

THE
EDINBURGH
PHILOSOPHICAL JOURNAL,

EXHIBITING A VIEW OF

THE PROGRESS OF DISCOVERY IN NATURAL PHILOSOPHY,
CHEMISTRY, NATURAL HISTORY, PRACTICAL MECHANICS,
GEOGRAPHY, NAVIGATION, STATISTICS, AND THE FINE
AND USEFUL ARTS,

FROM

APRIL 1. TO OCTOBER 1. 1822.

CONDUCTED BY

DR BREWSTER AND PROFESSOR JAMESON.

TO BE CONTINUED QUARTERLY.

VOL. VII.

EDINBURGH:
PRINTED FOR ARCHIBALD CONSTABLE AND CO. EDINBURGH;
AND HURST, ROBINSON & CO. LONDON,

1822.

the square sterns, "*here are the glass doors which we open in the curtains of our floating fortresses*"

In concluding these remarks, therefore, it may be observed, that Sir Robert Seppings, in his letter to Lord Melville, has most unquestionably demonstrated two essential and important principles, namely, 1st, That a ship's stern, when constructed of a square form, is weak and feeble, when compared with the present general structure of the vessel; and, 2dly, That vessels with sterns of the same form, are incapable of making a strong and vigorous defence, when attacked by a powerful force in that part; but that vessels with circular sterns possess qualities and powers precisely the reverse, exhibiting strength where weakness is invariably found in the old form, supplying all the defects attendant on that mode of construction, giving strength to the entire mechanical frame of the ship, and affording increased security and power to the gallant men who navigate and defend her.

PLYMOUTH, }
6th April 1822. }

ART. IV.—*Account of Professor Reinwardt's Journey through the Preanger Regencies in Java**

THE districts which have been explored by Professor Reinwardt, for the purpose of investigating the native condition of the country, are Tjifondarie, Banjaran, Tjiparay, Manabaya, Timanganten, and the Regency of Limbangan. The principal mountains which he ascended, extending themselves south-east from Mount Gedè, are the Patacka, the Tombak-Pacyong, the Piloc, the Malabar, the Sumbong, the Gadja, the Gainang-Gaintoer, and the Talaja-Budar.

The district of Tjifondarie, on account of its more elevated situation, is distinguished above all others by a very temperate climate, and by great fertility, as well as by the beautiful prospects, which are enriched by a sight of the loftier mountains

* This account appeared originally in the *Bataviaas Courant*, from which it was translated into the *Calcutta Journal* for August 1820, p. 411

towards the south and south-west of that country, and these indeed, were among the most interesting scenes of his investigation. The extensive mountain Patacka, which is the most remarkable of the range, elevates itself next to Mount Gedè, above most of the other peaks of the adjoining ones; the height of this is about 7400 English feet above the surface of the sea. Near the summit are still seen many proofs of early explosions or eruptions, so that this mountain may be reckoned amongst the more ancient volcanoes of Java. On the very top of this mountain are two very wide abysses, which probably are the ancient craters of volcanoes. The one on the south side of the mountain produces a very striking spectacle. It is an extensive circular basin on the very summit of the peak, at the bottom of which, to the depth of more than 700 feet, is a great lake of sulphur. A considerable quantity of sulphur is also spread over the sides of the basin, and mixed with decomposed stones, forming a yellowish-white crust all around this abyss. The sulphureous vapours have penetrated even through the rocks of the mountain, which are originally of a black basalt, and have partly dissolved them so much into a loose white sand, that their former nature is with difficulty distinguished.

The second abyss, which is on the north side of the top of that mountain, is also a spacious and deep basin, but its bottom is dry, and scantily overgrown with wild plants.

