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TRANSACTIONS

OF AUG 19 1896

THE ASIATIC SOCIETY  
OF JAPAN.

—  
*(From 30th October, 1872, to 9th October, 1873.)*

—  
VOL. I.

—  
REPRINT OF THE ORIGINAL EDITION, PUBLISHED IN 1874,  
EDITED BY THE SECRETARIES.

—  
YOKOHAMA :

LANE, CRAWFORD & Co.; KELLY & Co.  
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1882.

Aug 6  
3/1/12  
4/1/12

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AUG 19 1896

## ASIATIC SOCIETY OF JAPAN.

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The first Annual Meeting of the Asiatic Society of Japan was held in room No. 19, at the Grand Hotel, Yokohama, on Wednesday, the 8th October, 1873, at 8.30 p.m.

On taking the Chair, the President, R. G. Watson, Esq., explained the reasons which had led to the deferment of the annual meeting till the present time, which was, however, in fact, the true anniversary of the Society's commencement of actual work. He called on the Secretary to read the minutes of last meeting, which were approved; and also the Report of the Council of the Society, which was as follows:—

### REPORT.

In presenting their First Annual Report, the Council of the Asiatic Society of Japan are checked in the congratulations which they had hoped to present to their constituents, by the necessity for announcing the heavy loss sustained by the destruction, in a recent fire, of the printed matter intended for the first number of the Society's journal.

The loss, however, is not irretrievable, since it will be possible to reproduce most of the articles intended for publication, though not without a delay of some few weeks. This will somewhat retard our entering into relations with other Societies of similar character, and obtaining their publications in return for our own; but no great harm to the Society need be felt from this slight check to our progress: certainly none will be felt if we are stirred up to greater determination that the objects we have in view shall be the more vigorously prosecuted.

As evidence that interest has not been lacking, the Council refer to the following List of Papers read before the Society at its regular Meetings during the past twelve months.

- 1.—On the Loochoo Islands, by Mr. Satow.
- 2.—On the Hyalonema Mirabilis, by Dr. Hadlow.
- 3.—On the Streets and Street-Names of Yedo, by Mr. Griffis.
- 4.—On the Ascent of Fujiyama, by Mr. Hodges.
- 5.—Five Short Papers on the Language of Loochoo, by Japanese Students.



6.—Notes of a visit to the Mulgrave, Islands, by Officers of H. M. S. *Barossa*.

7.—On the Geography of Japan, by Mr. Satow.

8.—On Cyclones in Japan, by Lt.-Com. Nelson. U.S.N.

9.—On Russian Descents in Saghalien, by Mr. Aston.

The prospect of receiving valuable papers during the coming twelve months is good; and with the confidence that their successors will find little difficulty in carrying on the operations of the Society, the present Council beg to resign their offices.

Fifty-nine members have been added to the Society since the first Meeting at which it was organized; the whole number at the present time being—Resident Members 64, Honorary 2, Corresponding 3. One has died and 5 are absent.

The newly-established German Asiatic Society of Yedo has courteously presented us with a copy of their Proceedings; and the Royal Asiatic and Geographical Societies of London have—through the good offices of Dr. Hadlow—promised to exchange their publications for ours.

A commencement has been made by ourselves towards the establishment of a Library and Museum, by the presentation of some few books and specimens; but this part of our operations requires a building of our own before it can be expected to flourish.

The balance now in the Treasurer's hands to the credit of the Society is \$308.75.

On behalf of the Council.

EDWD. W. SYLE,  
*Hon. Sec.*

It was moved by Sir Harry Parkes and seconded by Mr. Bellamy—

That the Report of the Council be accepted, and the thanks of the Society be tendered to them for their services during the past twelve months.

On the motion of Mr. W. H. Smith, seconded by Mr. Aston, it was resolved—

That the following gentlemen be the office-bearers of the Society for the coming year:—

*President*—J. C. Hepburn, Esq., M.D.

*Vice-Presidents*—Rev. S. R. Brown, D.D.,

Sir Harry S. Parkes, K. C. B.

*Council*—E. Satow Esq.

A. J. Wilkin, Esq.

W. G. Howell Esq.

Bayly Done, Esq., M.D.\*

B. H. Brunton, Esq.

*Treasurer*—R. B. Baker, Esq.

*Recording Secretary*—A. Bellamy, Esq.

*Corresponding Secretary*—Rev. Ed. W. Syle.

*Curator and Librarian*—H. Fryer, Esq.

---

\* Since deceased.

**MEMBERS.**

---

**HONORARY.**

Admiral Sir C. Shadwell, K. C. B.      Captain Arthur, R. N.

**CORRESPONDING.**

Dr. J. Berry, Kôbe.      Rev. J. Edkins, Peking.  
J. J. Enslie, H. B. M. Consul, Kôbe.

**RESIDENT.**

Allen, H. Jnr.	Cargill, W. W.
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Brown, R. M.	Griffis, W. E.
Brunton, R. H.	Grigor, J.
Caldwell, Dr. J., R. M.	Gubbins, J. H.

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\*Deceased.

Hadlow, Dr. H., R. N.	Purvis, Captain, R. N.
Hamilton, Geo.	Robertson, R.
Hardy, J. T.	Robertson, J.
Hartley, J.	Sandemann, F.
Hawes, Lt. A. G. S.	Sandwith, Lt. J. H.
Hegt, M. J. B. N.	Satow, E. M.
Henderson, J. Y.	Schoyer, E. A.
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Hill, Captain A., R. M.	Shaw, Rev. A. C.
House, E. H.	Shaw, T. K.
Howell, W. G.	Sitwell, Isla. S.
Irwin, R. W.	Smith, W. H.
Jackson, T.	Stransome, S. J.
James, F. S.	Summers, Rev. Jas.
Kilby, E. F.	Sutton, F. W.
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Parkes, Sir H. S., K. C. B.	Wilkin, A. J.
Pitman, J.	Wilkinson, H. S.
Pole, G. H.	Wooley, W. A.
Pryer, H.	Wright, Rev. W. B.
Purcell, Dr. T. A.	

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\*Deceased.

ASIATIC SOCIETY OF JAPAN.

RECEIPTS AND EXPENDITURE, 1ST JANUARY TO 31ST DECEMBER, 1873.

*Dr.*

RECEIVED.

Subscriptions .....	\$449.50
	<u>          </u>
	<u>\$449.50</u>

*Cr.*

PAID.

Preliminary Expenses .....	\$26.00
Printing, Stationery and Advertising, etc. ....	47.40
Binding Books .....	7.50
Rent .....	35.00
Furniture bought .....	38.00
	<u>          </u>
	\$153.90
Balance in hand, 31st December, 1873 .....	\$295.60
	<u>          </u>
	<u>\$449.50</u>

E. & O. E.

R. B. BAKER,  
*Honorary Treasurer.*





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1882.



## NOTES ON LOOCHOO.<sup>1</sup>

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By E. SATOW, Esq.

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[*Read before the Asiatic Society of Japan, on the 30th October, 1872.*]

Loochoo, called Liukiu by the Chinese and Riukiu by the Japanese, is the chief island of a group lying in the North Pacific Ocean, between the 24th and 29th parallels of latitude. Its name is said to be derived from a fancied resemblance to a 'dragon lying stretched out,' but is not written with the Chinese characters which would bear that interpretation. In the commencement of the 14th century it was split up into three independent sovereignties called Chiuzan, Sannan and Samboku, which were re-united under one monarch about the year 1490. Since that time it has been divided into three provinces, namely, Shimajiri Sei on the south, Chiuzan Sei in the centre, and Kunikia Sei on the north. The central province contains the capital Shiuri and its port Nafa. The whole number of subject islands, including those on the north, which in later times were considered as belonging to the Princes of Satsuma, is thirty-six. The smaller ones are administered by a single Governor, while to Taiheizan (or Miyako) Yayéyama and Ôshima<sup>2</sup> three, and to Bashi, two officials are appointed.

The Japanese manuscript account called Riukiu Jiriaku (by Arai Hakuséki), states that the first intercourse between Japan and Loochoo took place in the year 1451, [2] under the Emperor Hanazono II, when certain Loochooans brought a present of a thousand strings of cash to Ashikaga Yoshimasa, the ruling Shôgun. In those days very little

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<sup>1</sup> Revised by the Author.

<sup>2</sup> Ôshima, Kikai-ga shima, Toku-no shima and Oki no Erabu shima were entirely under the jurisdiction of Satsuma. The author of the Chiuzankoku Shiriaku seems to have been ignorant of this fact.—E. S.

copper money was coined in Japan, and the greater part of the currency consisted of Yunglō (Yeiraku in Japanese) cash purchased from China by shipments of gold dust, so that the offering was no doubt highly acceptable. From this time onwards the Loochooans frequently traded to Hiōgo, and we find mention made of another embassy in the year 1580, during the supremacy of Hidéyoshi, or, as Europeans usually style him, Taikō sama. The relations between Loochoo and the province of Satsuma were always of a most friendly character, and vessels came annually to Kagoshima laden with presents. But about the beginning of the 17th century a Loochooan Minister named Jana, who was desirous of getting into favour with the Ming dynasty, at that time still rulers of China, persuaded the King to stop all communication with Japan. The Prince of Satsuma, Shimadzu Iyéhisa, who bore the title of Mutsu no kami, despatched a messenger to demand an explanation, but Jana treated the envoy with such disrespect that Iyéhisa's anger was aroused, and he started for Sumpu (the modern Shidzuoka), where Iyéyasu was then enjoying the sweets of retirement after having subdued all his enemies, to obtain permission to use force in bringing the Loochooan King to his senses. Full power having been granted to him to take whatever measures he might judge necessary, he proceeded on his expedition in the month of March, 1609, with a large fleet of war-junkss. The bravery displayed by his troops was such that in a few months' time they took the capital by assault, and making the king prisoner, returned in triumph to Kagoshima, where the unfortunate prince had to undergo a confinement of three years' duration as an expiation for his offence. It appears from the annals that the Chinese did not discover this until after the king's return, so that they were unable to assist their vassal.

From this date the kingdom of Loochoo became subject to the princes of Satsuma, the Shōguns not caring, [3] or perhaps not venturing, to interfere with the conquest made by Iyéhisa. The only marks of homage which were required by the House of Tokugawa from the Kings were a submission to re-investiture upon the accession of a new Shōgun, conveyed through the medium of the Prince of Satsuma, and the despatch of embassies to Yedo to return thanks on the succession of each Loochooan sovereign. We find from

the chronological tables entitled *Shinsen Nempiô* that fifteen embassies, mostly undertaken for that purpose, came to the Shôgun's capital, beginning with the year 1611 and ending with 1850. Considering the proximity of Loochoo to China, it is no cause for surprise that investiture should also have been received from the Court of Peking. Full descriptions of this ceremony are to be found in the *Riukiu Kokushi riaku* (*Liukiu Kuochi Iio*) a Chinese work reprinted in Japan.

Very little appears to be known of the history of Loochoo anterior to the 12th century, and its real annals commence with Shunten, who ascended the throne in 1187. Shunten is said to have been the son of the famous warrior Tamétomo, who after the defeat of his party in the civil war of 1156, was exiled to Vries Island, and fled some years later to Loochoo. Shunten was succeeded by his son and grandson, after whom the throne was occupied by descendants of the ancient sovereigns during five generations. The son of the last being a child only five years old, the people set him aside, and elected the governor of Urasoyé, named Satto, to be their King. From him is descended in a direct line the present sovereign Shôtai, who is the 34th since Shunten.

The climate of Loochoo, as we should expect from its position, is very warm. Ice is never seen, and snow falls but rarely. The vegetation is green throughout the year, and resembles for the most part that of the south of China. Of rice six kinds are produced, of barley and wheat three, and six sorts of beans. The sweet potato is cultivated in large quantities, though not indigenous, and forms one-half of the sustenance of the people. Each [4] household possesses a number of plantain trees, from the fibres of which the women weave the only cloth made in the island. It is worn by both sexes throughout the year. Both the cotton and tea plants are cultivated, but apparently to no great extent. The sugar-cane grows freely. The vegetables are of unlimited variety, including every kind of gourd and melon. Most of the trees known in Japan and several species peculiar to China are successfully reared. The domestic animals are the cow, horse, sheep, pig, cat and dog, and amongst wild animals the deer, ape and wild-boar are mentioned, but no beasts of prey exist in the islands. The natives keep domestic fowls, ducks and geese, and the game consists of wild



pigeons of various sorts, quail, pheasants and mandarin-ducks. The swallow makes its visit in the month of August, and the hawk is blown over from the outlying islands by the north-east wind in October. Wild-geese are sometimes seen, but storks rarely. Of fish they have the shark, ordinary carp, perch, eel, mackerel and golden carp, besides prawns.

The houses of the Loochooans are built in Japanese fashion, with the floor raised three or four feet from the ground, and have mostly only one story, on account of the violent winds which prevail. They are roofed with tiles of a Chinese fashion, very strong and thick. The buildings in which they store their rice are built of wood and thatched with straw. They are supported on wooden posts about five feet high, and resemble the granaries of the Ainos, though constructed with much greater care.

According to Japanese accounts, the natives of these islands are of a calm and reflective temperament, not given to losing their presence of mind even on the most trying occasions. They observe the precepts of Confucius and are extremely courteous in their demeanour towards others. Conservative in their opinions, they also adore the native gods. In fact, such value do they attach to a polished behaviour that they style their native land 'the country which observes propriety,' and pillars inscribed with this appellation in Chinese characters stand at the corners of [5] the streets in Shiuri. It may be as well to observe in passing that the name given to the metropolis of Loochoo means simply 'chief city,' according to the practice which also obtains in China and Japan, where we find Nanking and Peking on the one hand, Kiôto and Tôkei (or Tôkiô) on the other.

The customs of the Loochooans seem to be, in the main, derived from China, as we find is also the case in Japan, and it is not improbable that, while many changes have taken place in the two latter countries, the Loochooans have preserved those customs unaltered. The following details are taken from a Japanese named Tomioka Shinkô, who compiled a short notice of these islands entitled '*Chiuzan-koku Shiriaaku*,' or 'Short account of the Loochooan Embassy,' some twenty years ago, on the last occasion<sup>3</sup> when an embassy visited Yedo.

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<sup>3</sup>An embassy has since visited Yedo in the year 1872.—E. S.

The Sovereign wears a cap called *ben*, made according to a pattern worn in the time of the Ming dynasty. It is of black gauze, and consists of a spherical piece which sits close to the head, with a low crown rising above it. On each side rises a long piece of gauze (not unlike asses' ears). The head-covering used by the nobles looks rather like a dried-up turban, and originally consisted of a long piece of cloth wound round the top of the head. At present it is formed of sheets of paper pasted together, covered with silk damask in overlapping layers, seven in front and twelve behind, and the rank of the wearer is indicated by the colour. The dress universally worn is a loose gown, descending to the feet, with sleeves reaching to the tips of the fingers. Under this is worn a short garment of silk or fine hempen cloth. Round the loins is wound a girdle fourteen or fifteen feet in length and six or seven inches in width. The stuff of both gown and girdle varies, of course, according to the rank of the wearer, the nobles indulging themselves in rich silks and brocades for these purposes, which are imported from China. These parts of their dress have evidently been [6] borrowed from China, but their socks, straw sandals and wooden clogs are of the forms usual in Japan.

Both men and women tie their hair into a knot on the top of the head, passing a pin through it, sometimes more than a foot in length. The best are made of gold throughout, the next best of silver with a golden top, the commonest of copper. The girdle, worn exclusively by the men, is the only difference in the dress of the two sexes. Between the ages of sixteen and nineteen the ceremony called *gembutsu*, which corresponds somewhat to coming of age, takes place for the males. The central part of the top of the head is shaven, and two short pins are substituted for the long one previously worn, one of which is ornamented with an artificial narcissus-flower, while the other has the form of an ear-pick. This practice of shaving part of the hair dates back only two centuries, and is probably a mark of Tartar influence. At the age of four-and-twenty the men grow their moustaches, and the beards six years later.

The study of Chinese literature is based on the commentaries of Kuötzü, a learned scholar of modern times. Medicine is studied both in China and at Kagoshima, and no one is allowed to carry the

medicine-case (*inrō*), which is the distinguishing mark of a physician, if he has had only a native doctor for his instructor. A few Loochooans endeavour to imitate the caligraphy of the old Chinese inscriptions, and read the classics according to the modern Chinese pronunciation, but the majority learn to write the Japanese *hiragana*, and copy the handwriting of the Japanese calligraphists Ohashi and Tamaki. Instead of reading Chinese straight down the page, they construe it backwards and forwards into their own language like the Japanese. In the pictorial art they have copied both the Chinese and the Japanese, but they have also a school of native growth. Their music is that of the last two Chinese dynasties, and is performed on instruments of Chinese form. In the arts of arranging flowers in vases and of making tea, both of which require many years of practice, they follow the Japanese style, and they [7] play such games as *go*, or draughts, according to Japanese rules.

As regards more manly accomplishments, they are expert archers on horseback and good marksmen with the matchlock. Their skill in boxing is such that a well-trained fighter can smash a large earthen water-jar or kill a man with a single blow of his fist.

The men spend their lives away from home, and despise all other than official occupations, while the women remain within doors and keep house. Girls begin to learn their duties, which consist in spinning and weaving cotton, hemp and silk, at the age of four or five, and are married at fourteen or fifteen. In the higher classes valuable presents are made on these occasions, but the common people are not expected to go to greater expense than a bag of rice and two strings of cash. Formerly, when a male child was born, his hair was allowed to grow naturally, but in more modern times it has become the custom to shave the head until the second or third year. The female children are tattooed on the arms, from the fingers up to the elbows, with small black dots. Their underclothing is longer than that worn by boys, while the upper garment, which is shorter, is turned up outside. Though they wear no girdles, the wind cannot disarrange their dress, because they keep the opening of the gown close with the hand as they walk along. Married women are seldom allowed to see any men but their husbands, with the exception, perhaps, of very intimate friends, and even then they may not converse. If a visitor calls when the

husband happens to be from home, no matter how excellent their terms of intercourse may usually be, he is not allowed to come inside the door. These precautions are adopted in order to prevent suspicions of unfaithfulness being excited. In the market places throughout the country only women are to be seen exchanging their wares; the men have no concern in the matter. It follows from this that they have no one to carry home their purchases for them, and they have to do this themselves, supporting the burden on a bundle of straw placed on the [8] top of the head. The wives of the better classes go to market in the same way as the poorer women, from whom they are distinguished by a piece of cloth a foot long carried in the hand.

Formerly, when a Loochooan died, he was provisionally buried for three years, until his corpse decomposed so far as to leave only the bones. These were taken out of the coffin, washed clean in a kind of *saké* called *awamori*, and being placed in a small vase, were deposited in the tomb. The tombs are small holes excavated in hill sides, just large enough to admit the vase, and the entrances are closed with wooden doors or slabs of stone. It seems, however, that at the present time the ordinary Japanese method of burying the corpse at once is followed, the ceremony being conducted by Buddhist priests.

A man's tomb is decorated with a piece of white cloth and a hat, and a pole is stuck in the ground close by on which are hung his straw sandals and wooden clogs. On a woman's grave they place a palm-leaf fan, fresh leaves of the same and a piece of white cloth.

There were formerly three classes of persons who shaved their heads and wore the skull cap called *hempô*, namely, the physicians, the king's servants and his gardeners, but at the present time the Buddhist priests alone practise this custom. There are only two sects of Buddhists, the *Shingon shiu* and *Rinzai shiu*, both of which also exist in Japan. The Chinese Government does not allow Loochooans to study theology within its dominions, and they are therefore compelled to go through the usual course at Kagoshima. Up to the beginning of the 18th century they were in the habit of making pilgrimages through Japan, but by a subsequent law they are prohibited from extending their peregrinations beyond the boundaries of the province of Satsuma.

The language spoken by the Loochooans, so far as I can judge at

present from a vocabulary which Dr. Willis has kindly sent to me from Kagoshima, appears to differ very little from Japanese. One or two of the heads of the embassy now in Yedo, with whom I had an opportunity [9] of conversing a few days ago, spoke Japanese with perfect correctness. It is also stated that the higher officials are acquainted with the Court dialect of China. It would not be a hazardous conjecture to suppose that the Satsuma dialect of Japanese, which contains several words unknown in other parts of this country, is closely allied to the Loochooan tongue. This is, however, a subject which should be treated separately.

I will conclude with a free translation of the last page of the 'Short Account,' which, it must be remembered, was written in 1850, while the Tokugawa dynasty still flourished.

"Although Riukiu lies several hundred miles away in the sea to the south, it can easily be reached by ship. The temperament of the people and their manners and customs closely resemble those of our own nation. The countries which from ancient times have rendered homage to Japan are China, Corea, Riukiu and Holland. Intercourse with China is restricted to visits made to Nagasaki for the purpose of trading, while the Coreans have ceased to visit the capital in modern times, and though the Dutch visit the capital, their numbers do not exceed three individuals on any one occasion. The envoys who came with presents from Riukiu alone show evidence of appreciation of the perfect etiquette observed towards foreign barbarians by the glorious line which rules over us. Though every one is acquainted with the valour of the province of Satsuma, it would be difficult to parallel its glory, which has lasted through countless generations, even to the present day."























## THE HYALONEMA MIRABILIS.

---

 BY HENRY HADLOW, SURGEON, R.N.
 

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[Read before the Asiatic Society of Japan, on the 30th October, 1872.]

[10] The Glass Plant, Glass Coral, or as it is now more generally and more correctly termed, the "Glass Rope Sponge" of Japan,—*Hyalonema Mirabilis*, as it was christened by Dr. Gray, and is termed by systematic writers,—is tolerably familiar in appearance to most residents in the East, either in its complete form, in which it presents a spongy expansion, sometimes large, sometimes small and of variable shape, having springing from it a very beautiful twisted coil of vitreous-looking cords, which itself is, for a part of its extent, invested and covered by a brown, warty bark-like structure; or as, perhaps, it is more commonly met with, in an imperfect condition, presenting only the glass rope and its attached bark without any trace of the spongy expansion from which it has probably been torn. We also sometimes meet with portions of the glass coil most ingeniously attached to and grouped with corals, shells and other marine products, which I need only refer to to remind you that such arrangements are entirely artificial, notwithstanding that they are often so artistically done as to have a most deceptively natural appearance, and that the way in which the coil is placed, with the free ends of the plume upward, has had, I imagine, considerable influence in persuading people that that was its ordinary mode of growth.

[11] The *Hyalonema* has long been a favourite with collectors from the intrinsic beauty of its form, whilst to the student of marine zoology it has a special interest from the peculiarities of its structure, the doubt that obtained as to the precise position it occupied in the animal



kingdom, and from an uncertainty, not even yet definitely set at rest, as to the true relation which the parts of which it is composed, namely the sponge head, the glass rope, and the so-called bark or polythoa, bear one to another.

Dr. Gray, who described the Hyalonema from some of the early specimens and gave it its scientific name, regarded the glass rope and its bark-like enveloping polythoa as an organism entirely independent of the spongy mass to which it was commonly found attached, and the glass rope with its coriaceous investment were described together as *barked coral*, the silicious twisted stem or axis being looked upon as the foot selection or *sclero-basic corallum*, as it is termed, of the compound polyp mass investing it and forming its bark. Dr. Gray considered its attachment to the sponge as merely parasitic and accidental, the sponge being supposed to form a fixed base from which the Hyalonema grew and projected like a plume. In a very trustworthy little work by Professor Reay Greene published in 1863, the Hyalonema are referred to the Actinozoa, although provisionally, and since that time our knowledge of them has increased. In 1868 it was reported that Hyalonemas had been discovered in the deep sea dredgings at Setubal on the coast of Portugal. It was first supposed that these must have been thrown overboard from some passing vessel returning from Japan, but other fresh specimens followed, and it became certain that the Hyalonema was a denizen of Portuguese waters. Since that time the deep sea dredgings of Setubal, carried on at depths of 300 and 400 fathoms, have been a kind of happy hunting-ground for marine zoologists. A fine collection has been secured for Lisbon. Professor Percival Wright was successful in finding specimens, some living, and some of large size, and has shown us that our original opinions were founded in [12] mistake, and that so far from the sponge being the fixed mass it is the glass rope which dips deeply into the mud or sand and forms a kind of anchor for the sponge head, probably being secreted by it for that purpose, and that it is not a mere growth attached parasitically to the sponge, but an essential part of its constitution. Professor Wyville Thomson has also been engaged in the capture and study of these forms, and has promised a memoir on the genus, which is impatiently looked for by all interested in the subject. I have not, however, heard of its ap-

pearance yet, and in the meantime, there are many points of interest and many structures of great beauty which we can discover for ourselves with a little expenditure of time and patience.

The sponge mass of the *Hyalonema* is perhaps most commonly cup-shaped, with the glass rope attached to its inner concave surface. Sometimes it is more or less globular, with the glass rope running through it and attached to nearly the whole length of the long axis. As you see in the specimen before you, it is sometimes of considerable size, eight or nine inches in its longest diameter. It must be remembered that in a dried specimen such as those before us, just as is the case with the common sponge of our toilet table, what we see is the mere framework or skeleton of the actually living sponge. During the life and growth of the sponge this skeleton is clothed with a soft semi-fluid gelatinous coating called sarcode, which is the really truly living matter of the organism; by which it breathes, by which it takes its food, by which it propagates and multiplies its species, and by which the skeleton, and the spicules of which I shall have something to say hereafter, are formed and secreted. Time will not admit of our discussion of this sarcode matter. I can only stay to remind you that it is not a mere homogeneous layer like a stratum of jelly, but that it contains an immense number of small sarcode cells or amœboid bodies, more or less globular in shape, often provided with a long whip-like filament or flagellum, by whose lashing movements currents of water are kept circulating [13] over the little sarcoid for its aeration and nutrition; and lastly, that each little sarcoid has an independent vitality which enables it to live when separated from the parent mass, and under favourable circumstances to become the commencement of fresh sponge growths. Also the living sponge presents an aquiferous system, consisting of a series of anastomosing channels passing through its mass, through which currents of water are constantly passing, entering by the minuter orifices or pores, and escaping from the larger openings or oscula, in this way bearing floating nutritive material to the fixed sarcode matter and at the same time aerating the whole animal. Such are the general characteristics of living sponge; the skeleton which we see in dried specimens is, in the ordinary sponge of every day life, composed of horny material in form of tubes, in composition resembling animal matter, and of a softness and elasticity which gives it its domestic value.

These sponges are called keratose or horny, and form one of the three groups into which sponges are divided by the nature of their skeleton. In a second order the framework is calcareous, composed of carbonate of lime, and there is yet a third to which Hyalonema belongs, in which the skeleton is silicious. Whatever may be the composition of the fibres forming the framework, they are arranged always in an intricate network, thus securing the peculiar cellular structure which sponges possess. For the purpose of strengthening the skeleton and assisting in giving support to the semi-diffuent sarcode matter, we also find, especially in the calcareous and silicious sponges, what are termed spicules, that is, calcareous or silicious particles of definite form, generally slender, acicular, sometimes needle-like in shape, in other cases assuming very graceful and elegant forms. The Hyalonema is particularly rich in these, but as we shall have to return to them in speaking of the polythoa or bark, it will be convenient to consider them then.

So far we have met with little in the general formation of Hyalonema different from siliceous sponges generally, nothing indeed, except the variety of beauty of the spicules [14] which we shall describe presently, but the glass coil or glass rope is a structure altogether new. As we have already seen, it was originally thought not to be a portion of the sponge at all, but the foot secretion of an Actinia. It is now more commonly regarded as an integrant part of the sponge itself, chiefly from the fact that we have recently become acquainted with several other sponges similarly provided with foot pieces or stalks serving as bases of attachment. We may, if you please, look upon the glass cords, as kind of gigantic spicules dipping down into the soft mud and ooze, and serving as an anchor. If we take a single filament of the cord and examine its structure, we find that it is not homogeneous as the thread of spun glass would be to which it has been compared, but that it is laminated,—composed of layer upon layer of silicious matter deposited round a central axis. This can be seen without much difficulty by breaking the glass fibre across in such a way as to produce an irregular splintered fracture, and examining the broken end under a low microscopic power. The appearance presented is shown in the sketch, taken from an object laid on the table, and in the

original it is easy to count more than twenty layers entering into the composition of the fibre. Towards each extremity of a fibre the number of layers is fewer and the fibre consequently tapers off, and as the fibres themselves do not extend the whole length of the coil, this likewise tapers off in the end which is attached to the sponge, and appears there to be tough and fibrous and securely attached to the spicules and network forming the skeleton of the sponge mass.

Mr. Carter, in his very interesting observations on the development of the fresh water spongilla, has described how the spicula of that organism are formed. He has shown that they first appear as a delicate line enclosed and developed within an elongated sarcode cell, and that they grow rapidly by external additions until they attain their full dimensions, soon outgrowing the cell in which they first appear. There can be little doubt that the filaments of the glass rope are developed in some more or [15] less analogous way, and that in the living state they are like the silicious skeleton of the sponge itself, clothed with sarcode matter from which layer after layer of silicious material is deposited as long as the fibre continues to live and to grow.

If we now examine the coriaceous envelope of the glass coil, or polythoa, which can be most easily done in dried specimens after it has macerated for a few days in water, we can easily make out that it consists of two layers, an inner one closely connected with some of the fibres of the glass rope, and which has been stated by some observers to extend between and invest each individual fibre of the glass coil which forms its axis;—I am, however, doubtful if this is the case; it does not appear to be so in the large specimens on the table;—and an outer thicker one which is largely made up of small particles of sand, broken shells, minute foraminifera, and here and there a diatom, mixed up with the beautiful spicules secreted by the organism itself. At first sight it reminds one of the little tubes which the terebellas build up from sandy and shelly particles and which you often meet with cast up on the sea shore. Studded about on the bark are little wart-like projections with flattened crowns, having in the centre a small depression or orifice with little radiating grooves proceeding from it. If, in a macerated specimen, we make with a sharp knife a thin section from without inwards, taking care to include the central depression, and then examine it with a com-

mon lens, we shall observe, supposing our section to have been a tolerably successful one, much the appearance which you see drawn here, the original of which is on the table. We see that the innermost of the two layers of the bark passes under the little cup-like projection, all together forming the base of the included cavity; whilst the thicker external layer, separating from the inner one, is raised up, forming the wall and crown of the tubercle until it reaches the central depression, where it turns inwards, forming a small funnel-shaped process which opens into the general cavity of the structure. This at once reminds us of the formation of the Actinozoa, [16] which consists of a simple digestive, or stomach tube, open at both ends, and suspended in the centre of the polyp by little partitions called mesenteries; indeed, the resemblance to an ordinary zoantharian is so close that we cannot feel any surprise when Dr. Percival Wright tells us that in living specimens brought up from the deep-sea soundings at Setubal, he has observed the little wart-like projections of the bark expanding their tentacles in search of food just like the common sea anemone of our aquaria, or any other zoantharian. It is a compound polyp; that is, although each little nipple-like projection has its own digestive sac, and its own prehensile organs or tentacles by which it secures its own food, they all unite together to contribute to the growth of the compound mass of which they form part. Such being the case, it is clear that the polythoa, or coriaceous investment of the glass rope, must be an organism totally distinct from the sponge mass, whose nutrition we have already seen to be derived from the currents of water flowing through its aquiferous channels. If we admit the silicious stem or glass rope to be an essential part of the spongy portion, we shall be constrained to regard the polythoa as a mere parasitic investment, and having no structural relations with the sponge and its glass coil at all. There are still, however, some observers who consider that from the universality with which the bark is found coating the glass rope and no where else, and from its containing peculiar silicious spicules, that these two, the polythoa and glass rope, form one organism which may exist independent of the sponge at all, as was first supposed, and they consider such specimens as these, in which no trace can be discovered of the spongy expansion, and the glass coil is

coated to its extremity with polythoa, as strongly favouring this belief. It is perhaps premature to pronounce dogmatically either way, although the first of these views—that is, of the parasitic nature of the polythoa—meets with almost universal acceptance.

What, then, are these spicules of which so frequent mention has been made? They are easily obtained for [17] examination. If we put a few particles of the polythoa, or some fragments gently torn from the inner surface of the sponge, into strong nitric acid for a day or twos the animal and extraneous matter will dissolve away, and the siliciou, particles, including the spicules, will alone remain. These must be well washed in many waters to remove all traces of the acid, and will then be ready for examination with the microscope, or for mounting in Canada balsam, if it is desired to keep them as permanent objects; taking care, in the latter case, not to break the more delicate forms by too much pressure on the covering glass. Proceeding thus with the polythoa, we find that the spicules have a great tendency to assume the cruciate form, the most common of all being described in scientific terminology as *cylinduro-cruciform with densely spiculate shafts*. In some other forms, the shafts of the cross are spiculate only at the extremities, and are much more delicate in contour. We meet with others in which the lateral shafts of the cross are reduced to mere rudimentary projections, whilst still in others they are absent altogether and the spicule is a short thick cylinder studded all over with sharp spines. Of these straight or nearly straight spicules we find several kinds, some spinous only at the ends, others with a small central enlargement, and lastly we meet with delicate spicules, some in the form of crosses presenting perfectly smooth outlines. In the sponge, some of the commonest, although not the most striking, forms, are these *spiculated cruciform spicules*, with a little foot-piece in the form of a cross from which springs a much spiculate stem. Dr. Wright tells us that these are chiefly found round the oscula or openings of the aquiferous channels and lining the cavities of the sponge, attached by the little foot piece to the sarcode mesh. He says,—to quote his own words—“From the peculiar way in which they are placed on the edges of the meshes, and from the fact that the barbs on the stem of the spicules all point in one direction, it

is possible that while it would be easy to glide over the slimy sarcode down into an osculum, return would be no easy task, as [18] any solid body would be at once caught and retained by the barbs." It is, however, only in fresh specimens, or in those which have been at once put up in preservative, that these can be properly seen in their natural position; in the dried sponge they are so loosely attached as generally to become separated.

Amongst other forms to which we can only briefly refer, are many of delicate cruciform shape, much resembling the foot piece of the spicules last described. Some are large and present the appearance of four radii springing at right angles from a central axis, hexradiate. We also find a number of peculiar kedge-like forms, some very simple, others larger, passing through various gradations of size, but leading up to the magnificent spicule described in scientific terms as "*multihamate birotulate, shaft slight, cylindrical, papillate.*" It might be roughly compared at first glance to two open umbrellas made of the finest spun glass with their sticks fused into one, but the true structure of the expanded portion is shown here, delicate silicious leaves curving gracefully from each extremity of the shaft towards its centre.

There are many other forms of spicules to reward the painstaking microscopist who searches for them, some of them minute and requiring the higher powers of the instrument and careful examination of the lighter washings, but the most beautiful and distinctive are those which we have seen and which can be easily demonstrated with the most ordinary microscope.

In conclusion, I would venture to impress upon you that there is a great deal yet to be discovered concerning this very interesting and curious sponge, which can only be learned by the careful examination of fresh specimens in the natural condition in which they are brought up from their ocean bed, and it is chiefly with a view of enlisting amongst the ranks of the observers any of my hearers who may be passing a holiday at Enoshima or the neighbourhood from which the sponges are brought, that these few brief notes of the *Hyalonema* are brought before your notice. The discovery, for example, of a young specimen complete [19] in sponge head and glass rope, but without

the coriaceous investment, would be of the highest scientific value. The verification of the observation that the little warty projections of the bark have their own tentacles and their own mouths, would have its interest, and the discovery of the bark-like polythoa, coating other structures altogether apart from the glass rope, would all aid us in clearing up matters yet in doubt, and help to give us a clearer view of the very interesting but not yet fully understood **HYALONEMA MIRABILIS**.



## THE STREETS AND STREET-NAMES OF YEDO.

BY PROFESSOR W. E. GRIFFIS.

[*Read before the Asiatic Society of Japan, on the 14th December, 1872.*]

[20] The history of the streets of a city is often a history of the city itself. The names of the thoroughfares of a nation's metropolis frequently mirror the national history. Such names become, in after ages, an index to the past, and, like rare fossils, exhibit to the mind of an antiquarian whole strata of forgotten history. Were one to be blindfolded and set down in Paris, the street names alone would tell him that he was in France, and from these names, he might read aright the story of the many victories of glory-loving France. The sight of the sign-board in the single street, Rue de l'Ecosse, would call up the history of the intrigues and long friendships of France and Scotland; and the eye of imagination might see the Highland sentinel pacing his rounds in the French capital, humming the airs of his bonny heath. The street-names of a nation's metropolis are often a true exponent of the national character, as well as of its history. Thus, while those of London, like those of Paris, tell of the national passion for war and glory, and all that is spectacular and heroic, they tell also of what is dear to humanity in all its phases, from the sublime to the most ridiculous. Of Philadelphia, Longfellow, in his "Evangeline," sings—

[21] "The streets still re-echo the names of the trees of the forest,

As if they fain would appease the Dryads whose haunts they molested."

We should perhaps make an apology for selecting so homely a subject as that which we bring before this cultured audience this evening. Let us see what may be learned from the street-names of the capital of the city of Japan, and how much light they throw upon the national character and history.

In the first place, we find an almost total absence of the names of great battle-fields, or places of victory, and indeed of nearly everything betokening military glory. Notwithstanding that Japan has been the theatre of conflict for many centuries, so that war may be said to have been the normal, and peace the exceptional condition of its inhabitants, and notwithstanding the invasion, conquest and long possession of Corea, it does not seem to have been the custom to record the names of battles or of victory in the street-names of the capital, as is the custom in Europe and America. Yet the reason is evident. Notwithstanding long civil wars and occasional warlike excursions, the natives of Japan delight to call their country the "Land of Great Peace," and a successful invasion of Japan has not yet been made. With the exception of Corea, Japan has been almost entirely without foreign enemies. For obvious reasons, none of the great victories gained by Japanese heroes over their own countrymen have found a monument in the street nomenclature of Yedo. It would have been unwise policy in the great unifier of Japan, Iyeyasu, to have given to the streets in the capital of a nation, finally united in peaceful union, any name that would be a constant source of humiliation, that would keep alive bitter memories, or that would irritate freshly-healed wounds. The anomalous absence of such names proves at once the sagacity of Iyeyasu, and is another witness to the oft-repeated policy used by the Japanese in treating their enemies, *i.e.*, conquer them by kindness and conciliation.

In the second place we have noticed that very few of the national heroes or really great men of Japan [22] are remembered in the street nomenclature of Yedo. Such a fact is significant, when we remember that the cities of Europe and America in their street names, give us, in many instances, excellent catalogues of their national heroes, statesmen, and scholars. In Yedo, the name of the warrior-emperor Hachiman is borne by several streets, usually by those which pass in front of, or issue from the shrines dedicated to Hachiman, who is also the god of war. Various individuals have had their own names transferred to streets, or have named them themselves, but these persons were mostly men of no renown, or at least of merely local fame; good, honest or wealthy nobodies, of whom no history speaks, and who were unknown except to their own friends and neighbours, and perhaps not heard of

beyond the smoke of their own dwellings. Several famous wrestlers have been honoured by having streets called after them, likewise several priests and nuns. A fencing-master, who appears as the central hero in one true narrative, and in a small host of romances, is celebrated among the people for having followed through many years and provinces the murderer of his father, whom he at last killed. He points the moral and adorns several of the many tales of Japanese revenge, which form the literary pabulum of the little children of Japan. The street which is named after him is Kanda Miyamoto.

While speaking of persons, it may be mentioned that near Nihon Bashi is the street formerly called Anjin Chô, after Will Adams, of whom we have read before, and whose sepulchre, thanks to the zeal of a recent discoverer, is known to be with us to this day. Near by Anjin Chô, though we cannot vouch for the truth of the statement, was another street, called Yayosugashi, which, as I have been informed by several natives, is the Japanese-Dutch for the name of a Hollander employed in the service of the Shôgun at the same time with Adams.

Knowing the populous character of the Pantheon of Japan, we might expect to find many streets called after the popular deities. Only a comparatively small number, however, have [28] received their names from this source, and even in such cases the streets take their names from temples situated in them. Two or three streets are named after the dragon, which, considering how omnipresent are the pictures of this fabulous ugliness on all things Japanese, is a noteworthy small number.

The chief idea prominent in the nomenclature of the streets of Yedo exhibits that trait of Japanese character which enters so largely into the national temperament—the passionate love of nature and natural scenery. Their beautiful country at once creates and satisfies their love of nature's beauty, and this feeling finds expression even in the street names. The latest official directory of Tôkiô contains the names of 1871 streets proper, and fully two-thirds of these have names derived from natural objects.

Since the peerless mountain is visible from many points, we are not surprised to find two "Fuji-san viewing" streets, and one "Suruga

Chô."<sup>1</sup> 'Willow,' 'Pine,' 'Stone,' 'Field' and 'Bamboo' streets are numbered by scores. We have a 'Pine' street in nearly every one of the ninety-six subdivisions of the city. It may be 'N.,' 'S.,' 'E.,' or 'W.' 'Pine.' It may be 'Front,' 'Side,' 'Rear,' 'Side,' 'Temple-facing,' or 'Hill-facing,' 'Pine.' Now it is 'Long Pine,' anon 'Little Pine,' 'Pine-foot,' 'Pine Branch,' 'Boat Pine,' 'Old Pine,' 'Young Pine,' 'New Pine,' and so on, with many others. The willow, at one time, must have been a very common tree in Yedo, if we may judge from the number of streets called after it. All varieties and forms of bamboo flourish in the street nomenclature. Other specimens of botanical names are 'Mushroom,' 'Rice,' 'Rush,' 'Wild Cherry' (Sakura), 'Cedar' (Cryptomeria), 'Wormwood' (Artemisia), 'Peony,' 'Chrysanthemum' and 'Hollyhock.' As a kind of supplement to these, are 'Bouquet,' 'Sunny,' 'Morning Sun,' 'Sun-shade,' 'Grassy,' 'Double Root,' 'Mist,' 'Mound,' 'Pure Water,' 'Dew Moon,' 'Plum Orchard,' which in some cases have their names duplicated and triplicated.

Zoological names are not absent, as the following will [24] show. We have 'Tortoise,' 'Monkey,' 'Stork,' 'Badger,' 'Falcon,' 'Shark,' 'Bear,' 'Goose Nest,' 'Red Feather,' 'Young Pheasant,' 'Crow's Grove,' 'Twenty Horses' and 'Clam' streets; with many others of the same nature, the names of which occur several times in various parts of the city.

Next to natural objects in respect to number, are the names of indispensable articles used in everyday life. In a country where the houses are almost universally built of wood, timber is almost as necessary as food, and we are not surprised to find in Yedo more than a score of 'Timber' streets. 'File,' 'Pot,' 'Kettle' and 'Table,' etc., repeat their names several times. 'Salt' street is a very common one, and the same is the case with 'Norimono,' 'Wheel,' 'Indigo,' 'Mat,' 'Fan,' 'Kitchen,' 'Hair-pin,' 'Charcoal,' and 'Leather,' streets. There are several 'Net' and many 'Fish,' etc., the latter of which may be 'Fresh,' 'Roasted,' or 'Plain.' Of 'Calamus,' 'Oil,' 'Gum,' and 'Pantry,' streets, there is one each. 'Three Hats,' 'Sweeping,' and 'Cabinet' streets are known, and we almost detect an attempt to be funny, in the name given to certain streets like our courts, which have an entrance, but no outlet. These 'blind-alleys' are called 'Bag' streets.

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<sup>1</sup>Fuji-san, or Fuji no yama, is situated in the province of Suruga.

As regards trades, 'Carpenter,' 'Blacksmith,' and 'Dyer' are the names most repeated, though there are also 'Sawyer,' 'Jockey,' 'Farmer,' 'Coolie,' and 'Sailor' streets.

What weapons were used by the warriors of Old Japan are told us in the street names of Yedo. We have 'Armour,' 'Helmet,' 'Arrow,' 'Bow,' 'Quiver,' 'Spear,' 'Sheath,' and 'Arrow-arsenal' streets.

Not to particularize to a wearisome extent, we shall mention but a few others: 'Row of Trees,' 'Same Friend,' 'Flower River,' 'Farmer's Lot,' 'One Colour,' 'Spirit Cave,' 'Peaceful,' 'Exist,' 'Congratulation,' 'King's Hand' (checkmate), 'Reaping Hook,' 'Lacquer,' 'Flock of Sparrows,' 'True Stone,' 'Myriad,' 'Brocade,' 'Cash,' 'Mint,' 'Silver Coin Mint,' 'Abounding Gladness,' [25] 'New Bloom,' 'Treasure Mountain,' 'Storehouse,' 'Tori-i' ('Birdrest,' or temple portal), 'Shrine Row,' 'Aqueduct,' 'Mountain Breeze,' 'Tomb-door,' 'Blue Mountain,' 'Monkey-music,' (name of an old comedy), 'Miôga,' (name of a disciple of Buddha, stupid, and of feeble memory; hence the name of an edible vegetable said to cause forgetfulness in the mind of the eater), 'Rich Bluff,' 'Conjugal Love,' 'Finger Valley,' etc.

Some of the wells in Yedo, besides being noted above others, have given names to streets; we have 'Bear's well,' 'Dyer's well,' 'Rock well,' 'Wild well,' etc. Many other streets are named from the guard-gate at which *octroi* was taken, and passports were examined. A few of them take their names from the bridges over which they extend.

After all the curious and suggestive bits of information that may be gained by a study of the street-nomenclature of Yedo, we must acknowledge that it exhibits in its frequent repetitions of the same names a poverty and lack of variety that can scarcely be explained except by assigning as a reason, what is in reality the fact; viz., that Yedo, like London or Philadelphia, was originally not one homogeneous city, but has become, in course of time, from the gradual agglomeration of many villages, a homogenous city. Indeed, this seems to be the order of history, and the law of growth, of almost every large city. At the present time the jurisdiction of Tôkiô Fu extends over 125 villages, which are considered as integral parts of Tôkiô. Originally the villages, which were finally ossified together, were more or less distant from each other, the extreme distance being as high as twelve miles.

The inhabitants of each village developed for themselves, as their needs arose, a system of street nomenclature, which, being the reflection of their life, surroundings and necessities, was, in each case, independent; and yet in the totality, from the nature of the case, these were identical. 'Timber Street,' 'Carpenter Street,' 'Pine Street,' 'Willow Street,' 'Bamboo Street,' would naturally be the first names. Then when a second 'Timber Street,' [26] would be laid out, the former one would be called 'First,' or 'Original' 'Timber Street,' and the succeeding namesakes would be dubbed 'N.' 'S.,' 'E.,' 'W.,' 'Front,' 'Rear,' 'Timber Street,' as the case might be. When all these villages agglutinated together, there would be several scores of 'Timber,' 'Blacksmith,' 'Pine,' and 'Willow' streets; just as in London were formerly, and perhaps are now, hundreds of 'Prince,' 'King,' and 'Queen' streets. In speaking of one of the many 'Pine' streets in Yedo, the name of the old village or district, or the new subdivision in which it is situated, must be mentioned to distinguish it from the others.

The names of Japanese streets are not marked on conspicuous sign-boards, as in European cities. Before each house, over the doorway, is pasted a slip of paper containing the name of the householder, the numbers and sexes of his family and household, the number of the house and the name of the street. At present the custom is coming in vogue of nailing up on the corners of the streets small boards containing the names of the streets and the numbers of the division or ward, and subdivision or precinct, of the neighbourhood. In many places, especially in the unbuilt or newly surveyed portions, small stakes, marked as above, are driven into the ground, and act as guide-posts. In directing a letter we must write the name of the person, street and number, the ward and precinct, and to avoid all mistake, the ancient name of the neighbourhood. These names are still tenaciously retained in the mouths of the people.

Iyeyasu made Yedo, then a comparatively insignificant town, his capital, about the year 1600. He gave new names to several of the principal streets, naming them after those in Shidzuoka,<sup>3</sup> but does not seem to have made any great municipal changes, and the

<sup>3</sup>Shidzuoka is the present name of the ancient city of Fu Chu, once the Shōgun's capital.

street nomenclature of Yedo remained, with scarcely any variations, until after the civil war, six years ago. The name Yedo (ye 'river' or 'bay'; and do, 'door') was changed to Tòkiô (tò [27] east; kiô, capital), and every name borrowed from Shidzuoka, or which could in any way recall the former power and glory of the house of Tokugawa was expunged, and new names were substituted. Some changes for the better were also made at this time. Many of the long streets having, as was formerly the case, a large number of local names given to their various parts, were called by a single name throughout their entire length, or else by the names, first section, second section, etc. About one-sixth of the street names were altered by this late act of the government, and it is of the streets of Tòkiô, and not of Yedo, that we have been speaking; that is, of the streets of the capital of Japan, as they exist now. The Japanese no longer recognize any such place as Yedo, and do not use the word. Foreigners, however, will very probably retain permanently the name Yedo.

The oldest part of the city of Yedo is the street called Temma Chô (Pack-horse [relay] street). Here, in ancient times, was one of the numerous travellers' stations on the route from the northern provinces to the southern. In the villages containing relays of horses, coolies, kago, etc., the Daimiôs and lesser folk could rest or lodge, obtain entertainment for man and beast, and fresh reinforcements of either. At the present day the people born in the immediate neighbourhood of Temma Chô, boast, with pride, their birth in the oldest part of Japan's capital, believing themselves to be therefore, Japanese of the Japanese, of specially pure blood, and peculiarly children of the Empire of the Rising Sun. The oldest avenue, or large street is called the Tôri, which begins at Shinagawa. From Shinagawa, the southern suburb, to Suji Kai Go Mon (Gate of the Inclined Plane), which is a little north of the centre of the city, the Tôri or Main street has, beside its general name, at least thirty local designations. Along the Tôri and the districts for a considerable distance east and west of it, throughout its length, is the chief business quarter of the city. Within the immense space of the castle were the residences of the large daimiôs and their retainers. The fortifications of the castle [28] are, to this day, not so much walls of defence against enemies, as stone lines of demarcation between the

merchants and the samurai. The general term for all people in Japan, who are not samurai, or of the privileged classes, is *chô-nin* ("street-man").

In treating of the thoroughfares of Yedo, the water communications must not be forgotten. By a glance at the map it will be seen that these are considerable in every quarter of the city. It is possible for a boat from Yokohama, or from the interior, to convey goods to almost any point within the castle moats, excepting points on the western side, and to many places in the northern and southern portions of the city. In the district called Fukagawa and Honjo, the canals are especially numerous.

Formerly, the city was divided into thirty districts or wards. At present, by an act of the Government, which went into effect the year before last (1871), the city is divided into six large divisions, each containing sixteen subdivisions. Formerly each street, or section of it, was under the superintendence of a petty officer, or monitor, who lived in the street over which he exercised supervision. Over these monitors, a ward officer, with assistants, presided. The house-holders were grouped together into fives, one of them being accountable for the others, and all acting as spies and checks upon each other. Under this system it was usually an easy matter to fix the responsibility of the origin of a conflagration, theft, riot, etc., upon the real offender. Every ward was surrounded either by canals, walls, or fences, the entrance to which were closed by guard gates. In case of disturbances of any kind, it was comparatively easy to shut the gates, and confine the infection of disease, riot, etc., to a single ward. At present the old system of municipal government having been done away, the city is governed by a body of about 8,500 policemen, who are of two grades; the one being that of the simple constable, and the other being invested to a very limited degree with the powers of a magistrate. The basis of the organization, division and local duties of this force, is the same as that of the divisions of the city, [29] there being ninety-six station houses in the various parts of the city. We hazard the belief that there is no other city in the world in which the public peace and order are better kept, or in which the safety of the inhabitants is better secured.



The streets of Yedo are in general wide and spacious, and are kept well repaired. They are usually straight, and run between opposite cardinal points of the compass. Within the castle, the avenues, especially along the moats, were originally made for the spectacular displays of feudalism, and though the Daimiô's trains no longer glitter and impress the mind of spectators with scenic effect, the wide avenues on which these glories of a by-gone age were once displayed, still remain to adorn the great city which is the capital of new Japan.

## THE GEOGRAPHY OF JAPAN.<sup>1</sup>

By E. SATOW, Esq.

[Read before the Asiatic Society of Japan, on the 22nd March, 1873.]

[80] Dr. Cornwell's School Geography, a book which had reached its 47th edition in 1870, and may therefore be supposed to have a large circulation, informs us that 'Japan consists of Nippon, Kiusiu, Sikoku, the dependencies of Jesso, the South Kouriles, and the south part of Saghalian.'

To say nothing of the incorrect spelling of the names in this sentence, it contains one error which every writer on Japan appears to have committed, and which demands immediate attention. This error consists in restricting the application of the name Nippon, or Nihon, to the largest island of the Japanese group, whereas it denotes in reality the whole of the empire. Amongst the numerous peculiarities of Japanese geography, none is perhaps more curious and more difficult to understand at first sight than this, although when the manner in which the country is divided is clearly pointed out, the necessity for giving a separate name to the main island seems less absolute than would be imagined.

A native manuscript entitled *Kō-koku chi-ri Riaku*, or 'A Short Geography of the Empire,' says: "From the most ancient times until lately Japan did not consist of more than sixty-eight provinces, namely, the five home provinces, the seven circuits, and the two islands, but in the winter of the year before last (1868) it was [81] redivided into eighty-four provinces, namely, five home provinces and eight circuits."

The *Go-Ki-nai* or five home provinces, are Yamashiro, Yamato, Kawachi, Idzumi and Settsu. The seven circuits are the *Tō-kai-dō*, *Tō-san-dō*,

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<sup>1</sup>Revised by the Author.

Hoku-riku-dô, San-in-dô, San-yô-dô, Nan-kai-dô and Sai-kai-dô. The first division of Japan into provinces was made by Sei-mu Tennô, A. D. 181-190, in whose time the jurisdiction of the Mikado did not extend further north than a line drawn from Sendai Bay to somewhere about Niigata, the rest of the island, namely the subsequent province of Dewa and part of Mutsu, being still occupied by the barbarous tribes of whom the Ainos are probably the remaining descendants. What in 1868 constituted sixty-six and a half provinces was divided by him into only thirty-two.<sup>2</sup> In the third century the Empress called Jin-gô Kô-gô, after returning from her victories in Korea, divided the country into five home provinces and seven circuits, in imitation of the Korean arrangement. In the reign of Mommu Tennô (696-707) some of the provinces were sub-divided, so as to increase the whole number to sixty-six. The boundaries then fixed by him were re-surveyed in the reign of Shô-mu Tennô (728-756) by Ki-bi Dai-jin and the Buddhist priests Giô-gi and Tai-shô, to whom the task was confided by that Mikado. They are said to have buried charcoal in the earth at points on the boundaries, that being the most imperishable mark which they were able to devise.<sup>3</sup>

The old division is as follows :—

The Go Ki-nai, or Five Home Provinces are :—

<i>Yamashiro</i> <sup>4</sup>	or Jô-shiu.
<i>Yamato</i>	“ Wa-shiu.
<i>Kawachi</i>	“ Ka-shiu.
<i>Idzumi</i>	“ Sen-shiu.
and <i>Settsu</i>	“ Ses-shiu.

[92] The Tô-kai-dô, or Eastern-Sea Circuit, comprises fifteen provinces, namely :—

<i>Iga</i>	or I-shiu.
<i>Ise</i>	“ Sei-shiu
<i>Shima</i>	“ Shi-shiu.
<i>Owari</i>	“ Bi-shiu.
<i>Mikawa</i>	“ San-shiu.
<i>Tôtômi</i>	“ En-shiu.

<sup>2</sup> *Kô-chô En-kaku Dzu-kai.*

<sup>3</sup> *Chikata Han-rei Roku*, Vol. I. ff. 20, 21.

<sup>4</sup> The names given in italics are those most in use.

Suruga	or	<i>Sun-shiu.</i>
<i>Idzu</i>	“	<i>Dzu-shiu.</i>
<b>Kai</b>	“	<i>Kô-shiu.</i>
<i>Sagami</i>	“	<i>Sô-shiu.</i>
<b>Musashi</b>	“	<i>Bu-shiu.</i>
<b>Awa</b>	“	<i>Bô-shiu.</i>
<i>Kadzusa</i>	“	<i>Sô-shiu.</i>
<i>Shinôsa</i>	“	<i>Sô-shiu.</i>
and <b>Hitachi</b>	“	<i>Jô-shiu.</i>

The Tô-san-dô or Eastern-mountain Circuit, comprises eight provinces, namely :—

<b>Ômi</b>	or	<i>Gô-shiu.</i>
<i>Mino</i>	“	<i>Nô-shiu.</i>
<i>Hida</i>	“	<i>Hi-shiu.</i>
<b>Shinano</b>	“	<i>Shin-shiu.</i>
<b>Kôdzuke</b>	“	<i>Jô-shiu.</i>
<b>Shimotsuke</b>	“	<i>Ya-shiu.</i>
<b>Mutsu</b>	“	<i>Ô-shiu.</i>
and <b>Dewa</b>	“	<i>U-shiu.</i>

The Hoku-riku-dô, or Northern-land Circuit, comprises seven provinces, namely :—

<b>Wakasa</b>	or	<i>Jaku-shiu.</i>
<i>Echi-zen</i>	“	<i>Es-shiu.</i>
<i>Kaga</i>	“	<i>Ka-shiu.</i>
<i>Noto</i>	“	<i>Nô-shiu.</i>
<i>Et-chiu</i>	“	<i>Es-shiu.</i>
<i>Echi-go</i>	“	<i>Es-shiu.</i>
and <b>Sado (Island)</b>	“	<i>Sa-shiu.</i>

The San-in-dô, or Mountain-back Circuit, comprises eight provinces, namely :—

	<b>Tamba</b>	or	<b>Tan-shiu</b>
[98]	<i>Tango</i>	“	<i>Tan-shiu.</i>
	<i>Tajima</i>	“	<i>Tan-shiu.</i>
	<b>Inaba</b>	“	<i>In-shiu.</i>
	<i>Hôki</i>	“	<i>Haku-shiu.</i>
	<b>Idzumo</b>	“	<i>Un-shiu.</i>

Iwami or *Seki-shiu*.  
and *Oki* (group of islands).

The San-yô-dô, or Mountain-front Circuit, comprises eight provinces, namely :—

Harima	or	<i>Ban-shiu</i> .
Mimasaka	“	<i>Saku-shiu</i> .
<i>Bi-zen</i>	“	<i>Bi-shiu</i> .
<i>Bit-chiu</i>	“	<i>Bi-shiu</i> .
<i>Bin-go</i>	“	<i>Bi-shiu</i> .
Aki	“	<i>Gei-shiu</i> .
<i>Suwô</i>	“	<i>Bô-shiu</i> .
and Nagato	“	<i>Chô-shiu</i> .

The Nan-kai-dô, or Southern-sea Circuit, comprises six provinces, namely :—

Kii	or	<i>Ki-shiu</i> .
<i>Awaji</i> (island)	“	<i>Tan-shiu</i> .
Awa	“	<i>A-shiu</i> .
<i>Sanuki</i>	“	<i>San-shiu</i>
<i>Iyo</i>	“	<i>Yo-shiu</i> .
and <i>Tosa</i>	“	<i>To-shiu</i> .

The Sai-kai-dô, or Western-sea Circuit, comprises nine provinces, namely :—

<i>Chiku-zen</i>	or	<i>Chiku-shiu</i> .
<i>Chiku-go</i>	“	<i>Chiku-shiu</i> .
<i>Bu-zen</i>	“	<i>Hô-shiu</i> .
<i>Bun-go</i>	“	<i>Hô-shiu</i> .
<i>Hi-zen</i>	“	<i>Hi-shiu</i> .
<i>Hi-go</i>	“	<i>Hi-shiu</i> .
<i>Hiuga</i>	“	<i>Nis-shiu</i> .
<i>Ôsumi</i>	“	<i>Gû-shiu</i> .
and Satsuma	“	<i>Sas-shiu</i> .

The two islands are :—

[84] Tsushima	“	<i>Tai-shiu</i> .
and <i>Iki</i>	“	<i>I-shiu</i> .

It will be seen from a comparison of this list of geographical divisions that the main island contains the Go Ki-nai, Tô-kai-dô, Tô-san-dô,

Hoku-riku-dô, San-yô-dô, San-in-dô and one province of the Nan-kai-dô. To use the names of these divisions is just as convenient for a Japanese as to use a collective name, like that which foreign geographers have misapplied to the whole island. The explanation of the anomaly is, therefore, that it has never been felt. The smaller of the two adjacent islands, namely Shi-koku (or the Four Provinces), contains the rest of the Nan-kai-dô; while the Sai-kai-dô exactly corresponds to the third island, Kiu-shiu, or the Nine Provinces. Europeans repeatedly confuse this island with the province of Ki-shiu, on account of the resemblance of the two names. The fact that the names of these divisions are all derived from Chinese words confirms the statement that the system has emanated from Korea, in which country the Chinese language seems almost universally to have furnished the names of places. Every province, except the eleven of the Hok-kai-dô, and the seven into which Ô-shiu and Dewa have been recently divided, has two names, one generally of pure native derivation, the other composed of the Chinese word *shiu*, a province, added to the Chinese pronunciation of one of the characters with which the native name is written. In many cases the pedantic Chinese name has completely superseded the original Japanese name in the mouth of the people, in a few both are used concurrently, while in some the original name is retained. For instance, Kô-shiu, Shin-shiu and Jô-shiu have replaced Kai, Shinano and Kodzuke. Ise and Sei-shiu, Sagami and Sô-shiu, Tosa and To-shiu are used concurrently, while Yamashiro, Yamato and several more have been retained. In such cases as Hi-go and Hi-zen, where the Chinese form is the same for both, it is not adopted in speaking, though it sometimes is in books, to the great confusion of the careful reader. Hi-go and Hi-zen were formerly one province, called Hi no Kuni, or 'the Province of Fire.' Echi-zen, Et-chiu and [85] Echi-go are three of the modern divisions of Koshi no Kuni, of which the present provinces of Kaga, Noto, U-zen and U-go also formed a part. *Echi* being the pronunciation of the Chinese character with which *Koshi* is written, the division nearest to the capital was called Echi-zen, or 'front of Koshi,' the next Et-chiu, or 'middle of Koshi,' the furthest Echi-go, or 'back of Koshi.' Kaga and Noto originally formed part of Echi-zen. Dewa in like manner was part of Echi-go. Chiku-zen and Chiku-go are the two divisions of the ancient province of Tsukushi, a

name which was applied in the most remote times to the whole of Kiu-shiu. Bu-zen and Bun-go also constituted one province under the name of Toyo. Tamba and Tan-go were formed out of one province called Taniwa, Tamba being a corruption of Taniwa, and Tan-go simply 'back of Taniwa.' Kadzusa and Shimôsa are contractions of Kami-tsu-fusa and Shimo-tsu-fusa, 'upper and lower Fusa,' while Kôdzuke and Shimotsuke are Kami-tsu-ke and Shimo-tsu-ke, upper and lower Ke, *tsu* being the archaic generic particle 'of.' The whole subject of the derivation of the names of the provinces of Japan is well treated in the '*Sho-koku Mei-gi Kô*' of Saitô Hikomaro, a pupil of the elder Motoori.

Another division of Japan was made by taking the ancient barrier of Ôsaka on the frontier of Ômi and Yamashiro as a central point, the region lying on the east, which consisted of thirty-three provinces, being called the Kwan-tô, or East of the Barrier, and the remaining thirty-three being called Kwan-sei, or West of the Barrier. This distinction is no longer maintained, the term Kwan-tô (or Kan-tô) being applied at the present day to the eight provinces of Musashi, Sagami, Kôdzuke, Shimotsuke, Kadzusa, Shimôsa, Awa and Hitachi. Sometimes the four provinces of Idzu, Kai, Dewa and Mutsu are also included in the term.

*Chiu-goku*, or Central Provinces, is a name in common use for the San-in-dô and San-yô-dô taken together. *Sai-koku*, or Western Provinces, is an ordinary synonym for Kiu-shiu, which in books is frequently called Chin-sei.

[86] For the purposes of taxation the country was again divided into Kwan-tô suji and Kamigata suji, of which the former comprised the twelve provinces just named, while the latter included the rest of Japan. In common language the term Kamigata is applied vaguely to Kiôto and the country round.

The islands of Iki and Tsushima are not included in any of the Seven Circuits, but form a division by themselves.

The province of Mutsu or Ô-shiu formerly extended beyond the northern shore of the main island, and included the territories of the *dai-miô* of Matsumaye, while the name Yezo, miscalled Yesso by most Europeans, was given not to the whole island, but to that part inhabited by the barbarous tribes.

In 1868, after the rebellious *dai-miôs* of Ô-shiu and Dewa had

submitted to the Mikado, those two provinces, which far exceeded in extent any others in the country, were subdivided, Dewa into U-zen and U-go, Ô-shiu into Iwaki, Iwashiro, Riku-zen, Riku-chiu and Mutsu, for obvious political reasons. At the same time the island containing the Matsumaye territory and the settlements of the Aino and the southern Kuriles were named Hok-kai-dô, or Northern Sea Circuit, and divided into eleven provinces, namely Oshima, Shiribeshi, Ishikari, Toshiwo, Kitami, Ifuri, Hitaka, Tokachi, Kushiro, Nemuro and Chishima, the last comprising those of the Kurile islands which belong to Japan.

The Japanese word *kuni*, which I have rendered by province, seems literally to mean 'country,' and province must be taken in the sense in which it was used in the maps of France previous to the revolution of 1789. The word *kôri*, which is used by the Japanese for the subdivision of a province, would be best translated 'department.' The number of departments in a province varies according to its size. In the old system there were altogether 629 departments, but the addition of the Hok-kai-dô has raised the number to 715.

[37] For purposes of administration all Japan except the Hok-kai-dô was again divided in 1872 into three *Fu* and seventy-two *ken*, without regard to the boundaries of the provinces. *Fu* might well be translated city, and *ken* prefecture. The three *Fu* are Yedo, Ôzaka and Kiôto, but it would be impossible to give the names of the prefectures, as a process of amalgamation is going on just now which will considerably diminish their number. The names, also, of some of the prefectures have been changed since the list was first published by the government.

The whole number of islands in the Japanese group, exclusive of the four main islands, is stated to be over three thousand. Many of these are so small as hardly to deserve the title, while others are large enough to constitute provinces by themselves. Beginning from Yedo and going westwards the first island of importance is that called Idzu no Ôshima, or, the Big Island of Idzu, by natives, and Vries', or Barneveld's island, by Europeans. It is the most northerly of a chain which extends as far south as the 27th degree of north latitude. Next to Vries come Toshima, then Nijijima, Shikine jima, Kôdzu shima, Miyake jima and Mikura jima. All these lie north of the Kuroshiwo, or as we call it, the



**Japan current.** South of the Kuroshiu, at a distance from Mikura jima estimated variously by Japanese at 66, 102 and 171½ miles, lies the island of Hachi-jô, or Fatsisio as it is spelt in our charts. Fifty miles further south is Awo-ga-shima, which, to judge by its delineation in the Japanese book of charts, is an extinct volcano. An interval of 341 miles separates Hachi-jô from the Bonin group, which consists of two large islands separated from each other by 50 miles of sea, and a host of islets. Europeans have corrupted the proper name Munin jima, which means 'Noman's islands,' into Bonin. Ogasawara jima is another name given to the group by Japanese. The next island proceeding westward is another Ôshima lying at the south of Kii, and separated from it by a narrow strait. South of Kiu-shiu extends another long chain, which may be said to begin with Tane-ga-shima [38] opposite to the province of Osumi and to end with Hateruma, the most southerly of the Yayeyama group, which lies close to the 24th parallel of north latitude. Yayeyama is called Pachusan in Keith Johnston's Royal Atlas, but that is not the name given to it by the natives. The ordinary maps of Japan do not include any of the islands south of Yaku no Shima.

Due west of the province of Satsuma lies the group called Koshiki jima, and north of this, close to Hi-go, the islands of Amakusa and Togi. Off Hi-zen, in a line stretching in a south-westerly direction, are Hirado, known to the early navigators as Firando, and the Go-tô, or Five Islands, namely, Fukuye, Kuga, Naru, Wakamatsu and Nakatsushima. This group contains innumerable smaller islands besides these five. North again of these are situated Iki and Tsushima, each of which constitutes a province by itself. By them lay, in former times, the ordinary route from Japan to Korea. On the north-west coast lie the Oki group, consisting of one large and three small islands, which is a province of the San-in-dô, and Sado, which also constitutes a province by itself.

The Inland Sea contains countless islands. The most note-worthy amongst these are Ôshima, or Yayoshima, off Suwô, Itsukushima or Miyajima, east and west Nomi-jima off Gei-shiu, and Shôdzu shima off Bi-zen.

Besides the five small islands on the west of the Hok-kai-dô, the Japanese claim Kunashiri and Etorofu, the largest of the Kurile islands. Promontories of course abound along the Japanese coast. Begin-

ning with the extreme north of the main island we have Riuhi zaki and Fujishi zaki in the Tsugaru Straits. Passing down the east coast we come next to Kuwa-ga-saki in Riku-chiu, close to the harbour of Miyako, Misaki near the port of Kesen in Riku-chiu, Kin-kwa-zan, near Matsushima in Riku-zen, and Inuboye no saki, wrongly called Inaboye no saki in our charts, just below the mouth of the Tone-gawa. Su-no-saki in Awa, and Miura no misaki, called Cape Sagami by us, mark the entrance to the Bay of Yedo. Next come Cape Idzu, [39] Omaye-zaki in Tôtômi, Irako zaki in Mikawa, Mugi-zaki in Shima, Idzumo-zaki and Shiwo no misaki, both at the extreme south of Ki-shiu. Hii no misaki further up the west coast of Ki-shiu is an important landmark for the seaman. Muroto-zaki and Ashizuri no misaki are the chief promontories on the southern coast of Shi-koku, both being situated in Tosa. Tsutsui-zaki in Hinga and Sata no misaki, or Cape Chichakoff, in Ôsumi are well known names, especially the latter. South of Nagasaki lies Nomo ga saki, and Shijiki-zaki at the south-west end of the island of Hirado. After rounding Misaki on the west coast of Nagato, the next cape of any importance is Suzu no misaki in Noto. From this point up to the Straits of Tsugaru the coast is almost straight, with the exception of the large projecting headland between the harbours of Akita and Noshiro in U-go. This is hardly small and sharp enough, according to Japanese ideas, to be distinguished as a promontory.

The chief promontories on the coast of the Hok-kai-dô are. Nossamu misaki, Erimo misaki, Esau misaki, Yagoshi no misaki, Okamui-zaki and Shirushi mizaki.

There is another peculiarity of Japanese geography which deserves to be noticed. Although the Japanese possess a fine map of the coast line of Japan and an elaborate set of charts for the use of junks, and are generally acquainted with the seas in the immediate neighbourhood of their own country, they do not give any names to the bays which abound along the coast, nor to the straits which separate them from other countries or divide their own. The bays of Yedo, Ôzaka and Owari are not known by those titles. The straits of Tsugaru (often miscalled Saugur in our maps), of Shimo-no-seki, of Akashi, of Idzumi, etc., have received their appellations from European navigators, as much as those of Van Diemen, Colnet, Von Krusenstern and La

Perouse. The term *seto* is applied by them only to narrow channels. On the other hand they make use of the terms *oki*, *offing*, and *nada*, sea, very freely. Thus, in going from Yokohama [40] to Nagasaki they traverse the Sagami Nada, Totômi or En-shiu Nada, Ten-riu Nada, Bin-go Nada, Suwô Nada, Gen-kai Nada, Hibiki Nada, and Matura Nada. Suwô Nada has often been supposed to be the proper equivalent for what we have naturally called the Inland Sea, but it simply means the sea adjacent to the province of Suwô. *Seto-uchi* (inside of the channels), which has been adopted in our later charts, is the correct name. I am reminded by the mention of the Inland Sea, that many of the names in our charts of it are either so badly spelt as to be unrecognizable when pronounced by a foreigner, or are altogether wrong. For instance, the large island off Bi-zen, called Shôdzû shima, is spelt Sozu, and Mutsure in the western entrance of Shimo-no-seki Straits, on which a lighthouse has been recently erected, is mis-called Rockuren. The town of Marugame in Sanuki is called Murakame in many of the charts published by the English Admiralty. It is no wonder, therefore, that native pilots are often accused of being ignorant of the name of places which it is their special business to know. The blame lies, not with the surveying officers who have prepared the charts, but with the native interpreters attached to them, who are often unable to read the names on Japanese maps. The mistake of Rockuren for Mutsure evidently arose in this manner. The native name for the Shimo-no-seki strait is Hayato no seto, for the Idzumi strait, Kada no seto, and for the Tsugaru strait, Mimmaya no oki, from a port of that name in Tsugaru.

The number of harbours and trading ports called *ô-minato*, or large harbours, by the Japanese, is fifty-six. A great many of these are no doubt inaccessible to European vessels of even moderate size.

Beginning with the Hok-kai-dô we find Matsumaye and Hakodate in Oshima. Across the Tsugaru straits lie Fukaura, Ajisawa, Mimmaya, Awomori, Sai and Okuto in Mutsu. Passing down the east coast we come to Miyako in Riku-chiu, Kesen, Ishi-no-maki, Sabusawa and Sendai in Riku-zen, Hiragata close to the boundary of [41] Iwaki and Hitachi, Naka-no-minato in Hitachi, Chôshi-ga-ura at the mouth of the Tone-gawa, Uchi-ura in Awa, Futsutsu, Kisaradzu, Giô-toku, Tôkiô, Yokohama

and Uraga in the Bay of Yedo, Ajiro, Shimoda and Kora in Idzu, Shimidzu in Suruga, Arai in Tôtômi, Kamezaki in Mikawa Bay, Ono and Miya in Owari, Toba and Matoya in Shima, both magnificent harbours, Sasara, Niye and Kowa in Ise, Nishiki, Kuki, Hayeda, Nikijima, Katsura, Uragami, Ôshima harbour, Nibu-no-fukuro, Tsuna-shirazu, Yura-no-uchi and Ôzaki in Ki-shiu, Kishi-no-wada and Ishidzu in Idzumi, Ôzaka, Amagasaki, Kôbe and Hiôgo in Settsu, Hino in Ban-shiu, Shimotsui in Bit-chiu, Tomo-no-tsu in Bin-go, Miyadzu, Sone, Murodzumi and Mitajiri in Suwô, Shimo-no-seki, Hinjiu, Senzaki or Setozaki, Hagi and Sui in Nagato, Hamada and Yunotsu in Iwami, Kidzuki, Uriu, Sagiura, Katsu, Kumotsu and Miwo-ga-seki in Idzumo, Moroiso and Kazumi in Tajima, Ine and Miyadzu in Tango, Obama in Wakasa, Tsuruga in Echi-zen, Miya-no-koshi in Kaga (a very bad port), Fukura, Wajima, Mawai and Nanao in Noto, Iwamachi, Niigata and Senami in Echi-go, Nezu-no-seki and Sakata in U-zen, Shiwokoshi, Yotsu, Honjô, Akita, Toga and Noshu in U-go. Mitarai harbour, between two islands near Gei-shiu, is a favourite port of call for the junks which trade in the Inland Sea. In Awaji is situated the port of Yura. In Awa we find Tachiye, Hiwasa, Asagawa, Tomo-no-ura and Shishikui. In Tosa Murotsu, Urato, Nagahama, Inoshiri, Kure, Yotsu, Sagadzu, Misaki, Shimo Kawaguchi and Suwôgata. Mitsukuye and Nagahama in Iyo, and Takamatsu in Sanuki complete the list of ports in Shi-koku. Bun-go has Kushimi, Kumage, Nadate and Fukaye. Hiuga possesses only one port, that of Takanabe; Ôsumi likewise only one, namely, Ôdomari. Passing westwards we come to Kagoshima, Yamaguwa, Ichiku and Kiôdomari in Satsuma, Hinaku in Higo, Sarashimi in Chiku-go, Moteki, Nagasaki, Nakatsu, Nagoya and Ayame in Hi-zen, Shijiki in Hirado, Fukuoka and Kane-ga-saki, in Chiku-zen.

Tsushima has a port called Take ura, Iki also one, Katsumoto, Sado one called Ogi. Besides these there are [42] numbers of smaller ports and harbours of refuge which can only be discovered by making an accurate survey of the coast.

An inspection of any native map shows that the greater proportion of the surface of the four main islands of which Japan is composed is covered with hills, which rise in many places to mountains of considerable height. The most extensive plains are those of the Kwan-tô, of Echi-

go and the north of Ô-shiu. The provinces of Mikawa, Mino and Owari also are very flat. Half-way between Yedo and Kiôto lies the tableland of Shinano, elevated at least 2,500 feet above the level of the sea, and surrounded and intersected by lofty ranges of mountains, of which those on the boundary of Hida are certainly the highest. From the eastern edge of this province there is a sudden drop of 1,800 feet on to the Yedo plain, while on the north the ground slopes gradually away down to the province of Echi-go. Another lofty range divides the former provinces of Mutsu and Dewa running from Aidzu directly north as far as Tsugaru. The province of Kai is almost surrounded by mountains, amongst which Yatsu-ga-take, or Eight Peaks, Koma-ga-take and Shirane are the most conspicuous.

The list of mountains which are considered the most worthy of notice by the Japanese naturally begins with Fuji-san, mispronounced Fusiyama by Europeans. Next come Gwas-san in U-zen, Ontake in Shinano, the Nikkô range in Shimotsuke, Ô-mine in Yamato, Haku-san in Kaga, Tateyama in Etchû, Kirishima yama in Hinga, Aso-san in Hi-go, Tsukuba san in Hitachi, Onsen-ga-take in Hi-zen, Asama yama in Shinano, Chô-kai-zan in U-go and Iwaki in Mutsu. There are several active volcanos in Japan, of which Asama yama and Aso-san are the best known to foreigners. It is a curious fact that the Japanese, nevertheless, possess no word for volcano.

