XXI. *An Account of ſome Obſervations relating to the Production of the* Terra Tripolitana, *or* Tripoli. *Humbly addreſſed to the Royal Society of* London, *by* Martin Hubner, *Fellow of the ſaid Society, Profeſſor of Hiſtory in the Univerſity of* Copenhagen, *and Member of the Royal Academy of Inſcriptions and Belles Lettres of* Paris. *Tranſlated from the* French, *by* Emanuel Mendes da Coſta, *F. R. S.*

Read June 21, 1759.

DURING a journey I made, in the autumn of the year 1755, through ſeveral provinces of France, principally in Britany, I made the natural hiſtory of that province, which has plenty of productions worthy the attention of a naturaliſt, one of the objects of my reſearches. The lead mines of Pouillaüen in the Lower, and thoſe of Pontpean in the Upper Britany, employed me ſome time. The metallic veins in theſe mines are not only rich and regular, but alſo hold a great proportion of ſilver, which they do not extract with that profit, that might be done. In general, they could work theſe mines to greater advantage, if they were more ſkilful, or had proper machines, and above all others the fire engine, which is uſed with ſuch ſucceſs in the mines of Cornwall to drain off the water, that element being the greateſt obſtacle to the right working of the mines of Britany: but the advantages of this invention, glorious to its firſt diſcoverer, and uſeful to

to this nation, where it has been perfected, are yet ſo unknown in France, that there are even mechanicians in that kingdom, who ſeriouſly doubt, whether the fire engine is any-wiſe uſeful. I ſhall not here mention any thing of ſome rare and curious foſſils found in Britany, nor of the ſquare ſtones of a particular ſpecies, on the formation of which the late M. de Robier, preſident of the parliament of Rennes, who had a magnificent collection of natural hiſtory, employed his thoughts. I likewiſe ſhall paſs over in ſilence the marbles and the plumb pudding ſtones, called in France *cailloux de Rennes*, from the vaſt quantities of them found in the neighbourhood of that city. The chief and only ſubject I propoſe in this diſſertation, is the generation or production of the terra Tripolitana, or Tripoli, of which there are great quantities, and of the beſt kind, in Upper Britany. I more readily determine to give this illuſtrious Society an account of my obſervations on this ſubject, as not only the diſcovery I think I have made thereon is very curious, but alſo that the generation of this earth has been hitherto utterly unknown, no one having, to my knowlege, explained, before me, in what manner it is produced. It is true, I heard in France, that a young gentleman, a native of Britany, had wrote ſomewhat on this ſubject, and that his diſſertation was to be inſerted in a collection of miſcellaneous papers, or looſe pieces; but I never could ſee his ſaid diſſertation, nor know what it contained; therefore I am incapable of judging what it is.

In the mountain de Poligné, called by the Bretons *le Tertre gris*, i. e. the grey hill, I think I have diſcovered the true origin of Tripoli. This mountain,

the Breton name whereof is manifeſtly derived from the greyiſh colour of its ſummit, is ſituated in Upper Britany, near the inn of Roudun, on the road from Rennes to Nantes, a ſmall league wide of Baru, and five leagues from Rennes. Obſervations and experience are the only means, that can conduct us to certain knowlege in natural hiſtory; and it is conformable to that axiom, that I mean, ſimply, to lay before the Society what I obſerved in that mountain, relating to the generation of Tripoli, and, at the ſame time, to produce alſo the moſt authentic documents of nature, in order to prove, that the terra Tripolitana, or Tripoli, is probably only *a wood wholly petrified, and afterwards calcined by the ſubterraneous fire.*

To give more weight to what I propoſe, and to eſtabliſh this aſſertion, it will be neceſſary to obſerve here, that the mountain of Polignè, in the interior of which the Tripoli is found, has been, and is perhaps yet, a volcano. Its colour, its form, its fiſſures, and its ſtrata, prove it; and the inhabitants of the neighbourhood declare, that they have formerly ſeen fire on its ſummit at night; but that, however, for many years paſt, they have not perceived any more. This being granted, I have only now to give an account of what is to be obſerved in the mountain itſelf, and to produce ſpecimina of the different ſtrata of earth found therein, to aſcertain the truth of my theſis.

The ſtratum of the true Tripoli, intirely calcined, lies from 50 to 60 feet depth; the ſample of it here produced is marked N° 1. This ſtratum is white; but it ſometimes has a caſt of grey, and ſometimes is of a reddiſh hue, as the ſample itſelf ſhews. It is quite or fully calcined and converted into Tripoli, becauſe it lay

lay near to the ſubterranean fire of the volcano, ſo as to be violently affected by it.

