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ART. I.—*The Dowry received by Kakshivan.—An Extract from the Rig-Veda, illustrative of the state of Hindu Society, twelve centuries before the Christian Era.—By the Rev.* DR. STEVENSON.

IT is a singular fact in the philosophy of the human mind, that nations have turned their attention almost to every branch of literature before they have engaged in historical researches. Accordingly we find in Greece, that heroic poetry had been brought to its highest perfection by Homer, tragic by Æschylus, and lyric by Sappho and Anacreon; that legislation had been carried as far as ever it was carried in the ancient world, by Lycurgus and Solon; and that Thales, Anaximander, and Pythagorus had founded schools of Philosophy before Herodotus the father of History arose. Had the progress of the human mind met with a sudden check in Greece, before the first of historians had conceived the idea of his immortal work,—had the Persian expedition, for example, succeeded, and Grecian liberty been nipped in the bud, it is extremely probable that we should never have had a Grecian history. It was the exciting and glorious events connected with the repulsion of the Persian hosts, poured by their Monarchs into Greece, which fired the breast of the patriot Ionian historian. Had that war terminated differently, had Greece become a province of Persia—as it afterwards became of Turkey,—would Herodotus have been moved by a like ardour to open up the hitherto untrodden path of History, in order that he might record

the triumphs of the barbaric spoiler of the land of liberty? Or had he recorded them, would his history have won the plaudits of universal Greece assembled at Olympus, and been handed down with exultation and pride to an admiring posterity? But with all the great names we have already mentioned, and many others of kindred fame, the literature of Greece could not have been held in contempt, though she had never produced a single historian. The case which we have supposed in regard to Greece, and which there happily is but a supposition, is what has actually in a great measure taken place in reference to India. The Brahmano-Indian tribes had certainly in very early times made great attainments in literature and the arts, but were soon checked in their progress towards higher degrees of perfection by foreign invasions, internal dissensions, and above all by a short-sighted system of civilization which narrowed the field for the action of genius, and cramped the powers of the mind by drawing too strong a line of demarcation between the different grades of society. Nothing then which can be considered as possessing the least claim to the designation of history, has been handed down to us by the Hindus from the ages that preceded the Christian era, nor many succeeding centuries. It is in their national literature, therefore, that we must trace their mental developement, and the history of society among them. While studying, with this object in view, some of the ancient writings of the Brahmans, I lately fell in with a curious fragment, an unpublished portion of the Rig-Veda, which seems to me to throw a good deal of light on the state of Indian Society at the time that it was written. The author, Kakshivan, son of the sage Dirghatamas—whose relation to the king of Kalinga is mentioned in the eighth chapter of the 4th book of the Vishnu Puran, as translated by Professor Wilson,—was the fifteenth person in descent from the patriarch Pururavas. Parasurama, the great defender of the Brahmans, was the fourteenth in descent from the same patriarch, by another branch of the family. He—according to Bentley's Hindu Astronomy—lived about twelve centuries before the Christian era, and consequently our author must have flourished about the same period or a little later.

The extract referred to is as follows:—

"1.—I fill up with all my heart the measure of no common praise to the son of Bhavavya, who dwells in the land of Sindhu, who has enabled me to perform a thousand moon-plant sacrifices; who is indestructible, and desirous of deathless fame.

2.—I Kakshivan, have lately received from the glorious bounteous sovereign, who requests our blessing, a hundred golden Nishkas, a hundred swift running horses, and a hundred bulls, and have, in consequence, spread his deathless fame throughout the heavens.

3.—The ten chariots conveying as many wives, and drawn by dark bay horses, given by Svanaya, and stationed close by, with a thousand and sixty cows, I, Kakshivan, have brought home before the decline of the same day, in which I received them.

4.—The forty bays yoked to the ten chariots lead the way, at the head of the herd of a thousand cattle, and the well girt attendants steadily bring along the road the horses that convey the gold.

5.—O! my beloved brothers who are desirous of renown, and have collected around me with your cars conveying the moon-plants like a crowd of merchants, all the aforesaid donation I have accepted for your benefit in all its particulars, with the eleven yoked chariots and a herd of cows worthy of the gods."

1.—From this extract it appears that there was no distinction of caste at the time it was written between the Brahminical and Regal or Kshatriya families. Kakshivan, it appears from the context, was the son of Usik a Kshatriya female, and Dirghatamas a Brahman; and his wives are all of the same description as his mother, and yet he is one of the great Rishis of the Vedas. From the Vishnu Puran also it appears that nothing was more common than such intermarriages. Parasurama himself, the great defender of the Brahmans, was born of a Kshatriya mother. Several even of the Brahminical family are clearly traceable up to Kshatriya ancestors: thus according to the Vishnu Puran the famous Angirasa Brahmans were descended partly from King Rathinara, and partly from King Harita. The equally famous Kanvayana Brahmans are lineal descendants of King Puru. Kanva was the son of Apratiratha a younger son of Rantinara, and adopted the Brahminical profession, while the descendants of Tansu, the elder branch of the family, continued to exercise the sovereignty:—just as in some of the principalities in Europe the eldest son succeeds his father in the government, while some of the younger members of the family enter the Church. It was not till a later period, and after a long struggle, that particular families usurped to themselves the sole privilege of being considered Brahminical.

2.—We see from this extract, that at the time in question the Hindus

were chiefly a pastoral people. If it is not a narrative of facts, the author must at least have paid some attention to probability, in reference to the state of society in the age in which he lived. Had then there been any general cultivation of the soil, in what one place were a thousand and sixty cows to find pasturage? Besides while we have a hundred breed bulls, and a hundred horses for the chariots and attendants, we have no oxen for plowing the fields, nor any provision for the purposes of agriculture. There are ten chariots for the ten ladies, but one conveys all their wardrobe, and provisions apparently for the whole company. Owing to the changes that have taken place in the Nishka it is impossible to say with much certainty what its true value was. The weight called Nishka is equal to four Mashas, and most probably that weight of gold was the original golden Nishka here mentioned. If so, the whole sum of money given did not exceed five hundred rupees: but even supposing it to have been treble that sum, and the Nishka equal to a Suverna, this was but a small sum of money when conpared with twelve hundred head of cattle, and a hundred horses. Gold, then, it is to be inferred, could not have been very plentiful. Flocks of sheep were either in no account, and thought unworthy of forming a part of a royal donation, or they were not so abundant as herds of cattle. Indeed, in the context when the author requires to refer to the sheep or the goat for a simile, he speaks of the flocks of Gandhara—probably the modern Candahar.

In conformity with this view of the subject it may be worth while observing, that the concluding prayer of the first part of the Sama Veda is —"O Savita, upholder of all things, give us for our portion the possession of cows and horses;"—implying that wealth then mainly consisted in the possession of these.

3.—We observe that at this period daughters were not given in marriage till they were grown up. This is fairly inferrible from the circumstance of the wives of Kakshivan being immediately sent home with him, and the fact that they were grown up is expressly stated in the context; showing that in this respect also, as well as in the institution of the rules of caste, the Brahminical Hindus have departed from the custom of the first founders of their nation.

4. I may further observe, that this extract proves the point that the Rishis are the real authors of the hymns of the Vedas, and not the mere channels by which they have been transmitted, as usually asserted by

modern Brahmans. In this Epithalmium, Kakshivan, without the least hesitation, mentions in the text his own name, and that of his father-in-law; plainly declaring himself to be the author of this eulogy on royal beneficence.

5.—It appears farther from this passage, that an intoxicating beverage was used in the most sacred rites of the ancient Brahmans. The moon-plant sacrifice here mentioned, and at which the hymns of the Sama Veda are chanted, is the most sacred of all the Brahminical rites. It has different names, owing to lesser differences in the manner of its performance, but it cannot take place without a liquor produced by the fermentation of barley mixed with water, and the juice of the acid Asclepias or moon-plant. This liquor is decidedly inebriating in larger quantities, and exhilarating in smaller. It is called in one place of the Sama Veda "the intoxicator of the divine sage Sukra,"* and often mentioned as exhilarating. It is said "to twine around the flame of the sacrifice"†—showing it be inflammable and to contain alcohol.

I perhaps ought to apologize to the Society for the brevity and other imperfections of this paper, but as they have now got both a Magazine and a Museum in which to store up everything valuable, however small, that comes in the way of any one, I have felt the more emboldened to present this small piece of antiquity for their acceptance.

II.—*Inscriptions from Palitana—Communicated by Captain* LeGrand Jacob.

Palitana is one of the five holy places of the Jains, the other four being, Arbudha, Girnar, Samel-sikra in Behar, and Chandragir in the Himalaya. A very distant antiquity is assigned to these temples by Colonel Todd, on the authority of local traditions and a Mahatma which he procured on the spot. But all monumental evidence to their ancient history has possibly been destroyed in the rivalry of two opposed sects, whose cause has been espoused alternately by different Rajahs, who have each annihilated whatever might support the cause of their rivals; and thus all records of remote date have been effaced. Or more probably this absence of ancient inscriptions is owing to "the buildings being chiefly of free stone, the decomposed surface of which

* Sama Veda, Part I, Prapathaka IV, Dasati 6, line 3. For the legend of Sukra's intoxication, and drinking the ashes of his Son-in-law, see Matsya Purana.

† Sama Veda, Part I, Prapathaka VI, Dasati 8, line 4.

peels off, to the destruction of inscriptions, though these are most frequently engraved on tablets of compact limestone or basalt."*

The following inscriptions will connect the history of the temple from A.D. 1526-27 to A.D. 1596-97. They were taken from apparently the most ancient temples on the hill, and are on the right and left of the entrance.

The second inscription is peculiarly interesting, as contributing much to the history of Akbar's attempt to raise a new religion on the basis of a toleration of all existent religions. General Kennedy, in introducing this important fact to the notice of oriental historians (see *Bombay Literary Transactions*, Vol. 2), does not seem to have been aware of the information which may be gathered on this subject from the Jesuit writers. The toleration, protection, and even support which these missionaries then found in the Moghul Court, and their own misconceptions of Akbar's patronage, form so complete a parallel with the substance of this inscription, that the publication of it must throw much light on an obscure but most interesting portion of Indian History.

The two last inscriptions are in so bombastic a style, that it was difficult to translate them so as to be intelligible and at the same time to preserve at all the character of the originals. A. B. O.

No. 1.—*Translation of the Inscription on Stone on the most ancient of the Palitana temples.—By Captain Le Grand Jacob.*

The manner of constructing the temple of the great and ever to be praised Adeswurjee is here exactly written—He is our God, and the Master of all things.

This temple was begun in the reign of Buhadoorshah, Son of Mahmood Shah, King of Goojrat, in the year Sumvud 1582, by Dosee Kurma Sha, the Agent of Mojad Khan, Dewan of the Kingdom. The *Sutroonjyu Hill* is also called Chiturkot Narnor. It is necessary to record that the temple of Adeswurjee will be constructed altogether 16 different times: this of Dosee Kurma Sha is the 7th. Question—where is it erected? Answer—on the Palitana Hill by one strong in the Jain faith, and for the ornament of the sacred mountain.

A. D. 1526-27.

Throughout Goojrat, and in the opinion of all persons of consequence, this hill is the choicest of all hills; whoever offers up his prayers upon it will be supremely happy and prosperous; its trees are like the Kul-

* Todd's Western India.

puwrksh, and it resembles the golden hill of Meroo; indeed it is the best of all spots for a temple of the Jains: every one who sees it becomes delighted, and he that dwells there has all his sins pardoned. The Raja of the hill was Shree Koomb'hajee, who was a mighty man, and like Agusht Rooshee, who was born from Koomb'h, and who swallowed up the ocean, so this Rajah devoured all his enemies. His son Sungma Sing was victorious in war—his grandson Ragmul was more hardy than any other Raja in battle—Rajmul's son Rutun Sing was worthy of the throne even as a Deu, and brave as a lion. In his reign lived the founder of the temple.

Account of the Family of Dosee Kurma Sha.

