

A letter from Mr. John Clayton, rector of Crofton at Wakefield in Yorkshire, to the Royal Society, May 12, 1688. Giving an account of several observables in Virginia, and in his voyage thither, more particularly concerning the air.

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HAVING oftentimes been urged to give an Account of *Virginia*, by several of the Worthy Members of the Royal Society, I cannot but, as far forth as I am able, obey Commands whereby I'm so much honour'd, and shew my Respect by my ready Compliance; tho' I am so sensible of my own Weakness and Incapacity to answer your Expectations,

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that before-hand I must Apologize for my self. And indeed by Sea I lost all my Books, Chymical Instruments, Glasses and Microscopes, which rendred me uncapable of making those Remarks and Observations I had designed, they were all cast away in Captain *Win*'s Ship, as they were to follow me; and *Virginia* being a Country where one cannot furnish ones self again with such things, I was discourag'd from making so diligent a Scrutiny as otherwise I might have done, so that I took very few Minutes down in Writing; and therefore, since I have only my Memory to rely on, which too has the Disadvantage of it's own Weakness, and of the Distance of two Years since now I left the Country, if future Relations shall in some small Points, make out my Mistake, I thought this requisite to justify my Candor; for I ever judg'd it villanous to impose in matters of Fact; but Descriptions of things that depend on Memory may be liable to Mistakes; and yet the Sincerity of the Person that delivers them intire. But hereof I shall be as cautious as possible, and shall rather wave some things whereof I have some Doubts, and am uncapable now of satisfying my self, than in any sort presume too far. The Method I design is, first, to give an Account of the Air, and all such Observations as refer thereto; then of the Water, the Earth and Soil; the Birds, the Beasts, the Fishes, the Plants, the Insects; and lastly, the present State of the Inhabitants: But at present I shall neither trouble you nor my self with any more than an Account of what refers to the Air alone, being conscious the honourable Society may receive such a Glut with the Imperfection of this, as to excuse me from a farther Relation. But

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But before I begin, perhaps it may not be impertinent to acquaint you with some things that happen'd in our Voyage. We sail'd in the Ship *Judith*, Captain *Trim* Commander, 'twas Flyboat built, about 200 or 250 Tuns; she sprung a considerable Leak. When the Captain had made long and diligent Search, had tried all Methods that Sea-men use upon such Occasions, or he could think of, all in vain, and that the Leak encreased, he came pensively to consult me. Discoursing with him about it, and understanding that the Ship was cieled within; so that though the Leak might possibly be in the Fore-part, it would

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fill the whole Cavity betwixt the Cieling and the Planks, and so run into the Hold at all the Crevices of the Cieling up and down: I thereupon conceived, that where it burst in betwixt the Cieling and the Planks, it must needs make some Noise. He told me, they had endeavoured to find it out that Way, and according to custom had clapt Cans to their Ears to hear with; but the working of the Ship, the Tackle and the Sea made such a Noise, that they could discover nothing thereby. I happily bethought my self of the Speaking Trumpet; and having one which I had contrived for some other Conveniences, of a differing Shape from the common Sorts, I bid him take it and apply the broad End to the Side of the Ship, the narrow End to his Ear, and it would encrease his Hearing as much as it augmented the Voice the other Way, and would ward the Ear the too from the Confusion of foreign Noise. Upon the first Application, accordingly they heard it, tho' it happened to be at a considerable Distance; and when they removed the Trumpet nigher, they heard it as if it had been the Current of a mighty River, even so distinctly, as to have Apprehensions of the bigness and figure of the Hole that the Water came in at; so that cutting there the Cieling of the Ship, they immediately stopt the Leak.

In the Sea I saw many little things which the Seamen call Carvels; they are like a Jelly, or Starch that is made with a cast of Blue in it; they Swim like a small Sheeps Bladder above the Water, downwards there are long fibrous Strings, some whereof I have found near half a Yard long. This I take to be a Sort of Sea-Plant, and the Strings its Roots growing in the Sea, as Duck-weed does in Ponds. It may be reckon'd among the Potential Cauteries; for when we were one Day becalm'd, getting some to make Observations thereof, the sportful People rub'd it on one anothers Hands and Faces, and where it touch'd it would make it look very Red, and make it smart worse than a Nettle. In my Return for *England* we struck a Hauks-bill Turtle, in whose Guts I found many of these Carvels; so that it's manifest they feed thereon. 'Tis commonly asserted by the Seamen, that they can smell the Pines at *Virginia* several Leagues at Sea before they see Land, but I could receive no Satisfaction as to this Point; I could not discern any such thing when at a moderate Distance, I fear much of this may be attributed to Fancy; for one Day there came three or