The ſtratum above this, of which N° 2. is a ſample, is already much burnt and calcined, but not enough to be whitened, having lain too far from the violence of the ſubterraneous fire to be freed intirely from its heterogeneous and combuſtible parts, inſomuch that the fire has left it quite black.

The ſmall layer or ſtratum, which follows, that is, lies above it, or overlays the laſt, and of which N° 3. is a ſmall ſample, is yet yellowiſh, verging on brown; and altho' the burning is eaſily ſeen on the extremities, and the effect of the fire in the interior part of the layer, yet it is eaſily to be underſtood, that it is the weakneſs of the fire incapable of reaching it with a force neceſſary to calcine it, that has put it and left it in this ſtate of imperfection. When one views this ſample narrowly, veſtiges, which appear pores of a wood, are eaſily diſcovered.

The next layer ſhews the ſame thing, but more clearly: the pieces marked N° 4. are ſamples of it. This layer has been leſs attacked by the fire than thoſe under it; nevertheleſs the lightneſs of the ſubſtance ſhews, that it is already a little calcined, and the ſight alone clearly demonſtrates the reſemblance of its pores to thoſe of wood.

The piece taken from the fifth ſtratum, and marked N° 5. confirms this ſame obſervation. It is more weighty in proportion than all the others, becauſe it is leſs calcined; and indeed it is leſs calcined, only becauſe it was the fartheſt diſtant from the ſubterranean fire, and thereby has ſuffered leſs, as I have obſerved before. However, its ends or extremities evi-

dently prove the action of the fire even on this higher or upper ſtratum ; and its interior parts likewiſe prove as evidently, that this ſubſtance has been formerly petrified wood, but from which the ligneous parts have been driven away, and conſumed by a heat ſuperior to their reſiſtance.

I do not doubt, but had my time permitted me to make further reſearches, I ſhould have found in the mountain pieces of petrified wood not yet altered or deſtroyed by the action of the fire ; but my leiſure not anſwering to my wiſhes, I thought I might remain contented with what I have now the honour to preſent to the Society, and which ſeems to me ſufficient to determine the proceſs of nature in the generation or production of Tripoli.

If I am aſked how all this vaſt quantity of wood could be heaped or gathered together in this mountain? I anſwer, 1°. That it is not to be ſuppoſed that the ſeveral layers or ſtrata of Tripoli, perfect or imperfect, follow each other without any interruption. 2dly, It may be allowed me to ſuppoſe a deluge, whatever it was, and which has covered many parts of our globe, to accumulate here all this wood, and even aid its petrification. 3dly, A further proof of my aſſertion is the wood-coals *, which inconteſtably are found deep in the earth ; for there are intire quarries of them in Saxony, in the neighbourhood of Halle, and which do not ſuppoſe a leſs quantity of wood : beſides, it is uſeleſs to diſpute againſt obſervation and experience, when they are ſolidly eſtabliſhed.

* Wood-coals. The author uſes the words " charbons de bois ;" but what he means by his intire quarries of charbons de bois, I declare myſelf ignorant of.

I muſt

I muſt here further obſerve, that the volcano of Polignè did not, perhaps, ceaſe to flame on the upper part of the mountain, till after the ligneous parts of the wood buried in it ceaſed to furniſh the pabulum neceſſary to the fire.

I ſhall be happy, if theſe obſervations merit the approbation of this illuſtrious Society, to whom I have the honour to dedicate them; but, however, am delighted, that they procure me an occaſion of teſtifying my zeal for this reſpectable and learned body, in communicating to it all obſervations, which appear to me uſeful.

However, I do not abſolutely pretend, that all Tripoli is a wood, wholly or *per totum* petrified, and afterwards calcined by the ſubterraneous fire. There are Tripolis of many kinds, as well as of ſeveral degrees of goodneſs; and among theſe there may be ſuch, as are not otherwiſe than a real or native foſſil, deprived by fire of its primitive hardneſs and weight: but yet I believe, that the Tripoli, which has its origin from a petrified wood, muſt be the beſt, becauſe naturally it ought to be the fineſt, ſofteſt, and the beſt calcined.

London, 8th Octob. 1757.