On the hill of Gopaha resided a Jutee named Bupb'hut, who had retired from the world for the purpose of penance and devotion; thither went Dosee Kurma Sha with his wife: the ascetic instructed them in wisdom, and convinced him that money and even life were things of no moment—all his race were persons of renown and chastity. His pedigree is as follows—Surundew's son was Ramdew and his Lak'ha, his son was B'huwunpal and his K'hetoo, who was the father of Nursing who had two wives, Taradew of noble birth and Leloo very religious; their descendants were all prosperous; the first son named Rutun Uksh was worth 100 crores of rupees, he resided at Shree Chitturkot, his wife was extremely virtuous, and he had two sons, Manuk and Heera; the third brother's wife was a treasure of wisdom, she had one son; the fourth brother was named Dusrut, whose wife was full of faith and devotion, their son was named Kelar; another brother was named Bhoj, whose wife was universally accomplished, their son was Madunjee, endowed with a patient disposition, penetrating intellect, and sound wisdom; he had one sister named Veera: Dosee Kurma Sha's first wife was Kupoor Devee, and second Kumat-de: his son was named Soorijee Purbhakur. Such is the pedigree of Dosee Kurma Sha:—now is to be recorded the consecration of the Lord of the Jain faith. In the reign of Shree Rajah Ruttun Sing, gifts were distributed and honours paid to holy men agreeably to the Shastres—Shree Dosee Kurma Sha was much beloved by the Raja. Whoever will listen to the account of the Chitturkot hill will have all his sins pardoned. He obtained by his wisdom, honour from the king and from all the numerous learned men of Goojrat: his patron, the Dewan Mujad Khan, was as brave as the lion

of the wilderness: in his service he obtained much honour and wealth: he came to Palitana to erect the temple of Adeswurjee as a place of refuge for all the brave and the good of the earth, with great pomp and festivity, dancing and singing, according to the instruction of his spiritual guide, with the melody of various instruments—the chureh, the chung and mirdung, the meree, the weena, the wasna, the nalruchna, and the soorta; everybody being dressed in their best attire of their clothes and jewellery, elephants, horses, carriages, palkees, all joining in procession: thus at an auspicious moment on Thursday, 6th, of the dark half of Wuesakh, in the era of King Vikramajeet, 1587, the consecration of the shadow of Adeswurjee took place. All the great, learned, and holy Pundits, and the most intelligent men of the assembly aided in the 7th consecration of this temple. Thus in the Kulyoog epoch, this temple was erected the 7th time by permission of the king, that every one of the Jain faith might, by coming to Palitana, obtain happiness for his soul. May the family of Dosee Kurma Sha be ever happy and prosperous; such a work as that he has performed was never before done or ever will be; since though under Mahommedan rule still the force and weight of his character gratified both king and people, and thus the consecration of the temple was permitted. The fame of Dosee Kurma Sha, inhabitant of Chitturkot, is spread throughout the world as the full moon shines over the earth; the various bands of pilgrims who visit Palitana are filled with delight at the view.

No. 2.—*Translated by A. B. Orlebar, assisted by Venayaka Shastra.*

Salutation to Om.

1.—May they who are fortunate and wise, and may ye also be blessed by the most excellent first of princes, the son of Marudeva, the crocodile of the sea of pleasures, who expandeth the lotus like the sun by his rays received on the water-born plant in greater and greater power as he ascendeth higher and higher in the firmament; who happy in his many conquests, hath become Omnipotent.

2.—May ye be blessed by him who loveth his lotus birth in the water of the hero family of Siddhatha, who is the mansion of glorious light, the prince Vardaman; whose words were swollen with sweetness as they declared the nature of birth, life, and death, as they purified the world, and like the Ganges even an asylum for devotion.

3.—As the moon rising from the sea, so from his chair was the

blessed Sudama, a treasury of great wealth, whose feet are worshipped by crowds of the children of Vasu. And his (spiritual) children, like the voice of the deified Viraprabhu, happy in ennobled joy, support his glory even to this day.

4.—After him were the two priests Saint Susbhita and Supratibudhapata; whose disciples, like the light of the sun and moon, were in this world named Kautikians.

5.—Among them was the Holy Ganadivipa Saint Vajra, revereuced by the Vajrians, the root of the Vajri branch as the Himalaya of the Ganges.

6.—In his chair as the pearl of day in heaven arose the teacher Saint Vajrasena; and his disciples were Naga, Indra, Chandravrita, and Vidiadhara.

7.—From these were born four families, named after each of them, and amongst them the Chandra family pre-eminently shone.

8.—Among these were born many who were honourable in the world, and like suns dispersed the proud darkness.

9.—Among them there followed in succession the sainted Sagatchandra Suris, by whom the bracelet of religion was assumed in the year 1285.

10. Next in the same Gun followed the Hemavimala Suris, and in their chair came the Anandavimala.

11. In the year 1582 a felicitous dwelling for the pure practice of religion was happily erected for the sake of the (right) way on account of the relaxation (of discipline) by the famed Moon-race, swelling with sweetness like the clouds which, utterly expelling the heat, again restore pleasure to the earth.

12.— Their chair delighted the minds of men, by the rise of the lotus, and was adorned by the lotus-sitter, Vyiya Dana, and Munisha, as the stream of the river of the Immortal Gods by the Swans.

13.—And when their felicity which robbed Hari of all his pride, their beauty more excellent than that of Kumbha's husband, and their warmth which was stolen from the friend of the hundred-petalled flower, were seen for many days by Madhuripu, by the Lord of Heaven, and the warm-beamed One; they three overburdened with the greatness of the shame turned milk-sellers.

14.—By the benevolent friends of Huvivijaya, the prince of great men, their pulpit was covered with a roof and also was floored with beautiful chunam; it became the support of the felicity of those who

are great in the fulness of light and most glorious. It was a place most beautiful to behold.

15.—The mighty Suris were honourably summoned by the fortunate Shah Akbar from Goozerat. And they came to the beauteous land called Mevut, bearing lotus flowers in their hands, and dispelling from the senses as suns from the heaven all darkness from the senses in the crowds (of hearers), expanding like the all beauteous lotuses.

16.—They exalted Futepoor above the earth of present joys, to heaven's height filling with lovers' joys the eyes of many a Swan in the year 1639; for truly they bore in their hands a forest of lotus flowers.

17.—He whose commands were as garlands on the heads of princes, the blessed heroic Emperor Akbar, the destroyer of sin, proclaimed by beat of the great drum a truce of six months in all lands. For delighted was his heart, when gladdened by the words of that (holy man.)

18.—Through his counsel, the Emperor Akbar, loving his courtiers, remitted the right of heirship, the tax, and the Sujij.

19.—With a mind free from fear through his exhortations, as a flood of water cleansed from mud by the Strychnos Potatorum, the merciful emperor, who ever embraced the righteous laws of government as a dear wife, remitted the taxes which other kings of the earth cannot remit, for the love of their people. He released also bulls and oxen, and birds and slaves.

20.—Gladdened by his eloquent language, in comparison of which ambrosia is but vanity, the blessed Akbar, Emperor of the world, with a heart full of joy, after remitting the taxes both in kind and money, gave to the Jains for their love sake that beautiful tirth, the mountain Shatrunjaya.

21.—Rejoiced by his discourse, he with a wise and kind heart made a library full of learning, like the dwelling of the Goddess of speech. Anxious to comply with his zeal, the emperor, in his pure mind, continually regarded the presence of the Saints as a great subject of rejoicing.

22.—The mind of the impartial lotus like moon, the Emperor Akbar, being expanded by his discourse, as the mud-born plant by the light of the sun, the emperor became celebrated by the good and perfect mendicant priests throughout all lands, as having a loving mind to the Arhats, even as Saint Shrenika, ruler of the earth.

23.—At the exhortation of the Saint, even the robber Meghaji ceased his perverseness, worshipped his feet daily, as the bee does the lotus flower. Many with delight at his words, which guide to placidness and pleasure, forsook their old principles and took on themselves the name of religion.

24.—At his preaching in Guzerat and in other lands, in the famous Kshetras, wealth was profusely expended in building. And on Shatrunjaya mountain, the holy men with the assistance of crowds of people from Guzerat and Mewat, and Mahrashatra erected a Pash.

25.—The all enlightened Vijaya sena nunindra chundramas, (or Vijaya sena, the moon of the lords of Memis) triumphs—the friend of the opening night lotus who expelled the thick darkness by many words, and made his pulpit as the placid sea.

26.—What can be said more to the praise of his glory than that he threw the bragsters into a dreamless sleep even while alive.

27.—The lotus-born Prince had taken prosperity from the uneven weaponed, splendour from the husband of the Lotus, glory from the husband of the mountain Goddess, the brightness of his full orb from the husband of the Nymphia esculenta, the might of sacrificial fires from the earth's support, profundity from the treasury of waters, and so had he given them his body.

28.—And they by holy Akbar having been graciously and hospitably invited to holy Mullabhapoor Purander, accompanied by multitudes of deities, holy and wise, adorned the city, as playful swans adorn the honied sweet-smelling lotus-forest.

29.—Openly in the court of holy Akbar they showed the most excellent Arhat to be the Almighty God, by a multitude of arguments, and the boastful twice-born chieftains were dazzled by the light of the victorious reasoning; as thieves confounded by kings.

30.—In the court of the holy emperor Akbar, they conquered with many evident arguments, the argumentive, as lions conquer the mad elephants, and they erected on the north side a holy high pillar bright as Keilas, to gratify the desires of the all-wise.

31.—That which was given in the presence of the fearless Harivijaya and royal priests by the holy emperor Akbar, the Prince of the earth, was for the love of him. By his man-like mind was all that done to which let the earth be witness. That letter termed a firman has been in holy manner promulgated in every quarter.

32.—Moreover (in it was written) that cows and bulls and buffaloes, both male and female, should never be led to the house of death; that the whole tax upon the dead should be remitted, and that slaves should on no pretence be made.

33.—All these benefits were graciously conferred for the joy of his people by Akbar, the Lord of the world, whose mind was a tree which drank from the bright cloud of his glory.

34.—Honoured by the son of Chote Begum, the Supreme Lord of the world, happy in the overflow of purity, felicitous in the full expansion of the flowers of virtues, they make the mighty plain of Guzerat ever a source of ennoblement to its inhabitants, and the dwelling place of glory; as garlands on the necks of lotus-eyed damsels.

No. 3.—*Translated by Ball Gungadhur Shastri.*

Further there was a Goldsmith Sreshti Shri Shewraja, in the Ukesa race, the lotus of the Abhur line and of virtuous mind. His son was Sindhar; whose son was Parvatta, whose son was Kâla, from whom descended Vagha. His son was the illustrious Bali born by Rajai. He had a consort by name Suhasini, as Pudmapati* has Padma—Tejapal was the offspring of this pair, as Iaija is of Indrani and the lord of the Suras, delighting Sumanas,† and pleasing the minds of his parents. As Kam (Cupid) has Rati for his consort, Hari has Rama, and the Lord of Gouri (Mahadeo,) has Gouri, so he had Tejalada, whose form was the most beautiful. This couple shone by the lustre of enjoyments, evinced great attachment to their Gouri, and paid honor to Suparwas ‡ like Papalomi (the life of Indra) and the lord of the Tridashas. Having his mind exalted with piety by the nectar nullifying instructions of Vijaya Sana, the chief of the Munis, who was a full moon over the ocean of resignation, an elephant among the devotees of Bahir Vijaya? and who shone by the lustre of good fortune and prosperity, he (Bali) became attached to those acts which are dear to virtuous men, such as congregational worship, pious gifts, and the repair of the temples of Jina. This Tejapala, the Goldsmith, dedicated with great rejoicings the auspicious Suparonva Bharta and Ananta Bharta

* Vishnu, as the husband of Padma, which is one of the names of Lachsmi.

† Here is a simile founded upon a play of words that cannot be translated—The son of Indra delights the Sumanas or Gods, while the Prince delights the learned men, which is another meaning of the word.

‡ Here is another untranslatable play upon the word Suparva. In the case of Indra and Indrani it signifies the interior Gods, but in that of the king and his wife it means festivals or Holy days.

in the year 1646, on a day on which the planets were favourable. He first constructed the temple glittering with precious stones, gold, &c., affording pleasure to the sight. Here also others willing to turn the wealth acquired by their arms to good use erected temples in succession? * At this holy place, an opulent man by name Sadhu Karama constructed a temple in the year 1588 to Mumraja, purified by delight. Seeing the Vihara (temple) of Bhagavan old, Tejapala conceived in his mind as follows:—When will that good time arrive, when this temple will be renewed. Next day that good merchant, while living in the excellent and holy town of Shree Stambha, had his heart enlightened by the advice of his preceptor; and desiring to make a good use of his wealth he fully made up his mind to construct a Gate to the temple of Arhat (Budha) on the auspicious place Shatrunjaya, which is the principal of all great places of sanctity, considering that virtuous acts done there contributed to happiness and prosperity of men, that virtuous man, for securing great bliss and delight to the line of his ancestors caused repairs to be made to the old temple of Arhat in the most hallowed Tirtha of Vemalachala?

This temple pierces the celestial vault by its steeple, its pinnacle glows with golden goblets? With a height of 52 cubits, with no mean pride it ascends to conquer the grandeur of the heavens. In this dwelling place of the Arhat there glitter 1,245 goblets which surpass the cheeks of the elephant of gods (Airavata) as so many suns in varied forms overcome by the exceeding glory of the lord and reduced to be his slaves. In this abode of Jina, there are 21 lions collected as if to signify they were ready to destroy at once all the obstacles, which, like elephants, have rooted out the tree of happiness in this world, where four Yoginis adorn the Jina's house as if four points of the compass subdued by his prowess had assembled to serve him. Where also (eight) Dikpalas are resplendent as if the virtues of the ascetics had assumed forms and were in attendence. Seventy-two orbs of the moon of Jinendra adorned the Deve—Kalika (?) As if the buds of seventy-two creepers, round which the dependants of Jina are hovering about like black-bees, were filling the world with their perfumes.