Owing to the comparative narrowness of the main island of Japan and the small size of the other three, none of the numerous rivers are of great length. The longest [43] and widest is probably the Tone-gawa. The Shinano-gawa and Kiso-gawa, both of which take their rise in Shinano, come next. In addition to these may be mentioned the Ôigawa, Fuji kawa and Tenriu-gawa on the south, Sakata-gawa in U-zen, the Abukuma-gawa in Ô-shiu and the Ishikari in Yezo, or as we ought now to say, in the Hok-kai-dô. Almost every one of these rivers takes its name either from a province, a department, or a place on its course. Many Japanese rivers change their name several times between the source and the mouth. Thus the Baniu-gawa, which flows into the sea between Fujisawa and Odawara, is called the Kadzura-gawa from its source in the Yamanaka lake at the base of Fuji down to the town of Atsugi. The Yodo-gawa, at the mouth of which is situated the city of

Ôzaka, is called the Seta-gawa at the point where it leaves the lake of Ômi, and the Uji-gawa between the towns of Uji and Fushimi. Above Hashimoto it receives the waters of the Kidzu-gawa, absorbing its name as well, which re-appears below the city of Ôzaka. The Yodo-gawa disappears at Ôzaka, and the other mouths are called Nakatsu-gawa, Aji kawa and Shirinashi-gawa. The Sumida-gawa which flows through Yedo is called the Ara kawa near its source, and the Toda-gawa at the point where it intersects the Naka-sen-dô. What foreigners have been accustomed to call the Logo or Logos ever since the opening of Japan, is the Tama-gawa, and that part only which runs by Kawasaki is called Roku-gô, which has been corrupted into Logo. Not even those rivers whose reputation is most widely spread, such as the Tone-gawa and Kiso-gawa retain the same name throughout.

The Tone-gawa rises on Mon-ju-zan behind Fujiwara in the department of Tone in the province of Kôdzuke. From its source to Chôshi point, where it falls into the Pacific Ocean, it measures more than 70 *ri*, or 170 miles. It is nicknamed Ban-dô Ta-rô, which may be rendered 'the eldest son of the region west of the pass.' The first town of any importance on its banks is Numata, formerly the seat of a small *dai-miô*. A little way below this town the Agatsuma-gawa flows into it on the right. Just above the [44] town of Mayebashi, important as a silk producing centre, it throws off a network of streams, which reunite with it near the point where the Karasu-gawa falls in. After receiving the waters of the Watarase-gawa, which drains the S.E. part of Shimotsuke, it separates into two branches opposite the town of Kurihari on the Ô-shiu kai-dô. The southern branch is called the Gon-gen-dô-gawa, and passing by Sekiyado, becomes the Yedo-gawa, falling into the Yedo Bay at Horiye. The main stream is here called the Akahori-gawa. In passing Sekiyado it throws off a branch which usually falls into the Yedo-gawa, but during floods its current becomes reversed, thus earning for it the name of Sakasa-gawa, or 'upside down river.' After receiving the waters of the Kinu-gawa, whose source is at the boundary of Shimotsuke and Iwashiro, and the Kokai-gawa, which rises near Utsunomiya, besides the surplus water of numerous meres, such as the Aga numa, Imba numa and Naga numa in Shimôsa, and those of Ô-ura, Kasumi-ga-ura and Saka-ura in Hitachi, and attaining a breadth of 1,740 yards, or nearly

an English mile, it enters the sea at Chôshi. At Chôshi it narrows down considerably, and passes between some sharp rocks on the Shimôsa side and a long sandy spit which forms part of Hitachi. In stormy weather the bar is completely impassable, even for the strongly built native boats. This part of the coast has been fatal to at least four foreign vessels since the opening of the country to commerce, the last victim being the "Wanja," whose loss was reported about a fortnight ago.\*

The Shinano-gawa rises in the department of Saku in the south-east corner of Shinano. It flows in a north-westerly direction and then due north past the towns of Komuro, Uyeda and Matsushiro. During this part of its course it is called the Chikuma-gawa, probably after the department of that name, though it does not pass by it. A little below Matsushiro it is joined by the Sai-gawa, which rises on Komagatake. After passing the town of Iiyama it enters the province of Echi-go, which it traverses in a north-easterly direction, and falls into the sea at Niigata.

[45] The Kiso-gawa likewise rises in Shin-shiu. It flows westward down the valley of Kiso, being joined by several small streams of no great importance. Entering Mino at Ochiai, it shortly afterwards unites with the Hida-gawa, which rises in the north of the province of Hida. At the point where it intersects the Naka-sen-dô it is called the Ôta-gawa, after a town on its right bank. From Inuyama it forms the boundary between Mino and Owari. Near this town, and at several points further on, it throws off branches which traverse Owari, and fall into the sea. On the right it is joined by the Sunomata-gawa, which drains the western part of Mino, and shortly before reaching its mouth near Kuwana splits into several branches.

The Tenriu-gawa flows out of the Lake of Suwa in Shinano, runs past the town of Iida almost parallel to the Kiso-gawa, and traversing the province of Tôtômi falls at last into the Tenriu nada. It has no tributaries of any importance.

The Ôi-gawa rises in the south-west of Kai<sup>5</sup> and traverses the

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<sup>5</sup> According to most Japanese maps this statement would be correct, but it has recently been determined that the whole of the upper valley of this river belongs to Suruga.—E. S., Sept., 1882.

province of Tôtômi, intersecting the Tô-kai-dô between Kanaya and Shimada. It is more remarkable for the breadth of its bed, which near the mouth is  $2\frac{1}{2}$  miles wide, and for the swiftness of its current, than for the length of its course.

The Fuji kawa, called in the upper part of its course Fuyefuki-gawa, rises on Koku-shi Dake in the north of Kai, and receives several tributaries of varying volume. During the lower part of its course it traverses the centre of Suruga. It is famous for being one of the swiftest stream in all Japan.

The Sakata-gawa rises in the range of mountains which separates U-zen from Riku-zen, and flowing due west between the departments of Mogami and Akumi on the north and Murayama and Tagawa on the south, enters the Sea of Japan at Sakata.

The Abukuma-gawa rises near the town of Shirakawa in Iwaki, flows northwards close to the eastern boundary of Iwashiro, passing not far from the towns of Miharû, Nihommatsu, Fukushima and Shiraiishi, traverses the upper end of Iwaki, and then, making a turn to the right, [46] becomes the boundary between that province and Riku-zen, falling at last into the Pacific Ocean near the town of Watari.

There are numerous lakes in Japan, some of which, such as those of Hakone, Suwa and Chiu-zen-ji near Nikkô, lie far above the level of the sea. Only one, the Biwa lake in Ômi, is worthy of notice on account of its size. It measures about 50 miles in length, or four miles more than the lake of Geneva, while its greatest breadth is about twenty miles or more than twice that of the lake of Geneva. At Katada, about ten miles from its southern end, it suddenly contracts to a breadth of one mile and a half, after which it expands again slightly.

The Inawashiro lake in Iwashiro, seven *ri* from which on the south side was formerly situated the castle of the Princes of Aidzu, is stated by natives of that part of the country not to exceed ten miles in length, it but certainly is drawn much larger on the maps. Out of it flows the Agano-gawa, which was formerly a tributary of the Shinano-gawa, but now falls into the sea some miles north of Niigata.

For a country in which the only vehicle used in travelling was until lately the palanquin, Japan possesses a very good system of high-roads.



Amongst these the Tō-kai-dō is best known to foreigners. Its existence probably dates from the time when the country was divided into circuits, though it has of course been much improved since it was first constructed. It is the only road in the country which is named after the circuit which it traverses. Whether it begins at the Nihom-bashi in Yedo and ends at the Sanjō-bashi in Kiōto or vice versâ is a point which would be difficult to determine. A great many writers have stated that all the roads in the Empire start from the Nihom-bashi, but this evidently cannot be true of roads on the west of Kiōto. The length of the Tō-kai-dō, according to an estimate lately prepared for the Japanese Post Office, is 125 *ri* 13 *chō*, or nearly 307 miles. The other road between the two capitals, called either Naka-sen-dō or Kiso kai-dō, which traverses half the Tō-san-dō [47] and the province of Musashi, is said to be 135 *ri*, 32 *chō*, or a little over 323 miles, in length. The longest highroad is the Ō-shiu kai-dō between Yedo and Awomori on the Tsugaru Straits. It traverses Musashi, Shimotsuke, Iwashiro, Riku-zen, Riku-chiu and Mutsu, and its length is given as 181 *ri*, 6 *chō*, or nearly 444 miles.

Two roads from Yedo to Niigata exist, the one by way of Takasaki in Jō-shiu, over the Mikuni pass into Echi-go, the other by Oiwake, Zen-kō-ji, Takata and Kashiwazaki. The former, which is said to be impassable in winter, measures 91 *ri* 29 *chō*, or about 225 miles, the latter 108 *ri* 17 *chō*, or about 264 miles. Neither possesses a name, and for a considerable distance each is identical with the Naka-sen-dō. Another road which possesses great interest for the traveller in search of mountain scenery is the Kō-shiu kai-dō. It unites Yedo and the town of Kō-fu, distant from each other 81 *ri* 14 *chō*, or 77 miles, and a continuation of it from Kō-fu joins the Naka-sen-dō at Shimo no Suwa, 13 *ri*, 6 *chō*, or about 32 miles further. The book of itineraries called *Go-kai Dō-chiu Sai-ken-ki* contains the itineraries of thirty-seven roads, all of which lie on the east of Kiōto. There are of course high-roads on the west of Kiōto, but they are of less importance because there is little traffic in the San-in-dō, and that of the San-yō-dō is conducted in junks which ply on the Inland Sea. I have heard Europeans call the road which passes through Kōbe westwards to Shimonoseki 'Tō-kai-dō,' but this is an error. It is not even called San-yō-dō after the circuit which it traverses.

In a work on general geography lately published by the Education Department (entitled *Yo-chi Shi-riaku*), the area of Japan is stated to be 24,780 square *ri*, or taking the linear *ri* as equal to 2.45 English miles, about 148,742 miles. This is about one-fourth more than the area of the United Kingdom, which contains 121,115 square miles. The Japanese estimate cannot be looked upon as exact, since it is founded on maps which are far from correct. The population is generally asserted to be about 30,000,000, the authority being a census made in 1804, which was [48] founded to a great extent on the reports furnished by the officers of the *dai-mios*, and is therefore not accepted as authentic. It is doubtful whether Japan, in spite of her greater area, has as large a population as the British Isles.

The notion that *miyako*, which means Imperial Capital, is the name of the old metropolis, has by this time been exploded. The real name of the city was Kiôto, until the year 1869, when it was changed to Sai-kiô, or 'western capital,' in order to distinguish it from Tôkiô, the new name given to Yedo. Tôkei is merely another pronunciation of Tôkiô, but it is certainly to be wished that the Japanese would adhere to one of the two, to the complete exclusion of the other. The population of Tôkiô is variously stated, but is probably not much over 800,000. Saikiô had about 870,000 inhabitants in 1870. Next in importance after these two cities comes Ôzaka with a population of 414,000 souls. Foreigners generally both spell and pronounce the name of this city wrongly. Nagoya, the capital of Owari, is next in size, followed closely by Hiroshima in Gei-shiu, Saga in Hi-zen, Kagoshima in Satsuma, Kanazawa in Kaga, the double town of Hakata and Fukuoka in Chiku-zen, and Himeji in Ban-shiu. Most of these towns are said to have over 100,000 inhabitants. Kumamoto in Higo, Kurume in Chiku-go, Fukui in Echi-zen and Gifu in Mino rank in the second class, but I am unable to say what is the population of each. Of the ports open to foreign trade, Ôzaka being excluded, Nagasaki is said to have the largest population, but Yokohama bids fair to surpass it before long. Hakodate and Niigata have, I believe, about 80,000 inhabitants each.

The work on Geography to which I alluded at the commencement of this paper contains numerous other errors besides that of supposing

Nippon to be the name of the main island of the group. Considering that the country had been open to foreign trade for at least eleven years when the edition from which I quote was published, it is a little strange that the author should not know better than to assert that there are few domestic animals in Japan. Cows, horses, dogs, cats and poultry [49] may certainly be included in this category, and the experience of every one who has resided here even for a short time must have convinced him that all these species of domestic animals abound. Another statement is that the country is deficient in timber, which may perhaps be correct of the neighbourhood of Nagasaki, but certainly does not apply to the rest of Japan. The facts that all the houses are constructed of wood, and that the maritime inhabitants possess countless junks and fishing-boats are a sufficient contradiction.

It is also incorrect to state that "the imports, mainly cotton and woollen goods, are paid for largely in copper, in bars."

Hakodate is spelt Ho-Kodadi. Japan is far enough from London to excuse the author for being ignorant of the fact that the Tycoon is no longer Emperor of Japan, but even supposing the news of the Mikado's restoration to have taken two years to reach England, that is no reason for calling the Tycoon a Kouba, and stating that he was assisted by a council of the great feudal princes.

The word *Ku-bô*, which the common people applied to the Tycoon, was no official title. The opinion of one or two of the great *dai-miôs* may now and then have been asked for or offered, but no such institution as a council composed of the eighteen *Koku-shi dai-miôs* existed at any time.

The great earthquake at Yedo, which is said by Dr. Cornwell to have occurred in 1860, took place five years earlier, and the number of persons who lost their lives on that occasion, which is stated by him at 200,000, is certainly immensely exaggerated. Even the Japanese, who have a passion for large figures, allow that not more than 104,000 were killed.

In order to give his readers a general idea of the manners and customs of the people, the author states: "One of their amusements, which they share with the Chinese, is strange to us—that of flying immense kites; not by the boys, who only look on and admire, but by

the men." Certainly, if the men do now and then indulge in this pastime, the little boys cannot be said to abstain from it. [50] Any one can convince himself of their ardent devotion to the sport by taking a walk through Yedo in the month of January. Yedo is called 'a handsome city of park-like appearance, with a population of 1,500,000 inhabitants.' Yedo can never have corresponded to such a description, even in its most flourishing days, and there is no reason to suppose that its population ever exceeded a million or twelve hundred thousand at the outside. A "colossal idol" is spoken of as still existing at 'Miyako,' by which the great bronze Buddha coined into 'cash' in the 17th century is evidently intended.

The rectification of these misstatements does not properly come within the scope of my paper, in which I profess to speak only of the physical geography of Japan, but so much that is erroneous has been written about this country that no opportunity should be lost of correcting mistakes or inaccuracies of whatever kind, even when they appear in a mere school book. A great deal has yet to be done to complete our knowledge of these islands, which is at present limited to the information which we can gain from native books and maps, from our own incomplete surveys of the coast, and from the notes of the few travellers who have passed along the high-roads of the interior.

The authorities for the statements in this paper are the following books:—

*Yo-chi Shi-riaku*.—Epitome of Universal Geography.

*Sho-koku Mei-gi kô*.—Derivations of the Names of the Provinces.

*Koku-gun Kun-gi*.—Meanings of the (names) of Provinces and Departments.

*Kô-chô En-kaku Dzu-kai*.—Historical Atlas of Japan.

*Kiso Mei-sho Dzu-ye*.—Guide to the Naka-sen-dô.

*Tone-gawa Dzu-shi*.—History of the Tone gawa.

*Chiu-zan Den-shin-roku*.—Account of Loochoo.

*Zô-ho Ni-hon Shiwoji no Ki*.—Japan Pilot. And the following maps:—

[51] *Jis-soku Ni-hon Chi-dzu*.—Map of Japan in four sheets.

*Fujini Jiu-san Shiu Yo-chi no Zen-dzu*.—Map of thirteen Provinces from which Fuji can be seen.

*Koku-gun Zen-dzu.*—Atlas of Japan in two volumes.

*Dai Ni-hon Yo-chi Zen-dzu.*—Map of Japan in one large sheet.

*Hok-kai-dô Koku-gun-dzu.*—Map of the Hok-kai-dô, published by authority of the Kai-taku-shi.

Keith Johnston's Royal Atlas.

*Dai Ni-hon Kai-ro-dzu.*—2 Vols. Charts of the Japan seas.

*Dai Ni-hon Chiu-kai Dzu-shi.*—Charts of the Japanese seas in 5 Volumes.

## THE TYPHOONS OF SEPTEMBER AND OCTOBER, 1872.

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BY LIEUT.-COMMANDER NELSON, U. S. WAR-SHIP "IDAHO."

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[*Read before the Asiatic Society of Japan, on the 10th May, 1873.*]

[52] Nearly two centuries ago there were accounts published of ships having scudded (run before the wind) in a hurricane for a day or two, and yet found themselves very nearly in the place from which they started when the gale commenced; and of others which in lying to, had the wind veering rapidly and sometimes shifting suddenly to an opposite point of the compass, the shift most generally preceded by a calm, but not always so; and again of other ships which, though not far distant from each other, had the winds blowing furiously in opposite directions and veering differently.

Yet no one appears to have attempted to solve this, at that time, strange problem or to account in any way for the singular phenomenon (that used to puzzle the understanding of the hardy old tars who having passed successfully through one of these storms escaped with their lives to tell the tale of their experience) until nearly one-third of the present century had passed away.

I would not be understood to say that no one had ever given any attention to the subject—for I purpose to cite authorities by whom these storms had been noticed and pronounced to be great whirlwinds—but I mean to assert that no one had ever attempted to solve the problem by [53] pursuing their investigations, and generalizing observed facts in order to clear up the mystery and discover the laws by which these storms are governed up to the time I have mentioned.

In the year 1698 Captain Langford in a paper on the West Indian

Hurricanes (Philosophical Transactions for 1698) describes the veering of the wind and calls it a whirlwind, speaks of a progressive motion and gives it some limits but nothing more.

In the year 1748 a Spanish navigator Don Juan De Ulloa, describes a storm on the Pacific coast of South America, in which description he speaks of the veering and sudden shifting of the wind, but does not seem to have conceived the idea of a whirlwind or rotatory storm.

Colonel Capper—in speaking of the Madras and Coromandel coast hurricanes—says, in a work published in 1801, after describing these storms:—"All these circumstances properly considered clearly manifest the nature of these winds, or rather positively prove them to be whirlwinds whose diameter cannot be more than 120 miles, and the vortex seems generally near Madras or Pulicat;" and again, after describing some on the Malabar coast, and in the Southern Indian Ocean, he says:—"Thus then it appears that these tempests or hurricanes are tornadoes or local whirlwinds, and are felt with at least equal violence on the coast and some little distance out at sea."

A French author named Romme, in a work published in 1806, describes a storm in the China sea near the Gulf of Tonkin, which he distinctly calls a whirlwind, and applies the same name to other storms experienced in the Mozambique channel, and again others in the Gulf of Mexico.

Professor Farrar of the Cambridge University, New England, in describing a storm that passed over Boston in 1815, says that he could not determine the centre or limits, but noticed the veering of the wind and the fact of it having veered in opposite directions at Boston and New York at the same time. Also the difference of time between [54] the greatest violence of the storm at the two places.

But it is not my purpose here to cite all the cases on record of gales that have attracted the attention of scientific men. Enough has been said to show that such men did notice the peculiar character of these storms, and to some extent explained it by deciding that they were great whirlwinds. None of them, however, followed up the clue thus found, or attempted to unlock the secret of the Law, to which this was evidently the key until the year 1831, when Mr. William Redfield, an American Philosopher and Naval Architect, came out in a paper pub-

lished in the *American Journal of Science*, and clearly demonstrated that the storms on the American coast were not only rotatory storms or blowing in circles around a common centre, but also that they had a progressive motion and were traceable moving on a curved track, from the West Indies and along the coast of the United States, curving off to the Eastward near the banks of Newfoundland. At the same time he published some excellent rules for avoiding the centre, and the chances of damage to ships caught in these gales at sea, showing also how the barometer might be made a valuable guide if carefully watched and properly attended to.

While Mr. Redfield was employed collecting the information upon which he based his theory of the law of storms, a similar investigation was going on in Germany.

A number of gales had attracted the attention of German Meteorologists chiefly on account of the oscillations and great fall of the barometer before and during these gales; and a Mr. Brande who had kept an accurate register of observations for a length of time, and obtained the registers in various places at the same time, eventually advanced a theory that the wind, during these great storms, blew from all points of the compass in straight lines towards a central space where the barometer was for the time at its lowest stand.

The theory of Mr. Brande was disputed by Professor Dove of Berlin, who subjected the observations to a new examination, and made it appear that an explanation of all [55] the phenomena was afforded by the assumption of one or more circular currents, or whirlwinds of great diameters, advancing from South-west to the North-east.

The theory of Professor Dove, although under discussion about the same time when Mr. Redfield by an independent course of investigation arrived at the results above mentioned, was not known in the United States when the latter gentleman published his paper in the *American Journal of Science*, a fact indicated strongly in the language of Sir David Brewster when he said: "The theory of rotatory storms was first suggested by Colonel Capper, but we must claim for Mr. Redfield the greater honour of having fully investigated the subject, and apparently established the theory upon an impregnable basis."

In the year 1838, Lieutenant-Colonel Reid of the Royal En-  
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gineers published a valuable work entitled "Reid on the Law of Storms," in which he agreed in all particulars with the views of Redfield, and verified by personal observation all his theory; adding many substantial proofs to the same by investigations of West Indian hurricanes, and of some in the Southern Indian Ocean. Colonel Reid by his observation of storms in the Southern Indian Ocean, further proved Mr. Redfield's theory that the storms in the Southern Hemisphere revolve in a contrary direction to those in the Northern Hemisphere. Colonel Reid may be said to have reduced the science to practical use by showing how safe rules for scudding, or lying-to in a hurricane, might be deduced from the theory, and how when obliged to lie-to, ships should do so on the proper tack according to the side of the path they are on; and lastly, how these storms may be made profitable to ships bound in the direction of their track, by sailing carefully on the outer circumference with a fair wind, being all the time in a safe position to heave-to and let the storm pass.

Thus, by the publication of Col. Reid's "Law of Storms" the science was reduced from a mere speculative theory to a practical law, the value of which can be fully appreciated only by the mariner when caught in one of these gales at sea.

[56] That which had been discovered by Mr. Redfield and verified by a great number of observations by Col. Reid has been termed the Law of Storms, and is briefly explained as follows:—If by reference to the Diagram we suppose the short curved arrows to represent the direction of the wind, and the long dotted arrow to indicate the track or course on which the gale is moving bodily forward, we shall have before us the Law of Storms in the Northern Hemisphere; and by reversing the whole, that is turning the points of the arrows in the opposite direction, the diagram will represent the Law of Storms in the Southern Hemisphere.

Mr. Peddington says, in speaking on this subject. The words "Law of Storms" then, signifies first:—that it has now been proved by the examination and careful analysis of perhaps more than two thousand logs and of some hundreds of storms by the authors already referred to (Redfield, Reid, Dove, and others) and by many other observers in periodical publications, as well as some whose results have

not yet been published, that the wind in hurricanes, and frequently in severe storms in the higher latitudes on both sides of the Equator, has two motions. It turns or blows round a focus or centre in a more or less circular form, and at the same time has a straight or curved motion forward, so that, like a great whirlwind, it is both turning round and, as it were, rolling forward at the same time.

Next it is proved that it turns, when it occurs on the north side of the Equator, from the east or the right hand by the north towards the west, or against the hands of a watch (as represented by this diagram), and in the southern Hemisphere that its motion is the other way or with the hands of a watch;—being thus as expressed by Professor Dove of Berlin, south, east, north, west, for the Northern Hemisphere; and north, east, south, west for the Southern Hemisphere.

These two principal laws (turning round a centre and moving forward) constitute the rule or law of storms, and it has been abundantly demonstrated to hold good for [57] several parts of the world; but as we do not have positive evidence from all parts of the world, it is assumed that this law is true everywhere, and this assumption is based upon the strongest grounds, viz:—the great analogy usually existing in the laws of nature, and the fact that every new investigation affords fresh proofs of the truth of the law in both hemispheres.

Having thus established the law of motion of the winds in a typhoon, we have only to consider whether we are north or south of the equator in order to locate the centre; if north we know that the winds rotate from right to left, contrary to the watch hands, or from S. to E. by N. to W., and also that the N. compass point is the E. typhoon point, that is the wind blows East.

The W. compass point is the N. typhoon point, the S. compass point is the W. typhoon point, and the E. compass point is the S. typhoon point; hence, to locate the centre as to bearing or direction, stand in the middle of a compass (or imagine such a thing) and look towards the typhoon point or in the wind's eye, and the centre will be on the right hand, and to prove this strike off a small circle and let the circumference represent the wind circle in a typhoon; then draw a straight line through the centre of the circle so as to cut the wind-circle, and it will do so at right angles. Draw another line through

the centre, at right angles to the first, and it will be found at a point 90 degrees to the left of the first line or where the second line cuts the wind-circle. The direction of the wind will be parallel to the first line; hence, standing at this point and looking in the direction of the wind's eye, and parallel to the first line, the centre will be 90 degrees to the right, or on the right hand.

As a practical example I will take the typhoon which passed over Yokohama on August 25th, 1872, and which this diagram is intended to represent. The wind in the commencement of this gale was E. S. E., and according to the above rule of looking into the wind's eye and having the centre on the right hand, in this case it ought to bear S. S. W., and this was exactly the case as shown by [58] this diagram, the *Idaho* at her anchorage in the harbour being marked on the N. N. E. part of the circle.

As most of you here present were in Yokohama at the time when this typhoon passed over the place, it will not be necessary to dwell long on the details of it, especially as there was nothing very remarkable about it. I will merely mention such of the principal facts as may be of interest to those of you who had no opportunity of observing them for yourselves.

Thus : at 4 p.m. the gale commenced with the wind at E. S. E., blowing with a force of from 6 to 9 ; barometer 29.28 ; thermometer 80 ; weather, o. c. q. r. u. ; clouds, *cumulus-nimbus* ; sea, m.

At 5 p.m., wind E. S. E., force from 9 to 10 ; barom. 29.14, having fallen 0.14 inch during the hour ; therm. weather and clouds the same ; sea c. r. At 6 p.m. E. S. E.  $\frac{1}{2}$  E., force 9 to 11 ; barom. 28.94, having fallen 0.20 during the hour ; therm. 78, at 7 p.m. E. S. E.  $\frac{1}{2}$  E., force 11 $\frac{1}{2}$ . This was a fearful blast which lasted about five minutes ; had it continued for any length of time great damage both on shore and in the bay would have been the inevitable results. Even during the short time it did last two vessels were started from their anchorage and driven rapidly before the fury of the blast. One, a small steamer, which in her course fouled a native junk and sunk her ; the other, a British barque, drifting at the rate of about five or six knots in a W. N. W. direction towards the Kanagawa shore, where she would surely have brought up had the wind continued for half an hour, or

even 20 minutes longer. Barom. at 7 p.m. 28.50, having fallen 0.44 inch during the hour. At 7.05, however, the blast was over and the wind began to veer to the southward.

At 7.15, barometer 28.85, having fallen 0.15 inch in 15 minutes, wind S. very light, the rain and squalls had ceased and an entire calm followed. At 7.30 barometer had reached its lowest stand, 28.27, having fallen 0.08 inch during the 15 minutes, and at that time I compute the centre to have passed over the *Idaho*; the calm lasted for nearly half an hour. At 7.45 light airs were felt from [59] N. W., and at 8.00 the shift came, in force from 7 to 9 from W. N. W.  $\frac{1}{2}$  W., with a re-appearance of heavy rain and violent squalls; the barometer had risen to 28.92. At 9 p.m. the wind was W. by N., barometer 28.70, showing a rise of 0.38 inch during the hour; the wind blew with a force of from 8 to 10. At 10 the wind was nearly W., force from 4 to 6; barom. 28.93, showing a rise of 0.23 during the hour; the rain at this time ceased. At 10.15 the blue sky appeared; and at 11 p.m. the typhoon had entirely passed away, and the barometer had risen to 28.99.

This diagram shows the centre to have passed over this place, and this is made evident (in accordance with the law) by the wind remaining nearly stationary during the first half of the gale, a thing which can only occur when the centre is travelling directly towards you, or when running on a course parallel to the course of the "Typhoon"—keeping the bearing of the centre the same as with the bearing of the centre, the wind must always change.

Take for an example this typhoon travelling N.E. instead of N.N.E., or at an angle  $22\frac{1}{2}^{\circ}$  to the first line of bearing of the centre as observed at the beginning of the typhoon—the centre in that case would not have passed over Yokohama but about 20 miles to the eastward, and the winds would have changed as follows: commencing at 4 p.m. E.S.E.—as it was—at 5 wind would have been E. by S., at 6 E.N.E., at 7 N.N.E. nearly, at 8 N. by W.  $\frac{1}{2}$  W., and at 9 p.m. N.N.W.  $\frac{1}{2}$  W., at which time the storm-circle would have left us, and we should have passed through the chord of an arc equal to  $138^{\circ}$  of the storm circle, and the length of that chord would have been equal to about 98 miles. I have computed the diameter of this typhoon to be 105 miles, the whole

diameter requiring seven hours to pass a given point, travelling at the rate of 15 miles an hour. The diameter and rate of travelling is arrived at by knowing the time occupied in passing over a space of 15 miles from a point in the vicinity of Cape Kamisaki to the *Idaho's* anchorage in this harbour.

[60] The general course of this typhoon was N.N.E., curving more to the eastward after passing here.

The greatest fall of the Barometer in one hour was 0.44 inch, and the total fall was 1.01 inches.

I will now briefly state a few of the theories afloat regarding the origin or cause of Circular Storms (Typhoons). Although none of the scientific men who advance these theories pretend to say that they are correct—or even approximately so—there is nothing positive known about the origin or cause of typhoons, and the theories at best are only probable ones. Thus Mr. Redfield seems to think they are produced by the conflicts of prevailing currents in different strata of the atmosphere, giving rise to circular movements, which increase and dilate to storms.

Colonel Reid thinks there may be some connection between electricity, magnetism and these storms.

Mr. Espy, an American Philosopher, has published a work (entitled "Philosophy of Storms") in which he gives one of the causes of storms as follows:—Upon any partial heating of the air at the surface of the earth, it rises in columns more or less charged with vapor, condensed into clouds or rain. Next, in this changing of state the vapor communicates its latent caloric to the surrounding air, which also expands, is cooled itself by that expansion, but also gives heat to that part of the air in which it then is, and becoming lighter, is carried farther up. So that which Mr. Espy calls an upmoving column is always thus formed before rain is produced, and the air rushing in to supply the partial vacuum at the base of this chimney-like column forms thus the centripetal streams of air which he affirms is the true motion of the wind in all storms, and especially in typhoons; and according to his theory the winds do not blow in circles, but are straight lined and blowing from the circumference of a circular storm disc towards the centre, rushing up an immense moving chimney of any longitudinal shape, the draught of which is occasioned by an extensive condensation of vapor above.

He accounts for the production of clouds, the rise and [61] fall of the Barometer by this cause, inferring, that at a certain height the rising air overflows the rest of the atmosphere, forming a ring of cloud vapor and air, which pressing on that below, occasions the rise of the barometer found at the edges of severe storms.

Mr. Thomas Hopkins of Manchester, in a work published in 1844, entitled "On the atmospheric changes which produce Rain, Wind and Storms," admits with Mr. Espy the ascent and condensation of vapor in the air from various causes, and that all horizontal winds are thus produced. He considers also that the ascending winds produce descending ones, and that the rain produced in the higher regions brings air and vapor with it in its descent, and thus constitutes the lower atmospheric currents ; and finally, that storms are produced by the same causes that produce other winds, and that the greatest storms are descending winds.

Dr. Alex. Thom, of H. M. 86th Regiment, in his book upon "Storms in the Indian Ocean, and South of the Equator," is of opinion that the cause of the rotatory motion in storms—is, at first, opposing currents of air on the borders of the monsoons and trade-winds, which differ widely in temperature, humidity, specific gravity, and electricity. These, he thinks, give rise to a revolving action which originates the storm, which subsequently acquires an intestine and specific action involving the neighboring currents of the atmosphere, and enabling the storm to advance through the trade-winds to its opposite limits.

He further inclines to believe that "as the external motion is imparted to the interior motion of the mass, and centrifugal motion begins to withdraw the air from the centre and form an up-current, the whole will soon be involved in the same vortical action." The up-current he accounts for by the pressure being removed from the centre, when the air there increases in bulk, diminishes in specific gravity, and hence its upward tendency.

There is, however, another point of view in which some writers have considered [62] the formation and continuance of these storms. They suppose, with Dr. Thom, that the storms are formed by opposite currents of air, producing whirlpools as in water, but do not consider with him, that they are produced at the edges of the streams, as we see in water whirlpools. These writers incline to the belief that the whirls

originate between the upper and lower surfaces of strata of air of different temperatures, degrees of moisture, etc., and moving in different directions.

These whirls, they suppose, first formed above, and then descend to the surface of the earth ; just as we see a water spout begin at sea, with a slight swelling of the lower part of a cloud, and then a gradual descent of it. In short, they look upon typhoons as wind-spouts.

The views of Sir John Herschel on the causes of typhoons may be briefly stated, as follows :—

It seems worth inquiry, he says, whether hurricanes in tropical climates may not arise from portions of the upper currents prematurely diverted downwards before their relative velocity has been sufficiently reduced by friction on, and gradually mixing with, the lower strata, and so dashing upon the earth with that tremendous velocity which gives them their destructive character, and of which hardly any rational account has yet been given. Their course, generally speaking, is in opposition to the regular trade-wind, as it ought to be in conformity with this idea.

He then goes on to say—but it by no means follows that this must always be the case : In general, a rapid transfer, either way in latitude, of any mass of air which local or temporary causes might carry above the immediate reach of the friction of the earth's surface would give a fearful exaggeration to its velocity. Wherever such a mass should strike the earth a hurricane might arise ; and should two such masses meet in mid-air, a tornado of any degree of intensity on record might easily result from their combination.

Sir John Herschel further suggests that two great atmospheric undulations (which he terms barometric waves, because they are made evident by the fluctuations of the barometer) travelling in opposite directions and intersecting [63] each other, from their opposing forces might cause the phenomena of hurricanes or rotary storms.

Mr. Peddington says, in his valuable work on storms, entitled the "Sailor's Hornbook," page 22, par. 38, with reference to the cause or origin of typhoons :—"My own views are that cyclones [cyclone is the word which Mr. Peddington adopted to express the idea of a circular storm, and which is now generally accepted and used by nautical people]

are purely electric phenomena, formed in the higher regions of the atmosphere, and descending in a flattened dish-like shape to the surface of the ocean, where they progress more or less rapidly." "I think that the whirling tornadoes, spouts, and dust-storms, are certainly connected with them; *i.e.*, that they are the same meteor in a concentrated form, but we cannot at present say where the law which regulates the motions of the larger kind, ceases to be an invariable one."

Some writers advance the idea that volcanoes—and even large fires—originate violent circular motions of the atmosphere; and that volcanic eruptions are often accompanied by violent storms and heavy falls of rain there is no doubt. Mr. Peddington says: "There is much to countenance the idea that cyclones in some parts of the world may originate at great volcanic centres," and he is inclined to believe that their tracks are partly over the great internal chasms of our globe by which perhaps the volcanic centres and bands communicate with each other. He then goes on to say:—"If we produce at both ends the line of the track of the great Cuba cyclone in 1844, we shall find that it extends from the great and highly active volcano of Cosseguina, on the Pacific shore of Central America, to Hecla in Iceland." In 1821 the breaking out of the great volcano of Eyafjeld Yokul in Iceland, which had been quiet since 1612, was followed all over Europe by dreadful storms of wind, hail, and rain. In Iceland the barometer fell from the day before the eruption and for several days after.

A well authenticated fact was published in the English newspapers in 1852, of an extraordinary marine convulsion [64] experienced by the British ship *Mary*, on her passage from Liverpool to Caldera, being 12 miles north of the equator, in long. 19° W. A rumbling noise was heard to issue from the Ocean, which gradually increased until the uproar became deafening. The sea rose in mountainous waves; the wind blew from all points of the compass; the control over the ship was lost, and she pitched frightfully, all on board expecting every moment to be their last. This continued 15 minutes; the water then gradually subsided, when several vessels, in sight at the commencement of the convulsion, were found to have disappeared. It is noteworthy that the phenomenon occurred in October, 1851, one of the hurricane months in the West Indies.



Typhoons seldom appear without giving notice of their approach, and some indications may almost be relied on as being sure messengers of warning. Among the principal of these is the barometer. Not unfrequently upon the approach of a typhoon, the barometer seems restless and the mercury keeps oscillating in the tube :—often, when on the borders of a typhoon, the barometer rises suddenly one or two tenths ; and Col. Reid gives an instance where two barometers on board the same ship rose half an inch above their usual level. If these indications by the barometer should be accompanied by a long, heavy swell, unaccounted for in any other way ; an unusual appearance of the sky, steel-grey or with a greenish tint ; blood-red, or bright yellow sunset : and, added to these, the appearance of peculiar or unusual forms or motions of the clouds, or a threatening appearance of the weather, I should have no hesitation in asserting that a typhoon was in the vicinity, approaching or passing ; but either one of these things—taken separately—ought not to be disregarded, and the careful seaman will always be on his guard should any of these things appear to warn him of approaching danger. Mr. Peddington relates the case of the *Earl of Hardwick*, Captain Neller, as follows :—

“ In the Southern Indian Ocean, when near the borders of a typhoon, she was standing off and on to keep out of [65] it ; and describes the weather as being squally, thick, heavy and wild looking ; the upper clouds coming from N. W. ; the next stratum N. E. ; and the lower scud, with the wind, fast from S. E. The trades (S.E.) were blowing strong—but at midnight ran into a deal calm ; the breeze soon sprung up again, and the next day had a high, confused sea, barometer rising from 29.95 to 30.00. For two days after, the barometer kept falling gradually, squally weather, but strong trades. On the third day, barometer had fallen to 29.71, ship hove to ; the appearance of the weather was threatening ; dense lurid atmosphere ; very peculiar appearance at sunset, last two evenings. Dark and threatening appearance to the N. Wd. ; the wind increasing and drawing to the E'd., with thick weather when standing to the N'd., but always fine when going S. A thick, lurid appearance over the heavens—the sun only showing as through a dense veil, with heavy leaden-looking clouds to the N. and N. W.” He further states : “ The weather became more squally, with

rain, when standing N.—and that one heavy squall from N. E. was followed by light airs from the E'd. In some of the squalls the clouds were so dense and dark that it was not possible to see further than fifty yards from the ship." He also speaks of immense masses of leaden-colored clouds, covering the whole canopy of heaven, and giving it a murky, threatening appearance, and the sun setting, casting over the whole a red, lurid appearance, and throwing over everything on board the ship a reddish tint.

I have selected this case as a good example of what the indications of typhoons are, and although all typhoons are not as well marked as this one, yet one or more of these signs will generally appear in advance of the gale, and, separately or collectively, should receive a proper degree of consideration, as much of the safety of the ship and crew depends upon timely measures being taken for avoiding the gale, or if that be not possible, at least the dangerous part of it. In connection with the signs of approaching gales, I would mention that several cases are recorded wherein have appeared peculiar red tints, or lights in the [66] heavens, described as—"Flaming clouds on the horizon from whence proceeds the fiery tempest"; "appearing like entire conflagrations of the air and seas." And on other occasions "appearing as borders round the edges of remarkably dense and dark clouds, reflecting an awful redness upon the sails and ship."

A number of similar cases are recorded, which show that this red light and sky is not an uncommon phenomenon, or precursor, of typhoons.

Nearly all writers agree that a typhoon is a circular storm-disc, varying from one to ten miles in height, and in diameter from fifty to one thousand miles; and that the winds within the disc blow in circles—or nearly so—round a common centre, which is generally calm, and varying in size from one-tenth to one-fifth, and in some cases as much as one-fourth, of the whole diameter of the gale.

Writers, as we have seen, differ as to the place of formation, or commencement, of these gales, some asserting with Dr. Alexander Thom that they are formed on the borders of the trade winds and monsoons; and others, with Messrs. Redfield and Peddington that their motion is caused by opposing currents meeting in mid-air, and differing in temperature, humidity, electricity, etc., etc.

Col. Reid suggests that electricity and magnetism have something to do with the formation and continuance of these gales ; and Mr. Peddington says they are, in his opinion, purely electrical phenomena.

Now, if we consider the theory of the mid-air formation of circular gales, and imagine two currents of air of different temperatures and degrees of moisture, and charged respectively with positive and negative electric fluids (the well known properties of which are to attract each other) travelling in opposite directions, it is probable that the meeting of these unequal and opposite forces, in the act of seeking or establishing an equilibrium, may have a rotatory motion imparted to them ; the first particles in meeting having become neutralized and formed a focus round which remaining currents commence to move with great rapidity, and so impart their motion to the [67] surrounding atmosphere, which, in its turn, performs the same duty, and soon a large portion of the atmosphere becomes involved in the same vorticular action. An extensive condensation of vapor going on in the centre, the air becomes lighter there than elsewhere in the revolving disc, and forms a kind of chimney for the denser air below to pass up through ; and when this process has been going on for some time, the air beneath is sufficiently exhausted to admit of the storm disc descending to the surface of the earth, after reaching which, it takes up a progressive motion and is impelled by magnetic attraction towards the magnetic poles.

A seeming contradiction to this statement may be found in the *Argyleshire's* typhoon, which I have here represented as travelling W. by S., and in a direction nearly parallel to the Magnetic Equator ; but when it is remembered that some portions of the earth are heavily charged with magnetism (as is shown by the variation of the mariner's compass to the extent of two points or more of deviation from the true Meridian, and especially in the Danish Sound and Baltic Sea, where the local magnetic forces in the adjoining countries—especially Sweden, where iron is found in great quantities—is so great as to attract the compass very much more) it may be quite possible that similar attractions exist in China, or on the island of Hainan, which is called by the Chinese “ the Mother of Typhoons.”

I am aware, while supporting Col. Reid's theory of magnetism in typhoons, that opinions and theories have been published in opposi-

tion to it ; but none have proved it to be wrong, or have accounted more clearly for the progressive motion of circular gales ; and as all theories as yet made known with regard to the origin and cause of circular gales are but speculative in their character, I see no reason why the theory of magnetism in connection with typhoons should not receive a fair share of consideration, and as far as I am personally concerned, I give it the preference.

Some writers are of opinion that there is a close [68] connection between whirlwinds, dust-storms, and circular gales, and go so far as to say that whirlwinds and dust-storms are but miniature typhoons.

I will cite a few cases of this kind which (if electricity be considered one of the agents in the production of circular gales) certainly proves to some extent that the idea is not altogether unfounded.

I quote from Mr. Peddington's work, page 303, where will be found the following report by Dr. H. P. Baddeley, H. E. I. C. S., dated from Lahore, showing by experiments that the dust-storms are purely electrical.

“ My observations on this subject have extended as far back as the hot weather of 1847 [this was written in 1850 in the *Philosophical Magazine* for August] when I first came to Lahore ; and the result is as follows :—Dust-storms are caused by spiral columns of the electric fluid passing from the atmosphere to the earth. They have an onward motion and a revolving motion, like revolving storms at sea, and a peculiar spiral motion from above downwards like a corkscrew. It seems probable that in an extensive dust-storm there are many of these columns moving on together in the same direction ; and during the continuance of the storm many sudden gusts take place at intervals, during which the electric tension is at its maximum.

“ These storms hereabouts mostly commence from the N. W. or W., and in the course of an hour—more or less—they have nearly completed the circle, and have passed onwards.

“ Precisely the same phenomena, in kind, are observable in all cases of dust-storms ; from the one of a few feet in diameter, to those that extend for fifty miles and upward, the phenomena are identical.

“ It is a curious fact that some of the smaller dust-storms—occasionally seen in extensive and arid plains, both in this country and in Afghanistan above the Bolan Pass, called in familiar language

'Devils,'—are stationary for a long time, that is upwards of an hour, or nearly so, and during the whole of this time the dust and minute [69] bodies on the ground are kept whirling about in the air.

"In other cases these small dust-storms are seen slowly advancing, and when numerous, usually proceed in the same direction.

"Birds—kites and vultures—are often seen soaring high up, just above these spouts, apparently following the direction of the column, as if enjoying it.

"My idea is that the phenomena connected with dust-storms are identical with those present in waterspouts and white squalls at sea and revolving storms and tornadoes of all kinds; and that they originate from the same cause, viz.—moving columns of electricity.

"In 1847, at Lahore, being desirous of ascertaining the nature of the dust-storms, I projected into the air an insulated copper wire on a bamboo on the top of my house, and brought the wire into my room, and connected it with a gold-leaf electrometer and a detached wire communicating with the earth. A day or two after, during the passage of a small dust-storm, I had the pleasure of observing the electric fluid passing in vivid sparks from one wire to the other, and of course strongly affecting the electrometer. The thing was now explained, and since this, I have, by the same means, observed at least sixty dust-storms of various sizes all presenting the same phenomena in kind."

He continues to describe the dust-storm as follows:—"Some of them come on with great rapidity, as if at the rate of forty to sixty miles an hour. They occur at all hours, oftentimes near sunset.

"The sky is clear and not a breath moving: presently a low bank of clouds is seen in the horizon, which you are surprised you did not observe before; a few seconds have passed, and the cloud has half filled the hemisphere, and there is no time to lose—it is a dust-storm—and helter-skelter every one rushes to get into the house to escape being caught in it.

"The electric fluid continues to stream down the wire unremittingly during the continuance of the storm, the sparks oftentimes upwards of an inch in length, and [70] emitting a crackling sound; its intensity varying with the force of the storm, and as before said, more intense during the gusts."

The dust-storms or whirlwinds when transferred to the ocean

would become whirlwinds and waterspouts,—being precisely the same phenomena—and a number of cases are recorded where they have been met with on the borders of typhoons, and of ships having performed various manœuvres to get clear of them.

On the subject of typhoons, a late writer asserts that the true theory of commencement or formation of cyclones in the Atlantic is “the intrusion of the S. E. trade-winds into the area of the N. E. trade-winds; and he tells us that this satisfies all the conditions of the cyclone problem, and is, therefore, the true solution of the origin of cyclones.”

I fail, however, to see that by this he accounts in any way for the progressive motion; and therefore see no reason to change my ideas with regard to the presence and influence of magnetism in the gales.

A few remarks on the barometer may be desirable in connection with this subject; and I will endeavour in as brief a manner as possible to explain its utility and action with reference to the subject of typhoons.

The first indications by the barometer of the presence, in its vicinity, of a typhoon is generally its oscillations or restless condition, which, though sometimes very small, not exceeding 01 of an inch, ought never to be disregarded.

A few cases are on record in which the oscillations at the mercury in the tube have reached 02, and of the same time the oscillation of the water barometer was 28 of an inch. These oscillations are caused by the disturbed condition of the atmosphere in front, and in the vicinity of the advancing gale. If the atmospheric fluid in which we live and breathe were visible to the eye, it would be seen on the approach of a typhoon to move in great waves over the barometer, like the undulations of a troubled sea after a heavy gale of wind; and as the [71] barometer measures exactly the weight of a perpendicular column of the air immediately above it, it in consequence rises and falls according as the atmospheric waves reach, pass over, and leave it.

The next thing worthy of notice is the fact that the barometer often rises just before the gale comes on; a fact which when properly understood will always put the seaman on his guard and give him timely warning, but a dangerous thing when not understood, as it tends to throw the seaman off his guard, and lull him to sleep, when he ought really to be wakeful and watching.

The cause of this phenomenon is evidently the air being banked up in front and by the pressure of the advancing gale; and can best be demonstrated by moving a large tub through a body of water, when it will be found that the water in front of the tub will be higher, and that the water behind the tub will be lower than that portion of the water which is not affected by the movement of the tub;—and this is just the case with the barometer, which as a rule is above in front of, and lower behind the gale than its average height, for the time being, in places not affected by the storm.

But we also find the barometer standing lowest at or near the centre, and this may be accounted for by the fact of a partial vacuum existing there from condensation of vapour, and the surrounding air rushing in to supply the vacancy, leaves room for neighbouring currents to expand and become lighter, a process which on this principle I suppose to be going on from the centre towards every part of the outer circumference; and the gradual fall of the barometer as a matter of course follows.

Now as the severity of a typhoon is measured by the velocity of the winds within the storm-disc—and we admit on the first principles that the greater the rapidity with which the currents revolve around the focus, the greater the condensation of vapour there, and hence the more perfect the vacuum at the centre—we shall have an explanation of the reasons why the barometer falls lower in a severe, than in a more moderate gale.

[72] Last of all we have the barometer as a measure of the distance from the centre, and although but little reliance ought to be placed on this, yet in some cases it might be of use in determining what to do with a ship caught in a typhoon.

By comparison of a great number of cases Mr. Peddington has constructed the following table, intended to guide the mariner in estimating the distance from the centre.

AVERAGE FALL OF BAROMETER. PER HOUR.	DISTANCE FROM CENTRE.	
	IN MILES.	IN TIME.
From 0.02 to 0.06	From 260 to 150	12 hours.
“ 0.06 “ 0.08	“ 150 “ 100	9 “
“ 0.08 “ 0.12	“ 100 “ 80	6 “
“ 0.12 “ 0.15	“ 80 “ 50	3 “

The above table gives the average of a greater number of barometer readings observed during typhoons principally at shore stations, where the observations have been made accurately and regularly, and from which the distance corresponding to each reading has subsequently been ascertained; but nothing is shown here nearer than three hours before and after the passage of the centre; the averages here registered apply respectively to 12, 9, 6 and 3 hours from the centre as marked in the table. After a typhoon has been blowing nine hours, no average fall can well be stated, as sometimes the barometer continues to fall at the same rate, and at other times (in cyclones of what Mr. Reddington calls the first class) falls when nearer than three hours from the centre, at a rate in proportion as 1 to 4 when compared with that of the former three hours.

If we examine the barometer readings during the typhoon which passed over Yokohama in August, 1872, we shall find that this rule nearly corresponds with what was observed by myself during that gale.

It will be remembered that the diameter of this typhoon was 105 miles; its semi-diameter  $52\frac{1}{2}$  miles; that the entire storm-disc was seven hours passing over the [73] *P'aho* (or any other given point); and the time occupied by the semi-diameter in passing,  $8\frac{1}{2}$  hours.

During the first hour the fall of the barometer was 0.14 of an inch, during the second hour 0.20, during the third hour 0.44, and during the remaining 30 minutes 0.21, showing, in this instance, a proportion of fall, by comparison of the third with the first hour, in the ratio of 1 to 3; and the distance from the centre being  $52\frac{1}{2}$  miles when the fall of the barometer was 0.14 of an inch per hour, agrees nearly with Mr. Peddington's estimate of the distance with a corresponding fall of the barometer, his distance being 50 miles, with an average fall of 0.15 per hour.

I infer from this that the distance of the centre in a typhoon from any part of it may be calculated approximately by this method, providing the observer is on shore, has a good barometer and watches it closely.



The total fall of the barometer during the typhoons on record ranges from 1.00 inch to 2.70 inches ; the latter in the case of the H.E.I.C.S. *Duke of York* off Kodgeree in 1833, from 29.00 to 26.30 inches.

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“ ARGYLESHIRE.”

(See Diagram.)

The ship *Argyleshire*, here represented in a typhoon, was making a passage from Hongkong to Yokohama, and on the 11th of September was near the South end of Formosa, *Botel Tobago* bearing N.E., 23 miles. She was struck by a typhoon with the wind at N.N.E. and the centre bearing E.S.E., and the captain believing the gale to be travelling to the Northward, supposed himself to be in the left-hand semi-circle, and continued on the port tack heading to the Eastward as near his course as possible, thinking all the time the centre would pass to the Northward of his ship ere he could approach sufficiently near to be in any danger. He evidently had an eye to business, and judging from the manner in which he handled his ship afterwards that he was conversant with the Law of Storms, I am of opinion that he desired to approach the [74] centre, as near as would be consistent with safety, in order to take advantage of the westerly winds which he knew he would find south of the centre, and by which he could lay his course for Yokohama and make good time. This would have been all right had the gale travelled north as he supposed, but the sequel in this case shows that seamen should never form hasty conclusions in cases where deliberation may be employed to advantage.

If the captain had hove the ship to at once, and awaited the first change of wind, he would have discovered that the gale did not—as he supposed—travel north, for in that case the shift would have been to the left of N.N.E. and not to the right as it actually occurred ; but urged on I presume by zeal and ambition to make a quick passage, and do well for his owners, he kept on under a heavy press of canvas until spars and rigging threatened to give way, and the strain upon these momentarily increasing, he was compelled to heave to, which he did on the port tack, evidently still thinking he was in the left hand semi-circle.

But he was not long left in doubt as to his position, for his falling barometer, the rapidly increasing force of the squalls, and the shortening of the intervals between them, the approach of darker and denser clouds, and the appearance of lightning in great quantities all told the story of the centre coming nearer the ship, and the idea evidently just occurred to the captain that the gale was not travelling north as he supposed but coming to the westward, and that he was heading nearly for the centre, for he at once wore ship and put her on the starboard tack (the proper tack).

*During the first 12 hours of the gale the ship sailed and drifted 118 miles S. 69° E. nearly E. S. E., (equal to 96 miles measured on the chord of the arc through which she passed) and towards the centre, until within 28 miles of the latter she was put on the starboard tack.*

If this had been done at the beginning of the gale, she would not have approached the centre nearer than 150 miles; for the winds drawing to the eastward, as the gale advanced to the westward, she would have made no drift [75] to the southward, and she would have been in a safe position to receive the shifts—as each one would have been more aft—and the ship, coming up to the wind, would have been riding head on to the heaviest sea.

If we start with the *Argyleshire* from the beginning of the gale we may follow her on the broken curved line marked 1, 2, 3, etc., sailing E. by S. 63.5 miles, E. S. E.  $\frac{1}{2}$  E. 30 miles, S. E.  $\frac{1}{4}$  S. 26 miles, and after being hove to on the port tack, drifting S. by E. 6 miles. The wind gradually veering to the eastward—or to the right (unmistakable evidence of being in the right hand semi-circle) and at the last named point it was N. E.  $\frac{1}{4}$  N.

It will be remembered that while the ship was sailing to the S'd and E'd, the gale was advancing to the S'd and W'd at the rate of 8.4 miles per hour, and during 12 hours 100.8 miles, while the ship, in the same time having sailed 118 miles S. 66° E. and, as shown, above 96 miles on the chord of the arc of the storm-circle through which she passed. It follows that at the end of 12 hours she had passed through 196 miles of the storm-circle, on the chord of that arc, and nearly in direct opposition to the course of the gale.

Dropping a perpendicular from this point on the chord, it will cut

the line A. C. in the angle "A," and point out the actual distance over this line 216.7 miles, and her distance from the centre at the time of wearing ship 86 miles.

The numbers 1, 2, 3, etc., on the line A. C. point out the particular part of the gale that passed over the ship in her real position, by corresponding numbers on the broken curved line, and consequently her actual track through nearly one-half of the storm-circle, the point at the angle "A" in the storm-circle corresponding to the point "A" on the ship's track. On the starboard tack, the ship during an interval of 30.26 hours drifted and sailed W.  $\frac{1}{2}$  N. 18 miles, N.N.W.  $\frac{1}{4}$  W. 17 miles, N.  $\frac{1}{2}$  E. 18 miles, N. by E.  $\frac{1}{4}$  E. 12.6 miles, N.E.  $\frac{1}{4}$  E. 27 miles, N.E. by E.  $\frac{1}{2}$  E. 28.8 miles, making good a course and distance equal to N. 23° E. 83.5 miles, [76] which, when measured on the chord is equal to 45 miles. The letters A., B., C., etc., on the line A., G., correspond to the same letters on the broken curve, marking the ship's track on the starboard tack, and point out the particular part of the storm that passed over the ship in her place on the curve, as indicated by such corresponding letter. The line A. G. also shows the ship's track through the last half of the storm-circle, and measures 314 miles corresponding to a distance on the chord equal to 300 miles. The diameter of the storm-disc is computed at 588 miles, and its rate of travelling 8.4 miles per hour.

It is here made evident that the *Argyleshire* passed through a distance in the storm-circle equal to 580.7 miles, contained within an angle of 115°, the chord of which runs nearly parallel with the course of the gale and measures 496 miles. The *Argyleshire* during the first half of the gale experienced the winds as follows: N.N.E., N.N.E.  $\frac{1}{2}$  E., N.N.E.  $\frac{1}{4}$  E., N.N.E.  $\frac{1}{2}$  E., N.N.E.  $\frac{3}{4}$  E., when the ship was hove to on the port tack, and the wind soon began to veer more rapidly, and in a short time veered to N.E.  $\frac{1}{2}$  N. The reason why the wind veered so slowly previous to heaving to was because she was running nearly direct for the centre, and therefore changing the bearing of it but slightly; and this circumstance ought to have attracted the attention of the captain to his mistake in supposing the gale to travel to the northward; for in that case, running as he was to the S'd and E'd, he should have changed the wind to the left—that is—from N.N.E. to N.

by E.N.N. by W.N.N.W. etc., etc., until eventually, when he should have reached the southern portion of the storm-disc, he would have had the wind from the W'd, and gradually changing to the S'd and W'd.

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“FRANCIS HENTY.”

The *Francis Henty*, of Melbourne, Captain William Thomas Quayle, left the Saddles on the 4th of October, 1872, bound for Yokohama, and stood across the Tung-Hai, [77] or Eastern Sea, with a northerly gale for Van Dieman's Strait. The wind, however, hauled to N. E., and headed the vessel off, so that she could not fetch or lie up to her course, and on the morning of the 7th, running down on a course for Colnett Straits, she passed close to Ingersoll Rocks. Strong indications of typhoon to the S. E., and thick weather prevented the captain passing through the Straits. Low barometer, heavy cross swell, occasional flashes of lightning, and a general threatening appearance of the weather determined the captain to keep on the western side of the chain of islands and await the result of the coming gale. On the morning of the 8th barometer rose 0.2, from 29.80 to 29.50, a circumstance that caused the captain to think he was all clear of the typhoon, and so hauled up on the wind and passed through what he calls Monturoso Pass, between the islands of Tokara and Toka-shima, standing E. S. E., between Cape Monturoso and Macedonian Rocks, to a point in latitude 28 deg. 84 min. N. and long. 129 deg. 54 E., the ship's position when the typhoon commenced; but the wind having changed to E. S. E., Captain Quayle stood to the N. and E'd., and while doing so, the barometer rose to 29.70. This calmed the mind of the captain, who, up to this time, had been exceedingly anxious, in consequence of the proximity of land to leeward. He believed that he was all clear of the typhoon, and that it would pass on his quarter (to the N'd. and W'd.), but he was not destined long to rejoice in this sweet illusion, for he quickly discovered that he had misinterpreted the message of his faithful barometer, which soon after began to fall rapidly, and the wind increasing in due proportion, gave notice that the dreaded gale had caught him, and left him no way by which to escape without the risk of placing his ship in imminent danger, and being wrecked on

one of the numerous islands composing the Loo-Choo and Linschoten groups, should he attempt to pass through, as he was at this time unable to see anything but dark and frowning clouds which seemed to rest upon the surface of the ocean. In this dilemma he resorted to the only [78] thing left for him to do—hove his ship to on the starboard tack. The wind at this time blew with such fury that canvas, however small, exposed to its force, was instantly blown into ribbons and torn from the ropes. Gust after gust followed with increased violence, and the wind remaining nearly stationary, and the barometer falling rapidly, told the dreadful story that the centre was approaching.

Lightning descending in vertical columns (of what Capt. Quayle describes as vivid green) added horror to the scene; and it is only necessary to hear Mrs. Quayle (who, with her children, was on board at the time) tell the story of her troubles and anxiety during that fearful night, in order to appreciate more fully the necessity for avoiding the centre of these violent gales; a thing which may be generally accomplished with safety, if the mariner is conversant with the Law of Storms.

There are a few exceptional cases, in which there is no escape; and the *Francis Henty* furnishes an instance. She was practically land-locked to leeward, the land being shut out from sight by a black cloud in which the *Francis Henty* herself was enveloped, and uncertain of her position, to attempt to run through one of the narrow passages between the islands would have involved the ship and crew in great danger by grounding on some of the islands or rocks in their vicinity. So of two evils the captain chose the least; and preparing his ship by passing extra gaskets on the sails, lashing the spars and other things liable to get adrift, making hatches and skylights more secure, getting relieving and other tackles ready for instant use, etc., etc., he adopted the proper course by heaving to on the starboard tack, being in the right-hand semi-circle, and awaited the passing of the centre. This, in due time, took place. When near the centre, the ship was thrown on her beam ends with the yard-arms in the water, and was so kept by the fury of the wind pressing her down until the centre reached her, when she righted in the calm that followed. She was, however, not more safe there than when exposed to the [79] blast, for the heavy and irregular sea threatened every moment to swamp the ship.

During a light breeze, while the centre was passing, the Captain wore ship, and put her on the port tack to prevent (as he says) the ship from foundering against the lee sea, when the shift should come from the N.W.; and by this manœuvre he evidently saved his ship: for although somewhat out of order according to the Law of Storms—as he was in the right hand semi-circle still—yet subsequent events proved that he was right. The events to which I refer are the incurving of the winds, evidently caused by coming in contact with the chain of islands composing the Loochoo and Linschoten groups, and as the winds here represented are those that were felt at the ship, it will be noticed that as the ship drifted to the E'd, the winds became more Southerly; and the inference drawn from this fact is that the Island of Oho Shima (which is high land) arrested the course of the wind, and diverted it to a more northerly direction, so much so that, when the ship bore N.N.E.  $\frac{1}{4}$  E. 23 miles from the Northern point of Oho Shima, the wind at the N.W. by W. typhoon point, was actually S. W. drawing up between the Islands of Oho Shima and Tokashima (being diverted seven points); and had the ship been on the starboard tack then, she would have been taken aback by every shift, got sternway, and probably foundered.

If this be true of Oho Shima, it is also true of any other similar land, and an important lesson is taught by Captain Quayle's experience, viz:—When struck by a typhoon in the vicinity of land, remember that the contact of the wind with land diverts its course in proportion to the angle of contact, and, therefore, make proper allowance for such change in locating the centre, or in determining the tack on which to heave to.

This typhoon may be cited as a remarkable instance of the incurving of the winds by contact with land—which is here clearly established—but I doubt very much if any considerable out-curving of the wind could ever take place, even should the angle of contact with the land be such as [80] to give it a tendency in that direction, because of the atmospheric pressure being so much greater on the outside than on the inside.

By reference to the Diagram, we find the *Francis Henty* entering the typhoon in N.E. by E. quarter, or having the wind S.E. by S. and follow her through the first half of the storm-disk to the centre, the wind having changed but one point to S.E. This change of wind is the effect

of having changed the bearing of a centre, first by running to the northward and eastward on a course inclining towards the track of the typhoon; and secondly, by heaving to and drifting to the northward and westward. Run and drift together during  $11\frac{1}{2}$  hours, making good a course and distance N.  $7^{\circ} 55'$  E. 685 miles—on the line marked D.R. 1., and following her from the centre out, we find that she is drifting to the eastward making good a course and distance S.  $83^{\circ} 24'$  E. 44.87 miles to the line marked D.R. 2: but at the end of the typhoon, the Captain discovered the Macedonian Rocks 7 miles to leeward, bearing S.S.W.  $\frac{1}{2}$  W. and 71 miles S.  $52^{\circ}$  W. of the point where his reckoning placed him. This indicates a strong current having affected the drift of the ship during the gale, at the rate of 3.24 miles per hour, S.  $42^{\circ}$  W. of S.W.  $\frac{1}{2}$  W. Applying this current to the course, through the first half of the storm-disc, we shall find that the ship travelled, through the storm-disc, on the straight line marked 1, 2, 3, 4, 5 and 6., and that her track over the ground was on the broken line having the corresponding marks; also that her course through the last half of the storm-disc, lies on the straight line marked A, B, C, D, and E, and that her actual drift over the ground is indicated by the curved line similarly marked.

Diameter of the storm-disc, 360 miles, and rate of travelling 16 miles per hour, N.E. Diameter computed from the time required for the *Francis Henty* to pass through the storm-disc, and the rate of travelling obtained by having the bearing and distance of the centre from two known points, at different times, and the elapsed time during the interval.

[81] I have confined myself so far to data and figures, absolutely necessary for the explanation of my diagrams, and will not tire you with a recital of the computations by which I have arrived at the above conclusions, and upon which I base my assertions; but should any person here present desire to investigate the subject more fully, I shall be most happy to show the computations, and render such explanation as may be desired to clear up any little point imperfectly understood.

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#### CAPTAIN QUAYLE'S LETTER.

“ Left Saddles at 1 A.M. on the 4th October; with fresh northerly

gale and high sea, wind veering to N.E., found it impossible to pass through the straits of Van Dieman. On the 7th passed close to Ingersoll Rocks, but weather so bad did not go through the claws, having indications of a typhoon to the south'd and east'd. On the 8th October glass rose 2.10, thought I was clear of typhoon; wind E. S. E., thought it would pass on my quarter; went through the Monturoso pass with strong gale; stood to the north'd for eight hours, then tacked to the N. E., barometer 29.50. As I stood to the north glass rose to 29.70, thought I was all clear. Lee shore distant 30 miles made me very anxious. At 11 P.M. glass began to fall rapidly, and wind came out steady at S. E. by S., the typhoon having evidently struck the Loo Choo Islands and recurved, coming right down on the ship. Stood north as long as possible under heavy press of sail. At midnight on the 8th barometer 28.65, blowing terrific gusts, sea resembling church steeples. At 3 A.M. 9th October, barometer 28.21, took in main topsail, and put ship on starboard tack, being in the right-hand semi-circle; at 4.30 the scene was fearful; gust upon gust, and sea running high but not breaking owing to the wind. At 6 A.M. barometer 27.50, men lashed on deck; nothing visible of ship but a portion of her weather deck, on her beam-ends, yard-arms in the water; when at 7 A.M. barometer 27.29, suddenly it lulled and the centre passed. Drift, up to this time, 5½ knots per hour, N. W., [82] was expecting every moment to hear the ship crushing on the reefs. Wore ship during a little gust in the centre, and put her on to port tack to prevent her from foundering against the lee sea when the wind should shift. The second mate washed overboard while wearing, but managed to crawl on board again. The bulwarks all washed away. In the course of 30 minutes the shift came, N. W., terrific blowing, harder than before, throwing ship down, washed away cabin and all my effects, nearly wife and children. At 8 A.M. 9th gave up hopes of ship and crew; compressed air below blowing up hatches and scuttles in the cabin; barometer at this time 27.19, clouds resting on the water, and the scene was fearful. The lightning falling in a vertical column of vivid green; the wind constantly veered to the south'd and west'd, and at midnight the wind was S.W., blowing a fresh gale; set storm canvas to steady the ship. Oct. 10th A.M., daylight,



gone down to moderate gale, but high sea. At noon the reefs in sight were seven miles to leeward. The whirl of the storm kept the ship off."

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### CHART OF BAROMETER CURVES.

(See Diagram.)

The Chart shows the barometer curves as indicated by the barometers of the respective ships herein named: the *Argyleshire*, Sept. 1872, the *Francis Henty*, October 1872, and the *Idaho* August 1872. An inspection of these Diagrams affords a comparison of the gales as to size and severity, supposing the fall of the barometer to be a measure of the latter. The chart is constructed on a scale of 20 nautical miles to an inch, or say  $\frac{1}{1,250,000}$  part of the actual size (nearly).

Hence, the length of the Diagrams shows the diameter and relative diameters, and the form of the barometric curves, the severity and relative severities of the gales which they are made to represent: Thus it would appear that the *Argyleshire* typhoon, although larger than either of the other two, was not so severe; since at a distance of 204 miles from the circumference, the fall of [83] the barometer was only 0.93 inch; but it will also be noticed that the *Argyleshire* did not pass nearer to the centre than 86 miles, and the lowest barometer reading was at 90 miles from the axis of the centre, and 45 miles from the actual boundary line of the calm space; it is therefore probable that her barometer might have fallen another inch before reaching the central axis, but this, of course, I have no means of knowing, except by comparison with the fall of the barometer during the Yokohama typhoon, August 1872, in which the barometer fell 1.01 inches from the beginning to the axis of the centre, a distance of  $52\frac{1}{2}$  miles.

Next, we notice the *Francis Henty's* typhoon, and observe the barometer falling rapidly, showing a total depression of 2.15 inches. This was an exceedingly severe gale, and the fall of the barometer went far below the average, the greatest fall recorded heretofore being 2.8 inches,

and the average of excessive fall of the barometer recorded does not exceed 2 inches. 1.96 inches, I think are the figures.

The diameter of this gale was 360 miles. and the calm space in the centre 60 miles.

Next, and last, we have the Yokohama typhoon, which occurred on August 25th, 1872.

The barometer, during this gale, was observed by myself every 15 minutes from the beginning to the end, and I have, therefore, no hesitation in saying that this curve is accurate and complete. The total fall of the barometer was 1.01 inches. The diameter was 105 miles, and the calm space in the centre, 15 miles.

In connection with the fall of the barometer, it will perhaps be proper to remark on Captain Quayle's idea of the compressed air below blowing up the hatches and scuttles in the cabin, as stated in his letter. That this circumstance should not be attributed to the compression of the air, but just the opposite, to expansion of the air, may be explained in this way: When the ship entered the storm circle, with a high barometer, a quantity of air of the same density as the surrounding atmosphere was confined [84] below; and this being unable to escape as the barometer fell, owing to the tightness of the hatches, eventually, when the barometer fell very low, and consequently the outside pressure was partly removed, expanded and forced up the hatches, or such portions of the deck confining it as happened to be weakest. This would not have occurred a second time, as an equilibrium of forces was soon established, and the pressure equalized on both sides.

There are two essential rules of vast importance to the seaman to be remembered in connection with circular gales, and which will always be a sure guide.

The first of these is: That the wind in the right-hand semi-circle always changes to the right of the point from which it blows; and the second, that the wind in the left-hand semi-circle always changes to the left of the point from which it blows.

This is true in both hemispheres.

Two other rules should be remembered as equally important. The

first is : That in the Northern Hemisphere the bearing of the centre of the gale is always eight points to the right of direction of the wind—as when the wind is N. the centre bears E. The second is : That in the Southern Hemisphere the bearing of the centre is always eight points to the left of the direction of the wind, as when the wind is N., the centre bears W.

Two other rules of equal importance should be remembered. The first is : In the right-hand semi-circle heave-to on the starboard tack. The second is : In the left hand semicircle heave-to on the port tack—in both hemispheres.

It will then be seen that a ship laying-to in the right-hand semi-circle in the Northern Hemisphere will be on the starboard tack, and heading off from the centre ; and in the left-hand semi-circle, will be on the port tack, and with her head towards the centre. Also : In the Southern Hemisphere, a ship laying to in the right hand semicircle, will be on the starboard tack, but heading towards the centre ; and when in the left-hand semi-circle will be in the port tack, but heading off from the centre.

[85] Upon a knowledge of these simple and few rules depends the safety of a ship ; and these contain all that is necessary to locate the position of a ship with regard to the bearing and movement of the centre, as the direction of the wind gives you at once the bearing of the centre, and several consecutive bearings of the centre will give you, approximately, its movements ; while the first change of wind will tell you whether you are in the right or left hand semi-circle. Thus located in the storm circle the rest depends on the judgment of the commander.

To demonstrate these rules would require a number of diagrams and more time than, perhaps, the greater portion of this audience would be willing to give to a subject of that kind, which would necessarily be dry, and of little interest to any ; but such few as may happen to be connected with the sea, or are otherwise desirous of investigating the matter more fully, I would refer to the works of Reddington, Reid, Redfield, Dove and others for a full and complete discussion of the matter. Yet to the practical seaman, who wants a great deal of sub-

ARGYLESIRE.

Date.	No.	Point.	Winds.	Condition.	State.	Course.	Difference of Latitude.	Departure.

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stantial information in a concentrated form, I should recommend some of the smaller works written on the subject, all of which are more or less adapted to the wants of the practical sailor. A small work of that kind, entitled "Weather Guides," is one of a number of other useful books written by Rear-Admiral T. A. Jenkins, U.S.N., while he was doing duty as Chief of the Bureau of Navigation, in Washington, D.C., and is an excellent book for reference and consultation when you wish to get an idea quickly and do not have time to hunt it up in the larger works.



RUSSIAN DESCENTS IN SAGHALIEN AND ITORUP IN  
THE YEARS 1806 & 1807.\*

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By W. G. ASTON, Esq.

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[*Read before the Asiatic Society of Japan, on the 7th June, 1873.*]

[86] The following account of Russian descents in Saghalien and Itorup has been prepared from a collection of Japanese manuscripts comprising the private correspondence of officials on duty at Hakodate, together with proclamations and other official documents.

The causes of these Russian descents are to be looked for in the events of the previous four or five years. The Russians had already made several attempts to open trade with Japan. Applications of this kind which were made to the Japanese authorities in Yezo were always referred to Nagasaki, and at last an embassy was sent there bearing a letter from the Czar to the Tycoon in which a Commercial Treaty was asked for. The Russians were delayed at Nagasaki for several months awaiting the answer of the Japanese Government. It was to the effect that they could by no means deviate from their ancient policy of seclusion, and was accompanied by an order from the Government of Nagasaki to quit that port immediately.

The irritation felt by the Russians at the ill-success of their mission must have been increased by an event which took place about the same time. Fourteen Russians who had ventured to land on the island of Itorup in hopes of [87] being allowed to trade were seized by the Japanese garrison there and thrown into prison, where they remained till the following year, when they made their escape.

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\* Revised by the Author.

In the autumn of the year 1806, two small Russian men-of-war arrived at Kushunkotan, the principal Japanese settlement in Saghalien. The united crews of these two ships amounted to no more than sixty-four or sixty-five men. On arriving at Kushunkotan, we are informed that they fired poison-smoke-guns, after which a party landed in boats and pillaged the godowns, carrying off the rice and whatever other valuables they could find. They also carried off seven or eight of the Aino inhabitants and one Japanese soldier, setting fire to the place before they went. The Russians nailed up a plate of copper on the Torii of the temple of Benten, with an inscription to the following effect:—

I. It is unjust of the Japanese to prohibit trade with the Russians in Saghalien.

II. If the Japanese should change their minds and wish for trade, they might send a message to Saghalien or Urup.

III. If the Japanese persisted long in refusing justice, the Russians would ravage the northern parts of Japan.

The approach of winter prevented the Russians from carrying their menaces into effect this year. One of the ships retired to Urup for the winter, and the other to Kamschatka.

Meanwhile, the news of the Kushunkotan affair had produced great alarm and excitement. The copper tablet was sent to Yedo, where it seems to have been taken as a declaration of war by Russia. Active preparations were made for repelling any future attacks which might be made. A body of 150 men was despatched at once to Kushunkotan, but arrived too late to be of any service. Two hundred Tsugaru soldiers were soon after posted at Soya, a settlement near the northern point of Yedo, and opposite to Kushunkotan. The garrison of Itorup was increased to 200 or 300 men, and by the spring of next year that of Hakodate was raised to about 2,500 men, mostly retainers of the northern Daimios.

[88] Extensive preparations were also made on the main island of Japan. Bodies of troops were stationed at all the seaboard villages in the northern provinces, and the Daimios were urged to increased vigilance in guarding their coast.

The diary of an official who was travelling northward about this time gives a lively picture of the bustle and excitement along the great

northern highway. Couriers were constantly passing backwards and forwards between Yedo and Hakodate, and between the Daimios' yashikis in Yedo and the provinces, carrying despatches wrapped in oil-cloth covers; and the road was thronged with troops equipped in the old fashion—some with bows and arrows, and others with spears and matchlocks—while occasionally a Daimio or Governor monopolized the way with his train. The transport service necessary for these movements of troops and officials was a grievous burden on the farmers, and many of them, to escape it, preferred to abandon their holdings and conceal themselves among the hills.

Another writer gives the following account of the train of a Governor of Hakodate.

The procession was preceded by a man whose duty it was to clear the way by the well-known "Shitani! Shitani!" the signal for every one to squat by the roadside till the great man had passed.

Next came a body of 12 foot soldiers, in two files of six men each.

Next two war-conch blowers.

Two drummers.

Eight matchlock men.

Two men carrying ammunition.

Two men carrying arrows.

Eight archers.

Three Samurai.

Three men carrying the emblems of the Governor's rank.

Two men with the Governor's private matchlocks.

Two men with the Governor's bows.

[89] Two men carrying the two lances indicating the Governor's rank, with two others as reliefs.

Six foot-soldiers.

Two halberdiers.

The Governor himself on horseback, his horse led by two grooms.

Six Samurai.

Two Doctors.

Three men bearing—one, the Governor's sandals, one his umbrellas, and one his camp-stool.

Two men bearing the lances of officers in the Governor's train.

Three men with baggage.

Three men with the Governor's tea and luncheon necessaries.

Two men to preserve order on the march.

Two grooms with spare horses.

Two men with straw shoes, etc., for horses.

Several subordinate officials with a suite of from two to nine persons brought up the rear, the whole amounting to 123 persons. This body of men seems to have been considered a warlike force, and is spoken of as an army; but of the entire number only thirty-six seem to have been really fighting men.

In the spring of 1807, as soon as the sea was open for navigation, the Russian ship which had wintered in Kamschatka joined her consort which had remained at Urup, and shortly after they appeared in company at one of the Japanese settlements in Itorup.

At this time the Japanese colony of Itorup was in a tolerably flourishing condition. It had been established more than ten years before, and had now a population of more than a thousand Ainos and 350 or 300 Japanese, including five women. Most of the Japanese were, however, soldiers from Nambu and Tsugaru. There is no mention of any trading population, except a *saké*-brewer from Akita who had established a brewery to supply the garrison. The Aino population was engaged in the fishery of *masu*, a species of salmon. Its oil was expressed, and [90] both oil and refuse sent to Hakodate. In the winter the Ainos hunted the bears for their skins.

