifle Brigade
 Green, Sir Edw. KCB. Maj.-Gen. H.M. Bomb. Staff Corps (11.)
 Green, G. F. Lieut. 70th Regt. (11.)
 Green, M. S. CB. Lt.-Col. H.M. Bomb. Staff Corps Resident at Khelat (11.)
 Green, Sir William H.R. KCSE. CB. Lt.-Col. H.M. Bomb. Staff Corps (11.)
 Greenfield, J. T. Lieut. R.A. (11.)
 Greenhill, J. R. Asst. Staff Surg.
 Greenwood, Wm. Lt.-Col. late Gren. Gds.
 Greer, H. Harpur, CB. Col. 68th Lt. Inf. Staff Corps (11.)
 Gregory, E. F. Capt. 28th Regt. (11.)
 Gregory, G. B. Capt. late 57th Midx. Rifle Vols. (11.)
 Gregson, J. D. Lieut. 40th Regt. (11.)
 Greg, J. M. Capt. R.E. (11.)
 Gremall, Frederick H. Lieut. 15th Regt.
 Greville, A. C. Lieut.-Col. unatt. (11.)
 Grey, Francis D. Lt.-Col. (ret.) 37th Regt.
 Grey, Hon. Sir Fred. W. GCB. Adm.
 Grey, Hon. George Lieut. 15th Regt. Adj. 1st A. B. Renfrew Rifle Vols. (11.)
 Grierson, Crichton Lieut.-Gen. (ret.) R.E.
 Griffith, Julius G. Gen. Col. Comm. R.A. Bombay (11.)
 Griffiths, E. St. J. Capt. 19th Regt. (11.)
 Griffiths, Fred. Aug. Major (ret.) R.A. (11.)
 Griffiths, Leonard Capt. R.A. Prof. of Fortification Roy. Mil. Col. Sandhurst (11.)
 Grimston, Walter J. Capt. R.A. (11.)
 Grosvenor, Hon. R. W. M.P. Capt. (ret.) 1st L. Gds.
 Gwyer, G. E. Lieut. R.E. (11.)
 Gubbins, Alexander Lieut. R.A. (11.)
 Gubbins, Jas. Lieut.-Col. 23rd R. W. Fus. Asst. Adj.-Gen. Malta (11.)

Guise, J. C. E. Col. (ret.) 90th Lt. Inf.
 Guy, Philip M. Nelson, CB. Major-Gen. Com. Troops in China (11.)
 HAGGARD, W. M. R. Capt. East Norfolk Mil.
 Haines, F. P. Major-General
 Halkane, G. H. J. Capt. 64th Regt. (11.)
 Halliburton, Alex. F. Capt. late Lanc. Yeo. Cav. (11.)
 Hallett, J. Lt.-Col. (ret.) Coldm. Gds.
 Hallett, Peter A. Commr. R.N.
 *Hall, A. W. Capt. and Adj. 80th Lancashire Rifle Vols. (11.)
 Hall, E. C. Lieut. R.N. (11.)
 *Hall, George Lieut.-Col. Durham Mil. Art. (11.)
 Hall, John Lieut.-Gen. Col. 19th Huss.
 *Hall, John P. Maj. Paym. 14th Dep. Batt. (11.)
 Hall, Julian H. Lt.-Col. Coldm. Gds.
 Hall, Lewis Alex. Lieut. Gen. Col. Commr. R.E.
 Hall, Richard, M.D. Asst. Staff Surg. (11.)
 Hall, R. M. Capt. 13th Light Inf. (11.)
 Hall, Robert Capt. R.N. Capt. Sup. Pembroke Yard (11.)
 Hall, Sir William H. KCB. FRS. Rear-Adm.
 Hall, Wm. King, CB. Capt. R.N. (11.)
 Hallett, J. A. Esq. Navy Agent (11.)
 Hallowell, C. J. M. Lieut. (ret.) 19th Regt. (11.)
 Hallowell, E. G. Col. unatt. Commr. Roy. Mil. College
 Hallowes, John Vice-Adm. (11.)
 Haldet, E. P. Vice-Adm. (11.)
 Haldet, Lawrence W. Lieut. H.M. Mad. Staff Corps
 Halton, Lanelet Major late 16th Lancers
 Haly, W. O. Grady, CB. Major-Gen. Comd. the Forces, Bengal
 Hamerley, John H. Lieut. 22nd Regt.
 Hamilton, A. C. Capt. Roy. Engrs. (11.)
 Hamilton, A. Terriock Capt. late 71st Highl. Lt. Inf. (11.)
 Hamilton, Charles, CB. Maj.-Gen. H.M. Beng. N.I. (11.)
 Hamilton, Lord Claud, MP. Lieut.-Col. Donegal Mil. (11.)
 Hamilton, Sir Edw. A. Bart. Capt. (ret.) Coldm. Gds. (11.)
 Hamilton, Fred. Wm. CB. Major-Gen. Comg. the Forces in Scotland (11.)
 Hamilton, G. R. Ens. 8th or King's
 Hamilton, J. Glencairn C. Major Lanark Yeo. Cav. late 2nd Life Gds. (11.)
 Hamilton, L. H. Lieut.-Col. (ret. h.p.) 87th R.I. Fus. (11.)
 Hamilton, Robert George Col. R.E.
 Hamilton, R. W. Lt.-Col. Gren. Gds. (11.)
 Hamilton, Terriock, Esq.
 Hamilton, T. Brumston Lieut. R. H. Art. (11.)
 Hamilton, W. H. Paym. R.N. (11.)
 Hamilton, W. D. Maj. late 13th Lt. Drs. (11.)
 Hamley, E. B. CB. Col. R.A. Mem. of Council of Education (11.)
 Hammersley, Chas. Esq. Army Agent (11.)

Hammerley, Fred. Major unatt. Asst.-Quar.-Mgs. General, Aldershot (11).
 Hammond, Fred. Col. (ret.) 66th Regt.
 Hammond, H. E. Lieut. late 1st Life Gds.
 Hanley, Jos., Esq. late War Office (11).
 Hancock, H. J. B. Ena. late 45th Regt. (11).
 Handy, B. F. Lieut. 8th or King's Vols. (11).
 Hanmer, Wyndham E. Major late 6th Drps.
 Hanna, H. B. Lieut. H.M. Beng. Staff Corps.
 Hanwell, Joseph Lieut.-Gen. (ret.) R.A.
 Harcourt, F. Venables Col. late Coldin. Gds. (11).
 Hardie, H. B. Lieut. Haddington Mil. Art. (11).
 Harding, Charles, FRSL, FRGS, FRS, FASL. Capt. 19th Surrey Rifle Vols. (11).
 *Harding, Francis Fynn, CB. Col. 22nd Regt. (11).
 *Hardinge, C. S. VISCOUNT Lieut.-Col. Kent Rifle Vols. (11).
 Hardinge, H. A. E. CB. Col. Coldin. Gds.
 Hardwick, C. Philip, EARL OF, FRGS. Admiral (11).
 Hardy, F. Major 84th Regt. (11).
 Hardy, John Capt. 9th Royal Lancs. (11).
 *Hare, E. H. Lieut. 11th Regt. (11).
 Hare, Hon. Richard Lt.-Col. late 90th Regt.
 Hare, R. D. Lieut. late 9th Regt. (11).
 Hare, Sir T. Bart. Capt. late 2nd Life Gds.
 Harford, F. H. Lieut. Sec. Fus. Gds. (11).
 Harrison, O. Lieut. 5th Fus.
 Harkness, G. Capt. 5th Fus. (11).
 Harman, D. J., Esq. Standard Bearer Hon. Corps Gent-at-Arms.
 Harness, Henry Deury, CB. Col. R.E.
 *Harnett, Edward Major 11th Hns. (11).
 Harrington, J. Dep. Purv. late Army Med. Dep. (11).
 Harrington, R. E. S. Capt. (ret.) 32nd Regt. (11).
 Harrington, R. H. Comr. R.N. (11).
 Harris, Hon. Edward A. J. CB. Vice-Adm. (11).
 Harrison, Geo. Alex. Capt. (ret.) 79th Highrs.
 Harrison, R. Capt. R.E. (11).
 Harrison, W. A. Ass.-Sur. Hants Mil. Art. Col. unatt. (11).
 Hart, Hen. Geo. Col. unatt. (11).
 Hartley, James Capt. (ret.) 32nd Light Inf. (11).
 Hartley, R. W. Capt. late 94th Regt. (11).
 Hartopp, W. W. Capt. R. Home Guards.
 Hart, Jos. Mark Col. (ret.) 33rd Regt. (11).
 Harvey, Chas. Elwin Capt. R.E.
 Harvey, C. Lacon Capt. 91st Highrs. (11).
 *Harwood, Ed. Major 2nd Som. Mil. (11).
 Harwood, J. A. P. K. Lieut. 13th Light Inf. (11).
 Haslett, A. K. Lieut. R.E. (11).
 Hastings, Hon. G. F. CB. Rear-Adm. Com.-in-Chief Pacific.
 Hastings, Sir Thomas, KCB. Admiral.
 Hatherston, Lord Col. 2nd K.O. Staff. Mil.
 Hathorn, Geo. Vice-Adm. (11).

Hatton, E. H. F. Capt. late Northampton Mil. (11).
 Hatton, Villiers Latouche Lieut.-Col. late Gren. Gds. (11).
 Haughton, J. Capt. R.A. (11).
 Havlock, Sir Henry, Bart. CB. & C. Free. Lieut.-Col. unatt. Asst. Quar.-Master-Gen. Canada (11).
 Hawes, G. H. Lieut.-Col. 9th Regt. (11).
 Hawkins, F. K. Commr. R.N. (11).
 Hawkins, H. C. Capt. R.N.
 Hawkins, Major R. Capt. Queen's West. Rifle Vols. (11).
 Hawkshaw, John Lt.-Col. Eng. and Railway Volunteer Staff Corps (11).
 Hawley, W. H. Major 14th Regt. (11).
 Hay, Lord Arthur Col. late Gren. Gds.
 Hay, C. C. Lt.-Gen. Col. 58th Regt. (11).
 Hay, H. C. R. Lt.-Col. (ret.) Soc. Fus. Gds.
 Hay, H. M. Drummond Lt.-Col. Commr. R. Perth Rifles.
 Hay, Rt. Hon. Lord John, CB. MP. Capt. R.N. (11).
 *Hayes, John Montague, CB. Capt. R.N. (11).
 Hayne, Rich. Capt. late h.p. B.S.C. (11).
 Hayward, H. B. Capt. 45th Regt. (11).
 Heath, Edwin Lieut. h.p. 88th Regt.
 Heath, Leopold G. CB. Capt. R.N. Commr. and Sen. Officer Indian Ocean (11).
 Heathcote, C. T. Capt. Bomb. Staff Corps (11).
 Heathcote, Eustace Major Hants Mil. (11).
 Heathcote, J. A. Commr. late H.M. Indian Navy (11).
 Heathorn, T. B. Capt. h.p. R.A. (11).
 Hely, G. C. S. Capt. late 86th Regt. (11).
 Hemana, G. W. Lt.-Col. Eng. and Rail. Vol. Staff Corps (11).
 Hemmings, Thos. Hinton Lt.-Col. (ret.) 78th Highrs.
 Henderson, E. Y. W. Lt.-Col. R.E. (11).
 Henderson, Joseph Cornet 12th Roy. Lanch. (11).
 Henderson, W. Major-Gen. (ret.) R.A.
 Hennessy, C. W. & C. Major 8th Huss. (11).
 Hennell, S. Col. (ret.) Bombay Army (11).
 Hennington, Sir R. Capt. late Field Train.
 Hennis, W. H. Lieut. 8th or King's.
 Henry, G. C. Lieut.-Col. h.p. R. Artillery.
 Hepburn, Henry F. Col. Soc. Fus. Gds. (11).
 Herbert, Arthur James, CB. Col. unatt. (11).
 Herbert, C. J. Capt. (ret.) Gren. Gds. (11).
 Herbert, H. A. Capt. (ret.) Coldin. Gds. (11).
 Herbert, J. B. Esq. late Mil. Sec. Col. h.p. 82nd Regt. MP.
 Herbert, R. W. H. Commr. R.N.
 Herbert, Hon. W. H. Major 84th Regt. (11).
 Hewett, W. N. & C. Capt. R.N. (11).
 Heyland, A. H. Lieut. (ret.) 65th Regt. (11).
 Heyland, H. Midshipman R.N. (11).
 Heythausen, Geo. Van Lieut. 14th Regt. (11).
 Heywood, J. M. Capt. R.E. Bengal.
 Heywood, Wm. Capt. (ret.) 14th Regt. (11).
 Hibbert, J. Nembhard Major late 97th Regt.
 Hichens, Wm. Capt. R.E. (11).

Higgins, T. Gordon Lieut.-Gen. Col. Commr. R.A. (11).
 Higgins, W. F. Esq. late Clerk in Colonial and War Depts. Capt. Queen's West. Rifle Vols. (11).
 Higinson, G. W. A. Col. Gren. Gds. (11).
 Hight, Edward Lieut. R.N.E. (11).
 Hildyard, Robert C. T. Lieut. R.E. (11).
 Hill, Edward Bowley Major-Gen. (11).
 Hill, Hon. Geoffrey, R. C. Capt. (ret.) R.H. Gds.
 Hill, Geo. Starvelay Lieut.-Col. N. Salop Yeo. Cav.
 Hill, Henry Capt. and Adj. Cheshire Yeo. (11).
 Hill, John Major-Gen. R.A.
 Hill, John Thomas Major-General.
 Hill, Pascoe G. Chaplain R.N.
 Hill, Stephen J. CB. Col. Governor and Commr.-in-Chief, Antigua and Leeward Islands.
 Hill, W. Lt.-Col. 2nd W.L.R. (11).
 Hime, H. W. L. Lieut. R.A. (11).
 *Hinchbrook, VISCOUNT Capt. Gren. Gds.
 Hind, Charles Col. 6th W. York Mil. or King's (11).
 Hinde, John, CB. Major-Gen. (ret. Fp.) 8th or King's (11).
 Hinton, F. Major 1st Dorset Art. Vols.
 Hirs, Henry W. Capt. R.N. (11).
 Hirst, R. A. H. Major late W. Essex Mil. (11).
 Hitchen, H. J. Capt. 24th Regt. (11).
 Hobart, Hon. H. M. Capt. 103rd Royal Bomb. Fus.
 Hodge, De Burgho E. Capt. (ret.) 12th Royal Lancs. (11).
 Hodgson, Geo. E. Capt. 44th Regt. (11).
 Hodgson, W. C. Col. 79th Highlanders (11).
 Hogarth, Joseph Capt. 43rd Lt. Inf.
 Hogg, J. McNaghten Lt.-Col. late 1st Life Gds. MP. (11).
 Hogge, C. Neville Lt.-Col. Gren. Gds.
 Holburne, Sir Thos. Wm. Bart. Commr. R.N. (11).
 Holcombe, F. Major (ret.) R.A.
 Holden, Henry Lieut.-Col. late 13th Light Drps. (11).
 Hollist, E. O. Lieut. R.A. (11).
 Holmes, H. R. Lieut. R.N. (11).
 Holmes, W. H. M. Capt. late R. Lond. Mil.
 Holmesdale, VISCOUNT, MP. Capt. late Coldin. Gds. (11).
 Holroyd, Geo. S. Capt. 73rd Regt. (11).
 Holt, Alfred Capt. 21st R. N. E. Fus. (11).
 Home, D. M. Lieut. R. H. Gds. (11).
 Home, R. H. Lieut. (ret.) 13th Lt. Inf. (11).
 Home, Robert Cap. R.E.
 Home, Hon. W. S. D. Capt. Gren. Gds. (11).
 Hood, Hon. A. Nelson Major-Gen.
 Hood, F. W. VISCOUNT Lt.-Col. (ret.) Gr. Gds. (11).
 Hood, J. Phipps, Esq. late Registrar Vice-Admiralty Court, Halifax.
 Hood, W. C. Lieut. 2nd Queen's Royals.
 Hood, W. H. Commr. R.N.
 Hooks, H. H. Capt. 45th Regt. (11).
 Hope, Chas. Wm. Capt. R.N. (11).
 Hope, Fras. Capt. late R.A. (11).
 Hope, Fred. Major-Gen.
 Hope, H. P., Esq. late Mts R.N. (11).
 Hope, H. W. Capt. (ret.) Gren. Gds.
 *Hope, John E. Lt.-Col. R.A. (11).
 Hopkins, J. O. Capt. R.N. (11).
 Hopkinson, C. Esq. Army Agent.
 Hore, E. G. Capt. 25th Regt. Major of Brigade, 2nd Brigade, Malta (11).
 *Horne, E. G. Capt. late 55th Regt. Horsford, Sir Alfred H. KCB. Brig.-General. 3rd Brigade Aldershot (11).
 *Hort, J. J. Col. 44th Regt. (11).
 Horton, George W. Col. late 7th Drag. Gds. (11).
 Horton, William Capt. R.N. (11).
 Housen, J. C. Captain R.N. (11).
 Hoste, Sir William, Bart. Rear-Adm. Gen.
 Hotham, Beaumont Lord, MP.
 Hotham, B. W. Capt. late Gr. Gds. (11).
 Hotham, Charles F. Capt. R.N. (11).
 Howard de Walden, C. A. Lord, GCB. Capt. h.p. 8th Foot.
 Howe, Esqr. Lt.-Col. Leicester Yeo. (11).
 Howes, Geo. Capt. R.N. (11).
 *Hozier, H. M. Lieut. 2nd Life Gds.
 *Hozier, John Wallace Lieut. 2nd R. N. B. Drags. (11).
 Hudson, John Capt. R.N.
 Huggins, John Capt. 20th Middlesex R. Vols. (11).
 Hughes, C. A. Lieut. 2nd Life Gds.
 Hughes, Charles Col. (ret.) 24th Regt.
 Hughes, J. W. Capt. (ret.) 8th or King's.
 Hughes, T. de Bashall Lieut. (ret.) Cape M. Rifles.
 Hughes, Waller P. Lieut. Coldin. Gds.
 Hughes, W. J. M. Capt. late 1st Drag. Gds. (11).
 Humm, Henry, CB. Col. (ret.) Gren. Gds. (11).
 Humfrey, Blake T. Lieut. 8th or King's.
 Hunt, H. B. Navigt. Lieut. R.N. (11).
 Hunter, Edward Major (ret.) 62nd Regt. (11).
 Hunter, G. W. E. Lieut. 3rd Huss. (11).
 Hunter, T. MD. Deputy Insp.-Gen. of Hospitals.
 Hunter, T. R. Lieut. H.M. Indian Navy (11).
 Hurst, W. B. Lieut. R.E. (11).
 Hutchinson, A. J. Ensign 23rd R. W. Fus. (11).
 Hutchinson, C. H. Col. R.A. Madras.
 Hutchinson, C. S. Lieut.-Col. R.E. (11).
 Hutchinson, Hon. H. Hely Col. late 6th Drags. (11).
 Hutchinson, John Lt.-Col. 8th Lan. Vols. (11).
 Hutchinson, W. Nelson Lieut.-Gen. Col. 33rd Regt. (11).
 Hutchinson, H. McL. Lt. 14th Regt. (11).
 Hutton, C. W. Capt. 59th Regt. (11).

Hutton, T. Bruce Maj. (ret.) 1st W.I. Regt. (11)
 Hybert, Thomas Lieut. R.N.R. (11)
 Hyde, G. Hooton Major-Gen. (ret.) R.A.
 IBBETSON, Chas. Parke Lt.-Col. h.p. 89th Regt.
 Ind, F. J. N. Major (ret.) 37th Regt. (11)
 *Inglis, W. L. CB. Col. 62nd Regt.
 Inglefield, R. A. Captain R.N. (11)
 Inglefield, S. H. S. Lt.-Col. (ret. h.p.) R.A. (11)
 Ingles, W. L. Capt. 16th Regt. (11)
 Inglis, C. D. Comr. R.N. (11)
 Inglis, John Lieut. R.N. (11)
 Inglis, John Lieut.-Col. Royal Engrs. (11)
 Ingram, Wm. CB. Col. unatt. (11)
 Ingram, Aug. H. Capt. R.N. (11)
 Irby, J. J. C. Capt. Adj. Chelsea Hosp. (11)
 Irby, L. H. L. Major 74th Highls. (11)
 Isacke, Rob. J. Capt. 71st Highd. Light Inf.
 Ives, C. R. St. J. Capt. R. H. Gds.
 Ives, G. M. Lieut. late Coldm. Gds. (11)
 JACKSON, F. G. Capt. 21st R.N.B. Fus. (11)
 Jackson, J. H. Ens. 90th L.I. (11)
 Jackson, J. M. Comr. R.N.
 Jackson, Randle Capt. 8th Huss. (11)
 Jacob, Geo. Thompson Capt. late 4th Drag. Gds. (11)
 Jacobs, M. H. Ens. Hon. Art. Co. (11)
 James, Edm. R. Capt. R.E. (11)
 James, Sir Henry FRs. Colonel R.E. Director Topographical Dept.
 James, J. W. Comr. R.N. (11)
 James, T. Lt.-Col. (ret.) Indian Army (11)
 Jarrett, C. B. Capt. (ret.) Gren. Gds.
 Jay, Jno. Livingstone, Esq. late Sec. to Governor Greenwich Hospital (11)
 Jay, W. C. Capt. Hon. Art. Compy. (11)
 Jobb, Fred. W. Major 67th Regt. (11)
 Jeffries, Edm. R. CB. Col. 5th Dep. Bu.
 Jeffries, John Lieut. (ret.) Madras Art. (11)
 Jefferson, R. Capt. Paym. h.p. Ceylon Regt. (11)
 Jekyll, E. Capt. late Gren. Gds. (11)
 Jennings, T. T. Paymaster R.N. (11)
 Jephson, J. H., MD. late Asst.-Surg. 40th Regt.
 Jerrard, F. B. J. Lieut. 8th or King's Regt.
 Jervis, E. S. Capt. 106th Bom. Light Inf. (11)
 Jervis, H. J. W. Major R.A.
 Jervis, W. S. Capt. 101st Roy. Beng. Fus. (11)
 Jervois, E. S. Capt. h.p. 7th Roy. Fus. (11)
 Jervois, W. F. Dragoon CB. Col. R.E. Dep. Director of Works for Fortifications (11)
 Jervoise, H. C. Lt.-Col. Coldm. Gds. (11)
 Jobling, F. C. Lieut. Ceylon Rifles
 Jocelyn, H. J. Strange Lieut.-Col. late Soc. Fus. Gds. (11)
 Jocelyn, H. J. Capt. late 7th Huss. (11)
 Jocelyn, R. J. O. Ens. 8th or King's
 Joddrell, F. C. Capt. late Gren. Gds.
 Johnson, Edm. Geo. Capt. Rifle Brig. (11)

Johnson, W. V. Capt. late 90th L. I.
 Johnston, Thos. H. Lt.-Col. 87th R. I. Fus.
 Johnston, W. F. Col. late Gren. Gds.
 Johnstone, Fred. E. Capt. R.N. (11)
 Johnstone, H. H. Butler Major, Scottish Borderers Mtl. (11)
 Jolliffe, H. H. Hylton Hedworth, MP. Capt. N. Som. Yeo. Cav. late Coldm. Gds.
 Jones, Alfred S. E.C. Major 13th L.I. (11)
 Jones, D. G. Lieut. R.E. (11)
 Jones, Douglas F. Lieut. R.A.
 Jones, E. M. Capt. 20th Regt. Adj. Royal Staff College (11)
 Jones, George Capt. late Montgomery Mtl.
 Jones, Inigo W. Col. late unatt. Lieut.-Col. Som. Rifle Volunteers
 Jones, John Lieut. 8th or King's
 Jones, Sir John, KCB. Col. I.F.O. Liverpool
 Jones, Wm. Capt. late 14th Huss.
 Jopp, A. A. Lieut. R.E. (11)
 KAIN, Geo. James, Capt. 1st Midldx. Eng. Vols. (11)
 Kaye, Wilkenson Lister Capt. h.p. R.A.
 Keane, G. M. Lt.-Col. (ret.) 2nd Queen's (11)
 Keane, H. H. F. Col. Dep. Adj.-Gen. Royal Engrs.
 Kearney, Chas. Lieut.-Col. late 2nd Drag. Gds.
 Keate, R. W. Esq. Gov. of Trinidad (11)
 Keating, James Singer Lieut.-Col. late Rifle Brigade (11)
 Kebbel, W. H. Capt. Roy. Arsenal Rifle Vols.
 Keirle, R. Capt. 1st Middlesex Art. Vols. (11)
 Keith, W. Capt. R.E. (11)
 Kellett, Henry, CB. Rear-Admiral
 Kelly, J. L. Capt. 62nd Regt. (11)
 Kelly, Sir R. D. KCB. Col. (ret. h.p.) 34th Regt. (11)
 Kelly, Rd. S. Capt. h.p. R.S. Corps
 Kelly, W. D. Lieut. late Roscommon Mtl.
 Kelsall, Henry Capt. 16th Regt. (11)
 Kenall, Sir Thomas KCB. Gen. Col. 63rd Regt.
 Kennard, E. H. Capt. 8th Huss. (11)
 Kennedy, G. M. Lieut. R.A. (11)
 *Kennedy, G. R. H. Col. R.A. (11)
 Kennedy, J. J. Lieut. 10th Regt.
 Kennedy, J. P. Bt. Lt.-Col. h.p. 42nd Royal Highls. (11)
 Keppel, H. H. Sir H. KCB. Vice-Adm. (11)
 Kerr, Lord Mark, CB. Col. (ret. h.p.) 13th Lt. Inf.
 Kerr, Lord Ralph D. Capt. 10th Huss. (11)
 Kerr, Robert Dundas Capt. R.E. (11)
 Key, Geo. Wm. Maj.-Gen. unatt.
 Keyes, C. P. CB. H.M. Madras Staff Corps Commandant 1st Punjab Infantry (11)

Kerworth, J. W. Capt. 48th Regt. (11)
 Kidd, John M. Lt.-Col. late 87th Royal I. Fus.
 Kidston, A. F. Lieut. 42nd Roy. Highls. (11)
 Kilcourse, Viscount late Lieut. R.N. (11)
 King, Edw. R. Col. late 36th Regt.
 King, George Major-General (ret. f.p.) 13th Lt. Inf.
 King, Geo. S. MD. Surg. h.p. late 96th Regt. (11)
 King, Geo. St. Vincent, CB. Vice-Adm. (11)
 King, H. J. Major (ret.) 3rd Buffs. (11)
 King, John R. Capt. Roy. Art.
 King, J. Hynde Col. Gren. Gds. (11)
 King, W. G. N. Capt. R.N. (11)
 Kingstone, R. N. F. CB. MP. Lt.-Col. late Scot. Fusilier Guards
 Kingston, A. B. Comr. R.N.
 Kinloch, Alex. Capt. late Gren. Gds.
 Kirby, Chas. F. Maj. and Adj. 7th Midlx. Rifle Vols. (11)
 Kirby, W. H. Col. 94th Regt. Dep.-Adjut.-General, Bombay (11)
 *Kirk, James B. Major 89th Regt. (11)
 *Kirkland, J. A. Vesey Col. 5th Fus.
 Kirkwall, G. W. H. Viscount Capt. Buckingham Yeo. Cav. late Capt. Sec. Fus. Gds.
 Kitchen, Edw. Capt. late Hon. Art. Co.
 *Kitchen, H. Lieut. 6th Regt. (11)
 Knight, H. S. Capt. 19th Regt. (11)
 *Knobel, Wm. Roberts Capt. Essex Rifles (11)
 Knollys, Sir W. T. KCB. General Col. 62nd Regt. (11)
 *Knollys, W. W. Capt. 93rd Highldrs. (11)
 Knowles, C. B. Lieut. 67th Regt. (11)
 Knox, G. W. Lt.-Col. Soc. Fus. Gds.
 *Knox, Richard Col. 18th Hussars
 Knox, T. E. CB. Col. 9th Regt. (11)
 Kyd, Hugh M. Col. (ret.) Mad. Army (11)
 LACON, W. Stirling, Esq. late H. E. I. C. S. (11)
 Lacy, G. de Lacy Capt. (ret.) 61st Regt. (11)
 Lacy, T. E. Col. Major and Superintendent of Studies Roy. Mtl. Col. (11)
 Laing, E. W. Lieut. 56th Regt. (11)
 Laing, Joseph Lieut. 14th Regt.
 Lake, H. Atwell, CB. Col. unatt. Com- missioner of Police, Dublin
 Lamb, Wm. Westworth Capt. (ret.) 7th Dragoon Gds.
 Lambert, F. W. Lieut.-Col. H.M. Beng. Army (11)
 Lambert, Sir George Robert, GCB. Adm.
 Lambert, John Arthur Major-Gen. late Gren. Gds. (11)
 Lambert, R. Capt. late 43rd Lt. Inf.
 *Lambert, Rowley Capt. R.N. (11)
 Lambton, Arthur Lieut.-Col. Coldm. Gds.
 Lambton, Francis Lt.-Col. Soc. Fus. Gds. (11)
 Lambert, Geo. F. Capt. Paym. late 30th Regt. (11)
 Lambert, James Dep.-Lieut. Bute
 Lamotte, C. W. Lt.-Col. late Unatt.