In this house of Jina there are four handsome windows like the mouths of Virinchi (Brahma) for the creation of the Universe. In which temple there are four ascetics, as if deities had assumed a form and had come to visit the Lord's House. In this house of Jinendra,

* Here one Shloka seems wanting.

there shine thirty-two female figures, whose forms surpass that of Indra's mistresses; and who as it were, are the queens of kings, that have recognized the Jina as their Lord by his characteristics? There are also thirty-two excellent artificial and enchanting portals—methinks they are the grand and handsome looking swings of the antelope-eyed beauty of the teeth of the founder of this holy place. In this house of Jina shine 24 elephants of the height of mountains, as if twenty-four forests had assumed the shape of elephants and had come to pay their devotions to the Lord. As if Indra, with the lords of the different points of the compass, had come to pay their devotions to their benefactor; there are seventy-four pillars to this temple of Jinendra as high as the Lord of the mountains. This noble edifice of great delight was constructed in the year 1649, by the assistance of Jasu Thakur, and a clever mason, called Rama, by the virtuous and noble-mined son of Balica on Shatrunjaya. Seeing this building which is compared to the temple on the holy place, Ashtapada, whose mind would refrain from experiencing joy? may this temple, standing on the hill of Shatrunjaya, called Nandivurdhan, like the house of four virtuous Lords of the Earth, which has delighted the whole universe, ever afford you the objects of your wishes. Knowing the great expenditure of wealth in the construction of this temple, which always cools the eye by its column of lustre, men say that by this expenditure Tejapala has exhausted the treasures of the desire-yielding tree.

Tejapala made a pilgrimage for virtue in the year 1650 to Shatrunjaya; and he caused the preceptor, the lion of learned men, called Bahirvijaya, to consecrate the temple on an auspicious day. As a crowd of lotuses is delighted to see the orb of the sun, as the current of the great watery basin is transported with joy to observe the luminary with nectar beams, or as a flock of peacocks is overjoyed when it beholds a very high cloud, so are all delighted on beholding this temple. A temple with four entrances was constructed by Shriramaji to afford delight; a second, high and noble was built by Jasu Thakur; a third temple, a handsome one, was the work of Kunjaraji; and the fourth, which is the most beautiful, is made by Mula Shrishreshthi. May this edifice, attended by four temples on Shatrunjaya, and having its beauty blended with these columns of light pervading the universe, long remain happy like Indra attended by the lords of the celestial regions (?)

This specimen of the skill of the excellent carpenter, by name Vasta should be particularly and often visited, being the work of an artificer under whom Vishvakarma, though skilled in the craft, wishes to be a pupil, in order to become celebrated in architecture. May this elegant eulogy, full as it is of figures, like a woman embellished with ornaments, composed by Hamavijaya, a black bee on the lotus-like feet of Kamalavijaya, of acute mind and of virtuous course of life. Thus is the eulogy on the Adisha Mula Prasada, an ornament to Vimalachala, constructed by Tejapala, the Saha of Sauvarnicas—happiness.—Kiraya Jayœ Sagarœ, one of the oceans of innate wisdom, wrote this, and it was engraved by the sculptors Mahadev and Nana.

III.—*Climate of Nagpore.*

In the Journal of the Asiatic Society of Bengal for 1833, there are two interesting papers on the Climate of Nagpore;—the first by Dr. Geddes, of the Madras Army, the other from the pen of the Secretary Mr. James Prinsep, in whose hands Dr. Wylie, now Superintending Surgeon at Madras, had placed the copious Registers kept by himself and Captain Lloyd (of the Bombay Artillery) between the years 1820 and 1830. The latitude of Nagpore is about 21° 10′ N., and the longitude 79° 15′ E.; it therefore forms a good intermediate station with which the observations at Calcutta, Madras, and Bombay may be compared; and from its importance as the capital of the Berar state, and its connection with the great inland districts in which much of the Cotton exported from Bombay is grown, every observation on its climate, especially on the quantity and distribution of rain, is of importance. Dr. Ludlow who succeeded Dr. Wylie as Residency surgeon, has favored the Secretary with the following table exhibiting the fall of rain during each season from 1833 to 1840. From November to May hardly any rain falls at Nagpore, and Dr. Ludlow was occasionally absent during these months, and so far the table is imperfect; Mr. Prinsep's table drawn up from Dr. Wylie's and Captain Lloyd's observations is therefore inserted. It is only necessary to add, that, as might be expected from its geographical position, the barometer at Nagpore has a smaller rise and fall during the year than

that of Calcutta, and a greater than that of Madras; and that the mean annual temperature is as follows:—

At Sunrise in the open air	69·5	from Dr. Geddes's tables.
Minimum Temperature	69·3	by Captain Lloyd.
At 9 A. M. in the House	80·5	by Dr. Wylie.
At noon do	80·3	(Tatty used in last months?)
At 2 P. M	81·1	by Dr. Geddes.
Maximum Temperature	89·4	by Captain Lloyd.
At 5 P. M. do	84·2	by Dr. Wylie.
At 8 P. M. do	80·2	by Dr. Geddes.
Mean of Maxima	79·2	by Captain Lloyd.
And Minima	82·7	

From the mean of the Maxima and Minima, and from the pair of observations at 9 A.M. and 8 P.M., it may be assumed with tolerable confidence, that the mean temperature of Nagpore does not differ much from 80 Fahr., which is nearly 2 degrees higher than that of Calcutta, and 1½ lower than that of Madras.* By Colonel Cullen's Barometrical measurements, Asiatic Researches, vol. 18, Nagpore is 900 feet above the level of the sea.

TABLE I.

Fall of rain at Nagpore, registered by Dr. Wylie.

MONTH.	(Lloyd) 1814-15	1826	1827	1828	1829	1830	1831	1832
January	....	2·30	0·40	0 19	..	..	..	..
February	....	..	0·50	1·21	0·76	..	..	2·98
March	....	..	3·84	0·71	2 49	1·57	..	..
April	....	..	1·01	0·06	0 06	0 68	..	..
May	....	1·10	0·21	1·55	..	1·35	..	..
June	0·2·	22·23	6 25	8·37	8·07	8·54	13·78	8·01
July	7·08	12·00	14·99	9·33	15·94	7 10	7·22	14·49
August	14·72	18·50	7 51	9·07	7 89	7·00	14·58	3·46
September	7·36	8·13	16 32	9·40	6 32	4·78	11·98	7·77
October	2·97	0·04	.0 00	6·46	8 22	1·98	7 24	..
November	0·45	1·31	2·89	0·26	..	..	2·27	..
December	....	..	0·13	..	0·50	..	8·24	..
Annual Total	....	32·81	65·61	53·99	46·61	50 25	33·00	65 31	37·14
In the Monsoon	32·3·	62·00	45·22	44·18	46·44	30 75	54·80	39·73

Average of 8 Years....48·10 inches.

* Journal of the Asiatic Society of Bengal, note 2d. p. 546.

Register of the Pluviometer kept at Nagpore by H. C. Ludlow, M. D., Residency Surgeon.

	1833.		1834.		1835.		1836.		1837.		1838.		1839.		1840.	
Feby.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.
26	..	..	..	0·20												
Total.	..	..	..	0·20												
April.																
2	..	..	0·49	0·36 0·40												
Total.	..	..	..	0·85												
May.																
12	..	0·80	..	..												
14	..	0·30	..	..												
18	..	0·2	..	..												
20	..	..	..	0·4												
21	..	..	..	1·78												
27	..	0·3	..	0·18												
31	..	..	..	..	..	..	..	..	..	..	..	..	..	1·16	..	..
Total.	..	1·15	..	2·00	..	..	..	..	..	..	..	..	..	1·16		

	1833.		1834.		1835.		1836.		1837.		1838.		1839.		1840.	
June.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.
1	..	..	..	..	0·40	0·32	..	..	..	..	..	..	..	..	..	..
2	..	..	..	..	0·03	..	..	..	..	..	..	..	0·92	..	..	..
3	..	..	..	0·02	..	..	..	..	..	..	..	..	..	..	..	..
4	..	..	..	..	0·30	0·12	..	..	..	..	..	1·10	..	..	..	..
5	..	..	..	..	..	..	..	..	..	..	0·08	..	..	0·56	..	..
6	..	..	..	0·15	..	..	0·48	..	..	..	..	..	..	1·26	..	0·17
7	..	..	..	..	..	0·05	..	0·05	..	..	..	..	0·76	0·59	..	..
8	..	..	..	..	..	0·04	0·05	0·03	..	..	..	..	..	..	..	..
9	..	..	..	..	..	0·13	0·26	0·14	..	..	..	..	..	..	..	..
10	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
11	..	..	0·53	1·10	..	..	..	0·11	..	..	..	0·25	..	..	..	2·74
12	..	..	0·06	..	0·13	..	0·80	..	..	..	0·29	..	..	..	..	..
13	..	..	..	·10	..	..	..	..	..	..	0·30	..	..	..	..	..
14	..	0·07	0·15	2·93	·03	..	..	0·16	..	..	..	..	..	..	0·14	0·12
15	..	..	..	0·08	..	1·15	0·09	0·06	..	..	..	..	..	..	..	0·74
16	..	..	0·10	..	0·06	·4	0·05	..	..	..	..	..	..	..	..	0·11
17	..	..	0·00	0·53	..	·80	0·10	0·11	..	..	0·90	0·11	..	..	..	1·89
18	..	..	..	..	0·15	·10	1·40	·22	..	..	..	..	..	..	..	..
19	..	..	..	..	0·40	..	..	0·06	..	..	..	1·45	..	..	0·14	0·78
20	..	..	0·06	..	..	..	..	..	..	..	0·33	..	..	..	..	6·02
21	..	..	..	1·08	..	..	1·20	0·05	..	..	0·03	0·22	..	..	..	..
22	..	·13	0·14	..	..	..	..	..	0·78	0·05	0·06	0·04	..	..	..	..
23	..	·5	1·34	..	0·03	0·30	..	..	..	..	..	..	..	..	..	..
24	..	..	..	..	0·30	..	0·06	0·35	..	..	0·31	..	..	..	..	..
25	..	..	..	..	..	..	..	..	..	..	..	0·25	..	..	..	..
26	..	0·22	..	..	..	..	0·11	..	..	..	0·78	0·39	..	..	..	..
27	..	..	..	..	..	·12	..	0·30	..	..	0·06	0·74	0·58	..	..	..
28	..	..	0·08	..	..	..	0·04	..	0·04	..	..	0·19	..	..	..	..
29	0·21	..	2·82	1·03	..	..	..	..	·27	..	0·60	0·32	1·27	..	..	..
30	..	..	..	·52	..	..	..	0·30	..	..	0·70	0·86	..	..	..	..
	0·21	0·47	5·34	7·54	1·86	3·17	4·58	1·94	1·9	0·05	4·44	5·92	3·53	2·41	0·28	6·57
	..	0·21	..	5·34	..	1·86	..	4·58	..	1·9	..	4·44	..	3·53	..	0·28
Total.		0·68	..	12·88	..	5·03	..	6·52	..	1·14	..	10·36	..	5·94	..	0·85