The climate of Itorup is described as being not very severe in the early part of the winter. In February, however, the sea freezes for fifty or sixty *ri* and remains frozen until May. Snow falls along the sea-shore to a depth of five or six feet, and in the mountains to a depth of thirty feet or more; and the ground freezes to such a depth that it requires weeks of warm weather to thaw it. It is not till the end of July that all traces of frost disappear.

There were two Japanese settlements in Itorup. The chief one was at Shana, where the garrison was stationed. A building had been erected at great expense for the officials from Yedo and their troops, which is described by the *saké*-brewer as exactly like a Daimio's Castle.

It was surrounded by a stone wall, no doubt an uncommon sight in those parts. There was a minor establishment at a place called Naiho.

It was at Naiho that the Russian ships first made their appearance. The Japanese account states that about 200 men landed, fired muskets and great guns, broke into the guard-house and carried off clothes and other valuables, setting fire to the settlement before returning to their ships. They also carried off with them five Japanese whom they had taken prisoners. The remaining inhabitants fled to Shana, where the Russians made their appearance a short time after.

The two principal officers of Shana were absent, and the duty of defending the settlement fell upon a subordinate named Toda Matadayu. He had at his disposal a force of over 200 men, armed chiefly with matchlocks, and the Castle was defended by a few small cannon, posted however in such a position that they could be fired in one direction only.

Notwithstanding the advice of his colleagues, who reminded him of the behaviour of the Russians at Naiho a few days before, Toda resolved to try to open negotiations with them. He sent the chief interpreter of the settlement with four or five other Japanese and a number of Ainos [91] to meet a party of 17 (one account says 20) Russians who landed near the Castle. The interpreter and his party were fired into, and one of the Ainos killed. The interpreter was himself shot through the thigh, but the Ainos hoisted him on their shoulders and carried him back to the Castle. There was now a good deal of desultory firing on both sides. The Russians ensconced themselves behind an oil-pressing shed which stood on the beach, and the Japanese did not venture out from their castle. The distance between the combatants was 160 yards, and as both parties were well sheltered, little damage was done on either side. The only casualties we hear of were one Russian and two Japanese killed, and a few wounded. In an hour or two from the time they landed, the Russians re-embarked, to the great delight of the Japanese garrison, who were overjoyed at their easy victory over the dreaded "red men," as they called the Russians. So secure did they feel on that night that they neglected the most ordinary precautions. Before the appearance of the Russian ships we hear of watch-fires kept burning, and night-guards posted on all the neighbouring headlands ; but everything of the kind seems to have been neglected on this night, when a

force landed from the Russian ships. Soon after dusk they were able to approach the Castle before any alarm was given, and the first intimation of their presence was a volley of musketry. There was no time to organize any resistance; every one was seized with a sudden panic and fled to the hills, with the cry "*ware ichi*," which may be freely translated "*saure qui peut*." They did not feel safe till they had reached a hill-top *à ri* distant from the castle. Here they halted, and as everything seemed quiet they ventured down to the sea beach; but they espied a Russian ship not far from the shore, lying in wait, as they thought, to intercept their retreat; they again took to flight and concealed themselves in the woods. That night when all were buried in sleep they were awakened by a loud cry from Toda. Unable to endure the disgrace of defeat he had committed suicide in the approved Japanese fashion by disembowelling himself. [92] One of his comrades pertinently remarked that it was all very well for Toda to die, but that it was a pity he had not chosen to die honourably in battle rather than die the death of a dog as he had done. After Toda's death his men made the best of their way through the hills and woods of Itorup towards Kunashir. They suffered great hardships on the way, having for three days nothing to eat except such roots and berries as they could find. Some unhulled rice boiled in one of their helmets was thought a great luxury. From the western end of Itorup they crossed over in boats to Kunashir, and from there they afterwards returned to Hakodate.

The Russians could not at first believe that the Japanese had really abandoned their Castle. They feared an ambush, and waited till morning before entering. They then carried off all the rice, *sake* and *shoyu* they could find, and what hurt the vanity of the Japanese more than anything else, the ornamental spears and halberds set up at the entrance to the Castle. Their next step was to burn everything,—the Castle, the barracks, the brewery, even the huts of the Ainos. The desolation was complete—nothing was left. They then returned to their ships, leaving behind two unfortunate men who had got drunk and had fallen asleep in a shed. Here they were afterwards discovered by the Ainos, who with the help of a Japanese who had not joined the general flight transfixed the poor fellows with spears as they lay asleep. Their heads were afterwards salted and sent to Hakodate, along with their clothing and arms.

The news of the Itorup affair spread rapidly throughout Japan. The officials on duty at Hakodate wrote reports of it in their letters to their friends at Yedo. These letters were sometimes addressed to a large circle of acquaintance and were at any rate eagerly copied and passed from hand to hand. Among persons who had not access to such authentic sources of information, the wildest rumours were rife. One account raised the number of Russians to 500 men; another made them all 11 or 12 feet high; while reports of Russian ships being seen at various points along [93] the coast were daily invented. The Government at last resolved to put down these rumours by a proclamation. This proclamation stated that a variety of rumours had become current in regard to some officials who had been sent on a visit of inspection in connexion with the arrival of some foreign ships off the coast of Yezo and Saghalien, and summarily prohibited any more talk on the subject.

The Government also urged the Northern daimios to redouble their vigilance. Matsumaye seems to have shown some remissness, for we find that about this time his territory in Yezo was taken from him, land being provided in exchange on the main island of Japan and a subsidy granted him to defray the expense of removal. The northern ports were closed to the native junk traffic, and no junk was allowed to put to sea from any ports in Ōshiu or Dewa.

The next appearance of the Russians was off the port of Hakodate. They entered the strait from the west, so they had probably come round by the north of Yezo through the Strait of La Perouse or Aniwa. They appear to have merely passed through the Hakodate Strait without making any hostile demonstration. Great preparations had been made by the Hakodate generals in the way of reviews, councils of war, watch-fires and the like, but more essential matters seem to have been neglected. Of ammunition in particular the supply was extremely scanty. Economy was the order of the day, and so rigidly were expenses cut down that there was not enough ammunition in the place to hold out for a single day's fighting. The important duty of keeping a look-out for the enemy's ships was entrusted to a merchant named Kimbei, a sort of harbour master for the port of Hakodate. He neglected to attend to it, and the consequence was that the appearance of the Russians took everybody

by surprise. Many of the towns-people and of the wives and children of the officials and soldiers took refuge in the hills. As an instance of the unprepared state of the garrison, it is stated that the gunners of a cannon in one of the batteries having applied for ammunition for their gun, were told that there was no [94] shot, and were served out twenty pounds weight of lead instead. They accordingly set to work to melt it into balls. There was only enough for two, and when they were made and carried down to the batteries, the Russian ships were already out of sight.

Soon after leaving Hakodate the Russian ships fell in with a war-junk which had left that port some days before with a reinforcement of twenty men for one of the Yezo settlements. It was commanded by Morishige Sachu, an officer who had the chief credit with the Hakodate garrison of the economical administration of affairs. Another officer was associated with him in command, but owing to a quarrel which they had about the best mode of fighting the Russians, Sachu's colleague went ashore leaving him in sole command. On board this junk was a cannon throwing a shot of about five pounds, one jingall, ten matchlocks and about 300 pounds of powder. This was considered a very respectable equipment, and Sachu was much blamed for allowing his guns to remain in the hold and not mounting them in such a way as to be able to fight his junk properly. But Sachu probably followed the wisest course open to him. As soon as the Russian opened fire, he and his men got into their boats and made for the nearest land, leaving their junk to be rifled and burnt by the enemy. The Hakodate officials were so delighted with Sachu's misadventure that it almost consoled them for the national loss which had been sustained. They were all agreed that he should have committed *harakiri*, and that if he had been a true *Samurai* he would have done so.

We next hear of the Russians at Ruitaka, a small settlement near the Kushunkotan in Saghalien. Here they burnt and pillaged as usual. There seems to have been no garrison in Saghalien at this time. The Matsumaye men had held it previously, but they had before this retired to Soya.

From Ruitaka the Russians crossed over to Riishiri, a small island near the entrance to Soya harbour. Here they found four junks mostly



laden with stores for the Soya garrison. These junks they rifled and burnt, carrying off [95] amongst other booty a 10-pounder bronze cannon captured by Taikôsama from the Koreans. The officers in charge of the junks reported to their Government that they had been wrecked in a storm. At Riishiri the Russians sent ashore the prisoners taken at Kushunkotan and Itorup. To one of them was entrusted a message to the Japanese Authorities, which was taken down in Japanese and ran as follows :—

TO THE GOVERNOR OF MATSUMAYE.

The distance between Russia and Japan being but small, our Emperor sent his officers across the sea to request that trade between the two countries might be permitted. If due inquiry had been made and a treaty of commerce concluded, all would have been well, but although our officers went repeatedly to Nagasaki they were sent away without an answer. Then things took an unpleasant turn, and our Emperor commanded us to give you a specimen of his power in return for your refusing to listen to his first request. If you persist in refusing his offers we will take all your northern territory from you and if possible get an answer out of you in that way. The "Red men" can always come to Saghalien and Itorup and chase you about.

If you comply with our wishes, we shall always be good friends with you; if not, we will come again with more ships, and behave in the same way as we have done before this year.

OROSHIYA.

This paper was delivered to the principal Japanese official at Soya, who composed a defiant reply, which, however, he had no opportunity of forwarding. He also concocted a scheme for inviting the Russians ashore and massacring them, but this plot was disconcerted by a storm which compelled the Russian ships to put to sea.

At this point the series of papers from which the above account is taken comes to a close. It is to be regretted that they do not contain an account of Golownin's capture, which took place a few years later.

*Note.*—The Russian officer commanding the two ships was Lieut. Chwostoff. He is called Koshito by the Japanese.

THE NATURE OF THE JAPANESE LANGUAGE, AND  
ITS POSSIBLE IMPROVEMENTS.

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BY THE REV. J. EDKINS, OF PEKING.

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[*Read before the Asiatic Society of Japan, on the 9th October, 1873.*]

[96] The comparison of Japanese with kindred languages may be expected to yield most interesting results. The field is a new one and its riches are therefore unknown. Why not try what it will yield?

The methods of inquiry are now better than they used to be, and in the present state of our knowledge they are not difficult to apply. Philology is now a recognized science; comparative philologists by limiting themselves almost exclusively to one family of languages have left the more to be learned by inquirers in new fields. We have grammars and dictionaries of the Chinese, Mongol and Manchu languages on the one side, and of the languages and dialects spoken on the islands of the Eastern Archipelago and of the Pacific Ocean on the other. By placing them in juxtaposition it is not difficult to assign to the Japanese language its true place in the world of speech.

The Japanese then is not in immediate sisterly relation to the Chinese, because it is polysyllabic and places the verb at the end of the sentence; nor is it Polynesian or Malay, because its adjectives do not follow their substantives, nor its genitive come after the nominative.

[97] Polynesian grammar like Chinese grammar requires the verb to come before the word it governs. Not so the Japanese. The verb is rigidly attached to the end of the sentence and marks the conclusion instead of the commencement of action.

The place of the verb in Japanese is highly unnatural and seems very much opposed to simplicity and good sense. But it is far from being uncommon in language. The native of Tartary, be he Turk, Mongol or Manchu, always pays rigid obedience to the same law. He must by the necessity of his syntax say "The Lama prayers recites," "the shepherd the flock leads," "the boy a horse rides." He cannot alter the position of the nominative or objective noun or of the transitive verb. So it is also in Japanese. For the human mind to resign itself to the control of so inconvenient a law is a decisive proof of intellectual inferiority. It does not belong to the speech of nations with creative genius. There can be no just or well-founded hesitation in calling the Japanese a sister language to the Turkish, Mongol and Manchu, when it is remembered that this and similar laws reign in the domain of its syntax.

There is often visible a congruity between the history of nations and the languages they speak. Poets, historians and philosophers have all of them owed not a little to the languages they used. Greatness in literature is impossible to those who have not been born to the use of an elevated language. Hence all that the Japanese have attained, they owe to the assiduous cultivation of borrowed literature. Unfortunately when they adopted the Chinese writing and books, they made no improvement in the native syntax, and after 1600 years the laws of the collocation of words are as objectionable as they were in the infancy of the language. There has been none of that boldness in innovation which might have modified the grammar, shortened the words in the native vocabulary, struck out much of the painfully extensive honorific element, and revolutionized the syntax.

We had in the Anglo-Saxon a very good basis for our living English tongue. But before A.D. 1300 it was [98] practically impossible for great writers to achieve an immortality. The infusion of French modifying elements beginning from the Norman conquest, and of Hebrew originated by the intense study of our Sacred Records modified and moulded our language to a form which might suit the genius of Shakspeare.

The Japanese pedagogue does not permit similar modifying influences to come into the sphere of his thought and produce improve-

ment in his language. He admits new words to any extent, but the grammatical framework of the language remains. In translating Chinese he alters the order of words to suit his own syntax, instead of allowing the Chinese syntax to improve his own.

But what will these islanders now do with English? It will be well for the intellectual progress of Japan if under this new impulse, which forces the native mind onward in the path of educational improvement, it should become conscious of a power to renovate the native language. This would be worth more to the people than hundreds of steamers and thousands of miles of railways. The English language is much more fitted than the Chinese, to improve the Japanese language. There is more freedom in its syntax, and by its polysyllabic structure it is more akin to the Japanese, and perhaps better able to lend to it elements of lasting utility.

The question mooted by Mori, the Minister to Washington, is of high importance in a way perhaps which did not strike his own mind. The substitution of English for the native language appears to many persons an impossibility, and therefore the proposition is regarded as absurd. But if the question is modified so as to refer particularly to the renovation of the native language by contact with European speech, it becomes highly practical and interesting.

The position of Japanese in language as a cousin of the Tartar modes of speech and with them of the Tamul and other languages of South India, may be decided by the place assigned to the verb as already remarked. This may be regarded as characteristic unique, uniform and conclusive. But it carried with it other laws, such as the [99] following; case-marks must be suffixes. And why? These case suffixes are themselves chiefly verbs. It is the law of the position of the verb which originates and necessitates the law of the position of case marks. The one law embraces the other. Treat the case-mark as a verb and its proper place is after its noun. *Kara* "from" *made* "to" must then be looked for among verbs meaning, for example, to begin and terminate action. Among Chinese roots we have *kai* to open, *k'i* begin, *pit* and *mat* to end. To some such roots I should look for the origin of these Japanese case-marks.

Another group of case-marks, those which indicate the nominative,

genitive and accusative, are more correctly regarded as demonstrative pronouns. The Japanese and Mongol usage in regard to these are the same, as may be seen by comparing them. In accounting for their origin there need be no great difficulty felt. Take the old English, John Smith his book. *His* has in modern English become abbreviated into an *s*. The principle would be the same if *he* were used instead of *his*. Probably no genitive particle in any language has any other origin than this. Bopp explains genitives in this way, and his system in this respect serves as well for the Eastern Asiatic languages as for those which he examined.

We may go farther than this. The growth of the European verb tree may be illustrated for Japanese and kindred languages. The European languages are the most perfect and finished in the world. Rudimentary forms are therefore more lost to view in Latin and Greek Grammar than in the more primitive speech of Eastern Asia, where the verb is in a sort of chrysalis condition. As the caterpillar changes into the chrysalis and then into the butterfly, and the leaf into the bud and then into the flower, so the bare and unornamental forms of Chinese grammar are seen passing into the crude transitional state assumed by the verb in Japanese and Mongol, previous to their European development, where we find them embracing those varieties of voice, mood, tense and person which strike us by their precision, richness and beauty. By dissecting [100] the verb in its intermediate condition as in Japanese, Tartar or Tamul, we can trace much of the process by which the European Verb was formed.

In the European or Sanscrit verb there is no more interesting point than the formation of the past tense indicative from the participle. One of the ways in which this is done is easily seen in colloquial Japanese. In Mr. Aston's "Colloquial Grammar" he says "the *ta* of the past tense is a shortened form of *taru*, which is itself contracted from *te aru*, *te* being the termination of the participle and *aru* the verb to be." The crucial point here to be noticed is that the past tense indicative is formed from the participle. So in English the past indicative "loved" is formed from the participle "loved," by the instinctive effort of language, which is always striving after the attainment of greater precision and variety of idea.

But the question is asked, how does the participle receive an indicative sense? It may be by dropping the last word. Thus in Mongol "yabaju boi," *he is having gone*, becomes in colloquial use "yabaji," *he is gone*, and sometimes, *he went*. In this easy way a participle or gerund becomes indicative. Sometimes we cannot trace such a loss of a last word. Thus in Greek ἔλεγον *I said* from λέγων λέγων *saying*. We may then invite attention to a law described in Mr. Aston's Grammar of written Japanese, by which verbs assume two forms, according as they are complete in action or not. The form of completed action occurs in the last place and has a peculiar suffix. The form of incomplete action wants this suffix, and its place is earlier than the last. The law appears in Mongol with greater distinctness. A special suffix, *ksan*, belongs to the category and expresses completed action.

In the Mongol expression "bi martaju boi" *I have forgotten*, we have a pronoun "bi," *I*, and two verbs, one meaning *to forget* and the other *to be*. The verb, *to be*, is in its primitive radical shape and corresponds in sense and use nearly to the Japanese *aru* and *masu*. Etymologically it is more closely connected with *masu*, than with "aru," *b* [101] and *m* being interchangeable letters.<sup>1</sup> The suffix *ju* in *martaju* was probably, at an earlier stage, a sort of case suffix used like the Japanese *ni* in a like position, that is when attached to verbs. It gradually assumed the character of a participial or gerund suffix. In the modern colloquial Mongol the final verb, *boi*, is omitted and "martaji" (which is the same as "martaju,") is a past indicative, *I have forgotten*. So the participle or gerund grows out of the law of position by which, when verbs are used together, completed action claims the last place and incomplete action earlier place. Let us call this the first stage of metamorphosis. The participle or gerund takes in the next place as a suffix an old verb (for example *ju* that is *de*) which has become transformed into a case mark. So far there are two

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<sup>1</sup>B in Mongol frequently corresponds to *m* in Japanese, as in the following examples:—biye or beye, *body* Jap. mi.

Bedere hu, *to seek*, Jap. motome.

Basa, and, also, Jap. mo.

Buri, *all, altogether*, Jap. mattai or mattaku.

stages of formation. Then the participle becomes transformed into a past indicative. This is a third stage.

Grammar is the work of the human mind, operating systematically on linguistic elements within its reach in an instinctive and unconscious manner. One language shews some special process better than others. Take the expression in Hepburn's Dictionary "hanashi wo kiki ni itta," *he has gone to hear what is said*, "kiki," *hear*, with the suffix "ni," *to*, is a verb in the supine in a crude state, where the suffix is still disconnected from the verb to which in favourable circumstances it may subsequently become indissolubly allied. The book Mongol has a true supine ending in "re." It is an instance of a noteworthy fact, viz., that the grammar of the Tartar languages is more advanced than that of Japan, and possesses a verb tree more like that of European grammar. All languages are, in a state of transition from one state to another, guided by the principles which are peculiar to them. It is possible for them to be improved by the adoption of new principles. Those who have the control of education and literature wield a power which should always be used for [102] the progressive improvement of languages. Without this all languages deteriorate and pass into decay.

If we understand the place held by the Japanese language, and estimate rightly the value of its special principles of development, it undoubtedly appears possible to improve it by the adoption of suitable educational methods with the aid of English-speaking teachers and of the Government department of public instruction,—the Mombushô.

When fifteen hundred years ago the Chinese language was brought over to Japan and taught in schools, no effort was made to introduce changes into the native grammar. The Chinese and Japanese Buddhists taught Buddhism. The object of attention and admiration to the Japanese youths of the time was the literature of China; no attempt was made to translate the Buddhist books or those of Confucius into the Japanese tongue. It was the task of the educators to teach both in the Chinese language. The consequence was that Chinese words and phrases were imported into the Japanese language wholesale. The Japanese medium of thought remained in all its grammatical categories unchanged. Nothing but the use of numeratives between numbers and nouns, such as the word "ban" in "ichi ban ni," *the first article*, and perhaps some few other un-

important additions, was gained to the grammar. The old stiffness of the laws of position was still retained. This is much to be regretted ; a fine opportunity was lost of altering the grammar for the better.

Now that the Mombushô has undertaken to establish instruction in English throughout Japan, another such opportunity for modifying the inconvenient principles of the native grammar is afforded : a vigorous effort now made to correct vicious principles of grammar, and introduce the germs of solid improvement on a sound philological basis would open a new path of progress to the language.

There is no good reason for the verb always coming last, or for the case-marks being always suffixes. Why not attempt to restrain and modify these capricious limitations ? I would propose the introduction of the English prepositions, *from, to, by, with,* and would recommend [108] that teachers should not allow them to be placed after their nouns. It should be the duty of the teacher in schools to enforce English syntax, so as to accustom the youth of the country to think in the European manner, and to the adoption of our order for the words.

The method I have recommended for use is the reverse of "pidgin English." The characteristic of that jargon is that it uses English words in a Chinese order. The Japanese in learning Chinese were guilty of the same mistake : they read Chinese in a Japanese order. They would have done better if they had adopted the Chinese grammar with the Chinese words. Had they early insisted in native schools on reading Chinese in its order instead of altering it as they now do into a Japanese order, they would long since have introduced into their native tongue principles from which their language would have derived the greatest benefit. By this time the whole nation would have been accustomed to freedom in the place of the verb and of the case-marks. There would then be a better prospect of progress in the formation of a good native literature.

The introduction of English words into the Japanese language should also by all means be encouraged. It is not an opprobrium to a vocabulary to be rich in words, derived from various sources. Poverty in a vocabulary indicates poverty in ideas. Our English words are instinct with the life of modern science, art, and learning. The appetite of the Japanese youth for foreign words and knowledge is a happy



circumstance and should be gratified. Thus their language will be enriched and may achieve something more in the world than it has yet been able to do under the painful restrictions to which it has been subjected. Let it not be said that the vocabulary will become heterogeneous in character. Is not our own English eminently so? All languages are liable to this charge if carefully examined. If we take the Japanese vocabulary as it is and compare it with the Chinese and Mongol, it is seen to be of the most composite character. I do not here refer to Chinese words introduced [104] such as "konnichi" *to-day*, "sakuban" *last evening*: I speak of the native part of the vocabulary.

Thus "uma", horse, is the Chinese *ma*, and Mongol "mori", with *u* prefixed; "sakana", fish, is the Mongol "dagas" with the *d* changed to *s*. This tendency to sibilate appears in the Japanese syllabary very distinctly. What but this has introduced irregularity into the *t* series, and changed "ta," "ti," "tu," "te," "to," into "ta," "chi," "tsu," "te," "to?" The same principle of sibilation which, since the invention of the Japanese syllabic *kana* ten centuries ago, has expelled *ti*, *tu*, *di*, and *du*, from the list of sounds and introduced *chi*, *tsu*, *ji* and *dzu* in their place, operated at an earlier period to change the (Hebrew "dag" and) Mongol "dagas" into "sakana". So also "shita" *below*, is in Mongol "dôtai"; "soroï" *to agree, correspond, be a match for*, is in Mongol "taraho."

I give some examples from Japanese words beginning with *k*. The Mongol equivalent is *h* or *g*. "Kutsu," shoes *gotai*; "kitsui", fierce, strong, *huchu*; "kayeru", return home, *hairchu*; "oki", great, *ihe*; *huldehu*, freeze, "kôri"; "koto", thing, *hereg*; "kotoba", speech, language, *hels*; "kotaye", return answer, *hairchu*; "kuro," black, *hara*; "kawa", river, *gol*; "katai", hard, *hatago*; "katana", knife, sword, "hadogor", sickle; *okure*, behind, *hotai*.

In identifying these words let it be assumed that the letters *l* and *r* both come out of *t* or *d*. This is in language so common a phenomenon that it is needless to prove it here.

In making a comparison of words throughout the vocabulary, the following changes of letters come to view.

The Japanese *k* corresponds to *h*, *k* and *g* of other languages. The Japanese *h*, *f* and *b* correspond to the *b*, *p* and *f* of other languages.

The Japanese *ts*, *ch*, *sh*, *z*, *s*, *j*, and *r* belong to the *t* and *d* of other languages, together with the *s*, *l*, and *r* of those languages. The Japanese *w* and *y* may usually be referred to *g* and *d* respectively.

The Japanese *m* at the end of the root very often corresponds to the final *ng* of Chinese roots.

[105] The Japanese initial *m* corresponds often to the *b* of other languages. In modern Japanese *m* becomes *n* when final.

The Japanese vocabulary if compared with constant reference to these correspondences of letters will be found to have little of purely native growth.

Thus *hosoi* is *petit*.

*hitotsu* is Turkish *bir one* and the Engl. *first*.

*hineri* is the Chinese *pien* to plait, twist.

*futatsu* is the English *both*.

*samui*, cold, is the Chinese *shwang*.

*same*, to awake, is the Chinese *sing*.

*sama*, shape, form, is the Chinese *chwang*.

*sumeru*, clear, is the Chinese *ts'ing*.

*sumi*, to end, is the Chinese *chung*.

Enough has been said to shew that if any one undertook to prove that generally the native Japanese words are of home growth he would have a hopeless task. The examples adduced are most of them beyond cavil.

Such being the state of the Japanese language, there is no reason why the process of enriching the vocabulary should not be allowed to continue. This is only to do what has been done before, whether before or after the beginning of Japanese history. They were once a Tartar people who came by way of Corea into the beautiful islands they now inhabit. They drove the Ainos, a people originally, as shewn by their hair, of a much more northerly home, into north Nippon and afterwards into Yesso, and proceeded to develop their legends and their grammar till they reached their present form. When the unassisted progress made by the native mind in the formation of religious myth and of the formulæ of Japanese speech had proceeded to the extent which they were capable of reaching, the Chinese language and system of thought appeared on the scene. The effect was most remarkable. A system of

instruction was established which resulted in the introduction into the language of many thousands of foreign words and expressions. This was the work of school training in the hands of Japanese masters and assisted by the government. At the present day we find in the common [106] talk of the people, including the uneducated men and the women of all classes, Chinese expressions which may be counted by thousands. This striking fact clearly shows the effect of schools in modifying popular speech.

In accounting for this remarkable adoption of Chinese words and phrases the aid of Buddhism must not be overlooked. Religion is always a powerful factor in modifying language. For three centuries the *Go on*, the pronunciation of Chinese words common among the Buddhist monks, prevailed exclusively in Japan. Early in the seventh century Japanese students were sent to the Chinese capital, in the province of Shensi, to study the Chinese language more thoroughly and to bring back books and information bearing on the Confucian religion. The Japanese at that time were so enamoured of everything Chinese that they adopted it in the most wholesale manner, and never thought of an alphabet for themselves till late in the eighth century. There was no one to undertake to alter the Japanese language and the attempt was never made. When at last the alphabet was invented, its chief use was to aid pupils in learning the sense of the Chinese books, and the sounds of the characters. As, however, most pupils never learned Chinese thoroughly, a mixed written language grew up, resulting in the native literature which has since come into existence.

To foresee what, if left to themselves, would be done by the Japanese in regard to English is not difficult. They would treat English books as they have been accustomed to treat Chinese books. They would introduce the *kana* into English works to assist students. The native order of words would still be retained and an immense number of new words would be added to the vocabulary.

This course, so highly to be deprecated, they may be induced to avoid. The advice, example and reasoning of foreign teachers may persuade them to learn English in a more enlightened way, and more thoroughly than they have learned Chinese. In schools where English is taught, a mastery of the grammar and the pronunciation should be

made a *sine qua non*. No vicious pronunciation or [107] erroneous syntax should by any means be allowed. When the Mombushô according to its present programme proceeds to appoint native schools for an English education throughout the country, particulars pains should be taken that the teachers appointed are qualified to give instruction and enforce correctness in these two particulars.

The consequence of this will be that the principles of European grammar will become familiarized to the juvenile mind of the country. The syllabary will also be greatly enlarged. There is in the English language a very great variety of syllables. By their adoption the Japanese syllabary would be more than doubled in capacity. Their acquisition of the letter, l, of th, of f, would be a great gain. They would have a vast number of compound initials such as str, pl, kl, tl, pr, kr, tr. The lost syllable ti, di, tu, du, and others would be restored. Finals such as m, rm, rd, lk, lt, ks, ps, nd and many others would be added. By such means a very poor syllabary would become rich. The enunciation of the native of Japan would become as full of energy, variety and expressiveness as our own. He would become master of two languages—the one spoken by him from a child, marked by perverse laws for which no good reason can be given, and a syllabary soft and melodious, indeed, but wanting in force, range, and adaptability; the other cultivated, scientific and unrivalled for compass, flexibility and variety.

Let us suppose that in all the 40,000 or 50,000 schools intended to be established by the Mombushô really good English were learned by the boys, could not something decidedly valuable be then done for improving the native language? An immense number of words will soon be added to the vocabulary. The most assiduous care should be taken that they be correctly pronounced. In the departments of religion, science, navigation, politics, and all the arts of the west the importation of new words should be encouraged. For example the word God is so far superior to the Japanese term *kami*<sup>3</sup> that it would be well [108] to

---

<sup>3</sup>The word *kami* at first meant the souls of ancestors, and afterwards the gods of the Shintô religion, which are in fact the souls of ancestors deified. The Buddhists and Romanists have both avoided the term *kami*. The Protestant Missionaries would do well to imitate their caution. Christian theology seems to require a better word for the Divine Being.

adopt it at once by the unanimous determination of all who are interested in the spread of Christianity among the vivacious people of these lovely islands.

The importation of new words, however, will not be enough. The native grammar requires to be expanded and the syntax remodelled. This can only be accomplished by the resolute and enlightened handling of those who, whether natives or foreigners, have charge of the new system of education. I mention here several particulars which appear to be important.

1.—The introduction of English prepositions to be used interchangeably with the Japanese post positions; such are, in, up, from, to, by, with, above, below, etc. Such words should keep their own position before the noun, while corresponding Japanese words retain their place after the noun.

2.—The directive adverbs up, down, in, out, above, below, should be introduced as appendages to verbs. It is found very convenient by Chinese, Polynesians and Englishmen to be able to indicate the direction of a verb's action by these and similar words, *e. g.*, press up, press down, press through.

3.—The article should be introduced. It has been found of great use in English, French, Greek and other of the most perfect languages spoken by man.

4.—The relative pronoun should be introduced. The Japanese interrogative *dare* would form a good base for it, but perhaps the English *who, which, that*, would in the circumstances of the country be better.

5.—The English syntax in regard to verbs should be carefully followed. There could be no better guide than the Bible, because of its Hebraistic cast of expression. For example: "In those days came John the Baptist preaching in the wilderness of Judea." To accustom the Japanese youth to place the verb "came" before "John" and "preaching" before the words "in the wilderness," [109] would be of the greatest benefit to them, because, though contrary to native rules of grammar, it is according to the law of nature and is authorized by the usage of languages of the best type.

6.—The introduction of the genitive with "of" would also be a

benefit adding greatly to flexibility and agreeably varying the expression of native thought. They might learn to say "The Ko of the Mikado" as a variation of *Mikado no ko*. As these changes found place in the language the present imperfect literature of the country might be ameliorated and elevated. Poetry with sweet, rhyming measure would become possible. The orator's eloquence might be exhibited in assemblies of the people. Government despatches and epistolary correspondence would undergo a beneficial renovation.

Perhaps, however, English teachers will consider that their task is done if they teach good English to pupils. They will not readily be persuaded that it is part of their work to improve the native language. It is the only aim of this paper to point out the importance of the object in view, and to offer some suggestions as to how it should be done, in the hope that educators will take it into consideration.

The government has great power on account of the submissiveness of the people. In China the improvement of the native language by foreign educators is utterly impracticable. It is not so in Japan. The institutions of the country are in the hands of the Government. The gradual abandonment of a Chinese education by the Japanese would open their minds to a true philosophy, and allow of a much more useful education being imparted to the youth of both sexes than that which they now receive. But this object might be gained without the sacrifice suggested by Mori, Ambassador at Washington, of the native language.

Instead of abandoning the native language in favour of English, it [110] should be enriched by large additions and the extension of its idioms after the European type of language. The more able pupils in schools will learn to speak English thoroughly. For an inferior class, books should be provided by a commission under the superintendence of foreign educators and of the Mombushô. For them a new idiom should be furnished on some such system as that recommended in this paper for a judicious amalgamation of the English and Japanese idioms. The rules of this amalgamation should not be left to chance and caprice. They should be adopted with forethought and with due attention to the principles of philology.

There is no more ill-founded prejudice than that which takes for granted the equality of languages in excellence and in suitability for literary

development. A good literature never can grow out of a poor language, and consequently all languages are found to be poor which have not a good literature. The best languages in modern Europe are the English, the French, and the German, just as the literatures of England, France, and Germany are also the best in Europe. So the Japanese language and literature are both poor, the literature being the reflection of the language.

Of course it would be better for the Japanese to improve their own language than for the foreign educators to undertake the task. But they will probably not do it without foreign help. It is also a problem beyond their competence in the present state of things. It would be an achievement worthy of the foreign educator, in the most practical and scientific age the world has ever known, to take in hand the Japanese language and mould it into a shape which should adapt it for the production of a fine literature, and for all the noble uses to which a well-constructed language can be devoted.

There never was a nation more willing than the Japanese to make changes if they only knew how, and except in regard to our religion they have shewn a truly liberal desire for knowledge of all kinds. Through a false impression they are for the time opposed, very unwisely, to the teaching of our religion. This limitation to their liberality they will probably soon abandon. When they have done so they will prove themselves to be deserving of our fullest sympathy and aid.

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TRANSACTIONS

OF

AUG 19 1896

THE ASIATIC SOCIETY  
OF JAPAN.

(From 22nd October, 1873, to 15th July, 1874.)

VOL. II.

REPRINT OF THE ORIGINAL EDITION, PUBLISHED IN 1874,  
EDITED BY THE SECRETARIES.

YOKOHAMA :

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## ASIATIC SOCIETY OF JAPAN.

---

The Second Annual Meeting of this Society was held at the Grand Hotel on Wednesday evening, the 15th July, 1874.

The chair was taken by the President, J. C. Hepburn, Esq., M. D., shortly before nine o'clock.

The Minutes of the last General Meeting having been confirmed, a Draft of Rules, submitted by the Council, was read and discussed, clause by clause. Having been amended in several points, it was finally passed as a whole on the motion of the Rev. Dr. Brown, seconded by Sir Harry S. Parkes, and adopted, as follows —

### RULES OF THE ASIATIC SOCIETY OF JAPAN.

---

#### I.—NAME AND OBJECTS.

1.—The name of the Society shall be "The Asiatic Society of Japan."

2.—The objects of the Society shall be—

- a. The collection of information and the investigation of subjects relating to Japan or other Asiatic countries.
- b. The formation of a Library and Museum adapted to the above purposes.
- c. The publication in a Journal of original papers and information read before or collected by the Society.

#### II.—MEMBERSHIP.

3.—The Society shall consist of Ordinary, Honorary, and Corresponding members.

4.—Honorary and Corresponding members will be admitted upon special grounds to be determined by the Council or for services rendered to the Society. They will not be resident in Japan and will not pay an annual subscription.

5.—Ordinary members shall pay an annual subscription of Five dollars, which will become due upon election, provided the election occurs previous to the latter half of the year.

6.—All annual subscriptions will be payable in advance on the 1st January of each year.

7.—On or about the 21st March in each year the Treasurer will give notice to members whose subscriptions may remain unpaid, and a further delay of three months in paying a subscription after notice thus served may be regarded as resignation of membership.

8.—The operation of this rule may in any particular case be suspended by a vote of the Council.

9.—All members will be elected by the Council. Honorary and Corresponding members will be first proposed at a meeting of the Council and be elected at the Council meeting next ensuing.

### III.—OFFICERS.

10.—The officers of the Society shall be—

- A President,
- A Senior and Junior Vice-President,
- Five Councillors,
- A Corresponding Secretary,
- A Recording Secretary, and
- A Treasurer,

to be chosen at the Annual Meeting in each year.

11.—Vacancies in the above offices shall be filled for the current year by vote of the remaining officers, but in case of the death or resignation of the President, his functions shall be discharged by the Senior Vice-President until the next Annual Meeting.

### IV.—COUNCIL.

12.—The Council of the Society shall be composed of the officers for the current year, and its duties shall be—

- a. To administer the affairs and property of the Society;
- b. To elect members into the Society;
- c. To decide on the eligibility of papers to be read before General Meetings;
- d. To select papers for publication in and to supervise the printing and distribution of the Society's Journal
- e. To select and purchase books, specimens, etc., for the Library and Museum.
- f. To receive donations on behalf of the Society;
- g. To present to the Annual Meeting, at the expiration of their term of office, a Report of the proceedings and condition of the Society.

13.—The Council shall meet for the transaction of business once a month, or oftener if necessary. At Council Meetings five officers shall constitute a quorum.

14.—The Council shall have authority to make and enforce such by-laws and regulations for the proper conduct of the Society's affairs as may from time to time be expedient, subject to confirmation by a General Meeting.

15.—The Recording Secretary shall have power to sanction the expenditure of the Society's funds to the amount of twenty-five dollars, reporting the same to the Council meeting next ensuing, but no larger sum shall be disbursed by the Treasurer without the sanction of a vote of the Council.

#### V.—MEETINGS.

16.—The Annual Meeting shall be held in July of each year.

17.—General Meetings shall be held, when practicable, once in every month, and oftener if expedient, at such date and hour as the Council may appoint.

18.—At Meetings of the Society eleven members shall form a quorum for the transaction of business.

19.—At the Annual Meeting the Council shall present a Report for the preceding year, the Treasurer shall render an account of the financial condition of the Society, and the Meeting shall elect Officers for the ensuing year.

20.—The work of General Meetings shall be the transaction of routine business (when a quorum is present); reading of papers approved by the Council; discussion thereon, and conversation on topics connected with the general objects of the Society.

21.—Notice of any business connected with the affairs of the Society, intended to be introduced for discussion by a member of the Society, shall be handed to the Secretary a week before the Meeting.

22.—Visitors may be admitted to the General Meeting by members of the Society, but shall not be allowed to address the Meeting except by invitation or permission of the Chairman, or to vote or take part in the business of the Society.

23.—At all Meetings the President, or, in his absence, the Senior Officer of the Council present, shall take the Chair, and in case of an equality of votes shall be entitled to a casting vote in addition to his own.

#### VI.—PUBLICATIONS OF THE SOCIETY.

24.—A Journal shall be published, when practicable, every year under the supervision of the Council. It shall comprise a selection of the papers read before the Society, the Report of the Council and Treasurer, and such other matter as the Council may deem it expedient to publish.

25.—Every member of the Society shall be entitled to one copy of the Journal. The Council shall have power to present copies to other Societies and to distinguished individuals, and to sell the remaining copies at such prices as the Council shall from time to time direct.

26.—Ten copies of each paper published in the Journal shall be placed at the disposal of the author.



27.—The Council shall have power to publish in a separate form, papers or documents laid before the Society, if in their opinion practicable and expedient.

#### VII.—POPULAR LECTURES.

28.—Occasional Popular Lectures upon literary or scientific subjects may be delivered, under the sanction of the Council, on evenings other than those appointed for general meetings of the Society. On such occasions the Senior member of the Council present shall take the Chair.

#### VIII.—AMENDMENTS.

29.—Amendments to these rules must be proposed in writing to the Council, who shall, after notice given, lay them before a general meeting of the Society. A committee of ordinary members shall thereupon be appointed, in conjunction with the Council, to report on the proposed Amendments to the General Meeting next ensuing, when a decision may be taken on vote of two-thirds of the members present.

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The Annual Report of the Council, together with the Treasurer's Account, was then presented, as follows :—

#### SECOND ANNUAL REPORT.

The Council of the Asiatic Society of Japan, in presenting their second Annual Report, feel much satisfaction in recapitulating the facts which prove that the organization was not uncalled for neither has it been unappreciated.

The First Number of the Society's Transactions is so much in demand that it has been found necessary to print another edition in order to satisfy the requirements of readers at a distance. The necessity for this will be obviated, as regards the forthcoming number, by issuing a larger edition at first.

The following Papers have been read at the Regular Meetings :

“ The Warm Springs of Kusatsu,” by Captain Léon Descharmes.

“ Dr. Kaempfer's History of Japan ;” by R. G. Watson Esq.

“ The Sword of Japan : its History and Traditions ;” by T. R. H. McClatchie, Esq.

“ Constructive Art in Japan ;” by R. H. Brunton, Esq.

“ Yezo : a Description of the Ishi-kari River, and the New Capital, Satsporo ;”  
by Captain Bridgford, R.M.A.

“ The Shintō Temples of Isé ;” by E. M. Satow, Esq.

“ The Games and Sports of Japanese children ;” by Prof. W. E. Griffis.

“ Winds and Currents in the Vicinity of the Japanese Islands ;” by Captain  
A. R. Brown.

“ Notes of a Journey in Hitachi, Shimōsa, and Kadzusa ;” by C. W. Lawrence,  
Esq.

“ Deep-sea Soundings in the Pacific ;” by Captain Belknap, U. S. N.

“ Has Japanese an Affinity with Aryan Languages ?” by W. G. Aston, Esq.

“ On the Increase of the Flora of Japan ;” by Dr. Savatier.

“ Meteorological Observations of Yokohama from 1863 to 1869 Inclusive ;” by Dr. Hepburn.

“ A Journey in North-east Japan ;” by Captain Blakiston, late R. A.

The following paper has been received, and will be read next session :

“ Meteorological observations at the Nagasaki Station for 1872 ;” by Dr. A. J. C. Geerts.

Of the interest and value of these Papers there has been ample proof in the increased numbers, and of those who attend the Meetings of the Society and partake in the discussions,—the substance of which, in the words of the speakers themselves, will be found incorporated in the Minutes.

Fifty-seven new Members have been added to the Society since the last Report, making the present number 168.

The Treasurer's account shows a satisfactory balance to the Society's credit of \$596.22, which amount, however, is subject to an appropriation of \$300 for the increase of the Library.

A Revision of the Constitution and By-Laws has been made, and the result printed in conjunction with this Report.

The important subject of meteorological observations has given rise to a Correspondence with the Signal Bureau at Washington, and the appointment of a Committee of this Society to bring the matter to the notice of the Japanese authorities. The Council consider the plan of synchronous observations, according to the scheme of the Vienna Conference, so important that they feel no hesitation in commending the advocacy of it to the consideration of their successors in office.

Some valuable contributions have been made to the Library and Museum ; but the Council feel that, at some suitable time during the coming year, a resolute effort should be made to do something effective in regard to both these departments ; also, perhaps, to provide a building suitable for the Society's business. Meanwhile they have to acknowledge the courtesy of the Managers of the Grand Hotel in furnishing gratuitously convenient accommodation for the holding of periodical Meetings.

On behalf of the Council,

E. W. SYLE.

*Hon. Sec.*

*Receipts and Expenditure 1st January to 30th June, 1874.*

*Dr.*

To Balance in hand 1st January .....	\$295.60
“ Subscriptions collected from 132 members at \$5 .....	660.00
“ Donations for Library .....	30.00
“ do. Museum.....	15.00
	<hr/>
	\$1,000.60
	<hr/>

*Cr.*

By Sundry Furniture bought .....	\$ 58.00
" Printing, Stationery, Advertising, etc.....	182.38
" Grand Hotel, rent of room, etc.....	136.00
" Wages of Curator, 6 months at \$5 .....	30.00
" Fire Insurance \$400 to 20th April, 1875 .....	8.00
	<hr/>
	414.38
" Balance .....	586.22
	<hr/>
	<u>\$1,000.60</u>

**HERBERT COPE,***Hon. Treasurer pro tem.*

To Balance deposited in the Hongkong and Shanghai bank ..... \$586.22

The adoption of this Report having been moved by Mr. Goodwin, and seconded by Mr. Wilkin, was agreed to, and the Chairman appointed a Committee to nominate the officers for the ensuing year, whose recommendation of the following gentlemen was adopted.

*President*—Rev. S. R. Brown, D. D.

*Vice Presidents*—Sir Harry S. Parkes, K. C. B., and C. W. Goodwin, Esq.

*Council*—J. C. Hepburn, Esq., M. D., A. J. Wilkin, Esq., W. G. Howell, Esq.,

R. H. Brunton, Esq., and T. Walsh, Esq.

*Treasurer*—J. Thurburn, Esq.

*Corresponding Secretary*—Rev. E. W. Syle.

*Recording Secretary*—G. H. Pole, Esq.

A vote of thanks having been accorded to the late Council for the successful conduct of affairs which had marked their administration, expressing at the same time regret at the retirement of Dr. Hepburn from the Presidency, the meeting terminated.

ABSTRACT OF "HISTORIA IMPERII JAPONICI  
GERMANICÉ SCRIPTA AB ENGELBERTO  
KAEMPFER, LONDINI, 1727."

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READ BY

R. G. WATSON, Esq.,

*Before the Asiatic Society of Japan, on the 22nd October, 1873.*

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The work which I propose to bring before your notice this evening in the form of a *précis* is divided by its author into five books, to which are added in an appendix six separate papers on scientific or political subjects, the whole being illustrated by a series of carefully-drawn and carefully-engraved plates.

I propose in speaking of it to follow the order of the subjects to which the books and papers are severally devoted, and as it may be difficult to compress so elaborate a work, in however elementary a manner, into the compass of one lecture, I shall as far as possible confine myself simply to expressing the leading views and observations of Mr. Kaempfer, without attempting to illustrate them by the observations of later writers on the subjects to which he refers. I do not doubt that on a future occasion a comparison will be instituted by one of our members, showing how far the notes and conclusions of Kaempfer have been borne out or otherwise by the labours of the present generation in the same scientific field.

[2] Before proceeding to an examination of the contents of the work before us, I may refer for a moment to the circumstances under which it came to be written.

Dr. Kaempfer, who was born at Lemgow in Westphalia in the year 1651, adopted the medical profession and, having gone to Sweden, accepted the post of Secretary to a Swedish Legation proceeding to Persia.

His desire of foreign travel not having been satisfied by his journeys in Russia and Persia, he joined the service of the Dutch East India Company, and sailed from Ormuz in the Persian gulf for Batavia in 1688. He in turn quitted Batavia for Siam and Japan in May, 1690, arriving at Nagasaki on the 24th of September of the same year, and remaining in the Japanese dominions until November, 1692. The work before us is consequently the result of his industry and observations during a period not exceeding two years and two months, he being then between 39 and 41 years of age. The difficulties he had to encounter were such as to deter most men from attempting to struggle with them, but Dr. Kaempfer's German laboriousness and perseverance enabled him to bequeath to posterity a result of his twenty-six months' residence in this empire, the value of which, as a whole, as an historical and scientific record, it would be difficult to exaggerate; and the interest attaching to it is enhanced by the circumstances under which his enquiries were undertaken.

Of the five Books into which Dr. Kaempfer's History is divided, the First, which includes eleven chapters, after giving an account of the author's voyage from Batavia to Siam, and of the Siamese court and capital, proceeds to a general statement of the political and geographical features of Japan; of its products, natural history, revenue and system of government, together with some speculations as to the origin of the Japanese race.

Dr. Kaempfer, as I have stated, landed at Nagasaki in September 1690, and was there received with the usual jealous precautions then observed. "We were," he says, "no sooner come to an anchor, but we had two Japanese [3] guardships put on both sides of us, which all the night long went the rounds with great diligence. All the Chinese junks that put to sea this day were each of them attended by a guardship until they got out of the harbour into the open sea. Not far from our ship we saw a fleet of forty pleasure-boats coming to an anchor, being the usual pompous train of a great man who had been on a voyage. \*  
 \* This little fleet made a fine show with its many lights at night. \*  
 \* . \* On the top of the neighbouring mountains stand guard-houses with guards in them, who with their spying-glasses are observing whatever happens at sea, of which they give immediate information

to the government, and by this method they had notice of our arrival already two days before. We dropt anchor at about 800 paces from the city, and as far from Decima, the habitation of the Dutch on a separate island formed purposely near the shore without the city. Then came to us two gentlemen of the governor's with many subordinate clerks, interpreters and soldiers, who called on all those that were newly arrived and made them pass in review before them one after the other, viewing everyone from top to toe, and writing his name, age and business, with a pencil on paper. Besides this, about six persons more were examined concerning our voyage, whence we came, when we set out, etc., etc. The answers were carefully written down. The review being over, soldiers and clerks were put into every corner, and the whole ship with her cargo taken as it were in possession by the Japanese. The boat and skiff were left to our men, only for this day, in order to look to our anchors. But pistols, cutlasses, etc., were taken into custody, the gunpowder packed in barrels. In our voyage everyone was obliged to give his prayer-book and other books of Divinity to the captain, who hid them from the Japanese until our return. \* \* I went on shore to Decima, on which occasion one is obliged to take out a passport from the Japanese ship-guard to those on shore and on return another from the land-guard to that on board." Such [4] was the jealous reception which Dr. Kaempfer met with at Nagasaki from the laboriously-trifling Japanese of those days: such were the humiliations to which the Dutch Trading Company was willing to submit. (pp. 56-58.)

The 4th Chapter of this 1st Book is devoted to a general geographical account of Japan. The land known to Europeans under that word has for its natives several names—the most common *Nipon*, sometimes pronounced *Nifon*—the foundation of the Sun, from *Ni*, *Fire* (in a more sublime sense, the Sun,) and *pon*, ground or foundation. Other names are (1) *Tenka* (*Subcelestial Empire*), (2) *Fi no Motto* (*Root of the Sun*), *Awadissima* (a terrestrial scum island, p. 59, to which term a fable is attached), (4) *Sinkokf* or *Camino Kuni* (the country of the gods), (5) *Akitsima*, (6) *Tontsio* (the true morning), (7) *Sio* (all, *i. e.*, all the Japanese islands), *Jamotto* and several others.

This Empire lies "between the 31st and 42nd degrees northern Latitude. The Jesuits place it between 157° and 175° 30' of Longitude.

It extends to N. E. and E. N. E., being irregularly broad, though pretty narrow in comparison with its length, which is supposed to be two hundred German miles [986 English miles] in a straight line from the end of *Fisen* to the extremity of *Osiu*. It may," says Kaempfer, "in different respects be compared to Great Britain and Ireland, being divided by corners and forelands, arms of the sea, great bays and inlets, and forming several islands, peninsulas, gulfs and harbours."

So far, I think Dr. Kaempfer's description will be recognized to-day as being an accurate one, but by the light of modern enquiry I am enabled, on the authority of Mr. Satow, to correct Dr. Kaempfer's next assertion, in which he states that the first and largest island of Japan is called *Nipon*—that name being, as I am told, only applicable to the entire empire. "The 2nd island is *Saikokf*, the Western country. It is also called *Kiusiu* or *the country of nine*, being divided into nine provinces. The third island lies between the first and second. It is [5] nearly square, and, being divided in four provinces, the Japanese call it *Sikokf* or *the country of Four Provinces*. These three large islands are encompassed with an almost inconceivable number of others. All these islands have been divided, in the year of Christ 590, into seven large tracts of land—called *Gokisitzido*. In 681 they were sub-divided into 66 provinces, to which number two formerly belonging to the Corea, *Iki* and *Tsussima*, were afterwards added. These 68 provinces have been broken up into 604 lesser districts. The borders of this empire are its rocky, mountainous coasts and a tempestuous sea, which by means of its shallowness admits none but small vessels, and even those not without imminent danger."

Amongst *the neighbouring countries subject to the Emperor of Japan* are specified by Dr. Kaempfer :

(1) The Islands of *Riuku* or *Liquejo*, the inhabitants of which style themselves subjects of the Prince of *Satsuma*.

(2) *Tsiosin*, the third and lowest part of the Corea, governed by the Prince of *Iki* and *Tsussima*.

(3) The island of *Jeso*, governed for the Emperor by the Princes of *Matsumai*, whose own dominions form part of *Osiu*. (pp. 61-62.)

With reference to a recent discussion at one of our meetings, it may be of interest to know that Kaempfer considers the *Liukiuans*, judging from their language, to be of Chinese extraction.

Under the head of the second of the three above-named dependencies of Japan (the Corea), an account is given of the invasion of the Corean peninsula in the reign of *Taiko*—a seven year's war, which resulted in the temporary reduction of Corea.

*Yeso* is spoken of as being a Japanese possession "out of their own empire." It was invaded and conquered by *Yoritomo*, the first secular monarch (p.64). *Yeso*, says Kaempfer, is so thoroughly full of woods and forests that it produces nothing of use to the Japanese besides pelts and furs and the famous fish *karasaki*, which is esteemed [6] a great delicacy. The Japanese, he says, describe the inhabitants of *Yeso* as "being a strong but savage people, wearing long hair and beards, well-skilled in the management of bows and arrows, as also in fishing, the greatest part living almost solely on fish. They describe them further as being very dirty and nasty, but," adds the author, "this accusation is not so strictly to be relied on, since the Japanese are themselves so nice and superstitious in washing, etc., as to have found the same fault with the Dutch." The language of *Yeso* is said to resemble that of the Corea.

In the following chapter (the fifth) we have the names and subdivisions of the several provinces of Japan, and notes respecting its revenue and government.

Of the provinces above referred to, five are designated as the *five Provinces of the Imperial revenue*, being so called because their revenue is particularly appropriated for the support and maintenance of the Imperial Court. It amounts to 148 *man* and 1,200 *kokf* (*koku*) of rice (*a man* contains 10,000 *kokf*<sup>1</sup> and a *kokf* 8,000 bags).

The five Provinces in question are :—

- 1.—*Jamasijro* or *Saunsju*.
- 2.—*Jamatto* or *Wosju*.
- 3.—*Kawatzij* or *Kasiu*.
- 4.—*Idzumi* or *Sensju*, and
- 5.—*Sitzu* or *Tsinokuni*.

Of the 7 large tracts of land into which the Japanese Empire was divided by the Emperor *Siusiun*, the first is—

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<sup>1</sup>Note 1 *koku*=333½ lbs. Therefore 148 *man* and 1,200 *koku*, i. e., 1,481,200 *koku*=493,733,333½ lbs., being the revenue above mentioned.



(1) *Tookaido* or *South Eastern Tract*. The *Tookaido* includes 15 provinces.

Iga,  
 Isie,  
 Ssima,  
 Owari,  
 Mikawa,  
 Tootomi,  
 Surunga,  
 [7] Kai,  
 Idzu,  
 Sangami,  
 Musasi,  
 Awa,  
 Kadsusa,  
 Simoosa, and  
 Fitats.

The revenues of these 15 provinces are  
 494 *mankokf*.

(2) The 2nd of the 7 tracts is *Toosando* or *Eastern mountainous Tract*. This comprises eight large provinces, namely :—

Oomi,  
 Mino,  
 Fida,  
 Sinano,  
 Koodsuke,  
 Simoodsuke,  
 Mutsu, and  
 Dewa.

The revenues of these eight Provinces  
 amount to 568 *mankokf*.

(3) The *Foku Rokkudo*, or *Northern Tract* has seven provinces, namely :—

Wackasa,  
 Jetsissen,  
 Kaga,  
 Noto,  
 Jetsju,  
 Jetsingo, and  
 Sado.

The revenues of these seven Provinces  
 amount to 248 *mankokf*.

(4) The *Sanindo*, i. e., the *Northern mountainous or cold tract* has eight provinces, namely :—

Tamba,  
Tango,  
Tsuma,  
Imaba,  
Fooki,  
Idsumo,  
Iwami, and  
Oki.

The yearly revenues of these 8 Provinces amount to 128 *mankokf*.

[8] (5) The *Sanjodo*, or *Southern mountainous or Warm Tract*, has likewise 8 Provinces, namely :—

Farima,  
Mimasaka,  
Bidsen,  
Bitsju,  
Bingo,  
Aki,  
Suwo, and  
Nagata.

The revenues of these eight provinces amount to 270 *mankokf*.

All of the above-mentioned five tracts form part of the main island, which Dr. Kaempfer calls *Nipon*, but which Mr. Satow asserts to have no especial distinguishing name.

We now proceed to the island of *Kiusju*.

The 6th large Tract of land is called *Saikaido*, or the *Western Coast Tract*.

It is composed of nine provinces, namely :—

Tsikudsen,  
Tsikungo,  
Budsen,  
Bungo,  
Fidsen,  
Figo,  
Fingo,  
Oosumi, and  
Satzuma.

The revenues of these nine provinces amount to 844 *mankokf*.

An island of the third magnitude, which lies between the two former, and is called *Sikokf* or the *Country of Four* (provinces), together with the neighbouring island *Awadsi* N. E. of *Sikokf*, and the great province *Kijnokuni*, which stands out from the continent of *Nipon*, make up the 7th large tract of land, called

(7) *Nankaido*, or the Tract of the Southern coasts. It is composed of six provinces, namely:—

Kijnokuni,  
Awadsi,  
Awa,  
Sanuki,  
Ijo, and  
Tosa.

} The revenues of these six provinces are  
140 *mankokf*.

[9] There remain, to complete Dr. Kaempfer's category of the Japanese dominions, the two above mentioned islands of *Iki* and *Tsussima*, which were conquered from the Corea.

Under each of the above-mentioned names of provinces Dr. Kaempfer enters more or less into detail with regard to the formation, climate, productions and subdivisions of the district he is describing (see pages 70 to 81). The entire revenue of Japan he states to be 2,828 *man* and 6,200 *kokf*, according to the above distribution. Another estimate from a Japanese author makes the revenue of the country to be rather less—that is to say, 2,257 *mankokf*. The former estimate, at the value of 16 shillings per *koku*, would represent in our money a revenue of £18,628,960.

With respect to the nature of the Government of the country, the author shortly states that “the whole empire is governed by the emperor with an absolute and monarchical power and so is every province in particular by the Prince who, under the Emperor, enjoys the government.” The emperor can disgrace or exile even the greatest princes, or can deprive them of their lives and dominions, according to his pleasure. Of the *Daimios*, the princes of *Satzuma* and *Kanga*, respectively, are said to be the most powerful in the empire.

The lords of smaller districts, called *Siomio*, such as those of *Goto* and several others, are only permitted to reside for six months of each year in their hereditary dominions. The other six months they must

pass at the Imperial Court, where their wives and families are detained all the year round as hostages. Some of these smaller districts are Crown lands or have been taken from the Princes by way of punishment. One of the chief political maxims of the Court has always been to lessen the power of the Daimios.

The 6th Chapter of the 1st Book is devoted to the author's opinion respecting the origin of the Japanese. He gives two stories or legends tending to the view that the Japanese are of Chinese descent, which two stories he immediately afterwards proceeds to refute, expressing [10] his own dissent from this theory. Having done so he next sets up a theory of his own, to which I shall presently refer. Dr. Kaempfer founds his chief argument against the Japanese race being descended from the Chinese on the difference betwixt their respective languages. He considers that on proper enquiry the Japanese language would be found to be entirely pure (p. 84). A native of Japan, he says, does not understand any of the three Chinese dialects of *Nanking*, *Tsiaksju* and *Foksjü*.

The Chinese language is, he adds, to the Japanese people what Latin is to the people of most European countries. The Japanese language is entirely different from the Chinese in two essential properties—construction and pronunciation,—and there is therefore no room to think that one of these two nations gave birth to the other. He here enters into some details respecting the construction of the two languages, respectively, and having done so he remarks that it is needless to give himself and his readers the trouble to prove Japanese different from Corean or Jedsoan, as no one ever pretended to derive the descent of the Japanese from one or other of these two nations.

Of Dr. Kaempfer's arguments, founded on the different manner in which certain letters of the alphabet are pronounced in China and Japan respectively, I would only say that he does not seem to me sufficiently to take into account the difference which climate is known to effect on the pronunciation of words even by people of the same race. Many English words, for instance, are pronounced in certain parts of America quite in another way to that in which we pronounce them in England, and South American Spanish also is something very different to listen to from the Spanish of Castile. I believe it is thought that the origin of this difference in both cases is chiefly to be traced to the influence of climate

in contracting or expanding the throat. Another of Kaempfer's arguments against the identity of the two races, the Chinese and the Japanese, is the dissimilarity of their respective religions.

Another is the difference between the characters anciently used by either people.

[11] Another argument to the same end is derived from their different modes of life, as for instance in eating, drinking, sleeping, dressing, shaving the head, saluting, sitting, and many other customs. The characters of the two nations are, he considers, essentially distinct, the Chinese being modest and lovers of a sedate, speculative, philosophical mode of life, though given to fraud and usury, whilst the Japanese are warlike, dissolute, mistrustful, ambitious, and always bent on high designs.

The arguments employed by Dr. Kaempfer to prove that the Japanese are not of Chinese descent are at least philosophical if they are not conclusive; but when the learned author, not contented with proving, or endeavouring to prove, from whom the Japanese are *not* descended, proceeds to tell us what their origin *is*, what at the present day shall be said of the arguments which he employs in support of his theory? The Japanese, he asserts, are clearly an original nation, at least they are not descended from the Chinese. Whence then, he asks, is their descent? "Perhaps it is not inconsistent with reason and the nature of things to assert (p. 86) that they—the Japanese—are descended of the first inhabitants of Babylon (such is the word he uses, meaning presumably Babel), and that the Japanese language is one of those which sacred writ mentions that all-wise Providence thought fit to infuse into the minds of the vain builders of the Babylonian Tower." On this conjecture, in support of which he does not even attempt to bring forward any argument whatsoever, Dr. Kaempfer proceeds to raise a further theory, his sole argument in favor of which seems to be of itself destructive of his theory. In view of the purity of the Japanese language and of the fact of its not affording the slightest trace of possessing any words belonging to the languages of the countries through which the author supposes the original Japanese to have passed on their way from the banks of the Euphrates to the Korean sea, he comes to the conclusion *not* that they never passed through those countries at

all, which would seem to be the natural conclusion, but that they came through them as it were at [12] express speed. Thus the only scientific argument which could be adduced with reference to the theory, and which seems to me to dispose of it, is misconstrued into its service. The Japanese, according to Dr. Kaempfer, must, it seems, have travelled from Babylon by way of Persia and the shores of the Caspian Sea, whence they ascended the Oxus to its source. It was then no difficult matter for them to penetrate to China, discovering in their route the lake Argüm, continuing their journey along the river of the same name and then descending the Amoor, whence they found their way to the Corea and—being now accustomed to navigation—across to Japan.

Such is the theory as to the origin of the Japanese nation which is propounded by Dr. Kaempfer, but he, with much more reason, admits that the original stock may have been supplemented by Chinese colonists and the crews of ship-wrecked vessels. He gives proof that the Chinese writers had influenced Japan, and he cites several interesting instances, from the times in which he wrote, of vessels from strange countries being stranded on the Japanese coast, their crews being saved alive. Of one of these the three black sailors who were saved could distinctly pronounce only one word, "*tobacco*" (p. 94). "The Japanese in the main, particularly the common people of Nipon, are," says Kaempfer, "of a very ugly appearance, short-sized, strong, thick eyelids, yet the descendants of the eldest and noblest families have somewhat more majestic in their shape and countenance."

Having given the above theory as to the beginning of the Japanese race, according to his opinion, Dr. Kaempfer proceeds to give the theory (or, as he he calls, the fabulous opinion) of the Japanese themselves upon the same subject, an opinion which many will think scarcely more fabulous than that propounded by Dr. Kaempfer (p. 96). "They pretend that they arose within the compass of their own Empire, though not out of the earth. They esteem themselves no less than offsprings of their very Deities." From their Deities "sprang an intermediate race between [13] gods and men, the greatest of the race of men being *Sin Mu Tenoo*, in whose family the hereditary right to the Crown with a more than human authority was continued down to the present 114th Mikado, that is 2860 years, computing to the year of Christ 1700."

The next succeeding chapter (8th) is devoted to the climate and the products of Japan. It includes observations under the following heads—namely, “Whirlpools,” “Waterspouts,” “Soil,” “Rivers,” “Earthquakes and places free from Earthquakes,” “Volcanoes.” Under the head of “Earthquakes” the author mentions a violent convulsion at Yedo which occurred in the year 1703, whereby, and by a great fire, almost the whole city was laid in ashes, upwards of 200,000 inhabitants being buried under the ruins. Some particular places in Japan are, he says, free from shocks of this nature—a fact which, he adds, is not called in question. Amongst these are the islands of *Gotho* and *Sikabusima* and the mountain *Kojasan* near *Miaco*, famous for its convents (p. 104).

Amongst the mineral products of the Empire the author enumerates sulphur, gold, silver, copper, tin, iron, coal, salt, agates, jasper, pearls, naphtha, ambergris, and submarine substances. Of these, sulphur, he says, is brought chiefly from the province of Satsuma. Gold is found in several localities, the richest ore being in Sado. After the mines in Sado come those of Surunga. There are silver mines in the province of Bingo, and in Kattami. Copper is found chiefly in Surunga, Atsingo and Kijnokuni; tin in Bingo; iron in Mimasaka, Bitsju and Bisen; coal in Tsikusen and the northern provinces. Salt is produced from the sea-water. Pearls were but slightly esteemed until it was found that they were prized by the Chinese, when they became an article of export. Naphtha is found in Jetsingo; ambergris on the coast of Satsuma and in the Riuku islands. It is found chiefly in the intestines of the whale, called from their supposed length by the natives *Fiakñiro*, or the *hundred fathom Fish*. Submarine substances are found in abundance in the Japanese waters. Amongst the minerals imported [14] into the country are antimony and sal-ammoniac, quicksilver, borax and sublimate of mercury.

Chapter ninth of this Book is devoted to the trees and plants of Japan. Amongst these are specified the mulberry-tree, the *kadsi*, or paper tree, the *urusi*, or varnish tree, the bay, the *kus* or camphire-tree, the tea-shrub, the *sansio*, the fig-tree, the wild-fig, the chestnut, the pear, the walnut, the pistach, the oak, *naatsime*, citron, orange, lemon, vine, bramble, raspberry, strawberry, plum, cherry, fir, cypress, bamboo, *maki-tree*, iron-tree, *tsubacki* shrub, *satsuki*, *sakanandsio*, maple, *fasi-tree*, feverfews, various lilies, the hemp-plant, the cotton-plant, the wild hemp plant,

plants affording oil, the turnip and others. In naming the above plants I have followed the order observed by Kaempfer. (pp. 118-122.)

The two following chapters give a list of the Beasts, Birds, Reptiles and Insects, as well as of the Fishes and Shells of the country.

Amongst the animals, the author does not fail to introduce certain chimerical quadrupeds, with the delineation of which those who have lived in Japan are probably familiar. Of these is the *Kirin*, a creature of incredible speed, having two soft horns before its breast and bent backwards, having the body of a horse, the claws of a deer and the head similar to that of a dragon. The animal in question is so considerate that it takes care never to trample on any plant and never to injure any insect or worm. Its conception requires a particular constellation in the heavens, and on earth the birth of a *Sesin* or man of an incomparable understanding and remarkable love for mankind. A representation of the *Kirin* is given amongst the plates at the end of Vol. I.

Other chimerical animals are the dragon and the water-dragon. These are likewise represented in the plates. The next chimerical creature of which mention is made is the *Foo* or Bird of Paradise, nearly akin to the phoenix of our classical legends. This bird, of which there is likewise a representation, dwells high in air and only visits the earth on the birth of a *Sesin* or of a great Emperor.

[15] From these the author turns to creatures that have a real existence. They are given in the following order:—The horse, the ox, the cow, the buffalo, the sheep, the goat, the swine, the dog, the cat, the deer, the monkey, the bear, the *Tanuki* (resembling a wolf, but of a brownish colour and having a fox's snout), the wild dog, the *Itatz*, the *Tin*, the bat, the mouse, the fox, various reptiles, white ants, *Mukadde* or forty-legs, lizards, snakes, hens, ducks, cranes, herons, wild geese, pheasants, woodcock, wild pigeons, storks, falcons, hawks, ravens (from China and the Corea), *Foken* (a night bird), *Misago* (a voracious sea bird), mews, larks, nightingales, bees, butterflies, beetles, and another kind of beetle, called *Sebi* or *Cicada*. It is asserted, says the author, that its noise may be heard at a full English mile's distance. It disappears in the dog-days and is said to creep into the ground in order to undergo a metamorphosis previous to reappearing the next year anew in a dormant condition from which it again re-emerges (p. 181). The Japanese name *Semi*, which it



bears, is given to this insect from its sound resembling music. Other creatures produced in Japan are the Spanish fly and a peculiar night-fly of such beauty as to be preserved by ladies amongst their curiosities. There is a curious belief attached to this fly, namely, that all other night-flies fall in love with it—a fatal step on their part, since in proof of their devotion they must fetch in fire, in doing which they singe their wings.

Amongst the productions of the sea the first-mentioned is the Whale, which is found chiefly on the southern shore of the chief island. It is caught by means of darts or harping-irons. The Japanese whaling-boats are, says Kaempfer, smaller than ours, and apparently better adapted for their purpose, carrying each ten men, who row them with incredible swiftness. In 1680 a new method of catching whales was discovered, namely, by nets of rope two inches thick (p. 188). This method was practised with great success, but it was abandoned on account of its calling for more expensive tackle than the fishermen [16] could afford. The various sorts of whales are called respectively, *Sebio*, *Awo*, *Sangi*, *Nagass*, *Sotookadsura*, *Mako* and *Iwasikura*. Of all these several kinds of whales nothing is thrown away as useless excepting the large shoulder-bone. The skin, flesh, etc., are eaten, either having been pickled, boiled, roasted or fried. The bones when fresh are boiled and eaten. Out of the various portions they make ropes, whilst several little implements are constructed from the jaw-bones, particularly the steel-yards for weighing gold and silver.

The fish next mentioned is the *Satsi oko*, which is sometimes as long as five or six fathoms, having long tusks which are occasionally used to ornament temples and public buildings. Amongst other fishes are the *Iruku*, the *Furuhe*, the Sea-Horse, the *Tai*, the *Kharo Tai*, the *Susuki*, the *Funa*, the *Najos*, the *Mebaar* (a red-coloured fish resembling the carp, caught in great plenty and the common food of the poor people); the *Koi*, the *Maar* or Salmon, the *Itojori*, a small Salmon, the *Makuts*, the *Sawara*, the *Fiuwo*, the *Kusuna*, the *Kamas* or Pike, the *Susuki*, the *Adsi*, the *Taka*, the *Kame*, the *Jeje*, the *Come* or *Jeje*, the *Come* or *Jei* or Sole, the *Bora*, the *Karasumi*, the *Katsuwo*, the *Managatsuwo*, the *Sake*, (not unlike the Cod: this fish is brought from Yeso) the *Tara*, the *Sajori*, the *Tobiwo* (a flying-fish), the *Iwas* or Sardine, the *Kissugo* or Smelt, the *Jeso*, the *Saba* or Mackerel, the *Ai*, the *Sijroiwu*, the *Kono*

*siso* (a sort of Herring,) the *Kingjic*, the *Unaji*, the Eel (several sorts,) the *Ika*, the *Jako* or Bait, the *Kuragge*; after which follow the names of forty varieties of shell-fish and minor products of the water, amongst them being included the Oyster, the Crab, etc., with which list the first Book of this work is brought to a conclusion.

The next Book (II.) is devoted to the History of Japan properly so called.

The author divides the History and Chronology of the Empire into three sections, the fabulous, the doubtful and the certain.

[17] Of these the first dates from the time of the creation, Japan being then governed by a succession or evolution of seven Celestial spirits, each of which reigned for a very long but undefined period, and who were succeeded by a race of Demi-Gods, five in number and called *Dni Sin Go Dai*.

Passing to the second or doubtful era of Japanese history Mr. Kaempfer observes: "It is little known what was the state of these countries and the way of life of the inhabitants, from the beginning of the creation to the time of their first Monarch, *Sin mu Ten Oo*, whose reign comes down within 660 years of Our Saviour's nativity. It is highly probable that in those days the Japanese lived up and down the country, disposed in hordes (as do the Scythian inhabitants of Great Tartary) separated from the rest of the world by a rocky tempestuous sea, being as yet in a state of nature and freedom, without a settled form of government, and destitute of arts and sciences. The neighbouring Empire of China was then already grown very powerful, arts and sciences flourished there and were by the Chinese brought over into Japan. It was owing to this that the Japanese became in time polite and civilised. That so considerable a period of time should not remain empty in their chronological books, they have filled up the vacancy with the names of the most eminent monarchs who after the demise of *Katsurakuki* and the five descendants of his family sat on the throne of China." The names of the Chinese Emperors alluded to are as follows:—(1) *Fuki* or *Fohi*, who is said to have discovered the twelve Celestial Signs and divided time into months and years and to have invented many useful arts and sciences. According to one of the Japanese historians consulted by Kaempfer, this Emperor began his reign 20,446 years before the Japanese emperor *Synmu*,

or 21,106 years before Christ; and this pretension is considered by the orthodox historian to be sufficient to exclude him from even the doubtful era, since, says Kaempfer, it would place him thousands of years before the creation of the world. Kaempfer, however, [18] seems disposed to attach more belief to the statement of another Japanese writer who places the commencement of *Fohi's* reign only 3,588 years before Christ or 396 years after the Creation, according to the Mosaic record as interpreted by Dr. Kaempfer. (p. 146.)

(2) The second Chinese emperor was *Sin Noo*, who is said to have taught mankind agriculture and to have discovered the uses of several plants. His picture, says Kaempfer, in which he is represented with the head of a horned ox, is held in high esteem among the Chinese, more especially by physicians. His reign extended over 140 years, a period which suggests the reflection that Dr. Kaempfer need scarcely have taken the trouble to divide his Japanese history into *three* branches, since the second or *doubtful* division seems scarcely less *fabulous* than the first.

(3) After this emperor came *Kwo Tei*, said by the Chinese historians to have really reigned, his reign beginning from the year B.C. 2,689, he being then eleven years of age. (4-8) His five successors reigned in the following order, viz.: (4) *Tei Gio*, (5) *Tei Sjun*, (6) *Uu*, (7) *Sioo Sei Too*, (8) *Siu No Bu O*. (p. 148.) Of these latter five the first named, *Tei Gio*, was a *Sesin*, well-versed in occult arts. During the reign of the 2nd, *Tei Sjun*, a great deluge happened in China, overflowing many provinces. To the third of these emperors, *Uu*, China owes canals and sluices. In the reign of the fourth, *Sioo Sei Too*, there occurred a seven years' famine, which reminds the author of the Egyptian famine of Holy Writ. The last emperor of these, *Siu No Bu O*, came to the crown 462 years before *Synmu* and 1122 B.C. and was succeeded in their turn by 37 descendants. In the meantime the authentic history of Japan begins, as apart from that of China, which brings the author to the commencement of the last of the three eras into which he divides the history of this empire. (p. 148).

(Chapter 2.) Here begins the long line of *Mikados*, or, as Kaempfer styles the monarchs of Japan, "Ecclesiastical Hereditary Emperors," and which dates from the year B.C. 660, being the 17th year of the reign of

the [19] Chinese Emperor *Kaiwo*. From that time till the year of Christ 1698, one hundred and fourteen Emperors of the same family have successively sat on the Throne of Japan. They value themselves extremely upon being the eldest branch of the family of *Ten Sio Dai Sin*, the sacred founder of the Japanese nation.

They have not inherited the title of *Mikotto*, which is given only to the divine and half-divine beings of the first and second succession, but that of *Mikaddo* (which is a diminutive of the same word), as also the titles *Dai*, *Oo*, *Kwo*, and *Tai*. They are likewise termed *Tensin*, that is *Sons of Heaven*. The Princes of the Imperial house are looked upon, says Kaempfer, as Popes by birth. A Mikado of the time when he wrote and of former times would, he says, think it prejudicial to his dignity to touch the ground with his feet. He must be carried on men's shoulders. Much less may the monarch's person be exposed to the open air or to the beams of the sun. His hair and beard may not be cut. His ablutions are performed on his person at night during his sleep. In ancient times he was obliged to sit on the throne for some hours every morning wearing the Imperial crown, and not stirring hands or feet or head or eyes. This tiresome duty was later commuted, the crown being placed each morning on the throne. The vessels and table-furniture made use of for the Mikado must be renewed at each meal. These are clean and neat but of common clay, and are generally broken after having been once used, in case they should fall into less holy hands. The ministers of the Court name the nearest of kin the next heir, without regard to age or sex. There have been even instances of an Emperor being succeeded by his widow, as also of a Mikado abdicating in favour of his son. The entire court is composed of the members of the same family of *Tensio Daijin*. At the same time of Kaempfer's visit the secular emperor had assigned for the maintenance of the Mikado's court the revenue of the city of Miako and its appurtenances, which were so insufficient for the purpose that the Court of Kiôto was remarkable for its splendid poverty.

[20] The Mikado is the fountain of honour, but the titles which he confers are given not only to men of the sacred race, but likewise to secular persons—to the princes of the empire and to men of note (p.

152)—this being done at the suggestion of the secular monarch or on the condition of money payment. All ranks or titles are divided into six classes.

The title of the 1st Class is *Dai Seo Dai Sin*. The person who is honoured with this title is esteemed so great and sacred, that they believe that his soul becomes a *Cami*, or god, the moment of her departure from the body. For this reason the Mikado seldom bestows it upon anybody. The dignity of *Quanbuku* belongs likewise to this class. *Quanbuku* signifies the second person in the ecclesiastical court and the Prime Minister in all affairs relating to the empire. This title, says Kaempfer, is assumed by the secular monarch, or is given to the presumptive heirs. *Quanbuku* is the *Dairi's* Vicegerent and Prime Minister in all affairs relating to the empire.

2.—The following three titles belong to the second rank : *Sa Dai Sin*, *U Dai Sin*, and *Nai Dai Sin*. They are never conferred on more than three persons at court.

3.—The *Dainagon* and *Tsunagon* make up the third rank. These two titles are always annexed to certain employments.