*Lamprey, Jones, MB. Surg. 67th Regt. (11)
 Lane, J. V. Asst.-Surg. 4th King's Own Langford, Hercules E. Loaz Lieut. Gren. Gds.
 Langley, G. C. Major-Gen. E. M. L. I. (11)
 Lancelles, H. H. W. MP. Maj. late 1st W. York Mtl.
 Lancelles, H. U. Viscount Lieut. Gren. Gds.
 Lancelles, John Capt. late 2nd Drag. Gds.
 Lancelles, W. Young Capt. Gren. Gds. (11)
 Laurie, J. D. Capt. 34th Regt. (11)
 Laurie, J. W. Lt.-Col. Inspecting Field Officer of Militia and Volunteers, Nova Scotia
 Laverton, F. K. Lieut. (ret.) 14th Regt. (11)
 Law, E. D. Lieut. R.N. (11)
 Law, H. H. S. Capt. late 28th Regt. (11)
 Law, Robert K. H. Major-Gen. Col. 2nd W. I. Regt. (11)
 Lawley, H. R. N. Lieut. York Hussars, late Capt. 2nd Life Gds.
 Lawlor, D. A. S. Lieut. 13th Lt. Inf. (11)
 Lawrell, Digby H. Maj. late 64th Regt.
 Lawrence, Sir Geo. St. Patrick, KCSI. CB. Lieut.-Gen. (ret.) H.M. Beng. S. Corps (11)
 Lawrence, H. J. H. Surg. Gr. Gds.
 Lawrence, John Maj.-Gen. Col. 8th Hussars
 Laws, M. R. S. Lieut. 62nd Regt. (11)
 *Layard, B. V. Lieut. 3rd W. I. Regt. (11)
 Layard, W. T. Colonel Ceylon Rifles (11)
 Leach, Edm. Capt. 50th Regt. (11)
 Leake, Arthur Maj. Roy. Engineers (11)
 Leake, Robert Martin Lt.-Gen. (11)
 Leask, J. G. MB. Staff Asst.-Surg. (11)
 Leath, John Towlerston Capt. 2nd Dorset Artillery Volunteers (11)
 Le Blanc, T. E. Capt. late 37th Regt.
 Le Cocq, H. Capt. R. A. Bombay (11)
 *Le Couteur, J. Col. Jersey Mtl. ADC. to the Queen (11)
 Le Couteur, J. H. Lt.-Col. Coldm. Gds. (11)
 Lee, J. E. Lieut. 55th Regt. (11)
 Lee-Jordan, Henry W. Lt. late 2nd Life Gds. (11)
 Leake, Sir H. J. Bt. KCB. KH. Adm.
 Leeman, Joseph Lieut. R. N. S. (11)
 Leeson, R. J. P. Capt. 34th Regt. (11)
 Lefroy, J. Henry, FRs. Brig-Gen. R.A. President Ordnance Select Com. (11)
 Le Geyt, W. F. Esq. Mtl. Storekeeper (11)
 Legge, H. H. Esq. H. Lieut.-Col. Coldm. Gds. (11)
 Legge, H. C. G. Lieut. Rifle Brig. (11)
 Legge, Compton Lieut. Oxford Mtl. (11)
 Legge, H. H. Heneage Capt. Coldm. Gds. (11)
 Legge, W. D. Capt. 5th Fus.

Leggett, R. A. Capt. 69th Regt. Major of
Brigade, Colchester (11.)
Lepg, George Cornwall Maj. 2nd Royal
Cheshire Mil. M.P. (11.)
Le Grice, Frederick Lieut. Roy. Art. (11.)
Leigh, Lord Lieut. Warwickshire
Le Mesurier, A. A. Capt. 14th Regt. (11.)
Lempriere, A. R. Capt. R.E. (11.)
Lempriere, George R. Capt. R.E. (11.)
Lempriere, Henry Major (ret.) R.A. (11.)
Lennard, H. R. Lieut. 67th Regt. (11.)
Lennard, T. G. B. Lieut. 70th Regt. (11.)
Leon, John F. Lieut. R.N.
Leonard, Peter MD. Insp.-Gen. of
Hosp. and Fleets (11.)
Le Patourel, Hy. Lieut. South Glouce. Mil.
Le Quenne, J. C. Capt. 12th Roy. Lancs
Leslie, Arthur Col. (ret. h.p.) 40th Regt.
Leslie, John H. Capt. 71st High. L. I.
(11.)
Leslie, Thomas Capt. (ret.) R. H. Gds. (11.)
Lester, C. S. Surgeon R.N.
Lewett, Theophilus J. Lieut. Stafford Yeo.
Cav. late Capt. 1st Life Gds. Lt.-Col.
late Westmeath Rifles (11.)
Lewes, W. L. Capt. 88th Regt.
Lewis, Adolphus J. Lieut. Hon. Art.
Company
Lewis, Charles Algernon Maj.-Gen. (11.)
Lewis, F. W. Lieut. R.N. (11.)
Lewis, G. O. Capt. (ret.) 7th Roy. Fus. (11.)
Lewis, H. F. P. Lieut. R.A. (11.)
Lewis, John Edw. Lt.-Col. (ret.) 68th Rt.
Lewis, J. Owen Lt.-Col. late 37th Regt.
Lewis, Robert Capt. 71st High. Lt. Inf.
Lewis, T. H. Lieut. late H. M. Indian
Navy (11.)
Leyland, T. N. Capt. late 2nd Drags.
late Lieut. 2nd Life Gds.
Liddell, Sir John MD. KCB. Dir.-Gen.
Nav. Med. Dept. (11.)
Liddon, Matthew Lieut. 8th or King's
Lidgwood, T. MB. Surg. 8th Huss. (11.)
Lillie, Sir John Scott Lt.-Col. late
Gren. Gds. (11.)
Lindsay, Sir Alex. KCB. Gen. Col.
Com. R. A. Bengal (11.)
Lindsay, Hon. C. H. M.P. Lieut.-Col. 11th
Middlx. Rifle Vols. late Lieut.-Col. Gren.
Gds. (11.)
Lindsay, G. H., Esq. late Capt.
Lindsay, Henry Gore Lt.-Col. Breck-
nock Rifle Vols. late Capt. Rifle Brigade
Lindsay, How. James Maj.-Gen. late Gren.
Gds. Cong. Division of Guards (11.)
Lindsay, Robert J. Lloyd E. C. MP. Lieut.-
Col. Hon. Art. Co. late Lieut.-Col. Scots
Fus. Gds. (11.)
Linton, J. K. Master (ret.) Indian Navy (11.)
Listowell, Earl of Capt. late Sco. Fus. Gds.
Litchfield, E. F. Capt. H. M. 5th Beng.
N.I. (11.)
Litchford, E. B. Lieut. late 48th Beng. N.I.
Littledale, Edward Major late 1st Roy. Drags.
Lloyd, G. W. Lieut. 16th Regt. (11.)

Lloyd, Francis T. Lieut. Roy. Art. (11.)
*Lloyd, Thomas Capt. 35th Regt. Sussex
Regt.
Lloyd, William MD. Staff-Surg. H. M.
Indian Army
Lloyd, Rev. W. Y. M.A. FRGS. Naval Inst.
R.N. (11.)
Loch, Geo. Capt. late Duke of Lancaster's
Yeo. Cav.
Lochner, Christopher P. Capt. 36th Middlx.
Rifle Vols. (11.)
*Lock, A. C. Knox Lt.-Col. 50th Regt. (11.)
Lock, F. E. Major 15th Regt.
Lock, H. Capt. 108th Mad. Inf. (11.)
Lockhart, Arch. Inglis, CB. Col. (ret.)
h.p.) 92nd Highs.
Lockhart, W. E. Capt. 74th Highs. Dep.
Asst. Adj.-Gen. Aldershot (11.)
Loock, Herbert Capt. Roy. Eng. (11.)
Lodder, Henry Coll. Lt.-Col. late 47th
Regt. (11.)
Lodge, W. R. Capt. (ret.) Indian
Army (11.)
Logan, T. G. MD., CB. Director-Gen. of
the Army Medical Department (11.)
Logie, Cosmo Gordon MD. Surg.-Major
R. H. Gds. (11.)
*Lombard, G. C. S. Capt. and Adj. Civil Ser-
vice Vols. (11.)
Long, Chas. P. Major 13th Lt. Inf. (11.)
Longden, Henry Errington, CB. Col. (ret.
h.p.) 10th Regt. Adj.-Gen. Bengal (11.)
Longfield, F. Capt. 8th or King's (11.)
Longford, The Earl of, KCB. Col. unatt.
Under Secretary of State for War
Longmore, Thos. CB. Dep. Insp.-Gen. of
Hosp. and Prof. Army Med. School at
Netley (11.)
Loraine, Sir Lambert, Bart. Comm. R.N.
(11.)
Loring, Wm. CB. Rear-Adm. (11.)
Lovell, John Williamson, CB. Lieut.-Col.
Comm. R.E. China and Hong Kong (11.)
Low, Alex. CB. Col. (ret.) 4th Light Drags.
Low, Sir John, KCB. Gen. H.M.
Madras Army (11.)
Lowe, A. Rear-Adm.
*Lowe, E. W. D. CB. Col. 86th Regt. (11.)
Lowe, R. H. C. D. Lt.-Col. Gren. Gds.
Lowe, W. D. Capt. unatt.
Capt. 47th Regt.
*Lowry, R. Wm. Major Westmeath
and Cumberland Yeomanry Cavalry (11.)
Lowther, H. MP. Major Westmeath
and Cumberland Yeomanry Cavalry (11.)
Luard, C. E. Capt. R.E. (11.)
Luard, John Lieut.-Col. late 30th Regt.
Madras Army (11.)
Luard, R. G. A. Colonel h.p. late 62nd
Regt. (11.)
Lucan, G. E. EARL of, KCB. Gen. Col.
1st Life Gds.
Lucas, W. Dep. I. Gen. Roy. Mil. Asylum,
Chelsea (11.)
Ludlow, John Maj.-Gen. (ret.) Beng.
Army (11.)
Lumsden, H. W. Capt. R. A. Madras (11.)
Lushington, Sir Stephen, KCB. Adm. (11.)

Lynch, Staunton G. S. Lieut. 14th Huss.
(11.)
Lynch, W. W. Major 2nd Queen's Major
of Brigade, Chatham (11.)
Lynn, James Lt.-Col. (ret.) R.E.
Lyon, Francis Capt. R.A. (11.)
Lysons, D. CB. Col. Unatt. (11.)
MABERLY, Wm. Leade Lt.-Col.
unatt.
Macbean, Fred. KH. Lt.-Col. late 84th
Regt.
McBean, Wm. Lieut.-Col. (ret.) 1st W. I.
Regt. (11.)
McGwire, E. T. St. L. Major 1st Royal
Regt. (11.)
McCleverty, Wm. A. Lieut.-Gen. Comm.
the Forces, Madras (11.)
McClure, Sir Rob. J. Le M. Kt. CB. Rear-
Admiral (11.)
McCoy, T. R. Capt. late 65th Regt.
McCrea, J. D. Capt. R.N. (11.)
McCrea, Joseph Surg. R.N.
Macdonald, A. J. J. Major late 96th Regt.
(11.)
*McDonald, A. M. Col. 7th Rifle Dep.
Batt. Winchester (11.)
McDonald, P. Capt. late 48th Middlx. Rifle
Vols. (11.)
Macdonald, N. Captain 5th Fus. (11.)
Macdonald (of Clanranald), Reginald J. J.
G. Capt. R.N. (11.)
Macdonnell, H. J. Lieut. 12th Regt. (11.)
Macdougall, Patrick L. Col. unatt. (11.)
MacGauran, F., Esq. Clerk War Office
MacGregor, Charles M. Lieut. H.M. Bengal
Staff Corps (11.)
*MacGregor, Sir Duncan, KCB. Gen. (11.)
*MacGregor, H. G. Lieut. 17th Regt. (11.)
MacGree, Sir Chas. Bart. Army Agent
McIlroy, J. D. Insp.-Gen. of Hospitals
(11.)
Macintosh, A. Fisher KH. Gen. Col. 92nd
Highs. (11.)
Mackay, H. A. Lieut. Roy. Art. (11.)
Mackay, Henry Fowler Capt. unatt.
Mackenzie, J. D. Capt. (h.p.) 14th Regt.
(11.)
Mackenzie, Kenneth D. CB. Col. late 92nd
Highs. Dep. Adj.-Gen. Dublin (11.)
Mackenzie, Sir Wm. Bart. Dep. Lieut.
Rossire (11.)
McKillop, H. F. Capt. R.N. (11.)
McKinnay, John Lieut. 94th Regt.
McKinnon, I. B. Capt. R.N. (11.)
McKinnon, W. A. CB. Staff Surgeon-Major
Capt. 3rd Buffs (11.)
McLaughlin, Edw. Capt. Royal Art. (11.)
McLean, Allan Lieut. 1st Royal Dr. (11.)
McLean, A. T. Lieut.-Gen. Col. 13th Huss.
(11.)
*Maclean, F. D. Major 13th Huss.
Maclean, P. Col. Roy. Art.
Maclean, W. C. MD. Dep. Insp. Gen. Prof.
of Medicine, Fort Pitt (11.)
MacLeod, D. Maj.-Gen. Col. H.M. 4th Mad.
Light Cav. (11.)
MacLeod, Norman, Esq. late Lt. Hon. Art. Co.
MacLiver, David Lieut. 2nd Son. Mil. (11.)
McMaster, V. M. A. Surg. MD. 18th Huss.
(11.)
*McMurdy, W.M.S. CB. Col. Brig.-Gen.
Comm. 1st Inf. Brig. Curragh A.D.C. to
the Queen (11.)
McNair, J. A. Fred. Capt. Roy. Art.
Madras (11.)
McNamara, Sir Burton, Kt. Vice-Adm.
Macnamara, Fras. Lt.-Col. Clare Mil.
Macnamara, F. R. Lieut. 93rd Highs. (11.)
Macnoll, Hector A. Capt. Edin. or Queen's
Regt. L.I. Mil. (11.)
Macpherson, Evan Major late 14th Light
Dragoons (11.)
Macpherson, G. G. Capt. Coldm. Gds. (11.)
Macquene, James D. Capt. unatt. (11.)
Magian, Wm. Capt. 49th Regt. (11.)
Magill, J. McG. Capt. (ret.) 2nd Queen's (11.)
Mahon, Viscount Capt. Gren. Gds. (11.)
Mainsbury, E. B. Capt. R.E. (11.)
Maitland, C. I. B. Col. (ret. h.p.) Gren. Gds.
Majendie, Vivian D. Capt. R.A. Asst.
Sup. Royal Laboratory, Woolwich (11.)
*Malan, C. H. Capt. 75th Regt. (11.)
Malcolm, G. A. CB. Lieut.-General Col.
105th Madras Light Infantry (11.)
Malcolm, G. J. Capt. R.N. (11.)
Malcolm, R. Major (ret. h.p.) R.E. Bombay
Malcolm, W. Lieut. 10th Regt.
Mallet, C. St. Lo. Lt.-Col. late Sco. Fus. Gds.
Mallet, H. C. E. Lt.-Col. Gren. Gds.
Mallet, Hugh Capt. late 4th Lt. Drags. (11.)
Malins, Sydneyham Capt. 94th Regt. (11.)
Malins, W. D. Capt. Scottish Borderers
Mil. (11.)
Man, H. Garnet Lt.-Col. late 54th Regt.
Major London Eng. Vols. (11.)
Man, J. Alex. Lieut. Royal Aberdeen High.
Mil. (11.)
Manby, Charles, FRS. Lt.-Col. Eng. and
Railway Staff Corps Vols. (11.)
Mangles, W. H. Capt. R.E. Middlx. Mil.
late Capt. 50th Regt. (11.)
Mann, J. B. Colonel (ret.) 63rd Regt. (11.)
Manners, A. C. Lieut. 18th Royal Irish
Manners, Lord Geo. John, MP. Col. (ret.)
R.H. Gds.
Mansfield, Sir W. R. GCSI. KCB. Gen.
Col. 38th Regt. Com.-in-chief, East Indies
Manton, A. R. Col. H.M. Bom. Army (11.)
March, Wm. H. Maj.-Gen. (ret.) R.M.L.I.
(11.)
Margesson, W. G. Major 80th Regt. (11.)
Margison, John Capt. late 48th Regt. (11.)
Marshall, H. R. Maj. late 1st Royals (11.)
Marshall, W. T. Capt. late Coldm. Gds.
Marriott, H. Christopher Maj. (ret.) 60th
Roy. Rifles (11.)
Marryat, J. H. Capt. R.N.
Marsden, Richard Lieut. R.N.R. (11.)
Marsh, Sir Henry D. Bart. Maj. late 3rd
Drug. Gds.
Marsh, J. Paym. R.N. (11.)
Marsh, Robert Maj. late 24th Regt.
Marsh, W. D. Capt. Roy. Eng. (11.)
E 2

Marshall, F. G. Lieut. 86th Regt.
 Marten, Francis Capt. R.N. (11)
 Marten, Thomas, KH. Lieut.-Gen. Col. 6th
 Inniskilling Drags.
 Martin, Edw. Lieut. late 28th Mad. N. I.
 (11)
 *Martin, Thos. Lt.-Col. 4th King's Own (11)
 Martin, Sir Wm. F. KCB. Adml. Commander-in-Chief Devonport (11)
 Martyn, Cecil E. Lieut. (ret.) 6th Drag. Gds.
 (11)
 Martyn, F. M. Col. (ret.) 2nd Life Gds.
 Marvin, Wm. Major late Roy. Art. (11)
 Massey, Hon. Lionel E. Lieut.-Col. Seco.
 Fus. Gds.
 Massey, Hon. N. H. C. Col. late 4th
 W. Y. Mil.
 Matheson, Thomas Maj.-Gen. (11)
 Mathew, B. H. Capt. R.E. Bombay (11)
 Mathew, W. H. Capt. 45th Regt.
 Matson, E. Major-Gen. R.E.
 Matthews, F. P. Capt. late 1st Sussex Rifle
 Vols. (11)
 Matthews, Henry G. Ens. late 44th Regt.
 Maude, Hon. Francis Capt. R.N. (11)
 Maude, G. A. CB. Lieut.-Col. (ret.) R.H.A.
 Maunsell, E. E. Capt. R.N. (11)
 Maunsell, F. Lieut.-Gen. Col. 85th Regt.
 Maunsell, F. R. Maj. R.E. Beng. (11)
 Maxse, Fred. A. Capt. R.N.
 Maxse, H. F. B. Lt.-Col. late Coldm. Gds.
 Maxwell, J. Balfour Vice-Admiral (11)
 May, Allan Capt. h.p. Roy. Eng. (11)
 Maycock, J. G. Major 14th Regt. (11)
 Mayne, J. O. Capt. R.E. Madras (11)
 *Mayne, Rich. C. Capt. R.N. (11)
 Mayo, John H. Lieut. late West Norfolk Mil.
 (11)
 Mayo, W. R. Esq. Dep. Asst. Sup. of Stores
 (11)
 Mayow, George Wynell, CB. Col. h.p. unatt.
 Dep. Quar.-Mas. Gen. Ireland (11)
 Meade, B. R. Major 8th or King's (11)
 *Meade, Jas. Capt. Ceylon Rifles (11)
 Meane, John Surg. 78th Highrs.
 Meehan, Geo. Walker Lieut.-Col. unatt.
 Melgund, G. J. Viscount Lieut. Scots
 Fus. Gds. (11)
 Mellor, A. Lieut. 8th or King's
 Melville, Hon. N. L. Capt. (ret.) 25th K.O.
 Borderers
 Menda, Geo. C. Capt. R.N.
 Menda, Herbert Col. (ret.) 2nd West I. R.
 Menda, J. D. Major 2nd W.I. Regt.
 Menda, W. R. CB. Capt. R.N. Director
 of Transports, ADC. to the Queen (11)
 McCreer, Alex. Cavalie Gen. Col. Comm.
 R.A.
 Merrewether, W. L. CB. Lieut.-Col. H.M. Bo.
 Staff Corps, Resident at Aden (11)
 Methuen, F. H. P. Lord Lt.-Col. R. Wilts.
 Mil. ADC. to the Queen
 Methuen, Hon. Paul S. Capt. Seco. Fus. Gds.
 Gds.
 Merrick, Aug. W. H. Lieut.-Col. Seco. Fus.
 Gds.
 Michell, Sir John, KCB. Lt.-Gen. Col. 86th
 Regt. (11)

Michell, J. Edward Lieut.-Col. R.H.A. (11)
 Middleton, F. D. Major 29th Regt. (11)
 Middleton, Sir George N. Broke, Bart. CB.
 Rear-Admiral (11)
 Middleton, John Major late Rifle Brigade
 (11, 12)
 Middleton, W. G. Lieut. 4th King's Own (11)
 Luns. (11)
 Middleton, W. H. Hon. Corps Gent.-at-
 Arms
 *Mildmay, Sir Henry, Bart. Lt.-Col. Hants.
 Yeo. Cav. (11)
 Mildmay, H. A. St. J. Capt. Rifle Brigade (11)
 Miles, H. R. W. Lieut. 5th Fus. (11)
 Miller, J. A. Capt. Royal Engs. (11)
 Miller, D. Capt. R.N. (11)
 Miller, Frederic, C. Lt.-Col. R.A. Pro-
 fessor of Military History, Royal Mil.
 Acad. Woolwich (11)
 Miller, G. M. Major 79th Highrs. (11)
 Miller, Robert B. Capt. R.N. (11)
 Miller, T. C. Lieut. 43rd Regt. (11)
 Miller, William V. Paym. R.N. (11)
 Miller, W. H. CB. Maj.-Gen. (ret.) Mad.
 Army (11)
 Milles, Hon. G. W. Lt.-Col. East Kent Yeo.
 Cav.
 Mills, C. J. C. Col. (ret.) 94th Regt.
 Mills, Wm. Staff Comm. R.N. (11)
 Milman, G. A. Lieut.-Col. Roy. Art. (11)
 Milne, Sir Alex. KCB. Vice-Admiral Lord of
 the Admiralty (11)
 Minchin, F. C. Lt.-Col. late H.M. Bengal
 N.I. (11)
 Minet, C. W. Esq. late W. Kent Yeomanry
 Minty, R. G. P. Lieut. 12th Hants Rifle
 Vols. (11)
 Mitchell, T. J. Capt. (ret.) 1st Drag. Gds. (11)
 Moffat, Bowland Col. h.p. unatt.
 Moffatt, K. M. Lt.-Col. Royal Can. Rif. (11)
 Molony, C. M. Capt. R.A. (11)
 Molony, W. M. Maj. late 22nd Regt. (11)
 Moncrieff, Alex. Capt. Edinburgh Art. M.
 (11)
 *Moncrieff, Geo. H. Lt.-Col. Scots Fus.
 Gds. (11)
 Moncrieff, L. N. Lieut. R.N. (11)
 Monro, Jas. MD. Surg.-Maj. late Coldm. Gds.
 Monson, Hon. D. J. Capt. (ret.) 96th Regt.
 Montgomerie, A. W. Capt. 20th Huss. (11)
 Montgomerie, Hon. G. A. Lieut. Gren.
 Gds. (11)
 Montgomerie, Sir Patrick, KCB. Gen.
 R.A. Madras
 Montresor, Henry Edw. Lieut.-Col. (ret.)
 Gren. Gds.
 Moore, A. G. Montgomery Major 4th Huss.
 Moore, H. CB. Lt.-Col. (ret.) Beng. Army
 Moore, H. C. Lieut. R.E. Bombay (11)
 Moore, John C. Capt. Rifle Brigade (11)
 Moore, R. C. CB. Major-Gen. Roy. Art.
 Madras (11)
 Moore, Thomas C. C. Maj.-Gen. R.M.L.I.
 Morant, W. Sam. Capt. late Gren. Gds. (11)
 Moray, H. E. H. Drummond Lieut. Scots
 Fus. Gds.