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four full Scent to tell me they were certain they smelt the Pines; but it afterwards prov'd that we were at that Time two hundred Leagues from the Shoar, so that I was satisfied that was therefore meer Fancy. Indeed we thought, by the general Accounts of the Ship, that we had been just on the Coast, but all were deceived by a Current we met with, that at that Time set about South-East, or East South-East, which when once becalmed we tried thus: We hoised out a Boat, and took one of the Scuttles that covered one of the Hatches of the Ship, tying thereto a great Weight, and a strong long Rope, we let it sink a considerable Depth, and then fastning it to the Boat, it serv'd as an Anchor, that the Boat could not drive; then with the Glass and log Line we found the Current set, as I say, Eastward, at the rate of a Mile and a half an Hour. This Current is of mischievous Consequence, it does not always run one way, but as it sets sometimes as we proved Easterly, so does it as they say, set at other Times Westerly, whereby many Ships have been lost; for then the Ships being before their Accounts, they fall in with the Land before they are aware. Thus one Year many Ships were lost on Cape *Hattarasse*, and thereabouts.

Of the AIR.

THE Cape called *Cape Henry*, lies in $36\frac{1}{2}$ of the Northern Latitude. The Air and Temperature of the Seasons is much govern'd by Winds in *Virginia*, both as to heat and cold, driness and moisture, whose Variations being very notable, I the more lamented the Loss of my Barometers and Thermometers, for considerable Observations might be made thereby, there being often great and suddain Changes. The Nore and NoreWest are very nitrous and piercing, cold and clear, or else stormy. The South-East and South hazy and sultry hot: Their Winter is a fine clear Air, and dry, which renders it very pleasant: Their Frosts are short, but sometimes very sharp, that it will freeze the Rivers over three Miles broad; nay, the Secretary of State assured me, it had frozen cleaver over *Potomack* River, over against his House, where it is near nine Miles over: I 6 I have observed it freezes there the hardest, when from a moist South East, on a sudden the Wind passing by the Nore, a nitrous sharp Nore-West blows; not with high Gusts, but with a cutting brisk Air; and those Vales then that seem to be shelter'd from the Wind, and lie warm, where

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the Air is most stagnant and moist, are frozen the hardest, and seized the soonest; and there the Fruits are more subject to blast than where the Air has a free Motion. Snow falls sometimes in pretty Quantity, but rarely continues there above a Day or two: Their Spring is about a Month earlier than in *England*; in *April* they have frequent Rain, sometimes several short and suddain Gusts. *May* and *June* the Heat encreases, and it is much like our Summer, being mitigated with gentle Breezes that rise about nine of the Clock, and decrease and incline as the Sun rises and falls. *July* and *August* those Breezes cease, and the Air becomes stagnant that the Heat is violent and troublesome. In *September* the Weather usually breaks suddenly, and there falls generally very considerable Rains. When the Weather breaks many fall Sick, this being the Time of an endemical Sickness, for Seasonings, Cachexes, Fluxes, Scorbutical Dropsies, Gripes, or the like which I have attributed to this Reason. That by the extraordinary Heat, the Ferment of the Blood being raised too high, and the Tone of the Stomach relaxed, when the Weather breaks the Blood palls, and like over-fermented Liquors is depauperated, or turns eager and sharp, and there's a crude Digestion, whence the named Distempers may be supposed to ensue. And for Confirmation, I have observed the carminative Seeds, such as warm, and whose Oil sheaths the acid Humors that ever result from crude Digestions. But Decoctions that retain the Tone of the Stomach, as I suppose, by making the little Glands in the Tunicles of Stomach, squeeze out their Juice, (for what is bitter may be as well offensive to the Stomach, as to the Palate) and then Chalibiates that raise the decayed Ferment, are no bad Practice; after which, I conceive, Armoniack Spirits might be very beneficial. But their Doctors are so learned, that I never met with any of them that understood what Armoniack Spirits were: Two or three of them one Time ran me clear down by Consent, that they were Vomitive, and that they never used any thing for that Purpose but Crocus Metallorum, which indeed every House keeps; and if their Finger, as the Saying is, ake but, they immediately give three or four Spoonfuls thereof; if this fail, they give him a second Dose, then perhaps Purge them with fifteen or twenty Grains of the Rosin of Jalap, afterwards Sweat them with *Venice* Treacle, Powder of Snake-root, or *Gascoin*'s Powder; 7 Powder; and when these fail *conclamatum est*. But to return. 'Tis wonderful