July.	1833.		1834.		1835.		1836.		1837.		1838.		1839.		1840.	
	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.
1	0·35	..	1·54	0·18	..	..	0·20	0·4	..	..	..	..	..	..	..	..
2	..	..	0·08	..	..	..	..	..	..	0·04	..	..	..	..	..	..
3	..	..	..	..	..	..	..	..	..	0·87	..	..	..	..	..	..
4	..	..	..	..	..	..	..	..	0·29	..	..	..	0·60	..	1·17	..
5	0·25	..	1·28	0·58	..	..	..	..	1·3	..	..	..	..	..	0·13	..
6	..	0·03	0·13	0·32	..	0·20	..	..	..	3·42	..	..	..	1·27	0·11	..
7	..	..	·14	1·2	.4	..	..	0·95	..	0·58	..	..	..	2·70	0·69	0·97
8	..	..	..	..	..	..	0·28	0·26	..	0·66	..	..	1·07	..	2·42	0 54
9	..	..	..	..	·3	..	0·11	0·12	..	..	..	..	..	0·24	..	..
10	..	..	0·18	..	..	..	..	1·45	0·24	..	..	..	..	0 85	..	..
11	0·19	2·47	..	..	..	..	0·05	..	..	..	..	..	0·57	0·70	0·97	2·12
12	..	5 50	0·58	0·38	0·18	..	0·60	..	..	..	..	..	1·14	0·28	0·46	0·86
13	0 50	..	0·33	1·22	..	..	0·03	0·10	..	..	..	..	0·60	..	0·51	..
14	..	0·02	0·15	0·14	..	..	..	0·15	..	..	..	..	..	..	..	..
15	0·18	..	2·40	..	..	..	0 26	0·09	..	..	..	1·02	..	..	..	..
16	..	..	..	0·20	0·35	0·08	..	..	..	..	0·70	..	0·29	0·16	..	0·89
17	0·24	..	0·03	0·38	0·52	..	0·07	0·09	0·20	..	..	..	..	..	0·56	0·11
18	..	..	..	..	0·67	..	..	..	0·75	0·14	..	..	..	..	0·09	..
19	..	..	0·56	0·38	..	0·30	..	..	0·34	0·22	0·33	1·10	..	..	0·14	..
20	0·05	..	..	0·32	..	..	..	..	0·56	..	0·67	0·49	0·57	0·14	..	..
21	0·03	..	..	0·22	..	..	..	..	..	..	..	..	0·26	0·17	..	0·89
22	..	..	0·25	..	..	..	..	..	..	..	..	..	..	0·28	0·41	0·47
23	0·03	..	..	..	..	..	..	..	..	..	..	..	1·18	0·06	0·22	0·36
24	0·011	..	0·42	0·03	..	..	0·06	2·64	..	..	..	..	0·03	1·25	0·18	3·10
25	0·015	1·05	0·05	2·18	..	..	..	..	..	0·25	..	..	2·34	0·37	1·08	0·32
26	0·30	1·78	2·90	0·45	..	..	..	..	0·15	0·95	..	..	0·69	0·04	0·05	0·68
27	0·98	..	..	..	..	..	0·12	0·10	0·54	0·42	..	..	0·02	..	0·03	....
28	..	0·50	..	..	0·12	..	0·14	0·70	0·56	..	..	..	..	..	..	..
29	..	..	0·75	0·45	..	..	0·25	0 3	..	..	..	..	..	0·47	..	..
30	..	0·57	0·15	..	..	..	..	..	..	..	..	0·43	..	..	0·47	0·14
31	0·08	..	..	0·03	0·72	..	0·24	1·32	..	..	0·18	0·06	..	..	..	..
	3·44	11·92	11·92	8·48	2·63	·58	2·41	8·04	5·57	6·64	1·88	3·10	0·36	8·98	9·69	11·45
	..	3·44	..	11·92	..	2·63	..	2·41	..	5 57	..	1·88	..	9·30	..	9·69
Total.	..	15·36	..	20·40	..	3·21	..	10·45	..	12 21	..	4·98	..	18·34	..	21·14

Aug.	1833.		1834.		1835.		1836.		1837.		1838.		1839.		1840.	
	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.
1	0·70	0·12	0·10	..	..	..	0·45	·15	..	..	0·90	0·70	..	..	..	1·39
2	..	..	..	0·15	..	..	..	..	..	..	1·16	0·16	..	..	0·06	..
3	..	..	0·38	0·30	..	..	..	..	..	..	0·38	0·07	..	..	..	..
4	..	..	0·03	0·58	..	..	..	..	..	..	..	..	..	..	..	..
5	..	..	0·70	0·20	0·06	..	..	0·18	..	..	0·19	..	..	..	0·08	0·03
6	..	..	0·03	..	0·10	..	..	0·82	..	..	..	..	..	..	1·23	0·82
7	..	..	0·08	..	0·04	..	0·18	0·48	..	..	..	..	..	..	0·67	0·24
8	..	..	..	..	..	..	0·32	0·52	..	..	..	..	..	..	0·03	..
9	..	..	..	..	..	0·08	0·12	..	..	..	..	..	..	0·46	..	..
10	..	..	..	..	..	0·80	0·05	..	1·12	0·52	0·25	0·11	1·30	..	0·11	0·78
11	..	..	..	..	..	..	..	..	..	..	..	..	0·86	0·11	1·57	0·2
12	..	..	..	..	1·10	..	0·40	0·12	..	..	..	..	1·60	..	..	..
13	..	..	..	..	·80	0·10	0·04	0·10	..	1·73	0 03	0·28	..	..	..	..
14	..	0·18	..	..	0·00	..	0·55	..	1·71	..	..	..	..	..	..	..
15	..	0·58	..	..	..	..	..	..	..	..	..	..	..	..	..	..
16	0·10	..	..	..	1·20	..	..	..	..	..	..	..	..	..	..	..
17	..	..	..	..	0·20	0·12	..	0·25	0·31	0·29	..	0·49	..	..	..	..
18	..	..	0·21	1·00	..	0·12	0·03	0·3	0·61	0·51	..	0·93	0·78	0·57	..	..
19	..	..	0·38	..	0·25	..	..	0·20	0·19	0·90	..	..	0·12	..	..	..
20	..	0·03	0·15	..	..	0·12	0·90	0·28	..	..	..	..	..	..	..	..

Aug.	1833.		1834.		1835.		1836.		1837.		1838.		1839.		1840.	
	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.
21	..	..	0·32	..	1·56	1·70	..	..	0·21	0·22	..	..	0·80	..	..	..
22	0·60	0·68	0·92	..	0·30	0·10	..	..	0·12	..	..	..	..	..	2·12	0·09
23	1·30	..	0·18	..	0·20	0·32	..	..	..	..	..	..	..	1·57	..	..
24	..	1·30	..	..	0·82	1·90	..	..	..	..	..	..	0·66	0·16	0·62	0·03
25	0·08	..	..	..	0·12	0·72	0·35	0·23	0·18	0·11	..	..	..	..	0·32	0·19
26	..	..	..	1·50	1·13	0·14	..	0·12	..	2 47	..	..	..	..	2·40	0·11
27	..	..	0·12	0·28	0·03	1·4	..	..	4·41	1·98	..	..	..	..	..	..
28	..	..	..	..	..	0·32	..	..	1·3	0·27	..	..	0·08	3·22	..	..
29	..	..	..	..	..	..	..	..	0·14	..	..	..	0·06	..	..	..
30	..	..	..	..	..	0·25	..	..	..	..	..	..	0·08	..	..	..
31	0·03	0·40	0·15	..	..	..	..	..	..	..	..	..	..	..	..	..
	2·81	2·29	3·75	4·1	8·2	7·83	3·39	3·48	9·3	9·	2·91	2·74	6·34	6·9	9·21	3·70
	..	2·81	..	3·75	..	8·2	..	3·39	..	9·3	..	2·91	..	6·34	..	9·21
Total.	..	5·10	..	7·76	..	15·85	..	6·87	..	18·3	..	5·65	..	12·43	..	12·91

Sept.	1833.		1834.		1835.		1836.		1837.		1838.		1839.		1840.	
	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.
1	0·03	0·05	..	·70	..	0·48	1·12	..	..	..	..	..	..	..	..	..
2	..	0·03	1·15	0·08	1·65	0·84	0·80	..	0·17	..	..	..	..	..	..	0·03
3	..	..	0·6	0·42	0·10	0 24	0·12	..	0·12	0·21	..	..	..	..	..	0·09
4	0·40	..	1·5	0 62	0·05	..	..	..	..	..	..	..	..	..	0 57	0·24
5	..	..	0·90	0·03	·50	0·16	0·03	..	..	..	..	..	0·53	..	1·48	3·13
6	..	0·42	..	..	·34	0·05	0·06	..	..	..	..	..	0·38	..	0·3	0·03
7	..	..	..	..	0·06	..	..	..	..	..	..	..	..	..	·34	0·39
8	..	0·32	..	..	..	0·04	..	..	..	..	..	..	0·59	..	0·09	..
9	0·32	..	0·16	0·11	0·03	0·092	..	..	..	0·09	..	..	..	·32	..	..
10	..	..	0 34	0·06	0·80	0·004	..	..	0·04	0·06	..	..	..	..	..	..
11	..	..	1·40	..	0·35	0·29	..	..	0·21	1·37	..	..	..	..	0·46	0·31
12	..	..	0·92	..	..	..	..	..	..	..	..	..	0·09	..	1·9	..
13	..	0·14	..	..	·3	..	..	..	0·15	0·49	..	..	1·10	..	..	0·36
14	0·08	..	..	..	..	..	..	..	0·60	..	..	..	..	..	..	1·25
15	..	..	..	..	..	..	..	..	..	..	..	..	1 62	..	0·78	0·51
16	..	..	0·22	0·52	..	..	..	..	0·47	..	..	..	..	..	..	..
17	..	..	0·14	..	2·85	2·14	..	..	..	..	..	..	..	..	0·24	..
18	0·27	0·18	..	..	..	0·35	..	..	..	0·04	..	..	0·13	..	0·06	0·10
19	..	0·30	..	..	..	0·03	..	..	..	0·12	..	..	1·12	..	..	0·26
20	..	..	..	..	0·04	..	..	..	..	0·44	..	..	..	..	1·11	2·45
21	..	..	0·82	0·05	0 05	..	..	..	..	..	..	..	..	..	..	..
22	..	..	..	..	·22	..	..	..	..	..	..	..	..	..	..	..
23	..	..	..	0·08	..	..	..	..	..	..	..	..	..	..	0·34	0 34
24	0·15	1·90	0·32	..	..	..	..	..	..	..	..	..	..	..	..	..
25	0·90	1·20	0·04	..	·10	..	..	..	..	..	..	..	..	..	..	..
26	0·30	2·15	..	..	..	..	..	..	..	..	..	..	..	..	..	..
27	..	..	0·04	..	..	..	..	..	..	..	..	..	..	..	..	..
28	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
29	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
30	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
	2·45	6·9	7·56	2 67	7·17	6·18	2·13	..	1·76	2·82	..	..	5·56	·32	6·59	9·58
	..	2·45	..	7·56	..	7·17	..	2·13	..	1·76	..	..	..	5·56	..	6·59
Total.	..	8·54	..	10·23	..	13·35	..	2·13	..	4·58	..	..	..	5 88	..	16·17

Oct.	1833.		1834.		1835.		1836.		1837.		1838.		1839.		1840.	
	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.	Day.	Night.
5	..	0·12	0·30	·06	..	..	..	..	..	..	..	..	..	..	..	..
6	..	..	0·45	0·30	..	..	..	..	..	..	..	..	..	..	..	..
7	..	..	0·03	..	..	..	..	..	..	..	..	..	..	..	..	..
12	..	..	0·83	..	..	..	..	..	..	..	..	..	..	..	..	..
13	..	..	..	1·12	..	..	..	..	..	..	..	..	..	..	..	..
16	..	..	..	·86	..	..	..	..	..	..	..	..	..	..	..	..
17	..	..	·16	1·92	·40	..	..	..	..	..	..	..	..	..	..	..
27	..	..	..	0·42	..	..	..	..	..	..	..	..	..	..	..	..
28	0·15	..	0·03	0·52	..	..	..	..	..	..	..	..	..	..	..	..
	0·15	0·12	1·80	5·20	0·40	..	..	..	..	..	..	..	..	..	..	..
	..	·15	..	1·80	..	0·40	..	..	..	..	..	..	..	..	..	..
Total. .	..	0·27	..	7·00	..	0·40	..	..	..	..	..	..	..	..	..	..

IV.—*On the Coral Islands and Coral Banks of the Red Sea, and on the improvement of the knowledge of the organization of small bodies by the aid of the Microscope.—By Professor Ehrenberg.*

The discoveries of Dr. Ehrenberg of Berlin, in the history of Infusoria and the Polythalamia tribes of animals which are only visible with the aid of powerful microscopes; and the astonishing fact brought to light, proved and magnificently illustrated by him, of their remains forming great rock formations in various parts of the world, have delighted the general enquirer, and have elevated the German Naturalist and traveller to a level with the first Philosophers of the age. Mr. Weaver, an eminent English Geologist, has recently given a sketch of these researches, with the view of drawing the attention of English Naturalists to a subject, which "involves no less than an investigation "as to what extent minute organic bodies, invisible to the naked eye, "may have contributed to the production of all limestone formations, "whether of an age posterior or anterior to the chalk, descending thus "to the primary limestones." This sketch he commences by an outline of Dr. Ehrenberg's earlier researches, concerning the Coral tribes in general, and those of the Red Sea in particular, which gave origin to his new views of the structure of the Polythalamia, and of the formation of the rocks in which they abound.