4 and 5.—The titles which belong to the 4th and 5th rank are *Seonagon*, *Tsiunagon*, *Tsiuseo*, *Seosjo* and *Silsiu*. Both of these classes are very numerous and are divided into different ranks. The whole ecclesiastical court assume the title of *Kuge*, by way of distinction from the *Gege*, that is to say the Laity and inferior sorts of people.

6.—The titles of the 6th class are *Tai U*, *Goi* and others.

When the secular Monarchs took the Government of the Empire into their hands, the *Dairi* reserved to himself the prerogative of conferring titles in general, but with his consent the secular Emperor may confer two ranks, *Maquandairo* and *Cami*, these being equivalent [21] respectively to *Duke* or *Count* and *Knight*. The word *Cami*, used in this sense, must not be confounded with the same word meaning a deified soul.

The persons composing the ecclesiastical court wear a habit peculiar to themselves, and different from that worn by secular persons. The habit in question is thus described (p. 153). Long trowsers covered by a large gown, a long train which they trail after them on the ground, their heads covered with a black lacquered cap. Some have a

broad band of black crape or silk ; others have a sort of lap before the eyes. The women's dress at the court of the *Dairi* is likewise different from the costume of the secular women. But chiefly the *Dairi's* twelve wives are dressed in sumptuous gowns interwoven with flowers of gold and silver, and so large and wide that it is difficult for the ladies to walk in them. Not only the *Kujes* but likewise many of the fair sex have acquired considerable accomplishments and reputations as poetical and historical writers. Formerly all the almanacks were made at court. The court are great lovers of music.

The Imperial consort occupies the same residence with the *Dairi*, the other wives living in separate palaces.

The Japanese reckon from two eras or epochs ; from the beginning of the reign of *Synmu Tenno* or B.C. 660 ; the second and commonly used one is called *Nengo*. It takes in a period of only a few years, generally less than 20, and is made use of in almanacks, proclamations, etc. They likewise reckon by periods of 60 years. (p. 156.)

The twelve celestial signs of the Japanese are :—(1) The *mouse*, (2) the *ox* or *cow*, (3) the *tiger*, (4) the *hare*, (5) the *dragon*, (6) the *serpent*, (7) the *horse*, (8) the *sheep*, (9) the *monkey*, (10) the *cock* or *hen*, (11) the *dog*, and (12) the *bear*. The same names are given and in the like order to the twelve hours of the day and to the twelve parts into which each hour is divided. What they call day is the interval of time between sunrise and sunset. This is divided into six equal parts, as is likewise the night, so that the length of an hour varies each day. The Japanese have five elements, wood, fire, [22] air, earth and water. The beginning of the Japanese year falls about the fifth of February. They have a leap-year every other or third year, or seven in nineteen years. The necessity for this arises from their beginning a new year from the new moon next to the 5th of February.

(Chapter 8.)—The emperor *Synmu* is said to have done very much for his country and to have reigned during 79 years. He was succeeded by his son *Sui Sei* B.C. 580. In the 80th year of this monarch's reign was born in China the illustrious philosopher *Koosi*, or *Cumfusu*, known to us as Confucius. Then follow in succession the names and reigns and principal deeds of 114 ecclesiastical emperors, down to the *Mikado* who succeeded to the throne in the year 1687, and who occupied it at

the time of Dr. Kaempfer's residence in Japan. The most noteworthy events of each year are likewise chronicled, Dr. Kaempfer being indebted for his information to Japanese historians whose names he gives. (p. 200.)

The 6th chapter of the 2nd Book is devoted to the series of *Crown-Generals*, or, as Dr. Kaempfer likewise calls them, *Secular Monarchs*, of Japan, whose succession it is to be remembered was co-existent with a portion of the succession of the long line of Mikados, *Yoritomo*, the first Crown-General, having been born during the reign of the 76th *Dairi* in the year of Christ 1154. Of these latter monarchs—for *Monarchs* or *Sole Governors* they were in the true sense of the word—a series of thirty-six is named, beginning with *Yoritomo* and coming down to *Tsinajosiko* who filled the *Shogun's* throne in 1692 at the time of Dr. Kaempfer's residence in Japan. Of these the most remarkable seems to have been *Taiko Sama*, originally a peasant's son and in his younger years a nobleman's domestic servant. Having become *Shogun*<sup>1</sup> he reduced under his power all of the provinces of Japan, which were until then governed by independent princes. He thus, properly speaking, became the first secular monarch of all Japan. On his death he was deified. With [23] the termination of the chronicle of the *Shoguns* ends the second volume of the work before us.

The third Book is devoted to a description of the state of religion in Japan, and its first chapter opens with the following passage:—“Liberty of conscience, as far as it doth not interfere with the interest of the secular government, or affect the peace and tranquillity of the Empire, hath been at all times allowed in Japan.” Hence it is that foreign religions were introduced with ease and propagated with success.

The four religions observed during the 100 years previous to the residence of Dr. Kaempfer in Japan were,

- (1) The *Sinto* or idol-worship.
- (2) The *Budso*, or worship of foreign idols, brought from Siam and China.
- (3) *Siuto*, the doctrine of their doctors or philosophers.
- (4) *Deivus* or *Kiristando*, i. e., the way of God and Christ.

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<sup>1</sup>Kaempfer's words are, “became the first absolute secular Monarch.” (En. Com.)

With reference to the last of the four the author observes that " it was owing to the commendable zeal and the indefatigable care of the Spanish and Portuguese Missionaries, particularly the Jesuits, that the Christian religion was first introduced into Japan, and propagated with a success infinitely beyond their expectation, insomuch that from the first arrival of the fathers in Bungo about 1549 (six years after the discovery of Japan) to 1625, or very near 1680, it spread through most provinces of the Empire, many of the princes and lords openly professing the same. Considering what a vast progress it had made till then, even among the many storms and difficulties it had been exposed to, there was very good reason to hope that within a short compass of time the whole Empire would have been converted to the faith of our Saviour, had not the ambitious views and impatient endeavours of these fathers to reap the temporal as well as the spiritual fruits of their care and labour so provoked the Supreme Majesty of the Empire as to raise against themselves and their converts a persecution which hath not its parallel in history, whereby the religion they preached and all those [24] that professed it were in a few years' time entirely exterminated." (p. 204.)

With the above extract the time allotted to me for this evening compels me to conclude my observations on Dr. Kaempfer's History of Japan. They only relate to a portion of his entire work, but I shall place the remaining portion of my abstract of it in the hands of the Secretary, and I am happy to add that, in the event of the Council wishing it, Mr. Satow will append notes to this abstract, showing to how great an extent he is disposed to assent to the statements advanced in Kaempfer's work.

I would say that no one could rise from a careful perusal of Kaempfer's History without feeling disposed to pay an ample tribute of respect in reference to the large and valuable compilation of scientific facts which are in the volumes before us bequeathed to the world. The world which more immediately became the heir of this bequest was scarcely in a position to estimate the value of its possession, since in those days none could dispute many of the assertions of Dr. Kaempfer; but at the present day we are in a different position. The pages which were presented to the public one hundred and forty-six years ago have



been now subjected to the full scrutiny of the scientific world. It would be beyond the purpose of this paper to examine minutely the exact correctness of Kaempfer's assertions or speculations in one or other of the fields in which his investigations were conducted. My object has only been to do something towards bringing to the notice of this Society the varied contents of a work which has in a great degree supplied modern writers on Japan with suggestive materials towards their respective compositions.

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*Note.*—In reproducing Japanese names, the author of this paper has followed the antiquated and sometimes inexact spelling of his original.—E.D. Com.

ITINERARY OF A JOURNEY FROM YEDO TO KUSATSU,  
WITH NOTES UPON THE WATERS OF KUSATSU.

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BY LÉON DESCHARMES,  
CAPTAIN 4TH CHASSEURS D'AFRIQUE, FRENCH MILITARY MISSION  
OF JAPAN

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*[Read before the Asiatic Society of Japan on the 22nd October, 1873.]*

[25] The warm springs of Kusatsu have enjoyed a considerable reputation in Japan for many centuries, though it must be left to the subsequent investigations of modern science to determine the value of this reputation. Be it as it may, the coolness and salubrity of the climate of Kusatsu during the hot months of the year are incontestable, and its comparative proximity to Yedo and Yokohama will consequently attract travellers or European invalids who, even though they may neglect the use of waters still little known to our medical practitioners, will find there during several months the temperature and bracing air of Central Europe.

I have thought that a short account of the route I took, the resources of the country, and the various information which I have been able to gather from the natives, would not be without value to travellers in Japan.

Regarding the medicinal effects of the waters, I must leave specialists to settle this delicate question. I had but one mercurial thermometer, graduated to 55° (Cent.), a good instrument, it is true, and registered at the Paris [26] Observatory. But it would be indispensable to have a maximum and minimum thermometer for determining the nocturnal temperature and those of the springs at Kusatsu, which vary several times during the day. Nor was I able to determine the elevation of the

place, and I only use the figures 1500 to 1600 metres for the altitude of Kusatsu as pure supposition, without attaching further value to them.

## ITINERARY.

Before entering upon any detail it may be well to state that the traveller can go in a carriage and in one day from Yedo to Takasaki (about 25 *ri*). There is even a native service between the two points. The road is often in bad order, and the carriages are inferior. In journeying by short stages the following is the itinerary which I should recommend, and which I myself followed.

	From Yedo to Itabashi	
	2 <i>ri</i> 8 <i>chô</i> .	
1st day, From Yedo to Okegawa 10 <i>ri</i> .	}	<i>ri chô</i>
		Itabashi to Warabi ..... 2 8
		„ Urawa..... 1 14
		„ Ômiya..... 1 10
		„ Ageo ..... 2 10
		„ Okegawa..... 2 30

Grand halt at Ômiya. Sleep at Okegawa.

1st August Temperature.	Itabashi .....	7.00 a.m.	28° 5
	Ômiya .....	12.00 „	32°
	Okegawa .....	7.00 p.m.	31°

Morning cloudy. Day fine with a gentle breeze S.W. Water drinkable 16°.

		<i>ri chô</i>
2nd day. From Okegawa to Honjo 11 <i>ri</i> .	}	Okegawa to Kônosu ..... 1 30
		„ Kumagai ..... 4 6
		„ Fukaya ..... 2 27
		„ Honjô ..... 2 25

Grand halt at Kumagai. Sleep at Honjô.

2nd August Temperature.	Konosu .....	6.00 a.m.	27°
	Kumagai.....	11.00 a.m.	31°
	Honjô .....	7.00 p.m.	30°

Morning cloudy. Day fine. Gentle breeze S.W. Water 16°: at Kumagai 15°, 5° and 14°.

		<i>ri chô</i>
[27] 3rd day, From Honjô to Minokura (or Sannokura) 12 <i>ri</i> 20 <i>chô</i> .	{	From Honjô to Shimmachi 2 0
		„ „ Kuragano... 1 18
		„ „ Takasaki ... 1 19
		„ „ Kamiyama 4 —
		„ „ Sannokura 3 18

Grand halt at Takasaki (very bad water). Sleep at Sannokura.

3rd August Temperature.	Shimmachi.....	5.30 a.m.	25° 5
	Takasaki .....	8.00 a.m.	25° 5
	Sannokura .....	7.00 p.m.	28°

Fine. Gentle breeze. Storm in the evening at Sannokura. Water at Sannokura 15°.

4th day, From Sannokura to Sugao 7½ <i>ri</i> . Mountain path, practicable for horse, or foot or in <i>kago</i> .	{		<i>ri chô</i>
		From Sannokura to Ôdo ...	4 18
		„ Sugao ...	3 18

4th August Temperature.	Sugao .....	12.00	28°
	„ .....	7.00 p.m.	27° 3

Fine. Water (at Sugao) 14°.

5th day, From Sugao to Kusatsu 6 to 7 <i>ri</i> ?	{	Sugao to Naganohara .....	4 00	<i>ri chô</i>
		„ Kusatsu .....	3 00	

5th August Temperature.	Sugao .....	4.30 a.m.	23° 5
	Kusatsu .....	12.0	23°

Grand halt at Naganohara.

#### GENERAL OBSERVATIONS.

The total distance is from 46 to 47 *ri*. The general direction is N. W. in relation to Yedo, which renders the route disagreeable in summer, as no advantage is gained from the S. W. breeze, and the traveller has the setting sun before his eyes during the whole of the afternoon journey. From Yedo to Shimmachi, the road is in general monotonous, traversing a vast plain slightly undulating, rich in cereals, and where the mulberry is much cultivated for the purpose of silk-worm rearing. This plain, especially as you approach Honjô, vividly recalls those of Lombardy, by the character of its cultivation, the number

of rapid streams which line the route, and the peaks [28] of the chains of distant mountains which rise upon the horizon towards the W. and N. W.

## II.—WATER-COURSES, ROADS, REMARKABLE POINTS, PRODUCTS.

The road traversed bears the general name of Nakasendô. It is the main line of communication from the centre of Nippon between Yedo, Kiôto and Ôsaka. At Itabashi there is a small stream flowing into the large river known in Yedo as Ôgawa or Sumidagawa. Before arriving at Warabi this large river must be crossed. It is there called the Todagawa. Its source is to the east of Mount Kimpusan, which seems to be the starting point of several considerable streams, and from this point as far as Kumagai it bears the name of Aragawa. It flows from its source to Kumagai in a north-easterly direction, and from that point to Yedo in a south-easterly direction, passing through Yedo and falling into Yedo Bay.

From Mount Kimpusan flow, on the north, the river Chikumagawa, which runs northward and empties itself in the Sea of Japan, and on the south, the Fuji kawa, which runs southward into the Bay of Suruga, passing to the west of Fuji no yama. This massive mountain becomes therefore remarkable as the dividing point between the waters of the Pacific Ocean and the Japan Sea. To the south-east of these mountains, the Temmokusan is also the point of departure of several streams, which form a secondary basin represented by the river Tamagawa which flows from the W. to E. and runs into the Bay of Yedo at Kawasaki. Another secondary basin is formed by several streams which, rising on the N. E. slopes of Fuji no yama, flow into the Bay of Sagami after a course mostly south-east.

From Warabi to Kumagai the road takes the left bank of the Todagawa. Kumagai is an important producing centre. A large trade in cotton and silk-worms' eggs is carried on there and the number of houses is estimated at from 1000 to 1200.

[29] All this country (Musashi no kuni) is rich and well cultivated. The mulberry grows in abundance, as do maize, various cereals, rice and cotton. Tea is but little produced and is of an inferior quality.

Leaving Kumagai, an arm of the Todagawa is passed, much diminished in summer, but which, judged by the breadth and rugged appearance of its bed, must be a formidable torrent at certain times of the year. Between the arm of the Todagawa and Honjô, towards a point named Okabe, the traveller leaves the basin of the Todagawa to pass into that of the Tonegawa. Crossing a small affluent on the right bank of the latter river, he arrives at Honjô, an important centre of 1000 houses, owing its importance less to its commerce than its position, being the point at which the Nakasendô gives off a branch to Nikkô. Formerly and at no distant date numerous travellers and pilgrims journeyed from Ôsaka and Kiôto to Nikkô. After leaving Honjô the road to Nikkô takes the special name of Reiheishi Kaidô, trending due north in order to pass the Tonegawa at a distance of about 1 *ri*, and from thence taking the direction of Nikkô.

The Tonegawa appears to take its rise to the north of Mikuni yama and Otoko yama, among a series of mountains the western slopes of which would form the basin of the Chikumagawa (Sea of Japan) while those of the eastern side would give rise to the various affluents of the Tonegawa (Pacific).

The Tonegawa flows to the N. E. as far as Shimmachi, and afterwards to the E., discharging itself by one branch into the gulf of Yedo, and by another directly into the Pacific to the north of the gulf of Yedo, forming in these two directions a confused delta, after having received numerous affluents from the mountainous countries comprised between Asama yama, Kusatsu and Nikkô. The Tonegawa is crossed by ferry a short distance before Shimmachi; the broad, rough and stony bed of the river shews that this passage can hardly be made without difficulty at certain seasons of the year.

Shimmachi is a place of no great importance; a road [30] leads from thence to Tomioka (a distance of 6 *ri*), where the government has established a model silk-spinning factory, under the direction of a Frenchman, M. Brunat. After Shimmachi the traveller passes an important tributary of the left bank of the Tonegawa, and arrives at Takasaki, the point where he leaves the Nakasendô to reach Kusatsu. Towards the west may be perceived the summit of Asama yama, crowned with smoke

and whitish vapours, and from the west round to the north and north-east a confused series of high mountains. The boundary of the plains forming the basin of the Tonegawa is now reached.

Takasaki is an important centre, furnishing everything necessary to the inhabitants of the surrounding mountains, and attracting to itself all their trade. The town, which is very long, extends itself on both sides of the Nakasendô and contains about 2000 houses.

A large trade is carried on there in cotton goods manufactured in the country, particularly in stockings (*tabi*). A certain quantity of silk worms is also bred there, and it seemed to me that the greater number of these were the *Yama-mai* (bombyx of the oak?). The drinking water, which since leaving Yedo has been invariably found good, and of a mean temperature of 15°, is very bad at Takasaki.

The Nakasendô, which we leave at Takasaki, and with which we shall have nothing more to do in this itinerary, seems then practicable for carriages from Yedo up to this point, but although the route may appear good at a dry season of the year, the nature of the ground clearly indicates that this same road would become heavy and often impracticable after continuous rains. The formation on this line, which opens up great commercial centres, of a macadamized road practicable for carriages in all weathers, would greatly advance the prosperity of the country.

The passage of the secondary branch of the Todagawa (Arakawa) after Kumagai, and of the Tonegawa in advance of Shimmachi may offer insurmountable difficulties at present, and could only be secured by the construction of bridges with stone piers strong enough to stand against a sudden rise of the stream.

[81] From Takasaki a footpath winds across rice fields, and after passing Kamiyama, follows the left bank of a small tributary of the Tonegawa as far as Sannokura. The ascent then begins to make itself felt: we are entering into the mountainous region.

At one place it is only possible for a *jinrikisha* to pass, and this with difficulty, while the ground is broken and uneven. It is preferable to travel on foot, on horseback, or in a *kago*. The temperature is sensibly lower; the nights are already cooler. On issuing from the

village an old ruined temple may be observed surrounded by venerable and very remarkable trees, the situation presenting some beauty. From Sannokura to Ôdo the road rises continually, and walking becomes more difficult. The views are picturesque and varied. Fresh springs of an excellent quality gush from the mountain. The vegetation, always rich, changes its aspect, and varieties of the oak, walnut and chestnut are observed.

On arriving at Ôdo the traveller enters another basin, the waters of which, springing from the north of Asamayama, flow from west to east, and empty themselves into a main current which passes to the west of the Mount Mitsu-ne san, and flowing from north to south, discharges itself upon the left bank into the Tonegawa. There is nothing remarkable about Ôdo but its very picturesque position, and traces which would seem to indicate that the spot had been formerly a consecrated one. Frequent cultivations of hemp (*asa*) are met with from Ôdo to Sugao and further on. The Japanese enclose it in long boxes of rectangular form, wherein it is packed in bundles placed vertically.

Beyond Kamiyama the transport of goods is performed on the backs of men, horses, or oxen. The country is stocked with mares; entire horses are in general excluded. In the same manner more cows than bulls are to be seen. The pack-horses are quiet, coarse and capable of supporting great fatigue. The shape of the back (which resembles that of the mule) enables them to carry enormous loads. The weight of the [92] burden fixed by the Government is 32 *kuan*, which, at 4 kilos per *kuan*, is 128 kilos., but generally they are loaded with three bags of rice each weighing 16 *kuan* or a total of 48 *kuan*, equal to 192 kilos., an almost incredible weight. The animals travel 9 *ri* per day over very bad roads. The hind feet are unshod; on the fore feet the straw shoes are fastened. They boldly face the steepest gradients and descend the worst paths, being guided solely by the voice, the simple bridle in the mouth being used only to stop them. The mares are singularly good-tempered, are well treated by the peasants, nor have I ever been witness of a single act of brutality. This breed of animals, though ill-looking, is precious, and great caution should be exercised in introducing foreign blood into it, especially that of American stallions, of which the Government, to its cost, has had some experience during the past two years. The cows are



fine, in good condition and very gentle. A little milk can always be got from them. These observations are applicable to all the mountains of this basin.

Sugao is a miserable village of no resources, and it is difficult to find there even a bad inn. A peasant showed me for a few tempos two somewhat curious animals taken in the mountains. One is of the rodent family, a kind of grey squirrel which must be somewhat analogous to what is commonly termed the flying squirrel. An elastic membrane on either side unites the anterior and posterior extremities. It is armed with very strong claws, and is about twice as large as the common squirrel of Europe. Its eyes are very convex, and its dread of strong light makes me believe that it is a Nyctalope. It feeds on nuts and fruits and is called by the natives Momoga. The other was a bird of the family of the waders, which lives on fish caught in the streams. There is no appearance of a tail, which gives it a singular look. The specimen I saw was, indeed, very young. It is said to grow to the height of four feet.

From Sugao to Naganohara the road becomes more difficult and picturesque. Before reaching Naganohara you pass, by means of a bridge of very original construction, a [83] deep and rapid stream running between high banks, which is fed from various sources, notably from the northern slopes of Asama yama, and from Yokozasa yama (the latter to the N. E. of Asama yama).

This stream flows from Kazana-no-yu, the source of the warm springs, runs from west to east, passes to Kawara-no-yu, also the source of warm springs, and receives at Naganohara the torrent produced by the warm waters of Kusatsu. On the left bank of the torrent, at the foot of Yakushi-ga-take, are to be found the waters of Yomo no yu and Sawatari, and on the right bank, near to Mount Kompira yama, is Ikao, a sufficiently celebrated hot spring.

After a somewhat disagreeable walk of 8 *ri* Kusatsu is reached. On leaving Naganohara the road overlooks the torrent, which it commands from a considerable elevation. This portion of the road is not without difficulty for horses that are either restive or not sure-footed. In the almost vertical sides of the rocks which flank the path a natural recess

has been availed of to rear a temple of singular picturesqueness. The remainder of the road presents slopes of much difficulty of ascent and descent, but in no sense dangerous.

### III.—KUSATSU.

Kusatsu is at this moment (1873) a village consisting of a hundred or so of houses built round the numerous springs of warm water which gush from the soil, it may be said, at every step. These springs are nearly all concentrated in a kind of tank so commanded by the hills, that from the village itself none of the interesting scenery of the neighbourhood can be seen. But as you ascend the surrounding slopes to the south-east, the remarkable summit of Asama yama comes into view, the foot of which is only 6 *ri* distant, and towards the east and north-east a chain of wood-clad mountains, which, without possessing the imposing character of the Alps or Pyrenees, are not wanting in a certain grandeur and present considerable attractions to pedestrians. The vegetation, more sparse and less rich than that of the lower plains, is still respectable, [34] though the various kinds of trees do not attain any great size. Tall thin pines, similar to those of central Europe, are to be met with and the birch begins to appear. Ferns are abundant. Considerable spaces may be seen covered with a tall thick grass, which has given its name to the district (*kusa* grass, *tsu* place). Another etymology is *kusa*, a root signifying 'stinking,' and *tsu* a river bank where people collect to wash clothes, etc.

#### RESOURCES.

The village of Kusatsu was formerly large and numbered, it is said, 1000 houses. A fire almost entirely destroyed it in 1872 and it is now rising with difficulty from these ruins. The crowd of Japanese who assemble here to gain relief from their frightful maladies is very large, and it is difficult to find lodging room. It is also to be remarked that you only see at Kusatsu Japanese of the lowest class, the victims for the greater part of horrible diseases. The tea-house which combines the greatest conveniences is one named Nakagawa, in the centre of the village. There is in this house a warm spring of the lowest known local temperature and therefore best suited to Europeans, who are not

accustomed to being boiled alive. But this house, which is the *rendezvous* of the Japanese of the lowest class, has the great inconvenience of being very noisy. Few nights can be passed without the accompaniment of *samisen*, *geishas* and the cries of drunken men. The complaints of Europeans on this head are unheeded, and the proprietor prefers to his European customers his ordinary Japanese visitors, who cross him in nothing. The tendency to raise prices upon foreigners is soon seen in little details after a few days, and this will increase from year to year.

Lodging may be also had among the bonzes, who are pleased to gain a little money. But the temple is on a hill remote from the springs and is not therefore convenient for those who visit the place for the sake of the waters. There are also two or three small tea-houses where accommodation may be had near the stream known as the *Kompira no yu* on the N.W. of the village. As regards [35] the means of subsistence, the country furnishes little. The neighbouring fishermen bring to market good mountain trout (*Yamome*) and a small fish called *ai*—the latter but rarely. Quails (*udzura*) are also to be found. The land grows potatoes and beans; eggs are plentiful, but chickens or ducks are scarce. Game is found in the winter,—hares, pheasants, wild boar, deer and even bears, but in summer it is almost impossible to obtain any.

#### CLIMATE.

The climate of Kusatsu appears to me to answer perfectly to the wants of Europeans during the hot months. A series of more accurate observations subsequently made will give greater certainty to the assertions which I would at present make with some reserve, as I had neither the means nor the time to observe very carefully. According to approximate comparisons, having, as I have said, no more than this value, I suppose that the elevation of Kusatsu is between 1500 and 1600 metres. The mornings and evenings are cool and the nights often cold. I regret that I had no registering thermometer to give an exact idea of the temperature at night, but I imagine that it falls to 18° even in August. I did not observe any maximum over 26°, when it must have been torrid in the plains.

The day breezes appear to be generally as on the coast, S.W. and S.S.W., and are of almost daily occurrence. The solar rays from a clear sky have certainly the same intensity as on lower levels, but are tempered by the elevation and the pure air of these regions. They are thus bearable, and even in the middle of the day walking produces no distress. There were frequent storms during the month of August, but the rains were moderate and generally short. The appetite soon becomes stimulated and remains good, exercise is felt to be agreeable, and sleep profound and restorative. Mosquitoes are unknown and flies rare in airy houses.

The springs of drinking water are numerous and very various in the midst of a confusion of waters of all kinds. Some are passable, others very good, and pains must be [86] taken to find them. Near the Nakagawa inn there is an excellent one with water at  $11^{\circ}5$  and even  $10^{\circ}$ , slightly aperient in its effects, but it may be taken in any quantity with impunity. Earthquakes seem rare, and the inhabitants show their indifference to them by building houses of two stories, which recall the chalets of Switzerland. Roofs are at a very open angle and weighted with large stones. This peculiar feature is observable from Sannokura. The inhabitants leave Kusatsu at the end of October and return towards the middle of May. During the winter months a sufficient number of men to guard the houses is left. The snow is said not to exceed three feet in thickness, and the inhabitants only move to a distance of 2 or 3 *ri*, where they find a tolerable climate.

#### GENERAL ASPECT OF THE WARM SPRINGS.

In the centre of the village there is a large rectangular tank whose largest dimensions are from W. to E. Several streams and neighbouring springs are concentrated here. This tank, constructed in ages long past, is a sufficiently remarkable work, for it was necessary to divert the spring and build in water of a high temperature—perhaps from  $55^{\circ}$  to  $70^{\circ}$ . It was covered in and divided into many compartments, but the fire of 1872 entirely destroyed this edifice.

The waters towards the east enter by a fall of from 4 to 5 metres, and this is used for *douches* in the lower part of the tank.

Those waters fall into a stream of warm water which, issuing from the side of the mountain on the N. E. of the village, flows through the village from the N. W. to the S. E., and having received all the waters from the various springs, joins, after a tortuous course among the surrounding hills, the stream of Naganohara, which, as I said above, carries off all the water to the Tonegawa and from there into the Pacific.

The central tank and all the springs and streams produce constant whitish vapours of a sulphurous odour. The vegetation is in no way tainted by these exhalations, and grass and trees grow to the edge of these streams, [87] which stand at a temperature of 55° and upwards. The bed of the streams, the stones of the tank, and the conduits employed to conduct the waters are by turns green, yellow or white, according to the composition of the waters, of which I will speak further on.

A study of the phenomena produced by these waters would be extremely interesting and well merits the attention of the specialists who sooner or later will devote themselves to it. The temperatures change several times a day. The maximum appears to be towards the middle of the day, the minimum at sunrise. I give this observation, as all others, under full reserve. Curious phenomena occur. The principal stream (which I shall name N. O.) received some years ago a small affluent on its right bank. This affluent was also warm and ran intermittently every other year, but for the last seven years it has disappeared. The dry bed of the torrent is now called "Sai no gawara" (the Dry River of Souls). A hot spring which rose vertically to the height of one metre from below the soil also disappeared in 1870. The Japanese regard it as the place of departed infant souls. On the numerous rocks of this dry bed they superstitiously heap up small stones, which produce a very singular effect. Among these rocks is one which the Japanese regard and show with much curiosity. It is a rocking stone which can be set in motion with the hand and then regains its equilibrium. It is called Yurugi-ishi. The site is wild and suggestive of superstitious legends. At a short distance there is a natural circle in a lonely and silent spot. A number of stones ranged around suggest a wrestling arena. The place is named Oni no Sumôba, "the arena of the devil's wrestlers." Beyond this a path leads through the grass

to a place distant about 8 kiloms. which the Japanese glorify with the name of the Kôri-ba or Kôri-dani glacier. There are rocks exposed to the full north, and in the crevices of which lurk small remnants of snow and ice, but I could not find as much as would weigh a pound. I have enlarged upon these details because they are the only curiosities of the country. Beyond this small excursion, [38] at a greater or less distance, some picturesque site, some torrent or remarkable wood may be found, but the environs are but little known. The celebrated volcano, Asama yama, the crater of which, always emitting smoke, is to be seen at a distance of 6 *ri*, and the lurid glare from which may be seen on dark nights, is a further attraction to the tourist. The ascent has been made several times ; it offers some few difficulties but attracts the natives but little.

In 1870 (or 1871 ?) the volcano ejected stones to a distance of 2 *ri*. Several houses were destroyed and lives lost. In the neighbouring mountains there are certain peaks which may easily be ascended, among others Shirane yama, but they afford only a small interest, the weather being rarely clear enough to afford a fine distant view.

It remains for me to speak of the warm waters, their composition and effects, as well as the manner in which they are taken.

The subject, indeed, is wholly within the domain of medical science, and I can only be expected to give uncertain information upon it. There exists in the country a very old work entitled "*Nintô annai-ki*," which may be translated "the bather's guide," containing the names of the principal springs and the diseases which should respectively be treated at them, as well as a series of precepts for the use of the waters, precepts which contain among many false ideas some sound and wise counsels, the justice of which I have learned by experience. Even in default of science the practice of several centuries has enabled these people, themselves ignorant, to discover some useful rules. I have deemed it useful to give as accurate a translation as I could of this little work, only adding to it a few observations and the registered temperatures.

Before entering upon this technical portion of my task, which may not interest all my readers, I shall conclude this paper by observing that according to national traditions these waters of Kusatsu and their virtues were discovered from 1000 to 1100 years back. The peasants

[39] were the first to make experiments with them. But subsequently, Yoritomo, hunting one day in the neighbourhood of Asama yama, and having fallen sick, heard from one of the peasants of their singular virtues. He used them with benefit to himself, and thus became the author of a reputation for them which many centuries have not diminished among the people of Japan.

#### IV.—COMPOSITION AND EFFECT OF THE WATERS OF KUSATSU.

The waters would seem *à priori* and by the accounts of the natives, to contain the following elements :

Sulphur .....	<i>Yuwô,</i>
Alum .....	<i>Miyôban,</i>
Sulphate of Copper .....	<i>Tampan,</i>
Arsenic .....	<i>Yoseki,</i>
Borax .....	<i>Hôsha,</i>

either pure or mixed according to the springs. A scientific analysis made on some samples taken to Yedo will hereafter give more exact results.

The temperature of these springs or streams ranges from 38° to 55°, 60°, 70° and above. In each spring the temperature varies several times daily.

#### V.—TRANSLATION OF THE "NIU-TÔ ANNAI-KI" OR BATHER'S GUIDE.

1.—The spring called "*Goza no yu*" appears to be exclusively sulphurous; Temp. above 55° (estimated at 65° to 70°?) Useful for the treatment of the following diseases :

1. *Raibiyô* ..... Leprosy.
2. *Ganbiyô* ..... Ophthalmia.
3. *Sho harimono* ..... Every kind of soft tumour.
4. *Mumei no dekimono* ..... Ulcers without names.

2.—The spring "*Netsu no yu*" seems to contain sulphates of different salts. Temperature very high. Much frequented, specially by syphilitic patients. Useful for the treatment of—

1. *Taidoku* [40] ..... Constitutional syphilis ?

- 2. *Hizen* ..... Inveterate scabies.
- 3. *Yokone* ..... Bubo or reduced syphilis.
- 4. *Senki* ..... Renal disease.
- 5. *Yobaisô* ..... Syphilitic eruptions.

3.—The spring called "*Kakke no yu.*" (The water seems composed of sulphate of copper in 3 tanks. Temp. 47°, 48° and 52°.) Useful for the same diseases as No. 2, and for diseases of the lower extremities (*kakke*, dropsy?).

4.—The spring "*Wata no yu.*" In 2 tanks. Temp. 46°.5 to 48°. Useful for the treatment of—

- 1. *Hiyeshô* ..... Shivering.
- 2. *Hizen* ..... Inveterate scabies.
- 3. *Shitsu* ..... Simple scabies.
- 4. *Mushi* ..... Intestinal worms.
- 5. *Mune senaka itami* ..... Pains in the chest and back.
- 6. *Koshi no itami* ..... Renal diseases.
- 7. *Senki* ..... do.
- 8. *Go ji* ..... 5 affections of the rectum.
- 9. *Koshi no yamai* ..... Renal diseases.
- 10. *Rôgai* ..... Consumption.
- 11. *Hakkiyô otoroye* ..... Nervous fever? (Seminal weakness.)

5.—Spring called "*Taki no yu.*" (The fall on the east side of the great tank. Height of fall 2 to 3 metres. Sulphates of copper and alum. Temp. 48° to 47°.)

Useful for the treatment of—

- 1. *Jôki*..... Congestion of the head.
- 2. *Dzutsu*..... Headache or neuralgia.
- 3. *Me-mai* ..... Fainting.
- 4. *Kennun* ..... Vertigo.
- 5. *Gambiyô* ..... Ophthalmia.
- 6. *Raibiyô* ..... Leprosy.
- 7. *Uchimi* ..... Contusions or contused wounds.
- 8. *Namadzu*..... White leprosy.
- 9. *Hizen* ..... Chronic scabies.
- 10. *Renso* ..... ——— ?



11. *Tan* [41] ..... Excessive expectorations.
12. *Moromoro no Sô-doku*..... All syphilitic diseases.
- 6.—Spring called “*Washi no yu.*” (Tem. 49°.5 to 51°.) Useful for the same maladies as No. 4, and for—
1. *Rîmbiyô* ..... Gônorrhœa.
  2. *Jishitsu* ..... Eczema of the arms.
  3. *Dakkô* ..... Prolapsus ani.
  4. *Tanseki* ..... Catarrhal cough.
- 7.—Spring called “*Matsu no yu.*” (Temp. 46° to 51°.) Useful for the same affections as No. 2, and further for *Rîmbiyô*, *Dakkô*, *Jishitsu*, mentioned in No. 6, and for—
- Sôdoku* ..... Syphilis.
- 8.—Spring called “*Chio no yu.*” (Destroyed by the fire of 1870.) Useful for—
1. *Kasa no rui* ..... Syphilis.
- Taidoku, Hizen, and Yobaisô.*
- 9.—Spring called “*Jizô no yu.*” (Temp. 48° to 52°.5. Useful for the same maladies as *Wata no yu*, No. 4.)
- 10.—Spring called “*Kompira no yu.*” (This spring, situated at the foot of the temple of Kompira Sama on the right bank of the stream N. W., flows through the several tanks at a temperature of 42°, 46° and 48°. Seems to be composed of sulphates and aluminates. Useful for the same affections as *Netsu no yu*, No. 2.) People attacked with *Raibiyô*, *Namadzu*, *Tamushi* and *Dekimono* are formally excluded from it.
- 11.—Spring called “*Tama no yu.*” (This spring is destroyed.) The following maladies used to be treated by it: *Hiyeshô*, *Mushi*, *Munosenaka itami*, *Hizen*.
- 12.—Spring called “*Ruri no yu.*” (This spring is destroyed.) Useful for the same maladies as *Tama no yu*, No. 11, and further for *Mambiyô*. Patients attacked with *Raibiyô* are excluded.
- 18.—Spring called “*Shirasu no yu.*” (Spring destroyed.) The following diseases were treated here :
1. *Shitsu* ..... Simple scabies.
  2. *Hizen* ..... Chronic “
  3. *Senki* ..... Renal disease.
  4. *Subaku* [42] ..... Hysteria ?

5. *Hiyeshô* ..... Chills.  
 6. *Kasa no rui* ..... Syph. diseases.  
 7. *Tadare* ..... Inflammation.

14.—Spring called “*Niyegawa no yu.*” (Destroyed.) The following diseases were treated there : ‘

1. *Umi*..... Pus.  
 2. *Shiru* ..... Leucorrhœa.

Spring in the Nakagawa tea-house.

(This spring is not cited in the above work. It has a taste strongly tainted with alum, and contains sulphur and sulphate of copper. The inhabitants use it but little on account of its temperature, which I found was 88° to 42°. Europeans suffering from slight complaints seem to derive benefit from it. Constant use of it seems to provoke irritation of the skin, especially in the folds. It stimulates the functions of the kidneys. The following rules of Japanese hygiene are applicable).

#### RULES TO BE OBSERVED IN TAKING THE WATERS.

‘On arriving at Kusatsu after a long journey and fatigued, it is well to repose for some days before commencing the treatment. The baths must not be resorted to in excess at first. During the first three days of treatment not more than three a day should be taken. After five or six days one may advance to five or six baths, but never more than this. In general, rather than decrease the daily number of baths, it is better to intermit a day if necessary. The ordinary duration of the cure is three weeks, and for more serious cases from seven to ten weeks. For the gravest cases from 100 to 150 days. It is well to repeat the treatment the next year at the same season, in order that the germs of the disease may be uprooted. The number of baths should be limited, and their effect is diminished if this rule be neglected. During the first six or seven days, simple bathing should be resorted to, after this period the action of the *douche* may be submitted to. It is most dangerous to take this too early.

[48] ‘In order to take the bath, the water must not be entered at once. The skin must first be moistened with a towel or sponge soaked in the warm water; the hands, feet, armpits and breast. The hair

must be allowed to float unfettered (this is for the natives and for women) and a *hishaku* (dipper) should be used to pour water over the knees, shoulders and head. Only after this preparation should the bath be entered. It is not well to remain too long immersed. If this is done the blood mounts to the head, the lungs become congested, vertigo ensues and consciousness is lost. It is not uncommon to see accidents of this nature happen to persons who use the baths without these safeguards. (I have been a witness of this; the natives often lose consciousness while taking excessively hot baths.)

‘Generally speaking, and if the virus is diffused throughout the body and into the members, syphilitic patients on taking the bath should place a folded cloth upon ulcerated portions of the body and dab them repeatedly with another cloth. In this manner the virus can be quickly expelled from the body. (Text is obscure here.)

‘In spite of adherence to this treatment it sometimes happens that fits of shivering are experienced, headaches, intolerable irritation of the skin over the whole body, eruptions on the skin and slight excoriations which produce distress. But these need cause no disquietude; they are signs that the disease is diminishing: the impure blood is disappearing. (Irritation of the skin more or less acute almost invariably accompanies the treatment. It is well to intermit the baths for a few days in case this irritation becomes very severe and to wash the parts most affected with white rice water. After a stay of proper duration at Kusatsu it is customary to pass a few days at the neighbouring villages, the waters of which have the property of allaying the irritation produced by the waters of Kusatsu. When the skin is irritated, and in general, it is not well on coming out of the waters of Kusatsu to rub it with force as is customary among Europeans. It must be dried by light dabbing, and hot clothes should [44] not immediately be put on, practices recommended elsewhere by the Japanese author. It is even well to remain unclothed for a few minutes.)

‘It also happens at times that the sight becomes disturbed, as if foreign bodies or small specks had got into the eye, and this is very distressing. But neither need this cause disquietude. In four or five days the trouble disappears and the sight becomes stronger than before

the period of treatment. In general every species of malady seems to increase at the commencement of the treatment. This arises from the fact that the malady is commencing to disappear.

'In regard to the vertigo and faintings of which mention was made above, no anxiety need be felt about them. They are favourable symptoms. If the irritation of the skin under the armpits and between the thighs really become very distressing, and even if, on the patient trying to allay it, a yellowish fluid appears, this arises from the virus of the scabies (*Hizen*) coming from the body. No heed need be given to this.

#### METHOD OF TAKING THE DOUCHE.

'The water must first be entered as above described and the patient can then go under the douche. The soles of the feet, the hams, the shoulders and head should be submitted to it : not so the chest, belly, or back, for this is dangerous in each case. It is bad only to douche the affected part, or to remain under the influence of the douche too long. It is best to remain in it but a short time.

#### GENERAL OBSERVATIONS FOR THE TREATMENT OF LEPROSY, ETC.

'For different phases of leprosy, *Raibiyô*, *Namadzu*, *Tamushi*, a cantery (fire) (*issoku*, lit. one hundred points of fire, by the moxa) must be placed around the discolored spots so that the virus cannot spread. For lepers it is of small consequence to place the moxas on any part of the body whatsoever. (This phrase can only be understood after it has been explained that the Japanese [45] only apply fire to certain fixed parts of the body ; the moxas are applied to each affected spot on the body and on the surface comprised in this perimeter.) Four kinds of moxas are used, respectively called large, middling, small and "moxa for the face." The last is used for the face alone.

'On the day fixed for this operation, a bath is taken before noon, and then interdicted. The moxas are applied at 2 p.m., and the use of the bath is suspended until the following day at 10 a.m. If a bath were taken immediately after the operation, the fever caused by canterization would be exacerbated, and this would be dangerous.

'Whatever may be the gravity of the leprosy, the cantery must not be applied without intermission. After each application there must be an interval of five days, when the moxas must be placed between the former blisters.

'Be the gravity of the malady what it may, the preceding rules must absolutely be adhered to.'

(A great number of the unfortunate victims of this dreadful disease are to be met with at Kusatsu. It is easy to recognize them by the sight of their bodies, which are literally covered with the scars of cantery. In such numbers, indeed, do these scars exist that but for their regularity it would be imagined they were due to a natural eruption. It is pretended that no pain is felt during these cruel operations, and that a complete insensibility of the skin is one of the characteristics of leprosy. The Japanese do not regard it as contagious except through sexual contact. They add, however, that women are then attacked with leprosy.)

One of the first symptoms of leprosy consists in a whiteness and unusual brilliancy of the skin. The disease is virtually incurable, and the severest treatment arrests its course but slightly. Its frightful effects in Japan must be known to all.)

'In conclusion, the sick of all provinces (of Japan) who require to take the waters can go to Kusatsu when [46] they will. The inhabitants return to the mountain on the 8th day of the 4th month of each year (May). Still it would be an error to imagine that the place can only be visited at that time. If a malady takes a very aggravated form, the waters may be taken from *Shōgatsu* (January-February) and even before this. But at that time of the year bathing must only be indulged in by day.

'The above rules have been epitomized in the service of bathers.

"ME ARAI YU"—SPECIAL SPRING FOR THE EYES.

'This spring is to be found behind the "*Goza no yu*," where the water issues from a small rock-cleft. The other warm springs of Kusatsu cause a painful smarting of the eyes—probably owing to the presence of sulphate of copper. The water from this source, on the contrary, causes no smarting. Immediate benefit to the sight accrues from its use. (This assertion is actually true.) All cases of ophthalmia are positively cured by this water, which is truly a gift of the gods.

ENUMERATION OF PROHIBITIONS TO BE OBSERVED WHILE UNDER TREATMENT.

'Excess in eating and drinking or in any other form must be avoided, as well as too prolonged a fast; the use of the baths must be

temperate and the bather must not remain in too long ; no bathing from midnight to sunrise or during heavy rains or typhoons or severe thunderstorms, and the patient must not shout or sing while in the bath. He must avoid covering himself, on leaving the bath, with warm clothes, which cause perspiration. (This observation would appear of questionable wisdom ; but it is sanctioned by experience, and I have found myself much the worse for disobeying the rule.) Excessive eating or drinking after the bath must also be avoided, as has been said above.

'Those who are too fond of wine (*sake*) are not good subjects for treatment (lit., it is not advantageous, etc.) Yet it is well to banish melancholy and to keep the mind free.

'To those who ordinarily digest well, nothing is interdicted ; [47] but digestions which are delicate and fastidious must not be forced. During the period of treatment, food must not be taken which the patient knows would disagree with him in his disease.'

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Thus ends this curious little work, of which I have given as accurate a translation as possible, a translation which has been revised by Mr. Satow, to whose courtesy I am indebted for the itinerary to Kusatsu (in July 1873).

I will conclude by advising travellers going to Kusatsu to finish their course of the waters by a stay of a few days at Sawatari and Ikao, villages in the neighbourhood also possessing warm springs, and to return to Yedo through Nikkô, striking the "Reiheishi kaidô" at Takasaki, or more directly through the mountains from Ikao to Nikkô. But this latter route, which saves only 9 or 10 *ri*, is very difficult and is impracticable with luggage.

The waters of Ikao are hot (40° to 45°) and do not appear to me to contain any salt. Those who have gone through a course of treatment at Kusatsu are recommended to stay at Ikao to get rid of the eruptions and distressing irritations caused by the former waters. This assertion is well founded. The stay at Ikao is also extremely agreeable in view of its pleasant climate.

LEON DESCARMES,  
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**TABLE OF TEMPERATURES OBSERVED FROM THE 1st TO 31st  
AUGUST, 1873.**

*(From Yedo to Kusatsu—Station at Kusatsu—from Kusatsu to Nikkō.)*

Date.	Morning.	Noon.	Night.	Water.	Winds.	Observations.
1	28.5	32	31	16	S. S. W.	Morning Misty. Fine.
2	27	31	31	15.5	..	....
3	25.5	29	30	15	..	....
4	25	28	27.5	15	None.	Fine. Storm in the evening (Sannokura). [48]
5	23.5	23	23	14.5	S. W. light.	Fine. Misty at night (Kusatsu).
6	20	25	20.5	15	S. S. fresh.	Fine (Warm Springs 37 to 55.—70).
7	20.5	24.5	22	14	..	....
8	21	25	24	12	None.	....
9	23	26	22	..	S. S. W.	Fine. Storm and rain at 3 p.m.
10	21	25	24	..	..	Fine.
11	22	26	23	..	None.	Cloudy. Storm at night.
12	25	26	23	11.5	Variable.	Cloudy. Incessant rain.
13	22	23.5	23	..	..	Fine; cloudy.
14	21	25.5	22	..	S. fresh.	Fine; storm; rain.
15	20	2.55	23	..	S. W.	Fine; storm and rain at 4 p.m.
16	20	23	20	..	Variable.	Cloudy; great rain.
17	18	20.5	30	..	..	Constant rain.
18	18	21	21.5	..	S. W.	Uncertain.
19	20	26.5	25	14	..	Fine. Storm at Sawatari p.m. Warm spring 37 to 50.
20	22	27	24	14	..	Fine; storm at Ikao 6 p.m. Warm springs 40 to 45.
21	23	25	24	..	S. W. light.	Overcast (Ikao).
22	25	27	28	..	S. W.	Rain (Takasaki).
23	27	27	28	..	None.	Rain; stormy (Ota).
24	23	31	28	16	..	Fine (Tochigi).
25	27	22	26.5	..	S. & S. W.	Fine, rain at night. (Itabashi).
26	23.5	25	25	..	None.	Overcast; rain at 6 p.m. (Nikkō).
27	22.5	..	25	..	..	Fine; cloudy; rain at 7 p.m. (Nikkō).
28	21.5	22	21	..	..	Incessant rain do.
29	32	23	23	..	E. & N. E.	Violent storm (Typhoon?) (Nikkō).
30	23.2	..	26.5	16	S. S. W.	Rain, fine. (Utsunomiya).
31	22	..	30	..	S. W.	Fine.

The indicated temperatures are Centigrade.

(Formula for reducing Centigrade to Fahrenheit: Multiply the degrees of Centigrade by 9, divide the product by 5, and add 32. This will give the degrees of Fahrenheit.)

[49] ITINERARY OF A JOURNEY FROM KUSATSU TO NIKKŌ,  
AND FROM NIKKŌ TO TŌKIŌ.

From Kusatsu to Nikkō you may pass directly over the mountains, but according to the information I have gathered this route is difficult. The paths are scarcely visible, and you are not sure of being able to procure coolies and beasts of burden.

The route which I followed and which I am now going to describe, is on the contrary easy and pleasant. It offers the advantage of taking the traveller to two warm springs, which are recommended after the use of the Kusatsu waters to mollify the skin and put an end to the often intolerable irritation provoked by the Kusatsu waters. Besides, in taking this route, you strike a high-road that enjoys a certain celebrity in Japan, and is really worthy of the traveller's attention on account of the gigantic trees which adorn it. It is known under the name of *Reiheishi Kaidō*. The route is divided into two principal parts :

1st. From Kusatsu to Takasaki.

2nd. From Takasaki to Nikkō.

If you wish to travel pleasantly and without too great fatigue, it will be convenient to go

From Kusatsu to Takasaki..... 8 days.

From Takasaki to Nikkō..... 4 „

Total..... 7 days.

*First day.*—From Kusatsu to Sawatari, about 9 *ri*. The road passes over hill and down dale and the scenery is very picturesque. Throughout you enjoy the sight of Asama yama, whose summit is crowned with white clouds and makes a splendid effect. You also see Shirane yama, but its effect is much less remarkable. Both these mountains have been climbed; Asama in August, 1878, by an officer of the French Military Mission, who took some observations.

In Sawatari there is a good inn at the entrance of the village. Here, too, are several springs of warm water [50] analogous to those of Kusatsu, but much less strong. Unhappily the tanks are repulsively dirty, and it is impossible to use them.



*2nd day.*—From Sawatari to Ikao, about 2 *ri*. The road is very picturesque, now ascending, now descending. Travel on foot, on horseback or in *kajo* only is possible, and this is also the case on the road from Kusatsu to Takasaki. Ikao is a large village, built in terrace form on a high elevation; from it you look down upon an immense plain, the basin of the tributaries that flow into the right bank of the Tonegawa, which I have already described.

There is a very good inn called Chigira almost at the entrance of the village and on the right side of the main street. From this inn you have a magnificent view, and as a spring of hot water enters the very house there are great facilities for bathing. The tank is clean and well arranged. The water is a little too warm for Europeans and must be cooled somewhat before entering it. Its temperature is from 45° to 48° centigrade. It does not appear to contain any salt, and it produces a pleasant sensation on the skin; it is a little muddy and must contain clay in a state of solution. Outside the tank, in the inner court of the inn, a small pond has been made from the cooled water, and there may be seen gold fish living in a temperature of 35° centigrade.

Ikao is surrounded by woods, and the temperature of the air is very pleasant. In this place a summer might very comfortably be passed, because here are fewer invalids than at Kusatsu, and the surrounding country is much more varied in scenery and picturesque. Besides this you are only one day's journey from Takasaki, where whatever may be wanted can be procured from Yedo.

*3rd day.*—From Ikao to Takasaki about 6 *ri*. The road is picturesque. The descent into the valley is rapid, where the temperature unfortunately rises again.

*4th day.*—From Takasaki to Ôta, 10½ *ri*.

*5th day.*—From Ôta to Tochigi, 10 *ri*.

*6th day.*—From Tochigi to Itabashi, 10 *ri*.

*7th day.*—From Itabashi to Nikkô, 5 *ri*.

[51] The whole of this part of the route can be done in *jinrikisha*. The ground is generally level, and several rivers must be passed. Before Shiba Machi is reached (fourth day) a large tributary of the Tonegawa is met with. The bed of this river is very broad, and its current rapid.

The traveller passes through very important villages, Ôta, Sano,

Tohigi and Kantama. These large centres are not very agreeable; the inhabitants are as yet not accustomed to see foreign travellers there, and it is rather difficult to obtain a lodging. If it is intended to make a halt in these large villages, the best thing is to send a servant beforehand to collect information. The local police are often timid.

Before reaching Nasawara commences that superb row of trees which perhaps is unparalleled in the world. Both sides of the road as far as Nikkō are planted with a double row of trees (*sugi*), three centuries old, planted, it is said, by the *daimiōs* living when Gongen Sama's successor founded Nikkō.

It is to be regretted that the peasants from the neighbourhood set fire to the surrounding grass and bushes. Already the fire has several times reached these magnificent avenues, and some day their total destruction might happen. May I venture to hope that the President of the Asiatic Society will call the attention of the Government to this point?

At Imaichi this road joins the direct road from Tōkiō to Nikkō and from that point the trees are, if possible, yet more remarkable. It would be sad indeed if such an avenue should disappear, even if only partially, through the carelessness of the local authorities.

In order to afford tourists facilities for making changes in the above itinerary, I shall give the same hereafter in every detail.

I do not intend to say anything particularly upon Nikkō, because it has already been the subject of several descriptions. I shall only warn the tourist that yearly from the 24th to the 30th August the roads are swarming with pilgrims, who then travel in numbers to Nikkō and to [52] the holy lake. This assemblage of pilgrims is very curious, but at the same time it makes the road much less agreeable. It is difficult to find an inn where one is not annoyed by a large number of them.

If this itinerary is followed, you will have travelled upon the *Reiheishi kaidō* in almost its whole length. As I already have had occasion to remark in the itinerary from Tōkiō to Kusatsu, the *Reiheishi kaidō* separates itself from the Nakasendō (or Kisokaidō) at Honjō, passes thence directly northwards, over the Tonegawa, and continues its northerly direction as far as the village of Goriō, the point where we again meet the road in coming from Takasaki.

From Goriô to Tomita, that is to say for almost 15 *ri*, the *Reiheishi kaidô* follows a north-westerly direction, passing over 12 or 15 more or less important tributaries to the left bank of the Tonegawa.

From Tomita to Imaichi the road again turns to the north, and thence after having joined the *Nikkô kaidô*, or the road from Yedo to Nikkô, it goes westward to Nikkô.

RÉSUMÉ OF THE ITINERARY FROM KUSATSU TO NIKKÔ.

From Kusatsu to Sawatari .....	9	ri	0	chô.
“ Ikao .....	9	“	0	“
“ Takasaki .....	6	“	0	“
“ Kuragano .....	1	“	18	“
“ Gomura (?) .....	1	“	18	“
“ Goriô ( <i>Reiheishi kaidô</i> ) .....	1	“	18	“
“ Shiba Machi.....	1	“	0	“
“ Sakai.....	1	“	80	“
“ Kizaki .....	2	“	0	“
“ Ôta .....	1	“	30	“
“ Hachigi.....	2	“	0	“
“ Yanada .....	0	“	18	“
“ Kawasaki .....	1	“	0	“
“ Sano .....	2	“	0	“
“ Tomita .....	8	“	0	“
“ Tochigi .....	1	“	18	“
“ Kassemba .....	1	“	0	“
[58] “ Kanazaki .....	1	“	18	“
“ Nasawara .....	1	“	28	“
“ Kanuma .....	1	“	0	“
“ Fubasami .....	2	“	8	“
“ Itabashi.....	1	“	0	“
“ Imaichi .....	2	“	0	“
“ Nikkô.....	2	“	0	“

57 ri 24 chô.

Note.—The *ri* contains 86 *chô*.

Practically the *ri* may be taken to be 4 kilometres, and this calculation will prove rather under the true distance, because the estimation of distances is very inaccurate in these countries, and when a Japanese peasant says 2 *ri* a journey of 9 kilometres may be counted upon.

On the other hand the printed itineraries, which are found in all the districts, make a *ri* longer than it in reality is whenever a river has to be passed in ferry boats. It is well to be warned of this fact, which is explained by the time lost through the passage in the ferry.

The itinerary of the return journey from Nikkô to Tôkiô is well known ; I give it hereafter for information, with the addition of only one detail which may interest the tourist, viz., that if you have undertaken a journey at a season when the rivers are swollen in consequence of rains or melted snow, it is easy to return to Yedo in an agreeable way and without much fatigue. For this purpose you stop at the large village of Koga, on an important tributary of the Tonegawa, and here you can hire boats that carry you in ten or twelve hours to Yedo and even to Nihon-bashi, thanks to the magnificent canal which unites the Tonegawa with the Ô-kawa not far from the sea.

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RÉSUMÉ OF THE ITINERARY FROM NIKKÔ TO TÔKIÔ

From Nikkô to Tokujiro .....	6 <i>ri</i>	0 <i>chô</i>	
“ Utsunomiya .....	4 “	18 “	
“ Oyama .....	5 “	4 “	
“ Koga .....	8 “	0 “	
[54] “ Nakada .....	2 “	20 “	
“ Kasukabe .....	6 “	2 “	
“ Sôka .....	4 “	20 “	
“ Tôkiô.....	4 “	0 “	
	85 <i>ri</i> 28 <i>chô</i> .		

L. DESCARMES,  
*Captain of Cavalry,*  
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## THE SWORD OF JAPAN: ITS HISTORY AND TRADITIONS.

BY THOMAS R. H. McCLATCHIE, ESQ.

[*Read before the Asiatic Society of Japan on the 26th November, 1873.*]

[55] There is, perhaps, no country in the world where the sword, that "knightly weapon of all ages," has, in its time, received so much honour and renown as it has in Japan. Regarded, as it was, as being of divine origin, dear to the general as the symbol of his authority, cherished by the *samurai* as almost a part of his own self, and considered by the common people as their protector against violence, what wonder that we should find it spoken of in glowing terms by Japanese writers as "the precious possession of lord and vassal from times older than the divine period," or as "the living soul of the samurai?"

The sword has in Japan a history of its own, and has formed the subject of several treatises, written with the object of assisting the student of the art of fixing the date and maker's name of a blade, an art which apparently was a subject of great attention from olden times. Among these the principal works are the "*Kotô Meijin*," or "Collection of Names of Old Swords," and the "*Shintô Bengi*," or "Reference as to New Swords." The former was compiled in 1791 A.D., and the latter was published by Kamada Saburôdaiyu in the year 1779 A.D. The expression "old swords" is explained as applying [56] to those made before the 8th year of the period Keichô, or 1608 A.D., while all those manufactured after the same date are included under the heading of "new swords."

Saburôdaiyu, in his preface to the "Reference as to New Swords," gives a short sketch of the Japanese legends regarding the history of the weapon; and though his allusions, in connection with his subject, to the mythology of his country may perhaps provoke a smile, still they

are worthy of note as being the words of an author who is generally held to be a high authority on the matter of which he treats. The translation of this sketch reads as follows :—

“ If we search out in by-gone days the origin of the sword, we find that our country excelled barbarian localities in regard to metal. In the olden times of the Divine period, when Izanagi and Izanami no Mikoto, standing upon the floating bridge of Heaven, thrust down their glittering blade and probed the blue ocean, the drops from its point congealed and hardened and became an island, after which the deities created several other islands. These eventually became a large country composed of eight islands, and amongst the many names of this country—they styled it too the land of ‘many blades.’ In its early days there existed the Divine Swords Tō-nigiri and Ya-nigiri. Then, too, when Sosanoō no Mikoto smote the eight-clawed Great Dragon, and struck him on the tail, the sword of the deity became slightly nicked, and from the inside of the tail he drew out a single blade. ‘This,’ said he, ‘is a marvellous sword,’ and he caused it to be presented to Tenshō Daijin. This was styled the ‘Sword of the Clustering Clouds of Heaven,’ and also the ‘Grass-mowing Sword.’ Should not this be said to be the commencement of fixing the dates of swords? That ‘Sword of the Clustering Clouds’ was made one of the ‘Three Divine precious things,’” (i.e. the Seal, Sword and Mirror held by the Mikados),—“it has had no equal in this country, and, being the gigantic weapon that watches over it, is a thing of great dread even to speak [57] of. Now, when our country had arrived at the Heavenly rule of Sūjin Tennō, the 10th of the mortal Emperors (97-29 B.C.), he feared to dwell in the same palace with the ‘Divine precious things,’ and so he caused a person called Amakuni, a man of the department of Uda in the province of Yamato, a far-removed descendant of Me-hitotsu-gami, to forge an imitation of the sword, and as for the ‘Clustering Clouds’ that had descended from the Divine age, he was pleased to offer it up to the shrine of Tenshō Daijin. Under the heavenly rule of Keikō Tennō (71-181 A.D.), Yamato Také no Mikoto, at the time of his expedition against the East, went to pay reverence at the shrines of Isé. His aunt, Yamato Himé no Mikoto, was the resident of the shrine at that period, and she besought that the Divine Sword of the ‘Clustering Clouds’ might be handed down to him from the shrine, and so gave it

over to Yamato Také no Mikoto, together with a tinder-case attached. This is said to have been the origin of the custom of fastening a charm-case to a sword as a guardian for children. Yamato Také no Mikoto, having accomplished the subjugation of the East, offered up the sword at Atsuta in the province of Owari. Up to the present day, the virtue of this sword, permanent and immutable even unto the end of myriads of ages, is the guardian of our country and our homes, and the protector of our own selves. In no way can it be fully described by the pen! The second 'precious sword' was buried in the Western seas at the time of the death of Antoku Tennô (1185 A.D.)'

Throughout the whole of the above passage, the word 'sword' is invariably rendered by the Japanese word '*ken*,' which signifies a long, straight, double-edged sword, as opposed to the '*katana*' of modern times, which has but a single edge, and is slightly curved towards the point. The '*ken*' is the oldest form, and the '*katana*' the newest, while between the two comes a sword much like the '*katana*,' only a great deal more curved. A beautiful specimen of a '*ken*' is now in the possession of the most noted fencing master of Yedo. [58] It is about three feet in length, and perfectly straight; the blade is some two and a-half inches in breadth, and the point somewhat heart-shaped. It is exceedingly heavy, double-edged, and engraved with various devices. This '*ken*' is said to be between seven and eight hundred years old. The curved sword was worn swinging from a belt, to which it was attached by two strips of leather; it appears to have been a common style of war-sword, and was generally very short. The shape of the '*katana*' was obtained by dividing the heavy '*ken*' down the centre of the blade, thus producing two single-edged swords of more convenient weight. Besides these again, there is the '*wakizashi*,' or short dirk, the custom of wearing which, together with the '*katana*,' as a sign of gentle birth, is said to have been introduced about the commencement of the Ashikaga dynasty, in the early part of the 14th century. The length of this dirk has of late years been gradually lessened to about nine and a-half inches. This is the weapon with which the ceremony of *hara-kiri* was performed, the dirk being then presented to the principal on a small square tray made of white wood, such as is used in temples. Hence the allusion, in a popular song written at the time of

the recent Revolution,—“The gift I wish to present to my lord of Aidzu is ‘nine and a-half inches’ on a temple tray,”—meaning that the author of the song, who was evidently attached to the loyal party, desired nothing better than the death of the nobleman in question.

The names of noted smiths are many in number. The first who appears to be a really authentic personage is one Amakuni, who lived during the reign of the 42nd Emperor Mommu Tennô (about 696-707 A.D.) He is stated to have been a man of Uda in Yamato, and this circumstance, coupled with the fact of similarity of name, induces the belief that he was a remote descendant of that Amakuni whose name has been mentioned above as having made a sword in imitation of the Divine blade called “Clustering Clouds.” There are various tales of other clever smiths before the time of Mommu Tennô, but it [59] is hard to place much reliance on these legends. With regard to later times, the “Reference as to New Swords” says, “The good makers of olden days were Kamigé, Shinsoku, and Amaza,—and of the middle ages, Munéchika, Yasutsuna, Sanémori, Yukihiro, and Yoshimitsu, with Kuniyoshi of Awataguchi (in Kiyôto). There were many Bizen men of old,—in the period Shôkiu (1217-1220 A.D.) there were numerous artisans,—and subsequently came Masamuné and Yoshihiro, who were universally renowned.” Of the above names, Yoshimitsu is placed by the author of the work as first in point of merit.

It appears rather strange that in this list there should not be found the name of Muramasa, who is certainly one of the most widely known smiths of Japan; it is most probable that his name was omitted by some oversight, as he is mentioned elsewhere in the book. The four makers of swords who seem to be best known in Japan are Munéchika, Masamuné, Yoshimitsu, and Muramasa. Of these Munéchika is by far the oldest; he was born in 988 A.D. and his swords were famous from 987 A.D. downwards. Masamuné and Yoshimitsu acquired their renown towards the end of the 13th century, while Muramasa did not appear till nearly a century after them. These makers, as indeed all smiths of any note, had their own marks which they engraved on the hilt of the sword, most frequently accompanied by a date, but as, of late years, the practice of counterfeiting the marks of well-known makers has been largely indulged in, these are not always to be depended upon. Mura-



masa was succeeded by his son and his grandson, who both bore the same name, and the latter of whom flourished in the early part of the 15th century. The blades turned out by this family acquired the unenviable reputation of being unlucky and of frequently bringing their owners into trouble. Mr. Mitford, in his "Tales of Old Japan," narrates the legend as to the reason why the Yoshimitsu blades were deemed of good omen in the Tokugawa family, while those of Muramasa were thought unlucky.

[60] The profession of the smith was deemed an honorable one, and those who engaged in it were generally men of good family. It is mentioned of the Emperor Gotoba Tennô, who succeeded to the throne in 1186, that not only did he "give directions to the noted smiths of the various [provinces and make them forge, but also worked with his own hand." In later years the famous smiths received from the Court an honorary rank, which was in proportion to the renown they had gained. Thus it is a common thing to see engraved on a sword the name of the maker, with the title "*kami* of such and such a province" appended. This, however, is also explained by the assertion that the maker engraved on his work the title of the nobleman in whose jurisdiction he lived; but of the two explanations the first-named is apparently more worthy of credit. To these names a date is generally added, while on the other side of the hilt is occasionally written a motto or a verse of poetry, some of which are rather curious. Subjoined are a few of these, selected at random :—

"There's nought 'twixt Heaven and Earth that man need fear, who carries at his belt this single blade:" again,—"One's fate is in the hands of Heaven, but a skilful fighter does not meet with death:" and again,—"In one's last days, one's sword becomes the wealth of one's posterity."

Apart from these mottoes, it was a common custom to give names to famous swords. 'Little Crow' was the title of one in great repute in the Taira family, while in the house of Minamoto there were two hereditary swords named "*Higekiri*" and "*Hizamaru*." The two latter names arose from the circumstances that when these swords were tried on two criminals sentenced to decapitation, one cut through the beard of the victim after severing the head from the body, while the

other also divided the knee. The historian Rai Sanyô narrates the fact that the forging of these two swords occupied the smith for a period of sixty days. The dirk with which Asano Takumi no Kami, the lord of the famous "forty-seven rônins," [61] committed *hara-kiri*, is still preserved at the temple of Sengakuji in Yedo, while swords alleged to have belonged to Minamoto no Yoritomo and to the Taikô Hidéyoshi are to this day shown at the shrine of Hachiman at Kamakura.

It was the writer's good fortune, in the spring of the present year, to pay a visit to the famous shrines of Nikkô in the province of Shimotsuké. The highest mountain of that cluster of hills is called Nantaizan, and has been considered for many ages a sacred place. Upon this mountain are several small *torii*, or gateways, such as are seen leading up to Japanese temples, and these guide the traveller to a small shrine at the summit. Here, on a bare rock overhanging a steep precipice some sixty or seventy feet in depth, lay, half-buried in the snow, a large number of sword-blades, old and rusted, which had evidently lain there exposed to the wind and rain for many years back. Tradition says that, in old days, any one who had committed a deed of blood with any weapon, was accustomed to make a pilgrimage to this mountain, and there fling away the instrument as a sort of expiation for his crime. The guides on the spot, however, stated that though this was doubtless true in many cases, still it was not an absolute fact. Among the sword-blades there lay one, broken into three pieces, but which when whole must have been not less than eight feet in length. This sword bore a date of some twenty-one years back, and the maker's name, Izawa Gijirô, who turned out to be a smith late of renown in the castle-town of Utsunomiya, some few miles off. Many a tale of blood, no doubt, could those old blades have told, had they a voice; but there they lay, as still as the hands that once wielded them, fitting emblems of the decay, in these days, of that once deep-rooted pride which was wont to cherish the sword, under the belief that it was the source of many spirit, and the very fountain of honour.

The different ways of carrying the sword are stated by some Japanese to have been indicative of the rank of the wearer. Thus, persons of high birth are said [62] to have generally worn it with the hilt pointing straight upwards, almost parallel with the body; the com-

mon people to have stuck it horizontally in the belt ; while ordinary *samurāi* wore it in a position about half-way between the two just quoted. This, however, does not appear to be an idea worthy of much credence, for all visitors to Yedo some three years ago must have noticed that the style of carrying it first quoted above was one that found great favour in the eyes of the low-class swashbucklers of the Capital, who frequently were seen swaggering about girt with weapons placed perpendicularly in their belts and reaching almost from the level of their chins to their ankles. To clash the sheath of one's sword against that belonging to another person was held to be a grave breach of etiquette ;—to turn the sheath in the belt, as though about to draw, was tantamount to a challenge ;—while to lay one's weapon on the floor of a room, and to kick the guard with the foot, in the direction of any one else, was a deadly insult that generally resulted in a combat to the death. It was not even thought polite to draw a sword from its sheath without begging the permission of any other persons present.

The decay of the practice of wearing swords is certainly a hopeful sign of more intelligent and orderly times. The contrast between the present peaceful condition of the great cities of Japan, and that of the same places a few years back, is in itself a sufficient argument that the swords were not really needed, but were, on the contrary, incentives to violence. Tales of unfortunate dogs serving as a test for the sword of the roystering student, or of some wretched foot passenger losing his life beneath the stroke of a ruffian anxious to try the edge of his blade by what is so expressively styled in Japanese "cross-road cutting," are happily now unknown. That these tales were, even in former times, much exaggerated is more than likely, but that such things did actually occur is beyond all doubt, and it is gratifying to find the Japanese themselves so far awakened to a sense of the uselessness [63] of their once dearly cherished swords as actually to ridicule, in the public press, the few who still adhere to the old custom. Honesty of purpose and firmness in action,—straight-forward dealing and steadfast endeavour, will do far more to help on this country to her proper place among the nations of the world, than could ever have been achieved by means of her formerly much-prized possession, the "girded sword of Great Japan."

## CONSTRUCTIVE ART IN JAPAN.

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 BY R. HENRY BRUNTON, ESQ.

 M.I.C.E., F.R.G.S., F.G.S.
 

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[*Read before the Asiatic Society of Japan, on the 22nd Dec., 1873.*]

[64] The accounts of Japan which at the present time are generally spread throughout Europe, are so exaggerated that both the natural beauties and wealth of the country as well as its genuine condition and the progress which it has made are greatly over-estimated by those who have not had an opportunity of visiting the country and of judging of them for themselves. Every one, therefore, who comes to Japan is led to expect too much, and there are few who on arrival do not experience feelings of disappointment. And it is probable that nothing develops these feelings more fully than the absence of those artificial improvements which are generally met with in all civilised countries. The dwellings of the people are of mean appearance, and are generally without ornament or adornment of any kind. They are built in a temporary and unsubstantial manner, and are to a great extent wanting in the comforts which are ordinary in all European houses. The streets in the principal towns, as well as the country roads, are rutted, uneven and perfectly untended; and although gravel is sometimes used, the roads are generally merely formed of the earth or clay through which they pass. There is almost an entire absence of [65] drainage, and the refuse water from the houses is allowed to spread itself over the streets. The rain-water has no means of egress, and lies in pools until it has time to sink into the earth or is evaporated.

It is further impossible to repress a feeling of disappointment when we turn to the religious monuments of the country. The temples are

stately, they are generally exquisitely ornamented, and are certainly built in a more stable and substantial manner than the other erections around them. But there is so great a sameness about them that it seems as if the original designer had made a groove so deep that all the intellectual power of the Japanese could not raise their architects out of it.

That earthquakes are prevalent throughout the whole of Japan is a fact which, in the minds of many, has affected the whole system of building in Japan, and has prevented the development of the native talent for construction. This is looked upon as sufficient reason for the absence of stone erections or buildings of solidity and durability. But if earthquakes have exercised this influence over the Japanese mind, the people have been influenced by false premises ; as I think that to imagine that slight buildings, such as are seen here, are the best calculated to withstand an earthquake shock is an error of the most palpable kind. Now that foreigners have introduced a different system of building, the present Japanese have no hesitation in adopting it, and edifices of any size or material are now erected with their approval. No objection is ever made on account of earthquakes, and on these grounds I am of opinion that at all events the present race have not that dread of earthquakes which would lead them to eschew solid constructions, and we must seek at some other source the reasons for the want of progress in the art of building.

The whole country is subject to earthquakes, and there is hardly an island or a province of Japan that has not at some time or other suffered from their effects. Through the courtesy of certain Japanese officials I have been put in possession of some information, which I have [66] every reason to believe to be correct, regarding the destructive earthquakes which have occurred. From this I gather that the country is becoming more and more liable to them, and that they have steadily increased in number during the last few centuries. Thus there was but one destructive earthquake in the 5th century, which happened in the year 415 ; none other is known to have occurred till the 10th century ; one more occurred in the 11th century, another in the 13th, two in the 16th, 10 in the 17th, 13 in the 18th and 15 in what has already passed of the 19th century. The average of this century therefore has been one destructive earthquake in every five

years, while 800 years ago there was but one in 50 years. The following is a list of the most destructive which have occurred throughout the country.

In the 5th year of the reign of the 20th Emperor—in the year 415—a destructive earthquake happened.

Another in the year 987, another in the year 1021, and another in the year 1292, which was felt worst at Kamakura.

One felt worst at Tsuruga and Tôtômi in the year 1588.

One which destroyed many houses and took many lives at Kiôto and Fushimi in the year 1595.

One at Yedo which destroyed the Castle and many Daimiô's residences in the year 1647.

Another at Yedo which knocked down many houses and killed a great number of people ; in the year 1649.

One in the province of Iyo which brought down the retaining walls of the Castle of Matsuyama and destroyed many houses in Uwajima ; in the year 1649.

One severely felt throughout the eight provinces surrounding Yedo in the year 1650.

One which partially destroyed the Castle of the Mikado at Kiôto and ruined the castle of Nijô in the year 1661.

One felt in the province of Echigo in the year 1661.

One felt in the Island of Yezo in the year 1662.

One which again partially destroyed the castle of Nijô at Kiôto when the shocks lasted for eight hours ; in the year 1662.

[67] One felt at Nikkô in the year 1682.

One felt in Dewa in the year 1693.

One felt throughout the eight provinces surrounding Yedo. Walls of outside and inside moats of Castle of Yedo destroyed. Felt very severely at Odawara, where many houses were destroyed and numbers of people killed. Tidal waves also broke along the coast at the same time, and caused enormous destruction. The road leading through the Hakoné pass was closed up by alteration in the surface of the earth ; in the year 1702.

One severely felt in Yedo in the year 1715.

One felt throughout the 15 provinces surrounding Kiôto—when

many parts of the earth opened up—and enormous tidal waves occurred in the year 1707.

One felt severely in the neighbourhood of Fuji no yama. At this time, which was on the 22nd of the 11th month, fire burst from a place called Moto hashiri kuchi at the base of Fuji no yama—there was a fearful noise like thunder, and a black gritty sand was thrown into the air which caused darkness to come over the whole surrounding country. Even in Yedo lanterns were used in the day-time. During the night of the 22nd this continued, but on the morning of the 23rd the sky was seen. On the 25th darkness again came on, black sand fell like rain, and it only cleared up again on the 28th. A small mountain rose up on the side of Fuji no yama at this time which has been called Hô-yei-zan, from the period in which the occurrence took place, which was in the year 1707.

One felt at Nagasaki, when there were more than 80 shocks in one day and night; in the year 1725.

One felt in the province of Echigo, which occurred during a heavy storm of wind and rain. The earth is said to have opened up and belched forth water, so that the plains were like rivers, and men, horses, cattle and all the animals in the neighbourhood were drowned; in the year 1726.

One felt at Kiôto in the year 1751.

One felt in the province of Echigo, when the earth trembled 80 times in 10 hours, a hill was cracked, the [68] earth opened and 16,900 lives were lost; in the year 1751.

One felt at Awomori, when the falling houses took fire and caused the death of a great many people; in the year 1766.

One felt in Yedo in the year 1771.

One felt in Yedo during the same year 1771.

One felt in Yedo in the year 1782.

Frequent severe earthquakes in Yedo in the year 1789.

One felt in Dewa, when both the hills and the plains were cracked and the earth opened up, in the year 1804.

One felt in the Island of Sado, when there were constant shocks for three days from the 1st of the 1st month and from the 18th of the 6th month in the year 1810.

One felt in the vicinity of Yedo, but worst at Kanagawa and Hodo-gaya, where many houses were destroyed ; in the year 1811.

One felt in the vicinity of Kiôto in the year 1818.

One felt in Ôshiu and Yezo, when the earth shook more than 150 times ; in the year 1821.

Frequent severe earthquakes at Yedo in the spring of the year 1824.

Frequent severe earthquakes at Yedo in the autumn of the same year.

One felt in the province of Echigo in the year 1827.

One felt at Kiôto, when the Mikado's residence, many of the temples and the Castle of Nijô were destroyed. The earthquakes commenced on the 2nd of the 7th month, they partially discontinued on the 20th of the 8th month, but were not entirely quiet until the following year ; in the year 1829.

One felt in the vicinity of Fuji no yama in the year 1833.

One felt in Sendai, when the castle was destroyed and great destruction was caused by tidal waves ; in the year 1833.

One felt in the province of Shinano, which destroyed many temples and houses, numbering in all about 5,000 ; 700 people were killed and 1,460 wounded. The earth opened and swallowed 16 houses ; in the year 1846.

