No. X. JULY, 1845.

JOURNAL

OF THE

BOMBAY BRANCH

OF THE

ROYAL ASIATIC SOCIETY.

JULY, 1845.

I.—*Some Observations on the Geology of the Egyptian Desert*; by A. B. Orlebar, M. A.

Immediately south of the town of Cairo, the Mukattim hills present a section which represents the structure of the whole desert as far as I examined it; and here the total absence of vegetation enables one, at a single glance, fully to observe the arrangement of the various beds of which the Egyptian Desert is composed. The lowest beds consist of a dazzling white limestone, which is capped by a yellow variety; and superposed on the yellow limestone, on the east side of the landscape, rises a red hill which is formed of various sands and sandstones, in which some red beds give a colour to the whole. In general, the beds may be said to be horizontal; but their stratification is undulatory, in bold sweeps, which the nakedness of the land enables the geologist to see in frequent sections. The red hill, above referred to, rises to a considerable height, but in general, the sandstones are imperfectly developed. They seem, however, to have furnished the fine quartzoze sand, which overlies the limestones, sometimes to the depth of a foot or more, and which, driven about by the wind, is so annoying to the traveller.

No district can present greater facilities for geological research than the

Desert, and we need not here conjecture any law of superposition, as the mind has little to do; for if the eye be active, every observation must be a theory and every theory a fact. Those who have labored to trace out the strata in cultivated or jungle countries will appreciate these remarks, if they but turn their attention to Egypt.

I shall now describe, *seriatim*, the three formations, viz. white *limestone*, *yellow limestone*, and *sandstone*.

WHITE LIMESTONE.

The appearance of this rock is very much that of the chalk but it does not soil. It is sufficiently hard to be made use of for building, but is very soft and easily broken, being composed of minute uncrystallized particles of lime.

The most marked characteristic of the rock is the abundance of nummulites, which seemed to me to be larger in the lower beds than in the upper. The *neritina grandis* is also very common, as is the *clypeaster varians*, and fossil crabs of the genus *carpilius*. The rock in many parts is wormed through and through by cylindrical bodies, which I take to be branching coral. The fossils in this formation are very numerous and well preserved, the shells having only lost their colour. I found no bones, but a piece of dicotyledonus wood, with central pith and seven concentric rings.

Its thickness must be very great; for beyond the spot where travellers are usually taken to visit the fossil forest, the Pasha (March 1844) was sinking a shaft in search of coal, and they had then sank 328 feet through the formation.

The beds of white limestone are parted by beds or seams of black clay. In the Pasha's shaft there were three such beds, the uppermost twenty feet thick, the next eighteen, and the lowest ten feet. In one of these clay-seams, in the Mukattim hills, there were many arborescent iron markings between the dry laminated strata.

The Pasha was induced to sink this shaft after the discovery of a black mineral, which his Officers, (but not his professed mineralogist, who unsuccessfully endeavoured to undeceive the Officer who conducted this vain speculation,) have supposed to be coal. It is mineral pitch, and coats the fossils in a very curious manner, making a black and white rock. I found some crystals of carbonate of lime at the mouth of the same shaft;

and also some of the lower rock, which contains sulphur, and blackens on exposure to the atmosphere. I found no where in this rock any other mineral, or pebble, or imbedded fragment.

It is extensively quarried for building. The pyramids are built on and of it, except the casings of the principal chambers.

Yellow Limestone.

This is a thin formation, not exceeding 60 feet at the most in thickness. It is much more rich in fossils than the white beds, but they are by no means so well preserved. Casts only remain in most cases, particularly in the harder beds. In the softer beds, they are much better preserved; and in the lower part of this series there are partings of black and of yellow clay, and in the upper part the lime is intermixed with quartzoze particles.

The yellow limestone also contains nummulites, but they are smaller in its lower beds than in the white limestone, and disappear altogether in the upper beds.

The series of beds are very strongly marked off by characteristic fossils, which are much better grouped than in the white beds. One of the lowest beds contains a vast quantity of coral, belonging to the genus *eschara*, with fragments and spines of *echinidæ*. Another a little above it has *anomia placunoides* in situ, with bone of a *mammalia!* Higher up is an oyster bed. *Turitella egyptiaca* is quite characteristic of another, and *Cerithi* a characterize a higher one. The highest fossiliferous bed in the Mukattim hills abounded with very large *solens* like the common razor shell. The highest fossiliferous bed, a few miles N. E. of the middle station, is formed of oysters, *pectens*, *anomias* and *scutellas*, upon which barnacles are fixed, all heaped confusedly together in vast numbers. The same bed may easily be studied just behind the third station.

The fossils in the softer beds, particularly the corals, are sometimes coated with rust.

The uppermost bed, are *unfossiliferous* and abound in common salt and gypsum. The gypsum is fibrous, and in thin seams. The salt frequently reddens the soil, and being washed down the tali of little hills by the rains, gives the whole of them a red tint, which is not unpleasing in the general yellow hue of the desert landscape, but deceives the geologist, at first sight, with the expectation of finding a distinct formation.

SANDSTONE.

The structure of this rock is very various, although its sole mineral constituent is quartz. It forms the whole of the red hill near Cairo, where it may be studied with great advantage. In some parts it is a light yellow sand, in others a hard black rock, in others a conglomerate, in another a compact white quartz rock; and frequently it has a red tinge. The brown Egyptian pebbles belong to one of its conglomerate forms.

The well known fossil trees lie in this sandstone, which is found overlying the yellow limestone throughout the desert.

The stratification of the red hill at Cairo is horizontal, but in the centre of it there is a white quartz rock, which is extensively quarried. At first sight this quartz rock appears an immense eruptive mass; but, on nearer approach, it is found to contain rolled pebbles; the lines of which are continued into softer sandstones, which lie against the quartz rock as a mound of earth thrown up against a wall. There can then be no doubt but that the whole extent of each of these lines of pebbles has been deposited at the same time; consequently the softer portions are the deposition in its original state, and the original sand has then undergone some action, in a vertical direction, which has metamorphosed vertical portions into a compact quartz rock.

No shells or fossils of any kind, but silicified wood, could be discovered in any locality of this sandstone, which I examined carefully for some distance south-wards of Cairo, as well as along and about the road from Cairo to Suez.

The superposition of this sandstone upon the yellow limestone is very easily seen, on the angle of the hill towards Cairo, by clearing away the rubbish a little. A little spur from the main hill is capped by the black sandstone; under this is the salt and gypsum deposit; and then come the upper beds of the limestone in their descending order. The same may be traced, although not with equal facility, all around the western base of the hill.

The superposition may be also easily seen, under the hills which appear to the northeast of the middle station, at the locality where I found so rich a bed of *pectens* and *scutellæ*.

Along the usual road to the fossil forest, this sandstone lies in such a manner, at the base of the hills, as to have the appearance of a dyke burst

through the limestones. Its structure however, the geological character of the red hill, and every positive evidence which can be alledged as to its nature, prove that it cannot be of volcanic origin as has been supposed by travellers.

The red hill contains no fossils of any kind, but the sandstone of the same character, near the middle station, contains fragments of trees; and all the trees of the fossil forest lie in a sand of the same description.

It is necessary to recollect that the stratification of the limestone is undulatory, and the surface of the whole country is therefore naturally diversified with alternate elevations and depressions, which may be easily traced by the eye, in this barren land, however much the sides of the elevations may be worn into cliffs by the torrents. At the extreme height of these elevations, fragments of the hard black sandstone and of fossil wood are almost always to be found. The lowest depressions are filled to some depth with sand, in which lie the trees which are so generally visited. This sand differs in nothing from the sand of the red hill. It frequently abounds with brown pebbles, which are often carried away and are well known as Egyptian pebbles. Around the trees, the sand is frequently of a red colour; and, a few inches below the surface, was quite moist in March, after rains had fallen about a month previously.

The trees are silicified, and have entirely lost all structure except the external shape of the tree, and some appearance of concentric rings. The trunks are of great length; and the measurements of those taken were 52, 57, 65, and 68 feet. Their girth is hardly proportionate; as trees of 52 and those of 68 feet were each only eighteen inches diameter. Knots are rare upon the trunks, and still less frequently are branches to be found. Those however, which do occur, are quite sufficient to prove that these trees belong neither to the *Palmæ* nor to the *Coniferæ*.

The trunks are divided transversely into segments; so, that it would be impossible to stir one from its position except in fragments.

The trees are all prostrate, and lie in every direction of the compass. I am imformed that some are to be found upright, but I doubt this. I was taken to one said to be upright, and having with me labourers to remove the sand, in order to ascertain in what soil the trees grew and the character of their roots, I had all the sand removed and the specimen sufficiently exposed. I thus discovered that it was the lower part of a trunk with the roots; but broken off about an equal distance from the

centre of the trunk, and forming in fact a circular base of about four feet radius to the trunk, just such a mass as an elm torn up in a high wind. This however proved that the tree is not a palm; for the roots of palms are mere clusters of long thin fibres, little better than the base of a mushroom; and the Egyptian fossil had the fine spreading thick roots of a modern forest tree. Further it was evident that the tree had not grown in the sand in which it was standing, for if it had, the roots would not, as they were, have been broken. The conclusion unavoidably made was that it had been torn up by wind in some distant locality; and being carried thence by a stream was left astrand in the place where it is now to be seen.

I could discover no trace in the trees, of boring animals, as *solens*, &c. nor could I find any mark of barnacles upon them.

The trees are to be found in every undenuded spot between Cairo and Suez, and also may be traced I understand as far as Thebes: so that there is every reason to believe this sandstone formation has covered the yellow limestone in the vast rectangular space comprised between the Delta, the Nile, the parallel of Thebes and the Red Sea.

GENERAL CONSIDERATIONS.

The three formations above described constitute but one system, for although they are very distinct from each other yet they also pass easily one into the other. The white limestone is parted by beds of bituminous marle, which also parts the lower beds of the yellow limestone; and losing its bitumen and blackness, the marle becomes yellow and more aluminous, till the marles giving place to limestone, in which quartzoze particles become more abundant, the limestone altogether disappears and gives place to sand entirely. In like manner there is a connection in organic remains. Dicotyledonus wood is found in the white limestone as well as in the sandstone. The nummulites gradually decrease in size from the lower beds of the white to the upper of the yellow limestone. The remains indeed of the white limestone are in general of larger proportions than those of the upper formation. For instance the *neritina grandis* is of immense dimensions for a *neritina*; and so also the crab large in proportion to its congenera. The *cardita intermedia* also seems to be larger in the lower than in the upper formations; yet the remains are all marine (except the bones and the wood), and the great proportion of shells are common

to both; so that the same animals appear to have existed throughout, but in a decreasing temperature as the deposits were successively made; if it be admitted that the same form of animal life inhabits larger bodies under higher temperature.

The animals are none of them inhabitants of deep sea. The crab belongs to a genus (*carpilius*) which frequents the sea shore, and so also does the *neritina*. But if any of the deposits were made in a deep sea we should suppose the deep white limestone was *that* one; and certainly not the beds of the yellow limestone, which gradually and almost imperceptibly seem to have changed into sandy *dunes* where the tide or flood deposited the great trunks of trees on dry land uninhabited by any shell fish.

But I am inclined to believe that the ancient owners of the white limestone fossil did not dwell in the localities where we now find them. The white limestone is, in many localities, full of long tubes branching in all directions, which one can refer to nothing but the branching coral which is only found where the tide never exposes it to the atmosphere. The white limestone was therefore probably formed in deepish water; but neither the *neritina* nor the crab could have lived in deep water, nor in a tanglement of coral. The *neritina* more probably lived on the surface of rocks ,and the crab used to lie in wait for his prey in their fissures, where he spread out his *great greedy pincers*, resting himself comfortably against the uneven sides of the rock clefts by help of the protuberances at the back of his test. But no such rocks could have existed here at a time when there was nothing but a loose floor of lime particles continually depositing. This was not the place then for them to have originally inhabited; and in fact it seems to have been only their grave yard: for if they were not produced here, they must evidently have been buried.

The crabs are always uninjured in the quarries, every member remaining perfect. Now if a live crab is suddenly immersed in any thing which he does not like, he throws away some of his limbs : these crabs therefore must have died in a natural and easy manner. This may also be inferred from the natural manner in which they have folded up their pincers, and spread out their legs, and shut down their eyes in the sockets. As soon as a crab is dead, he is generally pounced upon and made a meal of by some wading bird or some other genus of the crab class; a hole being thus picked in him and the specimen mutilated. Now that waders did

exist long before such a crab as this in the world is admitted, and therefore it is extremely improbable that such numbers as those in the Cairo quarries could have escaped a wader, even supposing that there was no species of carniverous *bracyoura* or *macroura* in the neighbourhood, or that our crab was not of a cannibal disposition, both which suppositions are rather impossible. He must therefore have been quickly carried away from the place of death to his present locality. The agent which carried the crabs to the Cairo quarry, did not treat them with great gentleness, for all the specimens are much broken in the weaker parts, as the lower portions of the *carapace;* and this is to be observed in the shells of the *neritina* also. Lastly they must soon have been buried, for if not they would most probably have soon fallen to pieces, and certainly would have been knocked against one another and coral, and been much more seriously injured than they have been. The evidence appears therefore to be conclusive that the *neritina* and the crab inhabited rocky spots at a distance from Cairo, where they were carried by a current, and lime rapidly deposited around. This rapid deposition of lime may have been connected with a flow of bitumen at the bottom of the sea.

Every sea-shore is naturally divided into zoological districts according to the distribution of mud, sand, and rock, and according to depth of water. Wanderers are occasionlly found straying out of their proper limits, but in general each species is restricted within very narrow bounds. The arrangement on a shore is sand, and then mud or clay. The sand is frequently composed almost entirely of shells. Now such is the order of the yellow limestone; for clay abounds at the bottom, sand at the top, and throughout the debri of shells has formed a limestone. Not that the shells are the exclusive source of all the limestone; for by some process or other, lime seems to have been disengaged from the waters of the sea, which added their quota to the deposits of limestone beds, and this deposition seems to have been the principal source of the whole beds. The series therefore indicates a gradual shallowing of the water, and consequently the vertical section, which the geologist now examines, tells him how the superficial surface of the ancient shore must have been mapped out, when the formative causes of the Egyptian limestone were narrowing the limits of the ancient sea. Beyond the limits where the large branching corals were rising in deep water above the lime, which precipitated around them, and was entombing the remains of *crabs*, *neritina*, and *various mollusca*, which a stray current drifted

among them, grew one of a genus of coral (*eschara*), whose modern types grow on rocks even under water, but generally exposed to strong currents. Beyond this was a bed of oysters. Next a bed of large turritted shells, much of the same character as the large *Proto* of our own coasts. Then crowds of *pleurotomæ*, associated with *cerithia*, apparently occupying much the position of the *cerithia* which abound both on our rocks, and in our mud, at such a low depth that they may often be exposed to the fresh air by the retiring tide. Lastly *pectens, scutellæ*, and *anomias* were washed on a shell beach from deeper positions. These are all shells of deepish water, and any one who has studied a modern beach, knows how constantly these large flat shells are washed on shore. We have already noticed that the *anomia* appears to have two localities; one is its beach or burying place, the other is its living locality; and we do not doubt but that more careful search will find deep sea localities for the *pectens* and *scutellæ*. Consequently we now see the following order of superposition: the upper strata of the yellow limestone is a shell beach, formed by the spring tides only, washing thereon more particularly the large flat *bivalves*; next, the strata of the beach left dry at ordinary tides, inhabited by *pleurotomæ* and *cerithia*. The next strata are parts of the coast left dry but for a short time, and inhabited by large *turritellæ*. Next an oyster bed, and next a bed of *anomias*, in deep water. Then a growth of coral, left uncovered only at spring tides, and then we come to deep water, where the tides washed many of the inhabitants of the coast regions.

I consider therefore the yellow limestone to have been the *habitat* of the primæval inhabitants of Egypt; and that the locality where the *neritina* and crab lived, will be probably found on the primitive rocks near Thebes, upon which the nummulitic limestone probably abuts.

The sea was continually retreating northwards from the neighbourhood of Thebes; and, as it shallowed, formed great salt pans, in which it deposited its salt, viz. common salt and sulphate of lime. Hence the upper beds of the formation abound in these minerals.

The origin of the sand and brown Egyptian pebbles, is probably to be sought in the mountains of upper Egypt or of Abyssinia: for following up the ideas ventured above, I should conclude that the *dunes* of sands have advanced from the south, following upon and filling up the salt marshes which the shallowing sea left.

The hard quartz rock, in the heart of the mound of sand now called the

Red Hill, may be the agglutination of the quartzoze particles, by a silicious spring of warm water; and a similar spring may have formed the appearance of a dyke along the fossil forest road. Such springs moreover may have poured out hot water over the whole surface of the country and silicified the trunks of trees.

The existence of a potent subterraneous heat at that time is rendered probable by the large size of many of the fossils before noticed: for it does not seem possible to account for a heat in the sea, sufficient to silicify them except it were fed by hot springs. The dissemination of bitumen in the lower beds of the white limestone may be connected with this unusual heat.

Although we have then a sufficient agent to silicify the trees, we have a difficulty in bringing them to their locality. That they were silicified in their present positions appears from the fact, that of the silicifying *agent* having divided them transversely, and as they certainly did not grow there, they must then have been transferred by water. They could never have been submerged in a sea, where *solens* abounded, without having been penetrated by them, and they could not have remained on a sea beach for any length of time, where *balani*, and *flustra* attached themselves to *pectens* and other marine bodies, without being also incrusted more or less by the same animal. Yet it must have been a powerful current which transported such large trunks, and that current was not the current of a river: for we cannot imagine ever to have been on earth a river stream whose breadth is a measure from the Red Sea to the Nile at least. Moreover, there is no trace of a river action on the nummulitic limestone. The trunks must then have been swept from their place of growth by the ocean, and by a rapid flood which swiftly drove the *dunes* of sand, and debris of the ancient forests, over the salt pans and dry beaches of the retreating sea.

The sea must have been gradually retreating owing to the greater depths quickly filling up by a deposit of lime. Perhaps in twenty years it might have filled up from the parallel of Thebes to that of Cairo, while a mighty flood overthrew the forests of the ancient African continent, broke in pieces its eternal rocks, and drove the debris of all down into the vast extent of low salt marshes which the sea had left.

The circumstances of the crab prove an unusually rapid deposition of lime, and consequently an unusually rapid filling up of sea, and advance of the usual coast, in the usual manner, on the sea, until all was filled up,

and nothing left but salt marshes. The circumstances of the fossil wood prove a subsequent unusual sea flood, in short, a deluge.

Egypt was inhabited and a kingdom three hundred years after the deluge of Noah. A shorter time than this would have been sufficient to drain off the waters of the deluge, and by that drainage to have hollowed the valley of the Nile and formed its fertile plain. Our geological facts then perfectly agree with the Bible history; for it is certain that a great flood was the last geological event in Egypt, and this affords additional evidence to the truth of the Bible record.

The nummulitic limestone, therefore, was in progress of formation a little before the flood, and might have commenced but a few years before. As it is clear that there was nothing miraculous or unusual in its formation, the length of time will entirely depend upon the amount of lime precipitated and the time requisite for this, and the time necessary for the multiplication of nummulites, of which creature the great mass of the stone is composed.

Relation of the Egyptian to other formations.

If then Egypt has really afforded us the means of connecting history with geology, we have a fixed point to which we may endeavour to connect other formations, and thus perhaps, step by step, to trace back the history of our earth.

First. With regard to the nummulitic limestone. It is found in Cutch and Siudh, in Lombardy, and in the Grecian islands, and I believe also in Spain. In all these localities it has been referred either to the upper members of the chalk, to the tertiary, or to some intermediate formation between the secondary and tertiary series. Now, with regard to the chalk, it does seem, in its general character, to be a deposition of much the same character as we have found the lower nummulitic limestone, namely, a rapid deposition in a deep sea. And with regard to the marine tertiary strata, they seem to indicate the same changes as the upper nummulitic limestone of Egypt; viz. the gradual recession of the sea from its shores. There are no doubt strong objections against the identification of the chalk with the lower nummulitic limestone and of the whole range of *eocene, meiocene,* and and *pleiocene* formations with the upper beds; and I merely wish to suggest the possibility of this view being correct.

With regard to the identification of the nummulitic limestone of India

with that of Egypt I have no doubt. In the description of fossils, several instances of the same being found both in Cutch and Sindh are specified. But I think that it would be premature to do more than to urge exertion in procuring more specimens from both Egypt and India for our Museum, and in collecting further facts; as we are in an admirable position between the two countries to establish the negative or affirmative of the assertion.

Having examined the nummulitic limestone about Verona, I feel no hesitation on the identification of the Lombardy with the Egyptian formation; but I am not able to refer to the work of the Italian Geologist who has described these formations. The nummulitic limestone of the Grecian Islands has been recently investigated by an English Geologist.

From the specimens brought from the great Sahara, by Captain Lyon, Dr. Buckland concluded that the greater part of the desert was an equivalent of the new red sandstone supporting patches of tertiary beds; and on the same grounds it has been generally imagined that the whole of that great salt bed, stretching from the Atlantic to the Himalaya, including the deserts of Africa, of Arabia, and of Persia, is new red sandstone. The accounts of travellers seem to establish the idea that they are all of the same character; and their geographical relations warrant the supposition, that this chain of salt desert has originated in the same geological events. The account above given of the salt and gypsum deposits shews, why Dr. Buckland erred in assigning so early an age as the new red sandstone to the desert formations; and Captain Lyon's specimens of tertiary shells were doubtless from the same nummulitic formation as the salt and gypsum. This extends the nummulitic limestone and the shallowing ante-diluvial sea to the Atlantic; and, again to the eastward of our researches, into Arabia and Persia, and thus connects the Egyptian directly with the Cutch *beds*, and with those of the Indus.

This great sea had then a southern boundary probably in the central mountains of Africa, or about the line of the Niger. Its northern boundary was the line of the Pyrenees, the Alps, the Balkan, the mountains of Armenia, and the central chain of India. The notices which have appeared of Mr. Murchison's investigations in Russia would, combined with our previous knowledge, seem to say that a great sea prevailed over northern Europe, so that the habitable continent, in ante-diluvial times, consisted of a long ridge from Cape Finisterre through Auvergne, Swit-

zerland, Hungary, on to central Asia. From the reported state of India itself, it would appear that it was then also a peninsula. The lakes and coal beds of the Nerbudda probably belonged to that period, and the fossils of Perim and of the Sevalik hills, prove the existence of large continental animals living in watery places: whilst on the other hand, the marine fossils at Mandoo on the one side, and on our East coast on the other side of the peninsula, prove that its dimensions were then much smaller than they now are.

It seems to me that we have then within the limits of our research, the possibility of mapping out and ascertaining the geography of the old world previous to the flood, and the nature of that great catastrophe. We may do much in India, to carry this into effect; and with the hopes of moving the spirit of research, which has been for years employed in unveiling the physical state of the peninsula, I offer these remarks. My theory may be quite wrong but it is drawn from many facts and is plausible. Let the whole country from the lakes, south of the Nerbudda to the Indus, and the deposits from the Ganges to Cape Comorin, be well examined; and India is likely to afford as valuable a contribution to the history of the whole peopling of the Earth in *præadimate* and *prædiluvial* times, as Egypt or Russia.

The fossils which I collected, together with contributions from Major Twemlow, Dr. Heddle, Mrs. Barr, Dr. Pigou, and Dr. Stevenson, are deposited in our Museum: and, as I can find leisure, I shall publish, lithographs * of these together with those from Sindh and Cutch which have not been already published.

CEPHALOPODA. *Clymene. Pl. iv. fig.* 1.

The genus Clymene is separated by count Munster from the Nautilus, on account of the position of the syphon, which in this genus is ventral, in the Nautilus central, and in the Ammonites and Goniates dorsal.

Count Munster says, that he has not found this genus in any formation of later date than transition limestone. *Annales des Sciences, August,* 1834.

* The Society having kindly permitted me, I shall deposit these lithographs with the librarian at such a price as will cover the expense of publication. The limited means of the Society will not allow it to hazard the expense of the illustrative lithographs.

He enumerates 14 species, from all of which this differs in the *long* lateral lobes of the saddle-shaped chambers.

TRACHELOPODA. *Plates i. ii. iii.*

1. *Conus.* This very minute cast occurs in the yellow limestone.

2. *Tornatella.* From the same place. Its spire is more depressed than most genera of this species. But I can refer it to no other genus.

4. *Buccinum.* Spire turrited. Longitudinally striated. Yellow limestone.

5. *Buccinum.* Whorls rounded, cancellated by transverse and longitudinal striæ. Yellow limestone.

Cyprœa depressa. I should not have identified the Egyptian specimen with the Cutch, had I not been favored by Mr. Leith with a specimen from Sindh, by which all doubts as to identification were removed.

7. *Buccinum.* A cast from the white limestone. It occurs also in Sindh ; Mr. L.'s specimens. It is not unlike Eburna spirata.

6. *Eburna.* An internal cast from the white limestone. The aperture of this species is much narrower than that of the modern.

8. *Strombus.* White limestone.

12. *a, b. Murex Smithii.* The two specimens from Egypt, figured by me, agree with *Murex Smithii* in every respect, but the variety *a*, has a more elevated spire; the variety *b*, has a more depressed spire than M. *Smithii* as figured by Sowerby: *Plate d,lxxviii min. chon.* But according to that author, the species is very inconstant in this character; and this removes every objection to referring the Egyptian to this species which occurs in the London clay. The species of the London clay *molusca* appear to be very inconstant in their character. Indeed they have all much the appearance of hybrids. This *murex* has much the character of *pyrula spirellus*, (Lamarck) differing from it only in having three instead of two knotted bands on its whorls, so that it seems to be a connecting link between the two genera. Lamarck's definition would have classed it as a *pyrula.*

b. is a broken specimen shewing the interior, and also the tail which has marks of plicæ.

14. *Pyrula.* Upper strata of the yellow limestone. If this is not a cast of *pyrula verspertilio*, it is very closely allied to it.

13. *Turbinella.* If not *T. cornegera* it is closely allied to it. It is a

mere cast from the white limestone; but it shows 4 strong internal plicæ and its oval turbinated shape is very marked as well as the narrowness of the aperture.

11. *Pleurotoma Egyptiaca.* The character of this shell approaches so much to more than one species of the London clay, that I unhesitatingly refer it to their alliance. But it has only a family likeness to those specimens which I possess. It is very abundant in one of the upper strata of the yellow limestone, the rock being almost composed of it and *cerithia.*

9. 10. *a, b. Cerithium tricarinatum.* I can discover no difference between the specimens of the *Cerithium tricarinatum* and the species which groups upon the Bombay high water rocks. This last is a most variable shell. It is sometimes very tapering, as the *C. tricarinatum* of the London clay. Sometimes very stumpy, as the *Buccinum granulatum* and propinquum of the crag. Sometimes it is without, and sometimes it has *highly developed* the peculiar expansion near the outer lip; the extension of which up the spire gives the *cerithium* somewhat of the peculiarity of the *murex.* Hence I identify the two Egyptian specimens with our Bombay species and that with the *terithium tricarinatum* of the London clay and *Buccinum propinquum* of the crag.

Spec. Char. Turritted, transversely streaked, three rows of granules on each whorl.

17. *Turrittella conoidea.* I refer the Egyptian to the London clay specimen, although it may not be the same. The Egyptian specimen is abundant in the yellow limestone, and its shape agrees better with *conoidea* than with *elongata.* Although Mr. Sowerby expresses much doubt as to the accuracy of the distinctions received between the species, yet there can be no doubt that the Egyptian specimen must be classed with the *conoidea and elongata,* to whichever of the two it may be referred. My specimens agree better with the *conoidea.* It is difficult to get a view of the outer shell, but from the one figured at *b*, it appears that the whorl has 7 principal *striæ* and there may have been other smaller *striæ.*

16. *Turrittella Egyptiaca.* Abundant in one of the middle strata in the yellow limestone. It is much like *T. assimilis* of Cutch, but differs in the number of threads, which in my specimens are uniformly four in the upper, increasing to five lower whorls. The angle at which the whorls taper is by no means uniform. It is frequently a very blunt shell.

18. *Cirrus.* A common internal cast in the yellow limestone. But it

is quite vain to decide even upon its genus until a cast or specimen of the exterior is found; for the genera of *cirrus*, *euomphalus*, and many of the *turbos*, appear to have internal casts exactly alike. The globulus (Grant's Cutch, pl. XXVI. fig. 4.) I conceive to be the same: for I found a great variety of casts in character passing into one another, from figs. 21 to 18. I am much inclined to refer fig. 20 to the same species, although this may be a young *ampullaria*.

19. *Ampullaria*. A cast from the yellow limestone.

15. *Neritina grandis*. The figure of this by Sowerby, in Col. Grant's paper on the Geology of Cutch, might have been supposed to have been taken from one of my Egyptian specimens. If I had any doubts of their identity, they must have been altogether removed by a series of specimens brought by Dr. Leith from Sindh.

As an unpracticed conchologist would hardly imagine the internal cast to be that of a *neritina*, I have given it in a different view from that in the geological transactions fig. *a*.

My specimens supply the characters hitherto deficient. The shell is very thin and patelloid in shape, the right border is crenulated, and the spire is almost obliterated. The actual spire is just broken off in my specimens; but one of Dr. Leith's specimens has in it a simple dot. As it must have been the same from the curvatures of the horizontal *striæ* which are uninjured in the Egyptian specimen, I have considered myself warranted in restoring it; and I have not thought it necessary to break away the rock, and run the risk of spoiling the specimen figured *b*. in order to prove the character of the spire. This figure is of the shell shewing the internal spire, and the smallness of this perfectly agrees with the vanishing spire on the Sindh specimens.

It is a very common fossil in the white limestone quarries near Cairo.

a. Internal cast of shell below.

b. Internal shell above.

b. Shell above.

GASTEROPODA.

1. *Laplysia*. I found some small fossils which I believe were the peculiar bodies which are found in the intestines of this genus.

2. *Bulla*.

3. *Calyptra Ægyptiaca*, *Pl. iv. fig.* 3.

CONCHIFERÆ, *Plates v, vi, vii.*

1. *Anomia Placunoides Pl. vii.*

Flat valve. Opercula foramen, elliptic, extending to the margin.

Convex valve. Round, central, undivided, muscular impression. Two deep fossæ at the hinge, one large and the other small.