At the instigation of the Royal Academy of Sciences of Berlin, Dr. Ehrenberg visited Egypt, Syria, Arabia, and the Eastern declivities of the Highlands of Abyssinia, in the years 1820 to 1825, and devoted many months to the investigation of the Coral animals of the Red Sea. The results of these researches were given to the world in two papers published by the Berlin Academy in 1833 and 1834. The first entitled "Contributions to the Physiological knowledge of Coral animals in ge-"neral, and in particular of those of the Red Sea, with an attempt to "classify them according to their Physiological distinctions: the 2d, "On the nature and structure of the Coral banks of the Red Sea." These works, besides the results of observations made at nearly 150 different points of the Red Sea, and descriptions of no less than 110 of its Coral animals (or three times the number formerly known), contain the most important general views and a critical examination of the labours of former Naturalists.

Many abstracts and sketches of these papers have appeared in English Literary and Scientific Journals, but neither have yet been translated or given in such a way to the English Student, as to enable him to

use them in his own researches. Having, therefore, procured copies of these papers, and the assistance of a well qualified translator, the Editor thinks that he cannot do a more acceptable service to the cause of Science in India, and especially in Bombay, than to put it into the power of all whose duties carry them to the Red Sea or Persian Gulf or who reside near our own shores, to read these observations.* On a future occasion he may introduce his readers to the more recent discoveries of the German Professor, on the composition of Chalk rocks and Chalk marl by invisible organic bodies; an investigation founded on these researches on Coralline animals, and on the structure of Egyptian Rocks, and on which the limestone of Luckput-bunder in Kutch, and of the hills of Scinde afford the best means of studying and of making new observations. He has, in the meantime, selected the paper on the Coral Islands of the Red Sea, as being of most general interest.

V.—*On the nature and formation of the Coral Islands and Coral Banks in the Red Sea. By C. G. Ehrenberg.*—Read in the *Royal Academy of Sciences of Berlin* on the 22nd March 1832, and revised and printed in February 1834. Translated by Rev. C. Menge.

I. *On the general impressions concerning the life of Coral banks, and the metamorphoses of Corals.*

The natural philosophy, and more particularly the natural history, of Corals, of which the fine red Coral so well known as an ornament is but a single form and the most inconsiderable part, cannot but be extremely interesting; they are reckoned among the most numerous, the most curious, the most unknown, and the most influential forms of organic life. Masses of lime-stone which are produced by them when mixed with layers of shells, sometimes form high ridges of mountains, and sometimes cover the soil to a considerable distance, and their fossil remains serve the attentive Geologist, as marks of the changes and the epochs of the formation of the different parts of the earth. But these remains of Corals which are much admired in Mineralogy, and used for important purposes, are found only in a state of decay, without life, and in fragments. Far more interesting do their forms appear to the traveller who touches the coasts of the South-sea, and sees them alive in their dwellings, which extend to enormous distances. There the flower-like animals of the vegetable Coral stems vie in the brilliancy of

* The sea around Bombay itself abounds in Corals, easy of access, and which may be studied in their native habitats by any who walk along the shore of Back-bay at low water.

their colours with our most beautiful flowers, and if the refraction of the light on the water did not hinder the view of a large surface under the water, the mass of what is beautiful, living and flower-like which covers the shallow ground of the sea, would present the picture of our gay meadows and fields in spring; yea, he who has seen the heaths of Circassia in Asia would be reminded of the carpet of tulips which spreads to a very great distance, and forms, under favourable circumstances, an enchanting and fairy counterpart of our beautiful little gardens.

Although it is impossible for us to have such an extensive view over the fields of Zoophytes which are commonly called Coral banks, as we have over the gardens and fields of our common plants, yet even travellers, who do not as professional Naturalists examine and delight in the construction and the laws of the forms of organic bodies by confronting and comparing them systematically, will be most agreeably surprised and enchanted by the rich variety of forms and hues of these living flowers, which are sometimes of metallic brillancy, sometimes of the most delicate tints. These inhabitants of altogether another world, pass like the pictures of the Kaleidoscope before the eyes of the landsman, who either walks along the shallow coast, or in a calm sails slowly in his boat over Coral banks. He sees clusters of shrubs and bushes on and around masses of stone apparently polished, which, themselves shining with brilliant metallic hues, indicate something more than mere masses of rock.

However, he who sails in a small vessel during a calm, enjoys a happier and richer view of these inhabitants of a new and to him unknown world, upon the luxurious Coral banks of the high sea, than he who travels along the coast, where the unequal depth of the sea produces only a few crippled specimens of this kind. At length, much excited and burning with curiosity, he steps into a boat, and endeavours in a shallow place to lay hold of some of the most beautiful of these forms, in order to examine them more minutely. The crew who on such occasions willingly assist, or he himself step out into the water, but as soon as they touch the ground of the Coral banks all those brilliant colors which an instant before beautified this spot, gradually disappear. The shrub-like brilliant red object, which a moment before had so vividly excited the attention and admiration of the traveller, is taken up out of water a brown insignificant mass, and upon examination it is found that the

form which appeared just now so graceful, delicate and gay to the eye, is a hard limestone, rough and covered with a thin brown slime. The traveller fancies he has been mistaken, and repeats his exertions and labours with no better success, till he is persuaded that here a change has taken place, which he, according to the turn of his mind, either calls a miracle and ascribes to enchantment, or esteems a remarkable phenomenon worthy of laborious and accurate examination.

The traveller who prosecutes his researches in the South-sea is more and more amused with this enchanting world. He observes here in the Coral bed a splendid living creature of a fiery red or brilliant emerald green colour, covered with numerous variegated threads and fringes very much like a large purple Pioni.

If approached within a short distance it seems to disappear, and in its place we find only a shrivelled, fleshy, shapeless grey mass. It was a sea-anemone, of which some appear to be 2 feet in diameter, and suddenly contract themselves to within half a foot, and sometimes 3 inches.

Small fishes, which are scarcely a few inches long and never grow larger, of a splendid gold, silver, purple and azure colour, play round the flower-like corals, like the colibris (Humming birds) in America, which play round the flowers of tropical plants. Curiously formed snails (Aplysiæ) without any shell, of a beautiful colour, gnaw the leaf like arms of the mollusck, just as caterpillars and garden snails gnaw the leaves of plants. Particularly interesting are certain forms which appear so perfectly like the leaves of mushrooms, that every traveller's attention is immediately directed towards them. They are found with long aculeated sea-hedge-hogs, gaping giant shells of various colours, ciliated porcelain shells, and others buried in sand between the Coral stems; they appear in the water of a brownish and sometimes glaring red colour, with a beautiful green disc, which sometimes has a red ring, and sometimes radiated brown stripes. If they are touched, their splendid colours vanish, and if exposed to the air, they appear like petrified leaves of mushrooms without a trace of life, and merely covered with a very thin slime of a brownish colour, which can scarcely be scraped off with a knife, and the experienced observer alone perceives the mollusck which forms this large fungus form stone which is sometimes a foot in diameter.

These strange metamorphoses are facts long ago known and noted

down in the annals of mankind. The ancient Greeks, who were only acquainted with the fine red Coral of the Mediterranean, which was much valued, called these soft and delicate bodies, which are changed into stone if roughly touched, and which they believed to be plants—Virgins of the Sea, Κώζη or Κούζη ἅλος, from which, as linguists have observed (Heinsius ad Metam. IV, 749) afterwards the ancients have formed the word Curalia and Corallia. We can easily imagine that Ovid, the Latin poet of metamorphoses, did not overlook these remarkable and strange changes. The following verses of his prove it:

"Sic et Curalium, quo primum contigit auras
"Tempore durescit: mollis fuit herba subundis."

"As the Curalium also, as soon as it touches the air is suddenly changed "into a stone; it was a soft plant in the sea." Afterwards Pliny (LXIII, c. 25, and XXXII, c. 2.) gives a fuller account of these changes, and derives the word Curalia from the Greek word Κουσὰ (the act of cutting off,) because they are cut off under the water; however neither is this derivation correct nor the above probable. Pliny mentions the Soldiers of Alexander the Great, and King Juba II. as authorities for the sudden petrifaction of Corals. Solin observes that Metrodorus called the Corals *Gorgia* from the Orator Gorgias in Thessaly (according to Pliny in Sicily) who reached an age of 109 years, or (according to Pliny: VII. 48,) of 108, or (according to Cicero de senectute, c. 5,) of 107, as if they were petrified by age, which was afterwards probably by metonomy changed into the known word Gorgonia, a name given by Linne, and other modern writers to the Horn-Corals; although on the contrary, the Gorgones produced petrifaction by their appearance, and Pliny calls only the red Stone Coral, as a precious stone Gorgonia (L. XXXVII c. 10.), Ovid tells us (Met. IV. 749) that Perseus, after he had killed Gorgo, put her head upon sea-plants, which in consequence became immediately petrified, and which now become petrified as soon as they are exposed to the air. Perhaps Ovid's Poetical dress has given occasion to authors of later times to call them Gorgonia instead of Curalia, for he himself does not give them that name. Dioscorides at the time of the birth of Christ, mentions the Corals (Κοράλλων) among plants, and addeth, the Corals are, as generally known, sea-plants, which are also called petrified trees (Lithodendra). Before Dioscorides, already Orpheus mentions them, perhaps 1200 years before Christ, if the work is not written by a more recent Orpheus, and speaks of them as peculiar minerals, and praises

the effect of the Κουζαλώιο against the bite of scorpions and serpents. Likewise Theophrastus, disciple of Aristotle, says in his book on Mineralogy 260 years before Christ: "also the Curalium (Κουζάλιον) is like a stone of a red colour, and grown on a root (πεζιφιζες perhaps πεζιφυες?)" In the Zoology of Aristotle the name is not found.

The earliest notice by an eye witness respecting the sudden petrifaction of the soft Corals, which I have met with—for all the notices of this circumstance given before this, are evidently not authentic, and only from hearsay, as they speak of the cutting off Corals (a thing quite impossible)—is given in Monconnys' Journal in the year 1630, which has likewise reference to the Red Sea, and which, as Strabo and Pliny had already observed, abounds in Corals. Monconnys' words, as it appears to me, have been frequently copied by modern authors without mentioning the source, although they have always altered and added several things, because the wonderful is more liked than the truth. This French traveller gives in his Journal the following account:—

"After dinner we caught in the Red Sea the species of petrified mush-
"rooms, shells, and all sorts of shrubs which are above described, and
"which are found in abundance in long tracts, because the sea is there
"so shallow, that one can, as in a well, distinctly see all that lies on
"the bottom, and the ground is completely filled with such plants of
"various colours, which at a distance appear like purple, and make me
"believe that they have given the sea the name of the Red Sea." *

"Curiosity induced me to step myself out of the boat and walk for
"more than a mile along the shore, where I amused myself for several
"hours in gathering a great quantity of such shrubs, fungi, and shells.
"The fungi are hard and grown on the sand; I could not feel any with
"my feet, although I frequently tried it, and those that were taken up
"are red and hard; but in order to whiten them, they are laid on the
"shore, where they are washed by the waves and dried by the sun, and
"thus become white. As long as these shrubs are imperfect or not
"quite ripe, some of them are like the moist mushrooms growing on
"old trees, and others like the granulated feet of the sea-spider; they
"are soft, and so full of water that one can strain them like a wet

* This remark is not without prejudice, because the brownish tint of the Tang and Coral plains is neither purple nor peculiar to the Red Sea. The Red Sea is remarkable rather on account of its depth than on account of its shallowness, as generally only a small strip of the coast and the Coral banks form shallow places, of which I shall afterwards give a fuller account.

"sponge. In this state they are of all sorts of colours: blue, violet, "grey, brown, green, white, which has a wonderful effect."*

So far Monconnys. But if the account of this traveller is attentively perused again and again, there exists almost no doubt that he himself had only observed the hard Corals, and that the account of these bodies being at first sought, has been received from the mouth of the Arabs who accompanied him.

As far as I am aware, the first authentic account of the soft Corals is given by Hans Sloane in his Journal. He was made President of the Royal Society in London, and at the end of the 17th century (1695) visited Madeira and Jamaica, and published a large well known work in 2 folio vols., with many prints rather harshly executed. In the first part of this work, page 55, he says that the Star-stones (Lappiddes astroite Astracæ) when young are soft; and on plate 21, fig. 1 to 3, there are prints of one of them with the name Lapidis astroitis sive stellaris primordia (young of the Star-stone.) But he thinks that very different kinds of various species of the Star-Corals are only various degrees of perfection of one and the same soft form and represents a petrifaction from England as the most perfect of them. In the first instance he says the Star-stones are jelly like as the white of an egg or star-shoots! and afterwards they become opaque. But there is no doubt, that this traveller mistook the leather Corals, which never become hard, for young, still soft stone-corals; and already in the year 1776, Ellis and Solander justly consider the drawing made by him to be that of the Wart-Zoanthe (Alcyonium mammillosum, or Mammillifera mammillosa.)