One felt at Kiôto and Ôsaka ; in the year 1851.

[69] Frequent earthquakes throughout the eight provinces surrounding Yedo, which were also felt at Kiôto and in the Islands of Shikoku and Kiushiu. The earth was not quiet for one year ; in the year 1854.

The most recent which has happened was most severely felt at Yedo, where the trembling of the earth continued for one month and gave 80 severe shocks. Many houses were knocked down, their timbers took fire and conflagrations commenced at 45 different places. About 120,000 lives were supposed to have been lost. This occurred in the year 1855.

Those parts of Japan most subject to earthquakes are, strange to say, the vicinities of the two capitals. Thus out of the 43 severe earthquakes which have taken place during the last 600 years, nine have occurred at Kiôto and 13 at Yedo. The province of Echigo is next in number, and has had four earthquakes. Yedo has been visited twice, as



also Dewa and the neighbourhood of Fuji no yama—while Nagasaki, Sado, Sendai, etc., have only suffered from one disturbance.

But, while the country, as is abundantly shewn above, is liable to very severe and increasingly numerous earthquakes, the system of construction in the buildings has not been well devised to withstand such visitations. The more solidity and weight in a building and the greater its inertia, the less liable it is to derangement from a sudden movement of its foundations; but at the same time, it is essential that the strength and connection of the materials in the walls are proportionate to their weight and mass. As a general principle preference should be given both on account of durability and stability to the adhesion of bricks or stone and mortar in a solid well built wall, over ordinary wooden buildings. It might be that a wooden erection could be constructed with its framework so tied and braced together as to render it almost perfectly secure against any earthquake, short of an upheaval or breach in the surface of the earth; but this would be an expensive, thriftless and impracticable style of construction. Whereas on the other hand, a stone [70] erection need not be more than ordinarily massive to make it capable of resisting any shock not of extraordinary violence. But in stone houses it is absolutely necessary that the masonry should be executed in a proper manner, the great point to which attention must be given being that a perfect bond is maintained throughout the entire building. Mr. Mallet in his history of the Neapolitan earthquake of 1857 gives many proofs of the truth of this. He says: "When the masonry consisted of round lumpy quadrated ovoids of soft limestone, the whole dislocation occurred through the enormously thick ill-filled mortar joints, and almost all buildings thus formed fell together in the first movement in indistinguishable ruin." "Where the masonry was of the best class, and such as would be so recognized in England, the buildings thus constructed stood uninjured in the midst of chaotic ruin. Some examples of this will be found in the second part, none more striking than the Campanile of Atena, a square tower of 90 feet in height and 22 feet square at the base, in which there was not even a fissure while nearly all around was prostrate." "Indeed it was evident that had the towns generally been substantially and well built or rather the materials scientifically put together, very few buildings would

have actually been shaken down even in those localities where the shocks were most violent. Thus the frightful loss of life and limb were as much to be attributed to the ignorance and imperfection displayed in the domestic architecture of the people, as to the unhappy natural condition of their country as regards earthquakes." A very striking example of the advantage of solid construction over lightness and want of strength was seen not many years ago at Manila, when an earthquake levelled almost the entire town and left the stone lighthouse at the harbour, which is a column of masonry of great height, standing by itself perfectly unharmed. From the vast and handsome edifices which may be seen in most countries in Europe liable to earthquakes, we may conclude that their inhabitants have acknowledged the correctness of this principle, and it cannot therefore be urged on sound grounds [71] that it is owing to the liability of Japan to earthquakes that its people have never desired or made an effort to build other than wooden houses or to make these of any but of the most flimsy description.

The general poverty of the people and their extremely simple habits may account for the simplicity of their dwellings, and as their habits become more refined and luxurious it is very probable that the internal comforts of their houses will also improve. Six hundreds years ago the dwellings of the English were constructed in the roughest manner of wood and clay. The inmates ate and slept in one room and privacy was perfectly unknown. In the beginning of the 15th century the houses began to be divided into rooms and private apartments. Shortly afterwards glass windows and chimneys were introduced, and stone building were erected, the ruins of some of which are in existence at the present day. Gradually improvements were one by one effected, until the modern English residence was produced.

At present in Japanese houses there is a want of privacy, for although there are apartments, they are separated from one another by paper partitions, which accomplish their purpose only in name. There are no healthy or safe means of artificially heating the houses, and chimneys have never been adopted. There is an entire absence of glazing, and the light finds its way into the houses through the paper windows. These paper windows generally compose a great part of the walls of the houses: and as they are very slightly made and do not shut

closely up, the houses are extremely cold and unhealthy in winter. During six months of the year in the greater part of Japan the weather is such as to require properly shut up houses with good fires, and although during the other six months considerable heat prevails, it cannot be said that the style of building is at all suitable for the climate of the country.

The construction of the houses is of an extremely fragile and temporary nature. The structures consist of wooden uprights resting generally on rough round stones. [72] These support the roof, the main beams of which are formed of very large timbers put in their place in their natural state, and without being squared or cleaned. The covering to the roof consists either of thatch, of tiles, or of shingles alone, and in putting these on the workmen are very expert. There are no diagonal struts between the uprights in the frame of the house, and no other means adopted to strengthen or stiffen it. The roof trusses are formed of one square frame built on top of another of a larger size until the apex is reached.

Thus, with its unnecessarily heavy roof and weak framework, it is a structure of all others the worst adapted to withstand a heavy earthquake shock. I should not forget to mention the fire-proof stores of the Japanese. These are buildings with a wooden framework of a better description, which is covered with sometimes as many as 50 coats of mud plaster, but generally with not more than 25 coats. They sometimes have a plaster roof and sometimes an ordinary tile roof. The plaster is of a thickness of from one to two feet, and the doors and window shutters are frames of wood covered with plaster in the same way. These stores, as is well known, have been found remarkably efficient in resisting fire.

On account of the simplicity of their construction and their general similarity, very little can be said regarding the temples of Japan in a paper such as this, which is devoted merely to a description of the art of building. The manner of their ornamentation and a history of their contents would form the subject for a separate and a very interesting paper. The foundations consist generally of square stones on which the uprights rest. These are of keyaki and are connected together at various intervals by longitudinal waling pieces. The roof is formed in a similar manner to the ordinary dwelling house roofs, but the wood in the

beams is generally of keyaki and of great size. The roofs are generally thatched with the bark of the hinoki tree, or with a grass named kaya, which is put on to a thickness of, at times, three feet, in some instances they are covered with sheet copper and, in the case of the smaller [78] temples, tiles are often used. The casing of the walls is thick keyaki planking on the outside and sometimes thinner hinoki planks as a lining on the inside. The outside is generally ornamented by panels of carved work illustrative of some legend or romance of the religion to which the temple was dedicated. The projecting ends of the beams of the roof have often some fantastic device carved on them, and are sometimes merely covered with copper to protect them from the effects of the weather. The joints of the various beams are also covered with copper. The timbers used in the structure are joined together by mortices, scarfs or dovetails in such a way that metal fixings are seldom required and, with the exception of a few small nails, are but little used. But there is the same want of diagonal struts or ties in the framework of the temples as in the framework of the dwelling houses, and while the execution of the practical carpentry is generally excellent and the wood always of the best description, the manner of their construction is, in this respect, decidedly faulty. There are many temples in Japan from 200 to 300 years old, such as one at Shiba in Yedo which is 270 years old, and the wood used in them is still fresh and sound. A very fine modern specimen exists at Narita, about 30 miles to the north-east of Yedo, which is much thought of, and which was only built 18 years ago, but neither do the principles nor the details of its construction differ in any way from the ordinary specimens.

In some branches of carpentry the Japanese are very expert, and as their buildings are almost entirely of wood, the concentrated energy of the people seems to have been devoted to this branch of building. The neatness of their work is very noticeable, the joints of the timbers are made with the greatest nicety, and as paint is never used, these are exposed, and are so made an object of especial care. The frames of their paper windows are generally models of delicate workmanship, and the carved ornamentation in their houses or temples is generally beautifully executed. But when we come to the higher branches of carpentry,

such as the arrangement of various beams so that they [74] will be best adapted to bear the strains which are likely to come upon them, or a combination of timbers which will form a stiff, strong, and reliable structure, or the selection of the proper size of wood to stand the different strains which it will have to bear, then we find the Japanese very deficient. The carpenters do not seem to have any appreciation of the disposition of strains in any framework, and where enormous timbers are placed they may be found resting on and sustained by beams not one-quarter the size they should be. In their bridges the same incongruities may be observed; thus beams, which if properly fastened would form a tie and be a great support to the structure, may be observed secured in their places by wooden keys about one inch square, which are not much stronger than a match. The workmen, however, are very skilful in the use of their tools. They only require explicit and detailed directions, and they are then competent to execute any work in a very creditable manner. The woods generally used for building purposes in the southern parts of the country are not very varied. There is a great variety of very excellent woods in the island of Yezo, but these have not yet been introduced into this part of Japan. Keyaki is the commonest hard wood and is, generally speaking, a very serviceable timber. If cut when ripe, and at the proper season, the good qualities will last for centuries, proof of which is shewn in the older temples in the country, but there are great varieties of quality and it requires a very practised eye to pick out the good from the bad. The exigencies of the people are such that, in the absence of any regulations to the contrary, they do not hesitate to cut the wood at all seasons, or when they receive an order for it. Wood full of sap is therefore as common in the market as seasoned wood, and perhaps it is not until after some years that the quality of timber purchased is made evident by the decomposed sap oozing out of it like a black tarry liquid. The fibres of the wood, very soon after this occurs, become rotten and the whole timber useless. Hinoki is the favourite soft wood [75] of the Japanese, and is chiefly prized on account of the beauty of its grain and colour. It is also thought to be very lasting and is always used in erections which are intended to be durable. *Sugi* is a kind of cedar, and grows in large

quantities throughout the whole of Japan. There are many qualities of Sugi, the best being almost as good in appearance as hinoki: it is, however, much cheaper. Sugi is principally used in the dwelling houses of the people which are only desired to be of an ordinary description. A cheaper wood which is used for more temporary erections is *Matsu*, a sort of pine. This wood is also used in bridges as, being a long fibred wood, it bears a considerable transverse strain, but it is by no means a durable wood. *Kuri* or horse chestnut is a very hard wood which does not grow to any size and is principally used for piles below water. A wood very much resembling ash, named *Kashi*, is used for boat's oars, handles of implements, etc. *Hiba* is very lasting under water, and is also used for piles. *Tsuga* is a kind of Hinoki but of very good quality. *Momi* is a cheap wood something resembling *Matsu* and used for the same purposes.

There are various other woods grown in this part of Japan, but the above are those most commonly used for building purposes.

The following are the names of the woods grown in the Island of Yezo—thirty-four in number, specimens of which I have received, and I have now the pleasure of presenting them to the Society. *Sakura* or common cherry tree, *Shiki Sakura*, a kind of cherry tree which is said to blossom in all seasons, *Yanagi* or Willow, *Kada Sugi* or Cedar, *Kuwa* or Mulberry tree, *Niga-no-ki* or Mulberry tree, *Momi* or Pine, *Kurumi* or Walnut, *Yezo-matsu* or Juniper, *Kuri* or Chestnut, *Katsura*, a sort of vine, *Momiji* or Maple, *Kashiwa* or Oak, *Sugu-nara* another kind of Oak, *Ishi-nara* another kind of Oak, *Hannoki* or Alder, *Hachigo Hannoki* another kind of Alder, *Shuro* a Palm tree, *Hô* or Honobei, *Yenju*, *Midzuki*, *Ouko*, *Aburagi*, *Tosen*, *Kisen Tani-chi-tamo*, *Aka-tamo*, *Nana kamado*, *Asada*, *Shiuku*, *Itaya*, *Gambi*, *Doro*, *Shina*.

[76] The art of building in stone, of brick-making, or an appreciation of the properties of lime has been very much neglected by the Japanese. Perhaps it would be too much to expect that the genius of the ancient Romans, to whom civilization is indebted for its present knowledge of building operations, should find its counterpart in Japan. Still if we consider that this country lays claim to a history of upwards of two thousand years, during the whole of which time it has been inhabited by

the same intelligent race which at present occupy it, and if we compare the evidences of constructive ability to be seen in Japan with what may be seen in almost any other part of the civilized world, it is impossible to resist the conclusion that the subject has never received that attention to which it is justly entitled, and that in consequence there has been an utter want of progress in Japan in the art of building. The liability of the country to periodical and violent earthquake disturbances may possibly have had an influence in deterring the people from the use of stone, but, if so, I have already explained, I think it has been founded on false grounds.

The country is extremely well supplied with stone. Few districts of any extent are without it, and even with the native means of conveyance, stone might be procured in almost any town in Japan at a moderate price, if the methods employed in quarrying it were more perfect. Along the whole course of the Inland Sea the formation is igneous and granitic, and the stone of excellent quality. Many of the mountain ranges throughout the country are also composed of granite, and excellent quarries exist at Mount Chikuba, which is not more than 100 miles distant from Yedo, and to which there is inland water communication the whole way. The other stones fit for building purposes consist principally of hard unstratified clay stones and stones of volcanic formation. These are found in various localities and especially at many points on the sea coast. There is a soft sandstone largely used in the neighbourhood of Yokohama, brought from the Provinces of Sagami and Bôshû, which is evidently quite a recent formation, [77] and unfit for any building intended to be lasting. There is also a stone of white appearance much employed, but it is of little use except for the very questionable expedient adopted by foreigners here, which makes it take the place of tiles and plaster as the outside casing for the walls of their wooden houses. The only really serviceable stones at present used in this neighbourhood are got from Idzu, about 80 miles distant.

The stone erections which have been executed in Japan are very unimportant. On my making enquiries whether there were any stone houses in Yedo, I was informed that the only one was a house built 100 years ago by Nakagawa, then Governor of Ôsaka. It is constructed

of granite brought from the neighbourhood of Ōsaka, but as it is only 12 feet by 9 feet and 10 feet high it is not a very imposing erection.

If we go back as far as the period of the Pelasgic architecture, which dates from 80 centuries ago, when the Pelasgi erected throughout Asia Minor and the whole south of Europe those wonderful specimens of their constructive skill which still exist, and if we compare their system of masonry with what may be seen in Japan at the present day, we can appreciate the want of progress made in this country. The walls of the Pelasgic erections were formed of stones of immense size put together without mortar. The stones when taken from the quarries were cut into irregular polygons and placed together in such a manner as to make the different faces of the geometrical figures which they employed coincide. This system of building resembles very closely what is to be seen at the castle of Ōsaka, or at the moats and gateways of the Castle of Yedo. But while the Pelasgi themselves gradually improved and adopted the use of square stones laid on a flat bed, while in later years the ancient Romans gave a further impetus to the science and have left such specimens of their skill and knowledge of the properties of materials as their aqueducts and great roads, the Japanese have not moved, they still employ the same crude systems of [78] building in stone, and are still ignorant of the most rudimentary principles of this branch of constructive art. The old Roman arch which marks an era in the history of building has no place in Japan. There certainly exist at Nagasaki, Kagoshima and in other places in the south, several specimens of semi-circular stone arches, but these were introduced by the Dutch residents and have never been largely adopted. In this also the Japanese have shewn a great want of appreciation of the art of building, and are behind their neighbours, the Chinese, in whose country I understand miles of stone arches may be seen, some of which are of almost incredibly large span.

Such stone work as is executed in Japan is put together perfectly dry, and it is an extraordinary circumstance connected with this subject that the people appear to be quite ignorant of the cementing properties of lime or of the use of lime mortar.



The use of mortar dates from the period of the invention of the Roman Arch some centuries before Christ, and was commonly used by the Romans of those days; but even up to the present day, after some years of education by foreigners, Japanese workmen will persist in laying stones on top of one another without any substance between them to fill up irregularities or to cement one to the other. Solidity in their masonry is not considered necessary, and the beds or joints of the stones are not made flat or even. The spaces between them are therefore large and are generally filled with pebbles, which are all that keep the stones in their proper places. Not being acquainted with the use of common mortar, it is unnecessary to say that they are also ignorant of the value of hydraulic mortar. The Romans also taught us a lesson in regard to this which I am astonished to say has not been followed even by ourselves to the extent which it might have. They mixed the lime with Puzzolana or volcanic sand, which gave it the peculiar property of hardening under water; this mixed, with certain proportions of gravel, formed concrete which, being thrown into the sea between moulds, in a short space became a solid and hard [79] wall. Various moles or piers exist executed by the ancient Romans in this way. In England, where volcanic sand cannot be had, it has been discovered that a mixture of certain clays with lime has a similar and more perfect effect, and the mixtures so made are known as Portland or Roman Cement. In Japan large quantities of Puzzolana exist, and lime stone is also found in various localities, but I can learn of no instances where the mixture of the two was ever attempted. The principle of hydraulic cement is, however, known to the Japanese, and a substance which is formed by a mixture of lime and clay is often used by gardeners as a lining for fish ponds, and for other purposes, but the process of mixture is either defective or the materials used are not good, because although the cement hardens under water to some extent, it does not harden sufficiently, and it further cracks and falls to pieces when exposed to frost. Though acquainted with the principle, therefore, the Japanese seem to have been unable to bring it to any practical result. A lime plaster is made which is tolerably efficient, and is formed by mixing lime with boiled seaweed. But in plastering a house the first coat consists of mud generally procured from the bottom of some

sluggish stream, the second coat of the same substance, this time mixed with sand presumably to harden it, and the lime plaster is then put on as the third coat, but so extremely thin that it is merely a veneer to the mud below it.

A curious system of building retaining walls, sea walls, or the face walls for any embankment or cutting, is so general throughout Japan that one is almost led to believe that the people had discovered some peculiar merit in it, although it is patently in contradiction to all our received notions of masonry. It consists of placing stones on one another which on their face are square or nearly so, but which are pyramidal in shape, and come to a point at their back. They rest at their faces on the thin ledge at the front of the stone and are supported at their backs by small stones loosely inserted, and the walls so built have generally a rubble backing about three or four feet thick. [80] As a retaining wall or one which has to sustain a thrust of earth from behind, such a system of building is in utter defiance of all the principles of mechanics, because the stones are like wedges placed the wrong way: they have absolutely nothing to keep them in their places, and any thrust from behind must inevitably dislodge them. As a sea wall it may have this advantage, that a wave striking the stones from without acts like driving a wedge home, but it possesses this great defect that it does not afford solidity or strength, which is the great desideratum in any construction exposed to the force of waves. As a mere veneer on the banks of a canal or river to protect them from the action of the water, it may be efficient enough, but, if no more than this is required, an equally effectual and much cheaper method would be to line them with thin flags or wooden boarding. The Hatobas in Yokohama, which have been broken up since they were erected by each heavy gale of wind that has occurred, were built in this way. The retaining walls of the creek in Yokohama, which were only built a year or two ago, and parts of which come down with every heavy rain, were also built in the same way, and it is so common, and the native quarrymen are so accustomed to cut out those peculiar pyramidal stones, that one of them can be bought at nearly one-half the price of a square stone of the same cubical contents. The intention or the advantages of this shape of stone I have never been able to discover, and although I have

made enquiries of officials acquainted with the processes of Japanese building in all parts of Japan, I have never succeeded in getting a satisfactory reply.

This paper would not be complete unless I made some mention of the bronze images to be seen in various parts of Japan, principally because they are, without doubt, the most meritorious of all the attempts at construction which the Japanese have made. These stand out by themselves as evidences of a skill which it would be difficult to improve upon.

The mixing of the metals which compose bronze was [81] practised in the earliest ages, and the casting of bronze images or statues dates from many centuries before the Christian era. Ancient coins as far back as the time of Alexander the Great were made of bronze, and, from an analysis which has been made of them, they have been found to contain from 17 to 6 parts of copper to one part of tin, with some other ingredients which it is not necessary to mention. Ornamental bronzes brought from Assyria have been found to contain 8 parts of copper to one part of tin. And the bronzes made in Europe of the present day consist generally of about the same proportion, viz., 8 parts of copper to one part of tin, and zinc or lead is sometimes added in quantities according to the purpose for which the alloy is to be used.

The Japanese bronzes differ in an extraordinary way from all these. From what I can gather the mixture generally consists of the following parts :—

To one part of gold there are added 8-9 parts of mercury, 83-65 parts of tin, and 1272 parts of copper.

There is therefore only 1 part of tin to 20-38 parts of copper, while the large quantities of gold and mercury, as far as I can discover, seem not to have been used by other people at all, and must add very much to the cost of the bronze.

The largest bronze image in Japan is at Nara, some distance to the eastward of Kiôto. This idol was first cast in the 18th year of Tempei (in the year 743). It was twice destroyed during the time of wars in its neighbourhood, and the idol which at present exists was erected about 700 years ago. The casting of this idol was tried seven successive

times before it was successfully accomplished, and about 3,000 tons of charcoal were used in the operation. The total weight of metal is about 450 tons and it consists of the following ingredients:—

Gold.....	500 lbs. avoirdupois.
Tin .....	16,827 ,, ,,
Mercury .....	1,954 ,, ,,
Copper.....	986,080 ,, ,,
	<hr/>
	1,005,361 lbs.

[82] It is cast in pieces, and these pieces are joined together by a kind of solder which is called *handa-rô*, and which answers its purpose very satisfactorily. A few of the dimensions of the figure may be of interest.

Total height of figure .....	53.5 feet.
Length of face .....	16 ,,
Width of face .....	9.5 ,,
Length of eye .....	3.9 ,,
Length of ears .....	8.5 ,,
Width of shoulders .....	28.7 ,,
On the head there are .....	966 curls.
Palm of hand .....	5.6 ft. long.
Middle finger .....	5 ,,

The image is surrounded by a glory or halo 78 feet in diameter, on which 16 images 8 feet long are cast.

There are two images standing in front of the larger idol, each of which is 25 feet high.

The whole is enclosed in a temple 290 feet by 170 feet, and 156 feet high, the roof of which is supported by 176 pillars.

The various pieces composing the image are not fitted together in a very finished manner, but the cement keeps the joints perfectly tight and close. The whole construction is one which shows great skill and original genius in the mixture of the metals and in the methods of casting them, and it is further one which will, no doubt, be a source of pride and gratification to the Japanese for many centuries to come.

In the beginning of this paper I referred to the conspicuous absence

in this country of artificial improvements. These form, to a great extent, the work of the civil engineer, and it is interesting to examine to what extent the Japanese have mastered the various branches of science which are connected with that profession. In the means of internal communication the country is sadly deficient, and as these may be taken as the measure of a nation's advance in civilization, it seems remarkable that so little has been done by the present progressive race of Japanese to improve them. The roads throughout the [83] country have not been formed with the intention of wheeled vehicles being used on them. Their surfaces are uneven and irregular, and little skill has been shewn in the choice of route so as to avoid hills or to get the best possible gradients.

There are many rivers which, if properly tended, would form excellent means of transport, but in some cases these have been neglected and in others treated in an erroneous manner. The Tone-gawa, the largest river in Japan, has a bar across its mouth on which there is not sufficient water to allow the native junks to pass over it. Inside the bar there is a considerable depth of water, and the river is navigable for small craft for more than 100 miles. The Shinano-gawa, the second largest river in the country, has 6 feet of water on its bar, and there is little doubt that this might be deepened with ease were proper means taken to effect this. It has been allowed to break through its original confines until it is in some places two or three times its proper width, and is so dammed back by shallows that in floods the water overflows the banks and spreads over hundreds of square miles of rich cultivated country. For how many hundred years this natural process of washing away the banks and widening the river has been going on without check, or for how long it has been allowed to flood the adjacent lands, I am not in a position to say, but a step was recently taken with the avowed intention of remedying the latter evil, which, however, has proved unsuccessful. Instead of keeping such an enormous river, which is equal in volume to that of the Rhine, in the course which nature ordained for it, and taking the natural and more easy method of training its banks, regulating its width and inclination, and, if necessary, straightening its course, the Japanese conceived the idea of cutting

another and separate channel to the sea for the purpose of carrying off the flood waters—a great part of which has been already executed—but the works are now stopped. The design was erroneous in so far that the abstraction of the flood waters would probably result in a further shallowing of the natural course of the [84] river, so entirely destroying its usefulness as a means of transport.

In bridge building the Japanese have a way of their own which has at least the merit of being quickly, easily, and cheaply accomplished. The piers generally consist of wooden piles driven a few feet into the bed of the streams. In some cases stone is used, but then it is cut to the same shape and of the same size as a wooden pile under the same circumstances would be. The platforms of the bridges are always of wood, and are generally constructed of longitudinal beams formed of a tree grown with such a bend as it may be desired to give the roadway. This bend is always considerable in Japanese bridges. The beams are laid 4 or 5 feet apart, and on top of them are laid cross planks which form the roadway. The span of each opening never exceeds 40 feet and generally is not more than 30 feet. One of the longest bridges in Yedo is the *Yei-tai Bashi*, which has 24 spans of 30 feet each.

The Japanese seem always to have been alive to the necessities for a plentiful and pure supply of fresh water. Yedo has had its water-works for many years, and the native town of Yokohama will also very soon be supplied with water in the same manner. The source of supply for both places is the River Tama-gawa, and the fountain-head is about 18 miles distant from each place. There is a small dam across the river for the purpose of collecting the water into pipes, but there is no settling pond, filter, reservoir or other such appliance for purifying or storing the water as was used by the ancient Romans and is generally attached to water works of the present day. The pipes are constructed of wood about 1 or 2 inches thick, and are made in the shape of a square trough, the joints being rendered tight by the insertion between them of a certain bark. The main pipes are from 1 foot to 2 feet square, and the smaller ones used for the distribution of the water are generally about 4 inches square. In the Yedo water-works the pipes are carried across valleys and streams on piles, but at Yokohama siphon pipes have

[85] been introduced. There appears to be some confusion in the Japanese mind in regard to the natural law that water always finds its own level. They appear to be cognizant of it so far, that they make allowances for the water rising in the siphon pipes and wells which they have adopted, but, on other hand, they do not appear entirely to have grasped the principle. In illustration of this, in Yedo there are placed five large wooden tanks at points where there are alterations in the inclination of the pipes. Thus, if they wished to supply a district higher than the level of the water main, instead of allowing the water to gravitate direct to that district they direct it first into one of these large boxes and allow it to rise there to the height which they desire, and then they carry it off from the box to the district requiring the supply. In the same way in the Yokohama water-works there are large boxes of a similar kind at each end of the siphons which carry the water under streams or other obstructions, so that instead of the water flowing direct through the pipe and along the siphon, it empties itself into the box at one end in the first place, the box then supplies the siphon, and the siphon empties itself into a box at the other end, from which the water proceeds along the main pipe. The adoption of these boxes must, I think, proceed from some misapprehension of natural laws, and I have been unable to discover any sufficient reason for them. The water is distributed through the towns in circular wells which are constructed in the streets. These are also made of wood and their tops project 2 or 3 feet above the level of the ground. The water is allowed to rise to a certain level in them or to overflow their edges, and the inhabitants procure their supplies by dipping their buckets into them.

In other works which the Japanese have undertaken there may be observed the same want of knowledge of the properties of materials, and the same crude methods of executing work. I have confined myself in this paper entirely to a description of what the people of the country have accomplished without extraneous aid. To what extent [86] foreigners have, in later years, been enabled to educate them, or to develop the building resources of the country, would fitly form the subject of a separate paper, which, if agreeable to the Society, I shall have pleasure in placing before it on some future occasion. But I may be

allowed to say here, that while I have felt it impossible to come to any other conclusion than that in constructive art, the Japanese are surprisingly behind us, I do not wish it be understood that I consider this deficiency of knowledge to be due to any want of intelligence on their part. Whatever may have been the causes for the want of attention which has been paid to building, there can be no doubt of the great aptitude and ingenuity of the people, and that, after a few years of well directed education, they will give good proofs of their ability to master all the intricacies of construction as now understood in all civilized countries.



A JOURNEY IN YEZO DURING THE MONTHS OF  
AUGUST, SEPTEMBER AND OCTOBER, 1873.

WITH A DESCRIPTION OF THE OLD WESTERN ROUTE TO SATSPORO,  
THE ISHIKARI RIVER, AND THE NEW ROAD FROM  
SATSPORO TO ENDERMO BAY.

BY CAPTAIN BRIDGFORD, R.M.A.

*[Read before the Asiatic Society of Japan on the 14th January, 1874.]*

[87] The Island of Yezo, now called Hokkaidô, is divided into ten Districts. They are named as follows:—Kitami, Teshiwo, Nemuro, Kushiro, Tokachi, Hitaka, Iburi, Oshima, Shiribeshi, Ishikari.

Ishikari district is the largest, and contains an area of about 8,508 square miles, which is also the area of the watershed of the Ishikari river. For the sake of comparison I give the area of the watershed of the river Thames, viz., 8,086 square miles.

Hakodate to Satsporo, *viâ*—

	Sigonope .....	23 miles
Volcano Bay	Mori .....	7½ "
	Yurap .....	21½ "
	Oshamambe .....	15 "
	Kuro-matsunai .....	15 "
	Ota-suts .....	10 "
	Isoya.....	6 "
West Coast	Iwanai .....	18¾ "
	Yoichi .....	85 "
	Otarunai .....	15 "
	Zeni-bako .....	7½ "
	Satsporo .....	15½ "

184¾ miles

[88] The road from Hakodate to Sigonope in its general direction bears N. N. W. by N., distance 23 miles.

The road is 86 feet in width and unmetalled; for some distance past Kamida bridge it runs over a large plain with a very gentle rise towards the hills, the soil a dark loam: much timber has been felled. The trees remaining are beech, birch, silver birch, maple, mulberry, chestnut, etc.

An experimental farm is situated some 220 feet above the sea level and close to the steep slope of the hills. Here was growing some fine hemp, also a little corn. The plain is mostly uncultivated.

The road winds upwards through a pass in the hills, attaining at its highest point 970 feet above the sea level. Through a gap in the hills is seen Hakodate bearing almost due south.

Sawara or Koma-ga Take (volcano) bears N. N. W. Two fine lakes embosomed in forest are also visible. The largest, some 7 miles in length, is studded with a few islets well timbered.

The volcano on its western slope is clothed with forest almost to its summit.

Descending, the road passes the small lake (570 feet above sea level) and reaches the level of the valley, at 520 feet above the sea. Here is one small tea-house backed by forest: this is Sigonope. Temperature at noon, August 8th, 1878, 87° in shade 128° in sun (Fahr).

Visit to the volcano of Koma-ga Take distant from Sigonope 7½ miles.

For the first two miles travelled along the road to Mori, then turned sharp to the right through the woods. The trees were young, mostly of 25 to 30 years growth, with occasional gaunt trunks of a much older date; after about 8 miles up hill the woods thin out into small birch clumps.

The ground is covered with pumice, amongst which lie the remains of the previous forest, destroyed by the last great volcanic outburst. The prostrate trees on this [89] (S.) side of the mountain lie with their heads pointing north; the portions resting on the pumice are charred; nearly all were silver birch of about 25 years' growth. In the last eruption a depth of two to three feet of pumice fell here.

Emerging from the woods on to the superior slope of the mountain, and tramping over the pumice, I observed much young birch springing up in many places, especially in the gullies or where the prostrate trunks of the former forest shew above ground. It is  $2\frac{1}{2}$  miles over loose pumice to the top of the lip of the old crater (and 2800 feet above the sea). Two jagged peaks, connected by a curtain of ashes, rise some 500 feet higher on the western side. The section of these peaks as shewn on the inner wall exhibits many beds of compressed volcanic ash, and near the top, two partial layers of lava, capped by basaltic rock of eccentric form.

The side of the crater towards Volcano Bay is completely blown away and the pumice extends to the sea in that direction.

To the S. E. the pumice has blocked up the valley below, forming two very pretty lakes (mentioned before). The beds of these lakes contain remains of the old forest.

The land in the vicinity of the lakes is swampy and covered with dense wood consisting of oak, ash, birch and a large variety of the useless poplar. Wild swans inhabit the lakes and are said to be very shy.

Within the great basin or crater (which is some three-quarters of a mile in diameter) are six distinct smaller craters, one of which was in activity two years ago. The bottom of this one is some 220 feet below the old upper lip and about 120 feet below the general level of the great basin.

Another of the six is about 100 feet deep. The rainfall in the basin drains into these smaller craters, and volumes of steam escape from many apertures in their side. Native sulphur and iron sand lie strewn about.

The view from the summit looking S.W. shews some fine ranges of hills, clothed in wood and without signs of cultivation.

[90] In this district there is not sufficient soil at present formed over the last layer of pumice to permit of its being profitably tilled. It does well enough for growing timber, and in that way makes soil in the most rapid manner.

From Sigonope to Mori distance  $9\frac{1}{2}$  miles.

The new road leads through young forest and is formed almost entirely of small pumice. The drains are revetted with hurdle work.

The road rounds the volcano of Koma-ga Take on its western side, and there are some steep gradients upon it. Gaunt charred trunks of trees of great size shew high above the young woods and their roots are embedded in the layer of soil that lies beneath the pumice bed, conclusive proof that they are remnants of a forest that was destroyed by the eruption which is said to have occurred some twenty-five years ago.

As Volcano Bay is approached, the forest dwindles into oak scrub and pasture ; may ponies were grazing here.

The road terminates at Mori pier, a large wooden structure, which is projected into the bay at right angles to the beach ; it is at present in an unfinished state, some 350 feet only having been completed.

From Mori to Shin Muroan, where the road to Satsporo recommences, distance 25 miles, is done by steam or sailing ferry boats.

Mori is a straggling village ; there are several tea-houses with fair accommodation and seemingly a fair amount of business doing. Long strings of pack ponies, laden and unladen, were seen in most parts of the main street.

At sunset the view of the volcano of Koma-ga Take from the main street of Mori is very fine.

From Mori to Yurap, distance some 21½ miles by bridle path, mostly along the beach ; low bluffs fringe the shore, wooded hills at back ; passed two or three villages and fishing stations. Also saw a petroleum pit with about three-quarters of an inch of oil in it.

Yurap is an Aino village of some fifty houses ; there is also a good Japanese tea-house with a very pretty garden. [91] A pleasant contrast to the wilderness of sand hills and scrub that surround the village. Here there is a very good salmon river.

The Aino village consists of three lines of huts, with each a store, which is erected on stilts, each hut with its store being placed about thirty or forty yards from its neighbours.

The government have given the Ainos equal rights with Japanese and have marked out the site for a regular village which the Ainos are expected to build, and then vacate their old huts and move into the village : there are no signs of commencing this work at present.

The interiors of the Aino huts were much more comfortable than was to be expected from their outside appearance. They are divided

into two parts by a reed and wattle partition. The large room is occupied by the family ; in it they eat, drink and sleep. In the centre is the hearth, with pothooks etc. depending from the roof; raised benches occupy two sides of the room, affording sitting and sleeping accommodation. On the end wall are hung numerous fishing and hunting implements, and skulls of animals, etc., killed in the chase. The ground was floored with rough boards, and small pieces of matting were used when sitting à la Japonaise.

The women manufacture cloth from bark fibre. It is woven in a very primitive way, but is strong and lasting, and is very cheap.

Rope of all sizes is made of bark fibre, beautifully laid, a 9-inch hawser 42 fathoms in length costing equal to £3 sterling.

Each Aino canoe is fashioned out of one log of timber, generally elm; two men will fashion one out in five days: these are canoes for river work; those used on the sea coast have the bottom dug out, the sides laced on, and the prow and stern laced together with bark fibre.

The river canoes are most skilfully managed with either pole or paddle by the Ainos. The Japanese cannot manage a canoe properly.

Yurap to Oshamambe, distance fifteen miles. Crossed the [92] Yurap river by ferry boat and followed the beach; observed an old embankment about three miles long and parallel to the sea; inside was a large flat stretch of land intersected by several artificial drains. This place had the appearance of having been at one time under cultivation.

Five miles from Yurap reached the Aino village of Kunnui; here the bluffs retire from the beach, and the land seems to be gaining upon the sea; from this to Oshamambe the hills gradually become small and the plain is intersected by many streams. Some small garden patches were under cultivation.

The sand hills that fringe the bay are covered with dwarf rose bushes, the flower, large single damask, and very highly scented. The natives eat the seeds, of which they collect large quantities.

Near Oshamambe two or three Aino families were observed hauling a seine: men, women and children, all assisted. The take consisted of young mackerel, sprats, halibut and plaice. Some of the latter had orange coloured bellies and dark rough backs. We took some of the fish and had great difficulty in inducing the Ainos to accept payment.

The boats employed in the herring fisheries are large and well built; some of them pull as many as twenty oars.

Oshamambe is a good sized but straggling village. A lagoon divides it from the fishing station, where are situated the store-houses, look-out station and the Aino settlement. The lagoon is fordable and is formed by the bar of a river that here flows into the bay.

Oshamambe via Kuro-matsunai to Ota-suts, on the west coast of Yezo, distance 25 miles.

A very bad bridle path leads in a N. W. direction through the forest with partial clearings; the path here winds up and down the sides of a succession of straggling hills. Seven miles from Oshamambe and at an elevation of 210 feet, crossed a rapid stream, also a ridge (elevation 275 feet), and reached the top of the pass (elevation 360 feet), from thence over very hilly country with a gradual descent to Kuro-matsunai, situated in a narrow valley [93] through which flows a fine stream said to contain plenty of sea trout and salmon. This stream reaches the sea near Suts (west coast).

The bridle path up to this point is very bad, traversing much swamp, heavy forest and dense underwood; in places there are stretches of corduroy, but in wretched condition. This path would be impassable in bad weather.

In this forest, the oak, beech and elm are very fine,—maple, ash, silver birch, and alder—fair; larkspur and large orange lilies were in blossom.

The soil is a dark loam in the bottoms and light reddish earth on the hills. Passed several huts surrounded by cultivated patches, the occupants of which did not appear to be very happy. They had planted *dai-kon*, buck-wheat, Indian corn, potatoes, onions, runners and some flowers. The crows damage the crops very much unless they are protected by netting. The cultivators are government settlers from Matsunaye district.

From Kuro-matsunai the path followed the banks of the river, crossing fords in three places; finally the path keeps the right bank until it opens into a plain bordered by ranges of hills, spurs from which project into the sea and form a fine bay, on the shores of which are situated the villages of Ota-suts and Suts.

The bridle path across the plain to Ota-suts is bordered by straggling huts and patches of cultivation, mostly vegetables.

The forest on the plain and on some of the slopes had been recently fired, which gave the country rather an appearance of desolation.

Ota-suts contains about 600 houses, the population being entirely Japanese. There were anchored off the town one foreign built barque and seventeen sea-going junks.

The population appeared to be all engaged in the cutting and preparation of seaweed for export.

A large colony of crows were seated on a sand bank taking the evening air. They looked very absurd as they kept their bills wide open and all faced head to wind.

Sutts, situated on the opposite side of the bay, appeared [94] to be a long straggling village, off which were anchored 25 junks. Ota-suts to Isoya, distance 6 miles.

The bridle road leads along the beach, which is thickly lined with cottages, fish-houses, seaweed, sheds, etc., etc.

The coast is formed of conglomerate, scoria and volcanic ash; a bold headland bears N. N. W.

A fork with long wooden prongs is used for catching or entangling the seaweed, boat loads of which were being landed and spread out on the beach to dry.

The weed here is said to be of finer quality than that gathered in Volcano Bay. It is certainly much smaller, as here it does not exceed four feet in length, while that in Volcano Bay measures 18 or 20 feet.

Observed some women preparing wild hemp.

Sea slug is caught here; it is smoke-dried and exported.

At Isoya is a picturesque islet on which is built a small temple held in great veneration by the fishermen; the islet is connected with the shore by a long bridge of many spans, built in the usual Japanese fashion.

Three-quarters of a mile further on, at a village called Shima kotan, we embarked in a ferry boat for Iwanai, distant 15 miles, so as to avoid travelling by the road, which leads over bad mountain passes.

Soon after starting in the boat we rounded a small headland and opened the mouth of a river in which lay 8 junks at anchor, and came in

view of a small village on the the left bank, then passed a long stretch of sandy beach, and a fine rugged headland, basaltic in character and interspersed with layers of scoria, the summit of which was thickly covered with wood. For the next 6 miles the cliffs presented the most picturesque outlines, and there was herbage and timber on every possible ledge. Some of the gorges opening towards the sea were lovely, and from them miniature cascades poured over the cliffs.

After passing an overhanging cliff named the 'Cliff of the falling sword,' the coast changed in character, and a gradual slope extended from the shore to the foot of the hills, which gradually retreated from the sea. This slope [95] was clear land and it was apparently covered with short grass; the roofs of Iwanai appeared, and the masts of some 29 large junks shewed over the low spit of land forming one side of the harbour. Soon after we entered the roadstead and moored.

The town is large and straggling and the population are all engaged in the fisheries. The bay is not well sheltered and is open to the N. and E.

Iwanai to Kayanoma coal mine, distance about 10 miles, by bridle path along the beach for some distance, then across a ferry and over low hills dipping into a small valley where is a very pretty junk harbour, which is sheltered by high rocks, also a few house and patches of cultivation. The place is called Chatsu, and is not far from Kayanoma, which is situated at the foot of a large valley at the head of which are the coal mines.

Iwanai to Yoichi, distance 35 miles by bridle road over several ranges of mountains. The highest point attained by the road is 1,100 feet above the sea. The country is entirely covered with forest, but the soil appeared to be very poor and rocky. There are magnificent walnut, oak, elm, Yodo (fir), ash and maple trees. Many streams intersect the ravines and valleys (several were forded), and the bottoms are full of swamps and very thick bamboo brush. The road was planked in parts, but in some parts was very bad indeed.

Only fourteen huts with small clearings were passed along the whole route.

Near Yoichi and for a distance of some  $3\frac{1}{2}$  miles, the whole forest had been fired, most probably by the wood-cutters so as to facilitate



their proceedings. The soil on the hills is but five or six inches in depth and rested on coarse sandstone. Larkspur was in bloom and hart's tongue ferns were seen in abundance.

Yoichi is a town of considerable size and is situated on the shores of a very open bay. The *hon-jin* is separated from the town by a projecting spur of rock, through which a passage is cut.

Yoichi to Otarunai, distance 15 miles by bridle road.

[96] The river is crossed outside the town by ferry boat. The road winds up to the summit of the sea bluffs some 200 feet in height. Soon after a curious pinnacle rock is observed called "Rō-soku Iwa" (candle rock) bearing about  $1\frac{1}{4}$  miles N. of Yoichi. Then is reached a very pretty junk harbour and village called Oshoro, slightly open to the W. N. W. Nine junks were moored here, and one that had been anchored off Yoichi (an open anchorage) made sail and stood out into the offing, in consequence of a north-easter and a heavy sea setting in, and bore up for Oshoro. There are three pinnacle rocks above water in the harbour, and none others. The depth of water at the entrance is 53 feet, inside 24 feet, and 20 feet close to the end shore.

From Oshoro the road soon turns inland and crosses the headland which forms the south side of the bay of Ishikari, where Otarunai is situated.

The road leads over hills, denuded of timber but covered with short grass. At the highest point there is a fine view of the bay with Otarunai nestling in the most southern corner of it. To the N.W. stretches the great plain of Satsporo. The mouth of the Ishikari river is also visible, while on the northern side of the bay are the high mountain ranges above Atsta.

The hills in the vicinity of Otarunai are entirely denuded of timber, and it was said that the roots had been dug out and burnt so as to prevent regrowth.

Otarunai is a thriving town and much building is going on. A swift running stream is conducted through two of the principal streets that are at right angles to the beach. There are numerous large stores, where are kept depots of fishing gear for the Ishikari fisheries, and where fish manure, oil, seaweed and sea-slug are prepared for export: the trade in these articles is said to be large.

There is a small lighthouse, from whence is exhibited a harbour light. The officials seemed numerous, and the government buildings are large and comfortable in appearance.

A fair quantity of vegetables are grown on the lower [97] slopes of the hills at the back of the town, where also a few Ainos reside.

Otarunai to Satsporo viâ Zeni-bako, distance 23 miles.

The road runs along the shore, in some places overhung by high cliffs of basalt or conglomerate. In one place a short tunnel has been cut through a projecting rock.

The cliff scenery is very fine, bold and wild. Marks of blasting were visible on the huge masses of rock that had fallen from the cliffs above.

The village of Zenibako is situated on the sea shore nestling under some fine steep hills that are well wooded.

From Zenibako, the road soon reaches the edge of the great Satsporo plain, over which it winds; this is a dirt road some twenty feet in width, fairly made and well settled all the way to Satsporo.

The country here changes in character. The dense woods and scrub give way to the most lovely park-like land; clumps of fine oak, elm, ash and walnut diversify the plain, which is covered with a luxuriant growth of pasture some four or five feet in height. This scenery extends for tens of miles over this lovely plain, in the centre of which is situated the new capital Satsporo.

#### THE ISHI-KARI RIVER, YEZO, 1878.

The Ishi-kari River rises amongst a range of mountains (the highest of which is called Ishi-kari yama and is situated in about 40° 40' N. and 143° 20' E.) and flowing through a fine plain called "Kami Kawa," reaches the gorge of Kamui Kotan, through which it rushes into a second plain on which Satsporo is situated; winding through this it finally reaches the sea in the Bay of Ishi-kari on the N. W. coast of Yezo.

The length of the river is about 112 *ri* = 280 miles.

For the first 80 miles the river flows with great rapidity through a series of basaltic gorges, the walls of which are often perpendicular and sometimes of considerable altitude. The river bed consists of boulders of large size which, forming a succession of barriers, cause numerous [98] rapids, which render the river unnavigable even for Aino

canoes. The Ru-bes-pie, a considerable stream, here joins the Ishi-kari, and this increase of volume gives sufficient water to carry a canoe over the rapids, which are very numerous and troublesome. The country is heavily timbered; oak, ash, birch, poplar, silver birch and alder abound: the river side is generally fringed with alder or silver birch. For the next fifteen miles the country becomes more open, the hill sides are in places covered with plume grass where not timbered, large patches of walnut appear, and small plains well grassed, with good black soil, having a subsoil of gravel. Wild grape, hops, asparagus, etc., abound.

The river winds very much and divides in places, forming many islets and shingle banks. The current is very rapid, varying from 12 to 18 miles an hour. There is a fine basaltic cliff on the right bank, which shoots up some 300 feet, and is capped by forest, principally *yodo* or *tondo*, a sort of white fir; at the base there is much wood, where the river does not sweep the rock. For the next twenty miles the width of the stream is about fifty feet, and seven feet deep; in the channel, on the left, a fine basaltic hill turns the river at a right angle. This hill, timbered at the base and shewing the columnar basalt above, capped as it is by fine *yodo* trees, presents a grand appearance. Another twenty miles and U-petsu is reached; the river is here very rapid and inclined to split up into several streams, and has much drift-wood of very large size, some of twenty feet girth and sixty feet in length, of the kind named *sinkee*. The large piles of drift-wood soon change the river bed. Sixty-three rapids are passed and the river has now fairly entered the plain of Kami-kawa, through which it winds. This plain is some forty or fifty miles in length by twenty miles in breadth. Bounded on three sides by forest-clad mountain ranges, and watered by many streams, this rich alluvial plain, when viewed from the summit of the hill, presents a fine appearance. Long stretches of prairie grass, relieved by clumps of walnut, oak, elm, etc., or dotted with single [99] trees, and between these stretches of grass are fine belts of full grown hard wood, free of underwood, and the resort of large herds of deer; whilst the banks of the stream, clothed as they are with willows, can be traced in their wanderings for many miles. In the autumn the golden yellow of the ripened grass, the varied tints of the foliage in the plain and the sparkle of the waters, all combine to produce a glowing picture

which is framed in the russet and purple tints of the surrounding mountain ranges. Above is a sky of azure, the sun is brilliant and warm, and the stillness is only broken by the murmur of some distant rapid. Ninety-three Ainos are the sole population of this plain; thousands of deer graze in its rich pastures, while bears and wolves, besides smaller game, prowl almost undisturbed. U-petzu is about 85 miles from the source of the river and consists of 4 Aino huts; 19 huts are scattered between this place and Kami kawa, which is 15 miles distant; total, 23 huts and 98 persons.

The Ainos have constructed fish traps which extend across the main river and also close the various tributaries. These traps are made of stakes and fascine work in the form of an arrow-head, the point up stream, and at the apex is a large cage with a platform on top. The fish enter the cage and are then speared by men stationed on the platform.

Fortunately for the salmon the freshets bring down driftwood which soon tears a passage through the barriers and puts a stop to the fishing for a day or two, and salmon in the upper waters move up mostly during freshets, as only then do they find water enough to take them over the difficult rapids.

Kami kawa consists of a godown 15ft. by 9, built 14 years ago by the Governor of Matsumaye, one ruined Japanese hut and 8 or 4 Aino huts which are in the vicinity. The godown originally stood on the bank of a river, but the river has made a new channel, and the dry bed of the old one is now covered with a three years' growth of osiers. In the godown, Government keeps a stock of tools and implements for trade purposes.

[100] In the next 18 miles the river leaves the plain and enters the mountain gorge which terminates in Kamui Gotan (or Kotan). Entering the gorge the stream increases in rapidity, and after traversing a distance of about four miles, canoes are turned into a still pool situated above a fall about  $4\frac{1}{2}$  feet high; here the canoes are unloaded and the ladings have to be carried a distance of 4 or  $4\frac{1}{2}$  miles down the gorge to Kamui Kotan (abode of the gods).

The path is wild and rugged; it is on the left bank of the river which foams amongst the rocks below. The canoes, now empty, are

well manned and, after an offering to the river god they proceed to shoot the fall and then a wild and continuous rapid.

The distance, about 4 miles, is done in a few minutes, and the canoes float on the still waters of gloomy Kamui Kotan. The walls of rock and large boulders in the gorge are polished like marble ; there is much serpentine, green stone, and schistose rock. Above tower the oak, ash, walnut, and *todo*, also the graceful silver birch and the maple.

The drift-wood in the gorge shewed that the spring floods reach a height of 27 or 30 feet.

Kamui Kotan is a deep and sombre pool, whose surface is only broken by eddies and swirls suggestive of a deep and rugged bottom. Walls of rock hem it in, and these are of weird and fantastic form. The strata are in some places thrown up into a vertical position, in others they are wavy. Proceeding to the end of the pool the channel turns sharp to the right and, after descending two or three small rapids, at 50 miles from Kamui Kotan the river reaches the great Satsporo plain, and from thence it is navigable, by vessels of light draught, to the sea, distant about 100 miles (by water). At this point the Ishi-kari, much increased in volume, becomes a broad and placid stream, which slowly meanders in a very serpentine course through the rich alluvium of the plain : many tributaries add their waters to it, until at the mouth of the Shinoro river and  $12\frac{1}{2}$  miles from the sea, the Ishi-kari has attained a width of 250 yards and a depth of five fathoms. Here the current does not exceed  $2\frac{1}{2}$  miles per hour.

[101] The total number of rapids on the upper waters is seventy-eight.

From Shinoro river to the mouth of the Ishi-kari is about  $12\frac{1}{2}$  miles. The river maintains a width of at least 250 yards and the depth in the channel is between three and seven fathoms. There is twelve feet on the bar, and the result of 24 days observation shewed a mean of five inches rise and fall of tide. Ishi-kari town is situated at the mouth of the river on the left bank ; here ships could load from stages erected on the bank, as there are four or five fathoms of water close to the shore.

From Kamui Kotan to the sea the river banks rarely exceed twenty feet in height, the general average being fifteen feet. The slopes are usually covered with short grass, and on top is a continuous fringe of willows, rising in places to the dignity of trees, in other places mere saplings.

The willows were very useful in estimating the age of the different portions of the banks, as no sooner does any change take place than up shoots a fresh crop of willows. The driftwood lodged in their branches gave the height of the river during floods. The timber varies very much both in size and quality, but large quantities of fine oak, ash, chestnut, walnut, elm and several other hard woods, exist in the vicinity to the river and its tributaries. The best timber is generally to be found in the narrow belts of wood that border the large stretches of prairie grass.

The climate of this portion of Yezo can compare favorably with some of the great grain producing states in America.

The Ishi-kari watershed is naturally divided into two portions by the range of mountains containing the gorge Kamni Kotan. It is stated that in the upper portion the climate is colder in winter and warmer in summer than in the lower portion, and that this difference is due principally to the fact of the lower plain opening on to the sea coast, whereas the upper plain is surrounded by mountain ranges on three sides and it is more removed from the sea.

[102] The spring generally commences early in April, and in some two or three weeks the winter snows have melted—the rivers are in high flood—and even some portion of the plains are under water.

The upper Ishi-kari when in flood rises nine or ten feet, in the gorge some twenty-seven or thirty feet; below the gorge it drops down to a rise of nine or ten feet, which increases at the great bend forty-five miles above Shinoro to a height of eighteen or twenty feet; at Shinoro the drift shewed twelve or fourteen feet rise.

It takes about three weeks for the waters to drain off; May, June, July and August are fine months. In upper Ishi-kari, this year, the first snow appeared on the hills on the 1st September, but there was no frost until the 4th October. In lower Ishi-kari (Satsporo) the snow first appeared on the 3rd October, and the first frost on the 5th. Snow falls heavily in November and December, and remains during the winter months. From four to seven feet is the depth of the snow-fall.

The total number of Ainos on the Ishi-kari is 246.

Besides the vast quantity of timber, there are found wild hemp, hops, grapes, millet, asparagus, celery, mint, mushrooms, etc. Winter wheat has been grown with great success, as also have buck-wheat,

millet, maize, potatoes, beans, peas and a large variety of vegetable and root crops. The finest and most valuable product is the Japanese hemp (*asa*). Its long staple, fine fibre and silken sheen, will always command attention if produced in large quantities.

There is every facility for the production of immense crops of this article, plenty of new clean land, of water for preparing, packing, etc., and for transport to the coast; little manual labour is required and very little machinery. Its cultivation on a small scale is already understood, and if developed with a view to foreign export it would bid fair to become as important a specialty as either tea, silk or silk-worms' eggs; then, in the event of the land sickening, the crop can be varied by sowing wheat or barley.

[108] Wheaten flour similar to the sample produced this year in Satsporo would equal in value the best imported flour.

Hills containing large beds of coal approach within three miles of the left bank of the Ishikari, where the Sora-choi or Soratsu river flows into the former. The junction is about 91 miles above Shinoro by river, and by land 80 miles distant from Satsporo.

Hills (probably part of the same group) containing large beds of coal are traversed by the Horo-mai or "Ikusa-bets," which flows into the Ishikari about thirty miles above Shinoro and on the same side as the Soratsu. The gullies in the hills, through which these streams flow, shew sections of coal beds many feet in thickness. The analysis attached, if correct, shows a valuable coal, especially as surface coal was used by the analyst. During the floods the coal is washed down into the Ishikari and can be picked up on any of the shingle banks below the mouth of the Soratsu.

ANALYSIS OF IKUSA-BETS COAL,		OF SORATSU COAL.	
Moisture.....	3.2. 4.0	2.4.	2.8
Volatile matter ...	34.6. 32.0	36.8.	34.8
Fixed carbon .....	59.6. 61.4	58.0.	59.4
Ash.....	2.6. 2.6	28.	3.0
	100.0. 100.0	100.0.	100.0

Syenite, slate, greenstone, coal, lignite, quartz, sandstone, limestone, schist, scoria, etc., were found amongst the shingle banks of the Ishikari. Of woods there are thirty-three kinds that are already known; the oak, walnut, ash and elm, are the most important.

Satsporo (or Sapporo), the new capital of Yezo, is situated on the south side of the extensive plain from which it takes its name. The Ishi-kari bears North, distant 8 miles, but distant 12 miles by road and 15 miles by water. The Shinoro and Barato rivers afford water communication with the Ishi-kari, as also does the To-ho-bira.

Laid out on the plan of an American city, the wide streets are placed at right angles to each other, and when lined by the Japanese houses and shops, present a very meagre appearance; while the detached frame houses, painted in discordant colours, which dot another section of the plain (the official quarter), show little taste on the part of the authorities. On the south side of the town is a large two storied building surmounted by a cupola and flagstaff. This is called the Capitol or Government House; it is to cost when completed \$100,000.

[104] The painters were engaged in decorating the outside of this building with such a variety of colours that their former efforts on the frame houses were thrown quite into the shade.

Water has been diverted from the To-ho-bira river and led in a small canal down the centre of the main street. A portion of this water is taken to supply the large timber floats and the mill; these are situated on the north side of the town.

The mill is driven by a large turbine of 68 H.P. and contains machinery capable of turning out 10,000 feet of lumber and 40,000 shingles per day, besides quartering, morticing, etc. There is also a one pair corn mill complete; near the mill is a portable steam engine employed to drive a circular saw. The principal wood used is the *yodo* or *tondo* (white fir) and the *Yezo matsu* (pine), but large quantities of hard wood logs were in the floats. The *yodo* or *tondo* grows on the adjacent hills.

Near the mill are long ranges of government godowns and also many residences of officials.

On the south side near the Capitol is a pretty two-storied villa built in a semi-european style; this is intended for a Court of Justice.

It is stated that the present population of Satsporo is about 8,000, besides which there are many small villages scattered over the plain. The settlers are very clannish; there are "Sendai" villages, "Nambu" villages, etc.



The Satsporo market seems well supplied with fish, venison and vegetables. The shops are very poor; a large Yoshiwara exists at the east end of the town.

The government model farm has proved that the soil is highly productive, the climate favorable, and that Japanese hemp and cereals of fine quality can be grown in large quantities.

It is a pleasant change from Satsporo, with its army of officials, to Ishi-kari town, with its thriving, hard-working population. Ishi-kari contains 374 houses and a population of 1682. It possesses a hospital and owns 33 horses, 18 mares, one sea-going junk, 72 launches and 83 sampans [105]. In the year 1872 the salmon caught amounted to 37,481 soku plus 8 fish; 1 soku=20 fish: total fish, 749,628. They average when cured 6 lbs. (Jap.) in weight, equal to 8 lbs. English. 45 Aino and 67 Japanese seines were used in the fisheries.

The government tax is twenty-five per cent. paid in kind. The Ainos pay no tax. The owner of a river station is supposed to clear \$300 to \$500 in a season.

The Japanese fishermen employed on the fisheries get \$30 for the season, which extends over the months of October, November and December; many Ainos are also employed.

In August and September the fish masters are employed in preparing for the coming season. The river is marked off into stations for both Japanese and Ainos. The Japanese then clear their stations of driftwood, and with snag boats they raise the snags and tow them out of the way. The banks have to be cleared and prepared so as to facilitate the hauling of the seines. Ranges of sheds are put up and heavily thatched, stores of salt, rice, fishing gear, etc., are collected, and all these preparations are completed by the end of September. Soon after, the arrival of the salmon is reported from the coast fishing stations, and in a few days they commence passing up the river on their way to the spawning beds in the upper waters. On the Ishi-kari, each station has two nets and two boats, and crews always at work from dawn until dark. A seine having been shot, the upper end is made fast to a post in the bank, and the lower end, or rather the rope attached to it, is passed around a capstan which is manned by the boat's crew that have shot the seine; the current assists in setting the net into the bank, along which it

lies, forming a long trough which contains the fish taken ; the men then leave the capstan and work the net by hand, turning the take into a fish-boat, which carries them to the stage used for landing and cleaning the fish. As soon as the first seine is half hauled the second one is shot outside of the first one, and hauled in its turn. When the fish are secured the boat's crew pick up the seine into the [106] boat, and again shoot it. By this method of working there is no time lost, and a wholesome rivalry exists between the crews ; in fact the scene is most exciting, as the men sing in wild chorus when shooting and also while they are running round the capstan. Then comes the leaping and plunging of the captive fish, the wild chorus is changed into yells and shouts, the fish master grows excited and objurgates freely, the culmination being when they dash in and seize the fish by their tails, slinging them into the fish boat, where they flap, dance and gape and make a pretty splashing. The man in charge of the boat now poles her to the landing stage, which projects over the river, is guarded by pieces of net, and slopes in shore ; he throws the fish on the stage, they flap down the slope and are seized by the cleaners. Two dexterous cuts with a sharp knife and out drop the gills ; a slit up the belly, two cuts inside, and out drop the whole of the contents, when behold the fish is cleaned and is ready for the curers.

The fish roe is now taken and placed in a bucket, which, when filled, will be carefully taken into the curing sheds, the roe placed in clean mats on wicker shelves and then well salted. Salmon roe is considered a great delicacy by Japanese epicures, and it accordingly fetches a high price.

The fish are carried from the stage into the shed ; each fish is placed in the salter's basket ; he throws three handfuls of salt inside, then dusts the outside with salt and throws it on the stack where the fish are placed in layers. On the completion of each layer, it is heavily dredged with salt, one picul (133½ lbs.) of which is used for every 40 or 45 fish. A stack complete generally contains 10,000 fish. After some time, the fish having been sufficiently cured, the stacks are unpacked and the fish hung up to dry : when dry they are ready for export.

The livers contain much oil, but they are not utilised.

The estimated value of each fish cured is five cents; the cost of one picul of salt is two *bu*=50 cents; all the fishing gear, etc., is brought up from the southern ports, mostly from Ōzaka and Yedo.

[107] The fish merchants of these two cities have by their enterprise developed the fisheries of the Island of Yezo, and great rivalry exists between the fish merchants of each port.

The fish caught and cured in the Ishi-kari district are shipped direct from the Ishi-kari river.

At Atsta, which is the next district, north of the Ishi-kari, the salmon fisheries are on the sea coast. Here they use very large seines, some of which are 4,000 feet in length. One pair of these each making three hauls will sometimes catch 20,000 salmon in one day.

All the fish taken on the coast are bright fish. Two or three days after they enter the river the scales commence to lose their metallic lustre. This is followed by large patches of discoloration, at the same time the jaws become inflamed and teeth commence to grow. The hump also begins to form on the back of the male fish; in fact, after being some twenty days in fresh water they have very much changed in appearance, and also in value. The spent fish are almost bloodless, and when on their way down to the sea, they are utterly exhausted. Large numbers of dead spent fish are left on the shingle banks after every freshet, to the manifest delight of myriads of crows, who do the work of scavengers on the river's bank.

I will now conclude this description of the Ishi-kari River and its resources, with a few observations on the large stretches of clear grass land that exist both in the upper and lower plains through which the river flows.

At present they are uncultivated and are consequently valueless to mankind. Hundreds of thousands of acres lying idle within five days' steam of Yokohama!

[108] Were but 30,000 acres cropped with Japanese hemp (*Asa*), and the produce exported, how much it would be to the advantage of all concerned the following will shew: 30,000 acres of Hemp=8,533 tons net. Taken at same value as Manila laid down in London, viz., £31 per ton, represents the sum of £264,523 sterling—with \$ @ 4/ \$1,323,615.

But I believe the Japanese hemp would command a far higher price as a material to be used in silk mixtures.

I will now quote the present market price of this commodity in Yokohama,

Muster No. 1—\$38 per picul, £137.5.6 per ton.

Muster No. 3—\$23 per picul, £83.1.9 per ton.

8533 tons at £137.5.6=£1,171,867.11.6.

Do. at £ 83.1.9.=£708,239.0.0.

An absurdly high price.

#### SATSPORO TO SHIN-MURORAN VIA NEW ROAD.

The new road from Satsporo to Shin-Muroran viâ Chitose, Tomakumai, Shiraoi and Horo-bets about 86 miles.

Soon after leaving Satsporo the road winds up some well timbered hills. The escarps have been cut into the underlying pumice, which material is used to cover the road ; the drains and culverts are generally revetted with fascine or hurdle work and the bridges are constructed of rough timber.

The road is kept well on the crest of the hills so as to avoid bridge making, and at last dips into the valley in which Chitose is situated, distance from Satsporo 25 miles.

There is a very large *hon-jin* at Chitose, from thence to Tomakumai a distance of 17 miles, the road for one half the distance leads over a swampy plain ; the subsoil is still pumice.

Tomakumai is situated on the sea shore on the east coast of Yezo. There is a large *hon-jin*, and close by is the fishing station. Here they catch fish something like a sardine and also herrings, which are boiled down, the oil extracted and the residue dried, packed, and exported for manure.

[109] The fish are caught in the months of March and April and in October and November. In a good year they produce 7,000 kokus of manure and 150 large tubs of oil at this station.

The government tax is ten per cent in money.

For the next seventeen miles the road runs parallel to the coast line and on a dead level ; here the coast has gained land to a great extent

at some very recent period. The old beach, cliffs, headlands and bays are distinctly visible; in some places they are now two or three miles from the sea. This new formation appears to consist of an enormous bed of pumice; this is covered by a thin skin of vegetable mould, the result, I should think, of about twenty-five years' vegetation.

This deposit of pumice may be divided into three parts. 1st, that which fell *in situ* during the eruption; 2nd, that washed off the hills and out of the valleys; 3rd, that carried thither by the sea. The maximum depth to which pumice fell during the last eruption in this section of the Island was about three feet six inches. A very good section of this fall may be seen on the banks of the river at Shiraoi, which is a fishing station on the same coast as Tomakumai, from which it is 17 miles distant; the perpendicular bank of the river shews this white band of pumice with a few inches of black earth on top and several feet of black sea sand below. In the twilight it appeared as though the river bank was topped with a plastered *yashiki* fence.

Shiraoi is a large well-to-do station. The whole station is the property of a blooming widow of about 55 named Marumata. It was stated that there were besides the *hon-jin* and fish houses, 20 Japanese houses (7 of which were grog-shops) and 240 Aino dwellings; the latter very neatly built and thatched.

The population is, Japanese 103, Ainos 260 men, 180 women. There is no cultivation whatever; fish oil and manure are produced in large quantities. Government tax is ten per cent.: 8 large boats and 28 canoes belong to the station. Salt was valued at  $1\frac{1}{2}$  riôs per picul. [110] Rice at  $2\frac{1}{2}$  riôs. Freight per junk to Yedo or vice versâ is paid in kind and amounts to one-fifth of the cargo.

From Shiraoi to Horo-bets, distance about  $13\frac{1}{2}$  miles. Just outside the station a long bridge spans the river. Further on forded two rivers where the bridges had been washed away, and ferried over another where they have not yet built a bridge. The bridges are a fair sample of Japanese Government contract work (i.e., bad work). The road leads over two hills and then down again into the level plain bordering on the sea. The escarpment down the last hill shews a layer of igneous rock overlying huge beds of pumice.

This portion of the road also shews that the Japanese have yet to

learn how necessary it is to keep a road in repair. Here the drains were choked and the water had torn up the road in many places to such an extent as to render it impassable for wheeled vehicles.

Since reaching the coast I have observed that all the streams on nearing the beach turn south and run for some distance parallel to it before they discharge into the sea. This denotes that there prevails a current along this part of the coast setting to the southward. Passed several large fishing stations with Aino huts contiguous. These appeared to be of a better class and more comfortable than those in the interior. The Aino children, also, were more numerous and well clad in bark cloth and skins.

At one station observed the process of launching the large boats used for shooting the seines in the sardine fishery. There was much surf on the beach. Twelve rowers sat in the boat, which was placed on rollers on the crest of the beach, the nets stowed in the waist and aft. Some twenty men then caught hold of the boat and, waiting for a favorable opportunity, they launched her down the slope at a run, and pushed her into the surf; the rowers immediately pulled hard, and a few vigorous strokes took them outside the broken water.

In some places the beach was covered for long distances with thousands of mats on which the fish manure [111] is spread to dry. Aino women armed with bows and blunted arrows kept watch and ward over the manure to prevent the dogs from purloining it.

There are forty Aino and fourteen Japanese houses in Horobets, and the population is stated to be, Ainos about 800; Japanese about 100.

800 kokus of salmon were caught here in 1872; also 100 kokus of seaweed (*kobu*) were exported.

Near here are two hot sulphur springs, and some eight miles distant amongst the hills much native sulphur of fair quality is found.

There are plenty of ponies. They are on the hills all through the winter; when wanted Ainos are sent out (mounted) to catch them. Ainos are very expert horsemen and soon turn sufficient to form a drove of some twenty or thirty into one of the mountain paths leading to the corral at the station: down the paths they gallop, and are skilfully headed for the entrance to the corral, into which they are driven.

A selection is then made of the number required for work and the remainder are turned back to the hills from whence they came.

Horo-bets to Shin-Muroran, distance  $12\frac{1}{2}$  miles. The road leads along the plain parallel to the sea. The upper layer of pumice, before noticed at Tomakumai, etc., here thins out and almost ceases about five miles from Horo-bets.

The soil is light and the plain is covered with good pasture and some clumps of dwarf oak. The hills at back are well wooded. Having passed the plain the road winds up some hills of scoria and pumice, well grassed and timbered; further on is a fortified barrack situated at the junction of the old Muroran road with the new road leading to Shin-Muroran. Soon after the bay (Endermo) on the shores of which Shin-Muroran is built comes into view. The road here is most skilfully led through some very pretty well wooded hills. On the right is an extensive and swampy plain covered with plume grass. Well wooded hills of considerable altitude form the back ground: the road at last descends to the harbour beach and then is [112] carried on the crest of a low range of bluffs on which is built the village of Shin-Muroran (i.e. new Muroran).

The inhabitants were brought over from the old village on the other side of the bay by government order. 100 riôs was loaned to each head of a family; the government sold them wood, shingles, etc., and the result is a village of some sixty Japanese houses, ten Aino huts and a gross population of 255 persons.

The new road ends here, distance from Satsporo 85 or 86 miles.

It is necessary to take ship for Mori, situated on the opposite side of Volcano Bay and distant some 25 miles. Having reached Mori (often a work of difficulty) another section of the road extends from thence to Hakodate *via* Sigonope, distance about 80 miles, which section has already been described.

THE SHIÑ-TAU TEMPLES OF ISE.

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By E. SATOW, Esq.

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[*Read before the Asiatic Society of Japan, on the 18th February, 1874.*<sup>1</sup>]

[113] The Temples of Ise, called by the Japanese 'Riyau-dai-zhiñ-guu,' or literally the 'Two great divine palaces,' are situated in the department of Watarahi, at a short distance from each other. Though not the most ancient, they rank first among all the Shiñtau temples in Japan in point of sanctity, and have in the eyes of Japanese the same importance as the Holy Places of Palestine in the eyes of the Greeks and Armenians, or Mecca in those of the Mahometans. Thousands of pilgrims resort thither annually, chiefly during the spring months, when the weather is most suited for travelling. In Yedo no artisan considers it possible to gain a livelihood unless he has invoked the protection of Dai-zhiñ-guu Sama, as the common people are accustomed to call the gods of Ise, by performing the journey thither once at least, and the peasants are even more devout believers. In former years it was a common thing for the little shop-boys of Yedo to abscond for a while from their masters' houses, and to wander along the Tou-kai-dau as far as Ise, subsisting on the alms which they begged from travellers; and having obtained the bundle of charms, consisting of pieces of the wood of which the temples are built, they made their way back home in the same manner. The Ise pilgrims are distinguished on their return by large bundles of charms wrapped in oil-paper, which they carry suspended from their necks by a string. [114] Stories are even told of dogs making the pilgrimage, no doubt in the company of these boys, and until a short time ago one of these holy animals was still living in Shinagaha.

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<sup>1</sup> Revised by the author, 1882.



In every Japanese house there is kept what is called a *kami-dana*, or 'shelf for gods,' which consists of a miniature Shiū-tau temple in wood, containing paper tickets inscribed with the names of various gods, one of whom is invariably Teñ-seu-kuwau-dai-zhiñ, the principal deity of Ise. This ticket, or rather paper box, is called *o-harahi*, and is supposed to contain between two thin boards some pieces of the wand used by the priests at Ise at the two annual festivals in the 6th and 12th months of the year. These festivals are called *oho-barahi no matsuri*, and are supposed to effect the purification of the whole nation from sin during the preceding half year. Every believer who has one of these *o-harahi* in his *kami-dana* is protected thereby from misfortune for the next six months, at the expiration of which time he ought to exchange the *o-harahi* for a new one, which he must fetch from Ise in person, but in practice the *o-harahi* is only changed once a year, perhaps less often. The old ones ought to be cast into a river or into the sea, or may be destroyed by burning. They are usually employed to light the fire which boils the water for the bath prepared for the *miko*, or virgin priestesses, after their dance in honour of the *uji-gami*, or patron-god of the locality, at his festival. Up to the revolution in 1868, as it was practically impossible for every householder to fetch his own *o-harahi* from Ise, there existed a class of persons called *oshi*, who made it their trade to hawk the *o-harahi* about the country, selling almanacs at the same time. This practice has been lately prohibited by the Mikado's Government, and they can now be obtained only at the temples themselves or at the recognized agencies.

The route usually taken by Japanese pilgrims lies along the Tou-kai-dau, those who come from the west leaving that road at Seki, while those who come from the east turn off at Yotsuka-ichi near Kuhana. The Temples are also [115] easily reached from the harbour of Toba in Shima, which is distant only about seven miles from the nearest. The castle of Toba was built by one of the leaders of Toyotomi Hideyoshi (Taicosama)'s expeditions against Korea, and some interesting relics are still preserved in it. The town is not large, and the chief business of the inhabitants seems to be furnishing supplies to the junks which frequent the port in small numbers.

The itineraries by the Tou-kai-dau are as follows :—

Yotsuka-ichi to Kañbe .....	1	ri.	80	ch.
“ Shiroko .....	2	“	7	“
“ Uhenno .....	1	“	11	“
“ Tsu .....	2	“	17	“
“ Kumōdzu .....	2	“	6	“
“ Matsuzaka.....	2	“	27	“
“ Kushida.....	—	“	18	“
“ Miyau-zhiyau .....	2	“	13	“
“ Yamada .....	2	“	6	“
“ Ge-kuu (Temple) .....				
“ Nai-kuu (Temple) .....	1	“	14	“

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19 ri. 5 ch.

Seki to Kusuvara .....	—	“	30	“
“ Mukumoto .....	—	“	34	“
“ Kubota .....	2	“	18	“
“ Tsu.....	1	“	24	“

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5 ri. 34 chō.

From Toba the road lies through two villages called Asama and Kusube. On the west of Asama village rises the lofty hill called by the same name, from which the view towards the sea is magnificent. The town of Furuichi, about eight miles from Toba, where the pilgrims lodge, stands on a long ridge between the two Temples. It consists entirely of inns, brothels and houses [116] of entertainment, mostly of large size, though this fact is less apparent from their standing with their gables towards the street. In few towns in Japan does the architecture present such a solid appearance throughout. A traveller who takes the route from Seki or Yotsuka-ichi would approach the Temples through the town of Yamada, north of the Ge-kuu, and pass through Furuichi after visiting it, on his way to the Nai-kuu. Yamada is also a considerable town, and contains numerous inns.

The Ge-kuu (Outer-Palace) stands in the midst of a large grove of aged cryptomerias. To reach it from Yamada, the street called Tate machi has to be traversed, and a bridge crossed, which gives access to

a wide space enclosed by banks faced with stone. On the right hand side is a building occupied by *Kaŋnushi*, or attendants of the Temple, who are to Shiŋ-*tau* what the bonzes are to Buddhism. They keep here for sale pieces of the wood used in the construction of the temple wrapped in paper, small packets of the rice which has been offered to the gods, and various other charms. Close by this building stands the *ichi no toriwi*, or first arch-way, which forms the front entrance, and whence a broad road leads through the trees to the Temple. As is the rule in all pure Shiŋ-*tau* temples, the *toriwi* is of unpainted wood. It consists of two upright trunks planted in the ground, on the tops of which rest a long straight tree whose ends project slightly; underneath this is a smaller horizontal beam, whose ends do not project.

The *Toriwi* was originally a perch for the fowls offered up to the gods, not as food, but to give warning of daybreak. It was erected on any side of the temple indifferently. In later times, not improbably after the introduction of Buddhism, its original meaning was forgotten; it was placed in front only and supposed to be a gateway. Tablets with inscriptions (*gaku*) were placed on the *toriwi* with this belief,<sup>3</sup> and one of the first things done after the restoration of the Mikado in 1868 in the course of the [117] purification of the Shiŋ-*tau* temples was the removal of these tablets. The etymology of the word is evidently 'bird-rest.' The *toriwi* gradually assumed the character of a general symbol of Shiŋ-*tau*, and the number which might be erected to the honour of a deity became practically unlimited. The Buddhists made it of stone or bronze, and frequently of red-painted wood, and developed various forms. It is to the present day a favourite subject for *ex-voto*.

About a hundred yards up the road through the grove stands a second *toriwi*, exactly similar to the first, and on passing through this the pilgrim comes in view of an oblong enclosure, situated close to the road by the right-hand side.

This enclosure is built of cryptomeria, as is the rule with all Shiŋ-*tau* structures, neatly planed and perfectly free from any kind of paint. It is formed of upright posts about nine feet high, planted at intervals of six feet, the intervals being completely built up with planks placed

<sup>3</sup>Vide Vol. VI. f. 2 of the *Kata-hisashi* by Saitou Hikomaro.

horizontally. According to a plan given to me by the second official in charge of the temple, the front, which faces the road, is 247 feet in length; the right side, supposing the spectator to be standing with his face to the entrance, is 339 feet, the left side 335 feet, and the rear only 235 feet in length. It thus appears that the shape is that of an irregular oblong, the formation of the ground rather than any necessary relation of numbers having determined the proportions. This enclosure is called the Itagaki.

A little on one side of the centre of the front face is the outer entrance, eighteen feet in width, formed by a *torii* similar in shape to the other two, but of smaller dimensions. It is called *Saï no torii* in the drawing given in volume 4 of the *Ise saï-guu Mei-shiyo Dzu-ue*, but *Itagaki go moï* in the plan above referred to. Opposite to it, at a distance of 54 feet, stands a wooden screen, called *baï-pei*, or fence, which recalls to mind the brick-built screen which in China occupies a similar position before the gate of a *yamén* or the private dwelling of a rich [118] person. There are four other entrances in the *Itagaki*, formed by *torii*, one on the east, one on the west, and two on the north side. Those on the east and west are near the lower or left-hand end, and opposite to each stands a *baï-pei* about 24 feet distant. Of those on the north side, one is situated about the middle, and has a *baï-pei* opposite to it. The other, which is smaller, only gives access to the *mi-ke-deï*, which is probably the reason of the absence of the *baï-pei*. The whole of the *Itagaki*, with the exception of the *Saï no torii* on the south side, has been erected since the Restoration in 1868.