Moreland, Jos. Capt. late Hon. Art. Comp.
 Moreton, Hon. Algernon T. Capt. late 8th
 Hussars.
 Morgan, Horatio Capt. and Paym. late
 43rd Light Infantry (11)
 Morrell, H. Capt. Essex Rifles (11)
 Morris, Sir Edm. F. KCB. Lieut.-General
 Col. 40th Regt.
 Morrison, W. L. Lieut.-Col. R.E. (11)
 Morse, H. B. Dep. Com. General (11)
 Morton, C. Brooke Lieut.-Col. (ret.)
 Bombay Army
 Morton, G. de C. Ens. 6th Regt. (11)
 Moseley, W. H. Capt. 60th Roy. Rifles (11)
 Mostyn, Hon. M. H. Lieut. and Paym. 21st
 R. N. H. Fus.
 Mostyn, Hon. Roger Lt.-Col. Seco. Fus. Gds.
 Mount-Charles, G. H. Earl of Col. 1st
 Life Gds.
 Mountain, E. F. Col. Roy. Art. (11)
 Muncaster, Lord Cornet Yorks. Yeo. Cav.
 late Capt. Rifle Brig. (11)
 Mundy, A. M. Capt. late Notts. Mil.
 Mundy, Sir George Rodney, KCB. Vice-Ad.
 Com-in-Chief North Amer. and W. I.
 Munro, Campbell Capt. late Gren. Gds.
 Murchison, Rod. M. Capt. late 50th Regt.
 Mure, Wm. Lt.-Col. (ret.) Seco. Fus.
 Gds. (11)
 Murray, Aug. Geo. E. Lieut. R.N.
 Murray, John Lt.-Col. late Gren. Gds. (11)
 Murray, John Commr. R.N. (11)
 Murray, Lord J. C. P. Col. (ret.) Seco.
 Fus. Gds. (11)
 Murtogh, John Surg. h.p. 6th Regt.
 Mush, John Lieut. 17th Regt. (11)
 Mussenden, W. Capt. 8th Hussars (11)
 Mylius, F. J. Capt. Paym. 61st Regt. (11)

NANGLE, Henry Capt. 15th Regt. Maj.
 of Brigade Curragh (11)
 Nangle, W. C. Capt. R. A. Dep.-Asst.
 Quartermaster-General, Woolwich (11)
 Napier, Geo. T. C. CB. Major-Gen. (11)
 Napier, Gerard John Capt. R.N. (11)
 Napier, R. H. Lieut. R.N. (11)
 Nares, G. S. Commr. R.N. (11)
 *Nason, Jno. Lt.-Col. 11th Dep. Batt.
 Gosport (11)
 Nelson, Thos. MD. Staff Surg. R.N.
 Neville, Edward Lieut.-Col. (ret.) Seco.
 Fus. Gds.
 Newdigate, Edw. Col. late Dep. Batt. Asst.
 Adj.-General, Aldershot (11)
 Newdigate, F. W. Lt.-Col. Staff, Rifle Volun-
 teers, late Lieut.-Col. Coldm. Gds. (11)
 Newton, C. E. Maj. Derbyshire Rifle Vols.
 (11)
 Newton, Samuel Chas. Lieut. (ret.) R. H.
 Gds. (11)
 Newton, W. E. Lt. 1st Mid. Eng. Vols. (11)
 Newton, Wm. Sam. Major-Gen. h.p. Coldm.
 Gds.
 Nicholls, G. Capt. Comdt. 27th Bombay
 or 2nd N. I. Belooch Regt. (11)
 Nicholls, Henry Maj. (ret.) 94th Regt.
 Nicholson, Henry F. Commr. R.N. (11)

Nicholson, Lethian, CB. Col. R. E. (11)
 Nicholson, S. J. Capt. R.I. (11)
 Nicoll, Chas. R. Surg.-Maj. (ret. h.p.) Gren.
 Gds.
 Nicolls, Geo. Green Lt.-Col. late Gren. Gds.
 Nicolson, Sir Fred. W. E. Bart. CB., Rear-
 Admiral (11)
 Noble, Andrew Capt. late R.A.
 Noble, Jno. Geo. Cap. 1st R. Lan. Mil. (11)
 Noble, W. Capt. late Q.O.L.I. Mil. (11)
 Nolloth, Edward, MD. Staff Surg. R.N. (11)
 Norbury, T. C. N. Capt. late 6th Drag. Gds.
 Norcott, Wm. S. R. CB. Col. unatt. (11)
 Norman, Henry Lieut. late 10th Hussars
 Norman, H. W. CB. Col. H. M. Beng. Staff
 Corps, Seco. to Government Mil. Dept. ADC.
 to the Queen (11)
 *Norris, Geo. Goodwin Capt. 2nd Warwick
 Mil. (11)
 North, C. F. Maj.-Gen. (ret. f.p.) R.E. (11)
 *North, C. Napier Col. h.p. 60th R. Rifles
 (11)
 North, J. S. D. Col. late Q.O.L.I. Mil. MP.
 (11)
 North, R. M. Maj. (ret.) Ind. Army (11, 104)
 North, Hon. W. H. J. Lieut. Oxford Yeo.
 Cav. late 1st Life Gds.
 Northey, E. R. Capt. late 52nd L. I. (11)
 *Northumberland, Duke of Lt.-Col. North.
 Mil.
 Nott, A. H. Capt. late H.M. Indian Navy
 Nugent, C. B. P. N. H. Lieut.-Col. R.E.
 (11)
 Nugent, C. Edward Lieut. late 53rd L.I.
 Nugent, Sir G. E., Bart. Lt.-Col. late
 Gren. Gds. (11)
 Nugent, St. G. M. Lieut.-Col. h.p. unatt.
 (11)
 Nuthall, W. F. Brigadier-Gen. H.M. Beng.
 N.I. (11)

OAKLEY, Geo. J. A. Capt. (ret.) 68th
 L. I. (11)
 O'Brien, Donatus Capt. late R.S.C.
 O'Brien, H. H. Donatus Major (ret.) R.A.
 O'Brien, J. T. N. Major 20th Regt. (11)
 O'Brien, R. S. Maj. Staff Officer of Penrs.
 (11)
 O'Byrne, Robert, Esq. FRGS. Navy
 Agent (11)
 O'Connor, L. S. CB. Maj.-Gen. Staff,
 Jamaica
 O'Flaherty, Rich. James Dep. Insp.-Gen.
 of Hospitals (11)
 Ogilvie, Graham Capt. R.N.
 Ogilvie, Alex. MD. h.p. Dep.-Insp.-Gen.
 Ordn. Med. Dep.
 Ogilvy, Thomas Col. late 2nd Life Gds. (11)
 O'Hear, J. B. Capt. late 25th Regt. K. O.
 Bords. (11)
 Oldfield, Chas. J. Lt.-Col. (ret.) Ben. Army
 *Oldfield, Richd. Capt. Royal Artillery (11)
 Oldfield, R. B. Capt. R.N. (11)
 Oldham, H. H. Lieut. 48th Regt. (11)
 Ommamney, M. F. Lieut. R.E.
 Ommamney, Octavius Major Surrey Rifle
 Volunteers (11)

Onslow, Arthur Edw. Lieut.-Col. late Soc. Fus. Gds.
Ord, Harry St.-G. CB. Col. R.E. Gov. and Commander-in-Chief, Singapore
Ord, W. Redman Lieut.-Gen. Col. Comm. R.E.
Orkney, T. J. EARL of late 9th Royal Lancers, and late Capt. Comm. Bucks Yeomanry
Orlebar, Orlando Comm. R.N.
Ormsby, Arthur Capt. unatt.
Ormsby, John William Major-Gen. R.A.
Ormsby, Thomas Capt. late 92nd Highls.
Osborne, Eric W. Lieut. 1st W. I. Regt. (11).
Ostrehan, E. S. Capt. H. M. Bomb. Staff Corps
Otway, Charles Maj.-Gen. R.A.
Ouchterlony, T. H. Capt. R.A.
Owen, C. A. Lieut. 107th Beng. Inf.
Owen, C. H. Lieut.-Col. R.A. Prof. of Art. Roy. Mil. Academy, Woolwich (11).
PAGET, C. H. M. Lieut. 20th Regt. (11).
Paget, Lord Geo. Maj.-Gen. Inspe.-Gen. of Cavalry (11).
Paget, G. E. Cornet Leicesters Yeo. Cav. late Lieut. R. H. Gds. (11).
Paget, H. E. Lieut. 87th Roy. Irish Fus. (11).
Paget, Joseph Capt. Derby Mil. (11).
Paget, Patrick L. C. Lt.-Col. late Soc. Fus. Gds.
Pakenham, C. W. Capt. Gren. Gds.
Pakington, Right Hon. Sir John S. Bart. GCB. MP. Secretary of State for War
Palk, Lawrence H. Lieut. Soc. Fus. Gds. (11).
Palliser, E. M. Capt. (ret.) 7th Huss. (11).
Palliser, Wm. Maj. unatt. late 18th Huss. (11).
Palmer, Frederick Capt. Soc. Fus. Gds.
Palmer, John Capt. R.N. (11).
Palmer, Roger Lieut.-Col. 2nd Life Guards
Palmer, John P. Comm. R.N. (11).
Panther, H. G. Major 22nd Regt. (11).
Parish, H. Woodbine Lieut.-Col. 45th Regt. (11).
Parke, Wm. CB. Col. h.p. 53rd Regt. (11).
Parker, Sir Chas. C. Bart. Admiral
Parker, C. W. Capt. 4th Royal Middx. Mil. late 69th Regt.
Parker, Francis Cornet 12th R. Lancers (11).
Parker, Richard Major-Gen. (11).
Parby, Geo. Lt.-Col. late 4th Regt. (11).
Parby, Wm. Major-Gen. Col. 21st Huss. (11).
Parnell, A. Capt. R.E. (11).
Parnell, Hon. Hy. W. Lieut. late R.N. (11).
Parnell, W. H. Capt. Gren. Gds.
Parr, Henry H. Ens. 13th Light Inf. (11).
Parrott, J. E. T. MD. h.p. R. A. Insp. Gen. of Hospitals
Parry, F. W. B. Lieut. 22nd Regt. (11).
Parsons, L. H. H. Lieut. R.H.A. (11).
Parsons, Wm. Lieut. R.N. (11).
Pasley, Chas. Lieut.-Col. R. E. Superintendent of Works Chatham Dockyard (11).
Pasley, M. W. B. S. Capt. and Asst. For- far and Kincardine MB. (11).

Pasley, Sir Thos. Sabine, Bart. Adm. Com- mander-in-Chief, Portsmouth (11).
Patten, Right Hon. John Wilson, MP. Col. 3rd Roy. Lanc. Mil. ADC. to the Queen
Patten, Eustace J. Wilson Capt. 1st Life Gds.
Patterson, David Aikman Capt. Payn. 27th Regt.
Patterson, W. T. L. Col. 91st Highls. (11).
Pattison, H. C. Capt. 22nd Regt.
Patton, John Major-Gen. Col. 47th Regt. (11).
Paty, Sir Geo. Wm. KCB. KH. Gen. Col. 70th Regt.
Paulet, Lord Frederick CB. Major-Gen. (11).
Paxton, A. F. Lieut. h.p. 11th Huss. (11).
Payn, Wm. CB. Col. 72nd Highls. (11).
Payne, J. B. Capt. 4th Middlx. Art. Yob. (11).
Payne, W. R. Comm. R.N.
Paynter, John Capt. (ret.) Scot. Fus. Gds.
Peacock, Geo. late Master R.N. (11).
Pearce, Fras. G. Paymr. R.A. (11).
Pearse, Geo. G. Major Roy. Art. (11).
Pearson, C. K. Lieut.-Col. 3rd Buffs (11).
Pearson, F. B. Capt. late 1st R. Cheek. Mil. (11).
Pearson, R. L. O. Lieut.-Col. Gren. Gds. Assistant Military Secretary Gibraltar
Peel, A. Lennox Major 52nd Lt. Inf.
Peel, Cecil Lennox Capt. Soc. Fus. Gds. (11).
Peel, Right Hon. Jonathan Lieut.-Gen. MP.
Peel, J. Floyd Capt. late Soc. Fus. Gds.
Pellow, Pownoll W. Comm. R.N. (11).
Pemberton, O. P. Capt. Soc. Fus. Gds.
Penfold, F. Paym. R.N. (11).
Pennant, A. H. Douglas Lieut.-Col. Gren. Gds.
Pennefather, Sir J. Lynght, GCB. Lt.-Gen. Col. 22nd Regt.
Pennefather, R. D. Major R. Kent Mil.
Pennefather, R. P. Lieut. R.E. Madras
Pennethorne, L. P. Lieut. R.A. (11).
Pennington, Edward, Esq. War Office (11).
Pennington, R. Capt. late Camb. ME.
Penrhy, Lord E. G. D. Col. Comd. Royal Carnarvon Rifles Mil.
Peppy, Edm. Lieut. late 1st Drags.
Perceval, H. L. Comm. R.N. (11).
Perceval, Jno. J. Lt. (ret.) 17th Regt. (11).
Perceval, Spencer Major-Gen.
Percival, Ernest A. Capt. late 11th Huss. (11).
Percy, Hugh Mauners, Lord, &c. MP. Maj.-Gen. (ret. h.p.) Gren. Gds.
Perigal, Fred. Esq. Admiralty (11).
Pester, Henry Lieut.-Gen. R.A.
Petley, Rob. Major h. p. 24th Lt. Drags. Col. Sandhurst (11).
Petre, John Barney Capt. late 1st Drags. Col. Sandhurst (11).
Petrie, Martin Major 97th Regt. (11).
Petrie, Samuel CB. late Direc. of the Com- missariat (11).
Peyton, Sir Algernon W. Bart. Capt. 1st Life Gds.
Peyton, Francis Col. 98th Regt. (11).

Peyton, T. G. Major Hereford Mil. (11).
Phayre, R. Lieut.-Col. H.M. Bom. Staff Corps, Quarter-Master Gen. Bombay (11).
Phibbs, Richd. Major 4th Roy. Lanc. Mil. (11).
Phillips, Geo. Capt. R. E.
Phillips, George Capt. 2nd Queen's (11).
Phillips, N. G. Capt. late 47th Regt. Hon. Corps Gent.-at-Arms (11).
Phillimore, Wm. Brough Capt. late Gren. Gds.
Phillips, Henry Lieut.-Col. late 3rd Lt. Drags. (11).
Phillips, Sir B. T. Maj.-Gen. (11).
Phillips, Courtenay Maj. late 15th Huss.
Phillips, E. B. Capt. late 53rd Regt.
Phillips, L. Guy Lieut.-Col. Gren. Gds. (11).
Phillips, Paul Winsloe Lieut.-Col. R.A.
Phillips, R. N. Major-Gen. unatt.
Phillipps, W. C. Capt. Royal Engns.
Philpot, John T. Esq. Paymaster-Gen. Office
Philpot, Philip Major 28th Regt. (11).
Phipps, C. E. Capt. 23rd Regt. (11).
Phipps, B. W. Capt. R.A. (11).
Piskewick, Chas. H. S. Capt. Wilts. Rifle Yob. late Capt. 2nd Som. Mil.
Pischook, Thomas Paymaster R. N.
Piers, C. B. Capt. and Paymaster R.A.
Pilgrim, J. Bunce Lieut.-Col. (ret.) 8th or King's
Pilkington, J. B. Lieut. (ret.) Ceylon Rifle Regt.
Pilleau, H. G. Lieut. R.E. (11).
Pinder, Geo. Col. (ret.) f. p. (11).
Pipon, J. K. Col. h. p. 68th Regt.
Pitt, W. L. Lieut. 56th Regt. (11).
Pittman, Frank Asst.-Paym. R.N. (11).
Plasket, W. A. H. Capt. 24th Regt. (11).
Platen, Corvyr late R.N. (11).
Plummer, H. Capt. 7th Roy. Fus. (11).
Pockington, E. H. P. Lieut.-Col. unatt. Member of Council of Education
Pockington, F. Capt. 5th Fus.
Pockington, G. H. Major 18th R. Irish
Pole, C. V. N. Major Cape M. Rifles (11).
Pole, Edward Major-Gen.
Pole, E. A. Capt. 12th Royal Lancers
Pollard, Chas. Capt. R.E. Bengal (11).
Pollard, H. W. Lieut. 67th Regt. (11).
Ponsonby, A. E. V. Lieut.-Col. 12th Regt. (11).
Ponsonby, Hon. Ashley J. G. Capt. late Gren. Gds.
Pookey, Henry Capt. 2nd Cheshire Art. Yob. (11).
Pope, James S. Esq. late War Office
Popham, Brunswick Vice-Admiral
Porrett, Robert, Esq. late Ord. Dep. (11).
Portal, Robert Lt.-Col. late 6th R.I. Lan- cers
Porter, Henry Esq. Maj.-Gen.
Porter, Whitworth Lt.-Col. Roy. Engi- neers Prof. of Fortn. R.M. Coll. Sand- hurst (11).
Portman, Hon. W. H. B. Col. West Som. Yeo. Cav. MP. (11).
Pote, C. St. Clair Ens. Cape Mtd. Rifles (11).
Powell, H. F. Capt. late Ceylon Rifle Regt.
Powell, R. A. CB. Capt. R.N.
Powell, Thomas Harcourt Capt. late Soc. Fus. Gds.
Power, W. J. Lieut. 6th Enniskilling Drags. (11).
Power, Sir W. T. J. KCB. Com. General- in-Chief
Powys, Charles Esq. Comm. R.N. (11).
Powys, Hon. Charles J. Fox Cap. 69th Regt.
Powys-Keck, C. H. G. Lieut. 60th Roy. Rifles (11).
Powys-Keck, H. L. Lieut. Leicestershire Yeo. Cav. (11).
Powys-Keck, T. B. Lieut. 60th Roy. Rifles (11).
Pratt, Lord G. M. Capt. Gren. Gds. (11).
Pratt, Robert, CB. Col. 23rd R.W. Fus. (11).
Pratt, Sir Thomas Simpson, KCB. Lieut. Gen. Col. 37th Regt.
Prendergast, G. A. Capt. Bengal Staff Corps, Commandt. 15th Beng. Cav. (11).
Prennis, W. T. Capt. late 2nd R.N.B. Drags. (11).
Prescott, A. S. E. Asst. Surg. R.A. (11).
Preston, H. E. W. Lieut. 56th Regt. (11).
Price, Edward, CB. Col. R.A. (11).
Price, G. E. Lieut. R.N. (11).
Price, T. C. Lieut. R.A. (11).
Pritchard, A. Lieut.-Col. H.M. Madras Staff Corps (11).
Pringe, J. H. Lt.-Col. Comm. 6 Lanc. Mil. late Soc. Fus. Gds.
Prior, A. de M. Lieut. R.A. (11).
Prior, H. M. Esq. late Ordn. Dep. (11).
Pritchard, G. D. Major R.E. (11).
Prowse, J. P. Comm. R.N. (11).
Pryce, Josiah Capt. late Glamorganshire Mil.
Prynn, John B. Major R. M. L. I. (11).
Puckle, J. Major H.M. Mad. Staff Corps
Pullen, W. J. S. Capt. R.N. (11).
Purcell, Edward Admiral (11).
Purcell, Geo. J. G. Lieut. R.N. (11).
Pursford, J. Esq. late Ensign 103rd Royal Bombay Fusiliers
Pyo, Kellow Chas. Lieut. R.E. (11).
QUIN, Michael Vice-Adm. (11).
Quin, Richard R. Capt. R.N.
RADCLIFFE, William Rear-Adm.
Raikes, P. B. Capt. R.A.
Raines, Julius A. R. CB. Col. 16th Regt.
Raines, J. R. Lieut.-Col. late 48th Regt.
Rainier, Daniel Maj.-Gen. Commg. Div. at Lahore
Rains, S. W. Dep. Purveyor to the Forces
Raitt, Charles Esq. Col. late unatt.
Raitt, E. A. Esq. late Ord. Dep. (11).
Raldon, W. C. Capt. 21st R.N.B. Fus.
Ram, Stephen J. Capt. Soc. Fus. Gds. (11).
Ramsey, B. D. W. Major unatt. Town Major Western District (11).
Ramden, W. J. F. Capt. Coldm. Gds. (11).
Ramsey, T. W. late Commissary-Gen.

Randall, Alfred	Lieut. and Adj. Ceylon Rifles	Robinson, C. W.	Lieut. Ride Brigade (11)
Randolph, C. G.	Adm. (11)	Robinson, Sir G. A. Bart.	Maj. late 22nd Regt. (11)
Randolph, Charles Wilson	Lieut.-Col. Gren. Gds. (11)	Robinson, G. C.	Capt. 17th Lancers
*Randolph, G. G.	Capt. R.N. (11. 10s)	Robinson, Henry	Lieut. R.E. (11)
*Ratcliffe, G.	Lieut.-Col. 1st Warwick Rifle Vols. (11)	Robinson, Sir Hercules G.R. Kt.	Governor and Commander-in-Chief Ceylon (11)
Rawlinson, George	Maj. late 1st W.I.R. (11)	Robinson, J. G. Lt.-Col. late Sco. Fus. Gds.	
Read, Constantine	Lt.-Col. h.p. Roy. Staff Corps (11)	Robinson, W. T. Major Hon. Art. Co. (11)	
Read, C. O.	Asst. Surg. Gren. Gds.	Rochford, C. G.	Capt. 20th Regt. (11)
Read, C. H.	Capt. Edna. Roy. Rifles (11)	Rochford, J. D.	Capt. late Roy. Lanc. Rifles (11)
Read, John M.	Lieut. 13th L. Inf. (11)	Roddy, John R.	Capt. R.N. (11)
Ready, Charles	Lt.-Col. (ret.) 55th Regt. (11)	Roe, E. M.	Lieut. 23rd R. W. Fus. Surgeon 59th Regt. (11)
Reddie, Jas. Esq.	Accountant-General's Department, Admiralty (11)	Roe, W. C.	Paym. h.p. 14th Lt. Drags. Lieut. 102nd Roy. Madras Fus. (11)
Redmond, J. P.	Col. 61st Regt. (11)	Rogers, J. E. Varty	Lieut. 102nd Roy. Madras Fus. (11)
Reed, Sir Thomas KCB.	Lieut.-Gen. Col. 44th Regt. (11)	Rokby, H. Loke, KCB.	Lieut.-Gen. Col. 77th Regt. (11)
Reeve, Ellis P. F.	Capt. Coldm. Gds.	Rolleston, Jas.	Commr. R.N.
Reeve, Fred.	Maj. 73rd Regt. (11)	Rollo, Hon. R. CB.	Col. h.p. unatt. (11)
Reeve, John	Lt.-Col. late Gren. Gds.	Romer, Rt. Frank	Lieut.-Gen. (ret.) R.A.
Reeve, Wm. H. Lt.-Col. (ret.)	Coldm. Gds.	Rooke, Willoughby S.	Lt.-Col. (ret.) Sco. Fus. Gds.
Reid, A. T. Capt. H.M.	Bombay Staff Corps (11)	Roper, Boufouy	Lieut. late 34th Regt. (11)
Reid, A. G. Capt. (ret.)	Beng. Army (11)	Ross, Albert E.	Maj. 5th Fus. Brigade-Major, Shorncliffe (11)
Reid, D.	Capt. and Adj. 1st Dep. Batt. Chatham	Ross, John, CB.	Col. Rifle Brig. (11)
Reid, George Capt. (ret.)	H.M. Beng. Cav. (11)	Ross, William A.	Major R.A. (11)
Reilly, W. E. M., CB.	Lt.-Col. Roy. Art. (11)	Ross, W. H. Capt. H.M.	Bombay Staff Corps
Rennie, J. CB. Capt. late H.M.	Ind. Navy (11)	Roswell, C. M.	Capt. Inns of Court Vols. (11)
Renny, Henry	Major-Gen. Commanding 1st Inf. Brigade Aldershot (11)	Ross, George Grey	Lt.-Col. late Gren. Gds.
Reynardson, C. B.	Lieut. Gren. Gds. (11)	*Rouse, Rolla	Major 2nd Admin. Batt. Suffolk Rifle Vols. (11)
Reynolds, John W.	Col. unatt. Asst. Adj.-Gen. Northern District (11)	Rowcroft, F. CB.	Major-Gen. H.M. Beng. Army (11)
Ricardo, A. L.	Capt. (ret.) Gren. Gds.	Rowcroft, H. C.	Lieut. R.E. Bengal
Rice, Cecil	Major 72nd Highs.	Rowles, James	Capt. late Rifle Brig.
Richards, John	Navigating Lieut. R.N. (11)	Rowley, G. C. E.	Ens. 23rd R. W. Fus.
Richards, P.	Lieut. 64th Regt.	Rowley, J. A.	Capt. 13th Lt. Inf. (11)
Richardson, A. H. G.	Comm. R.N. (11)	Rowell, E. P.	Capt. Lon. Rifle Vols. (11)
Richardson, James	Col. unatt. (11)	Ruddiman, Thos.	Capt. (ret.) Mad. Army (11)
Ricketts, Geo. Thome	Lieut. late 6th Drag. Gds. (11)	Rudduck, J. B. Esq.	late Professor of Mathematics Mil. Sem. Addiscombe
Ridgell, Reginald Charles	Lieut. Hants Mil.	Rumley, Randal	Ma/or-General
Ridge, Robert Stuart Major (ret.)	30th Regt.	Ruse, Richard	Capt. late 9th Regt.
Ridgway, Alex.	Capt. 1st Devon Mil.	Rushout, C. F. R.	Cent. Roy. H. Gds.
Ridley, Wm. John	Maj.-Gen. Commanding Division Malta (11)	Russell, Sir Charles, Bart. & C.	Lieut.-Col. Gren. Gds. MP.
Ripley, Thos. G. F. Esq.	late Ord. Dep. (11)	Russell, Lord Chas. Jas. Fox	Lt.-Col. late 60th Royal Rifles
*Riviere, Fredk.	Capt. Hon. Art. Co. (11)	Russell, D. CB.	Major-Gen. (11)
Roberts, H. C. Esq.	Dep. Lieut.	Russell, Lord Edward, CB.	Adm.
Roberts, C. P. Capt. Roy. Horse Art. (11)		Russell, F. H. Lieut. late Sco. Fus. Grens	
Robertson, Fred.	Lieut. 10th Regt. (11)	Russell, Godfrey	Major Salop Mil. (11)
Robertson, Jas. Elphinstone	Col. 21st R.N.B. Fus.	Russell, J. C.	Cornet 10th Huss. (11)
Robertson, Roderick	Major late 70th Beng. N.I.	Russell, Lindsay	Capt. R.E. Bengal (11)
Robertson, W.	Capt. 1st Roy. East Mid. Mil.	Ryecraft, C. A. W.	Cornet Hants Yeo. Cav.
Robertson, W. B.	Lieut. Cape Mounted Rifles (11)	Ryecraft, Sir Nelson, Bart.	Capt. late Stafford Mil.
Robeson, George	Lt.-Col. late Mil. Train (11)	Byler, Alfred P.	Rear-Adm. (11)