Nearly a whole century after Monconnys (1720), the celebrated divine Thomas Shaw visited the East and the Red Sea, just at the time when the observations of Count Marsigli respecting the vegetable nature of Corals excited much interest in France. Fancying, as he did, these bodies to be of a vegetable nature, he mistook the well-known rays of the animalcula for small roots, and admired the wise economy of nature in their being more numerous than the simple stick roots of common plants. Although this traveller after a minute examination gave a de-

* In reference to this remark, the Medicinal-Assessor, Dr. Bruckmann, in Wolfenbuttel, inserted, in the year 1745, a small Essay in the 8th volume of the Acta Naturæ Curiosorum, under the title—Lopides fungiformes Maris rubri, which however contains nothing new or interesting; besides, as the author was not informed of the observations of Peyssonel and others, it is below the standard of perfection to which the science had already attained, perhaps on account of the difficulty of communication at that time. He has printed a fragment of the Fungia Agariciformis, and copied the text out of Monconnys' Journal. It is probable that he had seen a traveller from the Red Sea who gave him a similar account.

tailed description of a great number of the Coral species of the Red Sea, still he does nowhere mention that they are at first soft and then grow hard. He writes as follows:—

"What is wanting in Botany (on the Arabian Coast) respecting "the various classes of common plants, is supplied by the abundance "of sea-plants, as there is perhaps not a second place which contains "such a quantity of them as the Seaport of Tor. While sailing "slowly over the surface of the water I saw such a variety of Ma- "drepores, Tanges, or Alges, and other marine vegetables, that I could "not forbear thinking them a marine forest, an expression which Pliny "before me used."*

"To this comparison I was led more particularly by the branching "Madrepores, for I saw several from 8 to 10 feet high, some of them "grew pyramidically like cypresses, others extended their branches "like oaks, not to mention the infinite number of others, which like "creepers spread themselves over the bottom of the sea."

"To these branching species one may add the marine fungia, brain- "corals, star-corals, and other forms of Corals, which sometimes form "aggregates and masses of extraordinary magnitude, and are used in "Tor, not only for mortar, but also as a valuable material for building "houses. The proper marine fungia are always found on the Rock "with a sort of small root, and their furrows, unlike those of the mush- "room, are on the top." †

"This species of Coral, as likewise the brain-coral, always appears "to retain in its form a certain peculiar formation; it is true each of "the other kinds of Corals has its peculiarly formed little stars and "marks, by which it can be distinguished, but that is only on the sur- "face. For as they have not the least sign of roots, they can but be "considered shapeless masses of coral-substance, which as they gradu- "ally grow, adopt the form of the rocks, shells, and other formations, "with which they came in contact, whilst these give them their forms." Shaw, Voyage Traduct. France. T. ii. p. 85.

* Lib. XIII. c 25. Nascuntur et in mari frutices arboresque, minores in nostro. Rubrum enim et totus Orientis Oceanus refertus est sylvis. In Mari vero Rubro sylvas vivere, laurum maxime olivam ferentem baccas et cumpluat, fungos, qui sole tactimutantur in pamicem. Fruticum ipsorum magnitudo ternorum est cubitorum, caniculis referta ut vix prospicere é navi tutum sit remos plerumque ipsos invadentibus.

† From this one may easily perceive that Shaw has not found the proper free fungia, or he must have mistaken for them the sticking thistle Coral which is somewhat similar (Crayophyllia lacera) which after him only Avigny has observed near Suez in Cosseir. What he called brain-coral was evidently maeandra labyrinthica, and what he called star-corals were several sorts of the species Astraea and Favia. What Shaw calls Madrepores are generally species of Heteropora. Thus it appears that the Coral banks near Tor were very similarly inhabited in the year 1730 as a century afterwards in the year 1823.

It is quite extraordinary, that Peter Forskal, who in the year 1742, was sent by the Danish Government to accompany Niebuhr to Arabia and the Red Sea, as Zoologist and Botanist, and whom we have found on many occasions an accurate and unprejudiced observer, should have been deceived like Sloane before him, for he also mentions that he has seen Corals grow hard in the air. He says in his descriptio animalum, &c., p. 132: "His in locis observator curiosus plura detegit paucis "diebus, quam toto anno alibi. Scopuli saxa littorea hic pretiosa "sunt eruditis, incommoda navigantibus; Turcis praesertim, qui altum "more timent et inter insulares proficiscuntur. Magna putatur scientia "nauteu haec brevia prospicientis et evitantis. Discernuntur elonginquo "colore ex albo-virescente; grato oculis otiosis spectaculo; opposito "littoribus nudis, arenosis et tristibus. Usque addecem Orgyas vidi "haec saxa sungentia. Dum aquis extrahuntur, suprema parte inven- "runtur mollia inde magis magisque cartilaginosa; fundus est lapis "solidus."

From this last remark, so generally and plainly expressed, we cannot but conclude that Forskal either has observed that the soft Corals grow hard in the air, or he must have noticed that the tender sprouts and top parts of the stone-corals are always soft, the middle part cartilaginous, and the bottom part which is in the sea as hard as a stone. But although I well remembered the words of Forskal and had his book with me when on the voyage in the Red Sea, still I never could understand this remark of his.

I found all genuine stone-corals under the water up to the last points always hard, as likewise the Dutch traveller Linschoten mentioned before me in the year 1599 respecting the Mozambique-Channel, and in the year 1702 Mr. Strachan respecting Ceylon,* and the more accurate examination of the upper stars in star-corals, even when they are dry, proves this truth so clearly and convincingly that there cannot be any doubt about it.

Of course we found also a great many leather and sponge-corals, which are always soft and never become stone. It is probable that

* Linschoten says: Ces escueils (Baixos de India i. e. Bassas de India) sont pour la plais part de pierre de corals dur, argu, de couleur noire, blanche, et verde, horribles à voir—and tells us, that in May 1568 the Flag ship of St. Taques was wrecked upon them. Histoire de la navigation do Jean Hugh Van Linschoten, Amsterdam 1638, p. 149. Strachan writes as follows:—"The branches (of Coral) are not softer when they are young than when they are ripe, yet I have observed a slime upon them always when they are under water, which I suppose is the substance which petrifies." Phil. Transact. 23. p. 1248, 1702.

Forskal has been led astray by some of these branching sponge-corals, perhaps a species of the Lobularia, of which there are many very wide spreading, some of them when they are extended (especially Lob. leptocladus) are very much like the branchy Madrepores in magnitude, form, and color; and it is likely that he himself would not have published this notice respecting them, which he left in writing, but Niebuhr did not venture to omit it, having found it in the manuscript of the author. It is true the skinny extended basis of the Lobularia, through the contraction of the whole, appears to be harder than the flexible points, and as the end of the branches are thinner, they are in consequence also more flexible and even softer than the stem of Polypes which is rather thick. Perhaps these relations, together with the novelty of the thing, and the haste with which a traveller passeth by, may have contributed to lead Forskal astray. It is also likely that the remark noted down in the beginning, was not the result of his own observation, but a communication of the crew, which was to remind him to examine the matter himself at some future period. Besides Forskal calls the submarine coral-rocks, coral-mountains (montes Lytho phyti,) which cannot be said of petrifaction; and the expression he uses in the description of corals—legi in montibus Djedda septintrionalibus, clearly does not mean to say—I found them upon the mountains near "Djedda," but upon the submarine coral-rocks there.

Only in the present time through the exertions and the success of the late highly distinguished and accomplished Jules Cesar Savigny, one of the most industrious and learned publishers to the Description de l'Egypt, who unfortunately in consequence of his voyage to Egypt lost his sight, the attention of the public has been directed towards the soft coral-animals of the Red Sea, hitherto little noticed, which it is possible, by their similarity with those that become stone, have given rise to all those metamorphoses and ancient accounts respecting their being petrified in the air. In consequence of these researches and accounts which were given by Savigny, in the years 1799, 1800 and 1801, Lamarck formed a new family of corals which he called Polypes (rabuliferes); and Schweigger, who had an opportunity to examine the specimens of Zenia in the Museum of Hunter in England, which Lord Valentia had brought from the Red Sea, published in the year 1819 (Observations from Philosoph. Voyages, p. 91), a fresh and very particular statement, that there is a family of coral-like Zoophytis without a lifeless substance, which contain sometimes animals like Anemones, sometimes

like Hydræ, and run parallel with the stone-corals (p. 100.) What Schweigger only in a few broken sentences hinted at and presumed, and Savigny, probably on account of his superficial observations, never has described in detail (as will appear from the drawings, although beautifully executed), that I hope I have placed beyond doubt by many new observations in my former paper, and therefore do not repeat it here, but intend in future to treat of it in a more special manner.

As in ancient times, so only a short time ago, a very respectable traveller has entertained those ideas of their being metamorphosed. John Barrow, a celebrated voyager, and Secretary of the Board of Admiralty, is of opinion, that the islands in the Pacific are formed by coral-animals, which he describes as jelly-like worms, which are soft and pliable like wax, and only grow hard like a stone when life is extinguished. *

Barrow recommends the survey of the Maldives near Ceylon, † which according to Ibn Batuta are 2,000 in number, but according to Peyrard de Laval, 12,000. Also Captain Beechey is of opinion that he lately saw Coral-animals engaged in filling up lakes.

This experienced observer of coast and sea is of opinion, that the innumerable isles of the South sea, some of which are extensive and inhabited, have been formed by the buildings of these little creatures which rise from the bottom of the sea and gradually grow hard; and consequently allows, that they have a remarkable influence upon the formation of the surface of the earth. The importance which the Coral-animals have acquired by such a relation to the numerous isles of the South-sea, in

* In the German Journal das Ausland 1832, Nos. 16 and 18, we find the following account given by him in 1831, at a meeting of the Geographical Society in London, whose Vice-President he is. However it is not published in the 1st Vol. of the Journal of that Society. He says: Of all the revolutions produced by Volcanoes upon the surface of the earth, none "is so remarkable and so little known until the present time as that which elevates parts "from the bottom of the Ocean unto its surface or only a little beneath, which are afterwards by the plastic labors of small inconsiderable creatures, which have scarcely received a place in the Classification of the grand system of nature, changed into fertile "soil. We know very little of their physical organization and the means by which they "execute their gigantic buildings, and have given their incredible activity the term of "*instinct*, but which, like Hunter, I prefer to call the spur of necessity.

"It would appear quite incredible that these small jelly-like worms should have produced "thousands of islands and acres of land in the Atlantic, but especially in the Pacific and "Indian Oceans, if they had not been as it were always seen actually engaged in this work. "If one is aware, that these small neat pipes of calcareous matter when they are brought up "out of the Ocean, are soft and pliable like wax, and become as hard as a stone when the "life of these small animals is extinguished, one can scarcely entertain a single doubt respecting the mode of their occupation during life. Yea! the increasing number of Islands, "and their gradual growth, could no longer remain subjected to a doubt, but this work "progresses slowly and silently, and the observations are still too new and too few."

† The recent survey of these Islands afforded excellent opportunities of studying the formation of land by Coral animals, and it is to be regretted that so little has yet been communicated to the public by the intelligent officers employed. Capt. Moresby is understood to have communicated some of his observations to Mr. Darwin for publication in his work on Coral Islands, on which he has been long engaged.

like manner with many other travellers of the present time, is of too great and universal an interest, that it should not be a very proper object of the more special natural philosophy to investigate and develope these relations in a more accurate manner.

On my voyage I took care to observe not only the Corals and the general impression their forms make upon the imagination, but also more particularly the buildings of Corals in the Red Sea, and what I have been enabled to discover in company with my late friend Dr. Hemprich, who died in the midst of this occupation on the coast of Abyssinia, I am happy now to communicate.

The further communications which follow immediately those that were made here last year, are divided into two parts, viz. into a Critico-Historical enquiry into the influence of coral-animals upon the surface of the earth, to which are appended my own observations and those of Dr. Hemprich on the coral-banks of the Red Sea; and into a systematical treatise, which more accurately explains the view which was given last year, of the families and species of coral-animals, newly arranged throughout, according to physiological principles, and which distinguishes by short descriptions, those specimens which we observed in the Red Sea, and which are also found among the specimens in the King's Museum, with all which I am perfectly acquainted.

As the latter, the systematical parts, serves the former, the critico historical, as a basis, and therefore should be the first, is not well adapted for a lecture, I begin to give a short historical view of the nature and formation of coral-banks as hitherto known. *

(To be continued.)

Extracts from Proceedings of the Geological Society, London.

A letter, dated Madras, July 1840, addressed to John Taylor, Esq., Treas. G. S., by Mr. Frederick Burr, on the Geology of Aden on the coast of Arabia, was afterwards read.