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what influence the Air has over Men's Bodies, whereof I had my self sad Assurances; for tho' I was in a very close warm Room, where was a Fire constantly kept, yet there was not the least Alteration or Change, whereof I was not sensible when I was sick of the Gripes, of which Distemper I may give a farther Account in it's proper Place. When a very ingenious Gentlewoman was visited with the same Distemper, I had the Opportunity of making very considerable Observations. I stood at the Window, and could view the Clouds arise: for there small black fleeting Clouds will arise, and be swiftly carry'd cross the whole Element; and as these Clouds arose, and came nigher, her Torments were encreased, which were grievous as a labouring Womans; there was not the least Cloud but lamentably affected her, and that at a considerable Distance; but by her Shrieks it seemed more or less, according to the Bigness and nearness of the Clouds. The Thunder there is attended often with fatal Circumstances: I was with my Lord *Howard of Effingham* the Governor, when they brought Word that one Dr. A was killed therewith after this Manner. He was Smoaking a Pipe of Tobacco, and looking out at his Window when he was struck dead, and immediately became so stiff, that he did not fall, but stood leaning in the Window, with the Pipe in his Mouth, in the same Posture he was in when struck: But this I only deliver as Report, tho' I heard the same Account from several, without any contradicting it. These things are remarkable, that it generally breaks in at the Gavel End of the Houses, and often kills Persons in, or near the Chimney's Range, darting most fiercely down the Funnel of the Chimney; more especially if there be a Fire, (I speak here confusedly of Thunder and Lightning) for when they do any Mischief, the Crash and Lightning are at the same Instant, which must be from the nearness of the Cloud. One Time when the Thunder split the Mast of a Boat at *James Town*, I saw it break from the Cloud, which it divided in two, and seemed as if it had shot them immediately a Mile asunder, to the Eye: It is dangerous when it thunders standing in a narrow Passage, where there's a thorough Passage, or in a Room betwixt two Windows; tho' several have been kill'd in the open Fields. 'Tis incredible to tell how it will strike large Oaks, shatter and shiver them, sometimes twisting round a Tree, sometimes as if it struck the Tree backwards and forwards. I had noted a fine spreading Oak in *James Town* Island, in the Morning I saw

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it fair and flourishing, in the Evening I observed all the Bark of the Body of the Tree, as if it had been 8 been artificially peeled off, was orderly spread round the Tree, in a Ring, whose Semidiameter was four Yards, the Tree in the Center; all the Body of the Tree was shaken and split, but its Boughs had all their Bark on; few Leaves were fallen, and those on the Boughs as fresh as in the Morning, but gradually afterwards withered, as on a Tree that is fallen. I have seen several vast Oaks and other Timber Trees twisted, as if it had been a small Willow that a Man had twisted with his Hand, which I could suppose had been done by nothing but the Thunder. I have been told by very serious Planters, that thirty or forty Years since, when the Country was not so open, the Thunder was more fierce, and that sometimes after violent Thunder and Rain, the Roads would seem to have perfect casts of Brimstone; and 'tis frequent after much Thunder and Lightning for the Air to have a perfect sulphureous Smell. Durst I offer my weak Reasons when I write to so great Masters thereof, I should here consider the Nature of Thunder, and compare it with some sulphureous Spirits which I have drawn from Coals, that I could no way condense, yet were inflamable; nay, would burn after they pass'd through Water, and that seemingly fiercer, if they were not over-power'd therewith. I have kept of this Spirit a considerable time in Bladders; and though it appeared as if they were only blown with Air, yet if I let it forth, and fired it with a Match or Candle, it would continue burning till all were spent. It might be worthy Consideration likewise, whether those frequent Thunders proceeded from the Air's being more stagnant, the Motion of the Winds being impeded by the Trees, or whether the Motion of the Winds being obstructed by them below, the Motion might not be more violent aloft; and how far that may promote Inflammability; for Stacks of Hay or Corn that ferment with Moisture, never burn, unless when brisk Winds blow, that agitate and fan the little fermenting Sparks, and often kindle them into an actual Fire. And Observance of the Meteors there might perhaps not be impertinent, as both what are more rare, and what are more frequent, as of *Gosimore* in great Abundance, and of those small Cobwebs in a Morning, which some have supposed to be Meteors: *Ignes fatui*, though there be many boggy Swamps and Marshes, are seldom, if any are seen there. There be frequent little sorts of Whirl-winds, whose Diameter may be sometimes not past two or three Yards,

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sometimes forty, which whisking round in a Circle, pass along the Earth, according to the Motion of the Cloud, from whence they issue; and as they pass along with their gyrous or circular Motion, they carry aloft the dry Leaves into the Air, which fall again often in places far remote. I have seen them descend 9 descend in a calm Sun-shine Day, as if they had come from the Heavens in great Showers thereof, so that all the Elements seemed filled therewith. And I could perceive them to descend from on high as far as I could possibly discern a Leaf. I remember a roguish Expression of a Seaman, otherwise silly enough, who wondering thereat, cry'd out, *Sure now 'tis manifest there is a World above! And now with them 'tis the Fall of the Leaf.* But to proceed, I thought this made it manifest, whence many preternatural Showers have happen'd. I remember at Sir *Richard Atherton* 's in *Lancashire*, some few Years ago, there fell a great Number of the Seeds of Ivy-berries; at first we admir'd what they were, for they were cover'd with a thin Skin that was red, and resembled the Figure of a small Wheat Corn; but afterwards they fully manifested what they were; for many sprouted and took Root. I suppose they were carry'd aloft by some such Whirl-wind, and let fall there. I have purposely gone into the Place where I perceived this Gust, which is notorious enough by the Noise it makes, with ratling the Leaves as it carries them aloft, and have found a fine sharp Breeze of Wind.