The particular Mountain of Patacka, as also the other elevations of the range, being more or less connected with the others to the north and west of them, compose one part of the district of Ronga, in which is also the Mountain of Tombak-Pacyong, of the elevation of 5900 feet. These are everywhere covered with thick woods, which afford an amazing variety of plants, changing in their nature at every different degree of height. The prospect from the summit of the Patacka, especially towards the south, over the district of Tjidam, extends as far as the sea, over a wilderness, and in other directions offers a variety of prospects, combining hills, woods, and an endless number of singularly shaped rocks.

From the cold atmosphere of the district of Tjifondarie, the rice fields produce a later harvest than in the other provinces; but many Indian fruit-trees cannot be reared there, as

in the milder climates below. On the other hand, the nature of the many plants growing wild there, and which are suited to the temperate climate of Europe, prove that this part of the country would be as favourable to the culture of many European plants, as Europe itself. At Tjumeding, which is the chief place of that district, the medium range of the thermometer is 70° of Fahrenheit, and on the top of the Patacka, it is often as low as 40°. To the east of the Patacka, at the distance of one and a half German miles, and separated by a ridge of less lofty hills, lies the Mountain of Tiloe, (which name signifies three mountains), composed of three distinct peaks, of which the first being the most southerly, rises to the height of more than 6000 feet. The stones of that and the surrounding mountains exhibit a greater variety than those of Mount Patacka. The most pure and unmixed basalt is found on the higher mountains only. The Tiloe is on all sides covered with thick woods; and the rocks on the surface are decomposed to a considerable depth, which is highly favourable to the formation of the soil, and supports the most exuberant vegetation.

The mountain, bearing the name Malabar, is known to be of a greater extent than the others, and is situated in the southerly easterly part of the district of Banjaran. This range is composed of many connected mountains, of which the loftiest elevates itself to a height of 6100 feet above the surface of the sea; and is, on account of its situation, its products, and in many other respects, more remarkable than all the other mountains on the island. The rocks, being, from the sudden precipitations by explosion and convulsion, in many places heaped together upon each other in large irregular masses, exhibit a greater variety to the eye of the beholder, than is elsewhere to be seen. The basis of the mountain is a basalt, partly pure, and partly mixed with different other stones, sand, or dust, amongst which there is also lava, and a volcanic kind of rock, containing iron in such quantities as to produce a sensible effect upon the magnet. The Mountain of Malabar has a great portion of its length cut through by a deep valley, extending from the south to the north, through which runs the River Tjigeure, which first precipitates itself from a perpendicular cataract of some hundred feet high, then runs on, with great velocity till it

makes another fall between the mountains, after which it unites itself in the plains of Banjarah with the River Tjisankooi. The Mountain of Malabar, and the plain here spoken of, unite all that great beauty and variety of scenery, and the profusion of a very rich and fertile soil can produce, to be striking and remarkable; and here, indeed, the travellers found the most ample materials for observation.

Professor Reinwardt, proceeded farther on in his journey, north and east of Malabar, going through Tjipalag and Marahaya along the banks of the Tjitarum, towards the south, till he came to the place of its proper origin. The high country where that river takes its rise is a large plain, rising gently towards the south, and is open to the north only, but shut in on all the other sides by high mountains. This plain, though entirely uninhabited, and even scarcely known to the greater part of the inhabitants of Java, nevertheless exhibits one of the finest and certainly one of the most fertile parts of the island. Between its luxuriant woods are rich pastures, where the wild cattle, deer, and other grazing animals undisturbedly enjoy abundance of food. Some of these rich pastures being surrounded by forests, or partly overgrown with groups of trees, appear like extensive parks, laid out by art. In one of these plains, situated on the south-east of the Mountain of Sumbong, the water, rushing down from hills, collects itself, and forms the source of the River Tjitarum, which is afterwards augmented by other smaller streams, issuing from the mountains on all sides of the plain. The climate of that part of the country is very temperate, the medium range of the thermometer being 68° of Fahrenheit. The barometer stands at 25½ English inches, which proves the descent of the Tjitarum, from its origin down to the sea, where it discharges itself, to be 4640 English, or 4498 Rhemish feet.