Remarks on Mr. Hubner's *Paper on Tripoli.*

HE is of opinion, that the different ſtrata, marked in his ſpecimina N° 1, 2, 3, 4, and 5. are all the ſame, only under different degrees of calcination. But N° 2. ſeems to differ from the reſt, as it looks like mere charcoal, and appears to be very little, if at

at all, petrified or ſaturated with extraneous particles; I would therefore propoſe, not only that this N° 2. ſhould be further calcined, in order to be ſatisfied, whether it will, by that means, come to be of the ſame nature with N° 1. but likewiſe that the following N° 3, 4, and 5. which Mr. Hubner ſuppoſes to be leſs calcined, ſhould undergo the ſame trial, in order to obſerve, whether they will by that means become Tripoli; alſo to know, whether by being calcined for ſome time (before they are reduced to tripoli) they will put on the appearance of a coal like N° 2. for, if they do not, as I ſuſpect may be the caſe, it will be little leſs than a proof, that N° 2. which ſeems the plaineſt wood of any, differs from the others more eſſentially than merely in its degree of calcination. Perhaps it may alſo be found, that N° 3, 4, and 5. differ not only from N° 2. but likewiſe from N° 1. and may not be capable of being reduced to Tripoli.

Remarks on the preceding Paper: In a Letter to the Right Honourable the Earl of Macclesfield, *Preſ. R. S. from Mr.* Emanuel Mendes da Coſta, *F. R. S.*

My Lord,

Read June 21, 1759. YOUR Lordſhip's commands to wait on Mr. Profeſſor Hubner, when in England, to receive his paper on the production of Tripoli, which he deſigned for the Royal Society, and to diſcourſe with him thereon, in order to tranſlate it, and

lay it before this illuſtrious body, I accordingly obeyed; and the incloſed is the ſaid paper. My avocations, which now abſorb many hours I formerly dedicated to ſtudy, have been the only cauſe, my Lord, that I have detained it ſo long; I therefore hope for your Lordſhip's and the Society's pardon.

When I firſt undertook the tranſlation, I had thoughts of giving my opinion thereon, not only by reaſoning, but alſo by experiments. Time, my Lord, has not permitted me to do ſo; and ſince, having ſeriouſly reflected, that Mr. Hubner, in his laſt paragraph, turns his intire ſyſtem into a partial production of one ſpecies of Tripoli, I think it unneceſſary to trouble your Lordſhip, or the Society, with any arguments pro or con. I ſhall only obſerve, that it is not improbable but ſome of Mr. Hubner's Tripoli, as he ſurmiſes, may have been produced from the petrified wood he found in the mountain; and the whole account is then reduced to this only circumſtance, that the layers of foſſil wood in this mountain, having been ſaturated with the Tripoline particles, which likewiſe abound in the ſame mountain, thereby compoſed a ſtone, or third body; and that afterwards theſe Tripoline particles were again reduced, by the effects of a ſubterraneous fire, to their priſtine ſtate; the force of the fire deſtroying the compages of the third body, or ſtone.

Had the wood, my Lord, been ſaturated with any other metallic mineral, or earthy particles, I believe every judge of ſcience will determine, that the calcination of petrified wood, alone, could never have changed it into Tripoli.

I have, in my hiſtory of foſſils, p. 76. 85. and 87. deſcribed five kinds of the Tripoli earth; and Mr.

Hubner's kind, here mentioned, is only a variety of that I call *creta, tripela alba dicta*, p. 76. N° 1. Your Lordſhip will pleaſe to obſerve, that of all the ſaid kinds none are produced in general by any ſuch operations of nature, as Mr. Hubner intimates; therefore, my Lord, reaſon will convince, that this is only a partial and local origin of his Tripoli, by concurring circumſtances of wood and Tripoli buried together in the bowels of a volcano; for as we find this very ſpecies elſewhere produced without ſuch circumſtances, it is certain they are not the ſole efficient cauſes of its production.

I am, with great ſubmiſſion and reſpect,

My Lord,

Your Lordſhip's moſt devoted,

moſt obliged, and moſt obedient

humble ſervant,

Bearbinder Lane, 19 June, 1759. Emanuel Mendes da Coſta.

XXII. *A remarkable Caſe of an Empyema. By Mr.* Joſeph Warner, *F. R. S. and Surgeon to* Guy's *Hoſpital.*

Read June 28, 1759.

MORRIS EVANS, aged 30 years, on the 13th of March, 1759, was admitted into Guy's hoſpital, with a remarkable complaint in his cheſt, which attacked him in the month of Auguſt 1758, with the ſymptoms of a pleuriſy.

Upon