Yours, &c. Mr. 2

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Mr. Clayton' s second Letter, containing his farther Observations in Virginia.

BEing honour'd with the Thanks of the Society for my last, and receiving by my worthy Friend Dr. *Moulin* their Commands to proceed, I have added here my Observations of the Waters, and part of the Earth and Soil. I shall wave both Complements and Apologies, since I have greater Respect and Honour for the Society than I can possibly express, and have no reason to suspect their Favour, whose Candidness I so signally proved in my last.

Of the WATER.

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'TWixt the two Capes, the Southern, called *Cape Henry*, the more Northerly, called *Cape Charles*, there runs up a great Bay, called the Bay of *Cheesepeak*; nine Leagues over on some places; in most seven, which lying West, Nore and South, divides *Virginia* into two unequal Parts. On the East Side of this Bay there lies a narrow Neck of Land, which makes the Counties of *Northampton* and *Accomack*. On the West Side of the Bay there branch forth four great Rivers, *James River*, *York River*, *Rapahanack* and *Potomack*, that rise from a Ridge of Mountains, whereof more in the Sequel. These Rivers plentifully water all the other Parts of *Virginia*, emptying themselves into the great Bay. The Mouth of *James River*, which is the most Southerly of them, and the Mouth of *Potomack*, which is the most Northerly, may be a hundred Miles Distance: But as I have been credibly inform'd that the Falls of *James River* are not past thirty Miles from *Potomack*, which is a vast large River nine Miles over in many Places. I have been told it was navigable nigh two hundred Miles, much higher than any of the other Rivers: Whence I conclude, in future Times, it will be the most considerable for Trade when the Country comes to be inhabited further up into the main Land. The other Rivers are much about three Miles over a-piece. And *James River* is navigable at least eighty Miles. Within four or five Miles of *James Town*, *James River* and *York River* are not past four or five Miles asunder. Yea, Sloops of considerable Carriage may sail up the Branches of the two Rivers, till they come within a Mile the one of the other; for I take it to be no more from Collonel *Bollard*'s to Major *Troop*'s Landing, and 11 and I believe they may come much about as near again as Collonel *Cole*'s, and several other Places. *York River* is distant from *Rapahanack* in some places not past ten or twelve Miles, *Rapahanack* from *Potomack* not past seven Miles in one Place, tho' it may be sixty in others. The Heads of the Branches of the Rivers interfere and lock one within another, which I think is best expressed alter the Manner that an *Indian* explained himself once to me, when I enquired how nigh the Rivers of *Carolina*, *Virginia* and *Maryland* arose out of the Mountains, from those that ran Westerly on the other Side of the Mountains, he clapt the Fingers of one Hand 'twixt those of the other, crying, they meet thus; the Branches of different Rivers rising not past a hundred Paces distant one from another: So that no Country in the World can be more curiously watered. But this

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Conveniency, that in future Times may make her like the *Netherlands*, the richest Place in all *America*, at the present I look on the greatest Impediment to the Advance of the Country, as it is the greatest Obstacle to Trade and Commerce. For the great Number of Rivers, and the Thinness of the Inhabitants, distract and disperse a Trade. So that all Ships in general gather each their Loading up and down an hundred Miles distant; and the best of Trade that can be driven is only a Sort of *Scotch* Pedling; for they must carry all Sorts of Truck that trade thither, having one Commodity to pass off another. This (*i. e.*) the Number of Rivers, is one of the chief Reasons why they have no Towns: for every one being more sollicitous for a private Interest and Conveniency, than for a publick, they will either be for making forty Towns at once, that is, two in every Country, or none at all, which is the Country's Ruin. But to return, the Tides in these Rivers regularly ebb and flow about two Foot perpendicular at *James Town*; there is there, as they call it, a Tide and half Tide; that is, it flows near two Hours along by the Shore, after that it is ebb in the Channel; and again, it ebbs near two Hours by the Shore, after that it is Flood in the Channel. This is great Advantage to the Boats passing up and down the River, I suppose this is caused by many Creeks and Branches of the Rivers, which being considerable many, tho' only three or four Miles long, yet as broad as the *Thames* at *London*, others ten Miles long, some above twenty, that have little fresh Water which they carry of their own, but their Current primarily depending upon the Flux and Re-flux of the Sea. So that after the Tide is made in the Channel, it flows by the Shore a considerable Time afterwards, being that those Creeks are still to fill, and therefore as it were draws up a Source upwards by the 12 the Shore; and likewise when the Tide returns in the Channel, the Creeks that could not so readily disburse their Water, being still to empty themselves, they make an Ebbing by the Shore a considerable Time after that it is Flood, as I say, in the Channel. So far as the salt Waters reach the Country is deemed less healthy. In the Freshes they more rarely are troubled with the Seasonings, and those endemical Distempers about *September* and *October*. This being very remarkable, I refer the Reason to the more piercing Genius of those most judicious Members of the Society: And it might perhaps be worthy the Disquisition of the most Learned to give an Account of the various Alterations