Shell very thick and large, composed of many pearly layers.

The shape of the shell is very irregular, but its normal figure appears circular. The convex valve has an external termination at the beak, very much like the hinge surface of an oyster shell.

It is to be found in great abundance, in the upper part of the yellow limestone, at the base of the Red Hill; and will be met with in a corresponding layer over various parts of the desert. Its locality near the Red Hill was pointed out to me by Mr. Malcolmson, before I went through Egypt. His specimens were without the hinge, and he consequently mistook the shell for a Placuna.

It is briefly noticed by Milne Edwards, in a note on the Placuna, and is regarded by him as a genus which connects that genus with Anomia, in a manner different from the connection which the new genus of Placuanomia has established.—Both Placuna and Anomia are too little known, for any very certain distinctions to be at present laid down.

2. *Ostræa gregarea Ægyptiaca.* The constant characters of this species are—1st, the absence of an ear; 2d the curvature of the shell is always towards the cicatrix; 3rd the upper valve generally flatter than the lower valve and never plaited. Its upper valve is generally very flat. The lower valve is plaited longitudinally, but the number of plaits is very uncertain. The plaits are sometimes furcated.

It differs from the *O. gregarea* (Pl. CXI min. Conch.) only in the latter having its upper valves plaited.

The *O. gregarea* is a crag shell.

Our species is abundant in one layer of the yellow limestone.

3. *Ostræa lingua Ægyptiaca.* This is a more rare species occurring with the *pectens* and *scutellæ* in the upper layers of the yellow limestone. It is much like *O. lingua* of the Cutch fossils.

4. *Pecten sulcatus.* Plate v. fig. 1. This occurs in all the nummulitic limestone of Egypt, but it is to be found in greatest abundance in the upper strata of the yellow limestone. It varies much in some characters.

One given to me by Mrs Barr, is much broader than any which I preserved; but my specimens seem to differ in no respects from the P. sulcatus of the mineral conchology, which is a common crag fossil.

P. Somrowensis of Cutch appears to be the same as the above: for some of my worn specimens agree with it in surface, and the ratio of the transverse and longitudinal diameters varies so much that the difference, between my figure and that in the Geological Transactions, cannot be considered of consequence. My figure was drawn by Mr. W. Fallon.

Pecten Complanatus Pl. vi. If this is not *p. complanatus* of the mineral conchology, it is very closely allied to it. The only specimen which I have is very much worn and is fissured; it has a small coral attached to it. The ridges therefore which are described upon *complanatus*, may very possibly be worn away to the striæ, which may be seen on our specimen.

Complanatus is another crag fossil. The locality in Egypt is with *P. sulcatus* near the middle station.

6. *Mytilus Ægyptiacus* Pl. v. figs 7.

7. *Arca Ægyptiaca* Pl. v. fig 2.

8. *Nucula Baboensis* Plate v. 9. This is found also in the nummulitic limestone of Cutch.

Cardita Intermedia. Pl. v. fig. 4. I refer my specimen to this species on the authority of Mr. Sowerby, who, in describing *Cardium intermedium* (Geolog. Trans. 2 Series Vol. V. Tab. XXIV, fig. I,) says: "this shell, of which we have only casts, is very near in form to *Cardita intermedia* of Lamarck; the hinge as we learn from the impression, however, wants the long marginal tooth which marks the genus *cardita*." The cast (fig. c.) and the shape of the shell as given in fig. *a*, is exactly the same as the figure above referred to: so that there can be no doubt as to the identity of the Cutch and the Egyptian fossil. But one of my specimens has the impression of the long marginal tooth; so that there can be no doubt of its generic character.

The absence of all evidence to the existence of the long marginal tooth does not seem to be of so much consequence: for M. Agassiz observes, that the impression of the teeth of the hinge is among those characters which will not probably be found in impressions: *(Memoires sur les moules des mousques p. 8.):*" and in his plate of the cast of *cardita sulcata* accordingly the hinge is not traceable.

It is found very thick in some beds of the yellow limestone, the shell being always destroyed or replaced by the limestone. It occurs also in the white limestone.

10. *Cardium Ægyptiacum Pl. v. fig* 8.

11. *Tellina? Ægyptiaca.*

12. *Psammobia Ægyptiaca.* Associated with the *solen* in the Mukattim hills. The same cast is also among Mr. Leith's specimens from Hyderabad in Sindh.

13. *Corbula cuspidata. Pl.* v. 3. Min. conch. Tab. 362.

Although I have only a cast, and that without a hinge, the shape of the shell seems to identify the Egyptian specimen with the English fossil; which is found with fresh water shells in some of the newest formations. There is but little difference between it and the *C. revoluta* of the London clay; and since it is an inhabitant of rocks, and subject to considerable deformations, all probably belong to one species. It is not uncommon in the yellow limestone, and a series may without any great difficulty be formed.

I can see no essential distinction between this and *C. trigonalis* of the Cutch fossils; and as this is said to differ from Lamarck's *C. rugosa* only in being wider and with more regular and prominent laminæ upon the surface, I should think that future collectors will be able to bring both from Egypt and Cutch a series, which will identify all the above species as varieties of one only. *C. rugosa* is a Paris basin shell.

14. *Corbula Lyrata Pl.* v. *fig.* 5. I think this must be the same as *C. lyrata* which is described as a *secondary* fossil from Cutch. Geol. Trans. Vol. V.

15. *Solen Ægyptiacus.* A cast of the character of *solen radiatus.* It is very abundant in one spot in the Mukattim hills, where the specimens lie in masses on one another. Some of them are a foot long. The layer belongs to the yellow limestone.

Cirripedœ.

Balanus Amphimorphus. Lamarck. Pl. vi. *fig* 2. This species seems to have been considered by Lamarck an intermediate link between *B. tintinabulum and B. perforatus. B. crassus* of the M. C. (1 ab LXXXIV) seems to be also identical with it. Neither does the specific

difference of *B. tesselatus* appear of much value in a genus, the species of which have peculiarly variable characters.

B. crassus and tesselatus are both crag fossils, and *B. amphimorphus* is said by Lamarck to be an Italian fossil.

The Egyptian specimen is on a *pecten* from the *great pecten locality* near the middle station.

ECHINODERMATA.

1 *Scutella subrotunda Pl.* viii. The beautiful monographs of the Echinodermata, which are now in course of publication, under the direction of M. Agassiz, enables even a tyro to speak with some confidence of a species. My specimens agree perfectly, except in two points, with the minute description of *S. subrotunda* in the monograph of Scutella. These two characters are that the *S. subrotunda* is described as having the the posterior ambulacra rather shorter, than the other three; whereas those in the Egyptian specimens seem quite equal; and the petals of the Egyptian specimen are very blunt, whereas those in M. Agassiz's figure are tapering. The correspondence of all essential characters will be seen on comparing the two figures. I have not attempted to draw the structure of the test which agrees however exactly with the European specimen, and the tubercles on the upper surface are smaller than those on the lower.

It is to be found in great numbers in the uppermost strata of the yellow limestone, with *pectens* near the middle station, and also just behind the third station bungalow near the telegraph.

The *S. subrotunda* is found in the *meiocene strata* near Bourdeaux.

a. Upper surface.

b. Half the lower surface.

c. Vertical section, shewing the thickness of the shell.

2. *Clypeaster varians Pl.* x fig. 1, 2. The characters of the Egyptian fossil seem quite sufficiently identical with the Cutch *clypeaster* (*Pl.* xxv. fig 21 Geolog. Trans. Vol. V.) to identify them specifically. In the Egyptian specimen the anus is closer to the boarder, and the vertex is a little more eccentric.

The Cutch specimen is from the nummulitic limestone; the Egyptian is from the white limestone in the Cairo quarries.

3. *Clypeaster Ægyptiacus. Pl.* ix. *fig.* 1. *a.* Anus very near the

border and transverse. Mouth central. Poreless lines from the ambulacra continued to the mouth. Height of the shell apparently not so great as in *c. varians.*

I obtained only two imperfect specimens of this from the third station. They belong to the uppermost strata of the yellow limestone.

4. *Spatangus acuminatus.* Pl. x. fig. 3, 4. This is also figured by Col. Grant as from the nummulitic limestone of Cutch. It is frequently crushed and injured. It is abundant in one strata of the yellow limestone at Cairo, with fragments of *eschara* and spines of *echinodermata.*

5. *Cidaris clurifera* ? Pl. ix. *fig.* 2. 5. These fragments are so much like *C.clurifera* which belongs to the upper part of the *calcaire neocomien* of Neufchatel, that I hesitatingly refer both the spine (fig. 5.) and the tubercle (fig. 2.) to it. It is found in the same bed at Cairo as *Spatangus acuminatus.*

4. *Cidaris Ægyptiacus.* Plate ix. fig. 4. These spines must belong to tubercles much the same as fig. 2. They are very remarkable spines, being found six inches long; but the rock in which they are, is so loose that I could carry away nothing but fragments.

5. *Gymnocidaris Ægyptiacus.* Plate 4. fig. 3. I conclude this fragment belongs to this new genus separated from *cidaris.* It might belong to *pedina,* but there are only two pores in pairs in the ambulacra. All but these two subdivisions have, I believe, large turbercles on the test, which my specimen is without. Locality, with the *spatangus acuminatus* and *cidaris.*

Crustacea.

Carpilius, Plate, xi. *Sectional and generic character.* Carapace arcuated. Plastron very narrow, epistoma rectangular and much broader than long. Third article of the jaw feet quadrilateral, without a notch externally, and not extending beyond the insertion of the fourth. External antenna situated in a fissure at the internal and lower corner of the ocular cavity. Internal antenna inserted at the internal angle of the eye to which it is contiguous. Anterior feet nearly or quite equal. Fingers not spoon shape. Posterior feet without a crest above, but rather angular.

Specific characters. Regions of the *carapace* well defined; surface mamillated and covered with minute granules, which are all over the test excepting the legs. One mamilla on each of the gastric regions; three on each

of the biliary regions; two on the genital; three triangularly disposed on the cordal; eighteen on each of the bronchial regions. Interocular space about $\frac{1}{4}$ of the longitudinal diameter of the test, divided by a canal which is separated from each ocular cavity by two tubercles. Two tubercles at the external angle of each eye. Anterior lateral border sharp and five lobed; two lobes being opposite the biliary region, and three to the bronchial, the three hepatic lobes terminating each in three recurved spines; the posterior biliary lobe in two spines and an abortion, the anterior in two spines. The anterior border is continued posteriorly in a line of six tubercles of which the middle is small, but the most posterior is very large, and divided into one large and two small processes. Hand broad but thin, with three obscure rows of tubercles on the posterior side, moveable finger with (four or more) spines above. Arm crested posteriorly. Transverse longitudinal diameter: 16 : 9, not reckoning the breadth of the lobed border. Transverse diameter of the largest (a male individual) $3\frac{1}{2}$ inches. Posterior border one inch. Interval between the external angles of the ocular orbit $1\frac{1}{2}$ inch.

The figures 1, 2, 3 have been drawn and above described from comparison of 13 specimens.

Fig. 3 *a*. the eye lying in the ocular orbit.

b. the place of the external antenna.

c. the place of the internal antenna.

d. the mouth.

e. the canal in the middle between the two orbits.

It is found in great abundance in the white limestone quarries near Cairo.

PLATE XII. *Corals.* I do not venture to discuss the specific characters of these corals.

Fig 1. A species of *eschara*, very abundant in the yellow limestone and characterizing a bed. It shows the dichotomy of the branches; *b* is a magnified representation of the cells; *c* is a section of the stem.

Fig. 2. An *astræa* (very common also in the yellow limestone.)

Fig. 3. a body very common in the white limestone. They are sometimes supported on long stems, and the cup-like body is composed of many growths which have a tendency to fill it up. From the sides of a cup other cups seem to grow out. From this it seems to be a *coral*, but I could discover no trace of cells.

Fig. 4. A microscopic object in the white limestone; an elliptic body with oblong cells at the surface, penetrating a short distance into the solid mass.

Art. II.— *Cuneiform Inscriptions. Translated from the eighth volume of Ritter's Geography.*

It was Anquetil Perron, who in 1771, conveyed to Europe the remains of the Zoroastric liturgical Zend and Pehlvi books, which the Parsees of Surat had for six hundred years preserved out of their ruin. (As. Res. Vol. IV, 1 P. p. 615—619.) These he published in three volumes 4to. under the title: Zend-Avesta, Ouvrage de Zoroastre; and they were immediately republished, in a German version, with additions by I. F. Kleuker. Since that time their contents were treated in various ways; but the text remained unedited. The language continued unknown, except from the very imperfect Zend and Pehlvi vocabularies appended, often with errors, to the third volume; and there was neither grammar nor lexicon. Yet from the first there were those who conjectured that the Zend might belong to the family of the Sanskrit; but Anquetil's versions were too faulty to be of use, as he had to follow, in the interpretation of the text, his Parsee instructors, the Mobeds of Surat. They were themselves but slenderly instructed, full of the opinions of their cast, and of intentional, systematically deceptive errors.

The Zend was indeed the original idiom of the Zoroastric books, but it was on insufficient grounds that Anquetil gave this name to the above-mentioned work. This Zend text was translated, at a period unknown to us, into another language, the Pehlvi, entirely diverse from the Zend, enriched in a considerable degree from the Semitic idioms, which are far remote from the Zend. At the time when the legal and liturgical books were communicated to *that* Iran, which was devoted to the laws of Zoroaster, the Zend was by no means the only language generally known: and the modern Parsees attribute as great authority to the Pehlvi version as to the original. It is in fact easy to prove, says Burnouf, that the Pehlvi has continued for several hundred years, and even till our own day, as a learned language; it has thus far been impossible to show a longer prevalence of the Zend. Whence the above-mentioned opinion of many, that the Zend existed, not as a popular dialect, but only as a religious language in the Zendavesta, or as a learned language; which is however contradicted by the existence of indigenous Zend appellatives, even to the present time, in the spoken tongue of certain districts.

That Pehlvi version, as Burnouf says, may have had its origin in a time when the priests still understood the Zend, but when they had to substitute the former for the people, by whom the too brief Zend was no longer intelligible. This version was therefore accompanied with a gloss, which was far more diffuse than the text: so that the Pehlvi is not sufficient of itself to give the obscure, concise, original Zend. In the Pehlvi version, which was at the same time a commentary, the knowledge of the Zend, as no longer necessary, died away, even among the priesthood. And further, the interpretation of the Zend books became exclusively the province of the Pehlvi.

This Pehlvi flourished till the time of the Sassanide dynasty; it even survived the destruction of the Zoroastric rites by the Mussulmans; but not in the case of those followers of Zoroaster, who fled to Guzerat. The poverty, the reverses, the flight of these, their three hundred years of Yezdejerd, the death of their last believing King, their beginning dispersion, their intestine, manifold divisions, all prevented this. After a hundred years of residence in Kohistan, and a flight to Ormuz, where they remained fifteen years, and to Diu, where they remained nineteen years, and after their final emigration to Guzerat, they had, in the fourteenth century, lost the copy of the Vendidad which they once possessed. One Destur Ardeshir, a learned Parsee from Sistan, came to Guzerat, and gave the priests a copy of the Vendidad in Zend, with the Pehlvi translation. From this two copies were made, and hence all the Vendidads in Zend and Pehlvi, which are extant in India.

But even the Pehlvi version underwent manifold alterations, by a Destur, or learned Parsee, of Kerman, and by his disciples. The language itself was gradually going into disuse among the Parsee priests, and had, just before Anquetil's time, been restored in a new form by this Destur, at Guzerat.

Such being the oblivion of the language, there could scarcely have been a hope of redeeming the original text from the corruptions of later hands, if there had not been discovered two other helps, as Burnouf tells us, by means of which a new critical investigation became possible. First, the analysis of the original text by the aid of the cognate Sanskrit, a language now fully developed in its grammatical character, both in regard to criticism and literature. Secondly, the tradition of the Parsees, derived from an older source than the accounts of Anquetil's instructors. These last

relate not to all the portions of the Zend, so-called, which are extant in the collection of the Vendidad, (the primitive legends and prayers,) but only to that portion of them called in Zend Yaçna, in Pehlvi *Izeshnè*, that is, Liturgy or Prayers. But these throw light on the other parts. The older source, to which allusion is made, is a manuscript in two copies of this liturgy, in Zend and in a Sanskrit version by Neriosengh, more fully brought to light from Anquetil's remains, in a very ancient original, and a modern copy. These made the critical labours of this sagacious investigator possible, and he published them under the title: *Commentaire sur le Yaçna*, thus far to half their extent; and we owe to this many of our contributions above to the geography of old Iran.

From the products of these sources however, we must carefully distinguish the results of the cuneiform inscriptions; which, in like manner, are now only beginning to be unfolded, inasmuch as the method of deciphering is not yet fully established in all its parts; as the language in which they were written, to say the least, is not yet intimately known, and as most of the copied texts are not yet accessible to general investigation, and many, unknown original inscriptions, may be lying, in the darkness of oblivion, in the furthest and most unfrequented districts of Iran, especially in eastern Persia.

Among the sure results of earlier deciphering, Burnouf reckoned, in his learned memoirs on the cuneiform inscriptions of Hamadan, the names Darius and Xerxes, found in inscriptions by Grotefend, as is sufficiently known from Heeren's celebrated ideas on the Politics and Commerce of the Nations. The name *Achæmenes* was read by St. Martin, and more exactly by Rask. The word *Kscah*, king, was deciphered, and correctly furnished with the proper vowels, by Grotefend and St. Martin; yet much was still wanting. Of five quite large cuneiform inscriptions in Niebuhr's copies only two of the shortest had as yet been attempted, and without success. Yet the name *Goschtaspa* was read by Grotefend, and more correctly *Vychtaspa* by St. Martin. The word King appeared in three different grammatical forms; but neither the grammatical construction, nor the language itself was thereby made apparent. Grotefend considered the language as Zend; St. Martin for one very nearly allied to Zend. Rask took the Zend to be the primitive language of Media. He amended two letters of the cuneiform inscription, and instead of *Achæmenes* read more correctly *Aquâmnósóh* (*akhéótschósóh* of Grotefend, *cûkhaâmychyé*

of St. Martin; he read as a termination of the genitive plural from rex, *anam*, (viz. in *ksâbyohânâm*, i. e. *regum*, instead of Grotefend's *ôtschâo*, and St. Martin's *abaâ* or *amaâ*); and Bopp concurred, declaring the language of the Persepolitan inscriptions to be the Zend. (Jahrb. f. Wiss, Er. Dec. 1831, p. 819). Burnouf has shown how far the special interpretation of the cuneiform inscriptions then known was advanced, when as many as forty-two copies of cuneiform inscriptions appeared in the papers which the lamented Dr. Schulz collected with untiring zeal, in his journey in Kurdistan, on the lake of Van. These he collected in different places, especially in ancient Media. These, with such as were before known, have afforded the objects of the latest grammatical investigation, from which some morsels have fallen to the share of geography, as will appear in the sequel.

Cuneiform inscriptions were left by Xerxes, on the rocks of Elwend, (Alvanda,) at Hamadan, on the ancient Orontes, and on the lake Van; likewise amidst the ruins of Persepolis. All these have certain parts common, and others in which they differ; as further appears from fragments in Ouseley's collections, so that the same inscriptions are engraved at Ecbatana, (Hamadan), and at Persepolis. Little attention has thus far been paid to the imperfect ones, and only the two completest inscriptions, or rather the double inscription at the foot of Mount Elwend, (Alvanda), with the names of Darius and Xerxes, have been, especially with Burnouf, the chief objects of investigation; together with two shorter ones, one from a pillar at Murghab, near Persepolis, furnished by Morier, Ouseley, and Ker Porter, bearing the name of Cyrus; the other, the so-called inscription of Tarku at the eastern foot of Caucasus, on the western bank of the Caspian sea, which was made known by Witsen a hundred years ago, and bears the name of Arsaces. The double inscription, at the foot of Mount Elwend, (Alvanda,) is on a large block of red granite, in three rows of cuneiform characters, cut in two sunken portions; and the other, that of Xerxes, at the top. Of the three parallel rows of the Darius-inscription, the first consists of twenty lines; the second and third uniform rows, which are in different character, probably what is called the Median and Assyrian, but which are not yet known, have perhaps the same contents with the first, but in other languages, more nearly allied to the Semitic. Here it will be interesting to subjoin the deciphering which has been accomplished of the twenty lines of cuneiform writing, as a sample of the language, adding

a strictly literal translation, in order to present a picture of those monuments and times.

DARIUS INSCRIPTION.	LITERAL TRANSLATION, BY BURNOUF.
1. Bû izrk âurmzdà.	L'être divin Ormuzd
2. ah ômân buiôm	il le Homa excellent
3. âdâ ah âim âçmâmu	a donné ; il le ciel
4. âdâ ah mrtôhm	a donné : il l'homme
5. âdâ ahchôhâtâm	a donné ; il la nourriture
6. âdâ mrtôhâhâ	a donné à l'homme ;
7. ah dârhium khchahyóhm	il Darius roi
8. aquunch aôim	a engendré ce
9. dlunam khchahy hm	des braves Roi
10. aôim plâm	ce des braves—
11. frmûtârm âôm	Chef ceci est
12. dâchiuch khchahyôhm	Darius roi
13. izrk khchahyôhm	divin, Roi
14. khchahyôhm ânâm	des Rois,
15. khchahyôhmôâhunûm	Roi des provinces
16. pl ôznâ nâm khchâhy	qui produisent les braves, Roi
17. khchahyôh âahâhâ buiôhà	du monde excellent
18. izrkâha rurôh	divin, ; redoutable
19. âpôh gochtâcpahâ	protecteur de Gôchtaçpa
20. pup akhâmnôchôh.	fils Achéménide.

The meaning is: "Ormuzd, the divine being, gave the excellent Homa, (a sacred plant), he gave the heaven, he created man, he gave him his nourishment; the begat King Darius, the king of heroes, the head of heroes. Here is (probably in reference to the sculptures near the inscription) Darius, divine King, king of kings; King of the provinces which produce heroes; King of the Behescht (i. e. the glorious and divine world, paradise); fearful protector; Son Gustasp of the Achæmenides."

The second inscription is almost identical with this first one, except that the name of Darius is exchanged for that of Xerxes. Both stand in such an elevation and such circumstances, that they evidently belong to sculptures to which their contents have reference.

The third or cuneiform inscription on the column at Murghab, north of Persepolis, was brought to light by Morier in his first journey, and then made public by Ouseley, and more perfectly by Ker Porter, with the beautiful bas-relief above which it stands. St Martin, by his method of deciphering, read on it the name Houschousch, which he took for Oxus (Ochus); Grotefend the name Kusruesch, which he took for Cyrus. Burnouf reads the text of the whole inscription, *Adm quluch khchâhyóh*

akhâmnócoh; "This (is) Cyrus, king (of the) Achæmenides." In this inscription, *quluch* or *quruch* is Kyrus, the Greek Κῦρος, (Κόρος, in Etym. Mag. ὑβασίλευς τῶν Περσῶν, ὁ Παλαίος· Ηλίου γάρ ἔχει τὸ ὄνομα. Κοῦρον γὰρ καλεῖν εἰώ θασιν οἱ Πέρσαι τὸν ἥλιον;) from khor. This khor is contracted from Kava Hucrava, in Zend, identical with Ke Khosto, or Kai, which Zend-forms have as their common root Kava, kavi, which, in the Sanskrit, according to Wilson, means the sun. Hence, in the Sanskrit version of the Neriosengh, Kavi, the designation of the royal family, is identical with the Sun-race of the Kaianian dynasty; the title Ke being prefixed, as in Ke Khosro, Ke Custap, etc. The title under which this sun of men is worshipped, is in Zend huarĕ, the same as khor; but the title of the royal race descended from this divinity, is in Zend ke or kavi. Thus the race of the sun shows itself not only among the Brahmans, but the Iranians, who like the former call themselves Arians.

The beautiful figure sculptured in marble is therefore Cyrus, in honour of whom was likewise erected the sumptuous building in the valley of Murghab, of which the ruins lie scattered about. The ancient sepulchral monument in the same vicinity, (Madré-i-Suleiman, Morier and Ker Porter. p. 498), was hence pointed out by the sagacious Grotefend, as the tomb of Cyrus. In the image of Cyrus, on this column, beneath the inscription, which is entirely different from those of Darius and Xerxes at Persepolis, Burnouf finds the confirmation of the inscription itself: for it represents the apotheosis of Cyrus.

The names of Darius Hystaspes and Xerxes also receive their etymological explanation in the cuneiform inscriptions and the Zend. Darhinch, i. e. coercitor, according to Burnouf, from the Sanskrit verb dhri, Zend dere, continere. Hence Hesychius renders the word Δαρεῖος by φρόνιμος. Lassen more exactly deciphers Darhawus, hence the Hebrew עוזר confirming the derivation from the Zend-root dere, as found by Burnouf; "the Regulator or orderer." Lassen reads in this inscription Hystaspes, vistâçpahâ, from açva, in Zend, horse, "he who gets horses," agreeing with Burnouf, *Comm. on the Yaçna* p. cv., who compares this Vistaspa, in signification with the French écuyer, and takes it for a more ancient title in Zend, which Ammianus Marcellinus seems to give in his "Vitaxæ, id est Magistri equitum." Von Hammer, however, deduces this word from the Persian Issfehbed, from Issfeh, *Pers.* a knight, which

becomes Sipahi, and among the Anglo-Indians, *Seapoy*. Xerxes is Ksh-ârsâ of the cuneiform writing, in the Assyrian pronunciation Kshras, and by transposition (a)h(a)sueros, the Ahasuerus of the Bible, from the Zend-root ksàh, to rule, (hence k'sathra, king, and the royal caste in Sanskrit;) and, in the second half of the name, the Zend word eres, by contraction ars, i. e. pure, good; hence, "the good ruler," or the "good king."

On the sculptures of Persepolis, Darius and Xerxes are surrounded with the splendour of supreme power and glory, their great men and their whole court, and even their people; so that in the imagery, as in the inscriptions, they appear as "kings of kings, as kings of the provinces, and leaders of heroes." In the ruins of Murghab, the image of the mortal king upon the column of marble, in addition to the royal mien, accompanied by that of a celestial being with outspread wings, holding place among the Izeds, the guardian spirits of the Ormuzd-heaven, (*Ized*, Pers. *Yazata*, Zend;) among whom the superstition of Iran could place the founder of the Persian monarchy, as that of the Quirites did their Quirinus. On the Persepolitan monuments appear also the kings Darius and Xerxes, the only ones as yet certainly discovered, in forms of human majesty, with their historic accompaniments; elsewhere, however, as in the case of Cyrus at Murghab, only with symbols, which have a religious significancy, and appear to be of different origin from the genuine Persian.

The Tarku inscription is here worthy of notice on account of its geographical site at the northern foot of the Caucasus, and because it is in a cuneiform character which does not contain the simple system of the double inscription at Elwend, but consists of a mixture of characters, which seem to be compounded of three different sorts or systems of cuneiform writing, as these occur in the double inscription and on other monuments; an observation which did not escape the sagacity of Grotefend, who hence derived a doubt at an early period, as to the correctness of the copy. This has now however been removed by a second copy of the same, among the papers of Dr. Schulz; the language, therefore, no more than the character, is the old Persian. From the locality on the north-western side of the Caspian sea, St. Martin had concluded that they must concern an Armenian king of the Arsacides, who pushed his conquests of the Kheizars into their own territory, and to immortalize his victories, caused this inscription to be graven in the rock. This

seems to be confirmed by the investigation of Burnouf, who finds in it the name Akchk, which he thinks not very remote from Achek, Archak, (Arsak, or from Ἀρσάκης, i. e. Arsacide). It is here that we find the most northern limit of cuneiform writing.

Thus far has the deciphering of the cuneiform inscriptions been carried by Burnouf; but he has also been employed about the first of Niebhur's copies, a very important geographical document, inasmuch as it enumerates the people tributary to Darius. Of this, however, he touches only in passing, on some of the names, so far as to criticise and make them public. He gives the names, Mad, Babolouch, Arbah, i. e. Medes, Babylonians, Arabs; the Ayura, Aroei; the Ktpdhuk, Cappadocians; Arion, Arran; Zrk, Arôi, Bakkhtroch, Cughd, i. e. Zarangians, Haroyn, Bactra, Soghd, &c. He has not overlooked the great importance of this inscription, which no one before him seemed to perceive. He regards it as collateral with the well-known catalogue of the twenty satrapies in Herodotus (III. 90-93). It belongs, he thinks, to the most flourishing period of the dominion of Xerxes, who here appears with the same title as his father Darius, son of Hystaspes, to whose honour he erected a monument like his own. Here we behold him surrounded by those heroes, the Pehlvan, who are of ancient fame in Asia, and whose images accompany his own on the monuments of Persepolis, just as a hundred years before, Cyrus was accompanied by his body guard.

In regard to the ancient language and writing of Iran, the following are the results of these researches:

The cuneiform writing, in relation to the language in which it is executed, shows that the sounds are not all expressed by the characters. Thus âurmzdâ, in the first line of the inscription above, is fully written in Zend Ahura mazda, i. e. divine being; whence by contraction Ormuzd. In this familiar name the deciphering is easy, but great doubt attends the interpretation in other places. So for example, in the Hamadan inscription, when we meet with cprd, as the name of a people, Burnouf arrived, at the conjecture of the Sporades, while Lassen shows that it denotes the Sapiri, from which name the *d* has fallen out in the Greek translation. The words which Burnouf reads Uiarzioh and Ytghuch, naturally suggest to him the Οἰχαρδος and Ythaguri, on the confines of the Seres; but Lassen, by a very slight change of the lection, recognizes the names of the Quarazmiah (Charasmii), and Zatagadus (Sattagydes). Here,

therefore, a wide field lies open for criticism. This circumstance shows a great discrepance between the language and the system of writing. There is no doubt that the language belongs to the Indo-Persian family, in which a full and consistent expression of the vowels is a demand of the language, and indispensable in writing. This discrepance, according to Burnouf, results from the conflict of two different systems, the Japetic, to which belong the Indo-Persian and the Germanic languages, and the Semitic, which reveals itself in the cuneiform writing, inasmuch as the character does not fully express the pronunciation. The system of the first of the three rows of cuneiform characters, on the double inscription at Elwend, which at the same time is the most simple, and reappears in most of the inscriptions at Persepolis, is not, in Burnouf's estimation, of Iranian, but of Semitic origin, a Babylonian writing, first borrowed from foreigners by the Persians. Before Cyrus the Persians possessed no writing in which they could record this name, till then unknown in the history of the world. History has not related from what people the Persians derived their cuneiform system. Grotefend supposes from the Medes, their former masters. Herodotus says, IV. 87, that Darius used Assyrian * characters, when he finished the columns commemorative of his Scythian expedition, and placed on the bridge of the Thracian Bosphorus, with the names of all the nations who accompanied him, but Assyrian on the others. This then, as Burnouf supposes, was probably the cuneiform character, which perhaps by Median intervention had at this early date found entrance from Nineveh and Babylon, where that sort of writing, though in complicated forms, is found upon the ruined bricks and on other monuments. The correspondence discovered by Lassen, on the other hand, between the cuneiform system and that of the Sanskrit Devanagari, of which more will be said below, renders this hypothesis of Burnouf very doubtful.