The third *torii* gives access into what appears to be a small court, the further end of which is formed by a gateway protected by a thatched roof, and ordinarily closed by a curtain, the two sides being shut in by low wooden fences. On the left hand is a gatekeeper's lodge.

Unless the pilgrim be a privileged person, he is prevented by the curtain from seeing further into the interior. A full view can, however, be obtained by ascending a bank on the west side of the enclosure, from which the whole arrangement of the shrine is at once perceived.

The thatched gateway above mentioned is the principal opening in a second fence composed of cryptomeria trunks, alternately long and short, placed at intervals of about 2½ feet, with two horizontal railings, the

one running along the top, the other along the centre. The distance of this fence from the outer enclosure varies, being 86 feet on the south, 27 feet on the west, 25 on the east, and 10 feet on the north. It is called the *Aragaki*, and like the *Itagaki* has been erected within the last six years. Besides the gateway on the south, there are three others, one on each side, corresponding to the other three main *torii* in the *Itagaki*. These gateways are *torii* closed with solid gates, an arrangement rarely seen in ShiŃ-tau temples. On passing through the thatched gateway the visitor finds himself in a second court, on the right-hand side of which stands a sort of shed, 40 feet in length by 20 in depth, called the *Shi-jiyau deñ*. [119] This is a restoration<sup>9</sup> of one of three buildings anciently called *Nahoraki dono*, which were set apart for the entertainment of the envoys sent by the Mikado, after the celebration of the great annual harvest festival called *KaŃname no matsuri*. Advancing through a *torii*, called the *ko-torii*, in a straight line for a distance of 99 feet, he comes to a third gateway, likewise covered in with a thatched roof (formerly called *Tama-gushi go moñ*, but in the plan *Uchi-tamagaki go moñ*), which admits him to the interior of a third enclosure, called the *Uchi-tamagaki*. This palisade is formed of narrow planks, about 8 feet in height, placed close together. Just within this is a small wooden gateway called the *BaŃ-gaki go moñ*, and immediately beyond the latter a third thatched gateway, which forms the entrance to the fourth and last enclosure. This palisade, called *Midzu-gaki*, is formed of broad planks, and is almost a perfect square, the north and south sides being each 134 feet in length, the east and west 131 feet in length.

Within the enclosure thus formed stand the *Shiyau-deñ*, or shrine of the gods, at the back, and two *hau-deñ*, or treasuries, right and left of the main entrance.

Japanese antiquarians tell us that in early times, before carpenter's tools had been invented, the dwellings of the people who inhabited these islands were constructed of young trees with the bark on, fastened together with ropes made of the rush *Suye* (*Scirpus maritimus*), or perhaps with the tough shoots of the wistaria (*fuji*), and thatched with the grass called *kaya*. In modern buildings the uprights stand upon

<sup>9</sup> GuŃ-shiyo ruwi-zhiu. Vol. I. f. 7v.

large stones laid on the surface of the earth, but this precaution against decay had not occurred to the ancients, who planted the uprights in holes dug in the ground.

The ground plan of the hut was oblong, with four corner uprights, and one in the middle of each of the four sides, those in the sides which formed the ends being long enough to support the ridge-pole. Other trees were fastened horizontally from corner to corner, one set near the [120] ground, one near the top and one set on the top, the latter of which formed what we call the wall-plates. Two large rafters whose upper ends crossed each other, were laid from the wall plates to the heads of the taller uprights. The ridge pole rested in the fork formed by the upper ends of the rafters crossing each other. Horizontal poles were then laid along each slope of the roof, one pair being fastened close up to the exterior angles of the fork. The rafters were slender poles or bamboos passed over the ridge-pole and fastened down on each end to the wall-plates. Next followed the process of putting on the thatch. In order to keep this in its place two trees were laid along the top resting in the forks, and across these two trees were placed short logs at equal distances, which being fastened to the poles in the exterior angle of the forks by ropes passed through the thatch, bound the ridge of the roof firmly together.

The walls and doors were constructed of rough matting. It is evident that some tool must have been used to cut the trees to the required length, and for this purpose a sharpened stone was probably employed. Such stone implements have been found imbedded in the earth in various parts of Japan in company with stone arrow-heads and clubs. Specimens of the ancient style of building may even yet be seen in remote parts of the country, not perhaps so much in the habitations of the peasantry, as in sheds erected to serve a temporary purpose.

The architecture of the Shiñ-tau temples is derived from the primeval hut, with more or less modification in proportion to the influence of Buddhism in each particular case. Those of the purest style retain the thatched roof, others are covered with the thick shingling called *Hihada-buki*, while others have tiled and even coppered roofs. The projecting ends of the rafters (called *Chiji*) have been somewhat lengthened, and carved more or less elaborately. At the new temple at Ku-dañ-zaka

in Yedo they are shown in the proper position, projecting from the inside of the shingling, but in the majority of cases they merely consist of two pieces of [121] wood in the form of the letter X, which rest on the ridge of the roof like a pack-saddle on a horse's back, to make use of a Japanese writer's comparison.<sup>4</sup> The logs which kept the two trees laid on the ridge in their place have taken the form of short cylindrical pieces of timber tapering towards each extremity, which have been compared by foreigners to cigars. In Japanese they are called *Katsuwo-gi*, from their resemblance to the pieces of dried bonito sold under the name of *Katsuwo-bushi*. The two trees laid along the roof over the thatch are represented by a single beam, called *Muna-wosahe*, or 'roof presser.' Planking has taken the place of the mats with which the sides of the building were originally closed, and the entrance is closed by a pair of folding doors turning, not on hinges, but on what are, I believe, technically called "journals." The primeval hut had no flooring, but we find that the temple has a wooden floor raised some feet above the ground, which arrangement necessitates a sort of balcony all round, and a flight of steps up to the entrance. The transformation is completed in some cases by the addition of a quantity of ornamental metal-work in brass.

All the buildings which form part of the two temples of Ise are constructed in this style, so disappointing in its simplicity and perishable nature. I am acquainted with but few other similar temples. These are the temple to the gods of Ise on the Nogi hill, and that of Oho-tafu no Miya at Kamakura. None but those which are roofed with thatch are entitled to be considered as being in strict conformity with the principles of genuine Shiū-tau temple architecture.

The *Shiyau-deñ* of the *Ge-kuu* is thirty-four feet in length and nineteen in width. Its floor, which is raised about six feet from the ground, is supported on wooden posts planted in the earth. A balcony three feet in width runs right round the building, and carries a low balustrade, the tops of whose posts are carved into the shape called *hau-shi no tama*. A flight of nine steps fifteen feet in width [122] leads up to the balcony in front, with a balustrade on each side. The steps, balustrade and doors are profusely overlaid with brass plates, but there

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<sup>4</sup>Vide drawings on ff. 1 and 2 in vol. VI. of the *Kata-hisashi*.

is none of the elaborate wood-carving which may be seen on many of the shrines which for ages past have been in the charge of the Buddhists, as for instance, the shrines of Kami-no-Suwa and Shimo-no-Suwa in ShiŪ-shiu. The external ridge-pole, cross-trees and projecting rafters are also adorned with brass, and the ends of the latter are prolonged more than is usual. The roof is what is termed a gable roof, but projects some three feet beyond the walls at each end.

The one peculiarity which more than all others distinguishes the pure ShiŪ-tau temples from those of the Buddhists is the absence of images, exposed as objects for the veneration of the worshipper. It has been observed that ShiŪ-tau temples often contain a mirror placed in a prominent position, and this mirror has been supposed by foreigners to be their distinguishing mark; but it is only to be found in those which have been under the influence of Buddhism. It is absent from all the pure ShiŪ-tau temples. At the same time these latter nearly always contain some object in which the spirit of the deity therein enshrined is supposed to reside. The common name of this is *mi-tama-shiro*, or 'august spirit-substitute.' Another name for it is *kaŷ-zane*, or 'god's seed.' It is usually concealed behind the closed doors of the actual shrine, within some kind of casing, which alone is exposed to view when the doors are opened on the occasion of the annual festival. As the *tamazhiro* at the *Ge-kuu* are imitations of those at the *Nai-kuu*, I will speak of them when I come to describe that temple.

The two *hau-deŷ*, or Treasuries, are much simpler in form, having no balcony and very little brass ornament except on the timbers of the roof. They stand facing towards the *Shiyau-deŷ*, one on each side of the gate, and have floors raised above the ground. Their contents consist of precious silken stuffs, silk fibre presented by the province of Mikaha, and sets of saddlery for the sacred horses.

In the northwest corner of the area, between the *Itagaki* [123] and the *Soto-tamagaki*, stands the *Ge-hei-deŷ*, or *Hei-haku-deŷ*, of a construction similar to that of the two Treasuries. This building is destined to contain the *go-hei*, or *mitegura*, as they are called by the teachers of pure ShiŪ-tau. A *go-hei*, when plain, consists of a slender wand of unpainted wood, from which depend two long pieces of paper, notched alternately on opposite sides, so that they assume a twisted



appearance. In some shrines which have been long in the hands of the Buddhists, gilt metal has been substituted for paper. The *go-hei* represent offerings of rough and fine white cloth (*ara-take* and *nigi-take* are the words used in the *norito* or addresses to the gods), and as the offerings were supposed to have the effect of attracting the gods' spirits to the spot, it was by a natural transition that they came in later times to be considered as the seats of the gods, and even as the gods themselves. At Ise, however, the *go-hei* have retained their original meaning. There is but one *go-hei* to each god worshipped at any particular shrine, and where three or five are seen in a row, the fact indicates that the building is dedicated to the same number of deities. I mention this because it has been stated that the three *go-hei* which are often seen in one temple have some connexion with the dogma of the Trinity.

*Go-hei* is compounded of two Chinese words meaning ' august ' or ' imperial ' and ' present. ' *Mitegura* is compounded of the honorific *mi*, corresponding in meaning to the Chinese *go*, *te*, a contraction of *take*, an archaic word for cloth, and *kura*, a seat. This is the derivation given in the *Wa-kuñ-kañ*. Motowori, in the *Ko-zhiki-deñ* (Vol. VIII. f. 49) says that *kura*, which he connects with *kureru*, to give, means a present, and that *te* is either ' hand ' or a contraction of *tamuke*, an offering. If *te* is hand, then the compound signifies that which is taken in the hand and presented. The wand was originally a branch of the sacred tree called *sakaki* (*Cleyera japonica*).

On the northeast corner of the *Ge-kuu* in a special enclosure within the *Itagaki* stands the *mike-deñ*, a building in the same [124] form as the *hau-deñ*. It is here that the water and food offered up to the gods every morning and evening are set out. These gods are seven in number, namely, the principal deity and three secondary (called *ahidono*) of the *Ge-kuu*, and the principal deity and two *ahidono* of the *Nai-kuu*. Formerly, that is to say, up to the year 729, as the legend states, the food offerings for the *Nai-kuu*, after being prepared at the *Ge-kuu*, were conveyed to the former temple, there to be set out. In that year, as the offerings were being carried thither as usual, they were unwittingly carried past some polluting object which happened to be in the road. The consequence was that the Mikado fell ill, and the diviners attributed his sickness to the anger of the goddess of the *Nai-kuu*. An envoy was

deputed by him to carry his apologies to the offended deity, and the *mike-deñ* was then erected at the *Ge-kuu* for the service of both temples. This account would appear to suggest that no *mike-deñ* existed at all before this occurrence, but that can hardly be possible.

The offerings made to each of the two principal deities consist of four cups of water, sixteen saucers of rice, four saucers of salt, and food, such as fish, birds, fruit, vegetables and seaweed, offered up by the surrounding villages. The proportion for each of the *ahidono* consists of the same quantities as offered to the principal deities,<sup>5</sup> except one-half the quantity of fruit.

The principal deity worshipped at the *Ge-kuu* is Toyoukebime no kami, called Ukemochi no kami in the Ni-hoñ-gi and Ohogetsuhime no kami in the Ko-zhi-ki. *Toyo* means abundant: *uke*, food: *hime*, lady, and the whole signifies 'abundant-food-goddess.' Ukemochi no kami signifies the 'food-possessing god.' In the name *Ohogetsu-hime no kami*, the first element *oho* is simply an honorific like the *o* in colloquial; *ge* is *uke* deprived of its first syllable and with the *niçori* of composition; *tsu* is the archaic generic particle, *hime* as before, and the whole means 'goddess of food.' Hirata Atsutane's compilation of myths from the most reliable sources (*Ko-shi Sei-buñ*) contains the following account of of her (Vol. II, f. 1).

[125] "Hereupon Ama-terasu-oho-mi-kami spake unto Kamu-haya-Susanowo no mikoto and said: "I have heard that there is a god named Ukemochi no kami in the central country of luxuriant reedy moors (Japan). Go thou and see." Then Haya-Susanowo no mikoto, obeying the most august command, descended from heaven, and coming to the august abode of Ukemochi no kami, asked for food from that Ukemochi no kami. When Ukemochi no kami hereupon brought forth from nose, mouth and hinder parts various kinds of food, and arranging them in various forms on a banqueting-table, entertained him, Haya-Susanowo no mikoto stood and watched the proceedings, and thinking that she was offering foul things, was angry and grew hot, and spake, saying:—"Foul indeed, despicable indeed. Why feed me with foul things?" Having spoken, he drew his sword, and having struck that Ukemochi no kami dead, reported, and when he told the matter in detail, Amaterasu-oho-mi-

<sup>5</sup> Guñ-shiyo Buwi-zhiu, vols. I. and II.

kami was very angry, and having said: "Thou art a wicked god; I do not desire to meet thee," remained secluded from him one day and one night.

"Then when Amaterasu-oho-mi-kami afterwards a second time sent Ame-kuma-no-ushi and caused him to see, Uke-mochi no kami was really dead. As to the things which grew on the body of the goddess whom he (Susanowo no mikoto) had killed, *aha*<sup>6</sup> grew on the forehead, a silk-worm and mulberry tree grew on the eyebrows, *hiye*<sup>7</sup> grew on the eyes, a rice-seed grew on the belly, barley, a large bean and a small bean on the private parts, and the head changed into a cow and horse. When Ame-kuma-no-ushi then took them all and presented them, Amaterasu-omikami rejoiced and spake, saying: "These things are things which the beautiful green-human-herb eating may live." Then she constituted *aha*, *hiye*, barley and beans seeds of the dry-fields, and constituted rice seed of the watery-fields. Also she appointed lords of the villages of heaven, and for the first time made them plant those rice-seeds in the narrow fields and long fields of heaven, so that in the [126] autumn the drooping ears were abundantly luxuriant, and ripened very well. Also she planted the mulberry-trees on the fragrant hills of heaven (*Ame-no-kaju-yama*), and reared silkworms, and chewing the cocoons in her mouth spun thread. The arts of silkworm-rearing and weaving commenced from this time."

The secondary deities (*ahidono*) are Amatsu-hiko-ho-no nini-gi no mikoto, Ame-no-koya-ne no mikoto and Ame-no-futo-dama no mikoto. The first of these is the grandson by adoption of the goddess Amaterasu oho-mi-kami, and great-grandfather of Zhiū-mu Teñ-wau. According to the legend the goddess wished to send her adopted son Oshi-ho-mimi no mikoto down upon earth to subdue it, but he put forward his own son instead as leader of the expedition. The goddess then presented Nini-gi no mikoto with various treasures, amongst which the most important were the mirror, sword and stone (afterwards the regalia of the Japanese sovereigns), and attached to his person the last two gods. With reference to the mirror she said: "Look upon this mirror as my spirit, keep it in the same house and on the same floor with yourself, and worship it as if you were worshipping my actual presence."<sup>8</sup>

<sup>6</sup>Panicum italicum. <sup>7</sup>Panicum crus corvi. <sup>8</sup>Ko-shi Sei-buñ, Vol. III, f. 22.

The *Ge-kuu* was founded in the year 478 (the 22nd of Yuu-riyaku Teñ-wau). It was removed from Manawihara in Tañba in accordance with a revelation from Amaterasu oho-mi-kami 482 years after the establishment of that goddess' temple at Uji in the province of Ise in the 26th year of Suwi-niñ Teñwau (4 B. C.). The perishable nature of Japanese architecture of course renders it impossible that the original buildings should have lasted down to the present day, and in fact it seems to have been the rule from time immemorial to rebuild the temple once every twenty years, alternately on each of two sites which lie close to each other.

From the *Ge-kuu* to the *Nai-kuu* is a distance of about three miles through the localities called *Meu-keñ-machi*, *Furuichi*, *Ahi-no-yama*, *Naka-no-chiyau* and *Uji*, which form a continuous succession of houses. Through the middle of *Uji* flows a [127] stream called the *Isuzu-gaha*, crossed by a fine wooden bridge, and the *torivi* on the outskirts of the grove in which stands the *Nai-kuu* is only a few hundred yards from the bridge and close to the river bank. Just within the *torivi* are some steps leading down to the water, and here the pilgrims are wont to wash their hands before proceeding to worship at the temple. The practice of cleansing the hands before praying at a shrine seems common to both Shiñtoists and Buddhists; it is symbolic of purification, but the water used for this purpose does not seem to have any miraculous virtues like the holy water of the Christians.

The whole arrangement of the *Nai-kuu* is similar to that of the *Ge-kuu*. There are the same number of *torivi* in the avenue by which it is approached, and it is surrounded by the same fourfold enclosure. There is, however, some difference in the shape and size of the different enclosures. The *Itagaki* is 195 feet long in front, 369 feet at the side, and 202 at the back, thus being narrower and deeper than that of the *Ge-kuu*. The innermost enclosure, or *Midzuyaki*, measures as follows: front 149 feet, back 150 feet, each side 144 feet. It is therefore larger in every direction than that of the *Ge-kuu*.

The principal deity worshipped at the *Nai-kuu* is *Amaterasu oho-mi-kami*, and the secondary deities or *ahidono* are *Ta-jikara-wo no kami* and *Yorodzu-hata-toyo-aki-tsu-hime no kami*.

The first of these may be called the Sun-goddess, and is nothing but a deification of the sun. She has several names, of which this is the most common. It signifies literally, the "From-heaven shining great deity." According to the legend in the *Ko-shi Sei-bun*, she was produced from the left eye of Izanagi no mikoto in the course of the long purification by washing in the sea which he underwent after having defiled himself by intruding on the privacy of his consort Izanami no mikoto in the lower regions. From his right eye was produced Tsukiyomi no mikoto, also called Takehaya-Susanowo no mikoto. This is the moon, a masculine deity.

[128] Izanagi no mikoto produced a large number of gods, but of all his children, he loved these two the most. Amaterasu oho-mi-kami shone beautifully and illuminated the heavens and earth. He therefore resolved not to keep her on earth, and transferred her to heaven to be its ruler. At this time the earth was close to heaven, and the goddess had no difficulty in climbing up the pillar on which heaven rested, and in reaching her realm. Susanowo no mikoto was made ruler over the blue sea, but he neglected to keep his kingdom in order. He wore a long beard which descended to his bosom, and cried constantly, until the land became a desert and the rivers and seas were dried up, so that human beings perished in great numbers. When his progenitor demanded the reason of his evil temper, he replied that he wished to go to his mother (Izanami no mikoto), who was in the region under the earth. Izanagi no mikoto therefore made him ruler over the kingdom of night. After this he committed various other offences, one of which was flaying a live bald horse from the tail towards the head, and throwing the body into the room where his sister was seated at her loom. The goddess was so frightened that she hurt herself with the shuttle, and in her wrath retired into a cave which she closed with a rock door. Heaven and earth were plunged in utter darkness, which endured for a considerable time. A rationalistic writer, the editor of the *Koku-shiryaku*, explains this event to have been the first solar eclipse. The more turbulent among the gods profited by the darkness to make a noise like the buzzing of flies, and the general disaster was great.

Then all the gods assembled on the dry bed of the river called Ame-no-yasu-no-kaha, and held council as to the best means of appeas-

ing the anger of the great goddess. By order of Taka-mi-musu-bi no kami, they entrusted the charge of thinking out a plan to Ame-no-koyane no mikoto, the wisest of the gods. He suggested that an image of the goddess should be made, and artifice be employed to entice her forth. A large rock from near the source of the river having been taken to form an anvil, [129] the god Ishi-kori-dome no mikoto and the blacksmith Ama-tsumara no mikoto made a mirror in the shape of the sun with iron taken from the mines in heaven. To make the bellows they took the whole skin of a deer. The first two mirrors which they succeeded in making were too small, and did not please the gods, but the third was large and beautiful. "This," says the legend, "is the august deity in Ise."

Taka-mi-musu-bi no kami then ordered two of the gods to plant the broussonetia (*kaudzu*) and hemp (*asa*), and to prepare the bark of the one and the fibre of the other, while other three gods were appointed to weave the materials so obtained into coarse striped cloth and into fine cloth for the goddess' clothing. Two gods, who seem to have been the first carpenters, cut down timber in the ravines on Ame-no-kagu yama, dug holes in the ground with spades, erected posts and built a palace. Next he commanded Ame-no-kushi-akaru-tama no mikoto to make a string of *maga-tama*, such as were worn in those days as ornaments in the hair and as bracelets. [The *magatama* is supposed by Motowori to have been so called from its curved shape, and to be identical with the pierced pieces of soapstone answering to that description found in the earth in different parts of Japan. They are generally about two inches in length, but some have been found in Loochoo which are twice as large]. Two other gods made *tamagushi* from branches of the *sakaki* (*Cleyera japonica*) and the *suzu* (a kind of small bamboo). [The *tamagushi* was originally a wand to which were attached valuable stones, but afterwards pieces of cloth and, in modern times, paper took the place of the stones. It is a smaller *go-hei*, carried in the hand.]

When these preparations were complete, Taka-mi-musu-bi no kami then called before him Ame-no-koyane no mikoto and Ame-no-futo-dama no mikoto, and instructed them to find out by divination whether the goddess was likely to be induced to reappear. They caught a buck, and having torn the bone out of one of its forelegs, set it free again. They placed the bone in a fire of cherry bark, [130] and the direction of the

crack which the heat produced in the blade of the bone was considered a satisfactory omen.

Hereupon Ame-no-koya-ne no mikoto pulled up a *Sakaki* by the roots. On its upper branches he hung the string of *maja-tama*, to the middle he attached the mirror, and to the lower branches he fastened the coarse and fine cloth. This formed a large *mitetura* (or *go-hei*), which was held by Ama-no-futo-dama no mikoto, while he pronounced an address in honour of the goddess. [In most of the pictures which represent this scene in the mythology, the *mitetura* is drawn stuck in the ground, the artists having probably omitted to consult the books which contain the legend.]

Next they collected a number of cocks and set them to crow in concert. Ta-jikara-wo no mikoto, whose name signifies that he possessed great strength in his hands, was placed in concealment by the door of the cavern. Ame-no Uzu-me no mikoto was appointed superintendent of the dance. She blew a bamboo with holes pierced in it between the joints, while other deities kept time to the music with two pieces of wood, which they struck together. [Every one who has been in a modern Japanese theatre has seen and heard this part of the performance. Uzume no mikoto is the goddess whose mask with swollen cheeks and diminutive forehead is often to be seen on the wall in Japanese houses. She is vulgarly called O-kame.] Ame-no-kamato no mikoto made a sort of harp by placing six bows close together with the strings upwards. [This was the origin of the Japanese musical instrument called *koto*, and it is said that specimens are still extant which preserve distinct marks of this form.] The strings were made of the *Saru no wogase*, a kind of moss found hanging to the branches of the pine-tree (*matsu*) high up on the hills. His son Naga-shiraha no mikoto produced music from this harp by drawing across the strings grass and rushes (the *chi*<sup>9</sup> and *suge*) which he held in his two hands. Uzume no mikoto also made herself a head-dress [131] (called *kadzura*) of a long kind of moss (*hikage*)<sup>10</sup> which hangs from the pine tree, and bound her sleeves close up to her body under the arms-pits with the *masaki* (*Evonymus radicans* Sieb., a creeping plant). [This proceeding is called putting on a *tasuki*, and is practised

<sup>9</sup>Eulalia japonica.

<sup>10</sup>Lycopodium Sieboldii

to this day by every Japanese woman when about to perform household duties, such as drawing water or sweeping.] She provided herself with a bundle of twigs of *sasa* (a kind of bamboo-grass) to hold in the hand, [no doubt as a sort of *biton* with which to direct the movements of the others,] and a spear wound round with the grass called *chi*, and with small bells attached to it. Bonfires were lighted in front of the cavern, to dispel the darkness which had been created by the sudden retirement of the goddess. Then the *uke*, a sort of circular box, was laid down for Uzume no mikoto to dance upon. [In a picture illustrating this legend which is given in one edition of the *Nakatomi no harahi*, the *uke* is represented as being diverted from its proper use to serve as a drum, which is no doubt an error of the draughtsman.]

Having mounted on to the *uke*, Uzume no mikoto began to tread it and cause it to resound, and she became possessed by a spirit, which seems to have been the spirit of folly. The verses of six syllables, which are said to have been her song, are—

*Hito futa miyo*  
*Itsu muyu nana*  
*Ya koko-no tari*  
*Momo chi yorodzu.*

These words are said to have been subsequently chosen to express the principal numbers, one, two, three, four, five, six, seven, eight, nine, ten, hundred, thousand and myriad. The only difficulty is *tari* for ten, which is *tono* (pronounced *tō*) in modern Japanese.<sup>11</sup> But they may also be interpreted in quite a different manner. *Hito futa miyo* [192] is 'men! look at the lid.' By men are meant the gods, there assembled. [Hirata quotes several examples of the application of the word 'men' to gods.] 'Look at the lid' means 'look at the door of the cavern.' *Itsu* is for *idzu*, an old word meaning 'majesty' or 'terrible glory.' *Muyu* is the conclusive form of *muyuru*, the same as *moyeru*, to spring

<sup>11</sup> Hirata ingeniously suggests that *tari* would naturally be contracted into *chi*, which might become *to*, and *wo* is merely the echo or prolongation of the vowel. This is according to the principle by which any syllable may be changed first into any other in the same perpendicular line of the table called *go-zhifu in*, and then changed again into any syllable on the same horizontal line as the syllable produced by the first transmutation. Upon this system any two words may be proved to be identical. *Muyu* is *mu* in modern Japanese, but the original form is preserved in *muyuka* or *muika*, six days. Vide *Ko-shi-den*, vol. XI, f. 53 et infra, where the whole subject is fully discussed.



up, to sprout, to bud. *Nana* is to be taken as *nari-nareri*, has been successful, *i. e.*, the stratagem by which the goddess is induced to put her head out of the cavern has succeeded. *Ya* is the same as *iya*, an archaic word signifying 'greatly.' *Koko* is the same as *kokoro*, mind, feelings; the abbreviated form seen in *kokochi*, feelings, sensations. *Tari* is the same as *tarashi*, an honorific form of *taru*, to suffice, and expresses 'satisfaction.' *Momo chi* mean 'thighs and bosom,' and *yorodzu* must be taken to be the same as *yoroshi*, good. The last three lines therefore mean: "Majesty appears; hurrah! Our hearts are quite satisfied. Behold my bosom and thighs." When Uzume no mikoto (says Hirata) lets her dress fall down so as to expose the whole of her person, her thighs are plainly seen, and at the same time she bares her breasts; the line is an invitation to the assembled gods to enjoy the sight of her charms. These proceedings,<sup>12</sup> which were caused by the spirit which had descended on the goddess, excited the mirth of the gods, who laughed so loudly that heaven shook.

Amaterasu oho-mi-kami thought this all very strange, and having listened to the liberal praises bestowed on herself by Ame-no-ko-yane no mikoto, said: "Men have frequently besought me of late, but never has anything so beautiful been said before." Slightly opening the cavern door, she said from the inside: "I fancied that in consequence of my retirement both Ama-no-hara [183] (heaven) and Ashi-hara no naka-tsu-kuni (Japan) were dark. Why has Ame-no-uzume danced, and why do the gods all laugh?" Thereupon Ame-no-uzume replied: "I dance and they laugh because there is an honourable deity here who surpasses your Glory (alluding to the mirror)." As she said this, Ame-no-futo-dama no mikoto pushed forward the mirror, and showed it to her, and the astonishment of Amaterasu oho-mi-kami was greater even than before. She was coming out of the door to look, when Ame-no-tajikara-wo no kami, who stood there concealed, pulled the rock-door open, and taking her august hand dragged her forth. Then Ame-no-koyane no mikoto took a rice-straw rope, and passed it behind her, saying: "Do not go back in behind this." As they were putting the mirror into the cave it struck against the door, and received a flaw which it has to this day.

<sup>12</sup> Said to be the origin of the pantomimic dances called *kagura*; *kagura* is derived from *kamu*, divine, and *eragi*, to laugh.

They then removed the goddess to her new palace and put a straw rope round it to keep off evil gods, a practice still observed by the followers of ShiŪ-tau.

Yorodzu-hata-toyo-akitsu-hime no kami, the second of the *ahidono* of the *Nai-kuu*, is another of the subordinate deities attached to Ninigi no mikoto when he descended upon the earth.

The mirror which plays such a prominent part in this legend was, as I have related above, given to Ninigi no mikoto, and by him handed down to his descendants, who kept it in the royal palace. In the year 92 B. C. there was a rebellion in Japan, which the reigning *mikado* (long afterwards canonized as Suu-zhiŪ TeŪ-wau) believed to be a punishment for his having kept the sacred emblem under his own roof. He therefore placed the real mirror and sword in a shrine built for this purpose at Kasanuhi in Yamato, and appointed one of his own daughters to be priestess. The copies of the mirror and sword which he had made were placed in a separate building within the palace called *kashiko-dokoro*, or 'place of reverence.' Later on, in consequence of a warning from the goddess, the princess carried the mirror from province to province, [184] seeking a suitable locality, but having grown old in the search she was replaced in the reign of the following *mikado* (Suwi-niŪ TeŪ-wau, B. C. 29—A. D. 70) by the princess Yamato-hime no mikoto, who after many changes finally chose the present site, on the bank of the Isuzu river, by the village of Uji in Ise. This happened in the year 4 B. C.

This mirror is spoken of by some Japanese writers as if it were actually a deity by itself, but others take it to be merely the image of the goddess. All the mirrors in ShiŪ-tau temples, whether exposed to view, as in those which have fallen under Buddhist influence, or concealed within the *hoŪ-shiya*, as at the Ge-kuu, are imitations of this one. It appears that the *tama-zhiro* of the principal and secondary deities of both *Nai-kuu* and *Ge-kuu* are mirrors, but strictly speaking *Amaterasu oho-mi-kami* is the only deity who should be so represented.

Each mirror is contained in a box of *hinoki*, furnished with eight handles, four on the box itself and four on the lid. The box rests on a low stand and is covered with a piece of cloth said to be white silk. The mirror itself is wrapped in a brocade bag, which is never opened or renewed, but when it begins to fall to pieces from age, another bag is

put on, so that the actual covering consists of numerous layers. Over the whole is placed a sort of cage of unpainted wood with ornaments said to be of pure gold, and over this again is thrown a sort of curtain of coarse silk, descending to the floor on all sides. The *tama-zhiro* of the *ahidono* are contained in similar boxes, without the outer cage, and of smaller size. The boxes, or rather their coverings, are all that can be seen when the shrines are opened at the various festivals.

The Ise Guide-book, which I have already mentioned by its title, speaks of numerous smaller temples (*setsu-shiya* and *matsu-shiya*) within the groves of the Ge-kuu and Nai-kuu, but most of these have been demolished within a few years, and I am unable to state which of them still exist. The temples of Ise were until lately unknown to foreigners. During a voyage of inspection made by the Japanese [135] Government steamer *Thabor* in December, 1872, to the lighthouses on the southern coasts, she put into Toba harbour, and arrangements were most liberally made by Mr. Ohokuma, Councillor of State, and Mr. Yamawo, Vice-Minister of Public Works, for giving to the party of Europeans on board an opportunity of visiting these temples. I had the good fortune to be a member of the party, and endeavoured to observe as much as the limited time at our disposal would allow of, but no doubt there still remains much to be investigated by future travellers.

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The foregoing paper by Mr. Satow was illustrated by drawings, specimens of "*O-harai*," and the model of a primeval hut, such as would seem to have furnished the type of Shintô Temple architecture, and on its conclusion

The President, Dr. J. C. Hepburn, tendered the thanks of the Society to Mr. Satow for his very interesting paper. He knew there were some gentlemen present who had made the subject of Shintôism a study, and hoped they would favour the Society with their views. As for himself, he had earnestly endeavoured to find out what there was in it, but had long given it up, unable to find anything to reward his labour;—excepting a small book of Shintô prayers, he had not been able to find any book on the subject. In these prayers man was recognized as guilty of the commission of sin and in need of cleansing.

The Rev. Dr. Syle quoted from Oliphant's narrative of Lord Elgin's Mission to Japan a passage which claims that "the Shintô religion has produced results which entitle it to a very high rank among the religions of the world." (Vol. 2, p. 86.)

Mr. Satow agreed with the President's opinion that Shintôism contained no

moral code. Indeed that view was expressly maintained by Motowori, one of the leaders of the modern revival of pure Shintōism. According to Motowori, morals were invented by the Chinese because they were an immoral people, but in Japan there was no necessity for any system of morals, as every Japanese acted aright if he only consulted his own heart. Further, Motowori declared that all the duty of a good Japanese consisted in obeying the commands of the *Mikado*, without questioning whether those commands were right or wrong. It was only immoral people like the Chinese who presumed to discuss the characters of their Sovereigns. Shintōism, as expounded by Motowori, was nothing else than an engine for reducing the people to a condition of mental slavery, and this was the reason why such a high rank was assigned to [136] the Department of Shintōism by the Mikado's government, in placing it on a level with the Council of State after the revolution in 1868.

Mr. Von Brandt thought that a distinction should be drawn between Shintōism as it existed in ancient times and the doctrine as it was developed by the writers at the Court of the Mikados in the more modern times. The one was originally a veneration of the common source of life, the fire, light or sun, which was considered as the generating power; afterwards it was found more convenient to subdivide this principal power into its elements and to give to each of its emanations a special *kami* as its representative; the history also of the Sun Goddess having withdrawn for a certain time into a cavern in consequence of her brother Susanowo's behaviour might be explained by the changes of the seasons rather than by the eclipse of the sun; the withdrawal of the goddess representing the winter, her reappearance the new spring. In ancient times the chiefs of the families and tribes were the first priests, their houses the first temples, and it was only several centuries after Jimmu that the temple of the Sun Goddess was separated from the dwelling of the Mikado. There appears to be good evidence that Shintōism resembles very closely the ancient religion of the Chinese; we find the same sacrifices made by the Japanese as are reported to have been made by the Chinese; sacrifices consisting first in the killing of the animal offered to the god, and in later years in the setting at liberty of the animals so offered; birds, especially quails, appear to have been used generally, but also larger domestic animals, and even cattle are mentioned.

Sir Harry Parkes expressed the disappointment which he in common with others had felt in being unable to learn what Shintōism was. Japanese in general seemed utterly at a loss to describe it, but this circumstance was intelligible if what was once an indigenous faith had been turned in later days into a political engine. Under such circumstances its character as a religion would be lost, and it would become for the time what the rulers of the country chose to make it. Infallibility on the part of the head of the State, which was naturally attributed to rulers claiming divine descent, was as convenient a doctrine for political purposes in China or Japan as elsewhere. It was evident that we must

look to early times for the meaning of Shintôism. He was disposed to agree with Mr. Von Brandt that its origin was closely allied to the early religion of the Chinese. The name seemed to imply such a connection—*Shintô* being a pure Chinese term meaning *The Way of the Gods or Spirits*. It seemed to point to one of those primitive or national systems of religion, often found coincident with early national life, which attribute spiritual agencies to the elements or natural phenomena. The sacrifices alluded to by Mr. Von Brandt included at a remote period human sacrifices at the graves of chiefs, in Japan as well as in China. The Gobei spoken of in Mr. Satow's paper pointed also to a connection with other Asiatic superstitions of a very early date. The practice of [137] putting up sticks with shavings or paper attached, in order to attract the attention of the spirits, is observable among certain hill tribes of India as well as among the Ainos of Yezo. The Hindoos, Burmese and Chinese have converted these sticks into flags and streamers. It was interesting to see from Mr. Satow's paper how some of the customs and practices of the present day were connected with the earliest mythology of the Japanese, also to learn from it what a myth Jimmu was, whose reputed birth-day upwards of six hundred years B. C. was made the occasion only the other day for salutes from ships and batteries. He certainly did not agree with the estimate formed by Oliphant of the merits of Shintôism. If it had worked great results or had ever taken deep hold on the religious feeling of the Japanese people, it would scarcely have been superseded so completely as it had been by Buddhism.

Rev. Dr. Brown said he could but reiterate the statement of the gentlemen who had preceded him, for so far as he could learn Shintôism was in no proper sense of the term a religion. It would be strange, if during a residence of more than fourteen years in Japan, he had not endeavoured to inform himself upon this subject, but, as had been said by the President, Dr. Hepburn, his search for information in the literature of the country had been but poorly rewarded, unless he counted the discovery of the emptiness of Shintôism as a compensation for his pains. The Japanese books in which he had hoped to find something that would command his respect, had utterly disappointed him. The *Kojiki* is the only work that professedly treats of the subject *in extenso*, but it hardly repaid the trouble of perusal. Professing to go back to the origin of all things, it proves to be atheistical, for the first material substance wants a creator. The details of the cosmogony it treats of are puerile and unphilosophical. The *Kojiki* contains no system of morals, discusses no ethical questions, prescribes no ritual, and points to no god or gods as objects of worship. All the essentials of a religion are wanting in Shintôism, and it is difficult to see how it could ever have been denominated a religion at all. Besides, the *Kojiki* is acknowledged by Japanese historians to be the work of a female peasant, who was possessed of so extraordinary a memory, that she could repeat all the traditions she had ever heard *verbatim et literatim*, and when in A. D. 712, the dynastic records had ceased to be worthy of credence,

this woman reproduced the ancient traditions from the beginning of all things down to her own times. The credibility of the work therefore rests upon no trustworthy foundation, and criticism of such a book is destructive of its pretensions. It had been intimated in the remarks of one gentleman at this meeting, that Shintôism was of Chinese origin. If so, it must have originated in pre-historic times. But it has rather the look of an original Japanese invention, the resemblances in forms of worship between it and those that have existed among other people being more probably those similarities that in many other departments of life, such as the arts and implements of husbandry, tend to demonstrate the unity of the human [138] race. Wherever it may have originated, it is, as a religion, hollow, empty and jejune beyond any other that is known among men. It is certain that the Japanese government, in attempting to substitute Shintôism for the long prevalent Buddhistic faith, has undertaken a herculean task. Buddhism appeals to men's religious susceptibilities, and has long been the popular faith, but Shintôism has nothing in it that comes down to men's hearts, and it is futile to attempt to make it the substitute for that religion to which the people have been accustomed for ages, and which is intimately interwoven with the whole social fabric. The government tacitly confesses that Shintôism is a vapid lifeless thing when it sends men to preach throughout the country, and provides them with texts taken from no Japanese sacred book but borrowed from Confucius and Mencius. The endeavour to revive the interest in this would-be religion must end in entire failure.

Mr. Mori considered the leading idea of the Shintô system to be reverential feeling toward the dead. As to the political use that was made of it, he thought that the state was quite right in turning it to account in support of the absolute government which exists in Japan. He must admit the early records of Japan were by no means reliable.

Mr. von Brandt remarked that the use of symbols similar to those mentioned by Sir Harry Parkes extended to many nations; thus the sword and dragon, the thyrsus staff and ivy, the staff of Æsculapius and snakes most probably had the same signification as the Japanese *gohei*, and that as Siebold had already remarked, it symbolized the union of the two elements, the male and female. The history also of the creation of the world as given by the Japanese bore the closest resemblance to the myths of India and China, so that little doubt could exist that this also had been imported from the west. But here again the difficulty arose to fix a date for the importation of this myth, as it might as well have been brought over by the first emigrants as later when Buddhism was introduced. To-day little was known of Shintôism which might give it the character of a religion as understood by western nations; nothing could be found in it referring to the idea of a future life, though the simple fact of horses, cows and servants being buried with a deceased chieftain, went far to prove that a belief in a continuation of existence in another world after death in this one, existed. The same custom

existed also with the ancient Chinese; and even Confucius speaks of the custom of burying wooden images with the dead, reproving it from fear that it might lead to human sacrifices. As to the historical records of Japan, it is first mentioned that under the 20th Emperor in 415 A. D. officials were sent into the country to verify and describe the names of all the families. Latterly a transcription of these records, originally written in all probability in the old Japanese letters "the gods' letters," in Chinese characters took place, and in 644 an historical account of the Emperors, the country, the officials and the people is said to have existed, which was destroyed when Iruka was murdered and his father's [139] palace, in which these records were kept, was burnt. Only the history of the country was saved. From this work as well as from what the old men of the whole empire remembered, a new compilation was made under the Emperor Temmu (672-686), and in order that it might not be lost again it was read to a peasant girl, of the name of Are, said never to forget any thing she had once heard. From this record and from what Are still remembered, the first historical record of Japan known to us, the Kojiki, was compiled about thirty years later.

## THE GAMES AND SPORTS OF JAPANESE CHILDREN.

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BY PROFESSOR W. E. GRIFFIS.

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[*Read before the Asiatic Society of Japan, on the 18th March, 1874.*]

[140] The aim of the Asiatic Society of Japan is, as I understand it, to endeavour to attain any and all knowledge of the Japanese country and people. Nothing that will help us to understand them is foreign to the objects of this Society. While language, literature, art, religion, the drama, household superstitions, etc., furnish us with objects worthy of study, the games and sports of the children deserve our notice. For, as we believe, their amusements reflect the more serious affairs and actions of mature life. They are the foretastes and the prophecies of adult life which children see continually; not always understanding, but ever ready to imitate it. Hence in the toy-shops of Japan one may see the microcosm of Japanese life. In the children's sports is enacted the miniature drama of the serious life of the parents. Among a nation of players such as the Japanese may be said to have been, it is not always easy to draw the line of demarcation between the diversions of children proper and those of a larger growth. Indeed, it might be said that during the last two centuries and a half, previous to the coming of foreigners, the main business of this nation was play. One of the happiest phrases in Sir Rutherford Alcock's book [141] is that "Japan is a Paradise of Babies;" he might have added that it was also a very congenial abode for all who love play. The contrast between the Chinese and Japanese character in this respect is radical. It is laid down in one of the very last sentences in the *Trimetrical Classic*, the primer of every school in the Flowery Land, that play is unprofitable! The whole character, manners, and even the dress of the sedate and



dignified Chinamen seem to be in keeping with that aversion to rational amusement and athletic exercises that characterize that adult population.

In Japan, on the contrary, one sees that the children of a larger growth enjoy with equal zest games which are the same, or nearly the same, as those of lesser size and fewer years. Certain it is that the adults do all in their power to provide for the children their full quota of play and harmless sports. We frequently see full-grown and able-bodied natives indulging in amusements which the men of the west lay aside with their pinafores, or when their curls are cut. If we, in the conceited pride of our superior civilization, look down upon this as childish, we must remember that the Celestial, from the pinnacle of his lofty, and to him immeasurably elevated, civilization, looks down upon our manly sports with contempt, thinking it a condescension even to notice them.

A very noticeable change has passed over the Japanese people since the modern advent of foreigners, in respect to their love of amusements. Their sports are by no means as numerous or elaborate as formerly, and they do not enter into them with the enthusiasm that formerly characterized them. The children's festivals and sports are rapidly losing their importance, and some are now rarely seen. Formerly the holidays were almost as numerous as saints' days in the calendar. Apprentice-boys had a liberal quota of holidays stipulated in their indentures, and as the children counted the days before each great holiday on their fingers, we may believe that a great deal of digital arithmetic was being continually done. We do not know of any country in the world in which there [142] are so many toy-shops, or so many fairs for the sale of the things which delight children. Not only are the streets of every city abundantly supplied with shops, filled as full as a Christmas stocking with gaudy toys, but in small towns and villages one or more children's bazaars may be found. The most gorgeous display of all things pleasing to the eye of a Japanese child is found in the courts or streets leading to celebrated temples. On a *matsuri* or festival day, the toysellers and itinerant showmen throng with their most attractive wares or sights in front of the shrine or temple. On the walls and in conspicuous places near the churches and cathedrals in Europe and America, the visitor is usually regaled with the sight of undertaker's signs and gravedigger's

advertisements. How differently the Japanese act in these respects, let any one see by visiting Asakusa, Kanda Miôjin, or one of the numerous Inari shrines on some great festival day.

We have not space in this paper to name or describe the numerous street-shows and showmen who are supposed to be interested mainly in entertaining children ; though in reality adults form a part, often the major part, of their audiences. Any one desirous of seeing these in full glory must ramble down Yanagi Chô from Sujikai in Tôkiô, on some fair day, and especially on a general holiday.

Among the most common are the street theatricals, in which two, three or four trained boys and girls do some very creditable acting, chiefly in comedy. Raree-shows in which the looker-on sees the inside splendors of a daimiô's *yashiki* or the fascinating scenes of the Yoshiwara, or some famous natural scenery, are very common. The showman, as he pulls the wires that change the scenes, entertains the spectators with songs. The outside of his box is usually adorned with pictures of famous actors or courtesans, nine-tailed foxes, devils of all colors, dropsical badgers and wrathful husbands butchering faithless wives and their paramours, or some such staple horror in which the normal Japanese so delights. Story tellers, posturers, dancers, actors of charades, conjurers, flute-players, song-singers [149] are found on these streets, but those who specially delight the children are the men who, by dint of breath and fingers, work a paste made of wheat-gluten, into all sorts of curious and gaily-smear'd toys such as flowers, trees, noblemen, fair ladies, various utensils, the foreigner, the jin-riki-sha, etc. Nearly every itinerant seller of candy, starch-cakes, sugared peas, and sweetened beans has several methods of lottery by which he adds to the attractions on his stall. A disk having a revolving arrow, whirled round by the hand of a child, or a number of strings which are connected with the faces of imps, goddesses, devils or heroes, lends the excitement of chance, and when a lucky pull or whirl occurs, occasions the subsequent addition to the small fraction of a cent's worth to be bought. Men or women itinerate, carrying a small charcoal brazier under a copper griddle, with batter, spoons, cups and *shôyu* sauce to hire out for the price of a cash each to the little urchins who spend an afternoon of bliss, making their own griddle-cakes and eating

them. The seller of sugar-jelly exhibits a devil, taps a drum and dances for the benefit of his baby-customers. The seller of *mochi* does the same with the addition of gymnastics and skilful tricks with balls of dough. In every Japanese city there are scores, if not hundreds, of men and women who obtain a livelihood by amusing the children.

Some of the games of Japanese children are of a national character and are indulged in by all classes. Others are purely local or exclusive. Among the former are those which belong to the special days, or *matsuri*, which in the old calendars enjoyed vastly more importance than under the new one. Beginning with the first of the year, there are a number of games and sports peculiar to this time. The girls, dressed in their best robes and girdles, with their faces powdered and their lips painted, until they resemble the peculiar colors seen on a beetle's wings, and their hair arranged in the most attractive coiffure, are out upon the street playing battledore and shuttlecock. They play not only in twos and threes, but also in circles. [144] The shuttlecock is a small seed, often gilded, stuck round with feathers arranged like the petals of a flower. The battledore is a wooden bat; one side of which is of bare wood, while the other has the raised effigy of some popular actor, hero of romance, or singing girl in the most ultra Japanese style of beauty. The girls evidently highly appreciate this game, as it gives abundant opportunity to the display of personal beauty, figure and dress. Those who fail in the game often have their faces marked with ink, or a circle drawn round their eyes. The boys sing a song that the wind will blow, the girls sing that it may be calm so that their shuttlecock may fly straight. The little girls at this time play with a ball made of cotton cord, covered elaborately with many strands of bright vari-coloured silk.

Inside the house they have games suited not only for the day-time, but for the evenings. Many foreigners have wondered what the Japanese do at night, and how the long winter evenings are spent. On fair and especially moonlight nights, most of the people are out of doors, and many of the children with them. Markets and fairs are held regularly at night in Tôkiô, and in the other large cities. The foreigner living in a Japanese city, even if he were blind, could tell by stepping out of doors whether the weather were clear and fine or disagreeable. On dark and stormy nights the stillness of a great city like Tôkiô is unbroken and

very impressive ; but on a fair and moonlight night the hum and bustle tell one that the people are out in throngs, and make one feel that it is a city that he lives in. In most of the castle towns in Japan, it was formerly the custom of the people, especially of the younger, to assemble on moonlight nights in the streets or open spaces near the castle gates, and dance a sort of subdued dance, moving round in circles and clapping their hands. These dances often continued during the entire night, the following day being largely consumed in sleep. In the winter evenings in Japanese households the children amuse themselves with their sports, or are amused by their elders, who tell them entertaining stories. The *samurai* father relates to his son [145] Japanese history and heroic lore, to fire him with enthusiasm and a love of those achievements which every *samurai* youth hopes some day to perform. Then there are numerous social entertainments, at which the children above a certain age are allowed to be present. But the games relied on as standard means of amusement, and seen especially about New Year, are those of cards. In one of these, a large square sheet of paper is laid on the floor. On this card are the names and pictures of the fifty-three post-stations between Yedo and Kiôto. At the place Kiôto are put a few coins, or a pile of cakes, or some such prizes, and the game is played with dice. Each throw advances the player towards the goal, and the one arriving first obtains the prize.

At this time of the year also, the games of cards called respectively *Iroha Garuta*, *Hiyaku Nin Isshiu Garuta*, *Kokin Garuta*, *Genji* and *Shi Garuta* are played a great deal. The *Iroha Garuta* are small cards each containing a proverb. The proverb is printed on one card, and the picture illustrating it upon another. Each proverb begins with a certain one of the 50 Japanese letters, *i*, *ro*, *ha*, etc., and so on through the syllabary. The children range themselves in a circle and the cards are shuffled and dealt. One is appointed to be reader. Looking at his cards he reads the proverb. The player who has the picture corresponding to the proverb calls out, and the match is made. Those who are rid of their cards first win the game. The one holding the last card is the loser. If he be a boy, he has his face marked curiously with ink. If a girl, she has a paper or wisp of straw stuck in her hair.

The *Hiaiku Nin Isshiu Garuta* game consists of two hundred cards,

on which are inscribed the one hundred stanzas or poems so celebrated and known in every household. A stanza of Japanese poetry usually consists of two parts, a first and second, or upper and lower clause. The manner of playing the game is as follows. The reader reads half the stanza on his card, and the player, having the card on which the other half is written, calls out, and makes a match. Some children become so familiar [146] with these poems that they do not need to hear the entire half of the stanza read, but frequently only the first word.

The *Kokin Garuta*, or the game of Ancient Odes, the *Genji Garuta*, named after the celebrated Genji (Minamoto) family of the middle ages, and the *Shi Garuta* are all card-games of a similar nature, but can be thoroughly enjoyed only by well-educated Chinese scholars, as the references and quotations are written in Chinese and require a good knowledge of the Chinese and Japanese classics to play them well. To boys who are eager to become proficient in Chinese, it often acts as an incentive to be told that they will enjoy these games after certain attainments in scholarship have been made. Having made these attainments they play the game frequently, especially during vacation, to impress on their minds what they have already learned. The same benefit to the memory accrues from the *Iroha* and *Hiakunin Isshiu' Garuta*.

Two other games are played which may be said to have an educational value. They are the *Chiye no Ita*, and the *Chiye no Wa*, or the "Wisdom Boards" and the "Ring of Wisdom." The former consists of a number of flat thin pieces of wood, cut in many geometrical shapes. Certain possible figures are printed on paper as models, and the boy tries to form them out of the pieces given him. In some cases much time and thinking are required to form the figure. The *Chiye no Wa* is a ring-puzzle, made of rings of bamboo or iron on a bar. Boys having a talent for mathematics, or those who have a natural capacity to distinguish size and form, succeed very well at these games and enjoy them. The game of Checkers is played on a raised stand or table about six inches in height. The number of *go* or checkers, including black and white, is 360. In the *Shô-gi*, or game of chess, the pieces number 40 in all. Back-gammon is also a favorite play, and there are several forms of it. About the time of the old New Year, when the winds of February and March are favorable to the sport,

kites are flown, and there are few sports in which Japanese boys, from the [147] infant on the back to the full-grown, and the over-grown, boy, take more delight. I have never observed, however, as foreign books so often tell us, old men flying kites and boys merely looking on. The Japanese kites are made of tough paper pasted on a frame of bamboo sticks and are usually of a rectangular shape. Some of them, however, are made to represent children or men, several kinds of birds and animals, fans, etc. On the rectangular kites are pictures of ancient heroes or beautiful women, dragons, horses, monsters of various kinds, or huge Chinese characters. Among the faces most frequently seen on these kites are those of Yoshitsune, Kintarô, Yoritomo, Benkei, Daruma, Tomoye and Hangaku. Some of the kites are six feet square. Many of them have a thin tense ribbon of whalebone at the top of the kite which vibrates in the wind, making a loud humming noise. The boys frequently name their kites Genji or Heike, and each contestant endeavours to destroy that of his rival. For this purpose the string for ten or twenty feet near the kite end is first covered with glue, and then dipped into pounded glass, by which the string becomes covered with tiny blades, each able to cut quickly and deeply. By getting the kite in proper position and suddenly sawing the string of his antagonist, the severed kite falls, to be reclaimed by the victor.

The Japanese tops are of several kinds, some are made of univalve shells, filled with wax. Those intended for contests are made of hard wood, and are iron-clad by having a heavy iron ring round as a sort of tire. The boys wind and throw them in a manner somewhat different from ours. The object of the player is to damage his adversary's top or to make it cease spinning. The whipping top is also known and used. Besides the athletic sports of leaping, running, wrestling, slinging, the Japanese boys play at blind-man's buff, hiding-whoop, and with stilts, pop-guns, and blow-guns. On stilts they play various games and run races. In the northern and western coast provinces, where the snow falls to the depth of many feet and remains long on the ground, it forms the material of [148] the children's playthings, and the theatre of many of their sports. Besides sliding on the ice, coasting with sleds, building snow-forts and fighting mimic battles with snow-balls, they make many kinds of images and imitations of what they see and know. In America

the boy's snowman is a Paddy with a damaged hat, clay pipe in mouth, and the shillelah in his hand. In Japan the snowman is an image of Daruma. Daruma was one of the followers of Shaka (Buddha), who by long meditation in a squatting position, lost his legs from paralysis and sheer decay. The images of Daruma are found by the hundreds in toy-shops, as tobacconists' signs and as the snowmen of the boys. Occasionally the figure of Geihô, the sage with a forehead and skull so high that a ladder was required to reach his pate, or huge cats and the peculiar-shaped dogs seen in the toy-shops, take the place of Daruma. Many of the amusements of the children indoors are mere imitations of the serious affairs of adult life. Boys who have been to the theatre come home to imitate the celebrated actors, and to extemporize mimic theatricals for themselves. Feigned sickness and "playing the doctor," imitating with ludicrous exactness the pomp and solemnity of the real man of pills and powders, and the misery of the patient, are the diversions of very young children. Dinners, tea-parties, even weddings and funerals, are imitated in Japanese children's plays. Among the ghostly games intended to test the courage of, or perhaps to frighten, children, are two plays called respectively *Hiyaku Monogatari* and *Kon-dameshi* or the "One Hundred Stories" and "Soul-examination." In the former play a company of boys and girls assemble round the *hibachi*, while they, or an adult, an aged person or a servant usually, relate ghost stories, or tales calculated to straighten the hair and make the blood crawl. In a distant dark room, a lamp, (the usual dish of oil,) with a wick of one hundred strands or piths, is set. At the conclusion of each story the children in turn must go to the dark room and remove a strand of the wick. As the lamp burns down low the room becomes gloomy [149] and dark, and the last boy, it is said, always sees a demon, a huge face, or something terrible. In the *Kon-dameshi* or "Soul-examination," a number of boys during the day plant some flags in different parts of a graveyard, under a lonely tree, or by a haunted hill-side. At night, they meet together, and tell stories about ghosts, goblins, devils, etc., and at the conclusion of each tale, when the imagination is wrought up, the boys one at a time must go out in the dark and bring back the flags, until all are brought in.

On the third day of the third month is held the *Hina matsuri*. This is

the day especially devoted to the girls, and to them it is the greatest day in the year. It has been called in some foreign works on Japan, the "Feast of Dolls." Several days before the *matsuri*, the shops are gay with the images bought for this occasion and which are on sale only at this time of year. Every respectable family have a number of these splendidly dressed images, which are from four inches to a foot in height, and which accumulate from generation to generation. When a daughter is born in the house during the previous year, a pair of *hina* or images are purchased for the little girl, which she plays with until grown up. When she is married her *hina* are taken with her to her husband's house, and she gives them to her children, adding to the stock as her family increases. The images are made of wood, or enamelled clay. They represent the Mikado and his wife; the *kuge* or old Kiôto nobles, their wives and daughters, the court minstrels and various personages in Japanese mythology and history. A great many other toys, representing all the articles in use in a Japanese lady's chamber, the service of the eating table, the utensils of the kitchen, travelling apparatus, etc., some of them very elaborate and costly, are also exhibited and played with on this day. The girls make offerings of *sake* and dried rice, etc., to the effigies of the emperor and empress, and then spend the day with toys, mimicking the whole round of Japanese female life, as that of child, maiden, wife, mother and grandmother. In some old Japanese families in which I have visited, the [150] display of dolls and images was very large and extremely beautiful.

The greatest day in the year for the boys is on the fifth day of the fifth month. On this day is celebrated what has been called the "Feast of Flags." Previous to the coming of the day the shops display for sale the toys and tokens proper to the occasion. These are all of a kind suited to young Japanese masculinity. They consist of effigies of heroes and warriors, generals and commanders, soldiers on foot and horse, the genii of strength and valor, wrestlers, etc. The toys represent the equipments and regalia of a daimiô's procession, all kinds of things used in war, the contents of an arsenal, flags, streamers, banners, etc. A set of these toys is bought for every son born in the family. Hence in old Japanese families the display on the fifth day of the fifth month is extensive and brilliant. Besides the display indoors, on a bamboo pole



erected outside is hung, by a string to the top of the pole, a representation of a large fish in paper. The paper being hollow, the breeze easily fills out the body of the fish, which flaps its tail and fins in a natural manner. One may count hundreds of these floating in the air over the city. The *nobori*, as the paper fish is called, is intended to show that a son has been born during the year, or at least that there are sons in the family. The fish represented is the carp, which is able to swim swiftly against the current and to leap over waterfalls. This act of the carp is a favourite subject with native artists and is also typical of the young man, especially the young *samurai*, mounting over all difficulties to success and quiet prosperity.

One favorite game, which has now gone out of fashion, was that in which the boys formed themselves into a daimiô's procession, having forerunners, officers, etc., and imitating as far as possible the pomp and circumstance of the old daimiô's train. Another game which was very popular, was called the "Genji and Heike." These are the names of the celebrated rival clans or families Minamoto and Taira. The boys of a town, district or school, [151] ranged themselves into two parties each with flags. Those of the Heike were white, those of the Genji red. Sometimes every boy had a flag, and the object of the contest, which was begun at the tap of a drum, was to seize the flags of the enemy. The party securing the greatest number of flags won the victory. In other cases the flags were fastened on the back of each contestant, who was armed with a bamboo for a sword, and who had fastened on a pad over his head a flat round piece of earthenware, so that a party of them looked not unlike the faculty of a college. Often these parties of boys numbered several hundred and were marshalled in squadrons as in a battle. At the given signal the battle commenced, the object being to break the earthen disc on the head of the enemy. The contest was usually very exciting. Whoever had his earthen disc demolished had to retire from the field. The party having the greatest number of broken discs, indicative of cloven skulls, were declared the losers. This game has been forbidden by the government as being too severe and cruel. Boys were often injured in it.

There are many other games which we simply mention without describing. There are three games played by the hands, which every

observant foreigner long resident in Japan must have seen played, as men and women seem to enjoy them as much as children. One is called *Ishi ken*, in which a stone, a pair of scissors and a wrapping-cloth are represented. The stone signifies the clenched fist, the parted fore and middle finger the scissors, and the curved fore-finger and thumb the cloth. The scissors can cut the cloth, but not the stone, but the cloth can wrap the stone. The two players sit opposite each other at play, throwing out their hands so as to represent either of the three things, and win, lose, or draw, as the case may be.

In the *Kitsune ken*, the fox, man and gun are the figures. The gun kills the fox, but the fox deceives the man, and the gun is useless without the man. • In the *Osama ken* five or six boys represent the various grades of [152] rank, from the peasant up to the great daimiōs or Shōgun. By superior address and skill in the game the peasant rises to the highest rank, or the man of highest rank is degraded.

From the nature of the Japanese language, in which a single word or sound may have a great many significations, riddles and puns are of extraordinary frequency. I do not know of any published collections of riddles, but every Japanese boy has a good stock of them on hand. There are few Japanese works of light, and perhaps of serious, literature, in which puns do not continually recur. The popular songs and poems are largely plays on words. There are also several puzzles played with sticks, founded upon the shape of certain Chinese characters. As for the short and simple story-books, song-books, nursery-rhymes, lullabys, and what for want of a better name may be styled Mother Goose literature, they are as plentiful as with us, but they have a very strongly characteristic Japanese flavour both in style and matter.

It is curious that the game of foot-ball seems to have been confined to the courtiers of the Mikado's court, where there were regular instructors of the game. In the games of "Pussy wants a Corner" and "Prisoner's Base," the *Oni*, or devil, takes the place of Puss or the officer. We have not mentioned all the games and sports of Japanese children, but enough has been said to show their general character. In general they seem to be natural, sensible, and in every sense beneficial. Their immediate or remote effects, next to that of amusement, are either educational or hygienic. Some teach history, some geography, some

excellent sentiments or good language, inculcate reverence and obedience to the elder brother or sister, to parents or to the emperor, or stimulate the manly virtues of courage and contempt for pain. The study of the subject leads one to respect more highly, rather than otherwise, the Japanese people for being such affectionate fathers and mothers, and for having such natural and docile children. The character of the children's plays and their encouragement [158] by the parents has, I think, much to do with that frankness, affection and obedience on the side of the children, and that kindness and sympathy on that of the parents, which are so noticeable in Japan, and which is one of the good points of Japanese life and character.

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The following Donations to the Library were announced :—Three volumes of "The Phoenix," from Professor Summers; "On the Poetry of the Chinese," from Sir John Davis; A copy of the Microscopical Journal for October, 1873, from Dr. Hadlow; and the following from Sir H. S. Parkes—"Annales des Empereurs du Japon"; "Histoire des trois royaumes, Corea, Yezo, et Loochoo"; Siebold's Geography; Dickson's "Japan"; Voyage of a Naturalist in Japan and Manchuria"; "The Japanese Embassy in America"; "Tour in Yezo," by Blakiston; "Trip in Japan," by Sandwith; Atlas of Japan, in two small volumes; six cases of Japanese MSS. on Belles Lettres, Politics, Foreign relations, Historical Memoranda, Curiosities, etc., etc.; China, illustrated; "China and the Chinese"; Atkinson's Amoor; Lobscheid on the connection of the Polynesian and American races with the Chinese; Two pamphlets by Mr. Nye; and a Map of the route between Peking and Kiachta.

Mr. Brunton said that an application having been made by the Honorary Secretary to the signal office at Washington for the use of Meteorological Instruments, a reply had been received from Brigadier General Meyer to it, and Dr. Murray, of the Educational Department, and himself had at the last meeting of the Society been appointed as a Committee to consider the matter. Mr. Brunton then read the report agreed upon by the Committee, of which the following is the substance :—

General Meyer expresses his willingness to lend the Society instruments on condition the proper observations are made as decided on by the International Convention at Vienna, and that copies of these observations are sent by each mail to Washington. The Society by itself cannot undertake the work of making such observations, nor could a mere amateur be expected to do so. But the assistance of the Japanese Government might be requested, so that those departments which now keep or are in a position to keep Meteorological returns may be directed to

keep them according to the system adopted at Vienna. The Asiatic Society in this way might become an intermedium between the Japanese and Foreign Governments upon a very important scientific matter.

Mr. Brunton then read a letter he had received from Dr. Murray, in which he expresses his concurrence with the report, [154] and suggests that the Lighthouse Department is the only one that could efficiently keep such returns. But in regard to this Mr. Brunton said that he knew that the Mining Department kept Meteorological returns, and he believed the Engineering School in Yedo under the Kô-gaku-riyô also kept them. On this point perhaps Mr. Ayrton, who was present and was engaged in that department, might be able to furnish the meeting with some information.

In reply to questions from Sir H. S. Parkes, Mr. Brunton further stated that it would be desirable that the stations should be as widely spread over the country as possible, and suggested Yedo, Kôbe and Nagasaki, as suitable places. The observations, which consisted merely of reading the instruments, were not difficult and could be taken by the Lightkeepers at present in the Lighthouse Department.

The Rev. Dr. Syle remarked on the desirability of harmonizing the efforts of scientific observers, especially at the present time when arrangements were not yet finally made in this country. He read a letter from Professor Abbe of Washington, which laid stress on the great advantage of making observations according to the synchronous plan of the Vienna Conference; and which also pointed out the value of the results of these observations to commerce, agriculture and fishing.

Professor W. E. Ayrton, in reference to Mr. Brunton's allusion to the Kô-gaku-riyô, said he did not know how far the Japanese Government had decided as to which of the Departments should undertake meteorological observations. As far as he had been able to learn, the present feeling seemed to be that purely astronomical observations were to be left to the Naval Department, while the Engineering College was to undertake those of a meteorological character. He agreed with the Rev. Dr. Syle in thinking that the present time would be most opportune for reference to be made to the Government, since the style in which the Kô-gaku-riyô buildings would be finished would necessarily depend on the object for which that part was intended to be employed; so that this fact, combined with the generous offer that had lately been made by General Meyer, might induce the Minister of Public Works, on a representation being made to him by the President and Vice President of the Society, to consider now which branch of that Department should co-operate in that International system of Meteorological observations which had already been of such importance to the people of the United States, and which would probably be of equal importance to the people of Japan. Mr. Ayrton would, however, take the liberty of suggesting that too much weight should not be laid on the observations required by the Washington Signal Board being purely mechanical, since although in such cases a great deal could be done

by a well regulated mechanical mind, a great deal more could be achieved by men whose minds shewed an aptitude for original scientific research. Such men, his experience has shewn him, were to be found among the Japanese.

[155] Professor Ayrton regretted to see that, in the list read by Mr. Brunton of the apparatus offered to the Society, there was no mention of any instrument for measuring atmospheric electricity. In the meteorological reports drawn up by Mr. Knipping and published in the proceedings of the "German Asiatic Society," there was a column headed "Electrische Erscheinungen" but that was confined to observations of lightning, thunder, meteoric stones, and shooting stars, although why the two latter were included under the head of electrical phenomena he did not know. Probably Mr. Knipping had not, therefore, at his disposal any apparatus such as was employed at Kew and Greenwich for the systematic measurement of atmospheric electricity. The importance of such measurements was not yet commonly understood, probably from their not having yet been of any practical use. This was not to be wondered at if it be considered in how few places, and for how short a time they had been made. That earthquakes were preceded by strong natural electrical currents in telegraph lines had been suspected from instances that had been observed in India and in Ireland. In a country like Japan, visited so frequently by earthquakes, it would be possible by proper observations to draw satisfactory conclusion with reference to this, at present, doubtful connection of phenomena. In England, too, Sir W. Thomson had shewn that certain electrical states of the atmosphere were followed by rain, others by fair weather. We were at present in the infancy of this branch of science, and it was impossible to foretell what important result might occur from its being systematically studied. Mr. Ayrton, therefore, would propose that either the Washington Signal Board be asked to add to the list of apparatus that they had so generously placed at the Society's disposal, suitable instruments for the measurement of atmospheric electricity; or, what might perhaps be better, that the President and the Vice-Presidents, in bringing the matter before the notice of the Japanese Government, should endeavour to induce them, in case they saw fit to accept the apparatus now offered them, to render it complete by supplementing it with the necessary electrical instruments.

On the motion of Dr. Syle, the following resolution, seconded by Professor Griffis, was carried:—"That the President and two Vice-Presidents of the Society be requested to address the Japanese Government in accordance with the suggestions of the Report just made by the special Committee."

The foregoing Paper was then read by Professor W. E. Griffis on "The Games and Sports of Japanese children;" at the conclusion of which

Mrs. Chaplin-Ayrton remarked that Professor Griffis' paper was most interesting. With reference to his description of children's amusements, she would add that some of the simple scientific toys were curious, such as a lantern in which the heated air in its ascent turned a wheel of prettily coloured paper; or another, a

toy on the principle of the Cartesian Diver, which, being of glass was doubtless originally imported, but still had taken root here; and the low price at which the little ingenious contrivance was at present sold in the streets of Tôkiô showed that now at any rate it was manufactured in Japan. The small prices of curled up paper which when floated in water expanded into various graceful forms, might perhaps also be included in the category of toys. With regard to tops, the most curious was one with a splendid hum, cut roughly from a piece of bamboo, so simple indeed and yet so successful that it seemed the very parent of the humming tops of all countries. She had observed occasionally in toy shops a most ghastly mask,—a blanched face with the blood trickling from a wound. The masks used professionally by adult maskers were generally of better quality, and of wood, whilst those to which she referred were made of paper and sold for a few “hiyaku.” She wished to know whether these masks were used by children in those games of a weird nature to which Mr. Griffis had referred. In reference to Japan having been called the “Paradise of Children,” it must, she said, have occurred to every one, on observing the apparent happiness of all the young folks, to ask what was the reason of their being happier than children of other nations. She thought the principal causes were four:—

1.—The style of clothing, loose and yet warm, was far more comfortable than the dress of our children.

2.—Japanese children were much out in the open air and sunshine. The advantages so derived were not even counterbalanced by the poisonous gases coming from the *hibachi*, since crouching over a charcoal fire was quite contrary to child nature.

3.—The absence of furniture and, therefore, the absence of repeatedly given instructions “not to touch.” For the complaints so often heard amongst foreigners of the destructive tendencies of children must, she thought, be unknown in Japanese households, possessing, as they did, so little that a child could spoil. The soft thick matting, forming at once the carpet and the beds of Japanese houses; and the raised lintel on to which the child might clamber as it grew strong, constituted the very beau-ideal of an infant's play-ground.

4.—Fourthly, and chiefly, children were spoiled. This might sound to some of the ladies present a highly undesirable state of things. But she proceeded to define *spoilt* as meaning that a child was much potted without being capriciously thwarted. She had never observed a child cuffed one moment and indulged the next, as was too frequently seen at home. It was these causes, she thought, which, obviating as they did many of the little troubles that worried our children, led to that good temper and contentment that foreigners so admire in Japanese boys and girls.

Professor W. E. Ayrton remarked that there were two points in connection with the amusements of Japanese children which had puzzled him, and which Professor Griffis could, perhaps, throw some light on. The first had reference to

those street-stalls at which a lottery formed a prominent feature. The piece of sweetmeat given to each child seemed, as far as Mr. [157] Ayrton could judge, to have no reference to the lottery. Could Mr. Griffis inform them whether seeing the wheel of chance turning round was merely an attraction to the buyers, or whether the place at which the wheel stopped in any way determined the amount of sweets given to each of the children who had previously deposited their *ju mon*!

The next question referred to the varied stock in trade displayed at different times at each of the toy-shops in Tôkiô. At the present time the principal of these shops contained only one kind of toy, which resembled more than anything else a fender for a fire-place, but made of wood. But quite recently dolls and nothing else were to be seen in the same shops. Before that, battledores alone were to be found, and so on through a long series. Where, he would ask, was this immense stock in trade kept? The masks of the Japanese mummers were excellent; they formed for the time part of the actor. Was this due solely to the goodness of the acting, or to the expression of countenance in the masks given to them in their manufacture, or to the cloth which the Japanese street actors tied over their heads and which concealed the edge of the mask, or to the fact that the faces of the common Japanese were themselves so comic that a mask, which in another country would be ridiculous and extravagant, was here but a slight exaggeration of the type of the men's faces amongst the lower classes? Professor Ayrton also remarked that he had been told by a Japanese that as in England sweets were considered almost exclusively for children, so in Japan the pleasures of eating fruit were left to the juveniles.

In reply to Mrs. Ayrton, Mr. Griffis said that the scientific toys referred to were made by the Japanese, but the particular toy called "The Cartesian Diver," though made by the native glass-blowers, was imitated from a foreign model. The bloody masks on which were red stripes and representations of ghastly wounds, such as children played with, were not used by boys in the weird games of "Hiyaku Monogatari" and "Kon-dameshi" ("One Hundred Tales" and "Soul Examination"), but were worn in imitation of actors, simply for amusement. The game with leaden counters (often played with real coins by boys), was a game in which one player tried to knock the other's counter (or coin) out of a ring drawn on the ground. The players win or lose as in a game of marbles. With regard to the questions of Professor Ayrton, he said that the street processions of boys in which they carried representations of shrines and jostled against each other, were evidently imitations of the popular *matsuri* and street processions, when the local gods were carried out to be aired and were returned again to their original sanctums. The jostling of the boys against each other was probably in imitation of the crowds of spectators brushing against each other, or jostling even the procession, as might be seen on the occasions of great processions in Tôkiô. In regard to the means of lottery displayed on the boards of itinerant candy-sellers, it was a matter of fact that, while no result of the revolution or

drawing decreased [158] the amount given for a certain price, a favourable turn or drawing might add a little to the normal amount. With reference to the ever-changing stock in Japanese toy shops, battledores making way for kites, and kites for tops, etc., all well-to-do toy-sellers kept supplies of toys in season, and when out of season those toys were placed in their godowns, and were on sale only at certain seasons. The stock in the godown of a native toy-seller was always far larger than that displayed in his shop.

At the close of the evening, Professor Ayrton, apologising for detaining the meeting, remarked that he would like to ask the Secretary whether it might not be advisable that a printed notice containing the name of the paper to be read and the author, or at any rate the former, should be sent to all the members of the Society a few days before each meeting. He was aware that this information was given in the Yokohama newspapers, but as their delivery in Tôkiô was frequently very irregular, the members resident in that city often up to the hour of meeting, did not know the subject to be discussed. As an instance he would mention that he himself was not aware that the paper for that evening was on "The Toys and Games of Japanese children" until he heard Mr. Griffin read the title on commencing his paper. The great importance of papers read at such Societies as the Asiatic was the discussion to which they gave rise. This had been so fully realised by the "Institution of Civil Engineers" and the "Society of Telegraph Engineers" of London that they frequently distributed to all the members likely to be present printed copies in full of the papers that were going to be read, in order that preparations might be made for the discussion. This of course might be out of place in so young a Society as this; still he thought acquainting all members with the business of the evening would tend to make the discussions more valuable, and would also tend, perhaps, to increase the attendance of members residing at a distance. The extra labour incurred by carrying out his suggestion would, he considered, be trifling if a stock of envelopes bearing printed on them each member's name and address were kept ready for the enclosure of a small printed notice.

This matter having been referred to the Council the Meeting terminated.



WINDS AND CURRENTS IN THE VICINITY OF THE  
JAPANESE ISLANDS.

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BY CAPTAIN A. R. BROWN,

JAPANESE GOVERNMENT LIGHTHOUSE SERVICE.

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[*Read before the Asiatic Society of Japan, the 15th April, 1874.*]

[159] While there can be no doubt of the great interest attached to the subject of this paper, it is, at the same time, one on which it is most difficult to gather a sufficient amount of information to render any remarks upon it either practically useful or sufficiently interesting to the members of this Society. The statements made in what follows have been gathered, to a great extent, from a considerable experience of the coast, and, while they may be, so far as they go, considered reliable, their incompleteness is due to the difficulties of obtaining information on the subject. This can only be properly procured by means of minute observations and records taken with tested instruments.

The stream known as the Japan Stream, which flows regularly along the southern coasts of Japan, has been termed the "Gulf Stream" of the Pacific, from its supposed resemblance to the stream known by that name in the Atlantic. Indeed, the two streams are very similar in many ways. They rise in nearly the same latitude, and the course or direction in which both flow are almost [160] identical for over

2,000 miles. The "Japan Stream" is also both warmer and saltier than the surrounding waters, as is the "Gulf Stream." But they differ from each other inasmuch as, while the main body of the Gulf Stream finds its way into the Arctic seas, only a small arm of the Japan Stream does so. This arm, known as the Kamschatka current, flows through the Behring Straits, and it leaves the main body in about latitude  $38^{\circ}$  N., and longitude  $150^{\circ}$  E. The main current flowing in an easterly and south easterly direction, is ultimately lost in the drift current of the Pacific. The Gulf Stream is also noted for its beautiful blue colour, hence the name which has been given it of "Kuro-shiwo" or Black Stream.

The Kuro-shiwo, or Japan Stream, is a portion of the great equatorial current of the Pacific. The greatest strength of this current is found between the parallels of  $10^{\circ}$  and  $20^{\circ}$  of north latitude, and is occasioned by the north-east trade winds in that ocean. This current, having its source about the middle of the Pacific, flows along in a westerly direction until it nears the eastern coast of Luzon and the Bashee Islands. When it reaches this locality, its waters are in the summer time or during the presence of the S. W. monsoon, considerably augmented from the China Sea. In winter or during the N. E. monsoon on the contrary the equatorial current is considerably drained; a portion of it joining the drift current forced down the China Sea by the N. E. winds. This portion, when it leaves the main current, flows through the various channels between the Phillipine Islands and Formosa. It will therefore be seen that the volume and breadth of the equatorial current in this region depend, in a great measure, upon the prevailing winds in the China Sea—they being increased during S. W. winds and lessened during N. E. winds.