The Mountain of Sumbong, if ascended from this plain, affords, at a height of about 5600 English feet, a wide prospect along that country, as well as on the west side of the Papandagang, out of which district, particularly from that side, rises a great quantity of vapour.

It did not appear to our travellers, that the Tjitarum takes its origin at the same place with the River Tjidakie, as indicated

in the map of the late Mr Beutjes. The swamp is, however, on that side shut in by a rising ground.

After having returned from the plains, our travellers proceeded on their way through the woody hills, north-eastward over the mountains of Goha, Tangar, &c. and through the district of Manabaya, in order to reach from that side the other mountains of Gadja Massagrit, and the Gainaig Gointor. This trip was one of great difficulty to the party, not only from their being obliged first to make their way through an extensive desert, through thick forests, and over a continually ascending or descending ground, but also on account of the amazing quantity of loose ashes, thrown out to a great distance by the Gainaig Gointor, which covered the ground to a considerable depth. Amongst the many remarkable objects which there presented themselves to the view of our travellers, a place on the mountain of Kismis, situated on the border of the districts Manabaya and Timanganten, deserves particular mention here. This place bears the name of Kama Karaha. Clouds of a whitish vapour rising from out of a cleft in the above named mountain, sufficiently indicate, even from a great distance, that a subterraneous fire is active there. The place itself produces such a spectacle as cannot be beheld without astonishment. A black, muddy, boiling water, mixed with lava, is thrown out in high and foaming waves with a great noise, from different wide and deep gulfs; spouting from an innumerable multitude of openings, dispersed all over the surface, the excessive heat of which makes the ground in many places quite impassable. Brimstone, a whitish salt decomposed, and various high coloured sands and stones, cover and variegate the ground. Rocks fallen down, and black burnt trunks of uprooted trees, mixed with each other, lie dispersed on the soil, while the atmosphere is filled with thick sulphureous and misty vapours. The road from that remarkable place ascending further gradually up towards the Mountain of Gadja, became continually more and more difficult to the travellers, occasioned by the increasing quantity of ashes, which every where covers the ground. The wood, through which these waters ran, scarcely presented a single tree that appeared to be still alive, merely the dead black burnt trunks remained standing; nevertheless, on coming nearer to this awful scene of vegetable de-

struction, the party were surprised by the sight of various young plants, and astonished at the particular manner in which they grew,—for instance, the crown of the leaves would have shot forth from out of the heart of the trunk, had the thick bark been able to protect the same against the deadly scorching caused by the heat of the lava. Wild plantain and other wild shrubs had indeed shot up from out of the deep ground through the midst of the very sand and lava that covered it. Nothing, say the travellers, can give an adequate idea of the effects left by the last eruption of the Gointoir, but a visit to the scenes themselves.

Proceeding along the south side of the mountains of Gadja and Massigit, the travellers soon arrived at the Mount of Gointoir itself. On the north side of it, near the summit, and not far from the spot where lies the crater of that remarkable volcano, they rested for a considerable time in expectation of more favourable weather and a clearer sky, which might afford them an opportunity to inspect and investigate the different objects of their search with more advantage, but the air continued to be very cold, and the hills entirely enveloped in damp clouds, which, together with the difficulty of bringing up the necessary water to such a considerable height, along a very steep road, covered with sharp stones thrown out from the crater of the volcano, obliged them to abandon their intention of a longer stay at that place. However, it appeared, that the road by which they had now ascended, though extremely difficult, was notwithstanding much easier and better than that which the year before Mr Reinwardt had chosen for the same task. The height of this volcano above the surface of the sea is more than 6000 feet.