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and fatal Effects that the Air has on humane Bodies, especially when impregnated with a marine Salt; more peculiarly when such an Air becomes stagnant: This might perhaps make several beneficial Discoveries, not only in Relation to those Distempers in *America*, but perhaps take in your *Kentish Agues*, and many others remarkable enough in our own Nation. I lately was making some Observations of this Nature, on a Lady of a delicate Constitution, who living in a clear Air, and removing towards the Sea-Coast, was lamentably afflicted therewith, which both my self and others attributed to this Cause, she having formerly upon her going to the same, been seized in the same Manner. But to return: There is one thing more in reference to this very thing very remarkable in *Virginia*: generally twice in the Year, Spring and Fall, at certain Spring-Tides, the most of the Cattle will set on gadding, and run, tho' it be twenty or thirty Miles, to the River to drink the salt Water, at which Time there's scarce any stopping of them, which the People know so well, that if about those Times their Herds are strayed from their Plantations, without more Sollicitation they go directly to the Rivers to fetch them home again. As for the Waters in the Springs in general, they are, I think, somewhat more eager than those in *England*. In that I have observed, they require some Quantity more of Malt to make strong Beer than our *English Waters*, and will not bear Soap. I have try'd several by infusing of Galls, and found little difference in the Colours, turning much what the Colour of common Sack in Taverns. I tried two Wells at Collonel *Bird*'s by the Falls of *James River*, several Wells near *James Town*, some Springs in the *Isle of Wight County*: There's a Spring in the *Isle of Wight*, or *Nanzamond County*, vents the greatest Source of Water I ever saw, excepting *Holy-Well* in *Wales*, but I had not Opportunity to make Experiments thereof. I tried likewise some Springs on the Banks of *York River*, in *New Kent* and *Glocester ter 13 County*, but found them vary very little as to Colour. I could not try any thing as to their specifick Gravity, having neither Aquapoise, nor those other Glasses I had contrived peculiarly for making such Experiments, they being all lost with my other things. I had Glasses blown would hold about five Ounces, others about ten Ounces, with Necks so small, that a Drop would make a considerable Variation; with these I could make much more critical and satisfactory Observations as to the specifical Gravity of Liquors, having

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critical Scales, than by any other Way yet by me tried. I used this Method to weigh Urines, which Practice I would recommend to the inquisitive and critical Physicians. I had made many Observations hereof, but all Notes were likewise lost with my other things. Yet I have begun afresh; for there are more signal Variations in the Weights of Urines than one would at first imagine; and when the Eye can discover little, but judge two Urines to be alike, they may be found to differ very much as to Weight. By Weight I find Observations may be made of Affections in the Head, which rarely make any visible Alterations in the Urine. I have found two Urines not much unlike differ two and twenty Grains in the Quantity of about four or five Ounces: But let them that make these Essays weigh all their Urines when cold, lest they be thereby deceiv'd. But to return to the Spring Waters in *Virginia*. There's a Spring at my Lady *Berkley*'s, called *Green-Spring*, whereof I have been often told, so very cold, that 'tis dangerous drinking thereof in Summer-time, it having proved of fatal Consequence to several. I never tried any thing of what Nature it is of.

There be many petrifying Waters; and indeed I believe few of the Waters but participate of a petrifying Quality, tho' there be few Pebbles or paving Stones to be found in all the Country. But I have found many Sticks with crusty Congelations round them in the Ruins of Springs, and Stones figured like HoneyCombs, with many little Stars as it were shot in the Holes. And nothing is more common than petrify'd Shells, unless you would determine that they are Parts of natural Rock shot in those Figures, which indeed I rather think; but thereof hereafter. Mr. Secretary *Spencer* has told me of some Waters participating much of *Alome* or *Vitriol* towards *Potomack*. Up beyond the Falls of *Rapahanack* I have heard of poisonous Waters. But these I only mention as a Hint to further Enquiry of some others, for I can say nothing of them my self. A

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A Continuation of Mr. John Clayton's Account of Virginia. Of the Earth and Soil.