SABINE, Edw. DCL. FRs.	Lieut.-Gen.	Scott, W. Hen.	Gen. Col. 36th Regt. (11)
Col. Comm. R.A. (11)		Scovell, E. W.	Col. late 98th Regt.
St. Aubyn, Lionel	Lieut. Mil. Train (11)	Scovell, G. T.	Capt. (ret.) 79th Highs. (11)
St. Clair, Hon. A.	Comm. R.N. (11)	Scriven, John	Lt.-Col. Comm. Roy. South Mid. Mil.
St. Clair, Hon. C. W.	Maj. h.p. 57th Regt. (11)	Scrymgeour, Wm.	Capt. R.N. (11)
St. Clair, S. G. B.	Capt. (ret.) 21st R.N.B. Fus. (11)	Scudfield, J. C. EARL of	late R.N. Dep. Insp. Gen. of Hosps. (11)
St. George, J. CB.	Maj.-Gen. Roy. Art. Director of Ordnance (11)	Seddou, H. C.	Capt. R.E. (11)
St. John, H. C.	Commr. R.N. (11)	Selton, W. F. EARL of	late Capt. Gren. Gds. (21)
St. Paul, D. R.	Lieut. late 45th Regt.	Selwyn, Jasper H.	Capt. R.N. (11)
Salmond, Wm.	Lieut. R.E. (11)	Seton, James Lumsden	Capt. 102nd Roy. Mad. Fus. (11)
Salt, Thos.	Capt. 2nd Stafford Mil.	Seton, W. C.	Capt. 82nd Regt. (11)
Sakoun, Alex. Lout.	Lt.-Col. late Comm. Aberdeen Mil. (11)	Settle, H. T.	Capt. and Adj. R. Sussex Mil. Art. (11)
*Sainsbury, Fred. CB.	Lieut.-Col. 101st Roy. Beng. Fus. (11)	Sewell, T. D. Capt. Lond. Rifle Brig. Vols. (11)	
Salway, Alfred	Dep. Gen.-Comm. Staff	Seymour, Francis, CB.	Maj.-Gen. late Sco. Fus. Gds.
Sandemas, J. E.	Lieut. Beng. Staff Corps (11)	Seymour, F. Beauchamp P. CB.	Capt. R.N. ADC. to the Queen
Sanders, C. D.	Commr. R.N.	Seymour, F. H. A.	Capt. Rifle Brigade
Sanders, Gilbert H.	Capt. Barrack Mas. Parkhurst (11)	Seymour, F. Hugh G.	Major-Gen.
Sanders, G. O.	Capt. late Leicester Mil.	Seymour, G. A.	Capt. R.N. (11)
Sandham, Henry	Lieut.-Gen. Col. Comm. R.E. (11)	Seymour, Hugh de Grey	Capt. Gren. Gds. (11)
Sandys, Edwin W.	Lieut. R.A. (11)	Seymour, Leopold R.	Lieut. Gren. Gds. (11)
Sargent, J. N. CB.	Col. h.p. 3rd Buffs (11)	*Seymour, W. F. E.	Lieut.-Col. Coldm. Gds. (11)
Sartorius, Sir George Rose, Kt. KCB.	Admiral (11)	Shakerley, Sir Charles W. Bart.	Lt.-Col. 5th Batt. Cheshire Rifle Vols. (11)
Saunders, H. F.	Lt.-Col. Hon. Corps Gent-at-Arms	Sharp, R. Jelf.	Lt.-Col. (ret.) Sco. Fus. Gds.
Saunders, J. M.	Lieut. R.A. (11)	Sharp, W. E.	Lieut. R.A. (11)
Saurin, E.	Admiral (11)	Sharpe, Benjamin	Commr. R.N. (11)
*Sawyer, C.	Col. (ret. h.p.) 6th Drag. Gds. (11)	Sharpe, M. S.	Capt. Mil. Train (11)
Sawyer, G. W.	Ens. 5th or King's	Shaw, C. Aug.	Gen. Col. 74th Highs.
Saxe Weimar, H. S. Highness Prince Wm.	Angustus Edward of, CB. Col. Gren. Gds. ADC. to the Queen (11)	Shelfield, Sir Robt. Bart.	Major late R.H. Gds.
Sayer, Fred.	Capt. (ret.) 46th Regt.	Shel, Sir Justin	KCB. KLS. Maj.-Gen. H.M. Ben. Army (11)
Scarlett, Hon. Sir J. Y. KCB.	Lieut.-Gen. Col. 5th Drag. Gds. Commanding Forces Aldershot	Shelley, Charles	Lieut.-Col. Sco. Fus. Gds.
Schaw, H.	Capt. Roy. Eng. Professor of Fortification and Artillery R. S. Coll.	Sherbrooke, Wm.	Lieut. R.N. (11)
Sandhurst (11)		Sheron, Alex. Nowell	Capt. unatt. (11)
Scott, A. de C.	Capt. Roy. Eng. (11)	Shipley, W. D.	Capt. 58th Regt. (11)
Scott, Beauchamp H. J.	Lieut. Sco. Fus. Gds. (11)	Shirley, H. CB.	Major-Gen. (11)
Scott, Hon. Chas. Grantham	Lt.-Col. Wor. Rifle Volunteers late Col. Sco. Fus. Gds.	Shoubridge, H. W. Lt.	Meywar Rhoed Corps
Scott, C. H. S. Capt. H.M. Beng. Staff Corps		Showers, Chas. Lionel	Col. Beng. Staff Corps
Scott, Lord Charles T.	Comm. R.N.	Shrewsbury and Talbot, EARL of, CB.	Adm. Staunburgh, Sir Francis R. Bart. FRs.
Scott, Edward	Lt.-Col. Kent Rifle Volunteers late Major 8th Huss.	Dept. Lieut. Warwick	
Scott, E. W. S. Major-Gen. Roy. Art. (11)		Shuckburgh, G. T. Franc.	Maj. late Sco. Fus. Gds.
Scott, Hen. Alex.	Gen. Col. Comm. R.A.	Siborne, H. T.	Capt. R.E. (11)
Scott, H. B.	Major 9th Regt.	Sibthorp, C. C. W.	Capt. late 1st Drags.
Scott, Hen. Young D.	Lt.-Col. R.E.	Silk, Geo. C.	Lieut. South Midd. Rifle Vols. (11)
Scott, Sir James, KCB.	Adm. (11)	Sim, E. C.	Capt. R.E. (11)
Scott, J. D.	Col. late Madras Art. (11)	Simpson, Cortland H.	Capt. R.N. (11)
Scott, Robert A. E.	Capt. R.N. (11)	Simpson, D.	Maj.-Gen. H.M. Beng. Army (11)
Scott, Sir Sibbald David, Bart.	Capt. late Roy. Sussex Mil. Art. (11)	Simpson, G. W. Y.	Col. R.A. Madras (11)
Scott, T. A. Lt. H.M. Beng. Staff Corps (11)		Simpson, R. Hamilton	Capt. and Paym. 65th Regt.
		Sinclair, W. Thomson, Esq.	h.p. Dep. Com. Gen.
		Singer, Morgan	Capt. R.N. (11)

Singleton, John Maj.-Gen. (ret. full pay)
 11th Regt.
 Sitwell, H. C. Capt. 88th Regt.
 Sitwell, H. S. Lieut. R.E.
 Skill, H. H. Lieut. 11th Regt. (11)
 Skinner, T. H. Lieut. (ret.) 8th or King's
 Skinner, Thos. Major late Ceylon Rifles
 Skipton, S. S. MD. Staff Surg.
 *Skipwith, George Lieut.-Col. late Depot
 Batt. (11)
 Skyring, Chas. Francis Col. Commanding
 R.E. Mauritius
 Slade, Charles G. Capt. Rifle Brig. (11)
 Slade, William H. Major-Gen. R.E.
 Sladen, Joseph Lieut. Roy. Art. (11)
 Slessor, E. A. Capt. Roy. Art. (11)
 Sloane, O. E. C. D. Capt. Royal Sherwood
 Foresters Militia (11)
 Sloper, N. W. Capt. Royal Wilts Mil.
 Smart, Sir Robt. KCB. KH. Vice-Admiral
 (11)
 Smith, A. MD. late Director-General
 Army Med. Dep.
 Smith, Astley C. Major (ret.) 25th K.O.
 Borderers (11)
 Smith, C. B. L. Capt. H.M. Mad. Staff Corps
 (11)
 Smith, Felix V. Capt. late 2nd Drag. Gds.
 Smith, Gerard Capt. Sco. Fus. Gds.
 Smith, H. Powls, MD. Staff Surgeon (11)
 Smith, Hy. Porter Lieut. h.p. Rifle Brig. (11)
 Smith, James Webber, CB. Col. unatt.
 ADC. to the Queen
 Smith, Jervoise Capt. Roy. Edmontons
 Rifles, MP.
 Smith, John Louis Lieut.-Gen. (ret.) R.A.
 Smith, Sir J. M. Frederic, KH. Gen. Col.
 Commandant R.E.
 Smith, Joshua Simmonds Maj.-Gen. (11)
 Smith, Michael W. CB. Maj.-Gen. (11)
 *Smith, Percy, G. L. Capt. R.E. (11)
 Smith, P. H. Lieut. 11th Regt. (11)
 Smith, Rob. M. Capt. R.E. (11)
 Smith, Thomas, Esq. Army Agent
 Smith, Thomas Charlton Maj.-Gen. (11)
 Smith, W. Capt. R.A. (11)
 Smith, W. H. C. Lieut. 104th Regt. (11)
 Smith, Wm. Lea Lieut. (ret.) h.p. 13th Light
 Inf. (11)
 Smith, W. S. Vice-Adm.
 Smyth, Henry, CB. Col. (ret.) 76th Regt. (11)
 Smyth, Henry Augustus Lieut.-Col. R.A. (11)
 Smyth, J. G. Col. 2nd West York L. Inf.
 Smyth, J. H. CB. Col. R.H.A. (11)
 Smyth, James S. Lieut. 63rd Regt.
 Smyth, Wm. Jas. Col. R.A.
 Soudy, F. J. Maj. Roy. Art. (11)
 Somerset, Edw. Arth. Col. h.p. unatt.
 Somes, G. W. Lord late Capt. R. H. Gds.
 Sotheby, Edward S. CB. Rear-Adm.
 Sotheby, F. E. Capt. Rifle Brig. (11)
 Sotheby, F. S. CB. Lt.-Col. (ret.) Bengal
 Art. (11)
 Sparks, R. H. Capt. 7th Roy. Fus. (11)
 Spearmann, H. R. Lieut. Beng. Staff Corps
 Spedding, Carlisle Lt.-Col. h.p. 32nd Regt.
 (11)
 Speirs, Arch. Alex. Capt. (ret.) Sco. Fus. Gds.
 Spence, Jno. Lieut. 86th Regt. (11)
 Spencer, Hon. J. W. S. Capt. R.N.
 Spencer, Hon. R. C. H. Col. (ret.) R.A.
 Spicer, R. W. Capt. late 16th Lancers
 Spink, John, KH. Gen. Col. 2nd
 Queen's Royals (11)
 Sprague, P. E. Lieut. R.E. Beagat (11)
 Squire, William. Capt. 91st Highrs. (11)
 Stace, W. S. Lieut.-Col. R.E.
 Stacey, J. W. Esq. Clerk Contract Branch (11)
 Stair, J. EARL of late Capt. Sco. Fus.
 Gds. (11)
 Stanhope, Sir Edwin F. S. Bart. Capt.
 R.N. (11)
 Stanhope, Philip Spencer Lieut.-Gen. Col.
 18th Light Inf. (11)
 *Stanhope, Walter T. S. Capt. 1st West
 York Yeo. Cav. (11)
 Stanley, C. E. H. Capt. Gren. Gds. (11)
 Stanley, Fras. S. Cornet (ret.) R.H. Gds. (11)
 *Stanley, Hon. Fred. A. MP. Lieut. Lan.
 Yeo. Cav. late Capt. Gr. Gds. (11)
 Stanley, Hans. Sloane Lieut. (ret.) 10th
 Lancers (11)
 Stanley, Hon. J. C. Lt.-Col. Gren. Gds. (11)
 Stanton, Wm. Commr. R.N. (11)
 Stapleton, F. G. Capt. (ret.) 33rd Regt.
 Stapleton, G. G. C. Col. h.p. 32nd Light
 Inf. (11)
 Staunton, Geo. Maj.-Gen.
 Staveley, Edmund Lieut. R.A. (11)
 *Stavell, W. St. L. Alcock Lt.-Col. North
 Cork Rifles (11)
 *Steele, Aug. F. Col. (ret. h.p.) 7th Huss. (11)
 Steele, T. Montague, CB. Maj.-Gen. (ret.)
 Coldm. Gds.
 Schelin, Ben. Spicer Maj.-Gen. R.E. (11)
 Stephens, Cecil J. Cornet 12th R. Lanes (11)
 Stephens, F. S. M. late Capt. 2nd Royal
 Middel. Militia
 Stephenson, B. C. Lieut. late 2nd Royal
 Middel. Mil.
 Stephenson, F. C. A. CB. Col. Sco. Fus.
 Gds. (11)
 Stephenson, S. V. Capt. Sco. Fus. Gds.
 Brig.-Major to the Brigade of Guards
 Stepany, S. Cowell, KH. Lieut.-Col. late
 Coldm. Gds. (11)
 Stewart, Ramsay Lieut. 94th Re.
 Stevens, Wm. Capt. 2nd or Queen's
 Stevenson, Hen. Lieut. 6th Inns. Drags.
 Stevenson, J. Capt. 12th Roy. Lancers
 Stevenson, Thos. Paym. late 7th Dr. Gds.
 Stevenson, W. G. Lieut. late Sco. Fus. Gds.
 Steward, E. Harding Capt. R.E. (11)
 Stewart, D. S. Lieut. Staff Yeo. Cav. late
 Capt. 11th Huss.
 Stewart, R. C. Capt. H.M. Mad. Army,
 Asst. Adj.-Gen. Nagpore Force (11)
 Stewart, R. C. Maj. (h.p.) Dep. Asst. Adj.-
 Gen. (11)
 Stewart, R. F. S. Capt. Roy. Ayrshire Mil.
 late Lieut. Sco. Fus. Gds. (11)
 Stewart, Sir Houston, GCB. Adm. (11)
 Stewart, W. Houston, CB. Capt. R.N. (11)
 Stirling, Francis Lieut. R.N. (11)

Stirling, J. S. Capt. Roy. Art. (11)
 Stirling, W. Major Roy. Art. (11)
 Stokes, Alfred Lieut. 28th Regt. (11)
 Stoney, F. S. Capt. Roy. Art.
 Stopford, James J. Vice-Admiral (11)
 Stopford, Richard H. Rear-Adm.
 Storer, Arthur T. Capt. R.E. (11)
 Stocks, Right Hon. Sir Henry K. GCB.
 GCMG. Major-Gen. Comptroller-in-Chief,
 War Office
 Stourton, Marmaduke Lieut. 8th or King's
 Stracey, Edw. J. Lieut.-Col. late Sco. Fus.
 Gds. (11)
 Stracey, Henry H. D. Capt. Sco. Fus. Gds.
 Strahan, William Capt. R.A. (11)
 Strange, A. FRAS. Lieut.-Col. late H.M.
 7th Mad. Cav. (11)
 Strange, Alexander Major 14th Regt. (11)
 Strange, H. F. CB. Col. Roy. Art. (11)
 Strange, Tom Bland Capt. R.A. (11)
 Strangways, W. A. F. Capt. R.H. Art.
 Stratford, Robert Lieut. 6th Regt.
 Strathmore, EARL of late Lieut. 2nd Life
 Gds.
 Streetfield, Sidney R. Lieut. late R.N. (11)
 Streetfield, Chas. Ogilvie Maj.-Gen. R.E. (11)
 Strickland, Edw. CB. Dep. Comm. Gen. (11)
 Strong, Clem. W. Col. (ret.) Coldm. Gds.
 (11)
 Stuart, Charles Maj.-Gen. h.p. Ceylon Rifles
 (11)
 Stuart, J. F. D. Crichton Lieut.-Col. (ret.)
 Gren. Gds. MP. (11)
 Stuart, Wm. Jas. Maj. Roy. Eng. (11)
 *Stuart, Wm. Tyler Capt. 17th Regt. Dep.
 Asst. Quartermaster-General Dublin (11)
 Stuckey Stanley, Sir George, Bart. Lieut.-
 Col. Devon Mil. Art. MP. (11)
 Studd, Edward Major-General
 Sturgeon, Chas. Ens. late 24th Regt.
 Sturt, G. N. Lieut.-Col. Gren. Gds. MP. (11)
 *Sutyan, Arthur Capt. Queen's Westminster
 Rifle Volunteers (11)
 Sullivan, G. A. F. Col. (ret.) 5th Roy. I. Lank.
 Sullivan, Wm. CB. Major-Gen.
 Sulterland, Edward * Maj. unatt. Barrack
 Master Woolwich
 Sutton, John Major late 47th Regt.
 Swan, J. Percival Capt. 3rd Roy. Middel.
 Mil. (11)
 *Swann, Jno. S. Capt. 22nd Regt. Dep.
 Asst. Quartermaster-General Cork (11)
 Swinburne, C. H. Admiral (11)
 Swinley, J. E. Major Cav. Depot, Can-
 terbury (11)
 Swiney, G. Gen. R.A. Beng. (11)
 Swiney, O. Clayton Capt. late 32nd L. Inf.
 (11)
 *Swinfen, T. H. Major 5th Drag. Gds.
 Sykes, Sir F. H. Bart. Capt. late 11th Huss.
 Sykes, W. H. FRSE. Col. (ret.) Bom. Army
 MP. (11)
 Symonds, T. E. Capt. R.N. (11)
 Symonds, C. E. H. Lieut. (ret.) Roy. Art.
 TABUTEAT, A. O. Capt. 33rd Highrs.
 Talbot, C. R. M. Esq. MP. Dep. Lieut.
 *Talbot, Hon. W. L. Lt.-Col. (h.p.) 21st
 R.N.B. Fus. (11)
 Talbot-Harvey, W. Maj. late Suffolk Artill-
 ery Militia, and 1st Middel. Eng. Vols. (11)
 Tanner, Edward Capt. 8th or King's
 Taplin, Thomas Surg. late H.M. Mad. Army
 (11)
 Tarbot, P. G. Lieut. R. E. (11)
 Tate, Jas. Roddam Lieut. R.N. (11)
 Tatham, Edward Paym. R.N. (11)
 Taitnall, R. C. Commr. R.N. (11)
 Taylor, Arthur Joseph Maj.-Gen. R. Art.,
 Inspector-General of Artillery
 Taylor, Brook Maj.-Gen.
 Taylor, The Rev. H. A. MA. late Chaplain
 to the Forces
 Taylor, Sir H. G. A. KCB. Gen. H. M.
 Mad. Army (11)
 Taylor, J. MP. Col. Bom. Army Brig-
 Gen. Commg. Brigade, Decan.
 Taylor, R. C. H. CB. Col. R.A. I. P. O.
 London
 Taylor, Thos. Matt. Lieut.-Gen. H.M.
 Bengal Army (11)
 Tensdale, Washington Lieut. late 1st W.
 York Art. Vols.
 Tensdale, Henry George Major-Gen. R.H.A.
 Tervan, Henry Lieut. 75th Regt. (11)
 Tempest, Thos. R. P. Col. (ret.) 23rd Royal
 Welsh Fusiliers
 Templetown, Viscount Lieut.-Gen.
 Col. Comm. 60th Royal Rifles (11)
 Tenynson, Julius Lieut. 25th Regt. (11)
 *Terry, Frederick S. Capt. 25th Regt.
 K.O.B. (11)
 *Toush-Hecker, C. H. Col. Comm.
 Cav. Depot Canterbury (11)
 Tre, Cyril B. Lieut. 68th Light Inf. (11)
 Trellous, A. G. B. Major late Coldm.
 Gds.
 *Thesiger, Hon. C. W. Major 6th Innis-
 killing Drags. (11)
 *Thesiger, Hon. Fred. A. Col. 95th Regt.
 (11)
 Thomas, C. D. Capt. Coldm. Gds. (11)
 Thomas, H. J. Lt.-Col. (ret.) Roy. Art.
 (11)
 Thomas, J. W. CB. Col. 67th Regt. (11)
 Thomas, Montagu Capt. R.N. (11)
 Thomas, William H. Ens. 1st Survey Rifle
 Vols. (11)
 Thompson, Daniel Capt. 67th Regt.
 Thompson, G. A. Lieut. 12th Roy.
 Lancers (11)
 Thompson, T. H. Capt. 78th Highrs. (11)
 *Thompson, P. S. Lieut.-Col. 14th Hus.
 (11)
 Thompson, R. T. Lieut. 56th Regt. (11)
 Thomson, Harry Gen. H.M. Beng. Army
 (11)
 Thomson, R. Kennedy Commr. R.N.
 Thorncliffe, Daniel Major-Gen. R.A.
 *Thornhill, E. Z. Lieut. 104th Beng. Fus. (11)
 *Thorold, George E. Col. (ret. f.p.) Lt.-Col.
 Kent Rifle Vols. (11)
 Thurlow, H. H. Lieut. 13th Light Inf.
 Thureby, Jas. L. Maj. (ret.) 17th Regt. (11)

Thureby, Rich. H. Capt. Coldm. Gds.
 Thynne, Alfred W. Lt.-Col. Gren. Gds. (11)
 Tidy, T. H. Col. Comd. Brig. Colchester
 Tinkler, W. A. Capt. late Hon. Corps
 Gen.-at-Arms
 Tipping, Alfred Lieut.-Col. late Gren. Gds.
 Tremen, Hy. Stephen Maj. (ret.) R.A.
 Todd, Thos. Fentham Lieut. 62nd Regt. (11)
 Tollmache, Wm. Aug. Capt. late 2nd Life
 Guards
 Toller, W. M. Capt. (ret.) R.A. (11)
 Tolson, Wm. Lieut. 35th Roy. Sussex Regt.
 (11)
 Tomkinson, E. Lieut.-Col. h.p. unatt.
 Tomline, G. MP. Col. North Lincoln Mil.
 Tomlin, Wm. Capt. late 10th Huss. (11)
 Tompson, W. D. Capt. 17th Regt. (11)
 *Tomnochy, Valens Capt. 81st Regt. (11)
 Toppin, J. M. Capt. 18th Royal Irish (11)
 Torriano, C. E. Capt. Roy. Art. (11)
 *Tottenham, Charles James Lt.-Col. Denbigh
 Yeo. Cav. late Capt. 2nd Life Gds. (11)
 Toulmin, Aug. Esq. late H.E.I.C. Sec. Ser.
 (11)
 Tower, H. Lieut.-Col. Coldm. Gds.
 Townsend, H. J. Stephens T. Lieut. late
 2nd Life Guards
 Townsend, J. C. C. Capt. North Cork Rifles
 (11)
 Townsend, Samuel P. Commr. R.N. (11)
 Townshend, Henry Dirc Lieut.-Gen. Col.
 25th Regt. (11)
 Tracy, Hon. Charles Hanbury, M.P. late
 Lieut. R.N. (11)
 Tracey, Harry A. Capt. Roy. Art. (11)
 Trull, Wm. Asst.-Surg. 91st Highrs.
 Travers, E. A. B. Lt.-Col. H.M. Mad. Staff
 Corps, Dep. Adj. Gen. Madras (11)
 Travers, H. F. Esq. Asst. Storekeeper
 Travers, James, E. C. Major-Gen. H.M.
 Beng. Army (11)
 Travers, J. O. CB. Major-Gen. Insp.-Gen.
 Roy. Marines
 *Trefusis, Hon. W. R. Lt.-Col. Sec. Fus.
 Gds. (11)
 Trevelyan, Arthur Lt.-Col. late 13th Lt. Drs.
 Trench, C. Capt. R.A. (11)
 Trench, Hon. W. Le Poer Capt. R.E. (11)
 *Trevelyan, H. A. Lt.-Col. 7th Hussars
 Trevelyan, Jas. Harrington Lt.-Col. unatt.
 Trevor, E. A. Lieut. R. E. Bengal
 Trevor, G. H. Lieut. R.A. Madras
 *Trevor, W. C. Lieut.-Col. 14th Regt. (11)
 Tritton, F. B. Major 5th Dep. Batt. Isle of
 Wight
 Trivett, J. F. Lieut. R.N. Reserve
 (11)
 Trollope, Chas. CB. Maj.-Gen.
 Trotter, H. Capt. Gren. Gds. (11)
 Trowsdell, W. G. MD. Surg.-Maj. Staff
 (11)
 Tryon, George Capt. R.N. (11)
 Tryon, J. Capt. 39th Regt.
 Tryon, R. Capt. (ret.) Rifle Brig.
 Tuile, Hugh Manley Maj.-Gen.
 Tulloh, Alex. CB. Lieut.-Gen. (ret.) R.A.
 (11)

Tulloh, J. S. Major R.H. Art. (11)
 Tupper, Chas. Wm. Capt. late K.O.L.I. Mil.
 Tupper, De Vis Major (ret. h.p.) 8th or
 King's (11)
 Turbell, T. P. Capt. R.A. (11)
 Turner, Geo. Esq. Master Shipwright Wool-
 wich (11)
 Turner, Geo. H. Lieut. 50th Regt. (11)
 Turner, Henry Gds. Asst.-Surg. Sec. Fus.
 Gds.
 Turner, H. S. Capt. 68th Regt. (11)
 Turner, James Trench Lieut. 73rd Regt.
 (11)
 Turnour, Edmund E. Commr. R.N. (11)
 Tweedie, Michael Capt. h.p. R.A.
 Twemlow, Geo. Maj.-Gen. Col. Comm.
 Roy. Art., Bengal (11)
 Twyford, A. F. Lieut. (ret.) 75th Regt. (11)
 Twyford, H. R. Lt.-Col. Hants. R. Vol. 2nd
 Adm. Batt. late Capt. 36th Regt. (11)
 Tyke, Alfred Col. (ret.) R.A. (11)
 Tyler, E. S. Capt. Roy. Engs. (11)
 Tyssen, F. S. D. Lieut. late 4th Drag.
 Gds.
 UFFINGTON, VISCOUNT Cornet Warwick
 Yeo. Cav. late Capt. Sec. Fus. Gds. (11)
 Underwood, G. A. Lt.-Col. (ret.) Mad. Art.
 Upton, Hon. Arthur Major-General
 (11)
 VACHER, F. S. Bt.-Major 22nd Reg. Dep.
 Asst. Qr.-Master General (11)
 Valpy, Ant. B. Capt. R.N. (11)
 Vandeleur, C. T. B. Capt. 12th Royal
 Lancers (11)
 Vandeleur, T. B. Capt. 7th Roy. Fus. (11)
 Varder-Meulen, J. H. Lieut. 50th Regt.
 (11)
 Van de Weyer, A. S. B. Lieut. Gren. Gds.
 Van Straubenzee, F. Lieut.-Col. (ret.) 13th
 Inf. (11)
 Van Straubenzee, T. Capt. R. A. (11)
 Vassall, Rawdon J. P. Major-Gen. unatt.
 (11)
 Vaughan, E. C. Lieut. Rifle Brigade (11)
 Vaughan, H. B. Capt. 20th Regt. (11)
 Vaughan, J. F. Lt.-Col. R. Mon. L. I. M.
 Ventry, T. T. A. Lord Capt. h.p. 43rd
 L. I.
 Vernon, L. Sidebottom Major unatt. (11)
 Verney, G. Hope Ens. Rifle Brigade (11)
 Verney, Sir Harry, Bart. Major late Gren.
 Gds. MP. (11)
 Vernon, G. A. Lieut.-Col. Staffordshire Rifle
 Vols. late Lieut.-Col. Coldm. Gds.
 Verschoye, H. W. Lt.-Col. Gren. Gds. (11)
 Vesey, Geo. Hy. Lieut.-Col. R.A.
 Vesey, Hon. J. R. W. Capt. Coldm. Gds.
 (11)
 Villiers, Hon. Fred. W. C. Capt. late Coldm.
 Guards (11)
 Villiers, Hon. G. P. H. Lieut. Gr. Gds. (11)
 Voyle, G. E. Col. R.A. (11)
 Vyner, R. C. de Grey Capt. (ret.) Gr.
 Gds. (11)
 Vyas, G. Howard Col. (ret.) 2nd Life Gds.