The researches of Burnouf reveal to us the closest resemblance even in the slightest inflections, between the Zend and the unknown language of the cuneiform double inscription of Darius and Xerxes. Thus it is not the Zend of the Zoroastric books, though belonging to the same family. It much more really resembles the idiom of the Brahmans, the

* So says Ritter's text, but Herodotus has *ἐνταμὼν δὲ γράμματα, ἐς μὲν τὴν' Ασσύρια, ἐς δὲ τὴν Ελληνικά*, which shows an error in the above sentence, and clears the sense.—Tr.

Sanskrit, though it has a character of its own, and must therefore be an independent tongue, which in some, though not very numerous instances, is like the modern Persian. It must then have been an actually spoken dialect, in which as that which was generally understood in the country, the Persepolitan inscriptions were cut into the walls of stone; and two nearly allied, yet dialectically different reigning languages then prevailed in the Persian monarchy.

Lassen, whose researches in this substantially agree with those of Burnouf, has on this account called it the Medo-Persian language, in contradistinction from the Soghdi-Bactrian, by which name he designates the Zend of the Zoroastric books. That at the time preceding the Macedonian invasion, and of course during the dynasty of the Achœmenides, such dialectical difference together with such a resemblance actually subsisted in the languages of the Medes, Persians, Arians, Bactrians, and Sogdians, we may be assured by the historical testimony of Strabo, (xv. 2, § 8, p. 224, ed. Cas.) that these people had almost the same language; εἰσὶ γὰρ πως καὶ ὁμόγλωτται παρὰ μικρὸν. And this is confirmed by a second testimony preserved by him from the work of Nearchus, in which the latter says of the manners and language of the Caramanians, that they are for the most part Persian and Median; (Strab. xv. 2, § 17, fol. 727, ed. Cas.) thus rendered: Nearchus asserit Carmanitarum mores ac sermonem maxima ex parte Persarum esse ac Medorum aemula.

The contemporaneous existence of three rows of different cuneiform writing in the double inscription at Elwend, might induce the conjecture that they belonged to three different languages, of which the first was merely a sacerdotal language, of religion and the laws, remaining unknown to the people, like the Egyptian hieroglyphics, or the Greek and Hebrew of the Christian Church; while the other two were translations into the common dialects. But it is conclusive against this that even the first language of the cuneiform inscription by no means contains the Zend of Zoroaster, but only a dialect widely diverging from the Zend text. It is as improbable that at the same time, in the fifth century before Christ, the pure Zend was the common language of districts lying so wide apart, and in so different degrees of culture, as from Bactria and Ariana and Persis, as it is probable that the speech of the inhabitants of the proper Persis, in the time of Darius, should have borne a certain relation to that of the Bactrian, Sogdian and Arian countries;

since even in our day there are resemblances between the ancient Persian and the Indo-Bactrian tongues.

The Persepolitan popular language, or Medo-Persian, barbarous as it seems from these cuneiform monuments, is nevertheless, on this very account, of far greater interest, than if the inscriptions, as was the earlier opinion, were merely in the Zend of the Zoroastric books, which both in itself and in comparison with the finished Sanskrit (Sanskrita, i.e. polished, perfected, complete, or classical tongue: Bopp) must be denominated a very rude language. For, in that case, we should only become acquainted with a learned tongue, five hundred years older than our era, whereas we now possess in it, says Lassen, the monument of a national language, which was spoken during the time of the Persian monarchy. These inscriptions prove indeed the existence of the Zend, and are a memorial from which the religious ideas of the Zendavesta break forth afresh; but they are at the same time conclusive touch-stones of the influence exerted by the sacred language of the Arians on those of Persian Asia.

This influence is apparent in the extraordinary number of geographical names on the field of northern and eastern Ariana as far as the Jaxartes, all of which receive their elucidation from the Zend, and their confirmation from the ancient classics; which will, below, be made further apparent in like manner from many national names still used by the people of western Iran as far as the Tigris. Hence the Zend can no longer be regarded as a dead language of priests, but must be admitted to the rank of popular languages, and as one which was growing old even five hundred years before Christ.

As to the Zend, and its relation to the Indo-European trunk of languages, otherwise called by Bopp, the Indo-Germanic, some remarks may here be made which concern their geographico-historical-position. This great philologist regards the Zend, neither with Rask, as a language altogether independent of the Sanskrit, nor yet as a mere dialect of the latter, but as having a sort of independence, like that of the Latin when compared with the Greek, or the old Northern as compared with the Gothic; whence this remarkable fact, that in many points, as the master of Sanskrit grammar expresses himself, it spreads into the other, of which the theory is thus rendered more comprehensible; for which reason we have above called the two, sister-languages. But, according to the researches of Burnouf, who also recognises the remarkable analogy

between the Zend and the Sanskrit, especially in the Vedas, these two moreover stand at the head of two systems of language of the same great division, which under different influences have been unfolding themselves during long periods,—namely, the Classic and the Germanic; or more specially the Greek and Latin on one hand, and the Gothic and Germanic on the other. The Zend follows more closely the law of the Gothic and Germanic tongues, diverging more from the Greek and Latin, to which, on the contrary, the Sanskrit approaches. To illustrate the analogy of the Zend and the Sanskrit, we adduce some words: In Zend, the son is *puthra*, sun *mithra*, land *choithra*, command *ferman*; In Sanskrit, *putra*, *mitra*, *kchetra*, *pramana*. To show how the Sanskrit and Zend stand at the head of two systems of the same great division, a few words will suffice. In Sanskrit, three is tri, in Latin tres, in Greek τρεῖς, in Zend thri, in Gothic threis. In Sanskrit, brother is phratri, in Latin frater, in Greek φράτηρ, in Zend brâtar, in Gothic brothar.

Besides the numerous tribe of words, which belong equally to the Zend and the German, the analogy between the Zend and the Gothic is so marked, that by means of these the great German grammarian Grimm, in his table of Consonants, has elucidated a number of particulars in which the Gothic differs from the Greek and Latin.

Cuneiform characters have been found as far west as Beyrut, (Monument de Berytus in Bulletino dell' Instituto di Corrispondenza Archaeologica, No. 3, Roma, Marzo, 1833. P. 20—27, by Bunsen, Felix Lajard, and Cailler,) and even on the Nile, according to Young. The most important ethnographical document, in this character, is that of Persepolis, copied by Niebuhr, containing all the tributary tribes. According to Lassen's lection, it runs thus:

adᵃm dârhᵃwusʿ kʿsâhziᵃh wᵃzᵃrk
Posui Darius rex magnus
kʿsâhziᵃh kʿsâhziânâm
rex regum
kʿsʿâhziᵃh dᵃnghunâm tîsʿâm psʿunam
rex populorum horum bonorum
visʿtaçpᵃngaâ put
Vistaspis filius
akʿâmᵃnisʿiᵃh zâtiᵃh
Achæmenius nobili genere
darhᵃwusʿ kʿsʿâziâh wasʿnâ auᵃmᵃz
dangâ
Darius rex voluntate Auramazdis
imâ dᵃnghâwa thâ.
Hi populi illi.
âdᵃm adᵃrsʿiᵃh adû ânâ pûrᵃçâ kûra
Posui debellator. Ileic hi Persæ ministri
thâ ayâm atᵃrç mᵃnû
isti (populi) adorationem igni, mihi
bâg iᵃm âbᵃr.
tributa attulerunt.

The names of people which follow are in this order: "Choana, Media, Babylon, Arbela, Assyria, Gudrâha, Armenia, Cappadocia, Capardia,

[What follows is not translated, but abridged, or culled from the midst of geographical details. What is placed within inverted commas, is translated.]

Hunae; tum hi, Uscangae, porro hi, Drangae; porro regiones hae, Parutes, Açagartia, Parthae, Zarangae, Aveiae, Bactria, Cugdia, Chorazmia, Zatagadus, Arachasia, India, Gadar, Cacac, Maci."

The following particulars occur concerning some of these;

Mad, that is Media, Madai. (Gen. 10, 2.)

Arbáh, comp. Arphaxad, Gen. 10, 22.

Hunâ Sacae: the Huns and Scythians. The residence of these is placed by Ritter south of Caucasus and the Colchians, where Herodotus gives us his 19th satrapy, made up of Μύσχοσι δὲ, καὶ Τιβαρήνοἱοι, καὶ Μακρωσι καὶ Μοσσυνοικοίοι, καὶ Μαρσὶ. The Tibareni and Moschi are the Tubal and Meshech of Gen. 10. Now the Talmuds call both these, *Huns*.

Art. III.—*Seven Ancient Inscriptions in the Devanagri and Hala-Kanari characters, collected in the vicinity of Kolapur, and translated into English. By* Bal G. Shastree, Esq.

1. The accompanying seven inscriptions are from Kolapur. No. I, was procured by my friend Keshavarao Narsing, the tutor to the Raja, and carefully compared by myself with the original in the temple of Mahalakshmi, commonly called Ambábái, the mother. No. II, III, and IV, were copied by myself; and the remaining three (i. e. Canarese ones) were transcribed at my request by a person, pretty well conversant with the ancient dialect of that language.

2. I annex a complete translation of No. I. It mentions the names of four kings of the well known Chalukya family; Karnadeva, his son Vetugideva, Someshwara, and Somadeva. The capital of this branch of the Chalukyas is stated to be Someshwar in the Konkan, which, there is reason to suppose, was always the residence of the provincial chiefs. This document does not bear any date. The copy originally obtained was dated the 60th year of Shalivahana; but I found nothing to indicate this in the original, and the interpolation could be easily accounted for, as the transcript came from one of the priests, who are interested in assigning to the temple as high a degree of antiquity as possible.

The analogy of the character would not justify me in pronouncing this inscription older than the tenth or eleventh century of Shalivahana.

4. The inscription No. II, was found on a pillar of an old open temple called the Mandapa of the nine planets, from its having the figures of the sun, moon, and other heavenly bodies upon it. It is the grant of a spot of ground, on the eastern side of a village called Kettadasari, made by the great King, *Rája Narayana Máháraja Mahádeva*, the younger brother of Abja, and the protector of the original symbols of Mahalakshmi, monasteries, and charity houses at Kolapur, to Kanakachandra, surnamed Saraswati Kanthábharana, (the necklace of Saraswati or the goddess of learning) the master of the charity house, living in the Mandapa. The same document records the grant of a house to Keshava and Narasinha, and is dated, Friday 15th Magha Shudha, in the Shalivahan year 1162 called* Krodhana.

5. No. III, is the grant of a village, called Kuradi, made in Shaka year 1172, by order of an officer of the abovementioned Yadava Narayana, called also *Shri Kankaradeva Vijaya*. This officer, whose name is Kanaya, calls himself "the worshipper of the sovereign's feet, entrusted with the collection of taxes in the districts of Kolapur and the whole of the King's dominions." The individual by whom the order is carried into execution is "Baswaunaya, the Governor or Chief of the town," and its object is "to secure the prosperity of Gautamári Keshavadeva, and his wife Edavá."

6. The character in which the three preceding inscriptions are written, differs so little from that of other records of the 11th and 12th centuries of Shalivahana, that with the very limited time at my disposal, I did not attempt making fac-similes of them. There are some doubtful letters in Nos. II and III; which a second reading might have cleared up.

7. The inscription No. IV, appears on a stone, in the town-wall near the *Varuna—tirtha* gate, which is well known to have been originally found under the ground by the late Raja who repaired the gate. It records another grant by Ráya Narayan called also Ravaladeva. It is a document of considerable length and some historical importance; and I regret that, owing to the inconvenient situation of the stone and the lamentable action of the elements upon the upper part of it, I did not

* The year is marked doubtful in my copy, the Krodhana year appears to be 1187 and not 1162.

succeed in obtaining a complete transcript. Imperfect as it is, it supplies after the usual invocations to Mahálakshmi, the names of Sinha, Aidavá, Krishna, and Rama, as the ancestors of Naráyana; and states what is perhaps more interesting, that the first of these had the seat of his power at Mirjaya (Meritch). The inscription is dated 15th Magha, 1194 Shaka year, called Angicas; and records the following grants made on the occasion of a solar eclipse, viz.

1. Divya Sevya (village?) for the morning worship of the goddess and the distribution of victuals to ascetics.

2. The village of Guivilé, in the valley called Tulsi Khola, granted by *Saurada Yadava Nayaka*, to the good priest Ravaladeva of the Bharadwaja Gotra, as well as to Dobe, the son of Govind, and the same, with the exception of land yielding Nishkasor pagodas, is for ever consigned to the charge of Vishwarúpa Ráshi Guru, skilled in the worship of Pashupati or Shiva.

3. A grant by the abovementioned Vishwarúpa of two spots of ground, yielding four and three pagodas respectively, to Vasudeva Bhatta of Vatsa Gotra, the great grandson of Gadadhara Bhatta; and to Keshavadeva, the son of Damodura Trivedi, skilled in the three Vedas.

" The grant is composed by Vásudeva Bhatta, the grandson of the very learned Gadadhara Bhatta."

8. This last inscription shows a somewhat curious circumstance, that eulogies of this kind sometimes commemorate different grants by different individuals.*

9. No. V, is an inscription, in corrupt Sanskrit, on a slab of stone in the Jaina Basti or temple, and its substance is as follows:—

Invocations to the laws of Jina and Arhata. In the race of Kshatriyas, descended from Shilhar, was born Naga (?), who had four sons, viz. Gonkala, Guisaha, Kirtiraja, and Chandráditya. From Gonkala was born Marasinha who was the father of five sons. Girvala, Gangadeva, Ballala Deva, Bhoja Deva, and Gandaraditya. A son of this last-mentioned prince named Vijayáditya is described in the pompous style usual in such documents; and among the other epithets applied to him are " the Lord of Tagarapura," and " one who had obtained his desires,

* I found another large stone with Sanskrit inscriptions upon it lying close on the ground by this gate. Half of it however had been broken and consequently I could make nothing of it.

through the favour of Shri Mahalakshmi." This Vikramaditya while residing in his tents at Valvád* and governing his kingdom in the enjoyment of agreeable society, grants one-fourth of the village of Havinaheralgee, and twelve cubits of land for building a house to Maghanandi and Mánikjanandi Pandits. This grant is made solemnly by pouring a stream of water on the occasion of a lunar eclipse, which occurred on the 15th of Magha in the Shalivahan year 1065, called Dundubhi, and the object thereof is the performance of light kinds of worship to Parashwanath and the repairs of the temple consecrated, at Kshullakapur, by Vásudeva, (master of the class of Múla Sangha and Pushkaraguchena, and the disciple of Mághanandi Sidhantadeva,) as well as the distribution of food to the devotees of the place and the service of ascetics bearing staves and pots. " The grant is made, under a written deed, after washing the feet of the two abovementioned priests. It should always be respected by the descendants of our royal race as well as other kings, &c. Vásudeva bearing in mind the advice of his preceptor Maghananda regards this as the element of virtue."

10. While the preceding inscription was being copied, the transcriber was informed of the existence of a larger one buried under the same Basti. This (No. VI.) was accordingly opened, and found to be in the old Kanarese dialect, mixed up with a large number of Sanskrit epithets. Its contents may be given in a few words:

Invocation to the laws of Buddha. The race of Chilhar (Silhar) was sprung from Jimutaváhana, and the descendants thereof were lords of Tagarapúra (Kolapúr). One of these Gandarádítya resided in Valvad, Gandagopála was a worshipper of his feet. Gandarádítya and Vimbadeva follow, and both are celebrated as great rulers and pious devotees of Buddha; but what relation they bore to the last mentioned king is not very clear. For the performance of eight kinds of worship to Parashwanath in the Basti of Madgadi, near Kavadigolla, as well as for the repair of the said building; and the giving of food to saints, king Nimbadeva, in the presence of an august assembly of Shetties, including Bilwana Shetti of Kolapúr, and Biraja Shetti of Miraja, (Meritch) Halia Shetti of Kavadigolla, and a great number of others, held on Monday

* A village six miles from Kolapur, the Patelship of which is still held by a Jaina.

the 5th of Kartika Vadya, in the Shaka year 1058, called Rakshasa, makes the following grant, by solemnly pouring a stream of water, to the learned and pious Kupa Narayana, the priest of the Basti and the worshipper of Traividyadeva; viz. the right of receiving various taxes. Here follows a very long enumeration of taxes; viz. on betelnut, piece goods, vegetables, leaves, ghee, oil, shops, tents, &c. &c. the proportion being a small part of the goods brought to the market; for instance, 50 betelnuts in a load, $2\frac{1}{2}$ seers of oil in a pot containing that liquid; and a *Falam* or one-tenth of a pagoda on every cart of turmeric, garlic, chillies, pepper, &c. The grant concludes with denunciation of the five great sins on the head of any one who may even talk of the abrogation thereof.

No. VII, was found in another Basti near the Rankalé gate. Though the fragment herewith submitted contains but a portion of the original, the names of Gandaraditya, Nimbadeva, Vijayaditya and the priest Maghanandi occur in it. The nature of the grant does not appear; but it is said to have been bestowed with a view to procure happiness, prosperity, and the birth of a son.*

12. All these inscriptions taken together, establish two points of some importance. First, That the influence of the Buddhists over the provinces round Kolapúr predominated in the eleventh century, and that it was altogether supplanted, or considerably diminished, in the succeeding centuries of the Shalivahan era. Second, That the followers of Buddhism, at the period under consideration offered reverence and worship to the local deities of the Hindus.

The present town of Kolapúr is not older than the time of Tárúbáí and Shivají. The records now discovered prove, however, that it was a place of some political consequence, and that its sanctity was in great repute, among the Hindus and Buddhists, upwards of seven centuries ago. I shall now mention some circumstances, which render it probable that it can lay a claim to a still higher degree of antiquity.

* The inscriptions No. IV and VII. being incomplete may not be deemed fit for being laid before the public in their present form. As I could not however expect paying another visit to Kolapur for the present, I have thought proper to take some notice of them with a hope that some of the people who are now residing on the spot, may be induced to favour us with more perfect copies.

14. Kolapúr,* called in Sanskrit Karavirapura, or Tagarapura, holds an exalted station among the holy places of the Hindus. It is reputed to be the representative of Benares in the Dekhan, and a description of its sacred spots, temples, and Tirthas or tanks, forms the subject of a large Mahatmya; which, like works of that kind, enumerates the different sages, who attained merit by practising austerities there in the former Yugas. The occupation of the same place alternately by Buddhists Jains and Hindus, as the head quarters of their religion, is a well known circumstance; and the existence of the remains of antiquity in the neighbourhood of the town in question, need not excite our surprise. These remains are to be found in abundance, and require only to be searched and studied.

15. The great temple of Mahalakshmi is a building evidently anterior to the modern style of Hindu architecture. The Shikhara or conical pinnacle, has been lately added to it by the Rajas, and it has not got the usual Hindu symbol of Ganapati in front to the present day. It belongs to the class of those dark, many pillared oblong stone temples, so common in the south of India, and known in the Dekhan by the appellation of Hemádepanti; which, though probably not so old as the caves, must yet be regarded as the works of remote ages. A tradition is current that the image of Mahálakshmi was hidden in the house of a Brahman, during the religious persecution of the Hindus, and the appearance on the temple of one or two figures of Jain saints, in their usual attitude of prayer, finally determines the question of its Buddhistic origin.

Ever since the establishment of the Mahratha Government at Kolapur, temples and other buildings have frequently beeen observed at different distances below the surface of the ground. Many of the present houses are believed to stand upon such remains; and the people have been so much accustomed to meet with them in digging down for the foundation of houses that they now scarcely excite any surprise.— The last discovery of this kind which was mentioned to me by a credible authority, occurred a few years ago during the construction of a Ghat, or flight of steps, on the banks of the Panchaganga. The minds of the Hindus are ever prone to look for the marvellous, and therefore instead of as-

* The word Kolapur itself probably meant the same thing as Tagarapura. It owes its origin either to the Sanskrit word Kulhar or to the Canarese word Kolihu, both of which signify a lotus.

cribing these records of antiquity to their proper origin, they suppose them to be the abodes of the Rishis mentioned in the Mahatmya. This belief has led their imaginations to fancy the appearance of human figures and lamps in the dark caves accidentally laid open to their view; and, as it is natural to suppose that such beings, who have been engrossed in meditation for millions of years, would not like to be disturbed in their religious exercises, stories have been circulated of daring and officious intruders upon the sanctity of their dwellings having been turned blind, deaf, and dumb, the moment their curiosity was likely to be gratified. These tales are enough to deter the silly and the timid from attempting similar enterprizes; and the course usually adopted, on the discovery of subterranean buildings, is to cover them immediately, and to keep the circumstance as secret as possible. Such is the feeling of awe and dread with which the people are induced to behold these spots, that they have not the courage to visit and explore the contents of one or two caves about the town, which have been left open probably by the carelessness of those who first discovered them.

Notwithstanding this, a great number of fragments of pillars, slabs, and other specimens of masonry have been picked up at different times; and these, with inscriptions upon some of them, are to be found in different parts of the town. An interesting question then presents itself, at what time and by what causes was the ancient town of Kolapur, or some part of it, at all events, buried under the ground?

18. The supposition of volcanic agency, earthquake, or any similar subterranean cause, is inconsistent with the alluvial nature of the surrounding soil, and no prominent elevations, rents, or any unnatural arrangements occur. The bed of the river Panch Gunga is obviously too low in comparison to the situation of the present town, and too strongly checked by high and steep banks, to admit the conjecture that this stream could have destroyed any portion of it unless the same was considerably lower than what it appears to have been from some of the old buildings still standing. The cause to which we may ascribe the revolution in question, with some degree of confidence, is the reservoir Rankalé, which stands on a higher level than many parts of the town. This tank receives the whole of the water descending from a hill on its southwestern side, and being about a mile in breadth and nearly three miles in circuit, is known at times to have poured forth impetuous tor-

rents of water in the direction of the town, when its banks were not sufficiently protected. A flood of this kind is said to have extended to the western frontier of the suburbs, about seventeen years ago. The majestic bason gave vent to its overflowing contents through a small channel, which, as was believed at the time, was dug by some mischievous children playing on its banks; and the mighty stream destroyed the innocent miscreants, and swept away a number of houses, in the Shukarwar Penth, before its ravages were stopped by the Raja with his elephants, and by more durable embankments. I may mention also that the subterranean temples, inscriptions, and all the other records, are found in that part of the town, which lies on the same side as the lake; and nothing of the kind has been found in the eastern quarter, as far as I am aware.

19. When the important phenomenon adverted to in the above paragraph took place, it is impossible to determine. Tradition is altogether silent on the subject, and there is no other circumstance from which we might hazard even a conjecture. But as all the inscriptions, now brought to light, are dated in the 11th and 12th centuries of the Shalivahan era; and as most of these have been found under the ground, there is strong reason to conclude that the old town was in existence to the middle of the 13th century of the Christian era, and that its destruction must have occurred at some subsequent epoch.

No. 1.

Translation of an inscription on a stone in the temple of the goddess Mahálakshmi.

1. Salutation to Mahálakshmi the goddess of wealth. May you receive protection from the remover of difficulties, (Ganapati); whose heart (lit. belly) is a reservoir for the nectar-like disposition to shed blessings upon the world; and the bright lustre of whose teeth, white as the *Jasminum Multiflorum*, dispels the gloom of ignorance and illumines all quarters. 2. May the king, Somadeva, with his queen Manikyadevi, be preserved by that goddess, who is an enemy to the Daitya race, and who, under different names and forms, such as Gangá, Brahmi, &c. averts the calamities of the three worlds, and has manifested herself on the earth in the shape of Mahalakshmi for the benefit of her votaries. 3. May prosperity attend the dynasty of the Chalukyas, of an untainted glory; which is the repository of every variety of excellence as the

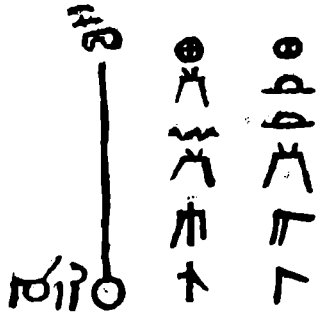
ocean is of gems; and like the luminary of the day, is the only source of splendour, and whose fame is spread far and wide. 4. How is it possible to describe the character of the sovereigns descended from this house; who were possessed of immense treasures; and who being mentioned, other eminent princes are thrown into neglect. 5. We shall, nevertheless, extol some kings of this dynasty, who flourished at Sangameshwar in the Konkan, and were all celebrated for their good qualities. 6. In this family was born king Karna of an unspotted character; who reclaimed the earth by his virtues; chastised those Kshatriyas that did not do him homage; obscured the moon by the fair fame of his liberality; and propitiated the gods by performing various Yagnyas accompanied with liberal distributions of alms. 7. He was the sovereign of a great kingdom, and having gained five great titles, lived at Vijaypat, the best of eastern cities. 8. He made the lotus of the Chálukya house bloom on the earth; his banners had the peculiar signet of a golden boar. 9. He was distinguished throughout (the regions bounded by) the seven oceans by the title of Nrisinh (lion amongst men), and was reputed to be a matchless hero, endowed with a noble and enterprizing spirit. 10. He might be called an adamantine asylum for refugees, and was much devoted to the service of the gods, the Brahmins, and his superiors. 11. The earth was eminently fortunate in being blessed with this king, whose hand was always wet by a perpetual current of water in giving alms; who was honoured in the assemblies of the learned, and who harassed his enemies by his daring exploits. 12. Whose armies were formidable in their march; who was virtuous in his deeds and a store house of all blessings in the Kaliyuga. 13. And he was distinguished for his wealth, virtues, and fame. 14. His son Vetugideva was a repository of glory and was possessed of immense wealth. As the sun, by his strong light, is the pinnacle of brightness, so was he the very pinnacle of the requisite qualities of a king. 15. As long as he ruled over the world with the tenderness of a father, diffusing an unrivalled fame, his subjects were as happy as they were in the presence of the moon. 16. To him was bornthe best of kings, Somadeva, who rendered his dynasty illustrious as the moon does the end of the rainy season. 17. Having held the sceptre of his vast kingdom and rendered the earth prosperous, he repaired to heaven to adorn it by his virtues: but finding a vacuity on the earth, returned to it like the emblem of Shiva, which purifies great sins by the

sprinkling of water poured over it. 18. His younger brother Somadeva, was known in the three worlds by his glory, and the dread which he inspired into the mind of his enemies, through the favour of his spiritual preceptor Shrishána Shambhu. 19. He was like a lion to his elephant-like enemies, and Shamed Káma (god of love) by his handsome features; his deeds were virtuous; his bounty pure; his generosity unbounded. He possessed every admirable quality and was renowned for virtuous actions. 20. To him bowed the Suras and Asuras, whose heads were crowned with rubies. This king granted a village called Kubhar for the offering of fine Modakas, (a particular kind of cake,) every day to Mahá-lakshmi at her mid-day worship. 21. The village has been given over to the goddess by king Someshwara, following a fixed virtuous principle and aspiring to be ranked among the great and the pious. 23. Whoever will resume our former grant of land, house, &c. situated behind the Matha (monastery) of Kaladeva, shall be doomed to the infernal region called Raurava, and shall be guilty of destroying one hundred Lingas. 32. Many kings as Sagar, &c. have enjoyed the sovereignty of this earth; to whomsoever the earth belongs, to him belongs the fruit thereof. 24. He who resumes a spot of land given either by himself or by another, becomes a worm in filth, for sixty thousand years. 25. This short, but elegant and figurative eulogy, has been compiled by consent of king Somadeva, acting under the directions of his preceptor Shrishana Shambhu. May it prove auspicious. Written by Vedyadhar Pandit. May there be prosperity for ever.

Note by the Secretary. The *Yadava* family, mentioned in inscription No 2, is also noticed in a Hali-Kanari inscription, at Bijapur, of which an account will be found in Vol: 1 of our Journal, p: 572.—The *Silhara* family also of No 5, and the city of *Tagara*, have been made known to us by various copper plate-grants of land: one of which, that was found at *Tannah*, was translated into English, and published in Vol: 1 of the Asiatic Researches; and another, making mention of *Gokal Raja*, *Guwel Raja*, *Kirti Raja*, and *Chandra Aditya*, with other branches of the same family, was made public in Vol: III of the *Transactions of the Literary Society of Bombay;* p: 395.—The author, in the previous account of ancient inscriptions at Kolapur, wishes to identify this city with the ancient *Tagara;* which, at the time when Arrian's Periplus was written, or in the beginning of the second century of our era, was the great emporium of the Dekhan, to which all kinds of commercial goods were brought, and conveyed through the *Bala-Ghat* mountains to *Barigaza*, or Broach.—The true position of *Tagara*, or its identification with the modern *Daulatabad*

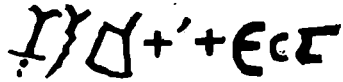
Plate XXII

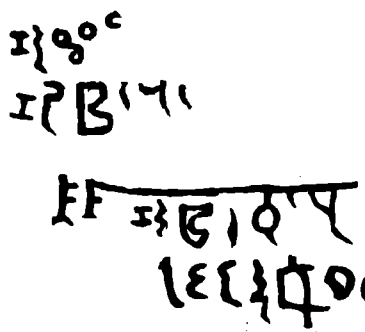
Inscriptions copied from the Jubal Mukatib near Wedj in 1831.

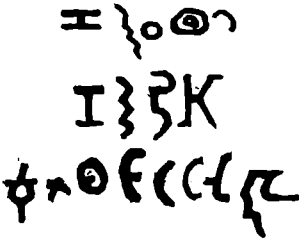


A

These two characters are seen in several places.