From Luzon the current which may now be known by the name of the Japan Stream flows northward, passing between Formosa and the Miyako-jima group, after which it turns to the north-east and strikes upon the south point [161] of the Island of Kiushiu. In summer, as already explained, its breadth is greatly extended, and a branch of it then proceeds up the west coast of Kiushiu through the Corean straits and into the Japan Sea. From the south point of the Gotô islands to Nomosaki, however, I have always found this branch to be under tidal

influence. From the South of Kiushiu the main current rushes through Van Diemen Straits and the channels between the various islands, which lie to the south of them, with great velocity, and, continuing its course in a north-easterly direction, it passes the east coast of Kiushiu and the south of Shikoku. I have examined the logs of mail steamers for seventy voyages with the object of gaining an idea of the approximate velocity of this current under various circumstances, and I have myself made twenty voyages from which to make deductions; but I find that even with the same direction and strength of wind, and at the same season of the year, the velocity is most irregular and frequently differs to a very considerable extent. On three occasions only during these voyages its velocity exceeded 70 miles in the twenty-four hours; once in the month of January with a strong S. W. wind, when it flowed 77 miles; once in June with a fresh easterly breeze 73 miles, and once in July with light variable airs 76 miles. With fine settled weather a ship steering a straight course from Sata-no-misaki to Irô-saki may expect to average about 40 miles a day. The greatest strength will probably be found off the Bungo Channel and the south coast of Shikoku. Here if the wind blows at all from the eastward a very heavy sea quickly gets up. This indeed may be expected, as while the Kuro-shiwo is forcing itself to the north-east, the wind is opposing its progress, and the tides are rushing up or down the Bungo Channel at right angles to the current, and a most confused and dangerous sea is the result. This part of the coast is the dread of Japanese seamen.

From Shiwo Misaki the current continues on its course towards the chain of islands south of the Gulf of Yedo, but it has generally less velocity than off Shikoku. A ship [162] coming from Yokohama may here escape the current entirely by keeping well inshore, passing Omaye-saki at a distance of from two to three miles, and then steering down towards Matoya Harbour. This route will be found of great advantage during the winter months when gales are very prevalent from W. N. W. By following it the water will be found to be much smoother, and as soon as Owari Bay is opened out the wind will haul more to the northward and will consequently be fair for shaping a course towards Ô-shima, before reaching which place it will in all probability die away entirely. I have no doubt this track will be more generally taken when the light-

house (now in course of construction) on Omaye-saki is completed, as it will occupy a shorter time and will be found less trying for both ship and passengers.

The main body of the stream now runs between the islands south of the Gulf of Yedo; a small branch, however, passes to the westward of Ō-shima (Vries), which island it rounds and flows out into the Pacific between it and Cape King. It is stated in the China Pilot that regular tides were observed about Mikomoto (Rock Island), the flood setting W. S. W., and the ebb E. N. E., but this I think must have been an unusual occurrence, as I have visited that place some forty or fifty times, and have always found a current setting to the N. E.

Between Cape King and Inuboye-saki the Kuro-shiwo is generally very strong, frequently running from two to three miles an hour. Ships bound into Yedo Bay from the northwards cannot be too careful between these two points of the coast, as during the summer months the land is often enveloped in a dense bank of fog, and, at night time, were the proper allowance not made for the current, it might be thought that a vessel had got well round Cape Kawatsu, and the course would be altered accordingly, whereas she would be considerably short of her distance and would probably find herself in a position of great danger somewhere to the northward of Cape King.

After passing Inuboye-saki the Japan Stream leaves [168] the coast of Japan, but still continues to flow in a N. E. direction till its northern edge reaches about 41° N. latitude in summer. It, however, only gets as far as to 38° in winter. The main body of the stream then flows to the eastward and south-east till it nears the western shores of America, when it is deflected to the south and southwest, and ultimately joins the drift current of the Pacific. Important observations of this current have lately been made between Vancouver's Island and San Francisco, and as it is said to be the intention of the United States Navy Department to run a line of soundings and to test the current from the former place to Japan during the coming spring, we may look for some very interesting information as to the boundaries, strength and direction of that part of the Japan Stream.

The following observations of the temperature of the Kuro-shiwo were taken on board the *Thabor* during her various voyages :—

146 BROWN: WINDS AND CURRENTS IN VICINITY OF JAPANESE ISLANDS.

BETWEEN SATA-NO-MISAKI AND Ô-SHIMA.		BETWEEN Ô-SHIMA AND MIKOMOTO.	
January .....	(Fahr.) 65°	January .....	69°
March .....	62° to 68°	February .....	60°
April .....	70°	March .....	64°
May .....	74° to 78°	April .....	67°
July .....	82°	May.....	70° to 76°
August .....	80° to 84°	June .....	76°
October .....	80° to 85°	July.....	76° to 78°
December .....	64° to 72°	August.....	82° to 84°
		October .....	76° to 79°
		December .....	74°

STRAITS OF TSUGARU.

April.....	42°
June .....	50° to 56°

During the spring months narrow streaks of hot and cold water were observed to exist in the neighbourhood of Sata-no-misaki. The cold streams were sometimes as much as eight and ten degrees lower in temperature than the rest of the stream. This peculiarity may be accounted for by the fact that a stream of cold water generally comes [164] out of the Yellow Sea during these months, and parts of it may get mixed with the warm water of the Kuro-shiwo.

The branch of the Japan stream which flows through the Straits of Korea during the summer months discharges a warm current into the Japan Sea, frequently at a velocity of from two to three miles an hour. This current then runs along the west coast of Japan as far as the north of Yezo. Its breadth, however, gradually decreases and its velocity proportionately decreases till arriving at the parallel of about 38° N. latitude, after which it can scarcely be detected. When nearing the Straits of Tsugaru and La Perouse, however, the current is again perceptible, and in the centre of these channels it at all times sets to the eastward, its strength depending greatly upon the local winds.

On the westward side of the Japan Sea but few observations

have ever been taken : a south-west set has, however, been experienced, and this, I think, may very probably be expected during the winter and early part of the spring.

It has been stated above that the Kuro-shiwo flows into the Japan Sea through the Korean Straits during summer or the continuance of the S. W. monsoon only, but that there is a constant outset through the Straits of Tsugaru and La Perouse. It is therefore evident that there must be some other cause than the current of the Japan stream to account for the eastward set through these straits during the winter months. And I think there will be little difficulty in discovering the reasons for this when we consider, that at the same time that the N. E. monsoon commences in the China Sea, and prevents the Kuro-shiwo from flowing into the Korean Straits, north-west winds set in in the Sea of Japan, blowing almost constantly and with considerable force. These heap (so to speak) the waters up before them until they find an outlet through the straits. The origins of both the Gulf and the Japan Streams are due to causes of a similar nature and the same results are observable on our own shores. A gale of several days' duration from the north-west [165] is well known to raise the whole level of the German Ocean, and then a strong current sets into the Baltic and through the Straits of Dover ; and on some of the Lakes of America, during the long continuance of wind blowing in the same direction, vessels have been left nearly dry in a harbour at one end, whilst at the other the water has risen several feet above its usual level. So that I think the prevalent north-west winds on the west coast of Japan will in a great measure account for the easterly flow through the straits of Tsugaru and La Perouse during winter. But, in addition to this, the fact that, in the Gulf of Tartary and north part of the Japan sea, the precipitation is very great during the winter, while the evaporation must be small, makes it clear that the result could not be other than it is.

In contra-distinction to the Japan Stream there is a cold current which comes from the North and is called the Oya-shiwo. It is comparatively of small breadth and volume, but it nevertheless produces a very great effect upon the climate of the shores contiguous to it. The south of Kiushiu is washed by the strength of the Kuro-shiwo and in consequence has almost a tropical climate during the whole year ;

while the Oya-shiwo runs along the East coast of Yezo, which coast is fast bound in ice for twenty miles off the land during the whole winter.

The Oya-shiwo has its source in the sea of Okhotsk; one part of it is supposed to run southward along the western shores of Kamschatka and the remaining part down the east of Saghalien. It then passes out into the Pacific through the various channels between Yezo and the Kurile Islands, and there meets that branch of the Kuro-shiwo which is called the Kamschatka current. The result of this meeting of hot and cold streams is, that those Islands are almost constantly enveloped in fog; this is very similar to what is experienced on the Banks of Newfoundland, where the cold water from Baffin's Bay meets the Gulf Stream.

The Oya-shiwo then flows in a S. S. W. direction along the coast of Nambu towards Inuboye-saki. Between [166] this place and the Island of Kin-ka-zan, when it comes in contact with the Japan stream, it appears to be turned towards the westward, and to set in towards the shore. I found this to be particularly the case while going close along the land on one occasion. The course of the vessel had then to be continually altered towards the east so as to enable her to clear the different dangers. I am informed that in 1865 the wrecks of no fewer than six foreign built ships were to be seen on the sandy beach which lies a few miles to the north of Inuboye-saki, and it is very probable that it was this current which led to the loss of the Pacific Mail Company's S. S. *Ariel*. A ship steering a course so as to pass inside a line from Kin-ka-zan to Inuboye-saki, will probably be set towards the shore and find herself much closer in than was anticipated; but on the other hand if she passes 6 or 7 miles outside the Kin-ka-zan and steers so as to pass at the same distance from Inuboye, she will then catch the Kuro-shiwo on her starboard bow, and will consequently be set to the eastward or away from the shore. The lead, however, is a sure guide on this part of the coast, and the temperature of the water will also invariably show which current a ship is in. The difference is sometimes as much as 20°, but it is generally not more than about 12°. In April, 1879, during a voyage from Yokohama to Hakodate, I found the temperature of the water of the Japan Stream to be 62°, and after passing Inuboye-

saki it dropped to  $44^{\circ}$ , the vessel being then in the Oya-shiwo. On the 26th of May off the coast of Yezo, I found the water as low as  $42^{\circ}$ .

The winds on the coast of Japan are very variable, and it is difficult to designate any particular direction as that which is prevalent during any season. Along the southern coast the prevailing winds throughout the year may be said to be from the north-east; but during the summer months light breezes from south-east and south-west are not unfrequent. Off the Bungo Channel northerly winds often blow with great violence. With a fresh breeze from the north-east a very ugly sea quickly gets [167] up in this locality, as has already been explained. This has probably been the cause of Sata-no-misaki having acquired so bad a reputation that it has been termed the "Stormy Cape." This, in reality, however, does not appear to be the case, as the light-keeper's returns from that point show that very few gales occur there and that the weather is generally exceedingly fine.

Between Ō-shima and the entrance to the Gulf of Yedo, north-west winds commence about the beginning of November, and continue to blow incessantly till the latter part of March, breaking up about the time of the equinox. They generally blow with considerable force and are strongest about sunrise, moderating towards the afternoon. With these winds the weather is invariably bright and clear, so that even during night the land may be seen from a great distance; but should the direction of the wind change, and should it blow at all freshly from the eastward during this time of the year, thick and bad weather may be usually expected. It will then blow hardest from south-east and south, and will gradually draw to the westward, at the same time moderating and clearing. Gales, throughout the whole of Japan, but more especially on the coast between Ō-shima and the Gulf of Yedo, are frequently quite local, and it is no uncommon thing to find that a heavy blow has been experienced about Rock Island, when there has been perfectly fine and settled weather at Ō-shima, a distance of only 170 miles.

Typhoons occasionally occur in the neighbourhood of Van Diemen Straits and the South of Japan, during the month of June. They sometimes happen in July or August, but September and the first half of October may be considered the worst season for them, and it invariably brings us one more of these terrific storms; they generally travel along the south



coast in a north-easterly direction, or over the same track as the Kuro-shiwo. Captain Maury in his "Physical Geography of the Sea," says of the cyclones in the Atlantic, that "they take a westerly course until they fall in with the Gulf Stream, when they [168] turn about and run along upon it until their force is expended." However applicable this may be to the Gulf Stream, it certainly is not always true in reference to the Japan Stream, as the course which typhoons take is sometimes from the south-east, crossing the Kuro-shiwo and passing on to the north-west; this was the track of the most severe one which we have experienced at Yokohama for many years, and which occurred on the 24th of August, 1871. It commenced with the wind from north-east, and the wind continued to blow steadily from that point until after the centre had passed, when it came from the south-west.

From June to October, when there is wind from N. E. to S. E. accompanied by rain, and the barometer is steadily falling, these may be taken as almost sure signs of the approach of one of these storms. On observing these signs, it would be prudent for a ship to seek shelter if practicable in one of the numerous harbours on this coast, or, if this be impossible, to take the other alternative and make a good offing. In doing this it should be borne in mind that at such a time as the approach of a typhoon, above all others, the current is least to be depended on, and that its strength would in all probability be greatly increased should the typhoon be coming up from the south-west. On the east coast from the Gulf of Yedo northwards, from October to April inclusive, north-west winds prevail which frequently blow very hard. They are generally accompanied by clear weather, but heavy snow storms are of common occurrence in and near the Straits of Tsugaru, and at these times the land becomes completely obscured even during the day. From May to June the winds are variable, with a great deal of fine weather. During July and August light south and southeasterly winds may be expected, and about the autumnal equinox the fine weather breaks up. Easterly winds here, as on the south coast, are generally accompanied by bad weather.

The weather in the Japan Sea is much the same as on the east coast. North-west winds are prevalent during [169] the winter. North of the parallel of 40° latitude they commence about the end of

September, but the weather continues fine in the southern part of the Sea till the middle of October. Heavy gales, however, occasionally occur here during September and October; the wind commences to blow from south-east and blows very hard between that point and south-west. When it reaches this point it moderates and the weather again clears. These storms seldom last over twenty-four hours. During the summer months southerly winds generally prevail with much fine weather. The Japan Sea is subject to violent squalls from the W.N.W. during the whole year; warning of their approach is however given by the appearance of the sky, or if they occur at night, by the appearance of lightning in that direction. The liability of this sea to these storms should not be forgotten when anchoring in exposed places, such as off Niigata; they blow at times with such force and bring in so heavy a sea, that a ship's safety may be very much endangered by them.

Fogs commence in the neighbourhood of Yezo, the east coast of Nippon, and the Gulf of Tartary, as soon as the regular north-west winds terminates, that is about the end of April. They may always be expected in these regions during calms or with southerly winds, that is with any wind that has blown across the warm stream. The period at which they are said to be most dense in the Gulf of Tartary is during the months of June and July. On the west coast they are less frequent, and do not continue so long, while on the south coast they but seldom appear. Winds, however, which come from N.E. to S. frequently bring very thick weather, making navigation at these times almost as hazardous as in a fog. This is always dispersed by N.W. winds.

From what has been stated it will be seen that the strengths, and in some cases the directions, of the currents on these coasts can seldom be calculated upon, and that, when the weather is at all unsettled, no dependence whatever can be placed upon them; that their velocities are sometimes exceedingly great; that a large portion of the [170] coast is, at certain seasons of the year, enveloped in dense fogs, while the remaining portion is, during the continuance of certain winds, subject to weather so thick as almost to equal in density a fog; that gales of wind arise suddenly and not unfrequently; that typhoons are liable to occur at certain seasons; and in addition there are the facts

that, in many places, on the southern coast especially, the water is so deep close to the shore that the lead—generally the seaman's best friend—gives but little warning of the approach to danger, and that outlying rocks and small islands are very numerous. The mariner, therefore, who has to guide a vessel along the coast of Japan has his vigilance taxed to the utmost, and his skill and judgment put to the severest tests to ensure the safety of the lives and property which are placed under his care.

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An ordinary general meeting of this society was held on Wednesday evening, the 15th April, 1874, at the Grand Hotel, J. C. Hepburn, Esq., M.D., President, in the chair.

The minutes of the last general meeting were read and confirmed, and the names of new members announced, as follows:—

Elected at a council meeting held on the 18th of March:—The Hon. C. C. Smith, and Mr. G. P. Ness. Elected at a council meeting held on the 1st of April:—Mr. C. Brennwald, of Yokohama; Messrs. M. O. Flowers, Henry Gribble, H. A. Howe, Junr., Duer, and Hunt, of Nagasaki; Messrs. Edward Dillon, B.A. F.C.S., Wm. Gowland, F.C.S., R. Maclagan, Wm. Smith, C.S., and H. W. Wheeler, of Ōsaka; Messrs. R. Eusden, J. A. Albinson, Wilson, and Dr. Eldridge, of Hakodate, and Sir John Smale, of Hongkong.

The donations, by Dr. Hepburn of a copy of his Japanese Dictionary, and of \$10 from Ch. de Groote, Esq., were acknowledged.

A paper on "Winds and Currents in the vicinity of the Japanese Islands" was then read, in the absence of the author, Captain A. B. Brown, by B. H. Brunton, Esq.

The President tendered the thanks of the Society to Captain Brown for his valuable paper.

The Rev. Dr. Syle regretted the absence of the naval gentlemen whose attendance had been especially invited for this occasion. The subject of currents off the shores and [171] among the islands of Japan was one of the greatest importance; one which possessed also a painful—almost tragic—interest in view of such losses as those of the *Hermann*, *Ariel*, *Relief* and now the *Nil*. In all these cases the disasters were attributed in great part to the influence of currents which were powerful though uncertain; and about which there seemed at present to be no reliable or useful knowledge. With regard to the violent currents often encountered in the Inland Sea, especially in the Kii Channel, the Bungo Channel, and the Straits of Shimonoseki, Captain Furber of the P. M. S. S. Co. had been understood to say that the prevalence of southerly or south-easterly winds at some times, and northerly, westerly or north-westerly at others, would determine the set of currents through these several Channels to the counteraction of all other

influences, tidal or otherwise. Captain Furber's absence was much to be regretted, as his large and recent experience would have enabled him to contribute much valuable information on a subject whose interest was of the most practical and in our circumstances, most painful character.

Mr. Brunton said: "Although Captain Brown is perhaps right in saying that the current always flows to the N. E. at Rock Island, there can be no doubt that, as the China Pilot says, that ebb tide flows E. N. E. and the flood W. S. W. in that locality. While the ebb tide flows with the Japan Stream, the flood tide opposes it. The strength of the tides are very variable, but at certain times they are of great strength. During ebb tide the flow of the Japan Stream is accelerated, and it is no uncommon occurrence to see boats carried past Rock Island at a speed of from three to four miles per hour. During flood tides, on the contrary, the Japan Stream is retarded, and it is not unfrequently altogether stopped. A conflict then arises between the two Streams, and the effect is that they sometimes neutralize one another. But this conflict causes an extraordinary disturbance in the surface of the water. In places it rises into pinnacle-shaped waves which dance about in all directions; in other places it breaks out into a long line of breakers just as a river torrent does when going over a rapid; and it generally presents the appearance that water does which is considerably over boiling point. I mention this because I have on several occasions gone between Rock Island and the shore in Japanese boats, and have so had very practical opportunities of judging of the state of the sea and of the directions of the current. I have never seen a current at Rock Island setting towards the S. W., but I have seen the water almost stationary, while half way between Rock Island and the shore the flood tide sets to the S. W. with great velocity. It is well known to navigators that with certain winds and at certain times there is a strong set into Suruga Gulf. This set was probably one of the causes which led to the loss of the *Nil*. Sufficient allowance had not been made for it, and in the thick weather which she experienced she got set to the northwards of her proper course, [172] and ran on shore about twelve miles to the N. W. of Rock Island, thinking she was going direct for it. It is the opinion of many nautical men that this northerly set is due to the direction in which the wind blows, and that it only occurs during southeasterly or southerly winds. But to my mind the most feasible way of accounting for it is that the flood tide, which rushes towards the S. W. between Rock Island and the shore, and which impinges on and is met by the Japan Stream, is turned towards the north immediately after it passes Cape Idzu, and finds a means of egress in the Suruga Gulf; just in the same way, as Captain Brown has explained in his paper, that the Oyashiwo on the East Coast where it meets the Japanese Stream is turned towards the West, and has been the cause of so many wrecks in the vicinity of Inuboye."

Mr. W. McDonald, being called upon by the Chairman, said that he had arrived too late to hear the paper read, and so could not make any remarks upon

it, and indeed it was many years since he had been in a position to study the subject. What experience he had had in former years was recorded in the Nautical Magazine of 1862-3. With respect to the currents he might mention that on one occasion, after good observation on the previous day, he experienced off the Gulf of Yedo a current of 60 miles E. S. E. in 16 hours.

Mr. J. Pitman said that he had unfortunately arrived too late to hear the whole of the paper read, but must decidedly take exception to the statement that the wrecks of the *Hermann*, *Relief*, *Ariel*, and *Nil* were attributable to the influence of the unknown currents on the Japan Coast. With regard to the *Nil* there might be, as Mr. Brunton had remarked, a current at times setting out of the Suruga gulf round Cape Idzu into the Gulf of Yedo, but these inshore currents and eddies, dependent as they were on local and tidal influences, were not peculiar to Japan, and a prudent navigator, knowing the uncertainty of these inshore currents, in thick and heavy weather would guard against being within their influence. The subject with which the paper treated was one of great general importance, and therefore deserving of close investigation. There could be no doubt that we had but a very imperfect knowledge of the currents on this coast, and he would mention a fact which came under his own observation in February, 1871, when on board the *S. S. Acantha*. She had left Yokohama and having met a strong westerly gale outside was forced to seek shelter under Cape Diamond until the wind moderated. On continuing her westerly course after sunset, expecting to make Rock Island light, she was found at midnight to be inside and close alongside the Redfield rocks and had a very narrow escape of being wrecked. It was only fair to mention that the vessel was only in "ballast trim" at the time.

Mr. W. H. Smith called attention to the fact that there were few persons present prepared to discuss this very important subject, and raised the question whether it might not [173] be advisable to allow the papers to be laid upon the table for a fortnight before the meetings at which they were to be read. After some discussion on the subject, he moved that the matter be referred to the Council for decision. This motion was seconded by Mr. Pitman, but on being put to the meeting, was lost. Mr. Brunton suggested that the papers should be read by the author at one meeting and discussed at the following meeting. This would meet all views which had been expressed, and was very often done at home. At length, the following Resolution, moved by the Rev. Dr. Syle and seconded by Sir H. S. Parkes, was carried: "That when practicable the papers about to be read shall lie on the table in the Society's Library for the perusal of Members."

Mr. Von Brandt then favoured the Meeting with an interesting description of the custom of tattooing as practised in this country; and a short discussion of the subject followed in which Sir H. S. Parkes, Mr. McDonald and Captain Bridgford joined.

The Meeting adjourned at about a quarter past ten.

## NOTES OF A JOURNEY IN HITACHI AND SHIMŌSA.

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BY C. W. LAWRENCE, ESQ., *H. B. M. Legation.*

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[*Read before the Asiatic Society of Japan, on the 13th May, 1874.*]

[174] Tsukuba san lies north of Yedo about 60 miles distant. Its two peaks are clearly seen from many places in the city. It is the highest mountain in Hitachi, if mountain it can be called. Its height is not much over 8,000 feet, but there not being any other mountains near it looks higher than it really is. The road to it is by the Mito kaidō, which joins the Ōshū kaidō about half way down the long street of Senji. A shorter way of getting into the Mito kaidō than by way of Senji is to cross the Sumida-gawa by the Adzuma bridge close to Asakusa, and then go through Mukōjima, which brings one into the Mito kaidō, one *ri* from Nijūjū, the first stage on the Mito kaidō, and 2 *ri* from Senji. Nijūjū is on the banks of the Itaka-gawa, and close to the river is a very good inn, the Fuji-ya. The next stage is Matsuido, the road perfectly flat the whole way. Before arriving at Matsuido the road crosses the Nishi Tone-gawa or Ichi-gawa. Matsuido consists of a long street by the side of the river, and is a prosperous looking place, as indeed are all the villages on this road. A little way beyond Matsuido, on the left, is the temple of Mammanji, which formerly possessed a revenue of 70,000 *koku* given to it by the Shōguns on account of a celebrated priest, Taku-an, having been brought up here. The [175] country now becomes less flat, and the road crosses two hills to Kogane, 2 *ri* from Matsuido. Near Kogane is an extensive moor where the Shōguns used to rear horses. It is now cultivated. The Mito kaidō now branches away to the right to Tsuchiura, and 2 *ri* beyond Kogane the road to Tsukuba separates from it. The next stage is Fuse (8 *ri* 8 *chō*)

on the banks of the branch of the Tone-gawa, which falls into Pacific Ocean. On a well-wooded hill close to the river is a shrine of Benten, and a little further is the hill of Akebono, much frequented in the spring and summer on account of the cherry and maple trees and azaleas with which it is covered. The shrine of Benten is worth a visit. It is surrounded by magnificent trees. A scroll in the possession of the priest says that the hill was once an island with the river on one side and a lake 7 *ri* across surrounding it on the other sides. The gateway and the bell tower have some of the finest wood carving that I have seen in Japan. The priest exhibits a piece of rock almost black, with a light-coloured layer in it, which with the help of a little manipulation is a very curious representation of the dragon which the Japanese are so fond of making drawings of. From the priest's house there is a very fine view of the mountains of Nikkô and Tsukuba San, with the broad expanse of the Tone-gawa as a foreground. From the little village on the opposite side of the river to Fuse there are two roads to Tsukuba: one by way of Sannon, a village on the Kokai-gawa, and the other by the castle town of Mori, which is a little the shorter of the two. The two roads meet again at Yatabe, 8 *ri* further on. Sannon is a flourishing place. The *nanushi* has a big house, and is very civil to travellers. From Sannon it is 3 *ri* to Itabashi passing through Ataka, where are the remains of the castle of Ogami, and from the side of the hill on which it is built are extracted shells of small round shellfish called *ishi-manju* (stone dumplings). Between Ataka and Itabashi the country is covered with pine. At Itabashi is a large temple of Kuwannon with a pagoda. From Itabashi to Yatabe is a 2 *ri* walk through a pine forest. [176] Yatabe is a large dirty place with gates. It was formerly the residence of a Hatamoto. A little way out of the town, the two roads from Fuse by way of Sannon and Mori join. It is a long stage of nearly 5 *ri* from Yatabe to Hôjô through Karima, Ichi-no-miya (where there is a Miya of great repute.) Tatamori, Ozore, and Wakamori, which was at one time the seat of the *Ken*, and very large buildings were erected here for the Chiji and his officials. Between Wakamori and Hôjô the road crosses the Sakura-gawa. Hôjô is a large place at the foot of a little hill on which formerly stood a castle of the Hôjô family. From here to Tsukuba is a walk of 1 *ri* through the villages of Kagori and Usui. The latter lies in a valley,

which was formerly, it is said, an arm of the sea, and here was the harbour of Toyo-ura. At the foot of the mountain, to the right of the road among some fir trees, is a shrine in honour of Waka-musubi no mikoto, who came on shore here. Her real name was Konshiki hime, and she landed here during the reign of Kimmei Tennô from a country called Kiuchiu in the North of India. She was the King's daughter, and being hated by her step-mother, she was put into a coffin and cast adrift in a boat which was blown on shore at Toyo-ura. When the body was taken out of the coffin it was converted into worms which the country people fed upon mulberry leaves and which produced silk. Hence, according to the tradition of the place, the introduction of the culture of silk into Japan. The hill to the right of Kagori is called Kaiko san and here is a Miya, the Kannushi of which exhibits one side of the coffin in which the goddess was conveyed to Toyo-ura. Here also is a block of stone which is scooped into holes by worshippers at the shrine, who believe that the powder scattered over their farms will ensure a plentiful crop. The village of Tsukuba is about a quarter of the way up the mountain. It consists of a long steep street of steps. The people of the provinces of Mito, Hitachi and Shimôsa congregate here for amusement. There is, however, one respectable inn kept by one of the officials. The houses have all upper stories from which there is a very [177] fine view of the plain of Yedo and Fuji, etc. The ascent of the mountain begins immediately after leaving the village, and the road passes through what was formerly the Buddhist temple of Chi-soku-in, which has lately been removed by the zealous Chiji of the province, who is a strict Shintôist. He has only left standing a curious covered bridge, which used only to be opened for pilgrims, and the gateway or Niô-mon. On the site of the temple it is intended to erect a Miya. From the temple to the summit of the western peak, called Nan-tai-zan, it is a walk of 50 *chô*, about three and a half miles. This is the usual route for making the ascent, being much less steep than the road to the eastern peak, Nio-tai-zan. The western peak is the higher of the two. On the summit are numerous shrines, those on Nan-tai-zan dedicated to Izanagi no mikoto, and those on Nio-tai-zan to Izanami no mikoto. The view from the summit is very extensive. The 8 provinces of Kuwantô are said to be seen from it. The meaning of the word



Tsukuba is a "bank heaped up to resist the waves," and the god and goddess to whom the shrines are dedicated are said to have caused the sea to retire beyond what is now the island of Kashima. As the country is perfectly level up to the base of the mountain, it is very probable that the sea has receded on this coast. Tradition says that the earth with which Tsukuba was formed was transported from a sacred mountain in China called Go-dai-san, which, according to the Guide-book, accounts for there being species of grass and trees found on it which are not found elsewhere in Japan. The mountain is covered with cryptomeria and pine, and at the summit are huge rocks over which it is difficult to scramble. In several places there are chains to assist the climber. The two peaks are half a mile apart. The descent from the Eastern Peak is very steep and much longer than the other, being 70 *chō*, about 5 miles. The path passes over and often between huge rocks, to which fanciful names have been given from their supposed resemblance to various parts of the human body. There are in all 120 shrines at different places on the mountain.

[178] Itinerary from Yedo to Tsukuba :

Senji from the Nihonbashi.....	2	<i>Ri.</i>
Nijjiku " " .....	2	"
Matsuido " " .....	1	" 18 <i>Chō</i>
Kogane " " .....	2	"
Fuse " " .....	8	" 8 "
Sannon " " .....	2	"
Itabashi " " .....	8	"
Yatabe " " .....	8	"
Hôjô " " .....	5	"
Tsukuba " " .....	1	"

The easiest way of returning to Yedo from Tsukuba is to walk across to Sekiyado, 10 *ri*, and then take boat, and sail down the Tone-gawa ; leaving Sekiyado at night, one is at Yedo in the morning. Another route for those wishing to visit the shrines of Kashima and Kadori is to return to Hôjô and thence to Tsuchiura, 4 *ri*, on the Mito kaidô, at the head of the fresh water lake of Kasumiga-ura. Tsuchiura is a large place of 2,000 houses and is a castle town. Leaving here in

boat, it takes the day to get across the Lake to Ushibori, 10 *ri*, thence down a channel connecting the Kasami-ga-ura lake with the Nishi-ura lake past the large village of Itako. The Kasami-ga-ura is about 10 *ri* in length and 7 in width; the shores are well wooded but very flat, and one can readily believe that the lake was once of much greater extent. There are 16 islands in it, the largest of which is Uki-shima. The Nishi-ura lake is only one *ri* across; it runs up a long way into Mito. Crossing it one lands at the little village of Ofunatsu in the island of Kashima or Deer Island, 14 *ri* from Tsuchiura. Kashima cannot strictly speaking be called an island. On the north it is separated from the mainland by a river. It is a spit of land, 18 *ri* in length, and 1 in breadth, separating the sea from the Lake of Nishi-ura and ending at the mouth of the Tone-gawa opposite Chôshi. The shrine is a mile from the village of Ofunatsu and situated in the middle of a forest. The god of Kashima is Take-mika-dzuchi no mikoto, who is descended from a god originating from the blood which fell from the [179] edge of Izanagi no mikoto's sword when he cut down Kagutsuchi, (the god of fire). According to the legend, when Taka-mi-musubi no kami assembled all the gods to choose some one to send to subjugate Ashiwaru no nakatsu-kuni (Japan), all said "Futsu-nushi no kami," who was ordered to go; but Take-mika-dzuchi advanced and said, "Futsu-nushi is not the only brave man, am I not one also?" In consequence of his noble language and air he was joined with Futsu-nushi in the expedition. The two gods descended in the province of Idzumo, whereupon Oho-na-muchi no Kami, and Koto-shiro-nushi no Kami fled and hid themselves. Upon this the two gods slew all the rebellious demon spirits, and the sublime grandchild afterwards descended from heaven upon Takachiho no Miné in the province of Hiuga. When Jimmu Tennô set out to subjugate the East, Take-mika-dzuchi and Futsu-nushi appeared at the head of his army and slew all evil doers. The temple was founded in the age of the gods. It was frequently restored by different historic personages, and Yoritomo in particular added to it. About a mile from the shrine is a plain called Takama-no-hara, where the god is said to have frequent battles with foreign demons; when he is victorious the deer emulate each other in pursuing the foe into the sea; when he is beaten, they hang down their ears, take to

flight, and seek refuge in the dwellings of the people. This moor is said to have been the site of a battle, and stone arrow-heads are found here. In the middle of the moor is a mound called Oni-dzuka; the god is said to have killed a devil and heaped up the mound over his burial place. There are plenty of deer in the Island of Kashima. Being sacred to the god they are unmolested. About half a mile from the shrine is a pillar which is supposed to be of fabulous length; the end of it protrudes about a foot out of the ground and the other end descends into the centre of the earth; it is called Kaname-ishi (Kaname meaning the rivet of a fan), and it was placed there by the god who buried there a gigantic fish and placed the stone on it to prevent its moving and disturbing [180] the world. An incredulous Prince of Mito is said to have dug down for six days around it without finding the end. From Kashima to Kaori is a distance of  $8\frac{1}{2}$  *ri* by boat, and with a favourable wind the journey takes only a couple of hours. You descend the Nishi-ura lake until it joins the Tone-gawa, which river you reascend for about a *ri* as far as the village of Tsunomiya. The shrine is 18 *chô* from this village and is situated in a grove of immense cryptomeria. It is larger than that of Kashima and in better repair. The god is called Futsunushi no mikoto, and the shrine is so called from the department of Shimôsa in which it is situated. According to the legend the ancestor of this god was a large heap of stones formed by the blood which dripped from Izanagi no mikoto's sword after slaying Kagutsuchi. Futsunushi is also worshipped at the temple of Kasuga near Nara. The temple is said to have been founded during the divine age.

From Tsunomiya is a walk of 10 *ri* along the right bank of the Tone-gawa to Chôshi. By the river it is 9 *ri*. Chôshi is a large town of over 8,000 houses. It is a prosperous fishing place, but the harbour is a very bad one: on either side of the mouth of the river are rocks. The number of fish caught here is enormous; one *tempô* will buy from 12 to 20 *Iwashi* or sardines. In Chôshi and in the villages on the coast of Shimôsa and Kadzusa, the sardines are boiled in huge cauldrons and the oil is drawn off and used as lamp oil, the residue being dried in the sun for use as manure. The stench from this process is overpowering, and renders Chôshi and the villages near the sea-shore unbearable. There are several roads from Chôshi to Yedo. The most direct is by Tsuno-

miya, another one following the coast. Near Chôshi are high cliffs which end abruptly at the edge of the sea, but the road soon becomes flat and uninteresting. It crosses several rivers, the largest of which is the Kuriyama-gawa, the boundary between Shimôsa and Kadzusa. At Ichi-no-miya, a large place on a river of the same name, 21 *ri* from Chôshi, there are once more cliffs close to the sea. One *ri* beyond [181] Ichi-no-miya, at a place called Daitôzaki, a stream runs out of a valley into the sea through a break in the cliff. By enlarging and deepening this break, and making the level of the valley lower than that of the sea, it would be very easy to make a harbour which would be perfectly landlocked. The fishermen of Ichi-no-miya and the neighbouring fishing villages have clubbed together, and are at present engaged in the operation. Should they succeed they will have a capital harbour, with an entrance rather narrow, but quite large enough for their fishing boats, which at present have to be hauled up on the beach. Close to Daitôzaki, rising abruptly from the beach, is a hill called Nari-yama, or mountain emitting a sound, so-called from the sound of running water being clearly heard inside it. On the high ground above it a little river called the Suye-nashi loses itself in the sand and, it is supposed, finds its way into the hill. However this may be, certain it is that when standing on the beach the roar of the waves does not prevent one's hearing the sound of water as if falling over rocks. From Ichi-no-miya the road continues round the coast to Kisaradzu opposite Yokohama; a more direct route runs inland from Ichi-no-miya to the castle town of Ôdaki  $5\frac{1}{2}$  *ri*. From Ôdaki to Kururi 5 *ri*, and thence by way of Kano-zan to Kisaradzu 9 *ri*. The whole way between Ichi-no-miya and Kisaradzu the road passes up and down hills, through a country broken up into small ridges; the scenery is very pretty. By going a little out of the direct road between Kururi and Kisaradzu, after crossing the Koito-gawa at Ichijiku, one can ascend Kano-zan, the highest of the hills of Kadzusa. There is a village on the summit, and the temple of Tônoji Kano-zan is much frequented by pleasure seekers in hot weather and has very good inns. In the Shôgun's time it was a great resort of gamblers. One has a very fine view of Fuji and the bay of Yedo. From Kisaradzu, Yokohama and Yedo can be most conveniently reached by boat.

CONCERNING DEEP SEA SOUNDING.

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BY CAPTAIN BELKNAP, U.S.N.

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*[Read before the Asiatic Society of Japan, on the 13th May, 1874.]*

[182] The accurate determination of the depth of the sea is a problem which has long puzzled the minds of seamen and scientists, but which now seems in a fair way of satisfactory solution.

The activity of scientific research in all branches of investigation, and the needs of commerce at the present day, demanding quick intercourse between remote parts of the world by means of telegraphic communication through submarine cables, have stimulated effort in the direction of Deep Sea Sounding, and finally made easy and indisputable a work which had hitherto been difficult and unreliable.

We hear no longer of almost bottomless depths in the Ocean; of pressures so great that nothing, whether of wood or iron, could sink below their plane; of an utter absence of life on the Ocean bed; or of a uniform temperature of 89° F., which was believed to exist after reaching down to a certain point beneath the surface. All these ideas have been exploded by the invention of the needed appliances, and the results of Deep Sea work during the past twenty years.

Under old methods with ordinary sinkers and heavy hempen lines, it was found exceedingly difficult to tell when the lead reached bottom in depths beyond 1,200 [183] fathoms, the friction and weight increasing to such a degree that the touch of the plummet could not be felt sensibly enough to make the fact sure; and the line would continue to run out indefinitely, simply from its own weight.

For many years, distinguished officers in the principal Naval

services strove in vain to solve the problem. Spun-yarn, silken lines, fishing lines and wire were tried, but generally with little or no success.

Captain Denham, of H. M. S. *Herald*, thought he found bottom, sounding in the South Atlantic, at a depth of 46,000 feet. Lieut. Parker of the U. S. S. *Congress*, sounding off the coast of Brazil, ran out 50,000 feet of line, reporting no bottom at that great depth (some nine miles). Lieut. Walsh, U. S. N. sounded with 34,000 feet of wire without feeling bottom, and Lieut. Berryman, in the U. S. brig *Dolphin*, ran out a line of 39,000 feet with no more definite results.

We know now that all those soundings were defective, and that hardly more than half or two-thirds of those depths exist anywhere in the Ocean. The deepest reliable sounding yet on record was recently made by H. M. S. *Challenger*, between St. Thomas and Bermuda, where a depth of 28,250 feet was found.

One trouble with the small lines was that they were not strong enough to bring the sinker back to the surface, but would generally break from the strain imposed upon them at great depths; another trouble arose from the fact that the line was let run as fast as it would go out, and, in fact, was rather assisted than retarded, so that the shock of striking, communicated through the dense mass of water by the line, was not felt perceptibly enough to make the fact unquestionable, and, in short, the moment of touch was never known, but guessed at, more or less.

Again, it was almost impossible to keep a sailing vessel directly over the line, and the drift of the ship and action of currents upon the rope gave very imperfect results, even at depths of no more than 1,000 fathoms, and where the indications were good that bottom had been reached.

[184] In surveying the immense coast line of the United States, the U. S. Coast Survey, then under the direction of Prof. Bache, undoubtedly initiated the first systematic endeavour to grapple with this important problem; and Lieut. Maury, of the National Observatory, seizing the opportunity, proposed that strong twine, made expressly for the purpose, should be used with 92 lb. and 68 lb. shot for sinkers, and, instead of sounding from the ship, he suggested the work should be done from a boat; the idea being that the boat could be kept directly over the line by means of the oars, and the twine being so small and light in propor-

tion to the weight of the sinker, the shock of striking might be felt as it ran through the hand, the twine to be cut when bottom was reached, without trying to haul it back ; thus a proportionately heavier sinker could be used than with the methods previously in vogue.

The U. S. brig *Dolphin*, under the command of Lieutenant, now Rear-Admiral, S. P. Lee, U.S.N., was the first to try that experiment, and after a number of failures which tested the patience and skill of that officer to the utmost, he finally succeeded, and the results obtained by that vessel were probably the most reliable which had been obtained up to that time. But this success lacked one important feature ; specimens of the bottom were needed, not only to put beyond doubt the accuracy of the sounding, but to bring to the light of investigation the character of the soil from the ocean bed.

Then it was that Lieutenant J. M. Brooke, U.S.N., invented the simple and beautiful contrivance of detaching the sinker and dropping it on the bottom, leaving a small rod, hollowed out at the bottom, in which were fixed open quills, to be hauled back on board by the twine. In the act of striking, the quills would fill with mud, and retain it till drawn up to the surface.

Lieutenant, now Rear-Admiral, B. F. Sands, U.S.N., also devised an apparatus by which a split sinker was made to fall apart when it touched bottom, leaving a cup, ingeniously arranged to bring up specimens of the bottom, [185] but the Brooke apparatus seemed to find the most favour, and from that time forward, 1854, that apparatus, or modifications of it, or machines based upon the principle of getting rid of the sinker, have been used in all services making deep sea explorations. On this head Prof. Ansted, in his "Geological Gossip," says : "We have to thank our brethren from the other side of the Atlantic for a number of trials and experiments, with various modifications of the old sounding-line, and also for the introduction of a simple and efficacious contrivance for overcoming the difficulty. Brooke's sounding apparatus, slightly modified in matter of detail, is now generally employed, with the greatest success, to obtain proofs not only of the depth, but of the nature of the bottom of ocean." In the English service the "Bull-dog," the "Fitzgerald," and "Hydra" machines, have been mostly used, the latter being the favorite, and which is now in use on board H. M. S. *Challenger*.

It was about this time too, that Mr. Massey, an English inventor, devised his sounding machine, which was a contrivance of cogwheels turned by the action of the water on a screw.

The machine was attached to the line above the lead, and in descending, the revolutions of the screw gave motion to the cogwheels, which registered the number of fathoms corresponding to the number of fathoms reached. This machine was a good step in advance, but owing to the enormous pressure of the water at great depths, which seemed to affect the perfect working of the wheels, the results were not so reliable as at first glance would appear.

These inventions happened just at the "nick of time," for the first Atlantic cable was then in contemplation, and the U. S. steamer *Active*, the first steamer used in making deep-sea soundings, was fitted out with every appliance, including a steam-reel, which experience suggested up to that time, and was placed under the command of Lieut. O. H. Berryman for the purpose of sounding out a route for the proposed cable. The line was run, both the Brooke and Massey apparatus being used, and many good [186] specimens of bottom soil were brought up, but on Lieutenant Maury's questioning the accuracy of some of the *Active's* work, the English Admiralty sent H. M. steamer *Cyclops*, Lieut. Dayman, to go over the same ground. Lieut. Dayman used Brooke's apparatus, slightly modified, and the soundings made by him substantially verified those made by Berryman.

In 1858, Brooke, in the U. S. brig *Dolphin*, tested his own apparatus in sounding in various parts of the North Pacific, and in 1868, Captain Shortland, R.N., in H. M. S. *Hydra*, ran a line of soundings from Bombay to Aden for cable purposes. On board that vessel was devised the *Hydra* machine, in which a spring was substituted for the trigger in the Brooke apparatus, and the tube for specimens was fitted with a piston and a series of valves. This machine, as before mentioned, is the one now preferred in the English service, and in use on board the *Challenger*. Captain Shortland kept a certain amount of tension on the line, and noted the time each hundred fathoms took in running out, then watching closely when the sinker was supposed to reach bottom,—the line was still permitted to run on, and if with diminished speed, it was considered that bottom had been reached: of course, if the specimen tube came up



alone, leaving the sinker on the bottom, there could be little doubt of the value of the sounding. In 1870 and 1871, Commander Jno. Irwin, in the U.S.S. *Yantic*, sounded among the West India Islands and in the Caribbean Sea. He used Massey's apparatus and undetachable lead, with specimen cup invented by Rear Admiral Sands, and sometimes duplicated the soundings in order to verify results.

The very successful sounding and dredging expeditions of H. M. Ships *Lightning* and *Porcupine* in 1868, 1869 and 1870 under the scientific direction of Dr. Carpenter and Professor Wyville Thomson, led the English Admiralty to fit out the *Challenger* for the cruise upon which she is now engaged. She has a large scientific corps on board, with Professor Wyville Thomson at its head, and I believe may be expected to arrive in the waters of Japan sometime in 1875.

[187] The *Tuscarora* was fitted out at the Navy Yard, Mare Island, Cal., in the summer of 1873, for the purpose of sounding between the shores of the U.S. and Japan, to ascertain the practicability of a cable route across the North Pacific. She was originally fitted with two machines; one, a heavy dynamometer, devised by Passed Assistant Engineer T. W. Rae, U.S. Navy, for sounding with a rope or cord; and the other, a small reel and dynamometer, invented by Sir William Thomson, of Glasgow University, to be used with fine piano wire.

The heavy dynamometer worked well at depths of 1,800 fathoms, beyond which it was not tried, as, owing to the sudden complication with Spain it was taken out of the ship to make room for a gun. Had that machine been kept on board, it was further intended to use with it a small cord, or rope of wire, instead of the hempen line, and the results would undoubtedly have been good. When sounding with that machine, the line passed from the reel with two or three turns round a large drum twelve feet in circumference,—the revolutions being registered by a counter, so that the length of line out was indicated both by the counter and the marks on the line. The principle upon which the working of the machine was based was essentially the same as that which constitutes the chief merit of the Thomson dynamometer; but this machine being out of the question for the cause above given, the Thomson machine had it all its own way, and so admirable has been its working, and so accurate are its indications, that it seems to be no more than due

to the genius of Sir William to say, that the appliances for what may be, not inaptly called, the perfection of Deep Sea Sounding, originated with him. Wire had been tried by Lieut. Walsh on board the U. S. schooner *Taney*, so far back as 1849, but the happy thought had not occurred to him to measure the weight of the wire as it ran out, and applying a counterbalancing weight inside to restrain it in its descent, hence the specific gravity of the wire being so great, it would continue to run on forever, if permitted, [188] without giving any indication of touching bottom, and so its use was abandoned.

The Thomson machine consists of a reel or drum six feet in circumference, made of galvanized sheet iron. The drum is about four inches in width and has a rim on each side from one and a half inches to two inches in height. Around the right side of the drum runs a V groove, which takes the endless rope or pulley line which controls the revolutions of the drum in sounding.

The drum weighs about 60 lbs., and will readily hold five miles of the piano wire. It rests on a light iron frame bolted to a wooden bed and can be readily unshipped when not required for use. Close behind the rim of the drum, and directly in line with the V groove, is fixed a light iron wheel ten inches in diameter; this wheel, called the dynamometer wheel, has one groove wide enough to hold two parts of line, and a second narrow groove to receive a cord simply. Back of this wheel is a common spring balance, which will register a strain of 110 lbs.

Some twenty-five feet from the reel is fixed a pulley wheel, connected with the drum on one side, by the endless rope, and having a pendant on its other side running through a block suspended for the purpose. To the pendant are attached hooks from which to suspend weights of different sizes. The inventor used a tackle, instead of a pendant and weight, to be hauled taut as occasion required; but weights were substituted as being easier to manage and more satisfactory in their working, as by that means a steady, known, and invariable strain could be had as desired, according as the weight of sinker and wire out make increased power on the pulley necessary.

In getting the machine ready to sound, an endless rope of medium size is fitted into the grooves of the drum and pulley wheel, like an ordinary belt; then a full turn is taken round the dynamometer wheel,

the latter being secured to the spring balance by a small cord resting in the narrow groove, and passing down through a small hole in the wheel; weights then being hooked to the pendant, the endless rope tautens, and the machine is ready for use.

[189] When the machine is in operation, the pulley line, or endless rope, runs freely round with the drum and pulley wheel, but the dynamometer wheel being held fast by the small cord attached to the spring balance, the friction of the turns of the rope running round the wheel expends itself in bringing a strain on the balance, the index of which registers the number of pounds of that strain; it is needless to say the strain is in proportion to the amount of weight on the pendant.

The piano wire No. 22 in size, weighs, in water, about 12 lbs. to the statute mile, and will bear a strain of from 200 lbs to 230 lbs. The wire comes in lengths of from 200 fathoms to about 400 fathoms, and has to be spliced to make it available for sounding purposes. The splices are made some three feet in length, the parts being put together with a long jawed twist, and the ends and three or four intermediate points secured with solder. The whole length of the splice is then served with fine waxed thread and the splice is complete. In no case have the splices drawn or broken. To keep the wire free from rust, it is kept at all times when not in immediate use, in a tank containing a solution of caustic soda. This protects the wire completely, and the piece before the Society this evening has been in use ten months.

To the outer end of the wire is attached a light galvanized iron ring, or rope grummet, to which is made fast some 25 fathoms of cord or Albacore line; to the other end of this line is attached the apparatus for the detachable sinker and specimen cup. The purpose of this line is to prevent the wire from coming into contact with the bottom, for if that were allowed, the wire being stiff and elastic, would be apt to fly upward, *kink*, and *break*.

The sinkers used are 8-inch shot with holes bored through their centres  $2\frac{1}{2}$  inches, and  $2\frac{3}{4}$  inches in diameter, through which the Brooke detaching rod and the specimen cylinders are passed; their weight is 55 lbs. and 51 lbs. Sir William Thomson used a lead sinker weighing 30 lbs. which he hauled back with the wire, but that plan put too much stress on the machine in reeling in, and the heavier [190] sinker to be

detached by Brooke's apparatus was adopted on board the *Tuscarora*. Sir William has now abandoned the hauling back of the sinker, I believe.

The cups or cylinders, of three different designs, used on board the *Tuscarora* with the Brooke apparatus, were devised on board, and work so well that mud enough to fill a five ounce vial is sometimes brought up.

The soundings are taken from the gangway, as being nearer the centre of motion than any other convenient part of the ship, and therefore less subjected to the pitching and yawing motion of the vessel.

When it is required to sound, supposing the ship to be under sail, the fires, which have been banked, are spread, and when steam is ready, say in half an hour, the usual time, all sails are furled and the ship brought stern to wind and sea and kept in that position by the backing of the engines. In calm or light weather, the use of the engines is only required at intervals ; at other times, when the wind is fresh and the sea heavy, they are kept backing all the time, and sometimes at full speed.

Meanwhile the machine has been got ready, and when the ship has lost headway and become steady, so that the wire can run straight down, the sinker is carefully lowered into the water by hand. Then the self-registering thermometer for ascertaining the bottom temperature is attached to the cord, and the line is allowed to run out gently until the wire is reached, when the latter is clamped to prevent further egress until a leaden weight of some four pounds can be attached to the ring. This precaution is necessary to prevent the wire flying upwards when the sinker strikes bottom, and relieves the wire of its tension, otherwise it would be apt to take in kinks and break, as in the other case mentioned.

Now a man has been attending at the pendant with the weights during this time, and, all being ready, the officer in charge has the wire unclamped and lets it run slowly at first ; then, when well started, directs some of the weights to be taken off to allow the wire to run more freely, but it is never allowed to run out faster than at the [191] rate of 100 fathoms in 50 seconds, and seldom at less rate than 100 fathoms a minute.

For instance, at the beginning of the cast, the weights on the pendant generally aggregate 90 lbs.—the indication shown by the

dynamometer being 37 lbs., and when the wire is going out with the greatest speed admissible, the pendant weight is 25 lbs. and the indication shown by the dynamometer 15 lbs.

On the left side of the drum is attached a counter which registers the number of revolutions, and an officer stands with watch and book in hand to note the time of each 100 fathoms running out. The wire has previously been carefully measured as it was wound on the drum, the number of fathoms in each splice being registered in the book; thus when bottom is reached, the depth is known with great accuracy, especially as there is no appreciable stretch to the wire, as there is to rope or cord.

Now when it is supposed that the sinker is nearing the bottom, the speed of egress is diminished by replacing the weight up to 90 lbs. or 100 lbs., the dynamometer showing from 35 lbs. to 40 lbs.

The moment the sinker strikes bottom it becomes detached, and the strain which has retarded the descent of the sinker, is now only resisted by the weight of the wire, and pulls back with a force equal to the weight of the shot now resting on the bottom. This causes the index hand of the dynamometer to fly up, and the drum to stop revolving. So perfect and unmistakable are the indications at whatever depth, that a person standing in any part of the ship and looking at the machine, can tell the moment bottom is reached. In reeling in, the dynamometer wheel is unshipped, and the pulley line is shifted for a larger one. The inventor's plan was to reel in by men hauling in on the pulley line, hand over hand, but after a while a heavy balance wheel was fitted for reeling in on board the *Tuscarora*, enabling four men to do the work with more ease, facility and quickness, than six men could do it under the old method.

As compared with rope, the time of the running out of [192] the wire is about the same, the great gain being in reeling in. For instance, Prof. Wyville Thomson states in his "Depths of the Sea," that sounding from H. M. S. "Porcupine" in 2485 fathoms, the deepest cast made from that vessel, the time occupied in descent of the line was 33 minutes, 35 seconds, and in "heaving up" 2 hours, 2 minutes; while on board the *Tuscarora*, a cast was had in 2565 fathoms, the time of running out being 31 minutes, 7 seconds, and of reeling in, 39

minutes, 42 seconds, or a gain of nearly a hundred per cent in the total time occupied in the cast. And I can but consider the difference in accuracy in favor of the wire, to be somewhat in the same proportion; for a sinker attached to that light, thin, attenuated material, goes straight to the bottom like a plummet dropping into a well, opposing an almost inappreciable surface to the action of ocean currents, while rope or cord, comparatively heavy, presents a not inconsiderable and rough surface, developing a good deal of friction as it runs down to great depths, and curves and bends in all directions in meeting the under currents, and the percentage of stretch should by no means be lost sight of.

When sounding, serial temperatures are taken at the same time from the topgallant forecastle with a duplicate Thomson machine. For instance, if the temperature is desired for every 100 fathoms below the surface down to 500 fathoms, a 7-lb. bead and a Miller-Casella thermometer is attached to the wire. Then the wire is allowed to run out slowly till the 100 fathom mark is reached and another thermometer is attached, and so on, till the desired depth is reached, and thus, at one serial sounding, the several temperatures are taken. The thermometers are very accurate in their indications, as found by their close correspondence in the many series of temperatures observed.

In the Central North Pacific, from San Diego to the Bonin Islands, the under temperature curve of  $40^{\circ}$  F. is found to range from 400 fathoms to 500 fathoms in depth. At 1200 fathoms about the lowest temperature is reached; [193] from that depth downward, the thermometer shows a uniform temperature of from  $33^{\circ}$  to  $34^{\circ}$  F., and the copper cases enclosing the thermometers come up from the bottom feeling very cold.

In September, 1878, the *Tuscarora* sounded 1,100 miles on a great circle from Cape Flattery, Washington Territory, towards Atcha, one of the Aleutian Islands. The work was then suspended owing to the lateness of the season. About 200 miles from Cape Flattery, a submarine elevation of 1800 feet was found, which is probably an under spur from Vancouver Island. From that point to the locality where the ship stopped work, the bottom descends in a remarkably regular manner, averaging a fall of about six feet per mile. Indeed, that part of the Pacific bed may be likened to a section of an immense shallow bowl, so gentle and regular is the curve of descent.

The character of the bottom varied considerably, mud, stiff clay, ooze, sand, pebbles, and shingle being brought up at different points on the line sounded; in that respect differing materially from the character of the soil on the telegraphic plateau of the North Atlantic, which is almost precisely uniform in its nature throughout its whole extent.

On the way back to San Francisco, and from San Francisco to San Diego, soundings were made off and on the coast to determine the "True continental outline, or the beginning of the ocean bed proper." The result shown was, that a slope or terrace, from 10 miles to 50 miles in width, makes off from the coast line in comparatively shoal water, and then drops very abruptly down to depths of 1,500 fathoms and 2,000 fathoms, constituting an immense buttress, as it were, to support the continent.

While sounding late one afternoon, some 140 miles off the coast of California, the lead suddenly brought up at a depth of 996 fathoms, where a depth of 1,600 fathoms or 1,700 fathoms was looked for. No specimen came up and the point of the cup was found to be battered.

Sounding round the locality it was found that a rocky [194] submarine peak, 4,000 feet in height, existed in that part of the ocean, rising very abruptly from the ocean bed on northern, eastern and western sides, with a gentle slope on its southern face.

The ocean bed between San Diego and the Hawaiian Islands is, like the Atlantic plateau, gently undulating, but differs in this respect, that it is boldly abrupt near the respective coasts; the character of the bottom soil—a light yellowish brown mud or ooze,—is nearly uniform.

Not so the bed from the Hawaiian Islands westward, which is irregular and mountainous, and the nature of the bottom soil dissimilar,—coral limestone, lumps of lava, coarse sand and ooze, containing particles of lava, coming up in specimen cylinders at various localities on the route sounded. Six submarine elevations, ranging from 7,000 feet to near 18,000 feet in height, were found, and the evidence seems indisputable that the entire region west of the Hawaiian group has been subjected, at some remote period, to volcanic disturbances. Professor Dana, the great authority on corals, states the range of living corals to be no more than 120 feet in depth. Where then, did the disintegrated coral, brought up from the mountain peaks 11,000 feet below the

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surface come from? The answer would seem to point to the former elevation of these peaks, and their gradual subsidence during the long epochs of geological action.

The theory has been that the greatest depth in the Pacific would be found in its eastern part, but so far as the question relates to the North Pacific, the line of soundings run by the *Tuscarora* would seem to prove to the contrary, the deepest water having been found near the Bonin Islands.

The deepest water found between San Diego and Japan viâ the Bonin Islands was 3,287 fathoms (19,722 feet), or about three and three-quarters statute miles, and as the weight of a column of water one inch square, is about a ton every 800 fathoms, it follows that the pressure at that enormous depth amounts to four (4) tons per square inch. The total time occupied in sounding to that great [195] depth and bringing back a bottom specimen, was 1 hour, 56 minutes, 32 seconds. The quickest time was made, when sounding at a depth of 3009 fathoms, which occupied 1 hour, 29 minutes, 32 seconds only.

The soundings are made at night as well as by day, and the incomparable working of the Thomson machine is a source of never ending wonder and admiration to all who witness it.

Nor is it a small gratification to receive back the specimen cups and thermometers which have travelled down so far, and snatched answers from those dark mysterious abysses which the heart of man has ever been questioning with but faintest replies.

This paper has been hastily prepared, and is with diffidence respectfully submitted to the Asiatic Society of Japan.

GEO. E. BELKNAP.

Commander, U. S. Navy.

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A Regular Meeting of the Society was held on the 13th of May 1874, at the Grand Hotel; Dr. Hepburn, the President, in the chair.

Owing to the absence of the Recording Secretary the Minutes of the last Meeting were not read.

Printed copies of the Amended Constitution and By-Laws were laid on the table for the use of the members. Some Fossils were presented by Judge Goodwin, and a Crinoid from Enoshima by Rev. Mr. Cooper. Also a copy of Vol. I. of Botanical Researches in Japan by Dr. Savatier of Yokosuka.

The names of the following gentlemen, as new members, were announced:—Messrs. C. W. Goodwin, C. W. Kinder, Herbert Cope, John J. Quin, F. Ringer, J. C. Smith, T. B. Glover, Alex. Wright, D. D. Inglis, J. J. Van der Pot, F. Hellyer, and Rev. H. Burnside.

A Committee was appointed to confer with the Literary Society on the subject of a new Hall to be occupied by the two Societies conjointly.

In the absence of the writer, C. W. Lawrence, Esq., of H. B. M. Legation, a paper "Notes of a Journey in Hitachi, Shimôsa and Kadzusa" was read by Mr. Satow, who afterwards explained in answer to an enquiry, that the removal of Buddhist Shrines and Temples, about which so much had been said recently, was to be understood—not as an endeavour to extirpate Buddhism—but only as a clearing away from Shintô grounds and temples of what had been intruded there during the Shôgunate.

[196] The Corresponding Secretary then read a paper by Captain Belknap, of the U. S. S. *Tuscarora* on Deep Sea Soundings, which was followed by explanations by Captain Belknap himself of the apparatus employed in the soundings; and also of a Diagram exhibiting an outline of the ocean bed from San Diego, in California, to the Sandwich Islands; thence to the Bonin Islands, and thence to Japan. The future line of soundings is to run along by the Aleutian Islands to Alaska.

The President tendered the thanks of the Society—afterwards confirmed by a special vote—and remarked on the exceptional value and interest of papers such as that just read.

Prof. W. E. Ayrton said:—Captain Belknap has ably described in his paper the history of deep sea sounding apparatus. As he has said, the methods by which attempts have been made to obtain accurate results may be divided into four classes—the use of a very heavy weight to keep the line approximately vertical, which weight had to be left at the bottom at every sounding so that the mere cost of metal thrown away was, in a long expedition like the present, considerable—next, an apparatus like a *patent-log* which recorded on a tell-tale arrangement attached to it, its descent in the sea—thirdly, sounding by time, in which case there was attached to the weight only a very light line, the object of which was merely to determine when the weight reached the bottom, it having been proved that a body falling unimpeded through water moves through equal spaces in equal times, quite unlike the case of a falling body in air, where if the time is doubled the space is quadrupled; with this latter method of sounding, however, not only the weight but the cord was also lost. All the above methods have proved more or less unsatisfactory in deep seas where there are surface or under-currents. After the paper we have heard from Captain Belknap bearing valuable testimony as it does to the efficiency of Sir William Thomson's piano-forte wire arrangement, it is with diffidence that I am now going to say a few words regarding that system. Perhaps the fact of my having been present on the occasion when Sir William first brought

his method before the notice of the public, at the Meeting of the British Association held at Brighton in 1872, now enables me to say something about the line of thought which gave birth to this invention and may plead as an excuse for my apparently trenching on a subject Captain Belknap has made so thoroughly his own. Owing to that little hesitation naturally displayed by Dr. Syle regarding infliction on the company of the valuable technical details contained in the paper we have just heard him read, I am afraid that the points of merit of the Thomson apparatus may not have been made clear to some of those present. It was quite evident to Sir William that in order to have accurate deep sea soundings fine wire and not cord must be used; the first point, therefore, was to devise a contrivance by which the paying out wheel should be automatically stopped the moment the weight reached the bottom. This he has succeeded in doing in a very ingenious way. To the end of the [197] wire a small weight is attached; to this, one end of twenty-five fathoms of rope, to the other end of which hangs a much larger weight with a cup for bringing up specimens from the bottom. The existence of the two weights and the very important part played by them was *not*, I think, grasped by many during the reading of the paper. This wire is wound on a drum, made as little massive as possible. The motion of the drum is regulated by an exceedingly simple friction break, which is so adjusted that when the lower and heavier weight has nearly reached the bottom, the retarding force is a little less than the total strain on the wire, but much greater than that strain becomes when the lower weight rests on the bottom, consequently the moment the bed of the ocean is reached the paying out gear automatically stops,—the wire hangs practically vertical without slack, and the total amount run out indicates the true depth. After arranging this apparatus, one of the early difficulties experienced by Sir William was to obtain thin wire of sufficient strength. This he at last succeeded in doing by the employment of piano-forte wire. But as the piano-forte wire is not that which is commonly used for sounding the deep C, considerable judgment had to be employed in the selection of wire of only the best quality. Another difficulty experienced was that it was necessary to make the drum on which the wire was wound very slight, for unless its mass is kept small the momentum the wheel would acquire by its rapid rotation would be such to as prevent it being suddenly stopped by the friction break when the weight reached the bottom. On the first trial of this apparatus, when Sir William was making soundings in the Bay of Biscay, the accumulated strain of the wire, produced on coiling in, completely crushed the slight drum on which it was wound, so that it became necessary for those engaged to seize the wire with their hands to pull it up. However, although the depth of the sea there is over twelve hundred fathoms, and although there were only two or three men in the small boat from which the soundings were being made, Sir William succeeded, by aid of that indomitable energy and perseverance that has characterised all his undertakings, in bringing up specimens of the bottom which he exhibited at that

meeting of the British Association. Perhaps Captain Belknap will kindly give us the results of his experience with reference to the crushing of the drum, also whether he knows why the *Challenger* has made, as far as I know, no use of the wire apparatus that was supplied them.

Captain Belknap, in reply to various inquiries, stated that they had been quite successful in bringing up specimens of the bottom; that corals were found at a depth hitherto unthought of; that evidences of life were found at the greatest depths; and that he had found it necessary once and again to strengthen the drum employed in the method of Sir Wm. Thomson, with whose views he was well acquainted, and who sympathized cordially with the work now being performed by the *Tuscarora*.

## A JOURNEY IN NORTH-EAST JAPAN.

BY CAPTAIN BLAKISTON, LATE R. A.

[Read before Asiatic Society of Japan, on the 17th June, 1874.]

[198] Some months have elapsed since the wreck of the P. M. S. S. *Ariel*, on a reef off Toyoma Point on the East coast of Japan in Latitude 37° N., was the cause of the journey here recorded. When Captain Newell and myself slid down a rope from the fore chains, the vessel had sunk so far aft that the water was on the upper deck forward of the paddle boxes, and the whole after hurricane deck was submerged. Fortunately there was little swell, so that all the boats in the darkness of the night reached the shore, and chanced to strike parts of the beach between the reefs. The head-man of the little village of Toyoma, whom I found with the assistance of a fisherman and his paper lantern, made arrangements for the accommodation of the eighty-four shipwrecked people, and the villagers were all extremely civil.

Next morning all that was visible of the unfortunate *Ariel* was one of her mast-heads. So, after a breakfast of beef and ship-biscuit, I hired a man to carry a small leather bag, which my next cabin neighbour had luckily saved for me, and started on foot for Taira, the chief town of Iwaki *ken* or district, to which a fair path of about three *ri* (7½ miles) in a general W.N.W. direction, leads through small valleys and over some low hills.

The town lies in a plain of some extent; in fact, the [199] name Taira signifies "a plain." It is surrounded on most sides by hills, which towards the north-west and west rise into mountains of considerable elevation. The plain is entirely under rice cultivation, and crossed only by the common narrow paths of the settled districts of the country. The ruins—as I took them to be—of the former *daimiō's* castle, stand on a hill just over the town.

Proceeding direct to the Government office, a temporary looking building occupied by a number of officials sitting at desks, I was at once introduced to the chief. He received me civilly, inquired about the particulars of the wreck, and promised to have quarters prepared for all the people, and forward them on their way to Yedo, being the nearest foreign settlement, distance  $56\frac{1}{2}$  *ri* (138 miles English). When I told him, however, that, being a resident of Hakodate, I requested a passport for the purpose of proceeding thence overland, he demurred and sought to convince me that my proper course was to return to Yokohama. I therefore left him and put up at a native hotel, where I ordered a horse, purchased a blanket, a Japanese pipe and tobacco, and was nearly ready to start when Captain Newell and the rest of the people arrived. As the ship's interpreter had not yet come on, I assisted in getting them billeted.

About half-past two an officer came to inform me that the idea of my travelling North—was, as he expressed it, “*mudzukashi*”; a word difficult of complete expression in English, but in this case meaning that the chief official would not give his permission. My mind was however made up, and I therefore informed him that being ready to start I should not wait even half an hour for the passport, but proceed without one. He seemed in great tribulation and went back to the government office.

I then told the man with the horse, who had already packed my scanty shew of baggage, to proceed on the northern road, and after a few minutes, I followed on foot. Outside the town I mounted on the pack saddle, and with the horse led by coolie,—which is invariably done in this part of Japan—I commenced my journey in earnest.

[200] This road is known as the *Hama-kaidō* or coast-highway, in distinction from the *Naka-kaidō* or inland post-road; both of which start from Yedo and running northwards, converge again at Sendai, one hundred *ri* from the *Nihon Bashi* or great bridge of Yedo. It partakes of the character of the *Tōkaidō*—so familiar to residents and tourists in Japan, and so often described—the general principle being a roadway from twenty to forty feet in width, lined by pine trees closely planted on either side, forming an avenue. Occasional intervals occur where trees are wanting, which may be accounted for in some parts by the moisture of the subsoil being unfavourable to the growth of *conifera*, in others by

want of superintendence. These intervals are in some places filled with willows and alders. A thousand scenes of the most picturesque groups of pines, rising in straight or inclined turtle-backed stems, and branching out above in all sorts of variations of curves and twists, roofed with a dense mass of the brightest dark green foliage, might be selected, and be a study for an artist's life-time. The Japanese have not failed in their artistic works to secure this feature so familiar to their own eyes, and have stamped the pine tree, one might say, as one of their natural emblems. It is to be hoped that the unsparing and barbarous hand of an impoverished government will not be laid on the pine trees skirting the old highways of the country, and that this great feature in the scenery of Japan will not be civilized off the face of the earth. As a protection against the rays of the sun, and some mitigation of the piercing blasts of winter winds, they are of utility. Besides, they thrive best on the driest soil, and in distinction from other trees do not seem to add to the dampness of the ground ; so that there is no reason why the very best road should not exist between rows of these trees. After the almost bloodless revolution which changed Japan from a feudal to a monarchical government, it should be the study of those in power to retain some of the time honoured features of a state which has passed away.

From Taira the road takes a northerly direction, but [201] trending a little east, and before leaving the plain crosses a considerable sized river known as Natsui-kawa, flowing eastward, probably the principal drain of this basin. After this there is another deep, but smaller stream called Niidagawa, some distance beyond which the road strikes the sea coast on the village of Yotsukura, distant three *ri* from Taira. Here I dismissed my horse and guide, and putting my baggage on a pack horse led by a woman who was returning from market, continued on foot over some moderate hills of white sandstone, and along the sea beach for another *ri*, reaching the village of Hisa-no-hama just before dark, where I was pretty decently lodged, and ordered horses to be ready at an early hour next day.

When I awoke in the morning I was hardly surprised to find the next room to mine occupied by two *yakunin*, who had come post haste during the night to overtake me. We made acquaintance by the usual morning salutation, after which Mr. Itou, for so the chief was named,



asked me if I had a travelling permit, which I quietly answered in the negative. Nor did I appear interested about the matter, for I suspected they had been sent to get me to return to Taira, and abandon my projected northern journey. He then produced a Japanese document which was unintelligible to me, and said that if I *was* going on, he had been deputed by the chief official at Taira to accompany me. I notified him that such was my determination, and that I trusted we should travel agreeably together. We then became the best of friends, and after we had had breakfast, the horses making their appearance, we set off together.

A general northerly direction carried us partly inland, and sometimes along the shore under clay-rock cliffs nearly pure white. The streams we crossed contained some granite stones, indicating the probability that a range of mountains running parallel to the coast, and about 10 to 15 miles distant, was of primitive formation. These mountains were not so much wooded as the lower hills. I observed also some coarse sandstone and conglomerate. The rollers coming in on the beach were very heavy, and [202] forced us in one place to make a considerable *détour* inland instead of following the usual route along the sea beach. A good deal of the country was wild, but the valleys were cultivated with rice, cotton, tea, and beans; the farmers having good substantial houses and appearing well-to-do. Pine trees skirted a great part of the regular road.

At three *ri* we changed horses at the village of Hirono. Thence one *ri* over a broken country, for a large part pine-wooded, the road being in places cut through the clay rock with gutters on either side, to a small place called Kido. On the beach are sheds in which sea water is evaporated for its salt, a wooden spout running out on the beach to high water mark, into which the water is baled by hand. All about Taira and throughout this part of the country, the nature of the rock admitting of easy excavation, one notices numerous caves which the farming people use as storehouses, some of them having regular doors and locks. These are said, with what truth is uncertain, to have been used as habitations by the aborigines of this part of Japan.

Soon after leaving Kido we found a rapid running good-sized river, having a weir set near the crossing places for catching salmon. Thence

over an uncultivated country, partly broken and hilly, and partly in plateaux, the ground being covered with green fern and brush, and sparsely wooded with pine. The road is about a mile or so back from the coast. At three *ri* it reached Tomioka, situated in a valley. Again we got fresh horses and made  $3\frac{1}{2}$  *ri* more over much the same kind of country, but more wooded and very little cultivated to Shinzan; passing on the way a village called Kuma-no-kawa in a tolerably open valley where a good deal of mulberry is cultivated, and a rapid river runs towards the sea. I noticed that the mulberry shrubs were all pollards, and at that time of the year the branches were tied up in a bunch, the intervening ground being used for cereal and other crops. Rice was under process of being cut. From Shinzan we took on the same horses another stage of one and a half *ri*, passing a considerable valley and several villages; then over a [203] pine covered ridge, descending from which into a fine valley we crossed a rapid river on its south side, where the bridge had been lately washed away, and took up our quarters for the night at the town of Namiye.

On the north side of this valley we crossed on the following morning by bridge another rapid river of considerable size. We then ascended the uplands by a good road through the finest avenue of pine trees I had yet seen. Onwards over a good deal of broken and wild ground, but wherever there happened to be a valley it was cultivated. When about a mile and a half from the sea I noticed a lagoon about half a mile long separated from the sea by a low neck or spit partly wooded. Passing over more broken country of which the hills ran mostly parallel to our course, that is north and south, we came to Odaka,  $2\frac{1}{2}$  *ri*. Forward we traversed much the same kind of country another  $2\frac{1}{2}$  *ri* to the town of Hara-no-machi, which lies in a fine plain, the south part of which is entirely clear and open and kept for horse grazing; having the appearance of a common or military exercising ground, for which it would be well adapted.

Throughout this part of the country there are many tanks formed by embankments creating dams across the heads of the narrow valleys and ravines, which are furnished with sluices for distributing water to the rice fields in the lower parts of valleys. The highway or *kaidō* often crosses the upper valleys on these embankments, which are strong

and substantial. The larger valleys are frequently double as it were ; that is to say, a river on either side, and a village and much cultivated land in the middle. Invariably there is a small stream led down the principal street of the village, used for household purposes. I do not consider that these double valleys are natural, but imagine that the tributary streams which make up a river, have been artificially confined and led down the sides of the valley ; so that what may have been in former ages an extensive river bottom with large shingle and sand flats and many waste patches subject to periodical floods and changes of the bed of the [204] river, is now, by these artificial means, rendered valuable agricultural land.

Two *ri* more brought us to Kashima where we halted for dinner. Thence we travelled 3 *ri* to Nakamura, the capital of the former daimiate of Sōma, a place containing a good many streets, but of poor appearance. It stands in a cultivated plain extending from the sea to the mountains, say 5 to 8 miles. Having a good many trees about it, it does not appear anything of a place from outside. There is a lagoon on the coast not far south of Nakamura, and one or two to the northward. Towards evening we passed out of Iwaki Ken near a small place called Koma-gamine, two and a half *ri* northward of Nakamura, where we put up for the night within the limits of the province of Miyagi Ken, in rather poor quarters.

On the 31st of October, being our fourth day, we made a start before daylight, making one *ri* over a rolling country, and changed horses. I walked on foot the next stage of two *ri*, where we had to change again. The headland of Kinkasan, the eastern extremity of Sendai Bay, was visible bearing about E.N.E. The next stage was five *ri*, the road keeping along the foot of some hills on our left hand and passing through a good village called Yamashita. The whole extent of country between the road and the sea is a low-lying dead level flat, entirely rice-cultivated. On the upper grounds I noticed in the gardens mulberry, beans, tobacco, *daikon*, cotton, turnips, buckwheat, and the paper-shrub. The country people seemed poor, and the houses dilapidated. I saw a good many cattle, and many houses kept numbers of tame ducks.

We passed through a long town called Watari, and thence con-

tinued on the same plain, which extends more to the East. It is entirely rice covered, but has clumps of trees about the scattered farm houses. The hills to the west become gradually lower. At two *ri* beyond Watari, we struck the river Abukumagawa, which seems to come out of a deep valley cut through the lower hills and a mass of mountains to the westward, having about an east course. It is at least 250 yards across where we [205] were ferried over, but mostly shallow, there being about ten feet close to the landing place on the left bank. We had some difficulty in crossing, as there was a gale of wind blowing which made the flat-bottomed scow somewhat unmanageable. It has fine solid embankments on either hand, some distance back from its actual banks, in order to allow for a considerable overflow during flood. On the north side the embankment is lined with fine pine and cedar trees.

Half a *ri* on the north bank of the Abukumagawa is the town of Iwanuma, which from the number of hotels and eating houses seems to be a favourite stopping place for travellers. It is here that the Naka-kaidō and the Hamakaidō unite, and thence only one road goes northward to the town of Sendai, distant five *ri*, and continues on through the old provinces of Sendai and Nambu, which is the way all travellers take from Yedo to Awomori and Hakodate, and before the introduction of steamers was much used. That portion of the Kaidō between Nakamura and the Abukumagawa is a poor and badly kept road, nothing in comparison to the fine road south of that place, on most part of which, if the bridges were only practicable, one might drive a carriage and pair. This is probably to be accounted for by the fact of the Naka-kaidō or inland highway having been invariably used by the Northern daimiōs ; while Sōma being the norther-most daimiō on the coast road, had no object in keeping up his communication to the north of his capital, but only troubled himself to look after the road he used in his annual state pilgrimages to Yedo.

Hiring *jin-riki-sha* at Iwanuma, we traversed the distance of five *ri* over a line of well cultivated country, crossing two considerable rivers on the way, and reached the important town of Sendai after dark. We were detained some time in heavy rain awaiting the selection of an hotel, but were ultimately provided with excellent accommodation.