*WADE, Hamlet Coote, CB. Col. late 13th
 L. I. (11)
 Wade, John Peter Major (ret.) Beng.
 Army (11)
 Wade, Seaton Surg. R.N. (11)
 Wadman, A. J. P. Capt. (ret.) King's
 Drag. Gds. (11)
 Wahab, G. D. Lieut. 20th Regt. (11)
 Wahab, H. J. Maj. and Paym. 94th Regt.
 Wake, A. J. Capt. R. Art. (11)
 Wake, R. W. Lt.-Col. h.p. Roy. Afr.
 Corps
 Wake, Rev. Henry J. late Lieut. 2nd
 Drags.
 Walhouse, Edward Capt. late 12th Regt.
 Walker, A. Capt. h.p. 70th Highrs. (11)
 Walker, C. P. Beauchamp Lt.-Col. (ret.)
 2nd Drag. Gds. Mil. Attaché H.B.M. Em-
 bassy Berlin (11)
 Walker, D. Corrie Capt. Roy. Engs. (11)
 Walker, Edw. Lieut. 21st R. N. B. Fus. (11)
 Walker, F. W. E. P. Capt. Sec. Fus. Gds. (11)
 Walker, John Esq. Major Scottish Bor-
 ders Mil. (11)
 Walker, Sir Geo. R. Bart. Capt. h.p. unatt.
 Walker, Hercules Major Rifle Brigade
 Walker, John Capt. late 66th Regt. (11)
 Walker, John Esq. Geographer East
 India Office
 Walker, S. Lieut.-Col. late Q. O. L. Inf.
 Mil.
 Walker, Wm. Capt. late 69th Regt. Prof.
 of Mil. Administration, Royal Staff College,
 Sandhurst (11)
 Wallace, Sir W. T. F. Bart. Lt.-Col. (ret.)
 Gren. Gds.
 *Waller, Geo. H. Major 7th Roy. Fus. (11)
 Waller, S. Lieut. Roy. Engs. (11)
 Wallington, J. C. Major late 10th Hussars
 (11)
 Walpole, Horatio J. T. Lieut. Rifle Brig.
 (11)
 Walpole, Horatio Capt. 5th Fus.
 Walpole, Wm. Admiral
 Walsh, Arthur MP. Capt. late 1st Life Gds.
 Walton, Clifford Dep. Asst. Com. Gen. (11)
 Walwyn, Jas. H. Capt. 23rd R. W. Fus.
 Ward, E. B. Capt. H.M. 3rd Punjab Regt. (11)
 Ward, Edw. Wolstenholme Lieut.-Col.
 R.E. (11)
 Ward, H. Capt. (ret.) Beng. Army
 Ward, John Lt.-Col. late 91st Highrs.
 Ward, John Ross Capt. R. N. (11)
 Ward, R. B. Ens. 12th Regt. (11)
 *Ward, Thos. Le H. Capt. R. N. (11)
 Ward, W. J. Maj. H.M. 8th Beng. Cav. (11)
 Warde, C. KH. Admiral (11)
 Warde, Edw. Chas. CB. Maj.-Gen. Com-
 manding Royal Art., Woolwich (11)
 Warde, Francis Lieut.-Gen. Col. Comm. R.A.
 *Warden, Robert, CB. Col. 19th Regt. (11)
 Wardlaw, Robert, CB. Col. (ret. h.p.) 1st
 Roy. Drags.
 Waring, Walter T. Capt. Kent Art. (11)
 Warre, F. Lieut. late East Kent Militia
 Warre, Hy. J. CB. Col. (ret. h.p.) 67th
 Regt. (11)

Warren, Charles Lieut. R.E. (11)
 Warren, Fred. P. Commr. R.N. (11)
 Waterford, J. H. de la Poer, Marquis of
 Lieut. 1st Life Gds. (11)
 *Waterhouse, Henry Capt. Lanesk Art. Vols.
 Watkins, T. V. Rear-Adm.
 Watson, Chas. Edward Lt.-Col. (ret.)
 18th Royal Irish (11)
 Watson, D. Col. 82nd Regt. (11)
 Watson, David H. Capt. R.N. (11)
 Watson, G. L. Lieut. (ret.) 1st Life Gds. (11)
 Watson, Rupert C. Capt. Ceylon Rifles
 Watt, Jas. Duig late Dep. Comm. Gen.
 Watts, Robert Capt. (ret.) H.M. Mad.
 Army (11)
 Waugh, Sir A. Scott, Kt. FR.S. Major-Gen.
 (ret. h.p.) R.E. Bengal (11)
 Weatherley, F. A. Capt. 6th Inniskilling
 Drags. (11)
 Webb, Theodosius Capt. late R.E.
 Webber, C. E. Capt. R.E. (11)
 Webber, Fred. W. S. Capt. (ret.) 45th Regt.
 (11)
 Webster, G. M. MD. Surg. on the Staff
 Webster, Hamilton B. Capt. 4th Bengal
 Eur. Light Cav. (11)
 Wegg-Prosser, F. E. Capt. 1st Mid. Art.
 Vols. (11)
 Wellesley, Hon. F. A. Capt. Coldm. Gds.
 (11)
 Wellesley, G. G. CB. Rear-Adm.
 Supr. H.M. Dockyard, Portsmouth (11)
 Wellesley, Wm. Hy. Chas. Col. late 7th
 Royal Fus.
 Wells, James S. Staff Commr. R.N.
 Wells, Richard Capt. R.N. (11)
 Wesley, Sir Robert KCB. Lt.-Gen. R.M.L.I.
 (11)
 West, C. E. late Mid. R.N. (11)
 West, C. R. S. Lord, CB. Major-Gen. (11)
 West, James B. Capt. R.N.
 West, Hon. M. S. Capt. late Gren. Gds.
 Westby, A. G. Capt. (ret.) 8th or King's
 (11)
 Westcar, H. P. Lieut. R. H. Gds. (11)
 Westmacott, Spencer Col. R.E.
 Westmorland, Francis William Henry, Esq.
 of, CB. late Col. Coldstream Guards
 Westphal, Sir Geo. Aug. Kt. Admiral
 Wetherall, Sir E. R. KCSI. CB. Col. unatt.
 Dep. Quartermaster Gen. Horse Gds. (11)
 Wetherall, Sir Geo. Aug. GCB. KH. Gen.
 Col. 8th Regt. Gov. Roy. Mil. College
 Sandhurst (11)
 Whalley, J. L. Capt. 1st Roy. Lancash.
 Mil. and Commt. 24th Lancash. Vols. (11)
 Wharmcliffe, E. M. G. Lord Lt.-Col. 1st W.
 York Yeo. Cav. late Lt. Gren. Gds.
 Wheatley, Wm. Lt.-Col. (ret.) Sec. Fus. Gds.
 Wheeler, J. Ross Lt.-Col. (ret.) 25th Regt.
 Wheeler, J. S. Capt. 8th or King's (11)
 Wheeler, Sir Trevor, Bart. Lt.-Col. late 5th
 Drag. Gds. (11)
 Whiffen, H. W. S. Esq. Chief Auditor Army
 Accounts (11)
 Whimper, F. A. Col. unatt. Major of the
 Tower of London

Whitfield, C. W. Lieut. R.E. (11)
 Whitbread, J. W. Capt. late Suffolk Art.
 White, A. Lieut. Queen's Westminster Rifle
 Vols. (11)
 *White, C. H. Capt. and Adj. Cheshire Mil.
 (11)
 White, Rym. Herbt. Lt.-Col. Sco. Fus.
 Gds. (11)
 White, W. R. Lieut. 50th Regt. (11)
 Whitelocke, G. F. Lt.-Col. late Ren.
 Army (11)
 Whitfield, C. T. Surg. h.p. Ord. Med. Dep.
 (11)
 Whitfield, Hy. Wase Col. 2nd W.I. Regt.
 Whittle, Wm. Capt. 10th Regt. (11)
 Whitmore, E. A. Col. Asst. Adj.-Gen.
 Horse Gds. (11)
 Whitmore, T. C. D. Capt. Roy. H. Gds.
 Whitehead, St. Vincent B. H. Capt. late
 Coldm. Gds. (11)
 Whitting, Reginald Capt. 8th or King's
 Wickham, E. H. Lieut. R.A. (11)
 Wigram, Ely D. Col. late Sco. Fus. Gds.
 (11)
 Wigram, J. R. Capt. late Coldm. Gds. (11)
 Wilbraham, Rich. CB. Maj.-Gen. Gov.
 and Comm. Royal Victoria Hospital
 Netley (11)
 Wildbore, Fred. Asst.-Surg. late Coldm. Gds.
 Wildman, John Col. unatt. (11)
 Wilkinson, F. G. Col. unatt. (11)
 Wilkinson, Henry G. Lt.-Col. late Sco.
 Fus. Gds.
 Willes, A. Capt. 104th Beng. Fus.
 Willes, Geo. O. CB. Capt. R.N.
 Williams, E. A. CB. Col. R.A.
 Williams, J. Aubrey Ens. 60th Roy. Rifles
 (11)
 Williams, Lawrence Capt. 5th W. York
 Mil. (11)
 Williams, Lewis Duncan Maj.-Gen. (11)
 Williams, Montgomery Lieut.-Gen. Col.
 Comm. R.E. (11)
 *Williams, O. L. C. Maj. and Lt.-Col.
 R. H. Gds.
 Williams, T. P. Lt.-Col. Comm. Roy.
 Anglesey Lt. Inf. MP. (11)
 Williams, His Excellency Sir Wm. Fenwick
 Bart. of Kara, KCB. Lieut.-Gen. Col.
 Comm. R.A. Lieut.-Governor Nova Scotia
 Williams, William Surg. h.p. 99th Regt.
 Williams, Wm. Capt. 103rd Royal Bombay
 Fusiliers (11)
 Williamson, R. F. Lieut. 23rd R. W. Fus.
 Willis, Browne Lieut.-Gen. R.A.
 *Willis, W. W. G. B. Capt. R.M.L.I. (11)
 Willoughby, M. F. CB. Maj.-Gen. (ret.)
 Bo. Army. (11)
 Wilnot, Eardley Major-Gen.
 Wilnot, Francis Lieut. 33rd Regt. (11)
 Wilnot, Fred. M. Eardley Col. R.A. Comm.
 and Supt. School of Gunnery (11)
 Wilnot, W. A. Eardley Lieut. 5th Fus. (11)
 Wilson, C. P. Lieut. late H.M. I. Navy (11)
 Wilson, C. P. Lt.-Col. late Coldm. Gds.
 Wilson, Edmund Capt. R.N. (11)
 Wilson, Fred. W. Capt. R.N. (11)

Wilson, Herbert L. Capt. late 71st Lt. Inf.
 Wilson, H. B. Lieut. 71st Highld. Lt. I.
 (11)
 Wilson, J. J. Capt. R.E. Instr. in Fortifica-
 tions, Roy. Mil. Academy, Woolwich (11)
 Wilson, Sir John Morillon, KH. CB. Col.
 unatt. Major Roy. Hosp. Chelsea (11)
 Wilson, S. W. F. Capt. 55th Regt. (11)
 Wilson, T. M. Maj.-Gen. h.p. 8th or King's
 (11)
 Wilson, W. H. Lieut. 7th Royal Fus. (11)
 Wily, John Capt. 18th Royal Irish (11)
 Windham, Sir Chas. Asho, KCB. Lieut.
 Gen. Col. 46th Regt.
 Windsor-Clive, H. G. H. W. Capt. Coldm.
 Guards (11)
 Windus, A. J. Commr. late H. M. Indian
 Navy (11)
 Wingfield, Chas. Wm. Maj.-Gen. (ret.) R.A.
 Wingfield, Digby H. R. Capt. R. H. Gds.
 Wingfield, Fred. Dep. Asst. Com.
 Gen. (11)
 Winton, Mathew Asst. Com.-Gen. (11)
 Winthrop, Hay E. S. Capt. R.N.
 Wiseman, Sir W. S. Bart. KCB. Captain
 R.N. (11)
 Wix, A. McKellar Ens. 96th Regt. (11)
 Wodchouse, Edwin Col. Roy. Art. ADC.
 to the Queen (11)
 Wolfe, W. S. M. Captain R.A. (11)
 Wombwell, A. Lt.-Col. late 7th Depot Batt.
 Wood, A. R. M. Lieut. Coldm. Gds.
 *Wood, H. Capt. Rifle Brig.
 Wood, H. G. Lt.-Col. 8th or King's
 Wood, Herbert W. Capt. R.E. (11)
 Wood, Thomas Lieut.-Gen.
 Wood, Sir William, KCB. KH. Gen. Col.
 14th Regt. (11)
 Wood, William Lieut.-Col. h.p. R.M.L.I.
 (11)
 Wood, Wm. Mark Col. (ret.) Coldm. Gds.
 Woodall, J. W. Major East and North
 York Art. Mil. (11)
 Woodford, Sir John G. KCB. KCH. Maj.-
 Gen.
 Woodgate, Francis Capt. (ret.) 2nd Life
 Gds.
 Woodhead, H. Esq. Navy Agent
 Woodroffe, G. W. F. Cornet (ret.) R. H.
 Gds. (11)
 Woods, Wm. Fell Capt. 40th Middx. Rifle
 Vols. (11)
 Woodward, John Capt. unatt.
 Woolley, O. B. B. Capt. Royal Art. (11)
 Worcester, H. A. W. F. Manqueis of Cornet
 Royal Horse Guards (11)
 Worsley, Francis Capt. Isle of Wight Mil.
 (11)
 Worsley, G. F. Capt. R.A. (11)
 Wray, Henry Lieut.-Col. R.E. (11)
 Wray, J. Esq. Dep.-Lieut. Lincoln
 Wright, C. J. Lt.-Col. 1st Nottingham
 (Robin Hood's) Rifle Volunteers (11)
 *Wright, D. Asst.-Surg. Residency Nepal
 (11)
 Wright, Edward W. C. Col. late 21st
 Dep. Batt. (11)

Wright, S. H. Lieut. R.N.R. (11)
 Wright, W. Esq. late Commissariat Dep.
 Wrottesley, H. Geo. Capt. R.E. (11)
 Wulff, H. Powell Maj.-Gen. (ret. f.p.) R.E.
 Wyatt, Sir Matthew Lieut. late Hon.
 Corps of Gent.-at-Arms (11)
 Wygram, Godfrey J. Capt. Coldm. Gds.
 Wyndham, H. Henry, MP. Capt. (ret.)
 1st Life Gds.
 Wynne-Finch, C. A. Capt. Sco. Fus. Gds.
 (11)
 Wynne, E. W. L. Lt.-Col. Gren. Gds.
 Wynne, G. Col. R.E. (11)
 Wynyard, E. G. Col. (ret.) Gren. Gds. (11)
 Wyre, A. G. Capt. 48th Regt.
 XIMENES, W. R. Capt. (ret.) 8th or
 King's (11)
 YARBOROUGH, EARL OF late Captain
 Roy. N. Lincolnshire Mil.

Yeates, W. W. Esq. late Dep. Asst. Comy.-
 Gen.
 Yeo, Gerald, MD. Surg. R.N. (11)
 Yolland, Wm. Col. R.E. Railway Depart.
 Board of Trade (11)
 Yonge, Edm. Rear-Adm. (11)
 *Yonge, G. N. K. A. Lt.-Col. 1st W. I.
 Regt. (11)
 Yonge, Henry J. Capt. 61st Regt.
 Yonge, W. L. Capt. R.A. (11)
 Yorke, Sir Charles GCB. General
 Col. Rifle Brigade (11. 10e.)
 Yorke, J. CB. Major-General (11)
 Young, Chas. Allen Major late 33rd Regt.
 Young, C. F. Major Roy. Art. (11)
 Young, Thos. Major (ret.) 37th Regt.
 (11)
 Young, Wm. late Chief Com. Gen. Field
 Train Department, R.A. (11)
 Youngusband, C. W. Col. Roy. Art.
 Yule, Patrick Maj.-Gen. R.E. (11)

LIST OF LIFE MEMBERS.

ABERGAVENNY, Rev. J. KARL of Dep.
Lieut. Norfolk
Adair, H. A. Capt. 52nd L. I. (94)
Airey, J. M. C. Comr. R.N.
Airey, J. T. CB. Col. (ret. h.p.) Coldm. Gds.
Alcock, Thos. St. L. Lt.-Col. Commt.
Roy. East Mid. Mil. (34)
Aldham, W. C. CB. Capt. R.N. (34)
Alexander, R. Lieut.-Gen. Col. H.M.
24th Mdr. N.I. (34)
Allen, J. L. Esq. Dep. Lieut. Perthshire
Anderson, Thomas Maj. 64th Regt.
Andrews, Rob. A. Lt.-Col. (ret.) 30th
Regt.
Archer, Clement R. Capt. late 4th Dr. Gds.
Armstrong, R. S. Maj.-Gen. R.A.
Armstrong, Thomas Maj. late 2nd W. I.
Regt.
Arrow, W. G. Maj. late 28th Bomb. N. I.
Ashburnham, Hosa. Thomas CB. Lt.-Gen.
Col. 82nd Regt.
Ashmore, Chas. Maj.-Gen. Col. 50th Regt.
Atkinson, Thos. Lieut. 1st Royals
Austin, Thomas Colonel late 69th Regt.
Aylmer, H. Major-Gen. (ret. f.p.) R.A. (34)
Aylmer, T. C. Col. unatt. (94)
BADDELEY, F. H. Maj.-Gen. (ret. f.p.)
R.E.
Bago, Charles Col. 3rd K. O. Stafford
Mil. late Gren. Gds.
Bago, George Major 69th Regt. (94)
Baldock, W. Lieut. late Rifle Brigade
Balfour, C. James Capt. R.N.
Balfour, F. W. Major late Rifle Brig. (94)
Balfour, Geo. CB. Major-Gen. R.A.
Madras (34)
Barclay, A. R. Capt. late Sur. Yeomanry
Barclay, D. W. Capt. late 90th L. I.
Barlow, Geo. Capt. 4th Duke of Lanc.
Owen L. I. Mil.
Barnston, R. H. Esq. Dep.-Lt. Cheshire
Baron, R. J. Lieut.-Col. (ret.) R.E. (104)
Barrell, Justinian Capt. R.N. (104)
Barrow, W. P. Lieut. R.N. (94)
Bartley, J. Cowell Lt.-Col. 5th Fus.
Barrell, William Capt. R.N.
Bassei, J. P. Capt. R.E. Bengal (94)
Bastard, W. B. Capt. late 90th L. Inf. (34)
Bateman, H. W. Lieut. 31st Regt. (94)
Bayfield, H. W. Admiral
Baylis, E. W. D. Ens. 36th Middlx. Rifle
Vols. (94)
Baylis, H. Inglis Lieut. H. M. 39th Beng. N.I.
Baylis, T. H. Capt. 36th Middlx. Rifle
Vols. (94)

Bayly, John Col. R.E. (104)
Baynes, G. Macleod Capt. h.p. R.A.
Baynton, W. H. Capt. late 12th Royal
Lancers
Beardon, George Capt. R.N.
Beauchamp, Lord Amelius W. Capt. R.N.
Beasley, Geo. G. Capt. 83rd Regt. (94)
Belcher, Sir Edward, KCB. Vice-Adm.
Bell, Chas. Wm. Lt. late 15th King's Huss.
Bell, Sir John, GCB. Gen. Col. 4th Regt.
Benice, H. B. Col. late Suffolk Art.
Bere, E. B. Major late 45th Regt.
Beresford, Wm. Hy. Capt. late Rifle Brig.
Best, Hosa. Henry Mid. late R.N. (94)
Best, T. C. H. Major (ret.) 72nd Highls. (94)
Bidwell, J. FSA. Lt. late Queen's Roy.
Vols.
Bingham, G. W. P. CB. Col. (ret.) 64th
Regt.
Black, B. West Major-Gen. late R.A.
Madras (94)
Black, William, Esq. late Mid. R.N.
Blair, William Fordyce Capt. R.N.
Blakeley, A. T. Capt. late R.A. (104)
Blanchard, Rich. Esq. late Lieut.-Gov.
and Vice-Adm. of Vancouver's Island
Blundell, H. B. H. Capt. Gr. Gds. (94)
Boileau, C. L. Major late Rifle Brigade
(14)
Boileau, Sir J. P. Bert. Lieut. h.p. 90th
L. Inf.
Bonamy, John Lt.-Col. (ret.) 6th Regt.
Borland, Oswald Comr. R.N.
Borton, Arthur, CB. Col. Brig.-Gen.
Comg. 2nd Inf. Brig. Curragh
Boulbee, Fred. Moore Rear-Adm.
Bourchier, Jas. J. Major (ret.) 52nd L.I.
Infry. (94)
Bourne, Jas. Col. Commt. Roy. Lan. Art.
M.P. (94)
Boustead, John, Esq. Army Agent (34)
Bowen, A. F. J. Comr. R.N.
Brakazon, Rev. W. J. M. late Chaplain
to the Forces
Brandreth, Thomas Capt. R.N. (94)
Brandill, R. A. Capt. 86th Roy. Co.
Down (94)
Breton, H. W. Lt.-Gen. Col. 56th Regt.
(34)
Breton, Peter Wright Capt. Hants Mil. (94)
Breton, W. H. Comr. R.N. (34)
Bright, R. O. Col. 19th Regt.
Brigstocke, G. C. H. P. Capt. late 4th R.I.
Drag. Gds.
Brocas, Bernard Lieut. late 6th Drag. Gds.

Brook, G. S. Esq. Ordn. Storekeeper
Broughton, J. C. Lord, GCB. Col. R.
Wilts Mil.
Brown, R. Esq. FRS. FLS. late Surgeon
Scotch Fencible Regt.
Browne, H. R. Lt.-Col. 20th Regt. (94)
Browne, Lord John T. late Lieut. R.N.
Browne, Fea. Archde. R. W. M.A. late
Chaplain to the Forces
Browne, W. B. Ensign late 68th L. I.
Brymer, J. Capt. late 5th Drag. Gds. (34)
Buedach, Walter F.M. Duke of K.G. K.T.
FRS. Lord-Lieut. Co. Mid Lothian
Buchan, G. W. Fordyce Col. (ret.) R.H.
Gds.
Buckie, W. Hill Lieut. late 14th Regt.
Buckley, E. P. Gen. Col. 83rd Regt.
Buckmill, J. T. Lieut. R.E. (94)
Budge, John Comr. R.N.
Buller, E. M. Major Rifle Brigade (94)
Burdett, Francis Lieut.-Col. late 17th Lanc.
Burdett, Sir Robert, Bart. Col. late 68th
L.I.
Burrard, Sidney Lieut.-Col. Gren. Gds.
Burriss, E. N. Lieut. late Ceylon Regt.
Burrows, R. E. KH. Col. late 69th Regt.
Burslem, G. J. Capt. late 94th Regt.
Butler, Henry Thomas Capt. 4th Huss. (94)
CAMBRIDGE, H. R. H. GEORGE W. F. C.
DUKE OF, K.G. GCB. GCMG. Field-
Marshal, Commanding-in-Chief, Col. Gren.
Gds. Roy. Art. Roy. Eng.
Cadmam, W. E. Capt. 5th W. York Mil.
(94)
Caldwell, Charles B. Capt. late 69th Regt.
Caldwell, Henry, CB. Capt. R.N.
ADC. to the Queen (34)
Caldwell, William Chas. Capt. late 47th
Regt. (34)
Calvert, A. M. Capt. R.H. Art. (34)
Campbell, A. J. Lt.-Col. late 16th Regt.
Campbell, Archibald Col. late 46th Regt.
Campbell, D. L. Lieut. late 9th Royal
Lancers
Campbell, P. A. Capt. R.N. ADC. to the
Queen (34)
Campbell, Robert Comr. R.N.
Cannon, Edward St. Leger Rear-Admiral
Cannon, Frederick Capt. R.N.
Cardigan, Jas. Thos. EARL of, KCB. Lt.-
Gen. Col. 11th Hussars (94)
Carey, Le Marchant Capt. late 66th Regt.
Carey, Wm. Capt. R.A. (94)
Caryon, T. F. Lieut. 14th Regt. (94)
Carranahel, Chas. M. CB. Lt.-Gen. Col. 20th
Huss. (104)
Carmichael, Geo. Lynedoch Major 95th
Regt.
Carpenter, C. Comr. R.N.
Castle, William Lanford Rear-Adm. (104)
Cautley, Sir Proby T. KCB. Col. (ret.)
Bengal Art. (34)
Cavan, P. C. Lieut.-Col. late 30th Regt.
(34)
Cave, Lawrence Trent Cap. late 54th Regt.
Chalmers, P. Esq. Capt. late 3rd Drag. Gds.

LIST OF LIFE MEMBERS.