The promontory of Aden, eighty miles eastward of the Straits of Babelmandel, consists of a bold cluster of volcanic rocks with lofty jagged peaks, and is connected with the mainland by a low isthmus. Its extreme length is about six miles, and its breadth is about three miles, and the summit of the highest point is about 1776 feet above the level of the sea. The loftier

* To avoid repetition, the sytematical part of this lecture has now been blended with the less special systematical view given last year, as they are printed at the same time.

portions of the promontory are wholly volcanic, and the lower are partly volcanic and partly consolidated sea-sand. The most interesting portion of the district is an immense, nearly circular crater, situated at the extremity of the promontory next the main land, and in the centre of which, upon a flat little raised above the sea-level stands the town of Aden. The diameter of the crater is about one and a half mile, and it is surrounded on all sides but the eastern with precipices chiefly composed of lava, and rising from 1000 to 1776 feet in height. Although the crater appears at first sight almost perfect, Mr. Burr says, it has been affected by some rude shocks which have cleft it entirely through from north to south, forming two rents, known as the northern and southern passes. The portion to the west of the fissures, and called the Gebel Shunsam, rising to the height of 1776 feet, stands entire; but that to the east has evidently undergone a partial subsidence, attaining to not more than half the height of the western side, and for the distance of about half a mile it has been broken down, allowing the sea to come almost close to the two and form a little bay; but the direction of the original outline of the crater is indicated by the island of Seerah, situated in about the middle of the gap.

To the northward of this great crater is an immense mass of lofty and jagged volcanic products, probably the remains of smaller craters.

The prevailing rock is a dark brown or chocolate lava, generally of a very cellular structure. About the middle of the east side of the great crater, it contains a very thick mass composed of alternations of greenish porphyry, slightly lamellar in structure, and of red ochreous clay. Near the northern pass Mr. Burr noticed a granular rook, or volcanic breccia. The inclination of the beds is generally 15° from the crater.

Numerous perpendicular dykes intersect the volcanic rocks, and are harder and more compact than the beds they traverse. Small veins of calcedony also occur.

Dr. Malcolmson, Bombay Army, showed Mr. Burr some specimens of black and green obsidian obtained on the promontory, but the conditions under which they exist Mr. Burr was prevented from ascertaining.

The deposits of consolidated sea-sand occur more especially near the northern pass, towards the base of the volcanic ridges. The stratification is diagonal, and this arrangement Mr. Burr conceives to have been produced by the drifting of opposing currents. The flat line of coast on the northern part of the promontory, the author says, is evidently a raised beach, and the consolidation of the sand he assigns to the action of a tropical sun upon the calcareous materials. The stone incloses numerous shells and corals of species existing in the Arabian Sea.

PROCEEDINGS OF THE ASIATIC SOCIETY.

27th January.

Donations to the Library.—Nos. 17—21 Wight's Icones plantarum, by Government—Malcolmson's Fossils of the Eastern portion of the Great Basaltic district of India, by the author—Translation of two Copper Sunnuds, by H. B. Crockett, Esq.

Donations to the Museum.—A Chinese Rocket, by Capt. Ramsay—Snakes and Scorpions from Aden, by Col. Dickenson.

10th February.

The resolution to establish a Quarterly Journal was carried unanimously.

Donations to the Library.—Captain Fitzgerald's Memorandum on the operation of removing the wreck of the *Equitable*, by Government—Peltier's trial for a libel against the Emperor Napoleon, by J. C. Steuart, Esq.

Captain Ramsay; H. G. Gordon, L. C. C. Rivett, and C. J. Erskine, Esqs., were elected Members.

10th March.

Donations to the Library.—Adam's third Report on Education in Bengal and Behar, by Government.—

H. B. Crockett, Esq. was elected Member.

The Rev. J. Wilson, D. D., Rev. G. Pigott, J. G. Malcolmson, Esq., Dr. Morehead, Lieut. W. Montriou, and the Secretary were appointed Curators of the Museum for the present year.

14th April.

Donations to the Library by the Court of Directors.—Sir Francis Palgrave's Ancient Calendars and Inventories, and documents illustrating the History of Scotland—Sir H. Nicholay's Privy Council of England—Excerpta e Rotulis Finum in Turri Londinensis asservatis Henrico tertio rege—Records of Caernarvon—Rotuli chartarum in turri Londinensi asservati—Inquisitionum in officio Rot. Cancellariæ Hibernensis asservatanum—Report on the Public Records 1837—Rotulorum cancellariæ Hiberniæ callendarium.

Donations to the Museum.—Preparation of the bones of the human Ear, and Insects, by Dr. Barrington—Specimens of Mohammedan architecture, by Mr. Lumsden, C. S.

Elected Members.—Rev. W. K. Fletcher, and T. S. Burke, Esq.

12TH MAY.

The Rev. Dr. Stevenson read his paper on " The Dowry received by Kakshivan."

Donations to the Library.—Appendix to the Report of the Committee of Public Instruction, *and* the Acts of New South Wales 1839. by Government—Dr. Ochterlony's Mineralogical Report on a portion of the districts of Nellore, Cuddapah, and Guntoor, by himself—1st to 20th volumes of the Pamphleteer, by Col. Griffiths.

Donations to the Library by the Government.—A view of the Evidence before the House of Commons on the petition of the East India Government for a redress of grievances—Dr. Wallich's report on the Calcutta Botanical Gardens—Dr. Falconer's report on the Botanical Gardens at Serampoor—Wight's Illustrations of Indian Botany, vol. 2, part I.—Wight's Icones Plantarum, vol. 2. part II.—Royle on the productive resources of India—Ancient Laws of England, published by the Commission on the public records. *By the Astronomical Society.*—Their memoirs, vol. II.—Reinaud's Geographic de Aboulfeda, by the author—Von. Hammer's Falkner Klee, by the author—Magnetic Observations at Trevandrum, by Mr. Caldecott.

14TH JULY.

Donations to the Museum.—A trimurti, and a collection of minerals principally illustrative of the quartz family, by Lieut. Blake. Gypsum from below the passes between Kirmansha and Bagdad, by Hon. T. Dunlop.

A portrait of Col. Sykes was presented by Col. Lester, and the Society directed that it should be framed and hung up in their rooms.

11TH AUGUST.

Donation to the Library.—Romano's Tesoro Britanico, by T. Bowman, Esq.

Donations to the Museum.—Twelve Specimens of English coal, and six illustrative of the Alum manufacture in Cutch, by J. Bowman, Esq.

8TH SEPTEMBER.

Elected Members.—B. A. R. Nicholson, A. Campbell, and L. D. A. Blane, Esqrs.

Donations to the Library.—Frere's Translation of the Frogs of Aristophanes, by W. E. Frere, Esq.—Brett's Surgery in India, by the Bombay Medical Board—Statistics of Western Australia, by the Governor of Western Australia—Translations from English Scientific Elementary treatises, by H. H. the Nuwab Shams ool Oomrah Bahadoor.

Donations to the Museum.—The present current Coins of Egypt complete with the exception of three gold coins, by Lieut. James Young I. N.—Specimens of the Coal and the rocks associated with it, from Travancore, by T. Bowman, Esq.

To A. B. Orlebar, Esq.

Secretary of the Bombay Asiatic Society, in Bombay, &c.

Berlin, Prussia, *June* 18, 1841.

Sir,

Some weeks since I had the pleasure to receive your kind and esteemed letter dated April 1, *a.e.*, and I am highly indebted to you and to Messrs. the Curators of the Bombay Asiatic Society's Museum for the acceptance of my proposal. I hastened to pack up for you two boxes of minerals, containing 400 specimens, viz., 260 minerals and 140 petrifactions. The boxes are sent to Stettin, and will be forwarded from thence to the given address in London by the first vessel, I hope they will arrive in Bombay in good order.

Permit me, Sir, to make some remarks on the things sent. I had wished, that you had given me some notices on your Museum, and on the manner of your collections. Some collections are made more for the exterior lustre, others more for the view, others more from a scientific point of view, containing not only such minerals which have a rich splendour, but also such which are remarkable by their interior chemical composition, or by their interesting form. Some collections wish only specimens of a great size, others more in a minute form. Some collections are limited to minerals; others to petrifactions; others interest themselves for Mineralogy and Geology. It is also very difficult to make a first invoice without knowing the manner of collecting, and the wishes of his friends.

However, Sir, I have done my best to make my invoice so that it may give you satisfaction. I have not sent more than 4 specimens at the most of the same sort, not having known whether it may be desired by you to receive more of them. The first 100 specimens are from Sweden; they are a result of the great travels I made in this interesting country, and they cannot be procured finer. They are distinguished less by their exterior splendour, than by their chemical composition, by their containing the most rare substances, like Eberium, Lanthanium, Tantalum, Yttrium, Lithian, &c. Then you find a number of things from Bohemia; some of these are not so good as I had

wished, but I had them not better at the time. I think to make in this summer a journey to Bohemia, and if I should succeed to collect a very fine stock of minerals, as I have no doubt, then I shall send in the autumn a third box to you. The rest are minerals from Bavaria and other parts of Germany, and from Norway, and an addition of petrifactions. I hope, Sir, that the whole will give you satisfaction, and that you may regard it like a rich enlarging of your mineralogical collections.

I request you, Sir, to send me in return in mineral from the East Indies, what you may think are just and equitable or equivalent. I am in the possession of one of the greatest and most beautiful collections of minerals we have in Europe, but I am exceedingly poor in the mineral productions of your large and unknown country. Every interesting mineral will also be desirable to me, and being in relation of exchange with the greatest part of our collectors, you may send a *number* of specimens of the *same* sort, supposing that this sort is remarkable.

Being a scholar of the celebrated Mr. Mohs, I do occupy myself particularly with Chrystallography, and consequently CHRYSTALLIZED specimens are particularly interesting and desirable to me. I do not occupy myself with Geology, and in general I do not collect petrifactions;—but if you have any remarkable thing unknown in Europe, I shall be thankfully obliged for its communication.

I wish particularly the following things:—

A rich and beautiful suit of the crystallized minerals of the Zeolite family from Poonah, viz. *Apophyllithe* xx, *Poonahlite* xx, Henlandite xx, Stilbite xx, Chabasite xx, Lanmontite xx, etc. etc.—*Red Turmaline* xx, from Benares and from Bengal. A suit of *Diamonds* from Golconda, in their different crystallizations.—Such a suit of the *Diamonds* from Borneo. *Zinkon* xx, from the Circars.—*Sapphire* xx, *Corfindams* xx, *Zirkon* xx, etc. from Ceylon.—*Indianit* (Boavnon) from the Coast of Coromandel. Tin Ores from Banco Island.—*Chryeabrul* xx, *Chryeolite* xx, *Ruby* xx, etc. etc.—But also every other interesting mineral will be desirable to me, and I repeat, that you may send me a *number* of the same sort, which perhaps you may have abundantly.

Send the return in a sailing vessel—(not per Steamer), that the expenses may be as low as possible.

I wish particularly to augment my relations of exchange with your country, and I request you, Sir, if possible to communicate to the Members of your esteemed Society the following address:

Dr. Fr. Tamnan, junior, in Berlin, Prussia, care of Mr. H. Pontoppidan in Hamburgh, offers to every scientific gentleman, who is a friend of Mineralogy, an exchange of fine and well crystallized minerals from Europe, and particularly from Germany, Norway, and Sweden, for such mineralogical productions of the East Indies.

Perhaps you would have the goodness to put those lines in your highly esteemed Journal, and I should be highly indebted to you for your complaisance.

Should you be acquainted with some scientific gentlemen, or perhaps with some public collection or museum in your country, f. i. at Calcutta, Madras, Singapore, etc. etc., which you may think able and willing to enter into such an exchange with me, then I should be highly indebted to you for the communication of their addresses to me, and of mine to them.

I took the confidence to put into one of the boxes two copies of one of my pamphlets "Monography of Chabasit," the one for you, the other for your Society. I request you to accept the first as a mark of respect and consideration, and to present the other in my name to your esteemed Society.

I hope, dear Sir, to hear from you, and I flatter myself, that the first essay of exchange will be repeated very often. I request you to agree the expression of respect and consideration, with which I have the honour to remain.

Sir,

Your most obedient Servant,

Dr. Fr. Tamnan, *junior*.

Address

Dr. Fr. Tamnan, *junior*,

Berlin, Prussia.