Art. IV.—*An account of Sherm Wadj, in the Red Sea, with a notice of ancient inscriptions from Jabal Mukattib in the immediate neighbourhood. By Captain T. Carless of the Indian Navy and Assistant surveyor to the survey of the Red Sea from* 1829 *to* 1834.

Sherm Wadj is a small inlet, forming an excellent anchorage, on the eastern side of the Red Sea, in Latitude 26° 15′ north, where wood, water, and sheep, may be procured from the Bedwins at a cheap rate. The water is brought on camels from the ravines and vallies amongst the hills, a few miles inland, and is excellent. On the beach, close to the anchorage, there are six or seven rudely built storehouses or shops, from which the boats' crews frequenting the place, and pilgrims on their way to "Mecca," can obtain supplies of food and clothing; and on the cliff forming the north point of the inlet, the ruins of a fort are visible, but it does not appear to have been of any great size or strength, and is evidently of Arab construction.

From the plentiful supply of water, the country about Wadj is more fertile than any other part of the coast of the Red Sea above Jeddah, the vallies being full of small trees and bushes, and thinly covered with grass, one species of which, from its seeds being enclosed in long silky tufts, produces an appearance as if the ground were covered with fine down. Herbs and wild flowers are also observed springing up in profusion every where, and many of the latter, when in full blossom, are exceedingly beautiful, filling the air with their fragrance and affording to the cattle a most luxuriant pasturage.

has not been satisfactorily established, though *Phultamba*, on the southern bank of the Godaveri, and *Mungy Paitan* on the same river, clearly represent the *Pluthana* and *Paithana* of Arrian.—*Tagara* was ten days journey eastward of *Pluthana*, or about one hundred and ten miles, while Kolapur is more than 180 miles from *Phultamba*, being situated south-wards and considerably to the west of this ascertained position: the true situation of the ancient *Tagara* is therefore yet to be ascertained.—The *Callian* of Arrian is however without doubt, the locality known by this name on the mainland opposite Salsette and Bombay; where the Greeks, in the time of the Periplus, were prohibited from landing goods, and were confined in their commercial transactions to the harbour of *Broach*.

About six miles inland from Wadj, there is a small fort, situated upon a plain at the foot of the hills, belonging to the Pasha of Egypt, and garrisoned by a few of his troops. It is of a square form, strongly built with towers at the angles and gateway, mounts several guns, and serves not only to overawe the tribes in the neighbourhood, but also, as it lies in the direct route from "Syria" to "Mecca," as a place of refuge and succour for the pilgrims performing the Hadj. In its immediate vicinity, one of the principal routes from Wadj, into the interior, enters the mountains, and passes through several wild romantic ravines bounded by irregular crags of granite formation. At the entrance of the pass, the cliffs rise perpendicularly to a considerable height, and on those which have smooth surfaces, the face of the rock is covered with inscriptions in an unknown character. They are rudely cut, placed very irregularly and all very short, there being none, as far as I could discover, of greater length than those I copied. Niebuhr, if I remember right, mentions having seen them when travelling in this part of Arabia, and supposes them to be merely a kind of rude hieroglyphics cut in the rock to commemorate the arrival and departure of pilgrims, but in this opinion I do not agree with him, as they appear to me of great antiquity and a distinct character can evidently be traced throughout the whole, which bears some resemblance to the Ethiopic. From this I am inclined to think they are of Hamaiyaritic origin, for we know that even so late as the time of Mahomed's appearance, two distinct dialects prevailed in this part of Arabia, the Hamaiyaritic and Koreish, and although no records have been transmitted to us, to enable us to arrive at a satisfactory conclusion on this point, the former is believed to have borne a strong affinity to that language.

Nine or ten miles beyond the entrance of the pass, the road, after winding through several rocky ravines and beds of torrents, descends slightly and emerges upon a spot where the country for some distance is more open and the hills are much lower. Here the ruins of a large town are met with, occupying in clusters an extent of about a mile and a half in length, by three quarters of a mile in breadth, which the Arabs call Feyrabat, and assert was built by the Nasseranees or Christians. It is now so entirely in ruins, that heaps of stone alone remain to point out its site, and nothing whatever is visible from which an opinion might be formed as to its age or the people who built it, but some of the houses

have evidently been constructed entirely of marble, which is procurable in large quantities from the surrounding hills. One of these, not more than 300 yards distant, from its numerous extensive caverns and figures, is itself a great curiosity, and is said by the Bedwins, who are afraid to pass near it, to be the abode of all kinds of evil demons. If the inscriptions on the Jabal Mukattib, at the entrance of the pass, could be deciphered, they would perhaps throw a ray of light on the history of this town and its inhabitants.

All the Bedwins, with whom I have spoken on the subject, state, that throughout that part of Arabia, extending along the borders of the Red Sea from Akabah to Jeddah, and from 30 to 40 miles inland, the ruins of old towns are very numerous, and some of them also mention the existence of inscriptions, similar to those noticed above, in various places, but their descriptions are so vague and confused, that with my imperfect knowledge of the language I have not been able to ascertain the precise localities where they are to be found.

T. G. CARLESS,

Aden ; August 13th, 1845. *Com. I. N.*

The Journal, from which this extract is taken was written in 1831, during the survey of the Red Sea, some years before the inscriptions found at Hassan Ghorab and other places on the southern Coast of Arabia were discovered. Those I copied from the Jabal Mukattib, near Wadj, appear to be written in a different character, but some resemblance is still observable between them, a few of the letters and the signs or characters marked A, being common to both, others again are merely the same as some of the Amharic letters now in use, and it will be seen that the inscriptions are written both horizontally and perpendicularly ; a peculiarity not observable in those discovered on the southern Coast of Arabia.

Note by the Secretary.—The town mentioned in the fourth paragraph of Art: iv, near which, in one of the mountains, are said to be extensive caverns and figures, seems to be the same as *Wadi-al-Kora*, on the Caravan route from *Damascus* to *Medina*. One of the inscriptions is in the Hamaiyaric character of Southern Arabia, the others, mixed with Hieroglyphics, in the Nabathean character of the Syriac, similar to the inscriptions which have been deciphered by Professor Beer.—A bad copy of the inscriptions now sent by Captain Carless will be found in the Journal of the Geographical Society of London, Vol VI p: 64.

ART. V.—*Notes on the agriculture of the Cherotar district of Gujarat.* By LIEUTENANT COLONEL MELVILL, *formerly of the Gujarat Revenue Survey.*

The Cherotar is that part of Gujarat situated between the *Mahye* and *Sabarmati* rivers, and may be said to be bounded by a line roughly drawn from Ahmadabad to the small town of Oomret. It is the richest and most highly cultivated part of the Province; a character which it owes partly to the natural fertility of its soil, but in a much greater degree to the skill and industry of the Kunbies, who are its principal cultivators, and who claim this particular spot as that in which their ancestors first settled. All the agricultural skill of the country is concentrated here, and I have therefore thought that the following brief and imperfect notes may be of some use, as calculated to illustrate the system of agriculture which prevails in a province so celebrated for its fertility.

Soil.

Gujarat is well known to be an entire alluvial plain, an almost perfect level, and destitute of rock or stone, except in the neighbourhood of the hills which form its boundary. The soil has two marked divisions, *black* and *white*, called by the natives *kali* and *guraru*. The former prevails over all the southern, the latter over all the northern parts of the province. The black soil is known very universally throughout India, as black cotton ground; and is a rich loam, which, in the rains, becomes a mass of stiff ground, and in the dry season hardens and shrinks up, leaving deep holes and wide cracks. Its depth seldom exceeds six feet; and it is consequently adapted to those plants only which strike their roots along the surface, rather than deep down into the ground. The white soil is a light sand, more or less mixed with clay to the depth of ten or twenty feet, where a gravelly or sometimes a marly stratum appears, abounding in springs of water. It is a general remark throughout Gujarat that every spot of ground which is relatively *high*, partakes of the white soil, and *low* of the black; and so much is this the case, that in some parts of the country, the white soil is termed by the natives *Thullia*, or rising ground.

The soil of the Cherotar is almost entirely *guraru*; it is never equal, but sometimes approximates to the *marwa* land of the Jambusir Parga-

nah, on the southern side of the *Mahye*, which Mr. Marshall has described as a sandy loam of light brown, or *darkish* tinge, and the superiority of which he demonstrates, in his Statistical Report. An intermediate description of soil termed *besur*, neither wholly *kali* nor wholly *goraru* is common here, and used particularly for some kinds of crop. But the richest soil of all is the *bhata*, or land gained by alluvion on the sides of the broad beds which form the channel of all tropical rivers: of course this kind of land is of very confined extent.

Enclosures.

In the rich tract of the Cherotar, the fields are generally fenced with thick and luxuriant hedges, but, in most other parts of Gujarat, very little attention is paid to what an English farmer considers so important a part of his business. In the black soil indeed neither trees nor hedges thrive: and the cultivator is content to fence his field round with the thorny branches of the *bawal*, (mimosa,) during the time his crop is on the ground. At other periods, a narrow strip of unploughed land, marks the division of fields; and sometimes there are scattered pieces of the milk bush, or prickly pear, along it, which strengthen the dry thorns, and form a more compact hedge, when the season comes round for renewing it. The white soil, on the contrary, is well adapted to the growth of hedges, but they cannot flourish properly on any but irrigated land, where they receive a constant supply of water during the hot season.

The usual size of fields, in the Cherotar, varies from five to twenty acres. The hedges seldom exceed five feet in breadth; and crops of different kinds are frequently grown within the same enclosure. Rice lands, which require to be flooded, are enclosed with banks of earth about two or three feet high, and a foot broad. The sugar cane fields are guarded by thin walls of mud and straw, six or seven feet high, which completely encircle the field, leaving no aperture but a small hole just large enough to admit the body of a man; and even this is placed at some height above the ground, and carefully blocked up with thorns. This wall is absolutely necessary as a defence against wild hogs, which are so voraciously fond of the cane that they will break through all ordinary obstacles in their way to it.

Draining and Irrigation.

The husbandmen of Gujarat have no knowledge whatever of draining,

and from the costliness of the operation, and the skill required in its execution, it will probably be one of the last operations of scientific agriculture, with which they will make themselves acquainted. I am not sure indeed, that it could be often applied with much advantage. The Cherotar is a part of the country, which suffers particularly from floods of water during the periodical rains; but individuals can do little towards remedying this, as each man by draining his own, would flood his neighbour's property; and effectual outlets for the superfluous water require to be carried to so great a distance, that the work, if done at all, must be done with public, not with private capital.

To store up the rain water which falls during the monsoon, and to distribute it over the fields during the dry season, is a more important part of Indian agricultural economy. Without the aid of artificial irrigation, a single crop only can be produced in the year; but on a field which has the advantage of being watered, three crops may be raised in succession. Again the single crop is always one of a common kind, usually that which forms the staple produce of the country; and, from its abundance, must always be cheap, as all the fewer and valuable species of crops require to be regularly watered for several months. If we add to this the uncertainty of the rains, which may be too heavy or too scanty, or may fall in an improper degree at particular periods, it is certainly not too much to rate the difference of value between what are usually termed the dry and the wet lands, as four guineas per acre. The quantity of irrigated land in Gujarat bears but a very small proportion to that which is not irrigated. From accurate statements, to which I have had access, I think it may be fairly stated in the Cherotar at a tenth part of the whole quantity of land in cultivation.

It is singular that throughout all this Province, there is no work of art of any magnitude constructed for this important purpose. The Rulers of the country apparently have never cared for the construction of aqueducts or reservoirs. Of common tanks there are abundance; but the tank is not well suited, in level countries, for irrigation; it is itself so dependent on the monsoon rain, and is always liable to fail, just at the time when it is most wanted. The stream of rivers again generally shrinks up to such a narrow compass in the dry weather, as gives little opportunity of applying the water extensively, without the aid of such expensive machinery as must be far beyond the means of Indian agricul-

turists. There is one little river, indeed, near Ahmedabad, called the *Khari*, of which much use is made; it is very narrow, and confined between mud banks, which for a long distance are so low, that a dam brings the water even above the level of the neighbouring grounds. These dams are curious; they are formed of earth only, and never go straight across, but wind with an unskilful and often ineffectual contrivance to break the force of the water, and thus prevent its pressing too much on any part. The muddiness of the water of this little stream renders it peculiarly valuable for irrigation.

We may safely say that at least three fourths of the irrigated lands are supplied with water from common draw wells.—Spring water is abundant in the Cherotar, and with the exception of a tract of country near the bank of the *Mahye*, the level of which is higher than ordinary, it can be procured, in abundance, at the depth of twenty or thirty feet from the surface. In digging wells, the first operation is to make a round excavation, about twenty feet deep, or until some appearnce of water is perceived. A circle of wood, called a *Chakar*, made with great care, is then slipped to the bottom of the hole to serve as a foundation, and upon this the first layer of bricks is laid. As the building goes on above, the ground is loosened, and if it can be managed, dug up beneath, until the weight of the brick work causes the whole mass to sink, which it will do to the depth perhaps of ten feet, the water being drawn off each day as it rises, until the sinking can be carried no further. The work is then carried up to the surface, covered with a coat of *chunam*, and the well is complete. But if the depth thus obtained, be not sufficient to ensure a copious supply of water, a second circle of wood, called a *tundi* is fitted within the circumference of the first, and built upon, and sunk in a similar manner. In this operation the difficulty of drawing off the water, with sufficient despatch, is very great; and when, as is sometimes the case, it becomes necessary to insert even a third circle, the expense and labour is immense. In those parts of the well which are under water, the only cement used is a little clay, but the bricks must be fitted together with great nicety. In constructing the *chakar*, the use of metal, nails, or iron fastenings is avoided, and their place supplied by wooden pegs, to avoid the corrosion that would otherwise take place. Wells in the Cherotar are always made either of brick or of clay hardened in the sun called *kund*. In the neighbourhood of the hills on the frontier of the Province

stone wells are met with, but they do not answer well, from the difficulty of sinking them to a sufficient depth; for they cannot build them in the gradual manner of brick wells. Stone is better adapted to the construction of that kind of well called *bauli*, which has steps on one side, and is not intended to be used for irrigation; it consequently does not require to be sunk to any great depth, as it is not liable to be much drawn upon. A good brick well, perfect in every respect, and twenty feet deep, will cost in construction about two hundred rupees; if forty feet deep, five hundred rupees, and proportionally at intermediate depths.

The water is drawn up from wells in a large leather bag, made of buffalo's hide attached to a rope, to which a pair of bullocks is yoked. The rope is passed over a wheel fixed on cross sticks; and to assist the purchase of the cattle, an inclined plane is formed down which they walk, and thereby draw at a much more acute angle than they otherwise could. In a single well, several *Kos* may work at once according to its diameter; four is a very common number. I have seen eight and heard of fourteen. In working deep wells, called *Ramia*, two pairs of bullocks are usually employed to each *Kos*; when the first pair arrives at the bottom of the inclined walk, the bag is loaded by a man stationed for the purpose, and its contents discharged. The rope is slipped, and when the bag has again reached the water is fastened to the pair of bullocks at the top standing ready to receive it. It is curious to observe the men keeping count of the number of *Kos* drawn by passing little balls of clay from side to side of a niche in the bank. In working shallow wells, called *Sundia* only one pair of oxen is used, and a peculiar contrivance enables a single man to do all that is necessary. The *Kos* has, at the bottom of it, a long open pipe or trunk to which a second rope is attached, passed over the lowermost edge of the well, and joined to the principal rope just below the bullock's yoke. The length of this rope is so contrived, that when the bag is below the surface the end of the trunk is drawn up and secured, but as soon as it comes on a level with the top, the end is drawn inwards, and the water immediately discharges itself into the receptacle prepared for it. The *Ramia kos* is calculated to contain about 40 gallons of water, and the *Sundia* about 30; and 800 of either may be drawn in the course of a single day; and a single *kos* is calculated to be equal to the irrigation of 6 to 10 acres in a season.

The water on being drawn up, is receiv d first into a shallow basin

lined with *chunam*, whence it flows into a narrow sluice also chunamed for a few feet; but after this, the only channels used are of earth raised a little off the ground. The field is divided into little square beds, about 4 feet each way. The course of the water to different parts, is managed by one of the cultivators who diverts or directs its passage to particular spots by opening or damming up the channels with a little wet mud, which he carries in his hand for the purpose.

Implements of Husbandry.

There is only one kind of plough, known in the Cherotar, and that is the simple kind found all over India. The bar is usually a crooked piece of wood, and the small piece of iron used as the share, is the only metal about it. It is drawn by a single pair of bullocks, and scratches rather than ploughs the ground; but it appears to answer every required purpose, in this country, where all experience shews deep ploughing to be quite unnecessary, if not absolutely injurious. In the very stiff black soil, the plough is not used at all, but in its stead, they have an instrument, called a *Ramp*, something like, I believe, a drag hoe; it is a heavy bar of wood, about a yard long, to which is attached a blade of iron slightly curving inwards, in the shape of a crescent. It is drawn by four stout oxen, and cuts up and exposes all the surface of the ground, without penetrating to any depth, a practice of which experience has taught the agriculturists the utility.

All seed; with some trifling exceptions, is sown with the drill, here called *Turphun:* it is ingeniously contrived to sow several kinds of grain at the same time. Weeding is performed partly by hand, and partly with a rude harrow, having six or eight iron coulters or teeth; there is also a *Kumbri* or rampri, a smaller kind of *Ramp*, used for the same purpose.

The only other implement of husbandry worthy of notice, is a large rough board, which is drawn over the surface to break the clods and smooth it preparatory to sowing. This is called a *Sumar;* and fulfils very imperfectly, and with far more labour, the office of *Rollers* in England.

The rude manufacture of these farming tools may be judged from their value. The *Plough* costs about $2\frac{1}{2}$ rupees; the *Ramp* about 3 rupees; the *Drill*, 1 rupee, and the *Rampri* $1\frac{1}{2}$ rupees. The yoke and harness for the bullocks will cost perhaps an additional rupee in each case.

Manures.

The common manure of the Cherotar is cattle dung: every cultivator of any condition, has a stock of at least four or five cattle of one kind or another, the dung of which he preserves in some convenient spot, generally near his house. The compost accumulates, and is never disturbed until the season for using it comes round, when it is carried out to the fields in carts. No kind of care is taken of it, and much of its most valuable properties is doubtless dissipated in the atmosphere. The practice of folding cattle upon fields is quite unknown; they are driven out daily to graze, but the manure they leave behind, is not even collected, excepting for fuel, but left to rot and waste on the grazing ground. Sheep are not kept in any numbers, and their dung on which English farmers set so high a value, is consequently wanting.

On the sandy soil, they frequently use as manure, rich black mould taken from tanks or the beds of nullas; this corrects the looseness of the sand, and forms a mixed soil which is highly fertile; but the trouble and expense of digging it out and carting it are very great, and it is little used but for the very best and most valuable species of produce.

In the southern parts of the Province, the practice prevails of ploughing in the hemp plant when half grown; and it is found to answer as very good manure. The refuse stalk and leaves of the Indigo plant, after the extraction of the dye, are also very valuable for this purpose; but of course merely known to the greater part of the people, by report, as the growth of Indigo is so very limited.

In the wild woody countries, on the frontier of the Province, the *Bheels* are in the habit of selecting small spots in the jungle, on which they collect all sticks and leaves and set fire to them. The ashes are equal to any manure and sufficient to ensure a good crop for two successive seasons. The Hindus, and particularly the Kunbies, have a curious prejudice against this; they extend their reverence for animal, to vegetable life, which they say it is not lawful to destroy, unless absolutely required for the food and support of man. They refuse therefore to adopt this practice, though they are themselves aware of its utility, and it certainly would be a valuable improvement in the agricultural economy of those parts where brush wood is plentiful. A Kunbi of Viramgaum endeavoured to overcome the difficulty by procuring a Kuli to fire the fuel, which he had collected and spread over his field. He reaped an excellent

crop, but the caste expelled him, and he was obliged to go to great expense before he could get his character restored. The same prejudice would prevent the introduction of what is called, in England, paring and burning; it would probably improve both the loam and the sandy soils to a very great degree.

Common manure is not often sold, as few cultivators have any to spare. Its nominal price is usually about a Rupee per cart load.

Seasons.

Ordinary land yields but one crop in the course of the year; an irrigated field will produce two and three crops in succession, but never more. The agricultural year commences with Jeth or June; the *Dewali* or feast of lights, which occurs generally in October, marks the termination of the *Chumasia* or four rainy months, and the commencement of the *Sialu* or cold. The *Unalu* or hot season, is not so exactly defined, but may be called March, April, and May. The crops which ripen in October are called the *Kharif;* those which ripen in February are the *Rabi;* and in April or May, the *Hari.*

Productions.

The principal products of the Cherotar, are comprised in the following list. I have ventured to annex the proportionate extent to which the culture of each kind prevails, in decimal parts, supposing the whole extent of land under cultivation to be expressed by unity. I have drawn these proportions from the statements of the Revenue Survey; and, as they result from an actual survey and measurement of several *Parganahs,* I think they may be deemed to approximate pretty nearly to the truth. The botanical names I have drawn from various publications; but as I have myself no botanical knowledge, I cannot answer for their correctness;

Bajri, *(Holcus spicatus.)*
Jowar, *(Holcus sorghum.)*
Kodra, *(Paspalum frumentaceum.)*
Baota, *(Panicum frumen:)*
Rice, *(Oryza sativa.)*
Wheat, *(Triticum.)*
Barley, *(Hordeum distichon.)*
Sugar cane, *(Saccharum.)*
Indigo, *(Indigofera tinctoria.)*
Poppy, for opium, *(Papaver.)*
Tobacco, *(Nicotiana.)*
Kussoombhee, *(Bastard saffron.)*
Cotton, *(Gossypium.)*
Deweli, *(Ricinus communis).*
Tul, *(Sesámum orientale.)*

Garden and other produce.

	Proportion.	Decimals
Bajri & Jowar,		0.63
Kodra, Millet, and poor grains,		0.15
Rice,		0.06
Wheat, and Barley,		0.05
Sugar cane, Indigo, and Poppy,		0.001
Tobacco,		0.002
Miscellaneous produce,		0.107
Total cultivated land,		1.000

Culture of Grains.

Bajri and Jowar are the staple grains of the Province, and for the production of which it has always been distinguished. They constitute the food of the larger part of the agricultural population ; and are in fact the corn of Gujarat. Jowar is the proper production of the black soil, but grows also on *goraru*; bajri grows upon *goraru* only. To ensure a good crop, the land must be manured ; and if any after crop be grown, the manuring must be repeated annually ; otherwise once in three or four years is enough. The manure is ploughed in immediatily after the first fall of rain; the *Sumar*, a substitute for the roller, is then drawn over the surface, and lastly it is harrowed. The seed is sown in July, and after the lapse of a month, the ground is well weeded, and the crescent shaped knife, *(Rampri,)* is drawn between the furrows to clear away any old stubble or weeds. When the crop is about a foot high, its growth is checked by drawing the *Sumar* over it, and passing the plough between the ridges, by which means a much healthier and more fruitful plant is produced. The grain ripens and is cut early in October ; it is trodden out by bullocks, and the chaff separated by a very simple process, viz : a man standing on a high stool lets the grain and chaff fall together in a breeze of wind, which carries off the chaff in its passage, while the heavier grain alone reaches the ground.

With the bajri or jowar there is always sown a proportion of *Kuthol* or pulse, consisting of Mug, Muth, Chola, Urud, Wal (a species of phaseolus and other leguminous plants,) which come forward about a month after the other has been cleared away. The practice of thus mixing crops

is very general, and apparently a good one. In fields, which have not the advantage of irrigation, one or other kind is almost sure to succeed under the most unfavorable seasons; the stalks and leaves of the pulse afford a succession of the finest green forage, which, where grass, as in the Cherotar, is so very scarce, is of great value to the Ryot. The *Karbi*, or stalk of both bajri and jowar, is well known as nourishing food for cattle. The natives, for feeding their bullocks, prefer that of the bajri; but for horses, that of the jowar only is used by Europeans. The quantity of seed required to sow an acre of ground is 14 to 20 lbs, the *Kuthol* forming three parts in eight. The produce of the best kind of land is 1,700 lbs per acre, *Kuthol* included; on medium land the produce may be averaged at 1000 to 1200 lbs. Jowar is sometimes grown solely for the sake of the *Karbi*, which is finest in the poor lands, where the produce in grain would not repay the tillage.

Kodra, the various kinds of millet and other poor grains, are grown in the inferior *goraru* lands, and form the food of the poorest classes. They are sown and ripen at the same time as bajri; kodra by itself, is somewhat too strong a crop for the poor lands, and its value is too low to admit of its cumbering the richer soils; to correct this, it is generally sown in conjunction with *Tuwar (cytisus cajan)* which is found to be an ameliorating crop.

Baota is a singular grain grown in the *besur* soils, or those which are intermediate between the *kali* and *goraru*. It is sown first in seed beds, and afterwards transplanted to the fields, where it is planted by hand in furrows previously prepared by the plough. It ripens towards the close of the monsoon, and will not thrive on the same ground for two years in succession. It requires some manure, but the crop after all is not of much value.

Rice, as a subject of cultivation, is of novel introduction in Gujarat; and it is still too expensive to be used as food by the generality of the people. It first came into use about 60 years ago, when the manufacture of Indigo ceased. It is grown in *Kali* land, or in prepared beds of a kind of artificial soil, nearest in appearance to the *besur*, called *Kiari* or *Kaurda*. The seed is first sown in small beds, called *Daru*, of the richest loam that can be had. In July or August the plants are transplanted to fields which have been prepared for their reception by manuring, flooding, and ploughing. They must be kept supplied with an abundance of water,

and for this purpose, tanks or wells which can be resorted to, in the event of the monsoon rain not proving sufficient, are invaluable. The crop is harvested in October; the average produce is about 1,500 lbs per acre; the best land will yield as much as 2,800 lbs, and the worst so little as 600 lbs. The natives distingnish six kinds of rice, classed as follows:—

1st Punkhali, worth one rupee and two annas per maund.
2nd Kumod, worth one anna less.
3rd Haichi, worth one maund and eight seers per rupee.
4th Sutarsal, worth one maund and ten seers per rupee.
5th Wankla, worth one maund and twenty seers per rupee.
6th Sathu, worth one maund and thirty five seers per rupee.

The last is a coarse kind of rice, sown broad cast, in any low spot, and frequently without the use even of a plough, the ground being roughly broken up with a pick-axe or hand hoe.

Wheat is of two kinds, the *Waria*, or that grown with irrigation, and the *Chasia* or that grown without. Both kinds are barbed, a protection which is perhaps necessary to preserve the grain from birds; and both are sown in October, and reaped in February. The *Waria* wheat is grown as an after crop to *bajri* or rice; and as soon as the *Kharif* is cleared, the field is watered with the old stubble standing, which rots and answers in some degree as manure. The natives conceive it desirable that the seed should be as near the surface as possible, and accordingly sow it by hand, smoothing over the surface afterwards with the *Sumar*. Barley is treated precisely in the same manner; it is not so liable to blight as wheat, and it is on this account often sown with it in equal parts. The singular circumstance sometimes occurs, of the wheat being destroyed, while the barley comes forward to full maturity. The blight of the wheat is caused by excessive cold *(heem)*, or the attack of a small insect called *Girwo*. About 140lbs of seed of either barley or wheat is required to sow an acre; and the return is about 2000 lbs. These crops are likewise grown on land which has lain fallow during the monsoon, in which case the crop is more abundant, but barley compensates for the loss of the *Kharif*.

The *Chasia* wheat is grown on low lands of the blackest soil, which in some parts, bears the name of *Gheonwar*, or wheat lands. The ground intended for it, must lie fallow during the monsoon, and be ploughed two or three times. Where it can be done, it is advantageous to dam the field round, so as to retain the water upon it; in the richest wheat coun-

tries, these fields are perfect quagmires during the monsoon. The seed, about 65 lbs per acre, is sown in October; the ground requires no weeding; weeds indeed do not readily grow on it, and the crop is ripe in January or February. In reaping, the plants are drawn up by the root, and not cut off as most other plants are. The average produce of an acre is about 700lbs. The quality of the *Chasia* is superior to the *Waria* wheat, but both are very inferior to that brought down from Malwa.

Culture of Sugar cane.

Sugar cane is a very valuable description of produce, which can only be grown in the better kinds of *goraru* soil, and with the aid of the very best water. It can be grown, on the same ground only once in four or five years, and it is consequently generally found in detached fields. It should be preceded by a fallow, and the ground should be constantly ploughed and kept very clean during the preceding years. In February the land is plentifully manured with dung and black mould, which must be thoroughly ploughed into it. The cane is propagated from cuttings, each containing three joints or knots, which are planted in small square beds previously prepared and flooded. The seed canes are placed lengthwise, in rows, at the distance of 15 inches, and each cane is two or three inches distant from its neighbour on either side. They are trodden in with the foot. The ground is watered plentifully every ten days, until the rains commence, during which no irrigation is necessary; but when the rains cease, watering recommences, and is continued at intervals of 15 days, until the cane reaches maturity, which is usually in January or February. When ripe, it is cut off near the ground, and the juice is expressed by a screw mill. This is formed of three rollers, the centre one the highest, and turned by bullocks. The rollers are grooved diagonally down, and fitting into each other so as effectually to crush the cane which is twice passed through them. The screw is always erected in the field and sunk under ground, to admit of the bullocks being conveniently yoked. The juice, as expressed, passes at once into a large earthen vessel, also under ground, where it remains cooler than in any other situation, and is not so apt to ferment and spoil. With as little delay as possible, it is passed from this vessel, into a large boiler made of iron, where it is boiled, and the impurities as they rise skimmed off, until it obtains a considerable consistence; it is then poured into a trough made of tiles, and left to

cool and granulate; lastly it is put into *mathas*, or earthen pots, which when full weigh about 80 lbs each, and sold as *Gul* or raw sugar. It is often called *Gur* and *Jagri* in other parts of India. The screw mill is made of the wood of the *babul (mimosa)*, which is peculiarly hard and tough: it costs about 25 rupees; no metal is used about it, and it will not stand the use of more than two seasons.