33

Chaloner, Thomas Capt. R.N. (34)
Chamberlaine, W. C. Capt. R.N. (94)
Chambers, Montague, Esq. Q.C. MP. late
Lieut. 71st High. Light L. (94)
Chapman, J. J. Capt. h.p. R.A.
Charlewood, E. P. Capt. R.N. (94)
Chetwode, R. Col. h.p. 2nd Drag. Gds.
Chichester, Hosa. Aug. G. C. Col. 77th
Regt. (94)
Christie, S. Hunter, Esq. MA. late Prof. of
Mathematics Roy. Mil. Acad. Woolwich
Christie, W. J. Capt. late Gren. Gds.
Churchill, Lord Alfred late Lieut. 83rd
Regt.
Clarke, Geo. Calvert Col. 2nd R. N. B.
Drags.
Clarke, H. W. Lieut. R.E. (34)
Clarke, M. de S. M.K. G. A. Capt. 60th
Regt. (94)
Claverling, Sir William A. Bart. late
Capt. Northumb. Mil. (34)
Clayton, Matthew Capt. Northumb. Yeo.
Cav.
Clery, James Major (ret.) 100th Regt. (94)
Clinton, Frederick Col. late Gren. Gds. (34)
Clinton, H. Col. (ret.) 11th Huss.
Clinton, Hen. R. Capt. Gren. Gds. (94)
Cocks, Philip Reginald Col. late R.A. (34)
Cockington, W. Comr. R.N. (94)
Collett, J. Townsend Admiral
Collett, H. Capt. H.M. Beng. Staff Corps
(94)
Collings, J. E. Col. 33rd Regt. (94)
Colville, Henry Lieut.-Adm.
Conroy, H. G. Col. late Gren. Gds.
Cooke, J. G. Capt. 7th Lan. Mil.
Cooke, William Ensign 10th Regt. (94)
Cooke, George Capt. unatt. (34)
Cooper, D. S. Capt. late 1st Royals
Cooper, Henry Major-Gen.
Cooper, Leon Morse Col. unatt.
Coote, Robert Capt. R.N. (34)
Corbett, William Major late 52nd L. Inf.
Cotton, W. Esq. Deputy-Lieut. Essex
Cox, J. W. Col. (ret. h.p.) 13th L. Inf.
Asst.-Adjutant-Gen. Shorncliffe (94)
Craig John Major Roy. N. Down Rifles
(94)
Crawford, Charles Capt. R.E. (94)
Crofton, John F. Maj.-Gen.
Crooke, G. S. Major late 28th Regt.
Crutcheley, Charles Major-Gen. Com-
manding Troops, Gibraltar (34)
Cunninghame, A. A. T. CB. Major-Gen.
Comg. Troops, Curragh
Cuppago, Alex. Cornet late 4th Dr. Gds.
Curling, J. J. Lieut. R.E. (94)
Cust, Hosa. Sir E. KCH. Gen. Col. 16th
Lancers (34)
Cust, Hosa. P. F. Col. late 22nd Regt. (34)
D'AGUILAR, H. T. Lt.-Col. late Gren. Gds.
Dando, A. C. Capt. Royal Naval Reserve
(94)
Dashwood, W. B. Admiral
Daubney, H. C. B. Col. h.p. 71st High.
L. Inf. (94)

Davis, Sir John F. Bart. KCB. Deputy-Lieut. Gloucestershire (91)
 Dave, Charles Major late 8th or King's
 Dawson, Hon. R. M. W. Capt. Gren. Gds. (91)
 Dawson, Wm. Commr. R.N. (91)
 Deacon, H. C. Admiral
 Deane, H. C. Lieut. 17th Regt. (91)
 De Blase, Henry, BARON late Capt. 4th Royal South Middlesex Bn. (91)
 Denison, Sir W. T. KCB. FRS. Col. R.E.
 Dennis, M. S. T. Lt.-Col. h.p. 78th Regt.
 Derrymann, S. H. Capt. R.N. (91)
 Derville, Adolphus Lieut.-Gen. H.M. Madras Army
 De Winton, C. L. Major (ret.) 76th Bt. (91)
 Dicken, H. Perry Commr. R.N.
 Digby, J. A. Lieut.-Col. late Gren. Gds.
 Dixon, Matthew Capt. R.N.
 Dobie, Robert Surgeon R.N. (31)
 Downman, John Capt. of Invalids Royal Hospital, Chelsea
 Downshire, Manqris of Col. Roy. S. Down Mil.
 Drake, Sir T. T. F. E. Bart. Dept.-Lieut.
 Dromon, late Major 52nd Lt. Inf.
 Drax, J. S. W. E. Capt. late E. Kent Mil. (31)
 Drummond, Hon. James Robert, CB. Rear-Admiral, Superintendent H.M. Dockyard, Devonport
 Dugmore, W. F. J. Capt. Sec. Fus. Gds.
 Dundas, P. Col. late 96th Regt.
 Dunlop, Hugh, CB. Rear-Adm. (31)
 Dunstons, J. A. Admiral
 Durrant, Francis Lieut. R.N. (91)
 Dutton, Wm. Holmes Col. unatt.
 Dyer, S. H. Capt. (ret.) 8th or King's (91)
 EDINBURGH, H. R. H. A. E. A. DUKE OF KG.
 *Earle, Wm. Lieut.-Col. Gren. Gds.
 Ebury, LORD Capt. late Flint Yeom.
 Eden, A. D. Lieut. 26th Camerons (91)
 Edwards, Richard Capt. R.N.
 Edwards, Sampson Commr. R.N.
 Egmont, Rant of, Admiral (31)
 Elgee, Charles Lieut.-Col. 23rd R. W. Fus. (91)
 Ellenborough, Edward, EARL of GCB.
 Elliot, Sir Charles, KCB. Capt. R.N.
 Ellis, Arthur Capt. Gren. Gds. (91)
 Ellis, Robert Capt. Roy. Vic. Rifle Vols. late Hon. Art. Co.
 Elwes, R. H. H. E. Capt. late 12th Regt.
 England, W. G. Commr. R.N. (91)
 Evans, T. W. Esq. Dep. Lieut. Derby, MP. (91)
 Evelyn, G. P. Lt.-Col. Commr. 1st R. Surrey Mil. (31)
 Eversley, Viscount Col. Commr. Hampshire Yeo. Cav. (10x)
 Ewart, C. B. Lieut.-Col. R.E.
 Ewart, David Col. (ret.) Bengal Artillery
 FABER, W. Lieut. late 14th Lt. Drags.

*Fanshawe, Edward Gennys Rear-Admiral
 Farmer, W. R. G. Capt. (ret.) Gren. Gds.
 Farquhar, Harry R. Lieut. 24th Regt. (91)
 Farquharson, F. Gen. H.M. Bomb. Army (11)
 Farquharson, G. M.B. Major H.M. Bomb. Staff Corps (91)
 *Feilden, G. R. Major 78th Highlanders (91)
 Feilding, Hon. F. R. B. Col. Coldm. Gds.
 Festing, E. R. Capt. R.E. (91)
 *Field, E. Commr. R.N.
 Fishbourne, Edm. Gardiner, CB. Capt. R.N. (31)
 Fisher, E. R. Capt. (ret.) 4th R. I. Drag. Gds. (31)
 *Fitzclarence, Hon. George Commr. R.N. (31)
 Fitzgerald, H. C. Major h.p. 33rd Regt. (91)
 Fitzmayer, James W. CB. Col. 91st
 Fitzwilliam, F. W. J. Col. 15th Huss.
 Fletcher, E. C. Major-Gen. late 3rd Drag. Gds. (31)
 Flood, Warden Capt. late 51st Lt. Inf.
 Foley, T. H. Lord-Lieut. co. West. Lancashire (31)
 Forbes, J. A. Lieut.-Col. late 92nd High.
 Fordyce, C. F. CB. Col. unatt. Mil. Soc. to Gov. of Madras (91)
 Foster, Thos. Lt.-Gen. Col. Commr. Royal Engineers (31)
 Fox, Charles Richard General Col. 57th Regt. (31)
 Franklin, Rich. Lt. late 1st Life Gds.
 Fraser, Alexander M. Lieut.-Gen.
 Fraser, Chas. McKenzie Col. Ross. Mil. (31)
 Fraser, Sir Will. Aug. Bt. Capt. late 1st Life Gds.
 Frederick, E. CB. Gen. H.M. Bomb. Army
 Freeland, H. W. Esq. Dep.-Lieut. Sussex (31)
 Freer, J. H. Lieut.-Gen. (ret.) R.A.
 Frith, Cockayne Capt. late 88th Regt.
 Frith, J. G. Esq. late Mid. R.N. (31)
 *Fullford, John Rear-Admiral
 Fuller, T. Capt. 18th Huss. (91)
 GAMBIER, G. C. Admiral
 Gardiner, H. L. Col. Roy. Art.
 Gardiner, J. Capt. late 5th Drag. Gds.
 Garnham, John Commr. R.N. (31)
 Garrett, E. Commr. R.N. (31)
 Gascoigne, Fred. C. Trench Lieut.-Col. 1st (Leeds) Yorkshire Artillery Vols. late Capt. 68th Regt. (31)
 Gassiot, Sebastian Lieut. R.N. (91)
 Gawen, J. C. G. Roberts Admiral (31)
 Geddes, J. G. Lieut.-Col. unatt.
 George, F. D. CB. Major-Gen. unatt. (31)
 Gerard, F. Major Lane. Huss.
 Gerard, Sir Robert T. Bart. Lieut.-Col. Lane. Huss.
 Gibson, Sir James Brown, KCB. MD. late Dir. Gen. of the Army Med. Department
 Gibson, B. Esq. Capt. late 28th Regt.
 Gibsons, John C. H. Major-Gen.
 Gillum, W. J. Major unatt.
 Glouchon, Victor F. F. E. G. A. C. F. Coty Capt. R.N. (91)

Glen, Joseph Phys.-Gen. (ret.) Bomb. Army
 Goddard, A. Lethbridge Capt. R. Whits
 Yeo. Cav. MP.
 Godman, R. Temple Capt. 5th Drag. Guards (31)
 Godwin, John Capt. late Eng. Corps
 Turkish Contingent (31)
 Goldie, James Capt. 16th Lancers (91)
 Goodenough, James G. Capt. R.N. (31)
 Gordon, Sir J. W. KCB. Major-Gen. R. E. (31)
 Gordon, G. T. Rear-Admiral
 Gordon, Sam. E. CB. Col. R.A.
 Gordon, Wm. Lt.-Col. late 24th Regt.
 Gore, James A. Major h.p. 71st High Lt. Inf.
 Gorman, W. J. Capt. late Ceylon Rifles (91)
 Gosset, A. Maj. (ret.) R.A.
 Gosset, Henry Adm. (31)
 Grant, A. Capt. late 61st Regt.
 Grant, John Jas. Col. (ret.) Roy. Can. Rifles
 Gray, Bertie J. Lieut. late Roy. Afr. Corps
 Gray, C. G. late Lieut.-Col.
 Gray, R. A. Esq. late Hon. Corps of Gent.-at-Arms
 Grey, Hon. Charles Lieut.-Gen. Col. 71st Highland Lt. I. (31)
 Grey, Sir George, KCB. late Capt. 53rd Regt. (31)
 *Grey, Ralph William Lieut.-Col. 26th Middle. Rifle Vols.
 Griffith, Henry Darby, CB. Maj.-Gen.
 Grosvenor, EARL Lieut.-Col. Queen's Westminster Rifle Vols. MP. (91)
 Grover, Rev. H. M. late Chaplain to the Forces (31)
 Gunnell, E. H. Commr. R.N. (10x)
 Gunter, Robert Capt. late 4th Drag. Gds.
 *HAGGARD, Thos. T. Lt.-Col. R.A. Bom. Agent for manufacture of Gunpowder (91)
 Haig, C. T. Capt. R.E. (31)
 Halifax, Right Hon. Charles Viscount, GCB. late Secretary of State for India
 Halkett, J. Craigie Capt. High. Borders. Lt. I. Mil. (91)
 Hall, G. B. Lt. late 19th Lt. Drags.
 Hall, Henry Lieut.-Col. (ret.) Mad. Army
 Hall, Marshall Lieut. Roy. East Middle. Mil. (31)
 Hall, Thos. Lt.-Col. unatt.
 Hall, W. H. Lieut. R.N. (91)
 Hallowell, Edw. Esq. Dep.-Lieut. Middlesex
 Hallyburton, J. F. G. Lord, GCH. Vice-Adm.
 Halsey, H. W. R. W. Esq. Dep.-Lieut. Sussex (31)
 Haly, Geo. T. Col. (ret.) 108th Madras Inf. (10x)
 Hamilton, A. P. Admiral (31)
 Hamilton, Sir C. J. J. Bt. CB. Lt.-Col. late Scots. Fus. Gds. (31)
 Hamilton, H. G. Capt. R.N. (31)
 Hamilton, Sir J. J. Bart. Lt.-Col. late 39th Regt.
 Hamilton, J. Capt. late Beng. Cav. (91)
 Hand, Geo. S. CB. Rear-Adm. (31)
 Hand, Geo. Weightman Lieut. R.N. (31)
 Hankey, H. A. Lieut.-Gen. Col. 3rd Huss.
 Hammer, H. KH. Col. late R. H. Gds.
 Harcourt, G. S. Esq. Dep.-Lieut. of Bucks (31)
 Harding, Francis Rear-Adm.
 Hardinge, Edward Capt. R.N. (91)
 Hardinge, Henry Lieut.-Col. (ret.) Rifle Brigade
 Hardwick, J. Esq. DCL. Dep.-Lieut. Tower Hamlets
 Hare, H. J. Capt. 4th W. York Mil.
 Harris, J. B. Capt. late 24th Regt.
 Harrison, Rev. Oct. Swale, MA. Chaplain
 Hart, A. Fitzroy Lieut. 31st Regt. (91)
 Harvey, Gilmour Capt. R.N. (10x)
 Harvey, John Wm. Francis Lieut. R.N. (91)
 *Harvey, Thomas Rear-Adm. (31)
 Hawes, A. B. Capt. late Beng. Army
 Hawkins, Ethelred Capt. late 22nd Regt.
 Hawkins, F. Capt. late 80th Regt.
 Hawkins, J. S. Col. R.E. (31)
 *Haworth, B. B. Lt.-Col. 22nd East York Art. Vols. (91)
 Hay, James Beckford Lewis Rear-Adm.
 Hay, John Baker Porter Rear-Adm.
 Hay, Sir John C. D. Bart. FRS. MP. Rear-Adm. Lord of the Admiralty.
 Haygarth, F. Lt.-Col. (ret.) Sco. Fus. Gds.
 Heston, John R. Lieut.-Col. h.p. 37th Regt. (91)
 Hemery, Clem. Col. Jersey Mil.
 Henderson, G. W. M. Capt. late Sco. Fus. Gds. (91)
 Henry, Robert John Capt. late 4th R. I. Drag. Gds.
 Herbert, Hon. A. W. E. M. Lieut. (ret.) 7th Huss. (91)
 Hewes, T. O. Capt. R.N.
 Hibbert, F. D. Capt. R. Bucks Yeo. late 2nd Drags.
 Hilton, Thos. Capt. late 19th Regt.
 *Hincks, A. S. Capt. 70th Regt. (91)
 Hodge, Edw. C. CB. Major-Gen. unatt. (31)
 Holbrook, E. N. W. Lieut. Roy. Marine
 L. I. (91)
 Holdich, E. A. CB. Major-Gen. unatt. (91)
 Holland, R. S. Dep.-Lieut. co. Gloucester
 Capt. Roy. Glouc. Huss. (31)
 Holland, E. Capt. R.N.
 Hooper, Rd. Wheeler Maj. (ret.) 69th Regt.
 Hope, Sir Jas. GCB. Vice-Adm.
 Hope, Wm. CB. Col. h.p. 71st High. Light Inf. (91)
 Hope, Thos. Major-Gen. (ret.) R.E.
 Howarth, Wm. KH. Admiral
 Howtown, Wallace Rear-Admiral
 Howard, Hon. E. Vice-Admiral
 Howorth, B. Lt.-Col. (ret.) R.E.
 Hubbard, Chas. G. Lieut. Gren. Gds. (91)
 Hulse, Sir Edward Lt.-Col. late S. Hunts Mil.

Humbly, Wm. Wellington Waterloo Capt.
late 9th Royal Lancers
Hume, J. R. Major 55th Regt. (91.)
Hume, R. CB. Col. 55th Regt. (91.)
Hussey, Wm. Hayter Capt. late 26th
Regt.
Hutchinson, W. B. Clerk, R.N.
INGILBY, Sir Wm. Bates, KCB. Maj-
Gen. Col. Commandant R.A.
Irving, Alex. CB. Major-Gen. (ret.) R.A.
JAMES, George Maj.-Gen. (ret.) R.A.
James, W. Major late 26th Regt.
Janvris, F. Esq. late Ensign 20th Regt.
Jarvis, Sir Samuel Raymond Lt.-Col. h.p.
7th Drags. Dep.-Lieut. Hants (91.)
Jekyll, Herbert Lieut. R.E. (91.)
Jerrisse, F. J. E. Esq. Dep.-Lt. Hants
(91.)
Johnson, G. V. Lt.-Col. R. H. Art. (91.)
Johnson, Sir H. A. Bart. Capt. late 51st
Regt.
Johnson, Sir H. F. F. Bart. Lieut.-Col.
h.p. 5th Fus.
Johnson, W. S. Lieut. late 83rd Regt.
Johnstone, James C. Commr. R.N.
*Johnstone, J. Julius Lieut.-Col. Gren.
Gds.
Jones, Hugh M. Lieut.-Col. 73rd Regt. (91.)
*Jones, Oliver J. Commodore 2nd Class
and Senior Officer, Hong Kong (91.)
Jones, R. O. Capt. R.E. (91.)
Jones, Theobald Admiral
KELL, W. G. Capt. late K.O.L.I. Mil.
Kelly, Wm. Rear-Adm.
Kelso, E. P. P. Lieut. R.N. (91.)
Koppel, Edw. Geo. Ensign 74th High.
(91.)
Koppel, Fred. Chas. Lieut.-Col. Gren.
Gds. Equerry to H.R.H. the Prince of
Wales (91.)
Koppel, W. A. H. Lieut. Norfolk Mil.
Art.
*Kerr, Rt. Hon. Lord Fred. H. Capt. R.N.
Kerr, William Dalrymple, MD. Surg. R.N.
(91.)
*Key, Asley C. CB. Rear-Adm. Acting
Director-Gen. of Naval Ordnance
Kinahan, Richard G. Lieut. R.N. (91.)
King, Henry Capt. R.N.
King, H. B. Commr. R.N. (91.)
King, T. H. Esq. late H.E.I.C. Serv.
Kingsmill, W. Capt. late S. Hants Militia
Kirkland, Sir John, Kt. Army Agent
Knowles, W. Major (ret.) 50th Regt.
Knob, B. W. MP. Lt.-Col. R. Bucks Yeo.
Car. late Lieut.-Col. Seco. Fus. Gds.
LAMB, Henry late Lieut. H.M. Indian
Navy (91.)
Lambert, Thomas Capt. late R.A. (104.)
Larcom, Thos. Aiskew, CB. Major-Gen.
(ret.) R.E.
Lardner, Wm. Lieut. late 2nd W. I. Regt.
Lardy, Christian Fred. Lieut.-Col. late
59th Regt.
Last, Edward Major-Gen. (ret. full pay)
21st R.N.B. Fus.
Lauderdale, Earl of, KCB. Vice-Adm. First
and Principal ADC. to the Queen (91.)
Lawrence, J. R. Capt. late Indian Navy
Lawrence, A. Johnstone, CB. Maj.-Gen.
(91.)
Lawrence, Sir John L. M. Bart. GCB. GCSE.
Viceroy and Governor-General of India
(91.)
Lawson, Robert Insp.-Gen. Hospitals
(91.)
*Layard, C. E. Capt. 15th Regt. (91.)
Layard, Henry L. Capt. late 97th Regt.
Lecky, John G. Lieut.-Col. (ret.) 23th
Regt.
Lee, J. H. Lieut. late South Hants Mil.
Le Mesurier, F. A. Capt. R.E. (91.)
Lemos, Lord J. G. Lieut.-Col. late 6th
Drags.
Lemos, W. O. E. CB. Col. R.E. (91.)
Lewis, George Chas. D. Major (ret.) R.E.
(91.)
Lewis, Henry Commr. R.N.
Ley, J. M. Col. (ret.) Madras Artillery
Liddell, Hon. Geo. A. F. Col. (ret.) 6th
Drags. (91.)
Liddell, W. H. Commr. R.N. (91.)
Little, R. R. Capt. late Madras H. Art.
Lloyd, E. M. Lieut. R.E. (91.)
Lloyd, John H. Commr. R.N.
Lloyd, Mark Capt. unatt.
Lloyd, William, MD. Surg. h.p. 96th Regt.
Lodder, W. W. Major-Gen. unatt. (91.)
Loftus, Douglas Lieut. late Gren. Gds.
Long, Samuel Lt.-Col. late Gren. Gds.
Long, Samuel Lieut. R.N. (91.)
Loyd, W. K. Lieut.-Col. (ret.) Madras Ar.
(91.)
Lucas, H. H. late H.E.I.C. Sea Service
Luce, William Commr. R.N. (104.)
Lugard, Sir Edw. GCB. Lieut.-Gen. Col.
31st Regt. Under Sec. of State for War
(91.)
Lyell, T. Commr. R.N.
*Lydney, W. G. Major Inns of Court Yeo.
(91.)
*MABERLY, Evan, CB. Col. R.A.
Macaulay, G. W. Major. Commandant Lt.
Regt. Scinde Horse (91.)
Maclean, Archibald Col. (ret.) R.A.
McCall, S. Lieut. late 5th Drags. Gds.
McClean, J. B. Lieut.-Col. Eng. and Rail-
way Vol. Staff Corps (91.)
McClintock, William Lieut. R.A. (91.)
McDiarmid, H. C. Lieut. R.E. (91.)
McDonald, Alex. MD. Surg. h.p. Ord.
Med. Dept.
Macdonald, Alex. Lieut.-Col. late 68th L.I.
(11. 14.)
McDonnell, Christo Capt. 4th R.I. Drags. Gds.
Macdonough, A. M. Esq. Roy. Archers of
the Queen's Body Guard
McHardy, J. B. B. Vice-Admiral
Mackenzie, Keith Stewart Lieut. late 90th
L.I. Inf. (91.)
Mackenzie, R. I. M. Lieut. R.A. (91.)

Mackintosh, G. D. Esq. late Hon. Corps of
Gent.-at-Arms
*Mackirdy, D. E. Col. 69th Regt.
*Maclean, Henry John Major Rifle Brig. (91.)
Maclean, J. L. Capt. late 69th Regt.
McLennan, J. MD. Phys. Gen. (ret.)
Bombay Army (91.)
McNile, Alex. Capt. h.p. Indian Army
(91.)
Maiden, Chas. Capt. R.N. (91.)
Mahon, D. Major late 98th Regt.
Mahon, H. J. Pakenham Lieut. late 8th
Huss.
Mainwaring, K. H. A. Lieut. R.N. (91.)
Maitland, Fred. Thos. Col. late R.S. Corps
Makson, E. Capt. Q. O. L.I. Mil. (91.)
Malet, Sir A. Bart. Dep. Lieut. of Wills
late Col. Yeo. Cav.
Manchester, W. D. Duke of, Major Hunt-
ingtonshire Ls. Horse Vols. (11.)
Manners, Russell H. Admiral
Manning, C. A. Capt. late 2nd Surrey
Yeomanry (104.)
Mansel, J. C. Capt. late Northumb. Mil.
Margary, A. R. Major late 54th Regt. (91.)
Marsh, J. C. Esq. Asst. Surg. late
Notts Mil. (91.)
Marshall, W. Lieut.-Col. late Particular Ser.
Marshall, Wm. Esq. Deputy Lieut. Cumb.
MP. (91.)
Martin, James Capt. late Rifle Brigade
Martin, T. Admiral (104.)
Mason, Geo. Capt. late 4th Foot
Massie, Watkin Lieut. late Ind. Army (91.)
Matson, Henry Major late 58th Regt.
Mayne, Dawson Capt. R.N.
Mase, Edw. Capt. Hon. Art. Co. (91.)
Meikhan, J. Lieut. late 9th Lancers
*Mein, A. Major 4th Lanark Rifle Vols. (91.)
Melville, H. Viscount, GCB. Lieut.-Gen.
Col. 60th Roy. Rifles
Merwer, Saml. Capt. R.N.
Milman, G. H. L. Lieut.-Col. R.A. (91.)
Molyneux, A. M. Lt.-Col. late 2nd Mad.
Eur. Lt. Inf.
Molyneux, A. Mitchell Capt. 23rd R. W.
Fus. (91.)
Molyneux, E. Capt. 7th Drags. Gds. (91.)
Molyneux, R. H. Mitchell Commr. R.N.
(91.)
Molyneux, W. H. Capt. R.N.
Moncrieff, Geo. Lieut.-Gen. (91.)
Moncrieff, Sir T. Bart. Col. Roy. Perth
Rifles late Lieut. Seco. Fus. Gds.
Montague, Willoughby Major (ret.) R.A.
Montefiore, Sir Moses Bart. FRS. Capt.
late Surrey Local Mil. and Deputy-Lieut.
of Kent
Montgomery, C. T. M. Lieut. Gren. Gds.
(91.)
Montresor, Fred. Byng Capt. R.N.
Moody, Rich. Clement Maj.-Gen. R.E.
Moore, J. Capt. late 30th Regt.
Moore, T. N. Commr. R.N.
Morant, J. H. L. Lieut. R.E. (91.)
Morris, Jas. A. Capt. Adj. 7th Depot Batt.
Morris, E. Lieut. late 54th Regt.
Mount, J. F. FRCGS. Surg.-Major H.M.
Beng. Army (91.)
Mould, John A. Dep. Insp. of Naval
Hosps. (91.)
Mould, Thos. Rawlings Major-Gen. (ret.)
R.E.
Mowbray, G. T. Capt. Leicester Mil. (91.)
Moynsey, H. G. Lieut. late 11th Drags.
Murehison, Sir Roderick Impey, Bart. KCB.
FRS., &c. late Capt. 7th Ls. Drags. (104.)
Murray, Alex. h.p. Staff Surg.
Murray, Dennis, MD. Major-Gen. Comm-
Troops, Chatham (91.)
Murray, John Geo. Lieut. R.A. (91.)
Murray, Sir Patrick Keith Capt. (ret.)
Gren. Gds. (91.)
Musgrave, Sir George Bart. Deputy-Lieut.
Cumberland and Westmorland
Muttlebury, J. E. Major late 3rd Buff.