Care of

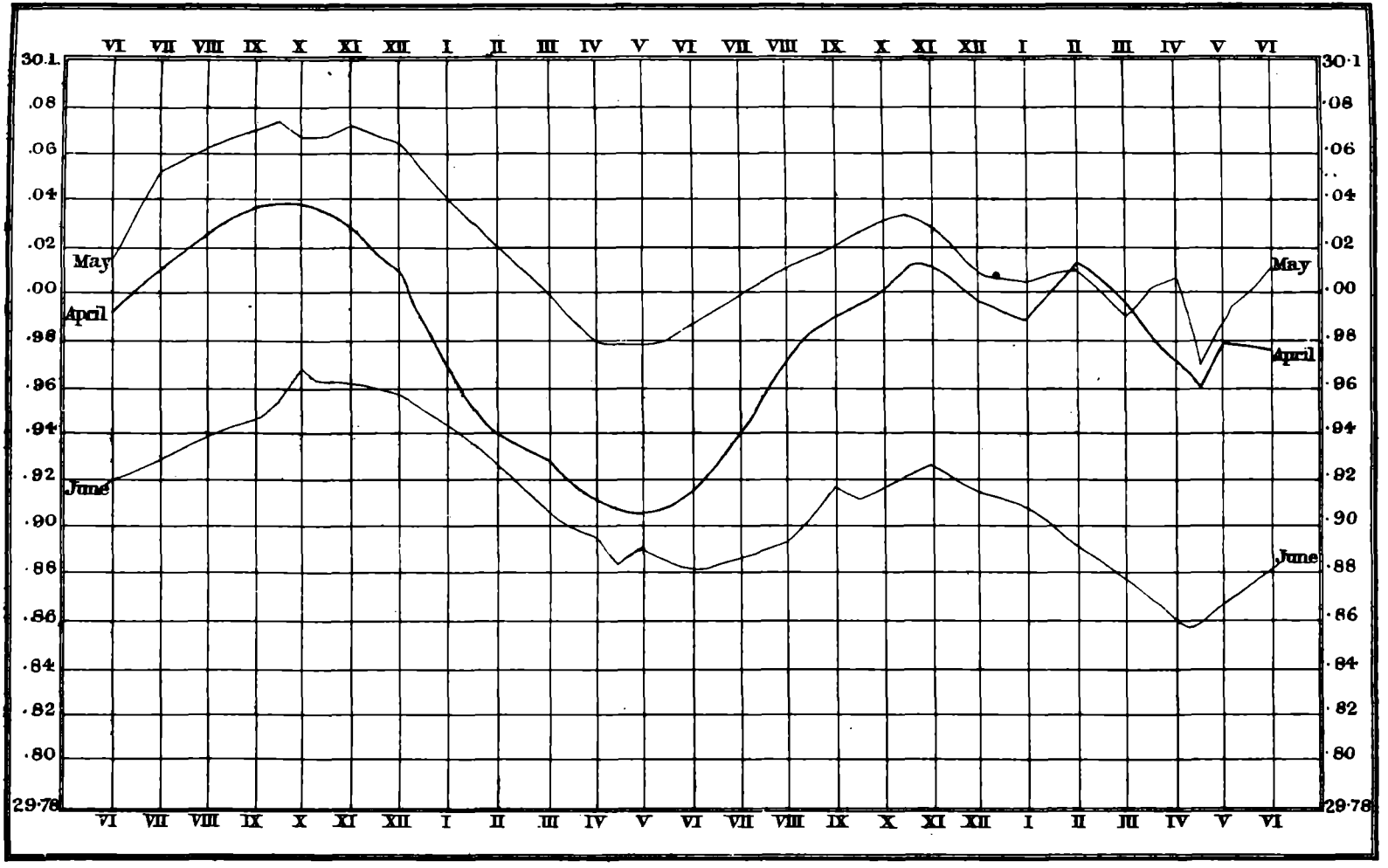
Mr. H. Pontoppidan, *in Hamburg*.

Or

Mr. Ed. Nicol, *in Stettin*.

Or

Messrs. Fr. Bohm and Co., *in Danzig*.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May
April
June

METEOROLOGICAL OBSERVATIONS, BOMBAY OBSERVATORY.

21st JULY, 1841.

Time.	Hour.	Barometer.	Thermometer. Attad.	Thermometer. Detad.	Wet Bulb.	Sympieso-meter.	Attad. Thermometer.	Winds.	Remarks.
A. M.	6	29·774	81·9	82·0	79·0	29·65	82·2	W. S. W.	
...	7	·795	82·0	82·1	79·0	·66	82·2		
...	8	·805	82·8	82·9	79·9	·67	82·9		
...	9	·820	83·2	83·4	80·0	·67	83·4	W.	
...	9½	·832	83·4	83·7	80·0	·68	83·7		
...	10	·828	83·8	84·0	80·0	·67	84·2	.....	The wind is remarked as blowing very strong.
...	10½	·828	83·8	84·0	80·1	·66	83·9		
...	11	·830	84·2	84·4	80·0	·66	84·5		
...	12	·816	84·0	84·0	80·0	·65	84·2		
P. M.	1	·796	84·2	84·4	78·6	·62	84·7		
...	2	·786	84·9	84·5	80·9	·61	84·9		
...	2½	·784	84·9	85·1	80·2	·59	85·2		
...	3	·778	83·7	84·1	79·9	·61	84·5		
...	3½	·770	84·6	84·8	80·0	·58	83·8		
...	4	·762	84·3	84·6	80·0	·58	85·0		
...	4½	·744	83·5	83·6	79·4	*·59	...		
...	5	·740	83·2	.....	79·8	*·59	...		
...	5½	·741	83·0	.....	80·0	*·60	84·6		
...	6	·743	82·8	83·2	80·0	*·62	83·6		
...	7	·750	82·5	82·7	79·0	·62	82·8	W.	
...	8	·760	83·0	82·6	80·0	·64	82·9		
...	9	·764	82·3	82·6	79·7	·66	82·7	}	Wind very high.
...	9½	·768	82·3	82·6	79·0	·67	82·8	}	
...	10	·773	82·3	82·7	79·5	·69	82·9		
...	10½	·776	82·5	82·6	79·0	·68	82·7		
...	11	·782	82·3	82·7	79·4	·70	82·9	W. S. W.	
...	12	·774	82·5	82·7	79·5	·68	82·9		
A. M.	1	·750	82·0	82·5	79·2	·63	82·5		
...	2	·734	82·1	82·4	79·5	·63	82·6		
...	2½	·710	82·1	82·4	79·4	·63	82·5		
...	3	·708	82·0	82·3	79·3	·62	82·4		
...	3½	·722	81·9	82·2	79·2	·63	82·4		
...	4	·723	81·9	82·1	79·3	·64	82·3	.....	The sky overcast with clouds throughout the day excepting about 3½ A. M., but only a few drops of rain fell.
...	4½	·726	81·9	82·1	79·3	·63	82·3		
...	5	·730	81·9	82·0	79·7	·65	82·2		
...	5½	·730	81·7	81·8	79·5	·65	81·9		
...	6	29·730	81·5	81·6	79·0	29·66	81·8	W. S. W.	

21st AUGUST, 1841.

Time.	Hour.	Barometer.	Thermometer. Attad.	Thermometer. Detad.	Wet Bulb.	Sympieso-meter.	Attad. Thermometer.	Winds.	Remarks.
A. M.	6	29·752	79·1	78·7	77·0	29.85	78·8	W. N. W.	
...	7	·767	79·1	78·6	77 0	·88	78·7	W.	
...	8	·783	79·6	79·7	77·9	·90	79·9	W. S. W.	
...	9	·802	80·1	80·1	78·4	·91	79·9	...	
...	9½	·810	81·0	80·0	78·0	·90	80·5	..	
...	10	·815	81·5	81·3	78·7	·85	81·3	...	
...	10½	·814	81·5	80·7	77·8	·89	81·2	...	
...	11	·805	81·0	80·5	77·5	·89	80·8	S. W.	
...	12	·800	81·3	81·3	78·5	·83	81·3	W. S. W.	
P. M.	1	·780	82·1	82·0	78·8	·84	82·0	...	
...	2	·770	82·5	82·2	78·7	·82	82·2	...	
...	2½	·765	82·9	82·5	78·0	·81	82·6	...	Cloudy, with rain at intervals.
...	3	·759	83·1	82·8	79·2	·79	82·9	...	
...	3½	·752	83·1	82·6	78·9	·80	82·8	...	
...	4	·756	83·0	82·2	77·0	·81	82·5	W. N. W.	
...	4½	·749	32·0	80·8	77·0	·82	81·2	W. S. W.	
...	5	·750	81·8	80·6	77·5	·82	80·8	...	
...	5½	·75	81·5	79·7	76·9	·85	80·0	S. S. W.	
...	6	·760	81·2	79·7	76·9	·86	79·8	S. W.	
...	7	·781	80·9	79·9	76·9	·88	80·0	W. S. W.	
...	8	·805	80·6	80·0	77·9	·91	80·2	...	
...	9	·817	80·0	79·2	77·4	·93	79·5	W.	
...	9½	·820	80·0	79·3	77·0	·93	79·5	...	
...	10	·817	80·0	79·4	77·1	·93	79·7	...	
...	10½	·820	80·0	79·5	77·2	·92	79·8	...	
...	11	·821	80·1	79·6	77·1	·93	79·9	S. W.	
...	12	·807	80·1	79·7	77·7	·92	79·9	S. S. W.	
A. M.	1	·793	80·2	79·7	78·0	·90	80·0	S . W.	
...	2	·780	80·3	79·7	77·6	·89	80·0	W. S. W.	
...	2½	·775	80·3	79·7	77·2	·88	80·0	...	Few clouds.
...	3	·767	80·2	79·7	77·3	·87	79·8	...	
...	3½	·770	80·0	79·6	77·0	·88	79·8	...	
...	4	·772	79·9	79·7	77·4	·88	79·9	...	
...	4½	·763	80·0	79·6	77·2	·89	79·9	...	
...	5	·770	80·0	79·6	77·2	·88	79·9	...	
...	5½	·780	80·0	79·5	77·0	·90	79·8	...	
...	6	29·788	79·9	79·6	77·0	29·90	79·8	W.	

21st SEPTEMBER, 1841.

Time.	Hour.	Barometer.	Thermometer. Attad.	Thermometer. Detad.	Wet Bulb.	Sympieso-meter.	Attad. Thermometer.	Winds.	Remarks.
A. M.	6	29·928	80·3	79·7	74·0	29·94	80·2	W. S. W.	Nearly calm.
...	7	·849	79·9	79·4	76·0	·96	79·8	E.	Wind fresh. Cirro strati and nimbi.
...	8	·870	80·9	80·5	77·0	·96	80·5	...	
...	9	·890	82·8	82·6	73·5	·96	82·3	S. E.	
...	9½	·892	83·6	82·9	76·5	·97	82·9	...	Cloudy.
...	10	·896	83·3	82·4	77·3	·97	82·3	...	Little rain.
...	10½	·890	82·5	81·8	77·0	·99	82·0	Calm.	Cirri, nimbi.
...	11	·891	82·4	82·0	77 7	·99	82·2	W.	
...	12	·875	83·4	83·4	77·5	·93	83·4	...	
P. M.	1	·852	84·9	84·7	77·4	·88	84·9	...	
...	2	·830	85·7	85·4	77·5	·83	85·7	...	
...	2½	·824	86·0	85·7	77·7	·83	86·0	...	
...	3	·822	86·1	85·8	77·9	·82	86·2	...	Cirri, cumuli, and nimbi.
...	3½	·821	86·2	85·8	77·5	·80	86·3	...	
...	4	·821	86·1	85·7	77·5	·83	86·2	...	
...	4½	·821	86·1	85·0	77·1	·84	86·0	...	
...	5	·821	86·0	85·2	76·7	·84	85·4	...	
...	5½	·831	85·2	84·0	76·7	·86	85·0	...	
...	6	·836	84·6	83·7	76·2	·87	84·2	...	
...	7	·820	82·9	82·0	75·0	·91	82·5	...	
...	8	·831	82·0	81·5	75·0	·94	81·9	...	
...	9	·845	81·7	81·0	75·5	·97	81·5	...	Cirri in a clear sky.
...	9½	·850	81·4	80·0	75·0	·97	81·4	...	
...	10	·858	81·2	80·7	74·9	·98	81·2	...	
...	10½	·858	81·2	80·6	74·9	·99	81·2	...	
...	11	·848	80·9	80·6	74·8	·97	81·0	...	
...	12	·845	80·9	80·3	74·6	·98	80·8	Calm.	
A. M.	1	·836	80·8	80·3	74·9	·95	80·7	...	
...	2	·830	80·2	80·6	74·5	·94	80·5	N. W.	
...	2½	·827	80·2	79·9	74·6	·94	80·6	W.	
...	3	·820	80·1	79·9	74·5	·94	80·3	...	
...	3½	·829	80·2	79·8	74·7	·95	80·3	...	Rain clouds gradually increasing.
...	4	·830	80·1	79·8	74·6	·96	80·3	...	
...	4½	·830	80·1	79·7	74·5	·96	80·2	...	
...	5	·840	80·1	79·7	74·6	·96	80·2	...	
...	5½	·849	80·0	79·7	74·5	·98	81·0	...	
...	6	29·855	80·0	79·5	74·3	29·99	80·6	W. N. W.	