There are two kinds of cane,...the white *(dholie)* and the red *(rathi)* —distinguished by their external colour. The *Gul* of the white cane bears a somewhat better price than that of the red, but a smaller quantity is produced from it. An acre planted with sugar cane is calculated to yield about 4000 lbs of the raw sugar.

Indigo.

Many parts of Gujarat were formerly celebrated for their Indigo. Beckman, in his history of Inventions, says that in 1633, Indigo was distinguished in Europe as Sirches, Chirches, Bejana, Begarm, and Gujarat Indigo. I do not know exactly what place Bejana may be, unless Bijapur, but Sarkhej is also mentioned in the Ayeen Akbary, as famous for its Indigo; it was indeed a *bander* or emporium for this article, even prior to the building of Ahmadabad, when it was a large town of 18,000 inhabitants; and named *Dakha bander*. The country about Kurrie and Jambooseer on the south of the *Mahye* also produced this plant extensively. About 50 years ago it began to be discontinued, as its price, from the superior manufacture of the Bengal planters, had declined so much as to take away nearly all profit from its culture, and it is now scarcely grown at all. The *kunbies* * have some prejudice against it, on account of the animalcule, which they supposed to be destroyed in extracting the dye from the leaves. There is a prejudice also against Tobacco; but their prejudices either bend or break when the kunbies see any palpable advantage before them. The kunbies of the Virangam Parganah entered into a general agreement, about 60 years ago, to discontinue the culture of Tobacco; and according to the custom of that country, had the agreement transcribed upon a stone, and deposited in the ground; but the culture of the plant has recommenced, and is rapidly spreading, as they find they can derive great profit from it.

Goraru is the soil suited to the Indigo plant; it does not require very good land; indeed it improves land, and no manure is necessary unless it

* The Gujarat name for a Cultivator of the soil.

be grown in company with some other plant. The seed is sown with the drill, (50 lbs per acre,) in July, and the plants are ready to be cut in September. Careful weeding is all that is necessary in the mean time. The plants are cut about a span from the ground, and as vats are seldom to be had within a convenient distance, they are usually carried home, and the leaves made up into balls to be sold in a dry state. But it is far better to extract the dye from the fresh leaves with all the farina upon them. When this can be done, the plants should be carried off the field early in the morning, and laid in a vat, which must then be filled with water, and heavy weights placed at top to keep the plants well under. When fermented, which is the work perhaps of a night, the water is drawn off into a second vat, where it is worked up with large sticks; this operation is intended to separate the salt of the plant from the colouring matter, and requires the greatest skill and attention to say exactly the proper time when they are separated, as if long continued they reunite and cannot be again divided. When declared to be sufficiently stirred, which is judged by the colour of the water, it is allowed to stand quite quiet until the next day, when the water is drawn off into a third vat, and the sediment at the bottom collected. This sediment is first tied up tightly in bags, and suspended from the branches of trees to allow still more of the water to drain from it; it is then spread in small lumps upon a cloth under a shed, where it dries, and the process is then completed.

The refuse, dregs, and the plants after steeping, make excellent manure. An old Indigo field is never ploughed up the succeeding season, until the rain has fallen, as the roots and cut stalks, if allowed to rot in the ground are very beneficial. An acre of the Indigo plant is expected to yield upon an average 40 lbs of the prepared dye.

A few acres of the poppy have been lately cultivated in the Cherotar and found to answer very well. The experiment has not been made on any scale sufficiently extensive to admit of an opinion being formed relative to its success. The treatment of it is derived from Malwa, and it is not therefore worth while to give any detail here of its management.

Tobacco.

The natives have very vague ideas, or rather no ideas at all, as to whence the culture of Tobacco has been introduced. That its introduction is of modern date, we have every reason to conclude, from the identi-

ty of the name, and the circumstance of such a production not being mentioned by any of the old authors who treat of India, nor is it even to be found in the Ayeen Akbary, when the other crops of Gujarat are minutely enumerated. And yet it is strange, that the use of this weed should have spread so universally amongst all classes, as to have become almost a necessary of life.

The tract of land where the Tobacco of the Cherotar is chiefly grown, lies between Pitlad, Neriad, and Kaira. It is grown either with or without irrigation; the former is called Peet, and yields the largest quantity, the latter is termed Korant, and produces the finest quality.

The Peet Tobacco is grown in *goraru* soil, which is prepared for it by manuring, ploughing, and good dressing. The seed is first sown in small beds, just after the first fall of rain, and the plants are transplanted into the regular fields, after the lapse of a month or a month and a half. In planting, a large rake *(Jesli)*, with 3 or 4 wooden teeth, about two feet asunder, is dragged over the field first lengthwise and then across, so as to divide it into small squares; and a plant is set at each intersection of the lines. The young plants require to be well watered for some time until they take good root, and this must be continued, at intervals of 10 or 15 days, until they have reached maturity. The plant must not be allowed to flower, and all the buds, as they appear, must be carefully nipped off, in order that the leaves may not be deprived of any of the sap which gives them their flavour. The crop takes about six months to ripen thoroughly; in the mean time, it is particularly exposed to be injured by excessive cold in December or January, and by the rain which often falls just when the leaves are plucked and laid out to dry.

The Tobacco is cut from the middle of February to the middle of March. The produce is classed in two sorts, the *kaleca*, and the *jurdo*. That which is thought good enough for *kaleka* is first cut down, stalk and all, and placed in rows to dry; it is allowed to remain thus on the field for 10 or 15 days, when it is tied up, moist with the dews in early morning, and carried home as expeditiously as possible. To secure the produce of an acre is the labour of eight days, and to pack up the leaves in a fit state for sale occupies 12 days more. The leaves which remain after the *kaleka* is cut, are plucked from the stalk, and laid on the ground to dry for 12 or 15 days. The large and the small leaves are separated, and made up in bundles with layers of each alternately.

The cultivation of the Korant tobacco is conducted in the same manner as that of the Peet. The ground must be well ploughed and manured during the monsoon, but it is only low moist soils, of a peculiar nature, where this crop can be grown. An acre of the Peet is more valuable than one of the Korant, for the difference of quantity in the one more than makes up for that of quality in the other.

There are properly four kinds of Tobacco, the Tulubdee, Khandeshee, Haeechee and Gandeeo, each of which is classed again into *kaleka* and *jurdo*. The kind produced depends more on the skill and care of the cultivator, than on the nature of the soil; brackish water for its irrigation is preferable to sweet. This Tobacco is found to be of too mild a quality to have any value in an European market—but I think it is questionable whether it might not be submitted to some preparatory process, which might enable it to endure the passage and preserve its good qualities. The Tobacco of America, I believe, is made up in little bundles, which are steeped in sea water, twisted in the manner of ropes, and then formed into rolls by winding them with a kind of mill round a stick.

Miscellaneous Produce.

The Kussoombhee, or Bastard Saffron, is sometimes grown for the sake of its flowers, which are used in dying as those of the real crocus are in Europe. The plant thrives best in *besur* or mixed soil, and requires manure and previous dressing. It is sown in October or November, and flowers, without irrigation or much care, in January. The gathering is made in the cool of the morning, and the flowers are sold, just as they are, to people who make it their trade to bring them up. Sometimes the cultivator keeps them, and sells them in a dry state, but this is disadvantageous to him. The seed which they call *kabree*, is a valuable article as food for cattle, to which it is found to be very nourishing. An oil is also extracted from the seed, which is used for adulterating other oils, but is itself of very inferior quality.

Cotton, in the Cherotar, is not much attended to; the plant grown here is a triennial, yielding no gathering the first year, and its best crop the last. It is usually sown in conjunction with *bajri*, or *baota*, in the proportion of seven drills of grain to one of cotton. An acre will yield at the utmost 400 lbs, and 300 lbs may be an average crop. This is the uncleaned cotton; cleaning reduces it to one fourth of its former bulk. In the Broach district the loss is only two thirds.

Deweli, the castor oil plant, and Chuna (*cicer arietinum*), gram, are crops generally used as fallows: their value being too inconsiderable to admit of their culture in other situations. They are sown at the close of the rains and reaped in January or February. Tull is another ameliorating crop, and is used as a preparation for bajri or jowar.

The Gardens of the Cherotar are merely enclosures, to which the means of the owner enable him to bestow a more than ordinary portion of manure, and constant watering. He then grows a variety of country vegetables, chilies, ginger, garlic, &c, and plentifully bedecks the walks with plantain plants. Plantains are grown as a regular field crop on the low grounds along the bank of the Sabarmati river, but I have never seen them in any other part of the Cherotar, and they are, I believe, very uncommon. Gardens can only be profitable near Towns, where there is a constant market for such produce.

Expenses of cultivation.

I shall venture to subjoin here a rough calculation of the expense attending the culture of each kind of crop compared with the return in produce. The only method of fairly estimating the expenses of cultivation is to consider the Ryot as a hired labourer, and to include every charge that he would be entitled to prefer, were he hired to till the lands of another. In reality the seed is perhaps the only article actually paid for in cash, as weeding, reaping, and all the labors of the field are performed by the Ryot himself or his family; but the prime cost of bullocks and stock, and the wear and tear of agricultural implements must be considered as entering in due proportion into the calculation.

	Expenses of cultivation per acre	Return valued at per acre
Bajri or Jowar	10 Rs	25 Rs
Kodra	5 „	15 „
Baota	10 „	24 „
Barley or wheat	18 „	30 „
Chaseia wheat	7 „	20 „
Sugar cane	180 „	350 „
Tobacco	40 „	90 „
Kussoombhee	20 „	60 „
Deweli, Tull, &c	5 „	18 „
Rice	20 „	50 „

The following is another rough estimate of the increase of seed. This affords a fair ground of comparison between different parts of the same country, but in comparing the fertility of different countries it may be erroneous; because superior skill may effect a saving in the quantity of seed, and produce even larger crops on land of only equal fertility.

Bajri	from	125	to	20;	average	36	fold.
Jowar	„	50	„	5;	„	25	„
Kodra	„	110	„	3;	„	40	„
Baota	„	300	„	50;	„	160	„
Barley	„	20	„	5;	„	14	„
Wheat	„	15	„	5;	„	10	„
Pulses	„	24	„	8;	„	20	„
Rice	„	100	„	25;	„	50	„

Markets, Roads, &c.

There are several little Towns in the Cherotar, which afford the cultivators a constant market for their produce of every kind. For its conveyance there is a cart road between every village, and though often very sandy and heavy, it is always passable, and easiest perhaps in the monsoon. This is a peculiarity, and an advantage attaching to the white soil: the roads over the black soil are always impassable by wheeled carriages after heavy rain. The carts of the Cherotar are small and ill made. The wheels are very broad, in order to adapt them to the sandy roads, and therefore their appearance is perhaps more clumsy than it otherwise would be. These carts are long and narrow, such as are here called Rurocwa. Those which come down from Malwa and Mewn, and those used in Khatiawar are very superior to the Gujarat carts. They are called the Pat Garoo, and carry nearly a hundred maunds, or about four thousand pounds; the platform is made to extend beyond their wheels, and it is thereby rendered much more capacious. In the Khatiawar carts, the platform is quite flat, but in those of the northern and eastern provinces, it is curved or rather arched, a contrivance which must add much to its strength. The only cattle used for draught are oxen, which, in the Cherotar, are of the Pattan breed, the largest and finest perhaps in India.

ART. VI.—*Abyssinia, Eastern Africa, and the Ethiopic family of languages, reviewed.* By the Secretary.

The Church Missionary Society of England, influenced by nobler views and higher motives than that superstitious credulity and sectarian zeal, which, in the end of the fifteenth century, led the Portuguese to select Abyssinia and the Eastern Coast of Africa as a field for Missionary labours, wisely turned its attention to the Abyssinians in the year 1829; since which time the Rev. Samuel Gobat's Abyssinia, the Journals of Messrs. Isenberg and Krapf, and the excellent *Amharic Dictionary* and *Grammar* of the former, with the vocabularies of the *Dankali* and *Galla languages*, have added much to our knowledge of the Geography and Ethnology of this interesting quarter: where the Abyssinians, already Christians, and possessing the *elevated plateau* of S. E. Africa, with a fine climate and productive country, naturally claim our sympathy and interest. Neither must we omit to notice Dr. Edward Ruppell's travels in Abyssinia, Sir William Harris's Highlands of Ethiopia, Johnston's travels in Abyssinia, Ignatius Pallame's travels in Kordofan, and Dr. Beke's Geographical communications to the London Society; which, while they bring prominently before us the claims of these countries to public notice, leave much to be desired, as yet unexplored, relative to the physical aspect and geology of the several countries, and the Ethnological relations of their inhabitants and tribes. It is almost a subject for regret that England and Englishmen should have borne so small a part in elucidating their Physical Geography and Ethnology; and relative to the Botany, Zoology, and local Geography of Abyssinia, we may expect to receive much additional and accurate information from the labors of the French Naturalists, M. M. Petit, Quartin—Dillon, and M. Vignaud, who, during the scientific expedition, commanded by M. Lefebvre, and sent into that country about five years ago, made extensive Botanical and Zoological collections, of which the results have not yet become public. M. D' Abbadie has supplied us with the most interesting account we have yet received of the Abyssinian family of tribes and languages; while Mr. Salt's vocabularies of languages spoken in Eastern Africa, and the publication, by the Royal Geographical Society of London, of Dr Beke's dialects of Abyssinia, may in some measure serve to redeem the character of our

countrymen from absolute indifference to this extensive and highly curious field of Ethnological research.

Abyssinia is an Alpine region of mountains, consisting of an immense *plateau*, of which the mean elevation ranges from 5,000 to 8,000 feet, and presents on its eastern and southern quarters, towards the Red Sea, and a portion of S. E. Africa, two great steeps. The lower country bordering the former, and resembling in many respects the low country on the opposite coast of the Red Sea, or the *Arabian Tahama*, is a sandy inhospitable region called *Samar ;* from which the traveller ascends the lofty hills of Assauli and Taranta into the Upland, or North Easterly Abyssinian province, called Tigré, of which Adowa is the present capital; though Axum be the more ancient and interesting one, which gave the name of *Axumitæ* to all the inhabitants of this quarter who spoke the *Giz* language, or original dialect of the Ethiopic, into which, soon after the Nicæan council, the sacred scriptures were translated. This Province and the neighbouring one of Amhara westward are divided into several districts, the general character of which is mountainous, varied by deep and abrupt vallies; where the fountains of the rivers Mareb, Taccazé, and Abai, or Bahr-al-Azrak, commonly called the Blue Nile, discharge their waters north-westward into the plain of Senaar, and join the Bahr-al-Abiad, or White River, at Khartum. This is the most southern limit probably of the Ancient or Lower Ethiopia; which, from the time of Juba to the Emperor Diocletian, was inhabited by tribes of wandering Arabs, called *Blemmyæ*, mixed with the African *Nobatæ* or Nubians. The general character of *northern* as well as *southern* Abyssinia is much alike, and consists of extensive undulating plains, traversed by higher mountain masses, deep vallies, and numerous rapid torrents, which uniting their waters, in their course over the elevated *plateau*, become at length rivers of magnitude, flowing to the north-west. In *southern* Abyssinia, however, the general decrease of steepness and inclination of the country is in an opposite direction, or to the south-east, so that the rivers Hanazo*

* The separate existence of the *Hanazo*, except as an affluent of the *Hawash*, (*Journal of the Royal Geographical Society, Vol: XIV p: 72*) has been lately called in question by the Rev. Mr. Trew, who thinks that the *Hanazo*, as the recipient of the *Milli* and *Ala*, may be identified with the *Hawash*. Ludolph, however, on the authority of Gregory, positively asserts that the *Hanazo* rises in the Abyssinian province of Angot, and the *Hawash* near Fatagar, situated more southerly; and there is much reason for thinking that this infor-

Hawash, and Wabi terminate in three salt water lakes on the eastward; while the Juba, or Gojab, joined by its affluent the Kibbi, opens to itself a passage on the Coast of Zanzibar, and debouches in 0° 30′ south latitude.

The Wabi and Gojab rather form part of South-Eastern Africa than of Abyssinia: which latter country, from its graduated elevation, approaches in climate to the temperate countries of Europe; while in its vallies many tropical plants are produced, which assimilate its vegetable productions with the hottest parts of India. Some of its most elevated districts, as the *Talba Waha* mountains of Gojam, and the Provinces of Simen and Lasta, possess a very cold climate, and are visited by tempests of rain and thunder; during the prevalence of which *hail* sometimes falls in large lumps, and is known by the name of "*beredo.*" The low lands along the coast of the Red Sea, known by the name of *Samar*, or pastoral districts, and those, on the south-east, occupied by wandering tribes of Gallas, are parched with extreme heat; except during the period of our winter from November to March.

The mountains on the eastern side of Abyssinia, and which are not far W. of Ategerat, in latitude 14° 16′ 26″ north, are elevated more than 8,000 feet above the sea, and form the water-shed between the Takazé and those streams which flow east-ward to the Red Sea. From Ategerat Dr. Ruppell, on the 1st of June 1832, saw the snowy tops of the mountains of Simen, and confirms an event, mentioned by the Adulitic inscription of Cosmas Indicopleustes, that Ptolemy Euergetes had subdued Northern Abyssinia, and "Semene, among mountains difficult of access and covered with snow." The water-shed between the Abai, or Nile and the Hawash and other rivers flowing S. E., has been determined, by Dr. Beke, along a line of nearly fifty miles northward of Ankober; and appears to exist in the Chaka mountains, which give rise to an affluent of the Abai called Chaka.

In the Ethnography of Abyssinia we obtain a connecting link between the Semitic tribes of Asia and Chamite nations of Africa; and though the

mation is correct. The *Wabi* is the same river as that which has been called, by Lieutenant Christopher, Haines River; and the *Juba*, or *Gojab*, is that which is called by Ludolph the *Zeb*: which is said to rise in the Province of Enarea, and after embracing the adjoining country of Zendero, or as Dr. Beke calls it *Yungaro*, falls into the Indian Ocean near Mombas.

Table of Abyssinian languages shewing their connexion with the Ethiopian and Syro-Arabian families.

FAMILIES OF LANGUAGES.	SUN	MOON	STARS	THE MORNING	DAY	EARTH.	WATER	FIRE	FATHER	MOTHER	EYE	HEAD	NOSE	MOUTH	TONGUE	TEETH	HAND	FOOT	ONE	TWO	THREE	FOUR	FIVE	SIX	SEVEN	EIGHT	NINE	TEN
1.—*Egyptian or Ethiopian.*																												
Modern Egyptian or Coptic	rê	ooh	siou	tooui	hoou	kah	moou	koht	ciôt	maau	bal	go	sha	ro	la	naghi	tot	rat	oua	snau	schoment	phtoou	tou	soou	shashph	shmen	pait	met
Bisharin or Beja	toin	tedai	haiek	tokroum	toy	tobut	ayam	toneyt	babo	tond	tolele	iggrema	togenouf	oyaf	,,	tougrek	oya	ragad	engat	malob	mih	faddig	ib	saggour	seramah	samhai	ogamhai	togoseráma
2.—*Lybian or Nubian*																												
Amazigh or Shilla	thafath	thazeeree	arân	assallâ	asaf	thammast	aman	oofa	baba	iemma	aval	irg'af	,,	afee	ilas	seenan	afas	adar	eewan	sin	karad	áquas	sams	seds	sâ	thâm	th'soo	maraou
Kanuz	musal	unatika	wisika.	asalki	okreski	ard	athiki	ika	aboka	indika	enessik	ork	soring	agilk	,,	nelki	,,	ossi	warm	oum	toshi	kamsoh	dijou	gorjou	kalat	idou	ishot	dimnou
Nuba or Berber	mashakka	unatika	winjika	mashanak	sáka	irkekah	ámanga	ikah	anbapki	anenka	mainka	ourka	soringa	akka	,,	naita	,,	orga	werka	oiiogha	toskoka	kamsoka	dija	gorjoka	koladka	idouka	oskoda	dimaka
Agawi or Hhâmera of Waag	kuorah	arwah	segulwa	,,	,,	zivva	akwa	awa	eer	iggena	yel	aur	yessoom	mije	,,	yerekuta	,,	luk	lo	leen-ya	sho-ka	seeza	acqua	walta	lamta	sota	sicha	sakka
Falasha	kuara	sirka	,,	,,	,,	,,	agho	,,	,,	,,	ile	,,	,,	af	,,	,,	nan	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
3.—*Syro-Arabic or Semitic.*																												
Arabic	zih	kamr	kawakib	fajr	nahar.	arz	ma	irr	abu	um	aayn	ras	anf	foum	lisan	sinn	yad	rijl	ahad	ithnan	thalatha	arbaáh	khamsah	sittah	sabauah	thamaniah	tisah	ashrah
Giz or Old Tigré	zahāy	warah	kakab	nagah	alat	medr	may	asat	ába	am	ayn	ras	anfa	aph	lesan	san	ad	agr	ahadi	halaite	salasati	arbati	hemasati	sadsati	sabati	samanati	tasah	ashrah
Adari or Harrargé	cer	warh	,,	,,	oj	dich	me	issat	ou	ae	ain	,,	,,	aof	arrat	sin	,,	,,	ahad	,,	,,	,,	,,	,,	,,	,,	,,	,,
Amharic or Modern Abyssinian ...	zahaý	tsharka	kakab	tewat	alat	medr	atata	asat	abat	anat	ayn	ras	aphnatsha	aph	malas	pras	ad	agrahad	,,	halet	sasati	arati	amsati	sadati	sabati	samanati	zataga	asar
Gafat	djember	chirka	,,	,,	,,	,,	ega	,,	,,	,,	ein	damoa	,,	simota	melasi	sinna	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
4.—*Shoho-Dankali.*																												
Dankali or Adáil	airo	alsa	hetuka	sako	leo	baro	le	girra	abba	ina	euti	amoita	senna	affa	arraba	boddina	giunaeta	minto	eneki	lamei	siddehu	ferei	koono	lehe	melhein	bahhara	sagalla	tabbana
Somali	ghurrah	taya	heddugo	,,	dinar	dul	beh	dup	abi	hoya	il	mudah	san	off	arrub	illuk	gunna	og	kow	lebba	suddé	afur	shan	leh	tdubba	sedeid	saggal	tubban
Galla	addu	tshia	urtshi	diruma	gafa	laffa	bisan	ibita	abba	hata	itsha	mata	funyan	afan	arraba	ilkan	hurkee	mila	toko	lamma	sadi	affoor	shan	ja	turbo	seddet	saggal	koodan
5.—*Shangalla or Gonga.*																												
Shangalla or Takazé	wah	terah	shunda	,,	,,	hugga	beya	tuma	iyah	anga	wa	annasunga	bubuna	ma	,,	,,	,,	,,	illa	belle	sette	sálle	bussume	erde	barde	kuonkeda	kuuntel	kunllakudde
Gonga	aba	keno	,,	,,	,,	,,	atcho	tamo	,,	,,	,,	toko	,,	nono	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,	,,
6.—*Sowahili.*																												
Sowahili.	joowar	moazi	niatar	,,	,,	meette	moye	moto	baba	mahma	mauchoo	keetwar	pooah	mooh	,,	mainoo	keejanja	,,	mowya	beetee	patoo	hinna	tano	setta	sabba	naany	paindar	roomee

N. B.—The words of the *Kanuz* and *Nuba* languages are from a vocabulary collected by me while in Nubia, and are nearly the same as those given by Burckhardt; those of the *Sowahili* language are from the vocabulary of Lieutenant Hardy of the I. Navy, collected in 1811.—*James Bird.*

publications of Messrs Isenberg and Krapf, the vocabularies of Dr. Beke, and the communications of M. D' Abbadie, afford ample means of comparison, the subject is yet far from being exhausted, and definite classification is perhaps premature, if not impossible. Two physical types, however, according to Dr. Ruppell, seem prevalent among the Abyssinians, from which he excludes the Gallas and Shangallas, as they are distinct from the original Abyssinian race. The first of these types, allied to the *European*, and characterizing those woolly haired races of Africa, with round faces and rather thick lips, exhibits the transition from the Negro to the Syro-Arabian type of countenance; and the latter being altogether of the Negro type, distinguishes all the black races, which, under every variety of aspect and of colour, are classed by the Arab Geographers from the *Zangi* to the *Nuba*, and is denominated *Ethiopian*. A round or oval face, a pointed nose, a well proportioned mouth, moderate thick lips, and lively eyes, resembling the Bedwins of Arabia, mark the former type of countenance, which pertains to the inhabitants of the high mountains of *Simen*, the *Agaus*, the *Falashas* or Abyssinian Jews, and the *Gimant* inhabiting Woggera, and the neighbourhood of Gondar. The *Ethiopian* type, represented by a somewhat flattened nose, thick lips, dull heavy eyes, strongly crisped and almost woolly hair, marks the wandering tribes of *Bisharin*, the *Ababdeh*, and *Berbers* of the Nile: between whom and the modern *Copts* a remarkable similarity of physical aspect may be traced, while the grammatical peculiarities of their various dialects show them to be of one original stock; though the latter, by their more frequent admixture with races of Semitic origin, approach nearer to the modified *European* type.

The following Table of dialects, spoken by the several tribes who were or now are in possession of the countries of Abyssinia and the Nile, will enable us to establish, however imperfectly, such a classification as may be useful in tracing the historical changes that have taken place in these regions, and in investigating the difficult subject of Abyssinian Ethnology. In our yet imperfect knowledge of many dialects, spoken by the tribes of Central Africa, the assumed classification of their cognate affinities may be premature, and perhaps erroneous, but we adopt it in the absence of a more perfect one, which time and further investigation can alone supply.

The *Bisharin* and *Ababdeh*, placed on the northern confines of

Abyssinia, and occupying part of the eastern Nubian desert, between the Nile and the Red Sea, extend along the latter; from Lat: 16° to 24° north, and neighbourhood of Koseir. They are the descendants of the *Beja*, or the Bajaditæ, a nomadic people, who inhabited the Egyptian desert eastwards, and are called, in the Greek inscription of Aeizana, king of the Axomites and Homerites, Bougaei* BOYΓAEI; who possessed the gold, silver, and emerald mines of that quarter. Their language, which is of importance, and has been made the subject of learned comment, by Lepsius, in the proceedings of the Berlin Academy of Science,† has much in common with the grammatical system of the Coptic, and has adopted some of its words, while it borrows frequently from cotemporary dialects of the *Falasha* and *Agawi*. It has, above all other living languages a title to be styled Ethiopian; and was probably the cultivated dialect of Lower Ethiopia, when Ergamenes was king of that country, and the soldiers of Candacé, queen of Meroe, were driven back from Assuan by the Roman and Greek troops of Ælius Gallus. M. Lepsius is of opinion that this is the language of the inscriptions, recording public acts of the government of Meroe; and which are abundantly met with in various localities of the Nile valley as far northward as Philœ.

The marked affinity of this language with the Coptic is characterized by its making use of the same signs, for the masculine and feminine, as the Egyptian; namely *b* in place of *p* for the former gender, and *t* for the latter. Like the Arabic and Giz, the Bisharin or Beja language, not having *p* in its original alphabetical system, substitutes *b* in its stead for the masculine article, which, after the manner of the Copto-Egyptian language, is frequently transformed into the indefinite article *ou*; though most of the words are made feminine and the definite article *t*, prefixed. The *Amazigh*, or ancient Lybian speech of the wandering tribes of the Sahrá, (or great desert,) manifests the same fondness for the use of the feminine article *t*, or *th*, as is observable in the Beja language; and this is one among other proofs shewing the cognate origin and original connexion of the *Beraberas* of Egypt and the Nile with the *Berbers* of Mount Atlas, and Western Africa. Ibn Khaldūn, in his history of the

* See account of the Hamaiyaric Inscriptions in the Journal of this Society Vol.—II page 34.

† See meetings of the Academy, for Nov.—1844, reported in L' Institut des Sociéte's savantes en France et a l' Etranger, No 115-116 Juil—Aout 1845.

Berbers, has examined this question with much care and learning, and maintains decidedly the opinion of this affinity, and that the *Berbers* are brothers to the Abyssinians, Copts, and Nubians;* while others have denied this affinity, but on insufficient grounds.

In Beja or Bisharin the word for *sun* is *toin*, consisting of the feminine Coptic article with ⲧⲟⲩⲱⲓⲛⲓ *light*, being when thus compounded *t—ouoini*, signifying *the light* or *the sun*. Both in Coptic and Bisharin the original word, without the article, is the Hebrew and Arabic عين *Aayn*, signifying *the eye* and *the sun*, or the source of vision; similar to the Coptic word ⲣⲉ *re*, *the sun*, of which the original appears to be the Hebrew *rah* ראה, *to see*, or the *source of light*. The Beja word however for *the eye* is *tolele*, which is a compound again of the Egyptian feminine article *t*, with the original *yel*, *aval*, or *il*, of the *Agawi*, *Amazigh*, and *Somali* languages. The Bejawi *toy*, or *the day*, is also an evident corruption of the Coptic *ta-hoou*, which has the same signification: and other cognate affinities of these two languages might be given, though those quoted will be sufficient for the present to establish the validity of the opinion here adopted, that *Coptic* and *Bisharin* are languages of the same original stock, and that the latter is the latest derivative.

In the tenth and eleventh century of our era, the capital of the Beja territory was *Aizab*, or *Aidab*, عيذاب, situated more than a degree and a half south-wards of the ancient Berenicé; or in latitude 22° 8′ N; on the western shore of the Red Sea. In the time of the geographer El Edrisi, A. D. 1154, it was a city and emporium of considerable importance, where a deputy of the Egyptian Sovereign and of the Beja Chief resided to collect the revenue, and divide it equally between these two ruling powers.† The Bejas, and their descendants the Bisharin and Ababdeh, are of the same original stock as the *Blemmyæ* of the Romans, who, according to Strabo, were below the parallel of Meroe, possessing, along with the *Megabari*, the whole of the eastern bank of the Nile, towards the Red Sea; while the western bank of the river was possessed by the Nubæ, a great nation of Lybia, not subject like the former to the kingdom of Ethiopia, but obeying several distinct governments of their own. The same authority informs us that the Egyptian exiles, who

* See Travel's of Ibn Batuta, translated from Arabic into English by the Revd. Samuel Lee B. D. p: 17.