Sendai, distant one hundred *ri* from Yedo, is at present the chief

town of Miyagi Ken. It was formerly the residence [206] of the daimiō. It is a large place, in fact from the imperfect way I was enabled to judge in the dark, I should take it to be of greater extent than any town I have been in in Japan, save Yedo and Ōsaka, though the population is stated at only 21,000. I noticed several good stores principally devoted to the sale of foreign imported goods. There are many bird fanciers' shops.

I was informed that the nearest part of the coast lay at a distance of three *ri* : that Sabusawa—which is on an island, but is the nearest available port—is seven *ri*. Rice in large quantities is shipped hence to Yedo, being the bulk of the produce of the country. Hemp is largely grown, Sendai being renowned for its fishing nets. Silk, tobacco, and many of the other ordinary products of Japan are produced, so that whichever of the ports of Sabusawa, Ishibama, or Ishinomaki in Sendai Bay shall be opened to foreign trade, will without doubt become an important place. Doubtless a short line of railway or tramway will be required to connect the port with the producing districts. Indeed, such feeders for ports will become necessary in many parts of Japan, for being a mountainous country, the building of trunk lines would be ruinously expensive, and the sooner such ideas are given up by the government the better. It may answer the interests of certain persons to advocate such schemes, and may please the vanity of some of the rulers of the country, while suiting the pockets of those connected with such undertakings ; but what real business would accrue from the enormous outlay is another question.

On the 1st November we made a late start—as is unavoidable at a town—making three short stages North-East and North, stopping for dinner at a large village called Yoshioka, distant  $5\frac{1}{2}$  *ri*. The rain during the night had fallen as snow on the mountains. At the outskirts of Sendai we passed through a collection of potteries, where are manufactured the coarser kinds of jars and pans. The Kaidō—hardly deserving that name—runs for a great part over a broken country, the uplands of which are mostly scrub-covered, with pine trees dotted about. The [207] narrow and confined valleys are rice cultivated. The villages are poor. The country, however, improves on approaching Yoshioka, which

is situated in a valley having a small river running through it. A fine mass of mountains lies away to the westward, having some detached pyramids standing out into the lower country. From an elevated position on the road I could trace these mountains stretching onwards as far as a north bearing, while some distant highland is visible about east, but the country between these points of the compass was clear of mountains. In fact, I presume it is the valley of the Kita-kami, to be afterwards mentioned.

From Yoshioka the road passes three *ri* over a rough scrub-wooded country, having a few pine trees scattered about. The form of the hills, which are nowhere of any height, has all the appearance of a confused sea, there being no prominent elevations, while the crests of all the ridges and mounds are about on a level. The road follows mostly the crests of these ridges, and its tortuous course may be traced by the lines of pine trees skirting it. Suddenly coming to the northern edge of these rugged uplands, we overlooked a great plain, stretching away north as far as we could see, but bounded on the north-west and west by distant mountains. From the latter direction a large river called Naruse-kawa skirts the foot of the highlands, flowing eastward. Where the bridge crosses it in entering the village it is from 100 to 150 yards wide, but owing to its being in flood, I could not judge of the depth. I saw, however, large-sized cargo boats on it. I was informed that it discharged into the sea at Nobiru, and from what I can make out from an inferior Japanese map, its mouth is a little west of that of the Kita-kami.

Sampongi is a large village on the north bank of this river. The whole valley at least fifteen miles in width is alluvial soil and planted with rice. There are clumps of trees about the homesteads. A little over one *ri* further north we came to Furukawa, another good sized village, from which an outlying double-topped mountain [208] bears about west. We took up our quarters in a comfortable inn for the night.

Salmon were at that season running up the rivers of this district, being valued at about 50 cents each. We met many droves of cattle and horses on their way from Nambu to Yedo.

In the morning a direct course north by east, part of which we

travelled before daylight, along the high road—here lined by willows and alders—crossed a river about 60 to 80 yards wide called Eaikawa, to a small village where we changed horses. In this interval of one and a half *ri* we passed the boundary of Miyagi Ken and entered the province or country of Midzusawa. Thence ascended uplands and a rolling country ; the road, about 2½ feet wide, running over low scrub wooded hills between lines of pine trees, the valleys only being cultivated. Changed horses again at 1½ *ri*, and then 2½ *ri* more brought us to a well-to-do looking village called Tsukitate. A branch road to Shōnai on the west coast of Nippon branches off somewhere hereabout. The distance is reckoned at four days travelling to Sakata, the former capital of that daimiate.

From Tsukitate we crossed the valley in which it stands, through which runs a good sized river called Hazama-gawa, probably a branch of the Kita-kami. This very pretty valley widens out from the mountains some ten or fifteen miles distant. The road passes through another large village on the north side of the valley, then over scrub-covered rolling uplands, and at 2½ *ri* reaches a poor village called Sawabe. The season was now so far advanced that the rice crops were for a great part cut, but still not yet carried off the paddy fields. There having been some frosty nights the leaves were beginning to fall, the autumnal colours of which appeared exceedingly brilliant when contrasted with the dark green cedars and pines. The prevailing fruit throughout this region is the persimmon, but as you proceed north they are not of large size. The people seem to take less care of their horses than in the south, and this negligence increases as you get into Nambu.

[209] After dinner we made four and a half *ri* to Ichinoseki, in which distance we passed a good many rough brush-covered hills, higher and with steeper slopes than hitherto. Rice is cultivated wherever possible. Ichinoseki lies in a fine valley, and is a fairly fine town, having been the capital of a small daimio called Tamura, a cadet of the house of Sendai. It is said to be one day's travel from the sea. The capital of the province, from what I could understand, is Midzusawa, on the coast. The Sendai peculiarity of dialect prevails here, the word used for "yes" being "Nae." In Nambu this is changed into "Ha," pronounced very broad.

At Ichinoseki the road strikes the valley of the Kita-kami river,

and thence follows up that valley to and beyond Morioka, the capital of the former province of Nambu, where the river takes its rise. Its general course is due South, through a beautiful fertile valley. It seems to break through a mountain mass near Ichinoseki. Its lower course I am unacquainted with, but it discharges into the sea at a place called Ishinomaki in Sendai bay, eleven *ri* from the town of Sendai. The situation of a staff light at its mouth is given in a late notification of the Lighthouse Department, as Latitude  $38^{\circ} 26'$  and Longitude  $141^{\circ} 15'$ . This river must consequently have a direct course of about 100 geographical or nautical miles. It has numerous and considerable tributaries and drains a large extent of country, the produce of which is very considerable, and for the transport of which the river furnishes ready means. Between this great valley and the Pacific coast, where are the harbours of Miyako, Yamada (Nambu), Tanohama, Kamaishi, and others, lies a rugged mountainous country crossed only by inferior mountain roads. In fact this valley is entirely cut off from the coast, so that although these harbours are the best on the whole East coast of Japan, they can never become available for more than quite local trade. The produce of the interior must find its way to the coast by the Kita-kami valley and river, an additional reason why a port opened in the bay of Sendai before advocated, [210] would be of the greatest importance. And it would be wise on the part of the Government to institute detailed surveys of the ports in Sendai bay, with a view to the selection and improvement of the most suitable for an increasing trade. There is probably no port in Japan where a larger export of the more bulky productions of the country would be drawn directly from the interior.

The 3rd of November was a very rough cold day, with frequent squalls of rain and sleet. We started early from Ichinoseki, crossed at once a large tributary of the Kita-kami, and thence followed up the road on the Western side of the main valley. A fine mountain group lies north-east of Ichinoseki, which has the appearance of a detached mass, but is really the commencement of a range of mountains on the east side of the river. Its slopes are very picturesque. The valley is well cultivated with rice, wheat, beans, and hemp, the last being made into twine used for fishing nets, the manufacture of which seems to employ a large part of the population.



Passing sometimes over spurs of the uplands, the road continues up the western side of the valley, and reaches Midzusawa at  $\frac{3}{4}$  *ri*. After dinner we made a straight course up the valley, coming at about two *ri* to another good-sized tributary emerging from the mountains to the west. At the next station we could find no horses to go forward, and therefore employed a couple of coolies, who easily carried all the baggage belonging to the three of us. The road rises on some well-wooded uplands, from whence a fine view of the river and its valley is obtained. This view, with a background of wooded mountains having their lower slopes cultivated in patches, I enjoyed from a house situated just where the road descends again into the valley bottom. The landlord was very communicative, and informed me that the boats navigating the Kita-kami could carry 150 to 200 *koku*, say 400 to 500 piculs, as far up as Kurosawajiri, and 50 *koku*, say 125 piculs, even up to Morioka. Thus from Kurosawajiri the passage to the sea occupied two days, and against the current with a fair [211] wind four or five upwards. The current is strong, and some of the rapids very shoal.

Continuing on we followed the road in the well-cultivated river bottom, passing through a small village where there are earthen banks thrown up to make the boundary of the old province of Nambu. Posts now show that this is likewise the limit of Midzusawa Ken on the south and Iwate Ken on the north. Just beyond this is a rapid river, which being then in flood, we only crossed with considerable difficulty in a narrow boat poled by four men. It was by this time nearly dark, but a short distance more brought us to Kurosawajiri, where we were comfortably lodged in a good large house. My Japanese companions seemed to think they were getting near the end of the world, the people and country being more uncivilized than anything they had been accustomed to. It was with difficulty that they made themselves understood to many of the people, and it was amusing to hear their remarks on these northern savages, as they designated them. On the contrary I felt more at home as I proceeded, and found my imperfect knowledge of the mixed dialect of Hakodate more and more useful.

On the 4th we made the whole distance of thirteen *ri* from Kurosawajiri to Morioka, the old capital of Nambu, and now the chief town

of Iwate Ken. Some of the first part of the road was over uplands, but the greater distance on the level plain of the river valley. The land is well cultivated with rice, wheat, beans, etc., and I particularly noticed some large, long carrots. I have seldom seen a finer and better watered valley. The scenery also is very pleasing, and at that particular season, when the autumnal tints of the hardwoods on the lower slopes of the mountains were intermixed with the bright green of the pines, and the mountain tops snow-covered, it was remarkably beautiful.

Several tributary streams coming from the westward join the main river in this part, the most important one being three *ri* six *chô* north of Kurosawajiri. The town of Kōriyama stands partly on a hill which rises in the middle [212] of the valley and abuts on the river. From thence the fine mountain known as Nambu-fuji is constantly in sight for the four *ri* to Morioka, from which it stands in a northwest direction. I was fortunate enough to be able this day to hire a jinrikisha, with which by the aid of occasional walks to keep myself warm, two stout coolies managed very well to get me over the latter twenty-five miles of the road. A large new wooden bridge—lately substituted for a bridge of boats—spans the Kita-kami at Morioka, which is situated on the left bank. A tributary stream meets the main river in the town; it comes from the eastward, and up its valley runs a road to Miyako on the east coast.

Morioka, though large, is a poor looking place. It is said to contain three thousand houses, and 18,000 inhabitants. It is favourably situated, and in a beautiful country. The surrounding hills are cultivated for a considerable distance up their sides. We were lodged at the Honjin or Government hotel.

Leaving Morioka in the morning, we travelled the whole day up the left bank of the Kita-kami, climbing in the first part some rather steep hills, which abut upon the river. We halted at a small place called Shibutami for dinner, right abreast of Nambu-fuji, from which point I was enabled to make a sketch of this fine mountain. Its conical form is tolerably perfect. The lip of the crater is very clearly visible. There is little or no wood except quite near the base, where the sides emerge into gently sloping grass plains, which form a beautiful middle ground in the picture. I should roughly estimate this volcano at over

five thousand feet above its base, which would make it about 7,000 feet over the sea level. Its detached position gives it a very commanding aspect, so much so that next to Fujiyama I think it the finest mountain I have seen in Japan.

The valley of the Kita-kami becomes much more confined above Morioka, and the river itself loses the character of a navigable stream. Its still considerable volume is more or less obstructed by rocks and boulders, and it is [213] confined to a narrow bed. In appearance it is the perfection of a fly fisher's river, but I understood the people to tell me that few or no salmon ascend these upper waters. Its course is pretty direct, and it has numerous small feeders. Before reaching Numakunai what is really its largest branch is crossed coming from the eastward, but the Japanese consider the direct north branch the main river, and so venerate it as the Northern God or Kami. As near as possible to its source they have erected a temple called Mi-dô-kannon, which one passes on the road four or five miles above Numakunai. There are some large cedar trees alongside this temple, but the building seems to be kept in but poor repair. As to the name of this river, the character by which it is now represented in Japanese means, I am informed, "Northern Source," but a Japanese friend of mine has discovered that it was not so written in former times, but then represented "Northern God." Discussions so frequently arise on such points that I have thought it proper to give the authority on which I base the more poetic translation of Kita-kami. Why it should have been considered as a god is, I think, not difficult of explanation, from the fact that in ancient times when the Ainos—now restricted to Yezo and its outlying islands—were in undisturbed possession of this part of the country, they probably venerated it as the source of their principal sustenance, fish; while later the Japanese being dependent on its waters for irrigating their rice fields, and as a highway of transport, would naturally adopt such a superstition. For, as I have said before, this river has a direct course from north to south of at least one hundred geographical miles, exclusive of its windings, along which whole distance its banks are thickly settled by an industrious population. It is probable, however, that the Japanese gradually invaded and settled this valley from the southward, and its source was probably for generations unknown to them. Seeing such a

constant stream of water coming from where they could not tell, it was but natural in a country like Japan, where rivers of large volume are exceptional, that they should venerate this fertilizing source.

[214] The distance between Morioka and Numakunai is  $8\frac{3}{4}$  *ri*; the first part of which after bad weather, such as when I passed, is rather bad travelling, added to the discomfort of which I was unfortunate enough on both stages we made to be accommodated with unusually small and uncomfortable pack saddles. I remarked that in distinction from south of Morioka, the pack horses we met were not bitted, but had simply rope halters; and instead of one man leading each horse, they were allowed to pick their own way, one driver looking after several. The horses, too, were lower and not so leggy as the Sendai animals. When the ground is likely to be pretty soft, the straw shoes which are generally used as protection to the horses' feet, were neglected. Men's straw sandals are cheap enough throughout this country, being usually eight-tenths of a sen to one sen per pair.

The valley is more or less cultivated all the way along. As you approach Numakunai ( $8\frac{3}{4}$  *ri* from Morioka) the hills become moderate, and are mostly bare of wood. This village may be said to be the last in the valley, there being above only a few houses. The name is Aino, or rather said to have been slightly changed from Numakumai. Before reaching this I had not noticed any Aino names, but many places to the northward in Nambu are so named. It is probable that the aborigines held the country which drains towards the north and east until a comparatively recent date. I have since learned that near the main road south of Morioka and between that and Kōriyama, there is a mound in existence, where it is said by Japanese that about twelve hundred years ago Tamura Shōgun, the reigning Mikado's General—and by some said to be his son—heaped up the bodies of all the Ainos killed by his troops in a great battle. The explanation of the name Yezo Mori supports this tradition, "Yezo" meaning Aino, and in the Aino language "Mori" signifying a mound.

There is a feature in the upper part of the valley of the Kita-kami which cannot well be passed unobserved. It is also to be seen in many river valleys on a larger or [215] smaller scale, but is most noticeable in mountainous countries, where the courses of

ivers are short and steep. I refer to *river terraces*, those comparatively horizontal steps which are sometimes on one side and sometimes on the other, and occasionally on both, and which form a series of terraces ascending the valley; frequently varying as to difference of level, but often remarkably regular in their gradations. Many persons are under the impression that these terraces are the remains of former sea beaches; that to have formed them the sea must have covered whole continents, and reached near the tops of high mountains; that the land has either risen out of the sea, or that the sea has receded. It is difficult, however, to accept such explanation. For, if it were the rising of the land, it must be assumed that the land has invariably been elevated evenly, and not on an incline; which is against all modern observations. Neither can they be accounted for on the supposition of depression of the sea, for to form terraces in such marked and regular gradation, sudden depressions and stages of rest should have occurred, which would be difficult to imagine. In the Rocky Mountains these terraces are seen in the river valleys running into the mountains from the prairies at an elevation of four thousand feet above the sea-level, and thence upwards they are remarkable. Similar features occur in many parts of the world, and in Japan they exist in many localities. Now as Japan is a volcanic country and has doubtless been subject to many and frequent changes of features in what are called geological epochs, upheaval and depression by such means are unlikely to have been even, but the chances are in favour of the new form of the surface being more or less contorted or inclined. Consequently it is natural to infer that these *river terraces*, which we now observe with little deviation horizontal, have been formed subsequent to any great disturbances of the earth's crust. Moreover, had the sea formed these beaches and terraces, there would have been numerous marine shells found in them. Instead of which we find them composed of stones, gravel, sand and clay, and of [216] course usually topped with vegetable mould the same as the surrounding country. For the mode of their formation we need not look farther than the nearest muddy gutter after heavy rain, or notice the rills of water streaming off a muddy road after a heavy shower; and compare these features with those on a great scale in the valley of a river. Imagine then the termination of the "Glacial

period"—admitted by all modern geologists—and the enormous amount of water from the melting snow and ice, streaming off the then unclad mountain sides, ripping great rents in them and the lower lands, and washing down an amount of stones and earthy matter sufficient to form beds of great thickness. And thus as the erosion goes on, so are the beds of the rivers, each season, deepening and leaving remains of their flood plains above. In our times, of course, these formations are going on more slowly and by lesser differences of level, but still the beds of rivers in mountainous districts are, where unobstructed by solid rock, generally deepening, and eating their way more and more into the mountain sides. Consequently they leave remains of their flood plains higher and higher above their beds. But to resume the journey.

On the 6th of November we started half an hour or so before day-break. There was a full moon with clear frosty air. Following the north branch of the Kita-kami, here only a small brook, for about three miles we passed a fork of the road which branches off on the right hand to Hachinohe. The hills then become more wooded, till having passed the temple Midō-kannon at the supposed source of the river, we mounted the actual watershed. This position is by barometrical measurements made by Mr. John Blakiston, who was one of Mr. De Long's party in 1871, about 2,000 feet above the sea level. On the top is a rolling grass-covered country, with a few deep valleys cut in it. The actual road is often avoided in favour of drier paths and better travelling, there being in bad weather many sloughs of black mud. Soon after passing a hamlet known as Naka-yama, the road strikes the head of a deep valley with steep sides, down which a stony [217] path leads to another hamlet, five *ri* from Numakunai, called Kotsunaki. Here we changed horses, and continued for the rest of the day down this valley, sometimes having to mount the sides to clear precipitous banks. A mountain torrent gradually widens into a river, which is that which flows into the sea at Hachinohe on the east coast. At first there are few houses and little cultivation, but both increase as the valley is descended, until it is well cultivated and fully peopled. The road is no more than a bridle path in most places, and, where not rocky, was when I passed, deep in mud. I noticed a great many lacquer trees. We took dinner at Ichinohe, a large but poor-looking

village. The road here crosses from the left to the right bank of the river by a bridge. There are some remarkably pretty cascades and rapids, and the river has the most enticing appearance for an angler. Ichinohe is  $8\frac{1}{2}$  ri from Numakunai.

From Ichinohe the road passes over a considerable height to avoid a bend in the valley. The country is of sandstone formation. At Fukuoka, another good-sized village, the valley widens out and is well cultivated with beans, *ara*, some rice and wheat. Thence the road is better to Kinda-ichi, just before which the river is recrossed to the left bank by a pretty good bridge. Kinda-ichi is not much of a place; it is only one ri below Fukuoka, the latter being  $1\frac{1}{2}$  ri from Ichinohe. The picturesque appearance of the river is increased by the sandstone cliffs, there being some very beautiful scenes.

I staid over night at Kinda-ichi and started early in the morning in a cold thick mist which filled the valley, which the road partly follows towards Sannohe, but in two places it ascends the mountains on the left bank, rising to a considerable elevation. The second pass descends at the back of the town to a tributary stream, which comes down a long valley from the westward, a high cedar-covered hill lying between it and the main river. On the right bank of the latter a peaked mountain rises, a very remarkable feature, which may be seen from a long distance north, even from Nohitsze Bay.

[218] At Sannohe, which is a considerable place, we changed horses, and then took the road following the left side of the valley, which runs to Hachinohe, formerly the capital of a small daimiate, situated near the sea at the mouth of the river,  $7\frac{1}{2}$  ri distant in an easterly direction. Our road, however, soon branched off and ascended the mountains to the northward, and thence ran along an elevated wooded ridge, from whence a very extensive view is gained embracing the mountains near Awomori, the whole eastern section of the great gulf known as Awomori Bay, Ando-no-yama mountain on its north side, the Yokohama hills, and the narrow neck of low land intervening between the bay to the eastward of Nohitsze and the Pacific Ocean. All the nearer valleys and ridges run eastward. This mountain path descends into a deep valley at Asamidzu, there crossing a small tributary of the Hachinohe river. Continuing over more ridges, but not nearly so high, we reached

Gonohe in the middle of the day, which is a considerable place for this part of the country, and has a business-like appearance. Goods are transported on pack animals from Hachinohe, distance five *ri*.

From Gonohe a rolling country but little wooded, with villages in the hollows, is passed over. At Fujishima we were ferried over a river running east. Thence a gradually rising plain extends to Sampongi, a place which has some importance as having been selected as the site of a settlement of former Aidzu officials (lately known as Tonami Han) which the Government has established. In one long street there are ninety small houses built for these settlers, and at or about this place there are altogether 800 of such dwellings. To call them houses suited to the rigorous climate of Northern Japan would be an error; as they are but wretched contract shanties, which have probably allowed the contractors and officials to divide a handsome squeeze at the expense of the Government, in the books of which they doubtless figure very large. In fact, as far as I could learn, the Aidzu settlement is something on a par with the doings of the Kaitakushi in Yezo.

In most of the villages of Nambu and Northern Sendai [219] there are stationary ladders erected in the middle of each village as fire outlooks. But I think it was near Gonohe where I noticed one on the top of a hill within sight of the town, which the people informed me had been erected in former times when the inhabitants of the neighbouring province of Tsugaru, and those of Nambu did not live on the best of terms, frequent raids being made by one side into the territory of the other, and *vice versa*. A bell was hung on the top of this ladder, at the sound of which the whole village was aroused. These former feuds are now nearly forgotten, but still the people of these neighbouring provinces are quite distinct from each other. In physical appearance and hardihood, the advantage is on the side of the people of Nambu.

On the 8th of November I travelled 8½ *ri* from Sampongi via Shichinohe to Nohitsze on the shore of Awomori Bay. Very little of this district is under cultivation, it being mostly large stretches of prairies and open rolling country, the roll being heavier as Nohitsze is approached. The season and weather being unfavourable, the mire in the hollows was very deep, so much so that our horses could with difficulty step from one rut into another, dragging their bellies over the intervening ridges. In dry weather, however, the travelling ought to be remarkably good. The



soil is black mould, in most part of considerable thickness, underlying which is a layer of clay, and then volcanic pumice, which in some places comes near the surface.

I passed not far from the Yachigashira Farm, where Messrs. Lucy and McKinnon, in company with two Japanese officials, are raising stock and grain. The first named gentlemen I was fortunate enough to fall in with that evening at Nohitsze, and learnt from him the present state and prospect of the establishment. They own some 200 head of cattle; 50 pigs, 8 brood mares, 1 foreign stallion and 4 foreign bulls. Their isolated situation may be imagined when I say that I was the third white man Mr. Lucy had seen for the last two years.

Nohitsze is favourably situated at the southern extremity [220] of the eastern division of the gulf known as Awomori Bay, and from its position will undoubtedly increase in importance as communication is opened out with the interior and the country becomes more peopled. Indeed it should be the port of supply and export for a large district, but the present imperfect means of transport by pack animals tends to throw most of the trade to the very inferior port Hachinohe. There is a fine situation for a town between a portion of the present one and the bay shore.

Though the direct distance from Nohitsze to Awomori is but 15 geographical miles, the road between these two places is forced by a mass of mountains to make a considerable detour, which increases the distance to 11 *ri*. By sea the distance is still much greater, as a long promontory stretches to the northward forming the two divisions of the gulf. Leaving Nohitsze the road follows the sea shore for a few miles to a cove known as Shiranai. Thence it strikes inland through the town of Ko-minato and crosses the intervening distance westward to Awomori Bay proper, and then turning southerly follows the rocky and picturesque shore to a small place called Nonai, where highlands cease, and a level rice cultivated plain and low shore extend to Awomori.

It being very cold, with snow and sleet driven by a north-west gale, I made the greater part of this my last day on foot. Hitherto I had walked as little as possible except on dry ground, as I had only one pair of thin boots, and had been unable at any place I passed through to purchase any suitable to the rough travelling. My two Japanese companions, unaccustomed to a northern climate, were nearly frozen, and

looked most miserable. They did not reach the end of their journey till long after I was comfortably lodged in the house of an old acquaintance in Awomori.

A description of this place is unnecessary, as it has been visited by many foreigners. There I found Mr. George, Superintendent of the Telegraph Department, who had lately arrived for the purpose of laying out the route for a line to connect Hakodate with the south, and Captain [221] Will was likewise there with the steamer *Seikai-maru*, expecting my arrival, a report of the loss of the *Ariel* having reached Hakodate. I need hardly say that I took the advantage of steam next evening for Hakodate, which is directly 60 sea miles due north of Awomori. The land road from Awomori to Yedo is reckoned at 200 *ri*.

The actual distance travelled by land on this journey, as will be seen by the itinerary attached, was  $144\frac{1}{2}$  *ri*, equivalent to  $352\frac{1}{2}$  English miles; the time taken being 13 days, gives an average of 27 miles per diem, which may be put down at a fair rate of travelling with Japanese pack ponies.

## ITINERARY.

1873.		<i>Ri</i> .	
October 28.	Toyoma .....	} 47	
" "	Taira .....		8
" "	Yotsukura .....		8
" "	Hisa-no-hama .....		1
" 26.	Hirono .....		8
" "	Kido .....		1
" "	Tomioka .....		8
" "	Kumanokawa .....		
" "	Shinzan .....		$3\frac{1}{2}$
" "	Namiye .....		$1\frac{1}{2}$
" 30.	Odaka .....		$2\frac{1}{2}$
" "	Haranomachi .....		$2\frac{1}{2}$
" "	Kashima .....		2
" "	Nakamura .....		8
" "	Komanamine .....		$2\frac{1}{2}$
" 31.	.....		8
" "	Watari.....	5	
" "	Iwanuma.....	$2\frac{1}{2}$	
" "	SENDAI.....	5	

Nov.	1.	Yoshioka .....	5
"	"	Sampongi .....	3
"	"	Furukawa .....	1
"	"	Tsukitate .....	5½
"	"	Sawabe .....	2½
"	"	Ichinoseki .....	4½
"	3.	Midzusawa .....	6½
"	"	Kurosawajiri .....	5
"	4.	Hanamaki .....	8½
"	"	Kōriyama .....	4½
"	"	MORIOKA .....	5
"	5.	[222] Shibutami .....	4½
"	"	Numakunai .....	4½
"	6.	Nakayama .....	8½
"	"	Kotsunagi .....	2
"	"	Ichinohe .....	3
"	"	Fukuoka .....	1½
"	"	Kindaichi .....	1
"	7.	Sannohe .....	3
"	"	Asamidzu .....	8½
"	"	Gonohe .....	1½
"	"	Fujishima .....	2½
"	"	Sampongi .....	1½
"	8.	Shichinohe .....	2½
"	"	Nohitsze .....	5½
"	9.	AWOMORI .....	11

97½

Total ..... 144½ Ri.

## HAS JAPANESE AN AFFINITY WITH ARYAN LANGUAGES.

By W. G. ASTRON, Esq.

[*Read before the Asiatic Society of Japan, on the 17th June, 1874.*]

[223] It has long been fully admitted that the languages constituting the Indo-European or Aryan family are sprung from a common ancestor, and it is even possible by comparing them with each other to arrive at a tolerably definite idea of the principal characteristics of this primitive Aryan speech, and of the state of civilization of the people who used it.

The nation or tribes by whom it was spoken now more than 8000 years ago probably inhabited the table-land which forms part of the modern Persia. They had already acquired not a few of the arts of civilization. They had settled habitations, and even towns and castles, and they possessed the principal domestic animals. They were also workers in several of the metals, and were acquainted with the art of weaving and of brewing a fermented liquor.

Their language had passed the agglutinative stage, and reached that of inflexion. It had declensions of nouns and adjectives, conjugations of verbs, and the grammatical distinction of gender. The distinctions between the parts of speech had become comparatively well defined, and they had a system of numerals extending as far as a hundred.

[224] The question naturally suggests itself whether this primitive Aryan tongue stood alone, wholly isolated from any languages which may at that period have been spoken around it, or whether it was merely one of a group, the members of which were related to each other in a somewhat similar way to that in which the languages of the Aryan

family are now connected. The latter alternative seems in itself the more probable one, and the facts adduced by Mr. Edkins in his suggestive and valuable treatise, "China's placé in Philology," appear to point unmistakably to the conclusion that the ancient Chinese was one of these languages. Have we any grounds for supposing that Japanese, or rather that ancient tongue from which the modern Japanese is descended, occupied a similar position ?

Before adverting to those points of resemblance between Japanese and Aryan languages which lend countenance to this supposition, it may be well to clear the ground a little by indicating in what respects it is evident that little similarity exists. Broadly speaking, the grammatical systems are entirely different. Japanese has no declensions, no conjugations (properly speaking), no grammatical distinctions of gender, number, or person such as all Aryan languages possess or have possessed at some period of their history. The construction and syntax proceed upon wholly different principles. The numerals are different, so are the names of the metals, and altogether the differences in the most important and fundamental respects are so numerous that it is quite plain that no near affinity need be looked for. In other words the point of divergence must be thrown back to a very remote period, and the common ancestor which this theory would give to Japanese and Aryan tongues must have been a language rude and undeveloped to a degree of which it is difficult for us to form an adequate conception. It must have been spoken in a remote antiquity by a tribe of ignorant savages belonging probably to the stone period of the history of our race.

Granting, however, that an affinity does exist such as [225] would be implied by a distant common origin of this kind, where are we to look for it ? Evidently not in the grammatical inflexions and terminations, nor in the construction or syntax, for all these belong to the comparatively later stages of a language's development. Nor is it likely that after a separation of many thousands of years, any considerable part of the vocabulary should be the same. All that we can reasonably expect to find is that a number of the more essential roots in Japanese and in Aryan languages should upon examination appear to be identical, and if this were shown to be the case, enough would have been proved to substantiate the hypothesis above suggested.

The method and conditions of such an inquiry deserve a few words of remark. Some of the principles which should guide it may be stated as follows :—

The oldest words and forms of words attainable should be compared.  
All grammatical additions should be carefully eliminated.

No letter-changes should be considered probable which are not supported by well established analogous cases.

The great desideratum, however, in comparing Japanese with Aryan languages is the discovery of the law or laws which govern the letter-changes which take place, in short of such a law as that discovered by Grimm for the principal branches of the Aryan family. It can hardly be doubted that if any real affinity exists, there will also be some such law by which their relations are governed.

The peculiarities of the languages concerned should not be forgotten. Those of the European languages it is impossible to enumerate here, but it may not be out of place to note briefly a few characteristics of the Japanese language which have a bearing on this question.

*R* is never found at the beginning of a word.

*L* is not a Japanese sound. It is represented by *r*.

*N* is not found at the end of verbal roots.

*M* and *b* are often interchangeable.

*H* and *f* are in Japanese identical.

[226] Every Japanese syllable ends with a vowel.

Double consonants are unknown—at least in the older forms of the language.

*T* becomes *ch* before *i*, and *ts* before *u*.

*D* becomes *j* before *i*, and *dz* before *u*.

Grimm's law divides the languages of the Aryan family into three classes: 1st, Latin, Greek, Sanskrit, etc.: 2nd, Low German, including English: and 3rd, High German. It is a statement of the different forms assumed in these classes of languages by what is substantially the same sound, little or no distinction having probably been recognized in the common original Aryan language. For example, the sound which is aspirated in the first class is the corresponding flat mute in the second, and the corresponding sharp mute in the third. The letters with which Grimm's law is concerned are the sharp mutes *p*, *t*, *k*, the flat mutes

*b, d, g*, and the aspirates *ph* or *f*, *th* and *gh* or *ch*. It will be useful to examine how these letters are represented in the Japanese alphabet. Of the series *p, b, ph* or *f, p* is entirely wanting in the old language and may safely be passed over, and of the other two series the aspirates are absent, so that in each case we have two consonants instead of three viz.: *b* and *f, d* and *t*, and *k* and *g*. It is unnecessary to say that in Japanese these pairs of sounds are represented each by one letter only. The difference in sound was not marked in writing until a comparatively late period, when the diacritic mark known as the *nigori* came into use for this purpose. Even at present the distinction between *k* and *g, t* and *d*, etc., is somewhat hazy in the mouths of Japanese, and it may be assumed that in ancient times it was entirely disregarded. In other words, we may take it that in Japanese *k* and *g, b* and *f* (or *h*) and *t* and *d* are the same letters.

It follows, therefore, that where in European languages we find *p, b, ph* or *f*, Japanese may have either *b* or *f* (practically it is often the corresponding nasal *m* which, as above stated, is in Japanese interchangeable with *b*); where we find *k, g, gh* or *ch*, Japanese may have *k* [227] or *g*, and where we have *t, d* or *th*, Japanese will have *t* or *d* or the letters which replace them before *i* and *u*. Upon the whole, however, Japanese would appear to approach more closely to the sounds of the principal branch of the Aryan family, viz., that represented by Greek, Latin, Sanskrit, etc.

Grimm's law is subject to numerous exceptions. For example in English an *h* is often found, especially at the beginning of a word, where the rule requires an aspirated *k* or *g*, i.e., *ch* or *gh*. Such differences must be allowed for, in comparing with Japanese, languages in which these exceptions are found.

The principles, some of the more important of which have now been briefly indicated, have been to some extent applied in preparing the following list of examples of apparent identity between Japanese and Aryan roots. It is not maintained, however, that these cases of similarity establish conclusively the hypothesis in question. They are rather to be looked upon as so much raw material, the real value of which it is difficult in the present state of our knowledge to determine, and they are given merely for what they are worth. The most that can

be said of them is that they present a plausible *primâ facie* case in favour of the proposition that Japanese is remotely related to Aryan languages.

The following are a few examples out of a much larger number which might have been given:—

Jap. *na*, a name; Sansk. *naman*; Lat. *nomen*; English *name*. The root in all these Aryan forms is *na* or *no*, the rest being a mere termination.

Jap. *mikai*, an old word for great; Greek *μέγα*; Lat. *magnus*; Sansk. *maha*; Engl. *much*; Lowland Scotch *mickle*.

Jap. *taku*, to burn; Sansk. *dah*, to burn; Greek *δαίω*; Lat. *lignum* (properly firewood).

Jap. *tsuku*, to thrust, to stab; Engl. *dagger*.

Jap. *tsuku*, to touch; Engl. *touch*; Lat. *tangere*.

Jap. *tsuku*, build; Greek *τέκτων*, a builder; *τεύχω*, to construct.

Jap. *horu*, *horeru*, to wish, to love; Sansk. *haryâmi*, to love; Greek *χαίρω*; Lat. *gratus*; Germ. *gern*; Engl. *yearn*.

Jap. *öu*, (properly *ofu*) to carry; Lat. *veho*; Sansk. *vah*, to carry; Greek *ἔχω*, to hold, to sustain, *ὄχος* a carriage; Engl. *waggon*.

Jap. *wataru*, to cross (especially a river); Lat. *vado*; Engl. *wade*.

Jap. *omo*, an old word for 'mother' connected with *umu*, 'to bring forth;' Engl. *mother*; Lat. *mater*; Greek *μήτηρ*. In all these words we have a root *ma*, *mo* or *me*, meaning to bring forth; the second syllable being merely a termination.

Jap. *köri*, ice; Lat. *gelu*.

Jap. *muta*, with, along with; Gr. *μετά*; Ger. *mit*.

Jap. *tsumu*, to pile up; Lat. *tumulus*, a heap.

Jap. *kake*, a barn-door fowl; English, *cock*, *chicken*.

Jap. *moru*, to divide; Gr. *μέρομαι*, to divide, *μέρος*, a part; perhaps Lat. *pars*.

Jap. *töru*, to pass through, *törite*, thoroughly; Sansk. *tar*, to cross over, to go beyond; Lat. *trans*, beyond; Engl. *through thorough*; Ger. *durch*.

Jap. *taberu*, to eat; Gr. *δάπτω*, *δειπνον*; Lat. *dapes*.

Jap. *tomeru*, to stop, Engl. *dam*.

Jap. *toku*, to melt; Engl. *thaw*; Gr. *τήκω*.



In the following cases a Japanese *k* is represented by *h* in English.

- Jap. *keru*, to kick; Lat. *calx* the heel, *calcare* to kick; Eng. *heel*.  
 Jap. *kara*, empty, a husk; Gr. *κοιλος*; *hole*, *hollow*, *hull*.  
 Jap. *kumi*, a collection, *kumu*, to gather; Lat. *cumulus* (compare above *tsumu* and *tumulus*); Eng. *heap*. As above stated, *p* is not a Japanese letter and *m* is usually found instead.  
 Jap. *koro*, time; Sansk. *kala*, time; Gr. *καιρός*, time; Eng. *while*.  
 Jap. *kōbe* (for *kamihe*), the head; Gr. *κεφαλή*; Lat. *caput*; Ger. *haupt*; Eng. *head*.  
 [229] Jap. *kuruma*, a wheel, *guruguru*, in a circle; Gr. *γυρός*, a circle; Lat. *gyrus*; Eng. *wheel*.  
 Jap. *kakusu* to hide, *kage*, a shadow, concealment, shelter; Lat. *cæcus*, blind; Dutch, *hoek*, a corner.  
 Jap. *kobu*, a wen; Eng. *hump*; Gr. *κυφός*.  
 Jap. *kubo*, hollow; Latin *cavus*.  
 Jap. *kasumi*, a mist; Eng. *haze*.  
 Jap. *kata*, hard; Eng. *hard*.  
 Jap. *kaji*, a hook; Eng. *hook*.  
 Jap. *kakeru*, to hang; Eng. *hang*.  
 Jap. *kiku*, to hear; Eng. *hark*.

The Japanese *m* is usually *b* or *p* in European languages as:

- Jap. *maru*, a ball; Eng. *ball*.  
 Jap. *moto*, bottom; Eng. *bottom*.  
 Jap. *makeru*, to be beaten, *magaru*, to be bent, *makaru*, to retire; Eng. *bow*; Ger. *beugen*; Lat. *fugio*; Gr. *φεύγω*.  
 Jap. *mina*, all; Gr. *πᾶν*.  
 Jap. *muchi*, a whip, *butsu*, to beat; Eng. *beat*.

*N* is the negative sound in Japanese as well as in European languages. It appears in *ina*, no, *inamu*, to refuse, *naki*, not, the *na* of the neg. imperative, etc. The use of *n* for negatives in European languages is too well known to require illustration.

There is no more essential part of a language than its system of pronouns, and it is therefore important to see if any resemblances can be traced in these parts of speech in Japanese and the Aryan languages. The following considerations seem to indicate a possible connection. Taking the oldest forms of the Japanese personal pronouns and stripping

them of terminations, we have for the first personal pronoun *a*, for the second *na*, and for the third *ka*. There is no difficulty in supposing *a* to be identical with the Sanskrit *aham*, Gr. ἐγώ, Lat. *ego*, Ger. *ich* and the Engl. *I*. The final guttural which is found in all these languages except English may easily have been lost in Japanese as it has been in English. There are numerous other cases in which gutturals are lost in Japanese, as for [230] instance the *k* of adjectival terminations and *g* in such forms as *sawaide* for *sawagite*, and if we accept Bopp's opinion that the root of the first personal pronoun in the Aryan languages is *a*, the guttural being an addition of the nature of a demonstrative, it is not even necessary to have recourse to this supposition.

*Na*, the pronoun of the second person, presents greater difficulties. *N* is, however, the nasal of *t*, and as seen above, the Japanese language often prefers the nasal in the case of *n* which is found instead of *b*. It is also well known that in the Yedo dialect at least, a nasal *g* has taken the place of the ordinary *g* hard. The same tendency would substitute *n* for *t*, and it is perhaps to this that such forms as *nameru* for *taberu*, to eat, are due. It also seems likely that *nani*, what, and *tare*, who, contain the same root. If this view is correct, *na* is identical with the Sanskrit *tuam* (stem *tua*), the Lat. *tu*, the Greek τὺ, or σὺ and the English *thou*.

The third personal pronoun *ka* is perhaps the Gr. ἐκεῖνος, the initial *ε* of which is a mere prefix, as may be seen by comparing its dialectical forms.

The Japanese reflexive pronoun *shi* may be compared with the Latin *se*, Engl *self*, Ger. *sich*.

The root *so* or *sa* which appears in *sore*, *sono*, *soko*, *saru* (for *sa aru*) may be identical with the English definite article, which in its old form was a demonstrative pronoun with the same meaning as *sono* and had separate forms for the three genders, viz., masc. *se*, fem. *seo*, neut. *thæt*, our modern article being a modified form of the last. What strengthens this supposition is the circumstance that just as from *so* as a stem are formed a number of adverbs as *soko*, *sochi*, *sasuga*, the English *the* serves as a stem from which are derived the adverbs *there*, *thither*, *thence*, *thus*.

By a similar analogy the root *ko*, 'this', may be the same as the

English pronoun *he* (as seen above a *k* in Japanese at the beginning of a word is commonly *h* in English) and its derivatives *koko*, *kochi*, will correspond to the English words *here*, *hither*.

[231] It is evident that this paper covers but a very small portion of the field of inquiry. Some of the branches of the Aryan family of which no mention has been made, as for instance Russian, may present much closer analogies than any which have been adduced, and no reference has been made to resemblances in points of grammar, which are not entirely wanting and deserve to be investigated. Nor has the subject of the Turanian languages cognate to Japanese been taken up. Such languages might be expected to aid the inquiry by furnishing intermediate forms which would assist in identifying roots apparently different and in many other ways. The difficulty, however, is to find a cognate language with a sufficient resemblance to Japanese for this purpose. In so far as I am aware, Japanese has no near relation among the other languages of Asia, and it has certainly none whose relationship has been clearly established. There seems to be no such close affinity between the branches of the Turanian family as there is between the members of the Aryan family of languages, and it is doubtful whether any other language of Asia resembles Japanese as closely as the most widely separated branches of the Aryan family resemble each other. There are several which present striking analogies with it in point of construction and grammar, but when we come to the vocabulary, but little resemblance can be traced. The Aino language is perhaps the most promising in this respect, but hardly enough is known of it to enable one to speak with confidence.

ON THE INCREASE OF THE FLORA OF JAPAN.

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BY DR. SAVATIER.

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[*Read before the Asiatic Society of Japan, on the 17th June, 1874.*]

[232] The *flora* of Japan has been enriched of late years by a considerable number of species, and it may be hoped that, at an early future, it will yield to that of no other country of equal area and analogous climatic conditions.

This rapid increase is due not only to the researches of European travellers, who have explored the coasts at rare intervals and penetrated more or less into the interior of the country, but also to the persevering investigations of Japanese botanists, who pursue the science with ardour, and have a far larger acquaintance with the vegetation of their country than is generally supposed in Europe. In proof of this I need only adduce the existence of their rich herbaries, and their innumerable collections of illustrations, where are exhibited, often in great perfection and with excellent regard to anatomical floral details, almost all the Japanese species diffused among our own herbaries, together with many others still unknown to us.

It may be said that the flora of Japan has been better illustrated than that of many States in Europe. Doubtless all the illustrated works have not the same value, but it would be but a hasty judgment to conclude after an inspection of the book *Kuwa wi*, published 150 years [233] ago, that these works can have no interest for the European student of botany. Inuma, in writing the *Só moku Dzusetsu*, proved incontestably that he understood the use of the magnifier and the scalpel, in contradiction to the malevolent assertions contained in an article published by the *Association Scientifique*, (*Bulletin Heb-*

*domadaire* 1878, p. 229). The anonymous author of, this article has long ago received interesting botanical collections from Japan, with figures of plants, drawn by native artists, with enlarged anatomical details. There is still much to be gained from these works by those who desire to study thoroughly the *flora* of Japan.

Thunberg, in his *Flora*, does not mention much more than 1,050 species of phanerogamous and cryptogamous plants, if the species called in to do double duty are subtracted. Until the researches of Siebold and Bürger, our knowledge of Japanese plants remained stationary, and it is only since 1848, the date at which Zuccarini studied, and published an account of, the plants collected by the Dutch botanists, that rapid steps were made in the progressive enumeration of them.

First, there were (in 1855) the American researches under Perry and John Rodgers, which furnished a considerable amount of materials chiefly drawn from the island of Yezo, the vegetation of which was thus for the first time made known with something like completeness. The botanical collections made in Japan were published almost immediately after this by Mr. Asa Gray.

A few years later Sir William Hooker gave, in the work of Mr. Pemberton Hodgson on Japan, a list of 1700 phanerogamic and cryptogamic species, compiled from the descriptions of herbaries collected by Messrs. Alcock, Hodgson, Wilford and Oldham.

The publications of Mr. Asa Gray and of Sir Wm. Hooker at last decided the Dutch botanists to unite in a work upon the rich materials which their herbaries embraced, and M. Miquel, whose recent loss science now deploras, produced successively in the *Annals of the Leyden Museum* his *Prolusio Flcra Japonicæ*: next, [284] his valuable reflections on *Geographical Botany* (1867-1868); and, lastly, his catalogue of Japanese plants collected in the herbary of Leyden (1870). The number of species enumerated in the latter work is less than that in the table which concludes the *Prolusio*, because the author was confined within the limits of the herbary, while, in the table of the *Prolusio*, he registered, to the number of 2,000, all the species the descriptions of which were known to him.

While Miquel was thus acquainting the world with the botanical wealth accumulated in the Dutch museums, M. Maximowicz, who

traversed Japan from 1861-1864, and formed collections larger by themselves than those of all his predecessors united, M. Maximowicz, I repeat, commenced to describe in the *Mélanges Biologiques*, and in the *Mémoires de L'Académie des Sciences de St. Pétersbourg*, all the novelties found by him, and which now amount to one hundred and fifty species. If, to this figure, the product of my own researches during a stay in Japan of upwards of seven years be added, it will easily be understood that the publication of a new catalogue of plants will not be useless, although the date of that of Miquel would only be four years anterior to it.

This new exposition of the wealth of the *flora* of Japan is now in course of publication, and I beg to offer you in advance a communication upon the novelties which it will contain.

I shall say nothing of the species mentioned in the first part of this work which appeared some months back ; but shall limit myself to give the species which my later acquaintance with them prevented my including at that time.

I shall make this enumeration in the order of the families as it is given in the *Genera Plantarum* of Bentham and Hooker, and which we have adopted in our *Enumeratio plantarum in Japoniâ crescentium*.

*Ranunculaceæ*. To the species already named by us, I can now add,—

*Thalictrum majus*, Jacq.—; *Atragene macrosepala*, [235] Led., known only in Siberia, and which I have found in the Nikkô chain ;—*Clematis fusca*, var. *Mandshurica*, Regel, from Hakodate, vaguely given by Miquel ;—*Ranunculus repens*, L., an exclusively northern plant ; lastly, another *Ranunculus*, gathered in the streets of Yedo, which must be placed near the *R. Sieboldii*.

*Berberideæ*.—*Berberis vulgaris*, L., from Nikkô which only differs from the European in having single instead of tripartite thorns.

*Fumariaceæ*.—*Corydalis raddeana*, Regel, a Siberian species which I gathered at Nikkô.

*Violariæ*.—*Viola variegata*, Fisch., a species remarkable for its venation tinged with white. I owe this plant to my friend, Mr. C. Kramer, who found it in the province of Kô-shiu.

*Geraniaceæ*. In the *Enumeratio*, we have only given three species

as belonging to the genus *Geranium*; I now know five others: *Ger. pseudo-sibiricum*, Mey., from Nikkô;—*Ger. Wlassovianum*, Fisch., from Hakodate;—*Ger. species nova*, like the *Ger. Wlassovianum*, and possessing like it united stipules (*stipules connés*) found in Shimôsa, by Mr. Kramer; *Ger. dahuricum*, Dc., from Hakodate, easily recognized by its grumous root; *Ger. robertianum*, L., a single specimen of which I found in 1871 in the mountains of Hakone. Lastly, I will mention the *Ger. pusillum*, doubtless imported from Europe, which I found in my garden. The *Impatiens parviflora* was given to me by Mr. Kramer without any indication of locality; this species is to be found depicted in the *Sô-moku*, Vol. 17, p. 69

*Ilicineæ*. I gathered at Nikkô the *Ilex rugosa*, Sieb., vaguely indicated in Japan, observed in the Island of Sagalien, and well delineated by Mr. Schmidt.

*Leguminosæ*. This family has increased in an important degree since the publication of Miquel's catalogue. The novelties are noted, in part, in our *Enumeratio*; since which M. Maximowicz has made others known in his 14th chapter.

[286] *Rosaceæ*.—*Spiræa salicifolia*, from the Nikkô hills, mentioned with doubt by Miquel.

*Hamamelideæ*.—*Hamamelis virginica*, L., from Nikkô. It is easily distinguished from the *H. japonica* by its leaves, which are covered underneath with black marks. The existence of this species in Japan constitutes another link between its *flora* and that of the north-west of America.

*Umbelliferaæ*.—This family is richly represented in Japan; the *Enumeratio* embraces a certain number of new species, partly due to the researches of M. Maximowicz. Since the publication of our work, this learned Russian botanist has described the new species *Angetica*, and I have myself gathered several of them, probably unnamed, but which it is difficult to characterize with certainty in the absence of the ripe fruit.

*Araliaceæ*.—*Acanthopanax sciadophylloides*, Franchet and Savatier; from Nikkô; remarkable for its small long petiolated leaflets; *A. asperata*, Fr. and Sav., from Hakodate, with leaves harsh to the touch, but with the fruit of which I have not yet been made acquainted.

*Caprifoliaceæ*—*Viburnum lantana*, L., from Hakodate, a variety with more rounded leaves than the European plant.

*Rubiaceæ*. The Japanese examples of the genus *Galium* have been enumerated by M. Maximowicz in his sixteenth chapter. I can now add to these two species: *Gal. pogonanthum*, Fr. and Sav.; and *Gal. stellarioides*, Fr. and Sav.; a relation, though very distinct, of the *G. ovatum*. The typical form of the *Gal. boreale* grows at Hakodate.

*Compositæ*. This great family has been considerably augmented since the publication of Miquel. I shall only cite the kinds unnamed up to this date. *Aster leiophyllus*, Fr. and Sav.; *Aster dimorphophyllus*, Fr. and Sav., from Hakone. *Stenactis annua*, Dc. and *St. ambigua*, Fr. and Sav., from the Nikkô hills. *Dichrocephala latifolia*, Fr. and Sav.; *Carpesium triste*, Max., from Nikkô; [287] *C. glossophyllum*, Max., from Yokosuka, unpublished species which I also found, and the names of which were obligingly communicated to me in anticipation by M. Maximowicz; *Arnica alpina*, Dc., a remarkable species, indigenous in the Arctic region and which probably attains in the Nikkô hills its southermost *habitat*, the altitude compensating for the latitude. I have received from Mr. Tanaka, without indication of locality, but with no doubt of their Japanese origin: *Senecio* (*Senecillis*) *Schmidtii*, Max., and another very curious *Senecio* of the group *Cacalia*, which we have named *S. Tanakæ*, Fr. and Sav., I may also mention, *Senecio obtusata*, Fr. and Sav., from Yokosuka; *Senecio* (*cacalia*) *adenostyloides*, Fr. and Sav., from Fujiyama; *Senecio* (*cacalia*) *davuricus*, Schultz, the old *Cacalia auriculata*, Dc., which M. Maximowicz has frequently observed in the environs of Hakodate.

Miquel only knew three *Saussureæ*, including among these his *Aplotaxis multicaulis* which should be called *Saussurea Bungei*; we enumerate eleven species: *S. Bungei*; *S. nipponica*, Miq.; *S. nikoensis*, Fr. Sav.; *S. Riederi*, herd; *S. Krameri*, Fr. Sav.; *S. gracilis*, Max.; *S. ussuriensis*, Max.; *S. Maximowiczii*, Max.; *S. triptera*, Max.; *S. Tanakæ*, Fr. and Sav.; *S. japonica*, Dc. We owe the knowledge of several of these species to M. Maximowicz. The same botanist has collected in Japan fourteen species of *Circium*; we cite only seven, including a new one; *C. suffultum*, Max.



In the Nikkô hills we have also found a magnificent *Rhaponticum*, *Rh. pungens*, the bearing and figure of which is that of the *Rh. atriplicifolium*, but which is easily distinguished from it by its lanceolated involucre and piercing scales.

Among the *Chicoraceæ* I may cite three singular species which hold, so to speak, a middle place between the *Ixeris* and the *Nabalus*. I shall here call them provisionally, *Nabalus spathulatus*; *N. Krameri*; *N. Tanakæ*, Fr. and Sav., I owe these three plants to Mr. Tanaka.

*Campanulacæ*—*Adenophora Nikkoensis*, Fr. and Sav., a [288] curious species, resembling a reduced *Platycodon grandiflorum*.

*Ericaceæ*. *Monotropa japonica*, Fr. and Sav., a poor species with velvety bell-shaped flowers, and with long pedicules: can this be the *M. hypopithys*, variety *hirsuta*, cited by M. Maximowicz as from the Nikkô hills?

*Primulacæ*. *Lysimachia vulgaris*, L. *forma typica*, grows in the environs of Hakodate. The *Lysimachia davurica*, sufficiently common in the north of Japan, is probably a simply variety of this plant.

*Oleaceæ*. *Linociera japonica*, Fr. and Sav., which seems sufficiently distinct from the American varieties.

*Gentianacæ*. *Gentiana brevidens*, Fr. and Sav. from Nikkô. *G. Nikkoensis*, Fr. and Sav., also from the Nikkô hills, where it grows at a great altitude. It is a charming species with greenish leaves, found by Mr. Kramer, and might easily be mistaken for the *G. decumbens*, if the lower part of the stem were not completely bare of root fibres. It must be placed by the side of the *G. pneumonantha*, and *G. triflora*.

*Asclepiadacæ*. The genus *Vincetoxicum* already represented by six species, according to Miquel, must be increased by two new ones. *V. Brandtii* and *V. Vernyi*, Fr. and Sav., both received from Mr. Tanaka.

*Convolvulacæ*. *Cuscuta Vernyi*. Fr. and Sav. a species with large flowers, a parasite of the *vitex unifoliata*, in the sand of Kamakura,—*cuscuta minor*. L.

*Borraginacæ*. In his eleventh chapter, M. Maximowicz expresses his surprise that neither in Japan, nor in the neighbouring countries, the *Fichinospermum lapula*, L. has been found. This gap is now filled, as I have received the plant from Hakodate. The *Cynoglossum micranthum* the existence of which in Japan, although mentioned by Miquel,

has seemed doubtful to Maximowicz, certainly grows in the province of Kô-shiu, where it was found by Mr. Kramer, and in the Nikkô hills, where I also found some specimens of it.

*Scrophularineæ.* I may cite as belonging to Japan, in this family, a *Dopatrium*, closely connected with the *Junceum*, [289] of which, perhaps, it is only a variety; we have called it *D. japonicum*, Fr. and Sav.;—The *Ilysanthes saginoides*, Fr. and Sav., a small species from Nikkô, having the appearance of a *Sagina*, and very different on this account from other species of the same genus :—The *Veronica Yedoensis*, Fr. and Sav., which must be placed by the side of the *V. acinifolia*.

*Labiatae.* *Plectranthus caudatus*, Fr. and Sav., remarkable for the long point which terminates its leaves, generally deeply indented at the stop. *Scutellaria parvula*, Mich., which presents itself in Japan in forms which it is difficult to consider otherwise than as distinct species. *Satureia japonica*, Fr. and Sav., received from Mr. Tanaka, under the name of *Arita Sô*.

In the Nikkô hills I have also had the satisfaction of gathering the beautiful *Nepeta Macrantha*, Fish., known only in Siberia. I have also received from Yedo a small species of *Salvia*, the exact source of which it would be interesting to ascertain. It is perfectly delineated in the *Sô-moku*, Vol. I., p. 80. We have called it the *Salvia Yedoensis*, Fr. and Sav.

*Polygoneæ.* *Polygonum propinquum*, Led., *P. Maakianum*, Regel, from Nikkô; this is the species named later by Meisner, *P. hastato-trilobum*. *P. humile*, Meisn., common in the Hakone chain.

*Aristolochiaceæ.* I can mention the existence, in the neighbourhood of Yokosuka, of the *Asarum albivenium*, Regel, the native place of which was unknown to M. Maximowicz.

*Euphorbiaceæ.* *Euphorbia Onœi*, Fr. and Sav., which is allied to the *E. Pekinensis*, and the *E. Rochebruni*, Fr. and Sav., recalling sufficiently the *E. Jolkini*.

*Urticaceæ.* I have received interesting species belonging to this family from Mr. Tanaka, not yet made known in Japan. *Memorialis hirta*, Wedd.; *Pilea strangulata*, F. and Sav., curious from its articulated stalk; it is well delineated in the *Sô-moku*, vol. 20, fol. 15. I gathered

at Yokohama the *Pellionia densiflora*, Fr. and Sav., and, in the Hakone hills, another species also belonging [240] to this genus, *Pellionia involucrata*, Fr. and Sav.

*Salicineæ*. The willows, as is known, constitute a genus the species of which it is often very difficult to distinguish, whether by reason of this affinity, or on account of their diœcian state, and the non-contemporaneity in the development of their organs. I think I may cite as new for Japan, the *Salix brachyitachys*, Benth. With regard to the *Salix purpurea*, which, Miquel says, has not been found since Thunberg's time, it is not uncommon at Yokosuka and in the province of Sagami.

*Hydrocharideæ*. I have received from Mr. Tanaka a beautiful specimen of the *Vallisneria spiralis*, L. It would be interesting to know the place where it was found.

*Smilacineæ*. I found at Nikkô a *Disporum* in fruit, the *D. Nikkoense*, Fr. and Sav., which seems sufficiently distinct from all the known species: The *Hekorima condida*, Kunth., has been found in fruit, by Mr. Kramer, in the Nikkô hills. I will also mention the *Smilax trinervula*, Miq., unknown to M. Maximowicz; the *Polygonatum pubescens*, Pursh., grows in the woods around Yokosuka.

*Orchideæ*. This beautiful family, which is represented in Japan by genera belonging to the most different latitudes, has lately been increased by some very interesting species. *Gymnadenia longebracteata*, Fr. and Sav., received from Mr. Itô Keisuke; *Habenaria Florenti*, Fr. and Sav., from the Hakone hills; *H. Nikkoensis*, Fr. and Sav., from Nikkô; *Platnothera chlorantha*, Fish., from Hakodate; *Perularia fuscescens*, Lindl., also from Hakodate, a rare species, only known in Siberia; *Liparis plicata*, Fr. and Sav.; *Liparis Krameri*, Fr. and Sav., from the province of Higo, and two other species of this genus not yet named. I owe all these to the courtesy of Mr. Kramer.

*Junceæ*. *Juncus Japonicus*, Fr. and Sav. from the Hakone hills and the environs of Yokosuka, a plant nearly allied to the *J. Cespiticius*.

*Cyperaceæ*. I was much surprised to find in the rice fields of Yokosuka, the *Cyperas Monti* L., common in central Europe, but not found beyond the Caucasus. The Japanese plant is somewhat more meagre, its capitules less furnished [241] than those of the

European plant, but here the differences end. The *Cyprus truncatus*, Turc., is not uncommon at Yokosuka, and is found in two forms, one attaining a height of about 40 centimetres. I may also mention the *Cyp. compressus*, L.; *Cyp. paniciformis*, Fr. and Sav., from the rice fields of Yokosuka, very remarkable for the irregular disposition of its spikelets: *Eleocharis bicolor*, Fr. and Sav., the scales of which are red or white as they occupy the base or the summit of the ear. *El. Onoi*, Fr. and Sav.; *Scirpus Badius*, Presh. *Sc. juncoides*, Nees. *Sc. javanus*, Nees; *Sc. Pollichii*, G. and God.; *Sc. striatulus*, Fr. and Sav. All these species grow in the environs of Yokosuka with the exception of the *Scirpus juncoides*, found at Hakone and Nikkô. Among the *Fimbristylis*, I will mention the *F. tenuissima*, Stend, and the *F. Autumnalis*, Ræm. and Schlt., the specific identity of which is not certain, but which do not the less constitute two new types for Japan. Miquel only knew the *Scleria japonica*, Stend, which I have not been able to re-find, but I have received from Mr. Ono two other very different species of the *Scl. japonica*, and differing equally the one from the other. These are *Scl. Onoi* and *Scl. fenestrata*, Fr. and Sav.

In the list of plants which concludes the *Prolusio*, Miquel enumerates 56 species of *Carex* in Japan. I do not fear to state that this figure will be doubled at a not very distant period: indeed, I can now add seventeen species to the number. *Carex argyrolepis*, sp. nov.; *C. Hakonensis*, sp. nov.; *C. ornithopoda*, Mey. var. *japonica*. *C. cryptandra*, sp. nov.; *C. Nikkoensis*, sp. nov.; *C. Vulgaris*, Fries., from which the *C. Thunbergii* hardly differs; *C. fibrillosa*, sp. nov.; *C. lupulina*, Mühl.; *C. planata*, sp. nov.; *C. crinita*, Lamk.; *C. lagopodioides*, sp. nov.; *C. polyantha*, sp. nov.; *C. leucorhyncha*, sp. nov.; *C. nutans*, Host., very common in Yokosuka. Japan now reckons 78 species of the *Carex*!

*Gramineæ*. The explorers of Japan are called on to enlarge this family considerably. For my own part I have but a small number of species to add to those already [242] known. *Leersia oryzoides*, L.; *Phleum asperum* var. *annuum*, C. Koch. a species only known in the Caucasus; *Calamagrostis epigeios*, L.; *C. Nipponica*, sp. nov.; *C. Hakonensis*, sp. nov.; *Dactylis glomerata*, L.; *Setaria viridis*, L.; *Setaria pachystachys*, sp. nov.; two new *Andropogon*, not yet named.

*Lycopodiaceæ*. *Lycopodium Complanatum*, var. *Chamæcyparissus*,

Al. Br. from the Nikkô hills: *Selaginella Kraussina*, Kunz., of which the *S. Nipponica*, Miq., is probably a synonym. The Japanese specimens are exactly like those which I have gathered at Madeira and at the Cape of Good Hope.

*Filices.* I have gathered a certain number of species new for Japan, but the analysis of them is not yet completely finished. I will only mention a *Craspedaria*, the *Cænopteris odontites*, the *Woodsia Mandshuriensis*, and an *Ophioglossum* closely allied to the *O. oratum*, Bory., if not identical with it.

This long enumeration will give an idea of the number of new plants, interesting to geographical botany in general, and to that of Japan in particular, which might be collected in the course of more sustained and profound researches than it has been possible for me to make.

The relations existing between the *flora* of Japan and that of Eastern Asia on the one side, and that of the western region of North America on the other side, have already been observed. The known species which I have enumerated confirm the conclusions drawn from previous observations, and if Siberia can claim as indigenous the *Atragene macrosepala*, *Clematis fusca*, *Corydalis raddeana*, *Viola variegata*, *Geranium pseudo-sibiricum*, *G. Wlassowianum*, *G. dahuricum*, *Senecio davuricus*, *Saussurea Ussuriensis*, *Nepeta macrantha*, *Perularia fuscescens*, *Cyperus truncatus*, *Woodsia Mandshuriensis*, Northern America has hitherto enjoyed exclusive possession of the *Polygonum pubescens*, *Carex lupulina*, *Carex crinita*, *C. lagopodioides*, *Hamamelis virginica*, *Stenactis ambigua*.

Europe also brings its modest contingent with the *Cyperus*, [248] *Monti*, *Scirpus Pollichii*, *Carex nutans*; the northern region with the *Ranunculus reptans*, *Arnica alpina*; the subtropical region with the *Liparis*, the *Dopatrium*, the *Scirpus Badius*, *Scirpus juncoides*, *Scirpus javanus*, &c. A certain number of species, therefore, are common to the temperate regions of Europe, Asia and America, such as the *Berberis vulgaris*, the *Viburnum lantana*, *Lysimachia vulgaris*, *Echinosperrum lappula*. *Platanthera chlorantha*, *Carex vulgaris*, *Leersia oryzoides*, *Calamagrostis epigeios*, *Lycopodium complanatum*.

Miquel has said that about one-half of the *flora* of Japan is

indigenous, and the list which I have just given entirely confirms this remark, as out of 129 plants specifically determined 68 are proper to Japan, though it is probable that this proportion will be diminished when the coasts of Northern China, Corea and Manchuria are better known.

I here conclude this over lengthy communication. All the new species here mentioned will be described in the *Enumeratio plantarum in Japoniâ crescentium*, the first volume of which, embracing all the dicotyledonous plants, must be published by this time.

SAVATIER, M.D.

Yokosuka, 10th May, 1874.

METEOROLOGICAL TABLES.

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FROM OBSERVATIONS MADE IN YOKOHAMA FROM 1863 TO 1869  
INCLUSIVE.

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BY J. C. HEPBURN, M. D.

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[*Read before the Asiatic Society of Japan on the 17th June, 1874.*]

[244] The city of Yokohama is situated in Lat.  $35^{\circ} 26'$  N. and Long.  $139^{\circ} 39'$  East from Greenwich. It lies on the west side of the bay of Yedo; about 87 miles from Cape King, the nearest point on the Pacific, and about twenty miles from Yedo, which is at the head of the bay. The bay at Yokohama is about twelve miles wide. The city is, for the most part, built upon a plain, about from two to 10 feet above high water mark, at the mouth of a valley opening on the bay. The valley is about a mile wide, and extends back in a westerly direction some three miles, gradually narrowing to a quarter of a mile. It is bounded on each side by a low range of hills about 120 feet high. It is cultivated in paddy fields, is consequently wet and marshy; and is exposed to the sweep of N. E. and Easterly winds from across the bay, and to S. W. and Westerly winds through the valley.

The climate of the Japan Islands generally is much influenced by their position, being on the edge of, and even within, the great ocean current called *Kuro-shiwo*, which flows from the equatorial regions in a northerly and easterly direction.

[245] The N.E. and S.W monsoons, which blow with so much regularity on the coast of China, are not much felt on the coast of Japan, the winds being at all seasons exceedingly irregular, frequently

MONTHLY AND YEARLY AVERAGE OF THE THERMOMETER.





violent and subject to sudden changes. The N.E. and Easterly winds are generally accompanied with rain, with a high and falling barometer, and are usually not violent. The S.W. and Westerly winds are generally high, often violent, and accompanied with a low barometer. It is from the S.W. that the cyclones almost invariably come, with one and sometimes two of which we are visited yearly. On clear and pleasant days, which are in excess of all others, there is a regular land and sea breeze at all seasons.

As may be seen from the Table, the rainfall is above the average of most countries; varying much, however, from one year to another. About two-thirds of the rain falls during the six months from April to October.

The steady hot weather, when it is considered safe to change to light summer clothing, does not generally set in before the latter decade of June or first of July, and ends, often very abruptly, about the middle of September.

The snow-fall is for the most part very light, not often exceeding two or three inches; though on one occasion, in the winter of 1861, it fell to a depth of twenty inches.

The ice seldom exceeds one inch or an inch and a half in thickness. Fogs are rarely noticed, so also is hail. Thunder storms are neither frequent nor severe. Earthquake shocks are frequent, averaging more than one a month; but hitherto, since the residence of foreigners in Yokohama, no very severe or dangerous shocks have occurred.

## ASIATIC SOCIETY OF JAPAN.

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[246] Regular Meeting of the Society was held on the 17th of June, at 8.30 P.M., the President in the Chair. After the passing of the minutes the names of the following new members were announced: Dr. S. Wells Williams (Honorary) and Mr. W. F. S. Mayers, of Peking; Dr. Thos. Antisell, Captain Léon Descharmes, Professor W. E. Grigsby, Dr. D. B. McCartee, Mr. Benj. Smith Lyman and Baron D'Anethan, of Yedo; Rev. E. B. Miller and Messrs. John Carey Hall, John Rickett, Jr., N. J. Stone and E. De San. The following donations were announced: from C. G. Wilson, Esq., a specimen of Petrefaction from the Great Salt Mines of Cracow; from E. M. Satow, Esq., a copy of his Japanese Chronological Tables.

Mr. Aston read his paper on the question "Has Japanese any Affinity with Aryan Languages?"

The President returned the thanks of the Society to Mr. Aston for his suggestive paper, and remarked that he had not given any special attention to the philology of the Japanese language, but from his general knowledge of the subject, he was of the opinion it belonged to the so-called Turanian family. He thought that the occasional resemblances to be traced between the words of different languages were not to be regarded as evidence of their affiliation; he considered resemblance in grammatical structure as a much surer evidence from which to infer such a relation. He knew a gentleman, a very good Japanese and Hebrew scholar, who had been led, from the frequent resemblances he found between Japanese and Hebrew words, to think that these languages might belong to the same family. No philologist as yet, however, regarded them as having this relationship.

Mr. Goodwin, when tendering his thanks to Mr. Aston for the attempt to throw some light upon the linguistic affinities of the mysterious Japanese language, professed himself unconvinced that a relation had been shown between it and the language of the Aryan family. The fact of apparently identical roots existing in different languages was not sufficient to prove a close connexion. Probably all the languages in the world could be shown on examination to have some common roots. If this proved anything it would only be that all the nations

of the earth were parts of one great family. But it was necessary to consider not only the apparent resemblances, but the differences which existed, in structure and organization and development, and it was admitted that the Japanese in its grammatical character differed as far as possible from the languages of Aryan stock. In tracing the affinities of the Japanese, the first step would be to find out those languages with which it had really some community in structure, and thus to bridge over the immense gap by which, as we see it at present, it appears to be divided from the Aryan and other families. A similar attempt had been made by Mr. Edkins to establish a connexion between the Chinese, and the Aryan and Semitic families. Although a great many of the instances of common [247] roots produced by him were transparently illusory, still there seemed a grain of truth in his contention. But it went no further than to show that possibly all languages have begun with a common vocabulary, all languages have some common features, as all men have the organs common to the human family. The question is how far, and at what period, such have diverged from the common type, so as to form an essentially distinct family.

Mr. Hall, mentioning an instance of an absurd attempt to identify a Japanese word with an English word of somewhat similar sound, said that this was a fair sample of some of the writing which even at the present day, in the case of the less known languages, passed current for philological enquiry. He had not seen the work of Mr. Edkins to which Mr. Aston had referred in terms of commendation; but if it were no better than certain other of that gentleman's contributions to philology, and notably than his paper on the Japanese language read before the Society last year, it was easy to conjecture how small its value must be. Mr. Aston, accepting as proved Mr. Edkin's views as to the common origin of Chinese and Aryan roots, professed to apply the same method of investigation to Japanese with a similar result. It was doubtful if he had succeeded in this attempt. He himself (Mr. Hall) had failed to find in Japanese any traces of an element common to its roots and those of European languages. But while he could not but agree with Dr. Hepburn in questioning the conclusion at which Mr. Aston had arrived, he thought that Mr. Goodwin had underrated the scientific value of the paper. It was highly desirable that the prevailing theory of the common origin of all the families of speech should be tested by the light of such evidence as could be obtained from examination of the various Turanian tongues. In the case of so old and highly developed a speech as Japanese—he meant of course, pure Japanese, the *Yamato Kotoba*—this evidence could hardly fail to be of especial importance; and to extract and set forth this evidence was the professed object of the paper. Mr. Aston had executed this task with a completeness and mastery of his subject that had left little to be gleaned by any subsequent enquirers in the same field. He was astonished at the number and verisimilitude of the resemblances discovered by Mr. Aston between Japanese and Aryan words. It would be impossible for him, and difficult, he thought, for any one, on the bare hearing of

so condensed a paper on so wide a subject, to pronounce off-hand a correct estimate of the value of the evidence and arguments adduced in it; each separate instance of alleged affinity between Japanese and Aryan roots would have to be examined in detail by itself, a work requiring time and care; but it must not be forgotten that behind all the etymological identities revealed by Grimm's law in the various members of the Aryan family, lay the great fact of the close structural affinity of those languages; and that this support was entirely wanting in the case of Japanese, the grammatical structure of which was essentially different; consequently the inference from [248] isolated instances of etymological resemblance lost much of its force. Moreover, he noticed that a few of the instances adduced by Mr. Aston were very questionable. To take the first in the list;—Japanese *na*, alleged to be akin to English *name*, Latin *nomen*, Greek *onoma*, etc. Now Mr. Aston, as an Aryan scholar, must be aware that an initial hard or soft guttural formed an essential part of this root in all the Aryan tongues, and though in the process of phonetic decay this guttural had in nearly every instance disappeared in the case of the substantive for *name*, still abundant traces of it survived in other offshoots of the same root, as in *ken*, *know*, *ignominy*, &c.; it would be difficult for Mr. Aston to find any trace of this guttural having ever existed in the Japanese *na* or any words cognate with it. However, a mere slip of this kind would scarcely affect the general scientific soundness of Mr. Aston's work, which was as undoubted as its philological acumen was conspicuous.

Professor W. E. Ayrtton remarked that, as Mr. Aston had mentioned that the Aryans possessed a system of counting up to one hundred, he would like to ask whether the names for the numerals resembled those in Japanese. He presumed not, since the Japanese numerals, with perhaps the exception of *futatsu*, differed entirely from the numerals of all the languages he was acquainted with, whereas the Chinese *ichi*, *ni*, *san*, resembled, of course, closely the numerals found in many countries of Asia and Europe.

He would also feel obliged if Mr. Aston would inform them whether the word "riyô," a yen, pronounced in Tôkiô "ro" and frequently "dô," and which was written in Japanese by the same characters as the word "riyô," meaning "both", had any connection with the root "do" and "du" meaning "two" which occurs in so many languages. Or was the Tôkiô word "do" simply short for dollar?

Mr. Aston replied that Japanese numerals had no connection with European.

Mr. Hall contrasted Mr. Aston's admission that he could find no connection between the Japanese and Aryan numerals, with Mr. Edkin's confident identification of two of them. This instance afforded a capital illustration of the difference between the philology of Mr. Aston and that of Mr. Edkins. The latter, in his paper on the Japanese language, had laid it down without any misgiving that

*hitotsu* is the English "first," and *futatsu* the English "both"! Of course *riyô*, which Mr. Ayrton affirmed was sometimes pronounced *dô*, had no connection whatever with the Aryan numeral for *two*, but was simply the Japanese pronunciation of the Chinese word *liang*.

In answer to an inquiry from Sir H. Parkes, Mr. Aston explained, in part, the grounds of discriminating the ancient from the modern forms of Japanese words.

Mr. Ayrton remarked on the resemblance of the numerals to those of European languages.

Rev. Nathan Brown thought the paper had by no means claimed too much for the affinities of Japanese with the Aryan [249] languages, perhaps not enough. The examples of affiliation that had been given, so far from being visionary, or mere accidental coincidences, would, he believed, be found to rest, in nearly every instance, on a true philological basis. He did not agree with the objection made to this paper that the only true way to study the affinities of language was to begin with the grammatical construction. It was a much readier and surer way to begin with the comparison of vocables. The first word adduced by Mr. Aston, *na*, English *name*, which had been objected to as a false example, is certainly of Aryan origin. The word runs through most of the oriental languages. In India its pronunciation fluctuates between *nam* and *nao*, while the Sanskrit is *naman*, the two forms corresponding to the Japanese *na* and *namaye*. Mr. Brown thought the suggestion, in the paper read, that the changes of form in Aryan words found in Japanese, were regulated by determinate and discoverable laws, was an important one; and he thought it a confirmation of this idea that the Bonzes, in transliterating Indian terms into Japanese characters, invariably represent the Sanskrit letters by the values which Mr. Aston gives them, *h* or *f* for the Sanskrit *p*, *ph* and *b*, and *k* for the Sanskrit *h*. The Sanskrit *ti* is naturally softened to *tsi* or *chi*, the sibilant being intercalated for ease or euphony, as it is also, not unfrequently, in the Western languages. In philological inquiries similarity of sound is not alone a proof of radical identity; we must also trace the historical connection of the words compared. Nor does dissimilarity of sound disprove identity; words that are very unlike in pronunciation often prove to have been originally the same. For example, the English word *pot* and the Japanese *hachi* are as far apart as they well could be, and yet, on historical grounds, we must pronounce them identical, for our *pot*, which is from the Norse *pottr*, corresponds with the Sanskrit *patra*, and the Assamese and Bengali *bati*; and the latter, transliterated by Japanese rules, must become just what it is, *hachi* or *bachi*. Mr. Brown believed that the comparison of Japanese with the Aryan languages, instead of showing meagre results, would prove a rich field of philological research, especially the comparison of Japanese and Greek. With the Burmese language, Japanese has very strong affinities, not only in its vocabulary but in its grammatical structure.

The second paper, (translated and read by Mr. Howell), was on "The Increase of the Flora of Japan," by Dr. Savatier of Yokosuka.

The third paper (read by Sir H. Parkee) was on "A Journey in North-East Japan," by Captain Blakiston.

Dr. Hepburn read Remarks on the Climate of Yokohama, to accompany his Meteorological Tables for the seven years, from 1863 to 1869.

Meteorological Observations were also presented, made at Nagasaki by Dr. Geerts, during the year 1872.

Arrangements were made for a Special Meeting to consider the Revised Constitution and By-Laws; and it was resolved to hold the Annual Meeting early in July.

















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