WHEN you make the Capes of *Virginia*, you may observe it low Land, so that at some Distance the Trees appear as if they grew in the Water; and as you approach nigher

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to emerge thence. For a hundred Miles up into the Country, there are few Stones to be found, only in some Places, Rocks of Iron Ore appear, which made me expect to have found many Waters turn Purple with Galls, but never met with any. Providence has supplied the common Use of Stones, by making the Roads very good: So that they ride their Horses without shoeing them; which yet are more rarely beaten on their Feet, than ours are in *England*, the Country and Clime being dry, their Hoofs are much harder; for I observed, that take a Horse out of the wet Marshes, and Swamps, as they there call them, and ride him immediately, and he'll quickly be tender-footed. In some Places, for several Miles together, the Earth is so intermix'd with Oystershells, that there may seem as many Shells as Earth; and how deep they lie thus intermingled, I think, is not yet known: For at broken Banks they discover themselves to be continued many Yards perpendicular. In several Places these Shells are much closer, and being petrified, seem to make a Vein of a Rock. I have seen in several Places, Veins of these rocky Shells, three or four Yards thick, at the Foot of a Hill, whose Precipice might be twenty Yards perpendicular, whose Delf, I suppose, shot under the Hill; pieces of these Rocks broken off, lie there, which, I suppose, may weigh twenty or thirty Tuns a-piece, and are as difficult to be broken as our Free-stone. Of these Rocks of Oyster-shells that are not so much petrified, they burn and make all their Lime; whereof they have that store, that no Generation will consume. Whether these were formerly Oysters, which left by the subsiding Seas, (as some suppose, that all that Tract of Land, now high Ground, was once overflowed by the Sea) were since petrified, or truly Stones, *sui Generis*, I leave to the honourable Society to determine. But when I consider the constant and distinct Shooting of several Salts, Nature's Curiosity, in every thing, so far exceeding that of Art, that the most ingenious, when refer'd thereto, seem only endued with an apish Fondness, I cannot think any thing too difficult or wonderful for Nature; 15 Nature; and indeed I do not apprehend, why it may not be as feasible to suppose them to have been Rocks, at first shot into those Figures, as to conceive the Sea to have amass'd such a vast Number of Oyster-shells one upon another, and afterwards subsiding, should leave them cover'd with such Mountains of Earth, under which they should petrify: But not to launch forth too far into those Disputes, since I must

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modestly remember to whom I write. Often, in the looser Banks of Shells and Earth, are found perfect Teeth petrified, some whereof I have seen, could not be less than two or three Inches long, and above an Inch broad: Tho' they were not maxillary Teeth, the Part that one might suppose grew out of the Jaw, was polished, and black, almost as Jett; the Part which had been fasten'd in the Jaw and Gums, was brown, and not soshiningly polished, or smooth; if they were, as they seemed to be, really Teeth, I suppose, they must have been of Fishes. The Back-bone of a Whale, and as I remember, they told me of some of the Ribs, were digg'd out of the Side of a Hill, several Yards deep in the Ground, about four Miles distant from *James Town*, and the River. Mr. *Banister*, a Gentleman pretty curious in those things, shew'd me likewise the Joynt of a Whale's Back-bone, and several Teeth, some whereof, he said, were found in Hills beyond the Falls of *James River*, at least, a hundred and fifty Miles up into the the Country. The Soil in general is sandy: I had designed, and I think it might be worth a critical Remark, to observe, the difference of Soils seem appropriated to the several Sorts of Tobacco: For there is not only the two distinct Sorts of sweetscented, and Aranoko Tobacco, but of each of these be several Sorts much different, the Seeds whereof are known by distinct Names, they having given them the Names of those Gentlemen most famed for such Sort of Tobacco, as of *Prior Seed*, &c. Nay, the same Sort of Seed in different Earths, will produce Tobacco much different, as to Goodness. The richer the Ground, the better it is for Aranoko Tobacco, whose Scent is not much minded, their only Aim being to have it specious, large, and to procure it a bright Kite's Foot Colour. Had not my Microscopes, &c. Tools to grind Glasses, been cast away, with my other things, I had made some critical Enquiries into their several Natures, I would have examined what Proportions of Salts, all the Sorts of Earths had afforded, and how Water impregnated with their Salts, would have changed with infusing Galls, how with the Syrup of Violets, and how they would have precipitated Mercury, or the like, and so far forth as I had been able, examined them by the several Tryals of Fire. I conceive Tobacco bacco 16 to be a Plant abounding with nitro-sulphureous Particles; for the Planters try the Goodness of their Seed, by casting a little thereof into the Fire; if it be good, it will sparkle after the Manner of Gun-powder: So will the Stalks of Tobacco-