The Talaga Badas, situated in the district of Mamaradja and regency of Limbangan, also belongs to these mountains, which, on account of the violent effects of the heat coming from out of the ground, is also very remarkable. On this mountain, near its summit, is also a lake of sulphur, shut up in a spacious basin, like the lake of sulphur on the top of the Patacka. Yet the phenomena on the top of the Talagas Bodas, are, on account of the more violent effects which still take place there, much more striking than those of the other. Besides the several wells

of boiling water and hot sulphureous vapours, there rises from out of an opening in the mountain on the south side of the lake, a great column of brimstone vapours; the steam being driven up from the deep abyss with great violence, and striking against the rocks above, is heard at a considerable distance. From other narrow openings a boiling sulphur is seen bubbling up, which afterwards spreads itself all around over the rocks. The lake, forming an oval, has a diameter of from 1500 to 2000 Rhenish feet; the water therein exhibits itself as purely and entirely white, from the incrustation at the bottom; the sides of the mountain in many places glitter from the transparency of these brimstone incrustations, while black masses of basalt and burnt trunks of trees scattered around, present a striking contrast, and shew also what great changes these mountains have already undergone, and to what future changes they remain still exposed. The vapours that display themselves here, appear to possess more dangerous qualities than those at the other places; besides which, from the steepness of the slope down which the overflowings of the springs run, on the east side of the mountain, the brimstone and wells of water have already caused great devastation in breaking up the soil and rocks. One finds there always many carcasses of wild animals which have evidently been killed, either from the drinking of the maddy water, or from the inhalation of the sulphureous vapours. Even the stronger beasts, such as the tiger and kidang, are not safe. It is a singular fact, that of these killed animals, the bones very soon disappear, whilst the softer parts and the skin remain for a long time in existence.

This journey of Professor Reinwardt through the above-named districts, has gained him the knowledge of a great number of natural productions. The vegetable kingdom in particular has every where presented to him an uncommonly great diversity of plants, which in every variety of shape and colour, continue to grow, even on the tops of the highest mountains. The greater part of the wild animals there frequent more the less elevated hills, where the woods yield them more nourishing food. Yet the rhinoceros, which is found every where in these elevated regions, ascends with an astonishing swiftness, even to the highest top of the mountains; it is on that account, that this animal is so rarely to be found, and that it was fre-

quently pursued in vain, till at length the party were successful enough to overtake a couple of them. One of these beasts was shot near the mountain of Papandayang, and the other close to Mount Talaga Bodas. Both are secured to increase the collection of natural objects, which this successful journey has procured for the Museum, already so extensively enriched by the enterprise and scientific ardour of the Professor and his companions.

ART. V.—*History of the Invention of Pendulum Clocks by CHRISTIAN HUYGENS.* By J. H. VAN SWINDEN, Councilor of State, Professor of Philosophy at Amsterdam, &c. (Concluded from Vol. VI. p. 213.)

2. **BUT**, it has been said that Huygens got intelligence through his father and Deodati of Galileo's labours. It is true, Deodati wrote to Constantine Huygens, father of the philosopher, and Secretary to Prince Frederic Henry, pending the above negotiations with the States-General; for his letters are of the year 1637, but they contain only the same intelligence which has already been given: (See Galilei Op. iii. p. 432.); and Huygens could learn nothing more than what shortly after appeared in the *Dialogi de motu*, except perhaps his notion of the pin and wheel, to indicate the number of oscillations without the trouble of counting them,—a thing as totally different from the principle adopted by Huygens to regulate clocks by means of the pendulum, as any of the attempts of Hook and Hevelius, who, however, never claimed the discovery of its application to clocks. And as to a clock or model having been sent over to Holland, we only learn, from a letter of Deodati of the same year, that if the States desired, Galileo would send what he had promised, to-wit, “a very perfect telescope, with the method he had found of using them on board vessels, whilst in an agitated sea; the observations about the motions of the satellites of Jupiter, and the construction (*fabricam*) of the very accurate *horologium* invented by him; and that he would explain all his inmost thoughts on this subject in words and writing.” This