† Edrisü Africa: Curavit Joannes Melchior Hartman, p: 78.

revolted from the authority of Psammiticus, as recorded in a Greek inscription, yet existing on the leg of one of the colossal statues, in front of the great cave of Abu-Simbal, were named *Sembritæ*,* or the strangers, and inhabited an island, or peninsula, distinct from Meroe, situated, as appears, between the Atbara, or Oriental branch of the Nile, called Astaboras, and the Astapus or modern Abai, which had its source from a lake on the south.† This emigration from Egypt into Ethiopia is mentioned by Herodotus ;‡ who calls those who migrated Egyptian warriors, instigated to revolt, as would appear, in consequence of the marked preference shewn by Psammiticus II. (B. C. 600) to the Greek mercenaries, who had restored him to his throne and kingdom ; while his Egyptian subjects were disparaged, by being placed on all occasions on the king's left, and the post of honour on his right assigned to the Greek troops. Thus, with the arts and manners of Egypt, this migration seems to have introduced civilization, if not the Coptic language into Ethiopia ; and it is a subject of much interest to trace the yet existing remains of this Egyptian dialect in the Beja and other African languages, of which the *Amazigh* is probably the most ancient. This latter language only exhibits, however, remote resemblances to the Arabic, though the voice of tradition is agreed that the Berbers of the Nile and those of Western Africa, are descendants of Kush, who was the brother of Canaan, though Arab authors call him his son.— It is impossible, perhaps after a lapse of more than two thousand eight hundred years, to find intimate cognate affinities between the Coptic, Arabic, Amazigh, and African dialects, though it be certain that in the time of Shishak, king of Egypt, and Rehoboam king of Judah, B. C. 970, the *Cushim* were in possession of Lower Ethiopia, and are mentioned, in II. Chronicles, ch: XII. ver: 3rd, along with the *Lubims* and *Sukkiims*, or the *Lybians*, and *Troglodytes*, west of the Red Sea.—Soon after the times of Isaiah, ch: XLV. ver : 14, a branch of the Syro-Arabian people, with the name of *Cushites* migrated, B. C. 769 to 729, from the kingdom of Midian, in Arabia, to the western shores of the Red Sea ; and from this period frequent migrations to the same quarter of the Syro-Arabian family seem to

* This is a derivative compound word, from Coptic, namely *shemmo*, a foreigner, and *beri*, new, meaning "new comers."

† Strabonis Rerum Geographicarum Liber Decimus Septimus, par. 2.

‡ Herodotus Book II para : xxx.

have taken place, and to have introduced into the African dialects a great many Semitic words.

The *Amazigh*, besides making use of the Coptic *article*, and *prefixes* for the cases of nouns, exhibits a well marked affinity between its pronouns and those of the Coptic: and, having several words in common with the *Kanuz* and *Nuba* dialects of the Nile, these three languages may be most appropriately classed as a *Lybian family*, distinct from, but not altogether unconnected with the *Egyptian*; since Herodotus tells us that the languages of the Ammonians, or those inhabiting the Oasis of Siwah, (Al-wah) west of Egypt, was a mixture of that of Egypt and Ethiopia.* The following are some of the best marked affinities of the *Coptic* and the *Amazigh* pronouns:

English	*Coptic*	*Amazigh*
he	netof	netoo
she	netos	nettath
they	nethou	nateen
to thee	nak	enak
to him, to her	nas	eenas
to us	nan	nanaa.

These are sufficient to establish the remote affinity and connexion of these very ancient languages, the modern dialect of which, called *Ertana*, spoken by the wandering tribes of Towarik inhabiting *Siwah* and *Augila*, or Eastern portion of the Sahrá (great desert,) is closely allied on one side to the *Amazigh* and to the *Coptic* on the other, while it has many words in common with the Kanuz and Nubinga dialects. In the Ertana *aman* signifies *water*, and *ázail* or *asal* the *day*; while in Kanuz these words are respectively *amanga* and *asalki*, having terminations that are peculiar to the latter dialect. Again the Coptic word *eiót*, which signifies father, appears in the Ertana with the article as *teeat*. We might multiply examples of the cognate affinities of these dialects, with a view of establishing the *Lybio-Egyptian* origin of the tribes speaking them; and in this opinion we are indeed supported by the voice of History and Geography: for both Pliny and Pomponius Mela† call the people *Libœgyptii*, thus plainly asserting their mixed origin.

* Herodotus Book II. paragraph XLII.

† Pomponius Mela, who wrote a book on Geography, flourished about the forty fifth year of the Christian era, and preceded Pliny more than thirty years. The words of the latter, relative to the situation of the *Libœgyptii*, are, "Interiori

The next family group of languages has a better and more exclusive title to be considered *Abyssinian*, as having occupied at one time the whole of this ancient kingdom, north and south, previous to the irruption from the south of the pagan Gallas; who, under their leader Mahomed Graan subdued the southern Abyssinian province of *Fatagar*, about the year of our era 1526, and soon after overran the whole of Shoa Proper, or southern Abyssinia, including the districts of *Shoa*, *Efat*, *Giddem*, *Efrata Geshe*, *Waraka*, and other places situated N. W. of the river *Hawash;* while various other African tribes got possession of the yet more southerly districts of *Zingera* or *Yangara*, *Enarea*, *Kaffa*, *Worata*, and *Wolaitza*, situated near the sources of the various affluents which flow southwards to form the river Gojáb. The oldest member of this Abyssinian family of languages, styled *Giz*, is a very pure dialect of ancient Arabic, closely allied to the Arabic dialects of *Mahrah*, and those spoken by the mountainous tribes of southern Arabia dwelling near *Hasik*, *Morbat*, and *Zafar;* and approximates much more to the *Hebrew* and *Syriac* than to the *Arabic*. It appears to have been the prevailing language of the country at the time the Abyssinians were converted to Christianity; and being of *Syro-Arabian*, or Semitic origin, has been improperly termed *Ethiopic:* an appellation which belongs more appropriately to a nation of mixed Egyptian race, situated on the banks of the Nile, between Khartum and the parallel of Assuan or the ancient *Syené*. These are the *Ethiopians Proper*, who spoke the same language and worshipped the same gods as the people of the Thebaid, or Upper Egypt; and who, in the time of Ptolemy Evergetes, were ruled by their king *Erkamen* or Ergamenes, whose name, in Hieroglyphics, is written along with that of Ptolemy, on the temple of Dakkah in Nubia; to the east of which that chain of mountains, running across the eastern desert to the Red Sea, may be said to begin; and is now in possession of the Bisharin, who are the modern representatives of the true Ethiopians. From the first conquest of the country along the banks of the Nile, from *Syené* to *Meroé*, this territory appears to have been debateable ground between the Greek and Roman rulers of Egypt and the Ethiopians; with whom various tribes of nomadic Arabs, or *Troglodytæ*, were mingled soon after the

ambitu Africæ, ad meridiem versus, superque Gætulos, intervenientibus desertis, primi omnium Libœgyptii; deinde Leucœthiopes habitant. Super eos Aethioi pum gentes Nigritæ, a quo, dictum est, flumine. Plinius lib: V cap. VIII.

latter people had been rendered tributary by Ptolemy Evergetes. In the reign of Diocletian, A. D. 283, these nomadic tribes of *Ethiopian Arabs* had become so formidable and harassing to the Roman garrisons of Upper Egypt, that the Emperor made a treaty with the *Blammyæ* and *Nobatæ*, who engaged to defend the frontier in consideration of an annual sum of gold paid to them: and from these once formidable marauders are descended the Kanuz and modern Berbers of the Nile.

The *Habash* or Abyssinians, whose Arabic designation denotes a people of mixed origin, have therefore improperly assumed to themselves the name of *Itiopiawan*, or Ethiopian: and appear not indeed, under their first national appellation of *Axumitæ*, much before the time of Frumentius, A. D. 325, when they were converted to the Christian faith; though *Aeizana's* Greek inscription, at Axum, dating so late as A. D. 356, shews them to have been still pagans and worshippers of the Grecian deities. In the beginning of the second century of our era, Arrian, in his Periplus of the Erythrean Sea, makes mention of the royal city of the *Axumitæ*; of which and the neighbouring country of Barbaria Zoskales was sovereign, an accomplished prince well acquainted with the Greek language and literature. Not long after this period *Aeizana* had reduced to his power the scattered tribes of the desert; among which, in Salt's Greek incription from Axum, are mentioned the Bejas, and Taguie or people of Taka, who are situated N. W. of Arkiko, between the river Takazé, and the Red Sea. If we may credit the authority of Masudi, this *Aeizana* or *Azancah*, of the race of the Amalekites, and the son of *Sumaida*, was appointed by the Romans king of the Axumites; and soon after carrying his arms into southern Arabia, he rendered tributary the race of *Hamaiyar*, and their king Zu-Yazan:* and this information is indeed confirmed by the Greek inscription, wherein *Aeizana* is called king of the Axumites and Homerites. Not long after this period, during the reign of the Emperor Justinian A. D. 528, the Homeritæ having quarrelled with, and killed some of the Alexandrian merchants, engaged in the Indian trade, the Axumitæ, or Abyssinians, un-

* Masudi, on the Arab tribes of the desert, in his "Meadows of gold and mines of jewels." He erroneously makes Zu-Yazan, a king of the Homerites, cotemporary with *Aeizana*: for he was, as would appear, the son of Zu-Nawaus, and cotemporary with Caleb the Abyssinian Emperor who subsequently invaded Arabia.

der their chief *Elesbaan* again made war on the *Hamaiyar Arabs:* at which time, as would appear, Nonnosus was sent by the Roman Emperor on an embassy to both people. From the history of this Mission we learn that while Elesbaan* ruled the Abyssinians, Kais his cotemporary governed the Arab tribes of Chinda and Maad on the opposite coast:† and about the same time John, a man of piety and character, was sent by Justinian to be Bishop of Axum and Abyssinia.‡ The Ethiopic inscriptions on the reverse of the Greek tablet at Axum, have reference to this event, and record that John taught from the neighbourhood of the River (Nile) the Sabeans of Hazramaa; but the two several invasions of Arabia by the Abyssinians have been confounded together in the history of the country; and the king Atzbeha, or *Aeizana*, is erroneously identified with Caleb who reigned after him several years.

The modern inhabitants of Tigré, or the chief district of Northern Abyssinia, speak a corrupt dialect of the ancient *Giz;* which was the vernacular dialect of the Agaazi, who founded the kingdom of Axum, and were the original of that mixed race known by the name of *Habash* or Abyssinians; of whom the greater part were of Syro-Arabian origin, as proved by the cognate affinities of their language and by history. The early connexion and commercial intercourse of the people of this country with those of Southern Arabia, will sufficiently explain the extension of the Jewish religion and customs throughout this country, with the introduction of the syllabic form of the *Hamaiyaric* alphabet: which, as a derivative from the *Phœnician*, was employed by the Abyssinian Jews and Christians for the publication of the Holy Scriptures into *Giz* or Ethiopic, after the former had learned the use of Greek vowel signs from reading the Septuagint, or Greek version of the Bible.§ How long the Agaazi had existed as a nomadic tribe, previous to their asso-

* This appears to be a title and not the name of the Abyssinian king then reigning, who was Caleb; and is composed of the Arabic article *El*, and the Giz word *Atsbeha*, the blest. It was also given to *Aeizana* two hundred years previous to this time, and hence has arisen the confusion which exists in Abyssinian history relative to the accounts of the two separate invasions of Arabia by the Abyssinian kings.

† Nonnosi Historia ligationum, in Photii Bibliotheca page: 6.

‡ Bibliotheca Orientalis Assemani vol. N. p: 453.

§ Origin of the Hamaiyaric and Ethiopic Alphabets in this volume of the Journal page, 66.

ciation with other neighbouring tribes under the Government of Axum, and their subsequent conversion to Christianity, is, in the absence of any authentic history of their early condition, a matter of doubt. They are first mentioned in the Adulitic inscription of the time of Ptolemy Evergetes; who, from the Greek inscription discovered amidst the ruins of the ancient Berenice,* and his name in hieroglyphics on the temple at Dakkah, already mentioned, is known to have subdued and rendered tributary the true Ethiopians of this quarter. While some have affected to doubt the truth of events recorded in the Adulitic inscription, it is wonderfully confirmed by the records previously mentioned, for Ptolemy appears to have extended his dominion over Lower Ethiopia, and into the country now called Abyssinia. Along with the nation of Gazé are mentioned the Ath-agai or Agaus, the Bega or Bejas, the provinces of Agamé, Ava or Avergale,† Samen, and others now forming parts of Northern Abyssinia.

The Agaazi kings of Axum being succeeded by the Zagean family, about A. D. 925, the seat of government was removed from Axum to Lasta, while a descendant of the original royal race fled to Shoa. Three hundred and thirty years after this period, or A. D. 1255, the banished representatives of the Agaazi royal family were restored to the throne of their ancestors, in the person of Icon Amlac; when the Amharic or modern Abyssinian dialect, which prevails in Shoa, and in the province called Amhara, situated between *Shoa*, *Gojam*, *Bagameder*, *Lasta*, and *Angot*, came into common use, and to the exclusion of the *Giz;* of which it is a derivative, and from which it has borrowed the twenty six *Giz* consonants and seven orders of letters, with the addition however of seven peculiar orders of letters, which serve to express sounds not existing in the *Giz*, but which are familiar to the surrounding African dialects from which the Amharic has adopted forms and words. It is not, as Mr. Isenberg observes in his Grammar, an original but a derived language; presenting all the characteristic features of Arabic and other Semitic languages, in the prevalence of biliteral, triliteral, and quadriliteral forms, though not in equal force as its parent the *Giz*. It enters extensively into the Adari language or dialect of Har-

* Wellsted's travels in Arabia vol. ii. page, 337.

† On the eastern bank of the river Takazé, and inhabited by a tribe of Agaus.

rar, south-west or *Zaila;* into that of Gafat, spoken in the southern parts of Damot and Gojam; and into that of Argobba, on the eastern and north-eastern skirts of Shoa. To any one acquainted with Hebrew or Arabic it will be a comparatively easy task to acquire a knowledge of this language through the aid of Mr. Isenberg's well arranged Grammar and Dictionary; which will be of invaluable assistance to future Missionaries and Travellers sent to enlighten and explore Abyssinia. Monsieur D'Abbadie, in his account of the Abyssinian languages, considers Amharic a *sub-semitic* dialect, and the Agawi *hamtonga*, or a genuine African dialect; in which opinion he appears to be correct.

The next class of languages, named Shoho-Dankali, belongs to a people occupying the tract of country between the Abyssinian *plateau* and shores of the Red Sea; the original tribes of whom, named Shoho and Hazaorta, mingle with the Habab and Bisharin on the north, in the latitude of Arkiko 15° 40′. From thence they extend south-wards to Tadjurra, in latitude 11° 58′; where they join the Somal and Ittoo Galla tribes; who appear to speak languages of the same original family as the Dankali; considered both by Isenberg and D'Abbadie to be *sub-semitic* in their origin. The latter has analyzed the grammatical structure of the Shahawi dialect, and acquaints us that the word *Shoho* is a Tigré word corresponding in meaning to *nomade;* though the people who speak this dialect and the corresponding one of *adali* near Tadjurra, call themselves *Afar* عفر, which may be a corruption of the Arabic *Aufir* اوفر signifying red, and may have been applied to designate the red Nubian race from which the *Danakil* people drew their lineage; which they trace to ancestors who descended from the highlands of Abyssinia. The cognate affinities between the words and numerals of these three languages may seem to justify the opinion, that the *Somali,* who inhabit the coast of Berbara from Zaila to Cape Hafun, and the coast of Ajan from thence south-wards to the mouth of the river Gojab, are of the same original stock with the Danakil and Gallas: but we have reason to believe, from both philological and historical evidence, that the *Somalis* like the *Adail,* or southern tribes of the Danakil, are chiefly of Arabian origin, and descended from Arabian tribes; who, according to Makrizi, fled from Aden Hej: 611, A. D. 1214, and traced their origin to Ali the son of Jafar Sadik. It is for this reason that the Ad-ali, or royal tribe of the *Southern Danakil* have obtained for all

the tribes the general name of Adail, and caused *Zaila*, the capital of these Mahomedan Arabs, to be generally known, in the beginning of the thirteenth century of our era, by the name of Adel. Ibn Said-al-Maghribi, quoted by Abulfeda, and who visited Egypt, A. D. 1250, says that they were then ruled by Shaikhs; and that in Hej: 617, A. D. 1220, that irruption of the *Damadem*, or Tartars of Soudan, first took place, by which the kingdoms of Nubia and Abyssinia were overrun and ravaged. By the *Damadem* of the Arabian Geographers and Historians, no other but the Galla tribes can be meant; and Ibn Said-al-Maghribi acquaints us that at this time they issued from the south, where their original country was situated between the equator and two and half degrees of north latitude. It is from this period that the intercourse between the Danakil and Galla tribes took place, by which the *Shawi* and *Adail* dialects of the former became adulterated with Galla words.

Arabian writers extend the name of *Jiberta* to the province of *Efat*, or *Wafat*, and the six other provinces composing the once flourishing kingdom of Adel; which, in Hej: 700, A. D. 1300, or about the time when the Agaai royal family of Abyssinia had been restored, was ruled by Sabr-ad-Din surnamed *Walshama*, a tributary of the Christian Abyssinian Emperor: between whose successors and their Mahomedan subjects, a fierce war broke out, which in the beginning of the sixteenth century of our era led to the division and ultimate ruin of the Abyssinian kingdom, that opened to the Gallas an opportunity of subduing its southern provinces, and obtaining the superiority already noticed.

In the national character of the Danakil, who are Mahomedans, excepting a small Christian division named *Taltal*, considerable difference between the northern and southern tribes is observable. Mr. Isenberg describes the former as generally vigorous, robust, fierce, and boisterous; while the latter are of shorter stature, of less expressive countenance and vigorous constitution, being shy, timid, and reserved. Between them and the *Somali* tribes, who are also Mahomedans, and have adopted Indian words into their language, there is a marked resemblance of physical aspect and general character. Most of the *Somalis*, who lead a Bedwin life, and are strictly a race of shepherds, without fixed habitations, are said to resemble the Arabs of Nejd. The Gallas who call themselves *Ilma-Orma*, or children of a foreign race, differing from the Abyssinians, seem to be of an intermediate physical type, between the

Arab and the Negro. They consist of numerous tribes, occupying the country on the north and west behind the Somalis and the Adail; and are generally Pagans, though some of the tribes have embraced Islam. Their religion is a monotheism defaced by many superstitious notions. They adore a Supreme Being, *Wak*, (originally heaven,) possessing all the attributes of God, whom they worship by prayers and sacrifice; they are much given, like the Shamanists among the Tartars, to the practice of astrology and augury. Their priests are named Kalitshas, who go about carrying with them a whip and bell; and their occupations are chiefly agricultural and pastoral, though in some of the villages, weavers, tanners, potters, leather cutters, and metal workers, to provide the necessaries of civilized life, are occasinally met with.

In grouping together the language of the Shangallas, or Negroes of the Takazê, and the dialect of Gonga, a small and low district south of *Bure*, along the river Fatzam in the province of Damot, we have assumed rather than ascertained their cognate affinities, and place them together as a *Soudanian* or Negro family. The natives of Gonga, according to Dr. Beke's informatian, retain a tradition of their former existence as a separate state, and occasionally apply the name of Gonga to the low country on both sides of the river Abai,* in the southern quarter of Damot before mentioned. The Gonga word *aba*, signifying *sun*, is an evident corruption of *awa*, or *wa*, found in several African languages with the signification of the *sun* or *fire;* and has been doubtless derived from the Giz word *waayé*, which means a *burning fire*, or *fervent heat.* But the specimens of this language, now in our possession, are yet too few for instituting any satisfactory comparison of it with other African dialects, such as those of *Kaffa*, *Woratta*, and *Wolaitza*, which are said to be closely connected with it. It is not improbable, however, as Dr. Beke supposes, that S. W. from Guragie, where the cognate dialects of the Amharic seem to terminate, there was previous to the irruption of the Gallas, one original language prevailing throughout the table land, now occupied by these invaders; and that this was cognate with both the Shangalla and Gonga languages.

From the mouth of the river Gojah, or Juba, to Cape Delgado, and tenth degree of southern latitude, the coast of South-eastern Africa is inhabited by Mahomedans; who are of mixed Arab and Negro race, and

* Journal of the Royal Geographical Society of London, vol. xxiv. p. 39.

are named *Sowahilis*, or inhabitants of the Coast. Their language is called Sowahili, and is a derivative from the dialect spoken by the *Makua* Negroes, who inhabit the Coast of Mozambique, from the mouth of the Zambezi river to the neighbourhood of Melinda; where they are intermixed with and lost in their descendants the Sowahili race. The Makuas are, as would appear, a branch of the Monjous, a Negro nation of the interior which figures in the early Portuguese accounts of this Coast as part of the celebrated kingdom of Mono-Motapa: relative to which and the former state of commerce on the Coast of the Golden Sofola, many questions of deep interest are open to the investigation and research of future travellers.

Art. VII. — *Hygrometric Tables.* By Professor Orlebar.

Professor Apjohn's formula and determinations being now satisfactorily established, and the British Association having determined that barometric observations might now be corrected for moisture, I caused tables to be formed from those calculated by Major Boileau in order that our observations might be reduced at a single inspection. The use of the Observatory was the only object which I at first had in view, and tables II and III were formed entirely for ourselves. Subsequently I considered that by forming table I, I could very much facilitate the calculations of observers and surveyors at greater heights. And as these three tables will, I think, be of considerable assistance to meteorologists and also facilitate very much the use of the barometer in determining heights, it seems to me that they may be published in the Society's Journal with considerable advantage to the public.

Major Boileau's elaborate tables are calculated to five places of decimals, mine only to three; because barometric observations are taken only to the third decimal of an inch, and our thermometers are not made with sufficient accuracy to warrant at present any closer calculation.

In order to use Major Boileau's tables it is necessary to use three tables; my object was to combine all these into one.

Upon these two principles I have formed the present tables in order to enable an observer by inspection or very easy calculation,

1st to reduce the observed pressure of the barometer to the pressure of dry air.

2nd to ascertain the amount of moisture in the air.

3rd to ascertain the relative humidity.

Where the barometer does not fall below 29.5 nor rise above 30.1 inches, Tables No. II and III will supply all these requisites. These Tables therefore will serve for all places along our sea coast and throughout the low land of Guzerat and Scinde.

The method of using them will be best understood by an example: Suppose the barometer to be 29.746, the dry thermometer 80°.2 and the wet bulb 73°. Hence the depression will be 7°.3—Look along the top of the table for 7° and along the side of the table 73° then opposite to those we find

0.724

Subtract .003 on account of 703

then 0.721 is the pressure and measure of the amount of moisture in the air.

Subtract this from 29.746

then 29.025 is the pressure of dry air. Now refer in the same manner to table III and 0.90 will be found to be the relative humidity of the air on the supposition that saturation is expressed by unity.

In using table II it must be observed that for every tenth of a degree of depression .001 must be subtracted from the number in the tables. In like manner a proportional part must be added for every decimal part of a degree of the temperature of the wet bulb, the amount of which will be easily seen by inspection: thus had the temperature of the wet bulb in the above example been 73°6 then the pressure for 7° depression would have been

0.726 not 0.724.

It is not possible to give a general rule for this correction, because, as will be seen on inspection, the correction for 1° is nothing at low depressions, and as much as .020 at high depressions and low temperatures. This correction will however be easily supplied by the eye.

Table I is made in order to facilitate the calculations of similar

tables to II and III for any particular heights. The table itself will be easily understood after the former explanations. It will be observed that the only depressions calculated are 0°, 10°, and 20°. The interpolation between these will be quickly and accurately performed by the following formula

$$\text{correction} = .01147\ (d—d')\ \tfrac{p}{30}$$

d is the nearest depression of the table, d' the given depression, and p is the barometric pressure of the table nearest to the barometric pressure of the place. Regard must be had to the sign of d—d' that is, if d be greater than d' the correction must be added, if d be less than d' the correction must be subtracted

Example: Barometer is 24.800 wet bulb 60° the depression is 8°; then

$$\begin{aligned}\text{the correction} &= .01147 \times (10°—8°)\ \tfrac{24}{30} \\ &= .01147 \times 2 \times \tfrac{24}{30} \\ &= .01147 \times \tfrac{8}{5} = \tfrac{0.3\,7}{5} \\ &= .019\end{aligned}$$

but by the table depression being 8 and wet bulb 60°, the moisture pressure is 0.430. Hence the required pressure is 0.430 + 0.019 = 0.449.

I hope that this table will facilitate not only the reduction of meteorologic observations but also enable surveyors to use Barometric observations with greater certainty. For, the inconsistent results between observations in using this very ready method of ascertaining heights are doubtless owing partly to the neglect of other meteorologic conditions, but more especially to the want of certainty with regard to the hygrometric correction.

After thus calculating from Table I a table similar to Table II, the meteorologist will have no difficulty in calculating Table III. He will take the logarithms of the numbers in the columns under 0° depression, and subtract them from the logarithms of the numbers under the other depressions, and the remainders are the logarithms of the numbers which express the humidity.

Tables I and II were calculated wholly by Keru Laxamon. Table III was calculated partly by Keru Laxamon and partly by Dinshaw Dorabjee, assistants in the Observatory.

TABLE I.

Pressure of Moisture under Barometer pressure 20 to 30 Inches for depression and Temperature of Wet Bulb.

t°	20.000			21.000			22.000		
Wet Bulb	0	10	20	0	10	20	0	10	20
50	0·373	0·298	0.223	0·373	0·294	0·215	0·373	0·290	0·208
51	0·386	0·311	0·236	0·386	0·307	0·228	0·386	0·303	0·221
52	0·400	0·325	0·250	0·400	0·321	0·242	0·400	0·317	0·235
53	0.414	0·339	0·264	0·414	0·335	0·276	0·414	0·331	0·249
54	0·428	0·353	0·278	0·428	0·349	0·270	0·428	0·345	0·263
55	0·442	0·367	0·292	0·442	0·363	0·284	0·442	0·359	0·277
56	0·457	0·382	0·307	0·457	0·378	0.299	0·457	0·374	0·292
57	0·473	0·398	0·323	0·473	0·394	0·315	0·473	0·390	0·308
58	0·489	0·414	0·339	0·489	0·410	0·331	0·489	0·406	0·324
59	0·506	0·431	0·356	0·506	0·427	0.348	0·506	0·423	0·341
60	0·523	0·448	0·374	0·523	0·445	0·366	0·523	0·441	0·359
61	0·541	0·466	0·392	0·541	0·463	0·384	0·541	0·459	0 377
62	0·559	0·485	0·411	0·559	0·482	0·403	0·559	0·478	0·396
63	0·578	0·504	0·430	0·578	0·501	0·422	0·578	0·497	0·415
64	0·597	0·523	0·449	0·597	0·520	0·441	0·597	0·516	0·434
65	0·617	0·543	0·469	0·617	0·540	0·461	0·617	0·536	0·454
66	0·638	0 564	0·490	0·638	0·561	0·482	0·638	0·557	0·475
67	0·659	0·585	0·511	0·659	0·582	0·503	0·659	0·578	0·496
68	0·681	0·607	0·533	0·681	0·604	0·525	0·681	0·600	0·518
69	0·703	0·629	0·556	0·703	0·626	0·548	0·703	0·622	0·541
70	0·726	0·652	0·579	0·726	0·649	0·571	0·726	0·645	0·564
71	0·750	0·676	0·603	0·750	0·673	0·595	0·750	0·669	0·588
72	0·775	0·701	0·628	0·775	0·698	0·620	0·775	0·694	0·613
73	0·801	0·727	0·654	0·801	0·724	0·646	0·801	0.720	0·639
74	0·827	0·754	0·681	0·827	0·751	0·673	0·827	0·747	0·665
75	0·854	0·781	0·708	0·854	0·778	0·700	0·854	0·774	0·693
76	0·882	0·809	0·736	0·882	0·806	0·728	0·882	0·802	0·721
77	0.910	0·837	0·764	0·910	0·834	0·756	0·910	0·850	0·749
78	0·939	0·866	0·793	0·939	0·863	0·785	0·939	0·859	0·778
79	0·970	0·897	0·824	0·970	0·894	0·816	0·970	0·890	0·809
80	1·001	0·928	0·856	1·001	0·925	0·848	1·001	0·921	0·841
81	1·033	0·961	0·889	1·033	0·957	0·881	1·033	0·953	0·874
82	1·066	0·994	0·922	1·066	0·990	0·914	1·066	0·986	0·907
83	1·100	1.028	0·956	1·100	1·024	0·948	1·100	1·020	0·941
84	1·135	1·063	0·991	1·135	1·059	0·983	1·135	1·055	0·976
85	1·171	1·099	1·027	1·171	1·095	1·019	1·171	1·091	1·012
86	1 208	1.137	1·065	1·208	1·133	1·057	1·208	1·129	1·050
87	1·246	1.175	1·103	1.246	1·172	1·095	1·246	1·168	1 088
88	1·286	1·215	1·143	1·286	1·211	1·135	1·286	1·207	1·128
89	1·326	1·255	1·184	1·326	1·251	1·176	1.326	1·247	1·169
90	1·367	1·296	1·225	1·367	1·292	0·217	1·367	1·288	1·210