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leaves, and perhaps has something analagous to the narcotick Sulphur of *Venus*, which the Chymists so industriously labour after. The World knows little of the Efficacy of its Oil, which has wonderful Effects in the curing of old inveterate Sores, and scrophulous Swellings, and some, otherwise applied and qualified. The Goodness of Tobacco I look on primarily consists in the Volatility of its Nitre: And hence the sandy Grounds that are most impregnated therewith, and whose nitrous Salt is most volatile, for such Grounds are quickliest spent, yield Tobacco's that have the richest Scent and that shortly become a pleasant Smoak; whereas, in Tobacco that grows on stiff Ground, the Salts seem more fix'd, and locked up in the Oyl, so that whilst new, 'tis very heady and strong, and requires some time for its Salts to free themselves, and become volatile; which it manifests, by its having an urinous Smell. The same Reason satisfies, why Tobacco that grows on low Lands as far as the Salts, tho' the Plant be never overflowed with salt Water, yet the Ground that feeds the Plant being impregnated with salt Water, that Tobacco smoaks not pleasantly, and will scarcely keep Fire; but do all that a Man can, will oft go out, and gives much trouble in frequent lighting the Pipe, 'till after it has been kept some considerable Time: Which may be assign'd to the more fixt saline Particles of the marine Salt in these Plants; which require more time ere they be rendered volatile. Here it might be worthy of an Enquiry into the nature of Filtration of Plants, since we may hence gather, Particles of the marine Salt are carried along with the *Succus Nutritius* of the Plant; concerning which, if it were not too much to deviate from the Matter in hand, I should offer some Reflections of my own, which the learned Society might perhaps improve: For I think thence might be made many happy Conjectures as to the Virtues of Plants. So where we see Plants, or Trees of an open Pore growing low, we shall find their Juice has subtile Parts; So have all Vines, whether the grape Vine, or briony, or a smilax, or the like. If a gummous Plant or Tree, that grows low, and close pored, it abounds with acid Spirits, as *Lignum Vitæ*, &c. if it grow tall, and be open pored, it abounds with a subtile volatile Spirit, as your Firs, and the Turpentine Tree. But to insist no further herein, than as this may be applicable to the present Discourse: For I have observed, that that which is called Pine-wood Land, tho' it be a sandy 17 Soil, even the sweet-scented Tobacco that grows thereon, is large and

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porous, agreeable to Aranoko Tobacco, and smokes as coarsely as Aranoko: Wherefore 'tis, that I believe the Microscope might make notable Discoveries towards the Knowledge of good Tobacco: For the closer the Composition of the Leaf, the better the Tobacco; and therefore the Planters and Merchants brag of the Substance of their Tobacco; which Word, did they always take it in a true Sense, for the Solidness, and not mistake it for the Thickness, it would be more consonant to a true Observation: For as I said of the Pine-wood Tobacco, some of it is thick and not solid, and differs from the best Tobacco, as Buff does from tanned Leather; so that if the Tobacco be sound and not rotten, you may give a great guess at the Goodness of Tobacco, when you weigh the Hogsheads, before you see them: For if an equal Care be taken in the packing of them, the best Tobacco will weigh the heaviest, and pack the closest. Now I said, that the sweet-scented Tobacco most in vogue, which was most famed for its Scent, was that which grew on sandy Land; which is true, if you would smoak it whilst new, or whilst only two or three Years old; but if you keep the stiff Land Tobacco, which is generally a Tobacco of great Substance five or six Years, it will much excel: for tho' the sandy Land Tobacco abound with a volatile Nitre at first, yet the stiff Land Tobacco abounds with a greater Quantity of Nitre, only that it is locked up in its Oyl at first, and requires more time to extricate it self, and become volatile; but the Pine-wood Land having little of the Nitro-sulphureous Particles, neither is, nor ever will make any thing of a rich Smoak. Discoursing hereof some Days since, to a Gentleman of good Observation, that has been versed with mauling, he assured me, to back this my Supposition, or Hypothesis, he had observed, that Barley that grew on stiff Ground, required more time considerably to mellow, and come to Perfection, than that which grew on light Land. Having proceeded thus far to speak of Tobacco, I shall add one or two things more. The Planters differ in their Judgments about the time of planting, or pitching their Crops: Some are for pitching their Crops very early, others late, without any Distinction of the nature of the Soils; and 'tis from the different Effects that they find, in that, sometimes early, sometimes the late planting succeeds: But they have not the reason to judge of the Cause, to consider the Accidents of the Year, and the difference of the Soils. In sandy Grounds they need not strive so much for early Planting, the Looseness of