NAPIER, W. C. E. Major-Gen. Vice-Presi-
dent of Council of Military Education (91.)
Neal, Wm. Capt. (ret.) 52nd Light Inf. (91.)
Neave, Everard S. Cornet 21st Huss. (91.)
Neels, Thos. Clarkson, Esq. late Mate R.N.
Nelson, Horatio Commander R.N. (91.)
Netterville, A. J. Lieut. late 12th Regt.
Neville, Park Percy Lt.-Col. late 63rd
Regt. Hon. Corps Gent.-at-Arms
Newsome, G. Capt. late 57th Regt.
Nicholl, Edward Lt.-Col. late 84th Regt.
Nicholson, J. A. Stewart Lieut. late Gren.
Gds.
Nisbet, Alex. MD. Inspector General of
Hospitals and Fleets
Nisbet, David, MD. Surg. (ret.) Rem. Army
Nokes, J. Major late 65th Regt.
*Nolloth, Matthew S. Capt. R.N. (91.)
Sollith, Peter B. Col. (ret. f.p.) R.M.L.I.
Northwick, Lonn Col. (ret.) Herefordshire
Mil.
Norton, J. F. Capt. 55th Regt. (91.)
Norton, R. T. L. Capt. late 2nd Life Gds.
Nugent, George Major (ret.) 2nd Drags. Gds.
O'CALLAGHAN, George W. Douglas Rear-
Adm.
O'Donnell, Sir Charles R. Gen. Col.
18th Huss.
Ogilvy, Wm. Major unatt.
Oldham, J. Wm. Capt. R.N. (91.)
Oliver, Rd. Aldworth Capt. R.N. (91.)
Olypherts, Richard Capt. late 1st W. I. Regt.
Omanancy, Erasmus, CB. Rear-Adm.
(91.)
Orle, Sir John P. Bart. Deputy-Lt.
Argyleshire
Osborne, J. H. W. Lieut. H.M. Bengal
Army, Reserve Survey C.P., Bengal (91.)
Otley, E. J. Capt. Edmonton R. Rifle
Regt. (91.)
Otway, C. W. Esq. late Mate R.N.
Ouvry, H. A. CB. Col. (ret.) 9th Royal
Lancers

PACKE, Edmund Capt. late R.H. Gds.
(34.)
Packer, G. H. Lt.-Col. (ret.) 24th Regt. (10.)
Pakenham, John Admiral
Pakenham, H. T. A. Capt. R.N. (32.)
Palmeila, Derek of late R.N. (94.)
Papillon, Alex. Fred. Wm. Major (ret.) R.A.
Parker, J. Capt. late Hon. Art. Co.
Parkinson, C. F. Col. late 70th Regt. (34.)
Parkinson, J. B. Capt. late 68th Lt. Inf.
*Parry, Charles Commr. R.N. (94.)
Parry, F. John Major K.O.L. Inf. Mtl.
Paschal, Geo. Fred. Lt.-Col. unatt.
Paterson, William Capt. late 60th Royal
Rifles, Prof. Mtl. Surveying Roy. Mtl.
Col. Sandhurst (34.)
Patton, Robert Admiral
Paulet, Lord William, KCB. Maj.-Gen. Col.
68th Lt. Adj.-Gen. to the Forces (34.)
Paynter, J. A. Capt. R.N. (94.)
Pence, R. Commr. R.N.
Peach, H. P. K. Cornet Warwick Yeo. Cav.
late Capt. R. H. Gds.
Peacock, G. J. Col. 16th Regt.
Pearl, Henry Cornet late 6th Drag. Gds.
Pearson, Sir Edwin, Kt. late Lieut. of the
Yeo. of the Guard
Pender, Francis Henry Major 25th K. O.
Borderers (14.)
Percival, Charles, Esq. late Vet. Surg. R.A.
Perston, David, MD. Surg. h.p. 13th Lt.
Dragoons
Pett, L. P. Esq. late Mid. R.N.
*Phillimore, Augustus Capt. R.N. (34.)
Phillips, H. C. M. Commr. R.N.
Pickard, A. F. Lieut. R.A. (94.)
Pigot, J. H. S. Esq. FAS. Deputy-Lieut.
Somerset
*Pike, J. W. Capt. R.N. (94.)
Pim, Bedford C. J. Commr. R.N. (94.)
Pinson, Albert Lt.-Col. H.M. 37th Madras
N. Inf.
Piper, H. Lt.-Col. late 38th Regt.
Pitman, John C. Capt. R.N.
Poland, J. A. Commr. R.N. (94.)
Pole, Arthur Canfield Maj.-Gen. (34.)
Pollock, Fred. Lieut. (ret.) Bengal Engrs.
Pollock, Sir Geo. GCB. GCSL. Gen. Col.
Commr. R.A. Bengal (24.)
Ponsonby, Henry Fred. Col. Gren. Gds.
(34.)
Poole, Wm. Halsted Capt. late N. Salop
Yeo. Cav. h.p. R.A.
Poore, Robert Major (ret.) 8th Huss. (94.)
Porcher, E. A. Commr. R.N. (94.)
Powell, Scott Capt. late 23rd R.W. Fus.
Powell, W. T. R. Lt.-Col. Commr. R.
Cardigan Rifle Corps
Powell, W. Wellington Capt. late 56th Regt.
Powis, E. J. Earl of Lt.-Col. Salop Yeo.
Cav. (94.)
Prendergast, H. N. D. & C. Major R.E.
Mad. (94.)
Precedent, Sir H. KCB. Admiral

Preston, D'Arcy S. Capt. R.N. (94.)
Preston, Sir Henry Lindsay, Bart. Capt.
R.N. (34.)
Preston, E. Lt.-Col. late 12th Regt.
Prevost, James C. Capt. R.N.
Priaux, Henry St. Geo. Capt. late K. O.
Stafford Rifles
Priaux, James Col. Roy. Guernsey Mtl.
ADC. to the Queen
Price, William, Esq. Army Agent
Prower, J. E. M. Capt. late 67th Regt.
QUICK, Geo. Capt. late 1st Royal Drags.
RAMSAY, G. A. Kt. Maj. late 77th
Regt.
Ramsay, Geo. Col. H.M. Beng. Staff Corps
Ramsay, William, CB. FRAS. Vice-Adm.
Ramsay, W. M. Major-Gen.
Ramsden, Frank Capt. R.N.
Ramsden, Sir John W. Bart. MP. Col.
W. York Art. Volunteers
Rawlinson, Sir Henry C. KCB. FRAS. MP.
Maj.-General (ret.) Bombay Army
Reed, Francis Capt. late 1st Roy. Drags.
Reynardson, Edw. Birch, CB. Col. late
Gren. Gds.
Reynolds, G. S. Capt. R.N.
Rhodes, Godfrey Major unatt. (34.)
Rich, G. W. T. CB. Col. h.p. 71st High.
Lt. (94.)
Richardson, James Capt. 4th Glamor-
gan Rifle Vols. (94.)
Richardson, Thos. Capt. h.p. 7th Huss.
Lieut. R.E. (94.)
Riddell, Charles J. B. CB. Maj.-Gen. R.A.
(34.)
Robe, Fred. Holt, CB. Maj.-Gen. late 87th
Roy. Irish Fus. (34.)
*Robertson, A. C. Col. 8th or King's (34.)
Robinson, George Capt. R.N. (94.)
Robinson, Robert S. Vice-Adm. Controller
of the Navy (34.)
Robinson, Walter F. Commr. R.N.
Madras Army
Rolf, J. E. Boggis Capt. h.p. 55th Regt.
Rooper, John Capt. late Rifle Brig.
Roscoe, S. Commr. R.N.
Ross, Eglington F. Lt. late 1st Roy. Sur.
Mtl.
Ross, J. T. C. FRAS. Surg. Staff (94.)
Ross, George Capt. R.E. (34.)
Rous, H. J. J. Adm.
Rous, Sir William, GCB. Gen. Col.
52nd Lt. Inf.
Rudge, John Capt. 10th Regt. (94.)
Russell, H. R. Capt. 57th Regt. (94.)
Russell, Sir William, Bart. CB. MP. Col. h.p.
14th Huss. (34.)
ST. QUENTIN, Matt. C. D. Col. late 90th
Lt. Inf.
Salkeld, T. C. Lt.-Col. late Indian Army
(94.)
Saltmarsh, A. Major 70th Regt. (34.)

Sandilands, E. N. Major H.M. Beng. Staff
Corps (94.)
Sandwith, F. B. Capt. 10th Regt. (94.)
*Saudys, H. Stair Lieut. R.N. (94.)
Saumarez, St. Vincent J. Lord de Col.
late 18th Lancers
Saurin, Wm. Lt.-Col. (ret.) Beng. Army
Sawbridge, S. Commr. R.N.
Scott, Daniel, MD. late Insp.-Gen. Army
Hospa.
Scott, James Rt. Capt. late 4th Drag. Gds.
Scott, John Bimsey Commr. R.N. (34.)
Scott, W. H. H. Esq. Asst. Mtl. Store-
keeper (94.)
Scratchley, P. H. Major R.E. (94.)
Seale, F. R. Esq. FGS. late St. Helena Regt.
Seymour, Sir G. P. GCB. GCH. Admiral
of the Fleet
Seymour, H. Maj. late 23rd R. Welch Fus.
Seymour, Sir Michael, GCB. Adm.
*Seymour, W. H. CB. Col. 2nd Drag. Gds.
(104.)
Shadwell, Chas. F. A. CB. Capt. R.N.
ADC. to the Queen (34.)
Shadwell, Lawrence Col. unatt. Military
Assist. War Office
Sharp, H. J. Major late 85th Regt.
Sharpe, J. H. Capt. 55th Regt. (94.)
Shawe, R. F. Major unatt.
Shearman, John Major late 48th Regt.
Sheffield, J. C. Capt. late 21st R. N. B.
Fusiliers (94.)
Shelly, J. Nicholas Surg. h.p. Greek Lt. Inf.
Sherer, Joseph, Kt. Rear-Adm.
Shipley, Conway M. late Lieut. R.N.
*Shortland, Peter F. Capt. R.N. (34.)
*Shortland, Willoughby Commr. R.N.
Sibthorp, F. R. Waldo Lieut.-Col. unatt.
(94.)
Sillery, Rob. MD. Staff Surg. h.p.
Simmons, J. Linton Arabin, CB. Col. R.E.
Director R. E. Establishment, Chatham
Simmons, T. C. Esq. late of the Hon.
Corps of Gent.-at-Arms (34.)
Simmons, T. F. Capt. late 72nd Highlanders
Simpson, Sir James, GCB. Gen. Col. 29th
Regt. (11.)
Sinclair, C. A. Lieut. late 56th Regt.
Skinner, A. McG. Capt. R.N.
Smith, C. H. Esq. late of Malta Dockyard
Smith, E. H. Capt. late 76th Regt.
Adj. Dorset Mtl.
Smith, Henry, CB. Admiral
Smith, Horace J. Capt. South Herts Yeo.
Cav. (34.)
Smith, N. Bowden Commr. R.N. (94.)
Smith, Philip Lieut.-Col. Gren. Gds. (34.)
Smith, Seymour Spencer Lieut. R.N. (94.)
Smyth, George Major late 65th Regt.
Smyth, H. C. W. Major (ret.) Bengal Army
Smyth, Bt. Carmichael Maj. late 26th Regt.
Smyth, William Rear-Adm.
Sole, A. W. Major late 5th West York
Mtl. (94.)
Somerset, The Duke of, KG. (94.)
Somerset, L. E. H. Capt. R.N. (94.)
*Southey, J. Lowther Paym. R.N.

Sparks, J. B. Lieut. H.M. Beng. Staff Corps
(34.)
Sparks, Jas. Pattison, CB. Major-Gen.
unatt. (34.)
*Spratt, Thos. A. B. CB. Capt. R.N. (34.)
Stace, Henry Coope Col. (ret.) R.A.
Stainforth, Res. F. J. Capt. late Beng. Cav.
Stanley, Zt. Hon. Lord Secretary of
State for Foreign Affairs, MP. (34.)
Stanton, Edward Lt.-Col. (ret.) Bombay
Art. (34.)
Stanton, Edward, CB. Col. R.E. (104.)
Stavley, Sir C. W. D. KCB. Col. h.p.
44th Regt. Brigadier-Gen. commg. a
Brigade, Poona
Sterling, Sir Anthony Cunningham, KCB.
Col. unatt. (34.)
Steward, Hon. Holden Capt. 2nd Drag.
Gds. (34.)
Stewart, Alex. Esq. Ordnance Storekeeper
Stewart, Alex. Esq. Dep.-Lieut. Norfolk
Stewart, Duncan Lieut. R.N. (94.)
Stewart, John Campbell Capt. 72nd Regt.
(94.)
Stewart, Rich. H. Esq. War Office
*Stewart, W. Little Lieut.-Col. Major 2nd
Dep. Batt. Chatham
Stillwell, John Gillian, Esq. Navy Agent (34.)
Stillwell, Thomas, Esq. Navy Agent
*Stirling, Charles Capt. R.N. (94.)
Stirling, M. Esq. Roy. Archers of Scotland
Stofford, Rt. Fanshawe Vice-Admiral
Stothard, Rich. Hugh Capt. R.E. (34.)
Stuart, Donald Major late 46th Regt.
Stuart, Herbert Crichton, Esq. Dep.-Lieut.
Bute
Stuart, Wm. Esq. Dep.-Lieut. Bedford
*Stubbs, F. W. Capt. Roy. Horse Art.
Beng. (94.)
Sturley, W. L. Lt.-Col. Gren. Gds.
Sudley, S. C. J. Lord late Capt. Gren. Gds.
Sullivan, Bartholomew J. CB. Rear-Adm.
(34.)
Sullivan, H. Col. late 6th Regt.
Sweeney, Eugene, Esq. Admiralty (34.)
Symonds, T. P. Lt.-Col. Hereford Mtl.
Symonds, T. G. Lieut. late 4th Drag. Gds.
Synge, Milington Henry Lieut.-Col. R.E.
(34.)
TALBOT, Sir Charles, KCB. Adm. (104.)
Tapp, Thos. CB. Col. 103rd Royal Bom-
bay Fus. ADC. to the Queen
Tarleton, J. W. CB. Commodore 1st class
Comptroller-General of Coast Guard,
ADC. to the Queen (34.)
Taylor, C. S. S. Capt. R. H. A. (34.)
Taylor, Pingle, Kt. Lieut.-Gen. Col.
24th Regt.
Taylor, Wilbraham Capt. late 6th Batt.
Midl. Rifle Vols. (94.)
Teale, Chas. Shipley Col. (ret. full pay)
Teenan, A. Lieut. 54th Regt. (94.)
Teenan, G. J. Capt. 94th Regt. (94.)
Tenison, Edward Capt. late 14th Drags.
Thackwell, Jas. Edwin Lt.-Col. unatt.
Deputy Adj.-Gen. Montreal

Thompson, T. Ferrouet Lieut.-Gen.
Thompson, C. W. Col. 7th Drag. Gds. (94)
Thompson, E. R. Lieut. late 14th Drags.
Thresher, Wm. Lieut. R.N. (94)
Tighe, Jas. Lowrie Surg. h.p. 12th Roy.
Lancers
Timbrell, T. CB. Lieut.-Col. (ret.) Beng.
Army
Todd, Thornton James Henry Maj. P. W. O.
Donagall Militia
Tomlyn, Rev. John late Capt. Roy. Dps.
*Torrens, H. D. CB. Lieut.-Col. 23rd R.
Welch Fus.
Townley, George Lieut. late Rifle Brig.
Traford, H. T. Capt. (ret.) 43rd Light Inf.
(94)
Tryon, Robert Rear-Adm.
Tryon, T. Col. late 7th Roy. Fus. (94)
Tubbs, Robert, Esq. Dep.-Lieut. Middlesex-
shire Rifle Regt. (94)
Tupper, A. C. Capt. late Roy. Brecknock-
shire Rifle Regt. (94)
Tupper, D. W. Lieut.-Col. 50th Regt. (94)
Turner, F. H. Colonel late Gren. Gds.
Turner, Sir W. W. KCB. Major-Gen. late
97th Regt. (94)
Turnor, Christopher Hatton Lieut. Rifle
Brigade (94)
Tweeddale, George, MARQUIS of, KT. GCB.
Gen. Col. 2nd Life Gds. (34)
Tylden, Sir J. Maxwell Lieut.-Col. late
52nd L. I.
Tyler, C. J. Capt. R.A. (94)
Tyler, Sir James Lieut. late of the Hon.
Corps Gent.-at-Arms (34)
Tyler, H. W. Capt. (ret.) R.E. Railway
Depart. Board of Trade (34)
Tyller, Wm. Fraser Major (ret.) 9th Beng.
Light Cav. (94)
VALIANT, Thos. Jas. Major-Gen.
Vandeleur, John Col. late 10th Hussars
Verling, Jas. MD. Insp.-Gen. h.p. Ord.
Med. Dept.
*Verney, E. Hope Commr. R.N. (94)
Vernon, Lord Capt. Commr. 2nd Corps
Derbyshire Rifle Vols. (94)
Vernon, W. F. Capt. late 68th Regt. (34)
Vivian-Hussey, H. Lieut.-Col. Swansea Rifle
Vols. MP. (94)
Vivian, Sir Robt. J. H. KCB. Lieut.-Gen.
Col. 102nd Royal Madras Fus.
Vyvyan, Rich. H. S. Lieut. late Duke of
Cornwall's Rangers
WALES, H.R.H. THE PRINCE OF, KG.
GCB. GCSI. Gen. Col. 10th Hussars (94)
Waddilore, C. L. Capt. R.N. (94)
Wake, Baldwin A. Commr. R.N.
Walker, A. L. Capt. 99th Regt. (94)
Walker, Sir Baldwin W. Bart. KCB. Vice-
Admiral Commr.-in-Chief, Sheerness
Walker, C. F. Commr. E.N. (34)
Walker, E. W. Forester, CB. Major-Gen.
Col. 94th Regt.
Wallis, Sir P. W. P. KCB. Admiral
Walpole, Sir Rob. KCB. Maj.-Gen. (94)
Walter, E. Capt. late 8th Hussars (34)

Ward, F. B. Lt.-Col. (ret. h.p.) R.A. (104)
Ward, James H. Rear-Adm.
Ward, W. R. Capt. (late) South Down Mil.
Warden, Fred. CB. Rear-Adm.
Warren, Wm. CB. Vice-Adm. (34)
Warry, E. T. Lieut. R.A. (94)
Wason, E. S. Lieut. and Adj. 33rd
Regt. (94)
Watts, J. J. Capt. late Cumb. and West-
moreland Yeo. Huss.
Webb, Sir Henry Capt. late Life Gds.
Webb, J. M. Capt. late 4th R. Irish Drag.
Gds.
Webster, Sir Augustus F. Bart. Commr.
R.N.
Welch, J. W. Capt. late Hon. Art. Comp. (34)
Weller, T. M. M. Capt. W. Kent Mil.
Wellesley, Hon. William Capt. late R.N.
Wellington, Arthur, DUKE of, KG. Lieut.
Gen. Col. Condit. Viet. Rifle Vols.
Wemyss, David Douglas Capt. late 48th
Regt. and Royal Montg. Rifles
Wemyss, W. B. Major-Gen. late 1st Beng.
Cav. (94)
West, Hon. W. E. S. Capt. Gren. Gds. (34)
Western, Jas. Roger Col. late Beng. Eng. (34)
Western, W. T. Esq. Navy Agent (94)
Wheatley, John Capt. R.N. (34)
Whitcheote, George Maj.-Gen. unatt.
Whish, Claudius B. Lieut. late 14th Huss.
(34)
Whitbread, W. H. Esq. Deputy-Lieut.
Bedford
White, Lornie Major, Knight of Wind-
sor, late Barrack Master, London (34)
Whitler, J. B. Esq. late Asst. Paym.-Gen.
Whittingham, Ferdinand, CB. Major-Gen.
unatt.
Wightman, George Lt.-Col. late 67th Regt.
Wilkinson, B. E. Lieut. late 4th Roy.
Irish Drag. Gds. (94)
Wilkinson, Chas. Edmund Maj.-Gen. R.E.
Williams, T. B. Capt. late 4th R.I.
Dragoon Gds.
Williamson, James Capt. 23rd Roy.
Welsh Fus. (94)
Williamson, J. Esq. late R.N.
Willink, W. N. Mid. R.N. (94)
Willmot, Chas. Edward Capt. R.N.
Wilson, George Lieut.-Col. late 65th Regt.
Wilson, John P. Lieut. 1st Warwick Mil.
(94)
Wilson, Lestock P. Esq. Lieut. late Westm.
Volunteers (94)
Wilson, Thomas Capt. R.N. (104)
Wilson, Sir T. Maryon, Bart. Col. W. Kent
Mil. (94)
Wilton, T. EARL of, GCH. Col. Q.O.I.L.
Mil.
Winchester, MARQUIS of Col. Hants Mil.
Winter, Chas. Capt. late 68th Regt.
Winterton, E. EARL of Capt. Commr. 6th
Sussex Rifle Vols. (34)
Witt, Geo. E. Esq. FRS.
Wood, James Capt. h.p. R. M. L. I.
Woodall, John, Esq. Deputy-Lt. York-
shire (104)

LIST OF LIFE MEMBERS.

Woodford, Sir Alexander, GCB. GCMG.
Gen. Col. Soc. Fus. Gds. Lieut.-Gov.
Chelsea Hospital
Woodgate, Thomas Capt. R.N.
Woodgate, William Lieut. late 25th Regt.
Wray, W. Long Lieut. late Newf. Corps
Wright, Chas. Jas. Col. R.A.
Wright, S. Capt. late 3rd Buffs
Wroughton, J. W. Lt.-Col. late
Coldm. Gds.
Wyatt, S. Captain h.p. Royal Artillery
(34)
Wyde, William, CB. Gen. Col.-Commr.
R.A. (34)
YELVERTON, Hastings R. CB. Rear-
Adm. Commanding Channel Squadron
Yorke, Philip James, FRS. Col. late Soc.
Fus. Gds. (34)
Yorke, Reginald Rear-Adm.
Young, Allen W. Lieut. R.N.R. (94)
Young, Horatio B. Rear-Adm.
Young, W. L. M. CB. Superintendent
of Stores (34)
Yule, James Commr. R.N. (34)

HONORARY MEMBERS.

BYE-LAWS.—SECTION X.

His Majesty the KING of the NETHERLANDS.
His Royal Highness Prince Alexander of the Netherlands.
His Royal Highness the Count de Paris.

The Hon. Lady Grey.	Lady Mulcaster.	Lady Gomm.
Mrs. Smyth.	Mrs. Somerville.	Lady Taylor.
Lady Grey.	Miss Mary Somerville.	Mrs. Hayes.
Mrs. Egerton Hubbard.	Miss Martha Somerville.	Miss Roberts.
Mrs. Alexander.	Lady Emily Fousenby.	Lady Franklin.
Mrs. Jackson.		

Addams, Robert, Esq.
Anderson, John, Esq., C.E., Superintendent
of Machinery, Royal Arsenal, Woolwich.
Arrow, Fred., Captain
Ballock, William, Jun., Esq.
Behnes, William, Esq.
Benthams, George, Esq. FRS. LS. and HS.
Bentley, Richard, Esq.
Bourne, John, Esq. CE.
Brooke, Sir James, KCB. Rajah of Sarawak.
Casher, E. Esq.
Close, Mark C. Captain
De la Chaumette, F. T. Esq.
Drummond, A. Robert, Esq.
Drummond, Charles, Esq.
Drummond, George, Esq.
Drummond, John, Esq.
Fairbairn, W. Esq. LL.D., &c.
Ferguson, James, Esq. FRAS.
Filose, Capt., Scindia's Service
Galton, Fran., Esq. MA. FRS. FRGS.
Gordon, A. F. Esq.
Gould, John, Esq. FRS., &c. &c.

Grey, Right Hon. Sir George, Bt. GCB. MP.
Hardwick, Philip, Esq. FRS.
Haverfield, Rev. T. T. BD.
Hope, Rev. F. W.
Jones, Owen, Esq.
Laird, John, Esq. MP.
Latham, John, Mr.
Mallet, R. Esq. CE. FRS., &c.
O'Byrne, W. R. Esq., Author of "Naval
Biography"
Oliphant, Laurence, Esq. FRGS.
Sandwith, Humphrey, Esq. CB. MD. DCL.
Sedgwick, Professor, FRS., &c.
Smyth, C. Piazzi, Esq., Astro. Roy. for
Scotland
Smyth, W. Warrington, Esq. FRS.
Stephens, Andr. John, Esq. FRS. Standing
Counsel to the Institution
Taylor, G. L. Esq. Architect of the Institu-
tion
Tobin, Geo. Webb, Esq.
Wigram, Clifford, Esq.
Wyatt, James, Esq.

CORPS DIPLOMATIQUE.

Austria.—Apponyi, Count, Ambassador Extraordinary and Plenipotentiary.
Bavaria.—Baumgarten, M. le Comte de, Councillor of Legation.
France.—Pignat, Captain Charles, Naval Attaché.
Italy.—Areglio, Marquis E. d', Envoy Extraordinary and Minister Plenipotentiary.
Maffei, Count, First Secretary.
Netherlands.—Bentinck, Baron, Envoy Extraordinary and Minister Plenipotentiary.
Portugal.—Lavrado, Count de, Envoy Extraordinary and Minister Plenipotentiary.
Prussia.—Bernstorff, Count Von, Ambassador Extraordinary and Minister Plenipotentiary.
Russia.—Brunnow, Baron de, Ambassador Extraordinary and Minister Plenipotentiary.
Sweden and Norway.—Beckfrus, Baron, Secretary of Legation.
Turkey.—Musurus, Pacha H. E., Ambassador Extraordinary and Plenipotentiary.
United States of America.—Adams, The Hon. C. F., Envoy Extraordinary and Minister
Plenipotentiary.

FOREIGN OFFICERS.

Bode, Baron de, Major-Gen., Imp. Russ. Ser.
Cecilie, Admiral, French Navy.
Da Cunha, C. P. Capt., Port. Navy.
Graham, J. D. Major, U.S. Topograph. Eng.
Lampo, A. Cavaliere, Capt. Italian Navy.
Londy, Capt. C. F. late of the French Staff.
Wright Major, Aide-de-Camp to General Von Moltke, Berlin.

CORRESPONDING MEMBER

Noritzky, N. de, Lieut.-Col. Imp. Russ. Service

Officers wishing to become Members of the Royal United Service
Institution can copy one of the subjoined Forms, and inclose the copy
to the Secretary:—

FORM FOR BECOMING AN ANNUAL SUBSCRIBER.

186

It is my desire to become a Member of the Royal United Service
Institution; and I hereby request and authorise my Agents [or
Bankers], Messrs. _____, to pay my
Entrance Fee and Annual Subscription now, and as it becomes due on
the 1st January in each year, to the Secretary of the Institution.

Signature.

Qualification
for Membership.

FORM FOR BECOMING A LIFE SUBSCRIBER.

It is my desire to become a Life Member of the Royal United
Service Institution; and I hereby authorise my Agents [or Bankers],
Messrs. _____, to pay my Entrance Fee
and Life Subscription to the Secretary of the Institution.

Signature.

Qualification
for Membership.

Entrance Fee—ONE POUND.

Annual Subscription—ONE POUND, which entitles a Member to
receive the Journal; or TEN SHILLINGS without the Journal.

Life Subscription TEN POUNDS (including Entrance Fee), which
entitles a Member to receive the Journal, or SIX POUNDS (in addition
to the Entrance Fee) without the Journal.

Form of Request.

I give and bequeath unto THE ROYAL UNITED SERVICE
INSTITUTION, situated in Whitehall Yard, London, the sum of

to be applied in and towards carrying on the designs of the said
Institution, such Legacy to be paid out of such part of my personal
Estate not specifically bequeathed as the law permits to be appro-
priated by Will to Charitable Purposes.

THE HISTORY OF THE
REIGN OF KING CHARLES THE FIRST

BY
JAMES HARRISON AND SONS

PRINTED IN ORDINARY TO HER MAJESTY
BY
JAMES HARRISON AND SONS

ST. MARTIN'S LANE, LONDON.

1681

THE HISTORY OF THE
REIGN OF KING CHARLES THE FIRST

BY
JAMES HARRISON AND SONS

PRINTED IN ORDINARY TO HER MAJESTY
BY
JAMES HARRISON AND SONS

ST. MARTIN'S LANE, LONDON.

1681

THE HISTORY OF THE
REIGN OF KING CHARLES THE FIRST

BY
JAMES HARRISON AND SONS

PRINTED IN ORDINARY TO HER MAJESTY
BY
JAMES HARRISON AND SONS

ST. MARTIN'S LANE, LONDON.