TABLE I. — *Continued.*

t°	23.000			24.000			25.000		
Wet Bulb	0	10	20	0	10	20	0	10	20
50	0·373	0·286	0·200	0·373	0·282	0·192	0·373	0·279	0·185
51	0·386	0·299	0·213	0·386	0·295	0·205	0·386	0·292	0·198
52	0·400	0·313	0·227	0·400	0·309	0·219	0·400	0·306	0·212
53	0·414	0·327	0·241	0·414	0·323	0·233	0·414	0·320	0·226
54	0·428	0·341	0·255	0·428	0·337	0·247	0·428	0·334	0·240
55	0·442	0·355	0·269	0·442	0·351	0·261	0·442	0·348	0·254
56	0·457	0·310	0·284	0·457	0·366	0·276	0·457	0·363	0·269
57	0·473	0·386	0·300	0·473	0·382	0·292	0·473	0·379	0·285
58	0·489	0·402	0·316	0·489	0·398	0·308	0·489	0·395	0·301
59	0·506	0·419	0·333	0·506	0·415	0·325	0·506	0·412	0·318
60	0·523	0·437	0·351	0·523	0·433	0·343	0·523	0·430	0·336
61	0·541	0·455	0·369	0·541	0·451	0·361	0·541	0·448	0·354
62	0·559	0·474	0·385	0·559	0·470	0·380	0·559	0·467	0·373
63	0·578	0·493	0·407	0·578	0·489	0·399	0·578	0·486	0·392
64	0·598	0·512	0·426	0·598	0·508	0·418	0·597	0·505	0·411
65	0·617	0·532	0·446	0·617	0·528	0·438	0·617	0·525	0·431
66	0·638	0·553	0·467	0·638	0·549	0·459	0·638	0·546	0·452
67	0·659	0·574	0·488	0·659	0·570	0·480	0·659	0·567	0·473
68	0·681	0·596	0·410	0·681	0·592	0·502	0·681	0·589	0·495
69	0·703	0·618	0·533	0·703	0·614	0·525	0·703	0·611	0·518
70	0·726	0·641	0·556	0·726	0·637	0·548	0·726	0·634	0·541
71	0·750	0·665	0·580	0·750	0·661	0·572	0·750	0·658	0·565
72	0·775	0·690	0·605	0·775	0·686	0·597	0·775	0·683	0·590
73	0·801	0·716	0·631	0·801	0·712	0 623	0·801	0·709	0·616
74	0·827	0·743	0·658	0·827	0·739	0 650	0·827	0·736	0·643
75	0·854	0·770	0 685	0·854	0·766	0·677	0·854	0·763	0·670
76	0·882	0·798	0·713	0·882	0·794	0·705	0·882	0·791	0·698
77	0·910	0·826	0·741	0·910	0·822	0·733	0·910	0·819	0·726
78	0·939	0·855	0·770	0·939	0·851	0·762	0·939	0·848	0·755
79	0·970	0·886	0·801	0·970	0·882	0·793	0·970	0·879	0·786
80	1·001	0·917	0·833	1·001	0·913	0·825	1·001	0·910	0·818
81	1·033	0·949	0·866	1·033	0·945	0·858	1·033	0·942	0·851
82	1·066	0·982	0 899	1·066	0·978	0·891	1·066	0·975	0·884
83	1·100	1·016	0·933	1·100	1·012	0·925	1·100	1·009	0·918
84	1·135	1·051	0·968	1·135	1·047	0·960	1·135	1·044	0·953
85	1·171	1·087	1·004	1·171	1·083	0·996	1·171	1·080	0·989
86	1·208	1·125	1·042	1·208	1·121	1·034	1·208	1·118	1·027
87	1·246	1·164	1·080	1·246	1·160	1·072	1·246	1·157	1·065
88	1·286	1·203	1·120	1·286	1·199	1·112	1·286	1·196	1·105
89	1·326	1·243	1·161	1·326	1·239	1·153	1·326	1·236	1·146
90	1·367	1·284	1·202	1·367	1·280	1·194	1·367	1·277	1·187

TABLE I. — *Continued.*

t°	26.000			27.000			28.000		
Wet Bulb	0	10	20	0	10	20	0	10	20
50	0·373	0·275	0·177	0·373	0·271	0·169	0·373	0·267	0·162
51	0·386	0·288	0·190	0·386	0·284	0·182	0·386	0·280	0·175
52	0·400	0·302	0·204	0·400	0·298	0·196	0·400	0·294	0·189
53	0·414	0·316	0·218	0·414	0·312	0·210	0·414	0·308	0·203
54	0·428	0·330	0·232	0·428	0·326	0·224	0·428	0·322	0·217
55	0·442	0·344	0·246	0·442	0·340	0·238	0·442	0·336	0·231
56	0·457	0·359	0·261	0·457	0·355	0·253	0·457	0·351	0·246
57	0·473	0·375	0·277	0·473	0·371	0·269	0·473	0·367	0·262
58	0 489	0·391	0·293	0·489	0·387	0·285	0·489	0·383	0·278
59	0·506	0·408	0·310	0·506	0·404	0·302	0·506	0·400	0·295
60	0·523	0·426	0·328	0·523	0·422	0·320	0·523	0·418	0·313
61	0·541	0·444	0·346	0·541	0·440	0·338	0·541	0·436	0·331
62	0·559	0·463	0·365	0·559	0·459	0·357	0·559	0·455	0·350
63	0·578	0·482	0·384	0·578	0·478	0·376	0·578	0·474	0·369
64	0·597	0·501	0·403	0·597	0·497	0·395	0·597	0·493	0·388
65	0·617	0·521	0·423	0·617	0·517	0·415	0·617	0·513	0·408
66	0·638	0·542	0·444	0·638	0·538	0·436	0·638	0·534	0·429
67	0·659	0·563	0·465	0·659	0·559	0·457	0·659	0·555	0·450
68	0·681	0·585	0·487	0·681	0·581	0·479	0·681	0·577	0·472
69	0·703	0·607	0·510	0·703	0·603	0·502	0·703	0·599	0·495
70	0·726	0·630	0·533	0·726	0·626	0·525	0·726	0·622	0·518
71	0·750	0·554	0·557	0·750	0·650	0·549	0·750	0·646	0·542
72	0·775	0·679	0·582	0·775	0·675	0·574	0·775	0·671	0·567
73	0·801	0·705	0·608	0·801	0·701	0·600	0·801	0·697	0·593
74	0·827	0·732	0·635	0·827	0·728	0·627	0·827	0·724	0·620
75	0·854	0·759	0·662	0·854	0·755	0·654	0·854	0·751	0·647
76	0·882	0·787	0·690	0·882	0·783	0·682	0·682	0·779	0·675
77	0·910	0·815	0·718	0·910	0·811	0·710	0·910	0·807	0·703
78	0·939	0·844	0·747	0·939	0·840	0·739	0 939	0·836	0·732
79	0·970	0·875	0·778	0·970	0·871	0·770	0·970	0·867	0·763
80	1·001	0·906	0·810	1·001	0 902	0·802	1·001	0·898	0·795
81	1·033	0·938	0·843	1·033	0·934	0·835	1·033	0·930	0·828
82	1·066	0·971	0 876	1·066	0·967	0·868	1·066	0·963	0·861
83	1·100	1·005	0·910	1·100	1·001	0·902	1·100	0·997	0·895
84	1·135	1·040	0·945	1·135	1·036	0·937	1·135	1·032	0·930
85	1·171	1·076	0·981	1·171	1·072	0·973	1·171	1·068	0·966
86	1·208	1·114	1·019	1·208	1·110	1·011	1·208	1·106	1·004
87	1·246	1·153	1·057	1·246	1·149	1·049	1·246	1·145	1·042
88	1·286	1·192	1 097	1·286	1·188	1·089	1·286	1·184	1·082
89	1·326	1·232	1·138	1·326	1·228	1·130	1.326	1·224	1·123
90	1·367	1·273	1·179	1·367	1·269	1·171	1·367	1·265	1·164

TABLE I. — *Continued.*

t°	29.000			30.000			31.000		
Wet Bulb	0	10	20	0	10	20	0	10	20
50	0·373	0·264	0·154	0·373	0·260	0·147	0·373	0·256	0·139
51	0·386	0·277	0·167	0·386	0·273	0·160	0·386	0·269	0·152
52	0·400	0·291	0·181	0·400	0·287	0·174	0·400	0·283	0·166
53	0·414	0 305	0·195	0·414	0·301	0·188	0·414	0·297	0·180
54	0·428	0·319	0·209	0.428	0·315	0·202	0·428	0·311	0·194
55	0 442	0·333	0·223	0·442	0·329	0·216	0·442	0·325	0·208
56	0·457	0·348	0·238	0·457	0·344	0·231	0·457	0·340	0·223
57	0·473	0·364	0·254	0·473	0·360	0·247	0·473	0·356	0·239
58	0·489	0·380	0·270	0·489	0·376	0·263	0·489	0·372	0·255
59	0·506	0·397	0·287	0·506	0·393	0·280	0·506	0·389	0·272
60	0·523	0·415	0·305	0·523	0·411	0·298	0·523	0·407	0·290
61	0·541	0·433	0·323	0·541	0·429	0·316	0·541	0·425	0·308
62	0·559	0·452	0·342	0·559	0·448	0·335	0·559	0·444	0·327
63	0·578	0·471	0·361	0·578	0·467	0·354	0·578	0·463	0·346
64	0·597	0·490	0·380	0·597	0·486	0·373	0·597	0·482	0·365
65	0·617	0·510	0·400	0·617	0·506	0·393	0·617	0·502	0·385
66	0·638	0·531	0·421	0·638	0·527	0·414	0·638	0·523	0·406
67	0·659	0·552	0·442	0·659	0·548	0·435	0·659	0·544	0·427
68	0·681	0·574	0·464	0·681	0·570	0·457	0·681	0·566	0·449
69	0·703	0·596	0·487	0·703	0·592	0·480	0·703	0·588	0·472
70	0·726	0·619	0·510	0·726	0·615	0·503	0·726	0·611	0·495
71	0·750	0·543	0·534	0·750	0·539	0·527	0·750	0·535	0·519
72	0·775	0·668	0·559	0·775	0·664	0·552	0·775	0·660	0·544
73	0·801	0·694	0·585	0·801	0·690	0·578	0·801	0·686	0·570
74	0·827	0·721	0·612	0·827	0·717	0·605	0·827	0·713	0·597
75	0·854	0·748	0·639	0·854	0·744	0·632	0·854	0·740	0·624
76	0·882	0·776	0·667	0·882	0·772	0·660	0·882	0·768	0·652
77	0·910	0·804	0·695	0·910	0·800	0·688	0·910	0·796	0·680
78	0·939	0·833	0·724	0·939	0·829	0·717	0·939	0·825	0·709
79	0·970	0·864	0·755	0·970	0·860	0·748	0·970	0·856	0·740
80	1·001	0·895	0·787	1·001	0·891	0·780	1·001	0·887	0·772
81	1·033	0·927	0·820	1·033	0·923	0·813	1·033	0·919	0·805
82	1·066	0·960	0·853	1·066	0·956	0·846	1·066	0·952	0·838
83	1·100	0·994	0·887	1·100	0·990	0·880	1·100	0·986	0·872
84	1·135	1·029	0·922	1·135	1·025	0·915	1·135	1·021	0·907
85	1·171	1·065	0·958	1·171	1·061	0·951	1·171	1·057	0·943
86	1·208	1·103	0·996	1·208	1·099	0·989	1·208	1·095	0·981
87	1·246	1·142	1·034	1·246	1·138	1·027	1·246	1·134	1·019
88	1·286	1·181	1·074	1·286	1·177	1·067	1·286	1·173	1·059
89	1·326	1·221	1·115	1·326	1·217	1·108	1·326	1·213	1·100
90	1·367	1 262	1·156	1·367	1·258	1·149	1·367	1·254	1·141

TABLE II.

Pressure of Moisture under Barometric Pressure 29·700 inches for depression and Temperature of Wet Bulb.

Temperature of Wet Bulb.	Depression.						
	0°	1°	2°	3°	4°	5°	6°
50	0·373	0·362	0·351	0·339	0·328	0·317	0·305
51	0·386	0·375	0·364	0·352	0·341	0·330	0·308
52	0·400	0·389	0·377	0·366	0·355	0·344	0·332
53	0·414	0·403	0·391	0·380	0·369	0·358	0·346
54	0·428	0·417	0·405	0·394	0·383	0·372	0·360
55	0·442	0·431	0·419	0·408	0·397	0·386	0·374
56	0·457	0·446	0·434	0·423	0·412	0·401	0·369
57	0·473	0·462	0·440	0·439	0·428	0 417	0·405
58	0·489	0·478	0·466	0·455	0·444	0·433	0·421
59	0·506	0·495	0·483	0·472	0·461	0·450	0·438
60	0·523	0·512	0·501	0·490	0·479	0·468	0·456
61	0·541	0·530	0·519	0·508	0·497	0·486	0·474
62	0·559	0·548	0·537	0·526	0·515	0·504	0·493
63	0·578	0·567	0·556	0·545	0·534	0·523	0·512
64	0·597	0·586	0·575	0·564	0·553	0·542	0·531
65	0·617	0·606	0·595	0·584	0·573	0·562	0·552
66	0·638	0·627	0·616	0 605	0·594	0·583	0·572
67	0·659	0·648	0·637	0·626	0·615	0·604	0·593
68	0·681	0·670	0·659	0·648	0·637	0·626	0·615
69	0·703	0·692	0·681	0·670	0·659	0·648	0·637
70	0·726	0·715	0·704	0·693	0·682	0·671	0·660
71	0·750	0·739	0·728	0·717	0·706	0·695	0·684
72	0·775	0·764	0·753	0·742	0·731	0·720	0·709
73	0·801	0·790	0·779	0·768	0·757	0·746	0·735
74	0·827	0·816	0·805	0·794	0·783	0·772	0·761
75	0·854	0·843	0·832	0·821	0·810	0·799	0·788
76	0·882	0·871	0·860	0·849	0·838	0·827	0·816
77	0·910	0·899	0·888	0·877	0·866	0·855	0·844
78	0·939	0·928	0·917	0·906	0·895	0·884	0·872
79	0·970	0·959	0·948	0·937	0·926	0·915	0·904
80	1·001	0·990	0·979	0·968	0·957	0·946	0·935
81	1·033	1·022	1·011	1·000	0·989	0·978	0·967
82	1·066	1·055	1·044	1·033	1·022	1·011	1·000
83	1·100	1·089	1·078	1·067	1·056	1·045	1·034
84	1·135	1·125	1·114	1·103	1·092	1·081	1·069
85	1·171	1·160	1·149	1·138	1·127	1·116	1·106
86	1·208	1·197	1·186	1·175	1·164	1·153	1·143
87	1·246	1·235	1·224	1·214	1·203	1·192	1·182
88	1·286	1·276	1·265	1·254	1·243	1·232	1·221
89	1·326	1·316	1·305	1·294	1·283	1·272	1·261
90	1·367	1·357	1·346	1·335	1·324	1.313	1·303

TABLE II.—*Continued.*

Temperature of Wet Bulb.	Depression.						
	7°	8°	9°	10°	11°	12°	13°
50	0·294	0·283	0·272	0·261	0·250	0·239	0·228
51	0.307	0·296	0·285	0.274	0·263	0·252	0·241
52	0·321	0·310	0·299	0·288	0·277	0·266	0·255
53	0·335	0·324	0·313	0·302	0·291	0·280	0·269
54	0·349	0·338	0·327	0·316	0.305	0·294	0·283
55	0·363	0·352	0·341	0·330	0·319	0·308	0·297
56	0·378	0·367	0·356	0·345	0·334	0·323	0·312
57	0·394	0·383	0·372	0·361	0·350	0·339	0·328
58	0·410	0·399	0·388	0·377	0·366	0·355	0·344
59	0·427	0·416	0·405	0·394	0·383	0·372	0·361
60	0·445	0·434	0·423	0·412	0·401	0·390	0·379
61	0·463	0·452	0·441	0·430	0·419	0·408	0·397
62	0·482	0·471	0·460	0·449	0·438	0·427	0·416
63	0·501	0·490	0·479	0·468	0·457	0·446	0·435
64	0·520	0·509	0·498	0·487	0·476	0·465	0·454
65	0·540	0·529	0·518	0·507	0.496	0·485	0·474
66	0·561	0·550	0·539	0·528	0·517	0·506	0·495
67	0·582	0·571	0·560	0·549	0·538	0·527	0·516
68	0·604	0·593	0·582	0·571	0·560	0·549	0·538
69	0·626	0·615	0·604	0·593	0·582	0·571	0·560
70	0·649	0·638	0·627	0·616	0·604	0·593	0·582
71	0·673	0·662	0·651	0·640	0·628	0·617	0·606
72	0·698	0·687	0·676	0·665	0·754	0·643	0·632
73	0·724	0·713	0·702	0·690	0·679	0·668	0·657
74	0·750	0·739	0·728	0·718	0·706	0·695	0·684
75	0·777	0·766	0·755	0·744	0·733	0·722	0·711
76	0·805	0·794	0.783	0·772	0·761	0·750	0·739
77	0·833	0·822	0·811	0·800	0.789	0.778	0·767
78	0·862	0·851	0·840	0·829	0·818	0·807	0·796
79	0·893	0·882	0·871	0·860	0.849	0·838	0·827
80	0·924	0·913	0·902	0·892	0·881	0·870	0·859
81	0·956	0·945	0·934	0·924	0·913	0·902	0·891
82	0·989	0·978	0·967	0·957	0·946	0·935	0·924
83	1·023	1·012	1·001	0·991	0·980	0·969	0·958
84	1·058	1·047	1·036	1·026	1·015	1·004	0·993
85	1·094	1·083	1·072	1·062	1·051	1·040	1·029
86	1·132	1·121	1·110	1·100	1·089	1·078	1·067
87	1·171	1·160	1·149	1·139	1·128	1·117	1.106
88	1·210	1·199	1·188	1·178	1·167	1·156	1·145
89	1·250	1·239	1·228	1·218	1·207	1·196	1·185
90	1·292	1·281	1·270	1·259	1·249	1·238	1·227

TABLE II.—*Continued.*

Temperature of Wet Bulb.	Depression.						
	14°	15°	16°	17°	18°	19°	20°
50	0·217	0·205	0·194	0·183	0·171	0·160	0·149
51	0·230	0·218	0·207	0·196	0·184	0·173	0·162
52	0·244	0·232	0·221	0·210	0·198	0.187	0·176
53	0·258	0·246	0·235	0·224	0·212	0·201	0·190
54	0·272	0·260	0·249	0·238	0·226	0·215	0·204
55	0·286	0·274	0·263	0.252	0·240	0·229	0·218
56	0·301	0·289	0·278	0·267	0·255	0·244	0·233
57	0·317	0·305	0·294	0·283	0·271	0·260	0·249
58	0·333	0·321	0·310	0·299	0·287	0·276	0·265
59	0·350	0·338	0·327	0·316	0·304	0·293	0·282
60	0.368	0·356	0·345	0·334	0·322	0·311	0·300
61	0·386	0·374	0·363	0·352	0·340	0·329	0·318
62	0·405	0·393	0·382	0·371	0·359	0·348	0·337
63	0·424	0·412	0·401	0·390	0·378	0·367	0·356
64	0·443	0·431	0·420	0.409	0·397	0·386	0·375
65	0·463	0·451	0·440	0·429	0·417	0·406	0·395
66	0·484	0·472	0·461	0·450	0·438	0·427	0·416
67	0.505	0·493	0·482	0·471	0·459	0·448	0·437
68	0·527	0·515	0·504	0·493	0·481	0·470	0·459
69	0·549	0·537	0·526	0·515	0·504	0·493	0·482
70	0·571	0·560	0·549	0·538	0·527	0·516	0·505
71	0·595	0·584	0·573	0.562	0·551	0·540	0·529
72	0·621	0·609	0·598	0·587	0·576	0·565	0·554
73	0·646	0·635	0·624	0.613	0·602	0·591	0·580
74	0·673	0·662	0·651	0·640	0·629	0·618	0·607
75	0·700	0·689	0·678	0·667	0·656	5·645	0·634
76	0·728	0·717	0.706	0·695	0·684	0·673	0·662
77	0·756	0·745	0·734	0·723	0·712	0·701	0·690
78	0·785	0·774	0·763	0·752	0·741	0·730	0·719
79	0·816	0·805	0·794	0·783	0·772	0·761	0·750
80	0·848	0·837	0·826	0·815	0·804	0·793	0·782
81	0·880	0·869	0·859	0·848	0·837	0·826	0·815
82	0·913	0·902	0·892	0.881	0·870	0·859	0·848
83	0·947	0·936	0·926	0·915	0.904	0·893	0·882
84	0·982	0·971	0·961	0·950	0·939	0·928	0·917
85	1·018	1·007	0·997	0·986	0·975	0·964	0·953
86	1·056	1·045	1·035	1·024	1·013	1·002	0·991
87	1·095	1·084	1·074	1·063	1·052	1·041	1·030
88	1·134	1·123	1·113	1·102	1·091	1·080	1·069
89	1·175	1·164	1·153	1·142	1·132	1·121	1·110
90	1·216	1·205	1·195	1.184	1·173	1·162	1·151

TABLE III.

Humidity of the air for Barometric pressure 29·70 arguments Temperature and Depression Wet Bulb.

Temperature of Wet Bulb.	Depression.						
	0°	1°	2°	3°	4°	5°	6°
50	1·000	0·970	0·940	0·910	0·880	0·850	0·820
51	1·000	0·971	0·942	0·913	0·884	0·855	0·826
52	1·000	0·972	0·944	0·916	0·888	0·860	0·832
53	1·000	0·973	0·946	0·919	0·892	0.865	0·838
54	1·000	0·974	0·948	0·922	0·896	0·870	0·844
55	1·000	0·975	0·950	0·925	0.899	0·873	0·848
56	1·000	0·976	0·951	0·927	0·902	0·877	0·852
57	1·000	0·977	0·953	0·929	0.905	0·881	0·857
58	1·000	0·977	0·954	0·931	0·908	0·885	0·862
59	1·000	0·978	0·956	0·934	0·911	0·889	0·867
60	1·000	0·979	0·957	0·936	0·914	0·893	0·871
61	1·000	0·980	0·959	0·939	0·917	0·897	0·876
62	1·000	0·981	0·961	0·941	0·921	0·901	0·881
63	1·000	0·981	0·962	0·943	0·924	0·905	0·885
64	1·000	0·982	0·964	0·945	0·927	0·908	0·889
65	1·000	0·982	0·965	0·947	0·930	0·911	0·893
66	1·000	0·983	0·966	0·949	0·932	0·914	0·897
67	1·000	0·983	0·967	0·951	0·934	0·917	0·900
68	1·000	0·984	0·968	0·952	0·936	0·920	0·903
69	1·000	0·984	0·969	0·954	0·938	0·922	0·905
70	1·000	0·985	0·970	0·956	0·940	0·924	0·908
71	1·000	0·985	0·971	0·957	0·942	0·927	0·911
72	1·005	0·986	0·972	0·958	0·944	0·929	0·914
73	1·000	0·986	0·973	0·959	0·946	0·931	0·917
74	1·000	0·987	0·974	0·960	0·947	0·933	0·919
75	1·000	0·987	0·974	0·961	0·948	0·935	0·921
76	1·000	0·987	0·975	0·963	0·950	0·937	0·924
77	1·000	0·988	0.976	0·964	0.952	0·939	0·927
78	1·000	0·988	0·977	0·965	0·954	0·941	0·929
79	1·000	0·988	0·978	0·966	0·955	0·943	0·931
80	1·000	0·989	0·978	0 967	0.956	0·945	0·934
81	1·000	0·989	0·979	0·968	0·958	0·947	0·936
82	1·000	0·989	0·980	0·969	0·959	0·949	0·939
83	1·000	0·990	0·980	0·970	0·960	0·950	0·941
84	1·000	0·990	0·981	0·971	0·962	0·952	0·942
85	1·000	0·990	0·981	0·972	0·963	0·953	0·944
86	1·000	0·991	0·982	0·973	0·964	0·955	0·946
87	1·000	0·991	0·983	0·974	0·965	0·956	0·947
88	1·000	0·991	0·983	0·975	0·966	0.958	0·949
89	1·000	0·991	0·984	0·976	0·967	0·959	0·951
90	1·000	0·992	0·984	0·976	0·968	0·960	0·952

TABLE III.—*Continued.*

Temperature of Wet Bulb.	Depression.						
	7°	8°	9°	10°	11°	12°	13°
50	0·790	0·760	0·730	0·700	0·670	0·640	0·610
51	0·797	0·768	0·739	0·710	0·681	0·652	0·623
52	0·804	0·776	0·748	0·720	0·692	0·664	0·636
53	0·811	0·784	0·757	0·729	0·702	0·675	0·648
54	0·817	0·791	0·765	0·738	0·712	0·686	0·660
55	0·823	0·798	0·772	0·746	0·721	0·696	0·671
56	0·828	0·804	0·779	0·755	0·730	0·705	0·680
57	0·832	0·810	0·787	0·763	0·739	0·715	0·691
58	0·838	0·817	0·794	0·771	0·748	0·725	0·702
59	0·844	0·823	0·801	0·778	0·756	0·734	0·712
60	0·850	0·829	0·808	0·786	0·764	0·742	0·721
61	0·855	0·835	0·815	0·794	0.772	0·751	0·731
62	0·861	0·841	0·821	0·801	0·780	0·760	0·741
63	0·866	0·847	0·828	0·809	0·789	0·769	0·750
64	0·870	0·852	0·834	0.816	0·797	0·778	0·759
65	0·874	0·857	0·839	0·822	0·804	0·786	0·767
66	0·879	0·862	0·844	0·827	0·810	0·793	0·775
67	0·883	0·866	0·849	0·833	0·816	0·799	0·782
68	0·886	0·870	0·854	0·838	0·822	0·805	0.789
69	0·889	0·874	0·859	0·843	0·827	0·811	0·795
70	0·892	0·877	0·863	0·848	0·833	0·817	0·802
71	0·896	0·881	0·867	0·853	0·838	0.823	0·809
72	0·899	0·885	0·872	0·858	0·844	0·829	0·815
73	0·903	0·889	0·876	0·863	0·849	0·835	0·821
74	0·906	0·892	0·880	0·867	0·854	0·840	0·827
75	0·909	0·896	0·884	0·871	0·859	0·845	0·832
76	0·912	0·900	0·888	0·875	0·863	0·850	0·837
77	0·915	0·903	0·891	0·879	0·867	0·854	0·842
78	0·917	0·906	0·895	0·883	0.872	0·859	0·847
79	0·919	0·909	0·898	0·887	0·876	0·864	0·853
80	0·922	0·912	0·902	0·891	0·880	0·869	0·858
81	0·925	0·915	0·905	0·895	0·884	0·873	0·863
82	0·929	0·918	0·908	0·898	0·888	0·877	0·867
83	0·931	0·921	0·911	0·901	0·891	0·881	0·871
84	0·932	0·924	0·914	0·904	0·895	0·885	0·875
85	0·935	0·926	0·917	0·907	0·898	0·889	0·879
86	0·937	0·938	0·919	0·910	0·901	0·892	0·883
87	0·939	0·920	0·922	0·913	0·905	0·897	0·888
88	0·941	0·932	0·924	0·916	0·908	0·900	0·892
89	0·943	0·935	0·927	0·919	0·910	0·902	0.894
90	0·944	0·936	0·928	0·921	0·914	0·906	0·898

TABLE III.—*Continued.*

Temperature of Wet Bulb.	Depression.						
	14°	15°	16°	17°	18°	19°	20°
50	0·580	0·550	0·520	0.490	0·460	0·430	0·400
51	0·594	0·565	0·536	0·507	0.478	0·449	0·420
52	0·608	0·580	0·552	0·524	0·496	0·468	0·440
53	0·620	0.594	0·567	0·540	0·513	0·486	0.459
54	0·632	0·607	0·582	0·556	0·530	0·504	0·477
55	0·644	0·620	0·595	0·570	0·545	0·519	0·493
56	0·656	0·632	0·608	0.584	0·560	0·535	0·510
57	0·668	0·644	0·621	0·597	0·574	0·550	0·526
58	0·679	0·656	0·634	0·611	0·588	0·565	0·542
59	0·690	0·668	0·646	0·624	0·602	0·580	0·557
60	0·700	0·680	0·659	0·637	0·616	0·595	0·573
61	0·711	0·691	0·671	0·650	0·630	0·609	0·588
62	0·721	0·702	0·683	0·663	0·643	0·623	0·602
63	0·731	0·712	0·693	0·674	0·655	0·636	0·616
64	0·740	0·721	0·703	0·684	0·666	0·647	0·628
65	0·749	0·730	0·712	0·694	0·676	0·658	0·640
66	0·757	0.739	0·722	0·704	0·687	0·669	0·652
67	0·765	0·748	0.731	0.714	0.697	0·680	0·663
68	0·773	0·756	0·740	0.723	0·707	0·690	0.674
69	0·780	0·764	0·749	0·733	0·717	0·701	0·685
70	0·787	0·772	0·757	0·742	0·727	0·711	0·696
71	0·794	0·779	0.765	0·751	0·736	0·721	0·706
72	0·801	0·786	0·772	0·758	0·744	0·730	0·715
73	0·807	0·793	0·780	0·766	0·752	0·738	0·725
74	0·813	0·800	0·787	0·774	0·761	0·747	0·734
75	0.819	0·806	0·794	0·781	0·768	0·755	0·742
76	0·825	0·812	0·800	0·788	0·775	0·763	0·750
77	0·830	0·818	0·806	0·794	0·782	0·770	0·758
78	0·836	0·824	0·812	0·800	0·789	0·777	0·766
79	0·842	0·830	0·818	0·807	0·796	0·784	0·774
80	0·847	0·836	0·825	0·814	0·803	0·792	0·782
81	0·852	0·841	0·831	0·820	0.809	0·799	0·789
82	0·857	0·846	0·836	0.826	0·815	0·805	0·795
83	0·861	0·851	0·842	0·832	0·822	0·812	0·802
84	0·866	0·856	0·847	0·838	0·828	0·818	0·808
85	0·870	0.861	0·852	0·843	0·833	0·824	0·814
86	0·874	0·865	0·856	0·847	0·838	0·829	0·820
87	0·879	0·870	0·861	0·852	0·843	0·835	0·826
88	0·883	0·874	0·865	0·857	0·849	0·841	0·832
89	0·886	0·878	0·870	0·862	0·853	0·845	0·837
99	0·890	0·882	0·874	0·866	0·858	0·850	0·842

ART. VIII.—*Literary and Scientific Notices.*

1. *Magnificent Sculptures found on opening the Mound of Nimrod, near Nineveh.*

Letters from Baghdad mention that Mr. Layard, a gentleman sent down by Sir Stratford Canning, has cut into the great *Mound* of *Nimrod*, on this side Nineveh, and discovered most magnificent sculptures, statues, and inscriptions in the cuneiform character of the most remote Babylonian era. He has also found copper swords, and the copper-tools with which the works were executed. The Mound is close to the Tigris, and transport will consequently be easy. In the mean time petty jealousy, on the part of the Pasha of Mosul, backed by the intrigues of good natured Gallic friends, has put a stop to the work of excavation, till a *Firman* has been obtained from the Porte.

2, *Maratha and Kanarese languages.*

These two languages are used by the natives inhabiting the countries from the upper part of the Nermada, (Nerbudda), on the North, to the source of the Kavary river, on the South; or from the 11th to the 21st degrees of north latitude; being bounded west-ward by the ocean, and east-ward by a line drawn from the upper parts of the Nerbudda, through Nagpoor, and the sources of the Warda river in this province, to Nandere, Beder, Maktal, Raichore, Gooty, Pennakonda, Panganoor, Venkatagherry, and sources of the Kavary. The region to which the Maratha language is particularly confined, is bounded, on the west and south, by a line drawn from Sedasheoghar, on the Malabar coast, to Koorundwar, Hassoor, Bahmenhaal, Jeroor, Jeergeeyal, Jutt, Mangalweera and sources of the Maun river, through Sholapoor, and thence, east-ward to Beder: at which place and its neighbourhood, the Telagu, Maratha, and Kanarese dialects seem to unite. The boundary of the Kanarese language on the W. and N. is the line now described from Sedasheoghar, and marks the extent of the Karnataka province on this side, as distinguished from that of Maharashtra, both of which however were anciently included in one kingdom; and of which Kalian, near Beder, was the capital, the country at this time being known by the name of the southern *Kuntala Desha.* It is so named in an inscription of the twelth century of our era A. D. 1173, (As: Res. ix. page 431). The Shapti Sambheda, quoted by Ward, on the Geography of the Hindus, describes Maharashtra, or Karnata, as extending from Ujain and the

holy place Marjara to Kolapoor, thus excluding Karnata proper; but the fact of this region being indiscriminately named, by a Sanskrit writer, Maharashtra or Karnata, shows that both were at some period included in one kingdom as just mentioned; and facts are not wanting to prove an interesting circumstance in the history of the country that both were the scenes of Bauddha missionary labours, during the reign of the great Emperor Asoka, or B. C. 247.

3. *Duplicate of the Rosetta Stone Inscription found at Philæ.*

The learned Prussian, Monsieur Lepsius, in a letter to M. Letronne, communicated to the Academy of Inscriptions and *Belles-Lettres* of Paris, states that he has discovered a duplicate of the Rosetta-Inscription at Philæ, along with many other inscriptions collected in Egypt and Ethiopia.—The following is an extract from his journal—"At Philæ I have discovered a copy of the decree of the Rosetta-Inscription: the hieroglyphic part of which has been already observed by Salt, as I have since learned; the *demotic text*, however, as far as I know, has not been mentioned by any one. Champollion takes no notice of it in his letters, and paid no attention to it as would appear, though it be an inscription of very great importance, since it repeats the decree word for word, and even preserves the same number of lines, so that the end of the decree, relative to the *triple system of writing*, is here found; although the Greek text has not been added, unless it may have been put below in letters of red, which are now effaced. A considerable part of the lower corner, wanting in the Rosetta-Stone, may be restored from our inscription, which will be of great utility to Egyptian philology; and the *demotic part* is also well preserved throughout, unless where the letters are taken away by the hieroglyphics, which Ptolemy Dionysos* placed above.† Along side of this decree there is another, also bi-lingual, and

* This is king Ptolemy XII, who reigned along with his sister the celebrated Cleopatra, between the years 52 to 48, before the Christian era. It is an error of the Chronologists calling him *Dionysos*.

† This fact of hieroglyphics cut, in the time of Ptolemy XII, above a demotic inscription of the time of *Epiphanes*, is most curious and hitherto *unique*: but it will not surprise those who know the Egyptian *low reliefs*, sculptured above the Greek inscriptions, of the time of Ptolemy Dionysos, on the great *pylon* of Philæ.

with the same termination* relative to the three systems of writing, but with the indication of some other place where this decree ought to find its place in the temples. I have found in this for the first time, the name of the City of Alexandria; and will copy the inscriptions after the impressions which I have taken; subsequent to which I shall be able to say more.

You are perhaps apprized that I have found, at the base of the obelisk, which Mr. Bankes left at Philæ, the traces of a fourth Greek inscription,† in large painted letters of five or six lines at least. Unfortunately I can only affirm the existence of such an inscription; but it will be impossible to decipher it, as I convinced myself anew during our late stay at Philæ.

On the subject of Ethiopic Inscriptions M. Lepsius continues;—"In short I have collected a very great number of *demotic inscriptions*, and what is of more importance several *Ethiopic inscriptions*. I believe I am authorized in calling them so, after my conviction that they contain the language of the inhabitants of Meroe at the period of its greatness. I have found these inscriptions in the Pyramids of Meroe, relative even to the representations of their Chambers: they are found frequently along side of *hieroglyphic* inscriptions, sufficiently rude. The people of the ancient *Meroe*, (whose monuments are certainly among the most modern of the antiquities found in the upper valley of the Nile,) descended even to the frontiers of Egypt: and I have discovered an *Ethiopian temple*, erected by the same kings and queens who built the temples of *Naga* and the pyramids of *Meroe*, in the country of the Cataracts, at *Amara*, and some specimens of their inscriptions even at Philæ. I believe also, I can prove, and have given the general reasons

* This refers to the last phrase of the Rosetta Inscription, wherein is mentioned that the decree should be engraved in *three* characters *sacred, common, and Greek.*

† I had no knowledge of this fact, but it is nothing more than very natural. There are three Inscriptions on the base of the Obelisk. 1st The petition of the priests of Philæ; 2nd The royal rescript which granted their request; 3d. The letter of advice in the proclamation. There is then wanting the reply of the priests, both to the king and to the proclamation, containing the expression of their gratitude. This is without doubt the subject of the fourth Inscription found at the base of the Obelisk, which is unfortunately in an irrecoverable state

for this opinion in a memoir sent to the Academy of Sciences at Berlin, that the Ethiopic language of the ancient *Meroe* exists yet, and is that spoken by the widely spread population of Bichariba, (Bisharin,) which occupies all the countries on the east, from the 23° to the 13° of N. L. as well as the fertile provinces of *Taka* which had latterly revolted from the Turks, during the time we were above. I have studied as much as I could, during the ten months I have spent in Ethiopia, the principal languages of the country; chiefly *Nubian*, in the valley of the Nile, from Assuan to the frontier of *Dongola*; the *Kongara* of the people of *Darfour*; and the *Beja* of the Bichariba. I have discovered that this latter language is a most interesting branch of the *Caucasian* family, though it be very different from the Egyptian language. I am perfectly convinced that the Ethiopians, in the time of the Ancient Pharoahs, had nothing almost in common, as a people, with the Egyptians, and that the ancient traditions relative to high Ethiopian civilization, are explained now in a way very different, but quite satisfactorily, by the important part which Egyptian civilization played in Ethiopia 2000 B. C. *L, Institut Nos.* 109. *sect*:11.

4. *M. Schmidt's Tibetan Grammar and Dictionary.*

At length M. Schmidt has finished the publication, at St. Petersburg, of his Dictionary of the Tibetan language, and the edition of the Tibetan text of the *Dgangloun*, with the corresponding German translation. These two works form, along with the Tibetan Grammar published in 1841, all that is necessary for the study of this language. Thus, by six works which have followed each other at short intervals, has this laborious Academician first opened, for the investigation of the learned, two literary languages of Central Asia, which before him, were deemed almost inaccessible. *L. Institut Nos.* 111. *Sec* 11. *March* 1845.

5. *M. Botta's discoveries at Nineveh. — Continued.*

In anticipation of the report from the Academy of Inscriptions, which will be given in our next number, &c. we here present an extract from two letters, on the discoveries of M. Botta at Nineveh, translated from a foreign collection wherein we have found them.

" There has been again published an account of 15 chambers, some of which are above 400 feet long, being evidently part of a magnificent

palace. Their walls are entirely covered with inscriptions and sculptures. These last are almost with out exception historical and illustrative of events of the highest interest, such as sieges, naval operations, triumphs, particular combats, &c. The inscriptions are in cuneiform characters, and of such an extent that if all those of the same kind, previously known, were joined end ways, they would not equal the space which the new inscriptions occupy. The character employed exactly resembles that of the inscribed columns at Persepolis, Hamadan (Ecbatana), &c. and the primitive inscriptions at Van. Each door has two rows of sculptures, placed one above the other; and the inscriptions, containing generally about 20 lines, are engraved between. We meet with them however frequently upon the vestments of figures, upon the towers, and other objects, which one observes in the *bas-reliefs*. We cannot doubt that they are dedicated to the events represented by these figures, and the names of the principal actors which they present, carry the conviction that they contain a portion of the historical archives of the kingdom. Independently of the variety of the subjects described by the sculpture, the spirit and the beauty of their execution offer the widest field for admiration and for conjecture. For those who have been in the habit of regarding the Greeks as the veritable masters in imitative arts, the sculptures of Nineveh furnish a new subject for research and for reflection. Though we cannot assign to these remains an origin much anterior to the most ancient periods of art amongst the Greeks, they appear to me quite original, both in design and execution. Though probably cotemporary with several of the most ancient sculptures in Egypt, they are incomparably superior to the stiff and ill proportioned figures of the monuments of the Pharoahs. This shows some knowledge of anatomy and human physiognomy, a remarkable intelligence of character, and surprising harmony in the *contour* and general execution.

At this period, the rude style had already given place to civilized art. The ornaments, dresses, implements of war, are finished with precision and extraordinary minuteness, without departing from a harmonious whole. The extreme beauty and elegance of the various objects, introduced amongst the groups, must command admiration.—The form of the vases, the drinking cups, the sword handles ornamented with lions, the shields decorated with animals and flowers, the arm chairs, the

tables and other utensils for domestic use, the ornaments for the head, the bracelets and earrings, are all finished with consummate taste, and rival the productions of the most flourishing periods of art amongst the Greeks. In spite of this, there are some faults in the general execution, such as frequent errors in the relative proportions of the figures; we see also evidently that the same hand has not presided over the entire work.

The nature of the sculptures and also of the inscriptions are alone sufficient to prove that they existed at a period prior to the conquest of Persia by the Macedonians; the difficulty is to know to which of the three great dynasties, which successively ruled the empire of the Assyrians, they ought to be ascribed, viz: the *first race* of Kings, of which Sardanapalus was the last B. C. 820; the *second race*, which became extinct at the destruction of Nineveh by Cyaxares (608); or the *Medo-Persian* conquerors, who governed the east till the time of their defeat by Alexander. The first supposition may be abandoned as quite improbable.—Several important facts concur to make us believe that the second Assyrian era was the date of the construction of the edifice: the first of these is a very remarkable passage in the xxiii Chapter of Ezekiel, 14 and 15 verses: "she saw men pourtrayed upon the wall, the images of the Chaldeans pourtrayed with vermillion, girded with girdles upon their loins, exceeding in dyed attire upon their heads, all of them princes to look to, after the manner of the Babylonians of Chaldea, the land of their nativity." It is impossible for any one having a knowledge of M. Botta's sculptures not to be struck by the exact description of them which this passage contains. It is evident that the entire surface of the marble has been painted with a sort of red ochre, except in certain places where the ornaments have been re-painted with more brilliant colours. The richly decorated girdles and head ornaments of the principal personages, whether these ornaments be tiaras, mitres, or simple bands, binding the hair round the temples and floating behind the back, are of a remarkable form. The agreement of these figures with the text in Ezekiel is such that we are forced to conclude that the prophet had these or similar sculptures in view. It must be remembered that Ezekiel prophesied by the river *Chebar*, the Chaboras or Khabour, in the immediate neighbourhood of Nineveh, and that, as we gather from this chapter, at a period previous to the fall of this city.

The following facts prove yet more that the monument of right belongs to the second Assyrian dynasty, viz; the absence of sacred symbols and emblems belonging to the *Magian religion*, the nature of the divinities and idols represented, the historical evidence which assigns it to the period of the destruction of Nineveh, the vestments of the figures, the character employed in the inscriptions, and the style of Architecture.

Between the fall of the first Assyrian dynasty and the final ruin of Nineveh, by the united armies of Cyaxares and Nebuchadnezzar, the Assyrian empire was governed by a race of Kings who extended their conquest over the whole of Western Asia, and even as far as the frontiers of Africa. Under the reigns of Senharib or Sennacherib, and Esarhaddon, the Assyrian empire comprehended not only the countries, which circumscribed the frontiers of Assyria, in the widest sense of the term, namely, Babylonia, Susa, and part of Media and Mesopotamia, but likewise Cilicia, Phœnicia, Syria, Egypt, Ethiopia, and part of Arabia. The monarchs of this dynasty are frequently mentioned in history and the Jewish prophecies. Their names, indicating from their construction an Indo-Germanic origin, entirely differ from those of the Kings belonging to the first Assyrian dynasty, which have been preserved by the profane historians, and are evidently of Semitic origin. This fact would tend to prove that this second dynasty came from Media. But as the Magian religion appears, even at this time, to have prevailed in this country, it would be reasonable to conclude that if the new dynasty was one of conquerors, these conquerors would have imposed their religion on Assyria. The same remark is applicable respecting the Median language, but we we have proofs most satisfactory that the Assyrians retained their language along with the ancient characters of their works. Thus in Kings, ch.xix v: 36 and 37, it is said that Sennacherib was slain by his sons at the time he was worshipping in the temple (or house) of *Nisroch*, his god, (Isaiah ch: xxxvii v: 38); also in Kings ch: xviii we read that the commanders of the same monarch were required to speak in Syriac and not in Hebrew. The Magi worshipped not in temples, and moreover, the name of the Assyrian divinity is an unexceptionable proof of its Semitic origin. *Nisr*, in all the Aramæan (Syrian) dialects, signifies an eagle; and Gesenius was of opinion that *Nisroch* signifies the great eagle. Now the divinity which is most frequently represented in the sculptures discovered by M. Botta, joins to the

human form the head and wings of an eagle. The presence of this figure at Nineveh, coming to support the text of the book of Kings, can scarcely be considered as a merely accidental coincidence. As one has found but one Semitic divinity, it may nevertheless be conjectured that there exist other emblems of the same worship. We have accordingly *Baal* or the Assyrian Hercules.—The figure seems to represent this divinity. The characteristic feature of all the religious systems of Western Asia consists of gigantic proportions and imposing forms. In one of his hands he is strangling with apparent ease a lion, whose contorted features, and extended claws grasping the garments of the god, attest the superhuman force which presides at his destruction. In the other hand is a serpent with a monstrous head, or armour of this form. These two attributes denote at once the Hercules of the Semitic race, whence the Greeks derived the traditions which they ultimately applied to their own proper Hero. In the low relief representing the manœuvres of a fleet at sea, one notices a marine divinity, whose superior half represents a man, and inferior extremity the tail of a fish, probably *a triton*, of which the worship extended widely in the east. These divinities, so completely opposed to the spirit of the Magian religion, prove then that the doctrines of *Zoroaster* had not yet been introduced among the Assyrian people.

The dress of the Kings altogether resembles that of the Medes. A mitre, or conical raised cap, painted with gaudy colours, covers their head. Their hair and beards are so carefully curled, and so minutely and neatly arranged, that they look more artificial than natural. Some of the long robes, richly decorated with borders and fringes, descend to the ancle. Other persons are dressed like, and represent apparently the courtiers having authority inferior to that of the Monarch. The warriors wear helmets and are clad in armour. Though this royal costume may be Median, it must not be forgotten that it also resembles very nearly that of the Babylonians. These allow their hair to grow, says Herodotus, when he describes this people, and have a mitre on their heads. They carry in their hands a *baton*, on the head of which is carved an apple, a rose, a lily, an eagle, or some other figure. They generally wear a linen tunick, which descends to the ancle, above which is another of the same material; and over the whole is thrown a small white cloak. But the Babylonians might have adopted before the time

of Herodotus the costume of their conquerors the Medo-Persians. Thus, though the similarity of the dresses found in the sculptures of Nineveh and Persepolis, would lead to the conjecture that both kind of monuments ascend to a Median origin, this opinion is not altogether of absolute certainty. The exact description of Ezekiel, contained in the passage which we have quoted, would appear to force on us the admission of a South-Assyrian origin. *L. Institut No.* 112 *April* 1845.

ART. IX.—*Extracts from the Proceedings of the Society.*

At a monthly meeting of the Bombay Branch of the Royal Asiatic Society, held, in the Library Rooms, on Thursday, the 9th January 1845.

The minutes of last meeting were read and approved of.

Assistant Surgeon J. Peet, proposed at last meeting, was ballotted for and duly elected; and Dunjeebhoy Framjee Esq., proposed as a subscriber to the Library by Dr. Buist, and seconded by the Secretary, was admitted agreeably to the regulations.

The Marquis de Ferriere LeVayer, Secretary to the French Embassy in China, proposed as an Honorary Member by Colonel Jervis, Vice President, seconded by Dr. Burnes. K. H, Vice President, and the Secretary, was duly elected, in accordance with Art. IX of the Regulations.

Dr. D. Grierson, of the Bombay Medical service, proposed as a Member of the Society by Dr. Burnes, K. H. seconded by the Secretary, to be ballotted for at next meeting.

The proposition for reducing a portion of the sum now expended on account of newspapers, of which due notice was given, having been submitted to the meeting, R. W. Crawford Esq., seconded by Dr. Buist, proposed that the finance committee, in reporting on the best means of reducing the current expenses of the Society, be requested to name the sum which ought, in their opinion, to be reduced from the usual charges for newspapers and periodicals; and that this sum having been fixed on, all periodicals and newspapers be held discontinued, so as to admit of Members of the Society naming those to be in future taken, within the limits of the prescribed sum. Notice of this to be given before next meeting.

The proposition also, of which previous notice was given, to partly

relieve the Society, in the present state of its finances, from the expenses of publishing the quarterly journal, by charging Members of the Society Rs. 2, for each number, and subscribers, not Members, at the rate of Rs. $2\frac{1}{2}$, having been brought before the meeting, it was thereon resolved that a subscription list be circulated to all Members of the Society, requesting their support of, and subscription to, the quarterly journal which promises to be of general interest in the *History*, *Philology*, *Palæography*, *Mythology*, and *Antiquities* of Western India, and the neighbouring countries; but which, without such support, must otherwise be discontinued: a subscription was accordingly opened, to which the Members at the Meeting appended their names.

The following donations were laid on the table;

To the Library.

Copy of Mr. Frere's translation of the Frogs of Aristophanes, and of Theognis, accompanied by a note from his nephew W. E. Frere Esq., of the Bombay Civil Service.

Second.—2 setts of Chinese Books, by J. Turner Esq., Assistant Surgeon, presented through the Vice President, Dr. Burnes, K. H.

To the Museum.

Various specimens of petrified wood, from the petrified forest near Cairo, by Wm. Pigou, Esq. Assistant Surgeon, through Dr. Burnes.—A shark's jaw, and specimens of black coral, by Captain J. A. Young, through Professor Orlebar.

Land shells from Ceylon, by Dr. Leith, and *larvæ* which destroy the mangoe trees, by the Rev. G. Pigott, through Professor Orlebar.

2 Curious Chinese mariner's compasses, by John Turner, Esq. Assistant Surgeon, through Dr. Burnes.

The Secretary read a letter from Captain Postans, accompanied by an English translation of a Sanskrit inscription, relative to the Temple of Somnath, but of which the Society has already a translation by W. Wathen, Esq. which has been printed in the October number of the Society's Journal, now about to issue from the Press.

The Secretary also read a paper on the origin of the *Hamaiyaric* and *Ethiopic* alphabets, arranged by him, and compared with the Hebrew, Phœnician, Samaritan, Mendœan, and Arabic.

Resolved—That the thanks of the Society be given for the donations and paper presented.

The meeting then adjourned to Thursday, the 13th of February next.

At a monthly Meeting of the Bombay Branch Royal Asiatic Society, held in the Library rooms, on Thursday the 13th February, 1845.

The minutes of last meeting were read and approved of.

Dr. D. Grierson, proposed at last meeting as a Member of the Society, was bollotted for and duly elected.

John Andrew Baumbach, Esq. proposed a Member of the Society, by R. W. Crawford Esq. seconded by J. R. Hadow, Esq. to be ballotted for at next meeting.

Lieutenant J. T. Barr, proposed as a subscriber to the Library, by Major General Barr, seconded by the Secretary, was admitted agreeably to the regulations.

The Committee appointed at the monthly meeting of the 12th December last, to audit the accounts and for other financial objects, reported that the confused state of the accounts prevented them completing the duty assigned them by the meeting; but submitted as accurate an *estimate of the Society's annual income, expenditure, and debt,* as in the yet undetermined amount of deficit, not accurately accounted for, could be made out.—It was evident from this financial statement that the expenses of the Society's *quarterly journal* could no longer be debited to the current income of the Society, but must be liquidated from special subscriptions to this individual object.

In reference to the proposition submitted at the monthly meeting, that the above Committee should name the sum which ought, in their opinion, to be reduced from the usual expense for newspapers and periodicals, it was suggested, by the Members of the Committee, that of the Society's available balance, Rs. 3,680 7 10, not more than one third be in future applied for newspapers and periodicals, Indian and English, and that the other two thirds, (after defraying the expenses of preserving the Museum,) be applied in equal proportions as nearly as may be, in the purchase of, 1st *Novels, Travels, and Modern Works of General Literature; and 2nd in Standard Works.* The Committee further reported that the present yearly expenditure for newspapers and periodicals is Rs. 1,635 13, and suggested that a reduction to the annual

amount of Rs. 430, should be made in these expenses. A reduction to the amount of Rs. 393 was accordingly made by the meeting.

The meeting further resolved that the list of proposed works and new editions of works, to be ordered from England, should be circulated to the managing Committee.

The following donations were laid on the table :

To the Library.

1st. Specimens of the illustrations of the rock-cut temples of India, by James Ferguson, Esq., presented by Professor Pole.

2nd, Webb's Pathologia Indica, and Medical Topography of the Ceded Districts, presented by the Medical Board.

The Secretary read a letter from Captain Cuthbert Davidson of the Bengal Army, and the Nizam's Cavalry Service, inclosing a list of Persian Books belonging to the Library of the *Durgah* of Kulburga; and proposing to forward an account of this ancient city, to be laid before the Society.

Read a letter from Professor Christian Lassen, of Bonn, acknowledging the receipt of copies of the *Visparad Yaçna, and the first volume of the Society's Journal;* and acquainting the Society that he had forwarded, through Mr. Richardson, two dissertations of his own, to be laid before the Society.

Read a letter from Professor Eugene Burnouf, of Paris, acknowledging the receipt of the 5th and 6th numbers of the Society's Journal, and returning his thanks for the presentation of the work.

Resolved that the thanks of the Society be given for the donations, and for Captain Davidson's kind communication and attention to the objects of the Society, in collecting information relative to places of interest throughout India.

The meeting then adjourned to Thursday, the 13th of March next.

At a monthly Meeting of the Bombay Branch Royal Asiatic Society, held in the Library rooms on Thursday, the 13th March, 1845.

The minutes of last meeting were read and approved of.

John Andrew Baumbach, Esq. proposed at last meeting as a Member of the Society, was ballotted for and duly elected.

Resolved that a special meeting be held on the 25th instant, to take into consideration the propriety of rescinding the resolution passed at the anniversary meeting of 1841, withdrawing the selection of new publications from Messrs. Longman and Co., and of again entrusting those Booksellers with the selection and forwarding of new publications to the amount of £ 200 per annum.

The following donations were laid on the table :

To the Library.

1st. Thornton's History of the British in India with Map, and Thornton's Gazetteer with Map, by Government.

2nd. Falconer's Extracts from some of the Persian Poets, by the author, through Dr. Burnes.

To the Museum.

1st. Coal from the Bolan Pass by Dr. Leith.

2nd. Supposed fossil ribs in trap, Bombay, by R. X. Murphy Esq.

3rd. Specimens of fish, Bombay, by the Rev. G. Pigott.

4th. Supposed fossil fruits and bone from the desert of Egypt, by the Rev. Dr. Stevenson.

5th. Stalactites from the Grotto of Adelsberg Carniola, by Captain Hebbert, Engineers.

The meeting then adjourned to Thursday, the 10th of April next.

At a special meeting of the Bombay Branch Royal Asiatic Society, held, in the Library rooms, on Thursday the 25th March, 1845.

It was proposed by Colonel Jervis and seconded by Dr. Burnes, That the resolution passed at the anniversary meeting of Wednesday the 10th November, 1841, withdrawing the selection of new publications from Messrs. Longman and Co., be rescinded, and that these Booksellers be again entrusted with the selection and forwarding of new publications, but limited for the present to £ 150 per annum, inclusive of all charges for freight and insurance.

The proposition was agreed to unanimously, and the meeting of the Society dissolved.

At a monthly meeting of the Bombay Branch Royal Asiatic Society, held, in the Library rooms, on Thursday the 10th April, 1845.

Read and approved the minutes of last meeting.

The Secretary read extract of a letter from Major Rawlinson, dated Baghdad the 12th of February 1845, intimating that he had lately sent to H. H. Wilson, Esq. Director of the Royal Asiatic Society, a literal translation of the whole of the *Be-Situn Cuneiform Inscriptions,* (about 500 lines) giving a detailed account of the campaigns of Darius Hystaspes, and containing various notices of ancient Persian History of the highest interest.

Extract of a letter from Captain LeGrand Jacob, dated Belgaum 3rd of March 1845, was also read, accompanied by a table of corrections of sundry errors in the lithographed copy of the *Girnar-Asoka-Pali Edict,* published in No. V. of the Society's Journal, and previously translated and commented on by the late James Prinsep.—Captain Jacob intimates that possibly his own copy of the inscription may be defective, but the corrections sent will aid any revised translation of this very ancient inscription, which may be made by other Orientalists.

The following donations were laid on the table:

To the Library.

By the author, Professor W. Pole, M. R. A. S. and of the Elphinstone College.

1st. Prize Essay on the Friction of Steam Engines.

2nd. A tract on the pressure and density of steam.

3rd. A treatise on the art of Painting on Glass, translated from the German.

From Government, 3 printed copies of the proceedings of the Board of Education for the year 1843.

To the Museum.

Fragments of a Greek statue, from Upper Egypt, by Assistant Surgeon Pigou.

4th. Petrified shells, ditto.

Specimen of *Gum Caoutchouc* as collected from the tree, and brought from the island of Borneo, by Lieutenant Robinson, of the Bengal army.

The meeting then adjourned to Thursday the 8th of May next.

At a monthly Meeting of the Bombay Branch Royal Asiatic Society, held, in the Library rooms, on Thursday the 8th May, 1845.

The minutes of last meeting were read and approved of.

Ten Members of the Society not being present, the ballot for Archibald Smart Esq., proposed at last meeting as a member of the Society, was postponed, agreeably to the regulations, till the next meeting.

E. T. Downes Esq., proposed as a member by Captain H. B. Turner, and seconded by R. W. Crawford, Esq. to be ballotted for at the next meeting.

The Secretary read a letter from Comte Auge St. Priest, President of the "Scientific Commission for the discovery of American Antiquities," dated Paris, 5th February 1845, requesting the sympathy and aid of the Bombay Branch Royal Asiatic Society in promoting a proposed expedition for the investigation of American Antiquities, composed of English, French, and German Literati, who are to be associated in this undertaking under the auspices of the above Commission.

A letter from M. Pirtz, Director of the Royal and University Libraries of Berlin, acknowledging the receipt of the *Yaçna and Visparad*, was also read, and expressed grateful obligations to the Society for the presentation of these works to the institutions, of which M. Pirtz is the director.

The following donations were laid on the table :

To the Library.

By the author, V. Fontanier, *Voyage dans L'inde et dans Le Golfe Persique, par L'Egypte et la mer Rouge*, accompanied by a letter.

The Rev. J. M. Mitchell then submitted a paper on the Theological dogmas and practical religious ceremonies of the Parsees, accompanied by notes: for which, and the donation to the Library the Secretary was directed to return the thanks of the Society.

The meeting then adjourned to Thursday, the 5th of June next.

At a monthly Meeting of the Bombay Branch Royal Asiatic Society, held, in the Library rooms, on Thursday the 5th June, 1845.

The minutes of last meeting were read and approved of.

Archibald Smart Esq. and E. T. Downes Esq., proposed as Members of the Society and duly seconded at previous meetings, were balloted for and unanimously elected.

Read extract of a letter from Captain Haines to the Secretary, announcing that 63 Hamaiyaric inscriptions were lately brought from the ancient Mareb, by J. Arnauld, a French Apothecary, who shewed them to Captain Haines, but declined to permit him to take copies of them. M. Arnauld had since presented these to the Asiatic Society of Paris, which was about to present a copy to the Royal Geographical Society of London, for decypherment by the Rev. Mr. Forster.

Read a letter from William Hamilton, Esq., Secretary of the Geological Society of London, acknowledging the receipt of Nos. 5 and 6 of the Journal of the Bombay Branch Royal Asiatic Society, and expressing the thanks of the Geological Society for this acceptable present.

Read a letter from Sir Erskine Perry, accompanied by nine volumes of the annual reports of the Poor Law Commissioners, and one volume of the report of Her Majesty's Commissioners on Criminal Law. The letter recommended that the Society should obtain in continuation the reports of the Poor Law Commissioners as they are published; which recommendation will be sent to Messrs. Longman and Co. with instructions to select from and forward such parts of the Poor Law reports as may be obtained for the Society at a moderate annual expense.

Read a letter, from William Escombe, Esq. Secretary to Government in the General Department, acknowledging the receipt of the Secretary's letter dated the 13th ultimo, acquainting the Society that the Honorable the Governor in Council, is pleased to subscribe for *twenty five copies* of the Society's Journal, and requesting that contingent bills for the cost of the Journals be submitted by the Society.

Read a letter from Mr. J. McCudden, dated Poona, the 24th May, accompanied by a prospectus of a work entitled "Oriental Eras," comprising those in use among Christians, Hindus, Mahomedans, Parsees, &c., accompanied by Chronological notices of important events in India and the East, and requesting the Society would become subscribers to the work. The Society agreed to Mr. McCudden's request.

The following donations were laid on the table:

To the Library.

1st. By the Translator, the History of the defection of the United Netherlands from the Spanish Empire, translated from the original German of Schiller, by Lieutenant E. B. Eastwick B. I. 1 volume.

2nd. No. II. of Illustrations of India Ornithology, by T. G. Jerdon Esq., Madras Medical Establishment.

3rd. By Sir Erskine Perry, Kt. 9 volumes annual reports of the Poor Law Commissioners.

The Secretary then read a paper containing observations on the coins of *Undophares*, or *Gondophares*, who is traditionally said to have been the co-temporary of St. Thomas the Apostle.

The Secretary was directed to return the thanks of the Society, for the various donations, and the meeting adjourned to Thursday the 3rd July next.