1681

CATALOGUE OF ROMAN COINS

FOUND AT THE REAR OF NETLEY HOSPITAL, WHILST DIGGING THE FOUNDATION OF THE NEW LUNATIC ASYLUM, JAN. 7, 1867.

BY F. DE CHAUMONT, ESQ., M.D.

I. Valerianus, 253 to 263 A.D.

	No. of coins
1. <i>Obverse</i> . IMP. C. P. LIC. VALERIANVS. P. P. AVG. Radiated bearded head to right. <i>Reverse</i> . ORIENS. AVG. The sun, holding a whip. Billon. 2	
2. <i>Ob.</i> same as No. 1. <i>R.</i> VICTORIA AVG. Figure of Victory. B. or III. æ. 1	
<i>Total of Valerianus</i>	3

II. Gallienus, 263 to 268 A.D.

1. <i>Ob.</i> GALLIENVS. AVG. Radiated bearded head to right. <i>R.</i> ABUNDANTIA. AVG. Figure of Abundance, standing. In exergue S. B. 8	
2. <i>Ob.</i> same as last. <i>R.</i> AEQVITAS. AVG. Figure of Equity, standing. In exergue S. B. 4	
3. <i>Ob.</i> same as last. <i>R.</i> AETERNITAS. AVG. Saturn (?) standing, holding a globe. B. 7	
4. Another; same, but head on obverse to left. <i>Scarce</i> . B. 1	
5. <i>Ob.</i> same as No. 1. <i>R.</i> AVOLINI. CONS. AVG. Centaur, to left. In exergue Z. B. 6	
6. <i>Ob.</i> same, but Centaur to right. B. 3	
7. <i>Ob.</i> same as No. 1. <i>R.</i> CONCORDIA. AVG. Female seated. B. 2	
8. <i>Ob.</i> GALL. <i>R.</i> CONSECRATIO. Altar. <i>Rare</i> . B. 1	
9. <i>Ob.</i> same as No. 1. <i>R.</i> DIANAE. CONS. AVG. Various types: stag, hind, antelope, ibex, and goat, to right or left. B. 23	
10. <i>Ob.</i> same as last. <i>R.</i> DIANA. FELIX Diana, standing, with doe. <i>Rare?</i> B. 1	
11. <i>Ob.</i> same as last. <i>R.</i> FELICITAS. AVG. Female, standing. B. 1	
12. <i>Ob.</i> same as last. <i>R.</i> FIDES (or FIDEI) MILITVM. Female, with spear and standard. B. 5	
13. <i>Ob.</i> same as last. <i>R.</i> FORTYNA. EEDVX. Fortune, standing. In field, S. B. 12	
14. <i>Ob.</i> same as last. <i>R.</i> CONSERVATOR. AVG. Æsculapius, standing. B. 1	
15. <i>Ob.</i> same as last. <i>R.</i> IOVI. CONS. AVG. Various: goat, to right or left; antelope, to left; Jupiter, standing. B. 7	
16. <i>Ob.</i> same as No. 1. <i>R.</i> IOVI. VICTORI. Jupiter, with thunderbolt. In field, S. B. 4	

CATALOGUE OF ROMAN COINS.

3

	No. of coins
17. <i>Ob.</i> same as last. <i>R.</i> IOVI. PROTVGNATOR. Jupiter, walking to left, with thunderbolt. In field, XI. B. 4	
18. <i>Ob.</i> same as last. <i>R.</i> LAETITIA. AVG. Female, standing. B. 1	
19. <i>Ob.</i> same as last. <i>R.</i> LIBERAL. AVG. Liberality, standing. B. 2	
20. <i>Ob.</i> same as last. <i>R.</i> LIBERO. P. CONS. AVG. Panther. <i>Rare</i> . B. 6	
21. <i>Ob.</i> same as last. <i>R.</i> MARTI. PACIFERO. Mars, walking. <i>Rare</i> . B. 1	
22. <i>Ob.</i> IMP. C. GALLIENVS. AVG. <i>R.</i> CONS. AVG. Griffin, to left. B. 1	
23. <i>Ob.</i> same as No. 1. <i>R.</i> NEPTVNO. CONS. AVG. Seahorse. <i>Rare</i> . B. 2	
24. <i>Ob.</i> same as last. <i>R.</i> ORIENS. AVG. Sol, passing to right, with whip. In field, Z. B. 4	
25. <i>Ob.</i> same as last. <i>R.</i> PAX. AVG. Peace, standing. In field, S. I. or T. or V. * B. 11	
26. <i>Ob.</i> IMP. CAES. GALLIENVS. AVG. <i>R.</i> PERPET. AVG. Female, standing. <i>Scarce</i> . B. 1	
27. <i>Ob.</i> GALLIENVS. AVG. <i>R.</i> PIETAS. AVG. Piety sacrificing at an altar. In exergue, III. B. 3	
28. <i>Ob.</i> IMP. GALLIENVS. P. P. AVG. <i>R.</i> P. M. TR. POT. VII. COS. IIII. P. P. Emperor, standing. B. 1	
29. <i>Ob.</i> GALLIENVS. AVG. <i>R.</i> PROVIDENTIA. AVG. Providence, standing. B. or III. æ. 3	
30. <i>Ob.</i> same as last. <i>R.</i> SALVS. AVG. Hygeia, feeding a serpent. In field, SI or *. In exergue, D or SS. B. 5	
31. <i>Ob.</i> & <i>R.</i> same, but figure of Æsculapius. B. 2	
32. <i>Ob.</i> same as last. <i>R.</i> SECVBIT. PERPET. Female, standing. In field, X. B. 4	
33. <i>Ob.</i> same as last. <i>R.</i> SOLI. CONS. AVG. Pegasus, to right. B. 2	
34. <i>Ob.</i> same as last. <i>R.</i> VERITAS. AVG. Female, standing. B. 13	
35. <i>Ob.</i> same as last. <i>R.</i> VENVS. VICTRIX. Venus, standing. <i>Rare?</i> B. 1	
36. <i>Ob.</i> same as last. <i>R.</i> VICTORIA. AVG. Victory. In field, Z. B. 1	
37. <i>Ob.</i> same as last. <i>R.</i> VIRTVS. AVGVSTI. OF AVG. Soldier, with spear and globe. B. 6	
38. Uncertain and barbarous. III. æ. 2	
<i>Total of Gallienus</i>	162

III. Salomina, wife of Gallienus, obd. 268 A.D.

1. <i>Ob.</i> . . . SALONINA. AVG. Head, to right. <i>R.</i> AEQVITAS. AVG. Equity, standing. B. 1	
2. <i>Ob.</i> SALONINA. AVG. <i>R.</i> FECVNDITAS. AVG. Female, standing. B. 5	
3. <i>Ob.</i> same as last. <i>R.</i> IVRONI. CONS. AVG. Antelope. B. 2	

		No. of coins
4. Ob. same as last.	R. FIDICITIA . AVG. Female, seated.	B. 2
5. Ob. same as last.	R. VESTA . AVG. Vesta, seated.	B. 2
6. Ob. same as last.	R. VESTA . FELIX. Vesta, standing.	B. 1
<i>Total of Salonina</i>		13

IV. Postumus, 258 to 267 A.D. Usurper.

1. Ob. IMP. POSTVMVS. AVG. Radiated and bearded head, to right. R. CONCORDIA. AVG. Female, standing, with helmet at her feet.	B.	2
2. Ob. IMP. C. POSTVMVS. P. F. AVG. R. COS. IIII. Victory.	B.	2
3. Ob. same as last. R. FELICITAS. AVG. Female, standing. Scarce.	B.	1
4. Ob. IMP. POSTVMVS. AVG. R. FIDES. EQVIT. Female, sitting. In exergue, P.	B.	3
5. Ob. same as No. 1. R. HERC. PACIFERO. Hercules, standing. Rare.	B.	1
6. Ob. same as last. R. IOVI. VICTORI. Jupiter, moving to left.	B.	3
7. Ob. IMP. POSTVMVS. P. F. AVG. R. MONETA. AVG. Female, standing.	B.	2
8. Ob. same as No. 1. R. ORIENS. AVG. Sol, with whip.	B.	3
9. Ob. same as last. R. PAX. AVG. Peace, standing.	B.	4
10. Ob. same as last. R. PIETAS. AVG. Piety, standing.	B.	1
11. Ob. same as last. R. P. M. TR. POT. COS. V. P. P. Emperor, standing.	B.	2
12. Ob. same as last. R. VICTORIA. AVG. Figure of Victory. Scarce.	B.	2
<i>Total of Postumus</i>		26

V. Victorinus, 265 to 267 A.D. Associated with Postumus.

1. Ob. IMP . C . PI . VICTORINVS . P . F . AVG. Radiated and bearded head to right. R. AEQVITAS . AVG. Figure of Equity, standing.	B. or III. E. 2
2. Ob. as above, but very imperfect legend. R. CONCOR . MILITVM. Female standing. In field, A . A. Restruck.	B. or III. E. 1
3. Ob. DIVO . VICTORINO . PIO. R. CONSECRATIO. Eagle. Very rare. R 3.	B. or III. E. 1
4. Ob. IMP . C . PIAY . VICTORINVS . P . F . AVG. R. FIDES . MILIT. Female with two standards.	B. or III. E. 1
5. Ob. IMP . C . VICTORINVS . P . F . AVG. R. INVICTVS. Sol moving to right with whip. In field *. Used to be thought rare.	B. or III. E. 67
6. Ob. same as last. R. LAETITIA . AVG. Female standing.	B. or III. E. 1
7. Ob. as No. 4 or No. 5. R. PAX . AVG. Peace, standing. In field, V *.	B. or III. E. 88

	No. of coins
8. Ob. same as No. 4. R. PIETAS . AVG. Piety, sacrificing.	B. or III. E. 33
9. Ob. same as last. R. PROVIDENTIA . AVG. Providence, standing.	B. or III. E. 75
10. Ob. same as last. R. SALVS . AVG. Hygeia feeding serpent to left.	B. or III. E. 28
11. Ob. and R. same, but Hygeia holding serpent to right.	B. or III. E. 27
12. Ob. same as last. R. VIRTVS . AVG. Helmeted figure. (Emperor?)	B. or III. E. 58
13. Uncertain reverses—worn, etc.	B. or III. E. 23
14. Coins from barbarous dies.	B. or III. E. 5

Total of Victorinus . 410

VI. Marius, killed 267 A.D., after a reign of three days. Usurper.

1. Ob. IMP . C . MARIVS . P . F . AVG. Radiated bearded head to right. R. CONCORDIA . MILITVM. Two hands joined. Very rare. R 3.	III. E. 1
--	-----------

VII. Tetricus Senior (Augustus). Usurper, 267 to 273 A.D.

1. Ob. IMP . C . TETRICVS . P . F . AVG. Radiated bearded head to right. R. COMES . AVG. Victory holding a crown. Used to be thought rare. III. E. (some B?)	66
2. Ob. IMP . TETRICVS . P . F . AVG. R. FIDES . MILITVM. Female with standards.	Do. 30
3. Ob. same as No. 2. R. HILARITAS . AVG. Female with branch and cornucopia. Used to be thought rare.	Do. 93
4. Ob. legend as No. 1 or No. 2. R. LAETITIA . AVG. N or AVG. Female standing.	Do. 126
5. Ob. same as No. 1. R. MONETA . AVG. Female standing. Rare. R 2.	III. E. 1
6. Ob. same as last. R. PAX . AVG. Peace standing.	Do. 147
7. Ob. same as last. R. PRINC . IVVENT. Male figure (Emperor?)	Do. 2
8. Ob. same as last. R. SALVS . AVG. Hygeia feeding a serpent.	Do. 59
9. Ob. IMP . C . FESTIVVS . TETRICVS . P . F . AVG. (Two others same as No. 2). R. SPES . AVG. Hope walking.	Do. 3
10. Ob. same as No. 1. R. SPES . IVBELICA. Hope walking.	Do. 51
11. Ob. same as last. R. VICTORIA . AVG. Victory.	Do. 23
12. Ob. same as last. R. VIRTVS . AVG. Military figure.	Do. 50
13. Ob. same as last. R. uncertain—worn and illegible.	Do. 81
14. Coins from barbarous dies, of various types: PAX, SALVS, PROVIDENTIA, HILARITAS, LAETITIA, etc.	Do. 17

Total of Tetricus Senior 749

VIII. *Tetricus Junior. Reigned with his father in Gaul or Britain (?)*

	No. of coins
1. Ob. c. PIVEST. TETRICVS. CAES. Radiated beardless head to right. R. COMES. AVG. Victory holding crown and branch. III. E. or B (?)	17
*** These used to be considered rare.	
2. Ob. same as No. 1. R. FIDES. MILITVM. Female with standards.	Do. 1
3. Ob. same as last. R. PAX. AVG. Peace standing.	Do. 13
4. Ob. same as last. R. PIETAS. AVGG. Sacrificial instruments.	Do. 13
5. same, but legend: PIETAS. AVGVSTOR.	Do. 31
*** Some of both 4 and 5 are from barbarous dies.	
6. Ob. same as last. R. PRINCO. IVVENT. Prince in military attire	Do. 9
7. another has c. PIVEST. T. II. TETRICVS. CAES. Probably struck or from a barbarous die.	Do. 1
8. Ob. same as No. 1. R. SALVS. AVG. Hygeia feeding a serpent.	Do. 1
9. Ob. same as last. R. SPES. AVGG. Figure of Hope.	Do. 80
10. Ob. same as last. R. SPES. PVBLICA. Figure of Hope.	Do. 73
11. Ob. same as last. R. VIRTVS. AVG. Military figure.	Do. 5
12. R. LAETITIA. AVG. N. Usual type. Rare, but barbarous.	Do. 1
13. Uncertain reverses.	Do. 6
14. Barbarous.	Do. 4
Total of Tetricus Junior	255

IX. *Claudius II, or Gothicus, 268 to 270 A.D.*

	No. of coins
1. Ob. IMP. C. CLAVDIVS. AVG. Radiated bearded head to right. R. ADVENT. AVG. Figure of Emperor (?)	B. or III. E. 1
2. Ob. same as No. 1. R. AEQVITAS. AVG. Figure of Equity.	Do. 19
3. Ob. same as No. 1. R. ANNONA. AVG. Female with cornucopia and patera.	Do. 8
4. Ob. same as No. 1. R. APOLLINI. CONS. AVG. Apollo standing.	Do. 1
5. Ob. DIVO. CLAVDIO. R. CONSECRATIO. Altar (or pyre?)	Do. 25
*** Some are barbarous.	
6. Ob. IMP. CLAVDIVS. AVG. R. CONSECRATIO. Eagle.	Do. 1
7. Ob. DIVO. CLAVDIO. R. CONSECRATIO. Eagle.	Do. 13
8. Ob. IMP. CLAVDIVS. P. F. AVG. R. DIANA. LUCIFERA. Diana with spear. Rare.	Do. 1
9. Ob. same as last. R. FELICITAS. AVG. Female standing.	Do. 6
10. Ob. DIVO. CLAVDIO. R. same as No. 9.	Do. 1
11. Ob. same as No. 9. R. FELIC. TEMPO. Female with spear and caduceus.	Do. 4
12. Ob. same as No. 1. R. FIDES. EXERCIT. Female with two standards	III E. 9

	No. of coins
13. Same, but FIDES. MILIT.	Do. 1
14. Ob. same as 6. R. FORTVNA. REDVX. Fortune standing.	Do. 5
15. Ob. same as No. 1. R. GENIVS. AVG. Male figure standing.	Do. 3
16. Ob. same as last. R. GENIVS. EXERCIT. Similar type.	Do. 3
17. Ob. same as last. R. IOVI. STATOEI. Jupiter standing with spear and thunderbolt.	Do. 3
18. Ob. same as last. R. IOVI. VICTORI. Nearly similar type.	Do. 6
19. Ob. same as last. R. LAETITIA. AVG. Female standing.	Do. 3
20. Ob. same as last. R. LIBERAL. AVG. OF LIBERALITAS. AVG. Figure of Liberty standing.	Do. 3
21. Ob. same as last. R. MARS. VLTOR. Mars with trophy and spear.	Do. 7
22. Ob. same as No. 6. R. MARTI. PACIFIC. Mars running, to left. Rare.	Do. 1
23. Ob. same as last. R. PAX. AVG. Peace; usual type.	Do. 4
24. Same as last; but legend, PAX. AVGVSTI.	Do. 3
25. Ob. same as No. 1. R. P. M. TR. POT. II. COS. P. T. Emperor standing	Do. 5
26. Ob. same as No. 6. R. PROVIDENTIA. AVG. Providence standing or leaning against a column.	Do. 10
27. Ob. same as No. 1. R. SALVS. AVG. Hygeia feeding a serpent.	Do. 1
28. Ob. same as last. R. SPES. PVBLICA. Hope standing	Do. 1
29. Ob. same as No. 6. R. VERITAS. AVG. Fertility standing.	Do. 3
30. Ob. same as 1. R. VICTORIA. AVG. Victory.	Do. 15
31. Ob. same as No. 6. R. VIRTUS. AVG. Soldier standing.	Do. 7
32. Ob. same as last. R. VIRTVS. AVG. Mars carrying a trophy and spear.	Do. 1
33. Uncertain reverses.	Do. 4
34. Barbarous.	Do. 8
Total of Claudius Gothicus	186

X. *Quintillus, killed 270 A.D.*

Duration of reign variously stated at from eight days to two months.

	No. of coins
1. Ob. ... QVINTILLVS. AVG. Head to right. R. APOLLINI. CONS. AVG. Apollo standing. Rare.	Do. 1
2. Ob. IMP. C. M. AVR. CL. QVINTILLVS. AVG. R. ETERNITAS. AVG. Saturn (?) holding a globe.	Do. 2
3. Ob. same as last. R. CONCORDIA. AVG. Concord standing	Do. 3
4. Ob. IMP. QVINTILLVS. AVG. R. DIANA. LUCIFERA. Diana with spear. Very rare. R. 4.	Do. 1
5. Ob. same as No. 2. R. FORTVNA. REDVX. Fortune standing.	Do. 1
6. Ob. same as last. R. PROVIDENTIA. AVG. Usual type.	Do. 1
7. Ob. same as last. R. SECVRETAS. AVG. Female leaning on a column, holding a spear. In field, XI.	Do. 3
8. Ob. same as last. R. VERITAS. AVG. Usual type. Rare.	Do. 1

9. <i>Ob.</i> same as last.	<i>R.</i> VICTORIA . AVG.	Victory.	No. of coins Do.	1
10. <i>Ob.</i> same as last.	<i>R.</i> VIRTUS . AVG.	Soldier standing.	Do.	1
In field, a.				
Total of Quintillus				15

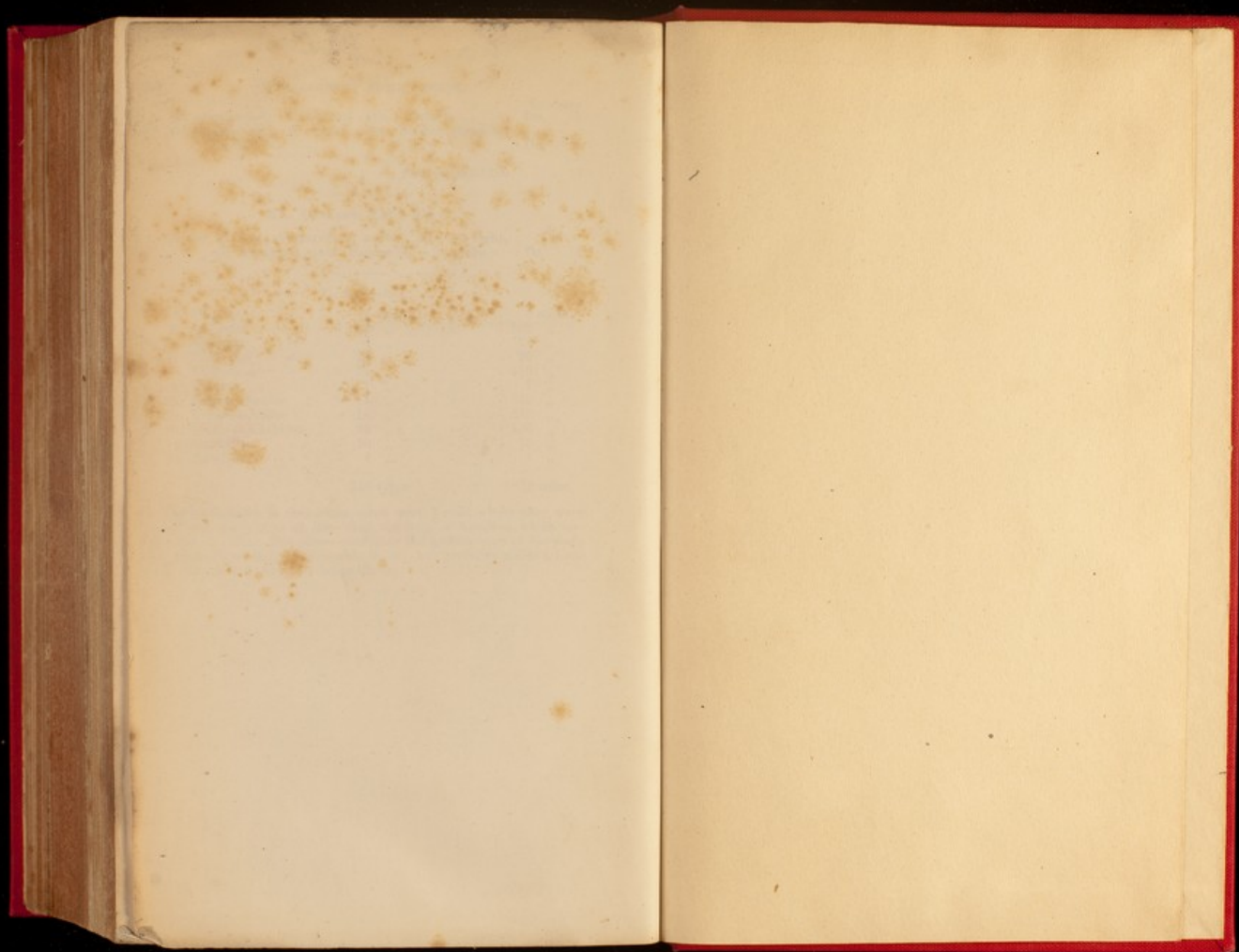
XI. Aurelianus, 270 to 275 A.D.

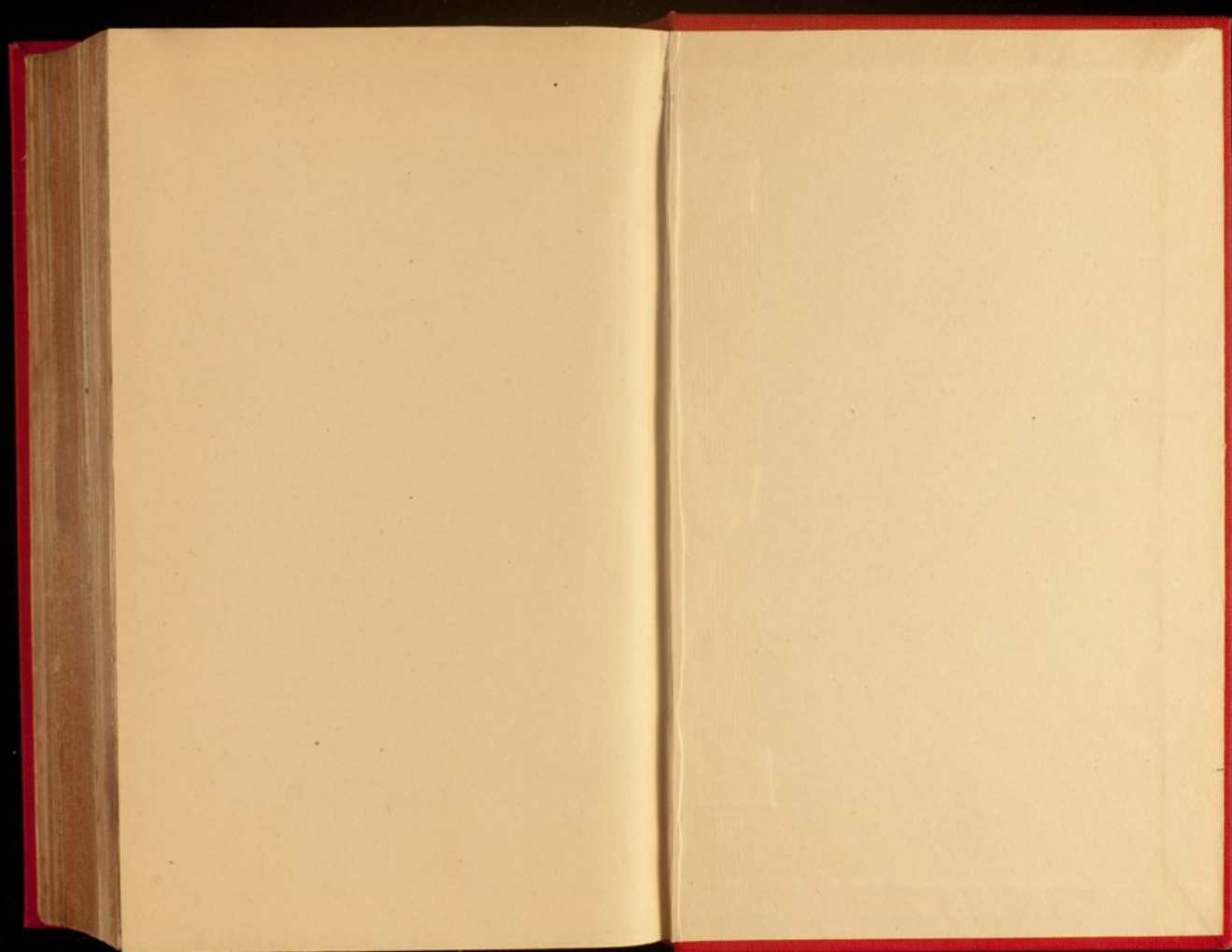
1. <i>Ob.</i> IMP. CL. DOM. AVRELIANVS . P. P. AVG.	Head to right.	Do.	1
<i>R.</i> AETERNITAS . AVG. Saturn (?) with globe.			

Recapitulation.

I. Valerianus	-	2 types	-	3 coins
II. Gallienus	-	38 "	-	162 "
III. Saloninus	-	6 "	-	13 "
IV. Postumus	-	12 "	-	26 "
V. Victorinus	-	14 "	-	410 "
VI. Marius	-	1 "	-	1 "
VII. Tetricus Senior	-	14 "	-	749 "
VIII. Tetricus Junior	-	14 "	-	255 "
IX. Claudius Gothicus	-	34 "	-	186 "
X. Quintillus	-	10 "	-	15 "
XI. Aurelianus	-	1 "	-	1 "
146 types				1821 coins

The probability is that these coins were buried where they were found, not much, if at all, later than the reign of Aurelian, which terminated A.D. 275. The above constitute the greater part of the *find*; but some (how many I am unable to say, but probably under a hundred) found their way into other hands.





PH

PAMPHLETS

44

44