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the Earth, and the kind natur'd Soil, yielding all that it can, easily and speedily, and 3 18 and Sand retaining the Heat, makes the Plants grow faster. But in stiff Soils, if the Crops be not early pitched so that during the Season of Rains it have got considerable Roots, and shot them some depth, if early Droughts come, it so binds the Land, that the Roots never spread or shoot deeper, or further than the Hill that they are planted in: For they plant them as we do Cabbages, raising Hills to set every Plant in, about the bigness of a common Mole - hill: observing this on the Plantation where I lived, that it was stiff Ground, I advised them to plant their Crops as early as possible; and in order thereunto, I tried several ways to further the Plants; but not to trouble you with the several Experiments that I made, in reference thereto: What I found most advantageous was, by taking an Infusion of Horsedung, and putting thereon Soot, and then my Seeds; this I kept forty eight Hours in an ordinary digestive Heat, I had two Beds left me to sow, in the midst of those the People sowed, and the quantity of Seed that they generally allotted to the same Quantity of Ground; when I sowed, I mix'd Ashes with the Seed, having decanted the Liquor, that the Seed might sow the evener: The effect was, that my Plants came up much sooner, grew swifter, and I had five Plants for one more than any of the other Beds bore; I left the Country shortly after, and so no certainty of the final Result. There are various Accidents and Distempers, whereunto Tobacco is liable, as the Worm, the Fly, firing to turn, as they call them, Frenchmen, and the like. I proposed several ways to kill the Worm and Fly, as by Sulphur and the like; but had no Opportunity to experiment it: I shall set down that I had most hopes of, which perhaps may give a Hint to others to try or improve. Tobacco-seed is very small, and by consequence so is the young Plant at first, that if gloomy Weather happen at that time, it breeds a small Fly, which consumes the Plume of the Plant; now it being early in the Year when they sow the Seed, *viz.* about the fourteenth of *January*, they cover the Ground, to secure, as well as they can, their tender Plants, from the niping Frosts, that may happen in the Nights; they cover them only with a few Oak-leaves, or the like; for Straw they find apt to harbour and breed this Fly: I therefore would advise them to smoak Straw with Brimstone, once in two or three Nights, and so they might cover them securely, with that which would preserve them infinitely

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beyond the Covering with Oak-boughs; indeed, I would advise them to keep peculiarly so much of their *Indian* Corn-blades, which they gather for their Fodder, for this very purpose, being, as I conceive, much the best, there being no Chaff to foul their Beds, and 19 and prejudice them when they should weed them. What they call firing is this: When Plants are of small Substance, as when there has been a very wet and cold Season, and very hot Weather suddenly ensues, the Leaves turn brown, and dry to Dust: The Cause I conceive to be hence: The Plant being feeble, and having a small quantity of Oyl, which makes the more solid part of the Plant, the Earth being suddainly heated by the Sun's fiercer Beams, the Roots are rather scorched and dried up in the Earth, than nourished; so that the Plant consisting only of watry parts, is consumed, as it were by Fire: sometimes hopeful Plants, when by a sudden Gust some Master Veins are broken; if suddain Heat ensues, they likewise fire: For being not come to Maturity, and being deprived of the Supports of Life and Vegetation they likewise perish, are dried up, and fall to Dust. *French-men* they call those Plants, whose Leaves do not spread and grow large, but rather spire upwards, and grow tall; these Plants they don't tend, being not worthy their Labour. Were they so critical, I believe, they might have great guess what Plants were most likely to turn *French-men*, by observing whether the Roots of the Plants run downwards, as those whose Branches are aptest to spire upwards: For tho' I have not made positive Proof thereof, I have something more than bare Fancy for my Conjecture; I have pulled up some of these *French-men*, and compared them with the Roots of some other Plants, and found them much longer than others; and 'tis observable, loose Soils, and sandy Ground are more subject thereto than the stiff Land. The Country of it self is one entire Wood, consisting of large Timber Trees of several sorts, free from Thickets or Under-Wood, the small Shrubs growing only on Lands that have been clear'd, or in Swamps; and thus it is for several hundreds of Miles, even as far as has yet been discovered. But that shall be reserved 'till another Opportunity. *I am,*
&c. *Mr.*

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Mr. John Clayton, Rector of Crofton at Wakefield, his Letter to the Royal Society, giving a farther Account of the Soil, and other Observables of Virginia.

I Shall here present you with a continuation of my Remarks on the River, Soil, and Plants of *Virginia*. And first, as to the River on the other side the Mountains, said to ebb and flow. I have been assured by Col. *Bird*, who is one of the most intelligent Gentlemen in all *Virginia*, and knows more of *Indian* Affairs than any Man in the Country, that it was a Mistake; for that it must run into a Lake, now called *Lake Petite*, which is fresh Water; for since that time a Colony of the *French* are come down from *Canada*, and have seated themselves on the back of *Virginia*, where *Fallam* and the rest supposed there might be a Bay, but is a Lake, to which they have given the Name of *Lake Petite*, there being several larger Lakes 'twixt that and *Canada*. The *French* possessing themselves of these Lakes, no doubt will in short time be absolute Masters of the beaver Trade, the greatest number of Beavers being catch'd there. The Colonel told me likewise, that the common Notion of the Lake of *Canada*, he was assured was a Mistake, for the River supposed to come out of it, had no Communication with any of the Lakes, nor the Lakes one with another, but were distinct. But not to ramble after here-say, and other Matters; but to return to the parts of *Virginia* inhabited by the *English*, which in general is a very fertile Soil, far surpassing *England*, for there *English* Wheat (as they call it, to distinguish it from *Maze*, commonly called *Virginia* Wheat) yields generally 'twixt Fifteen and Thirty fold, the Ground only once plow'd; whereas 'tis a good Crop in *England* that yields above eight Fold, after all their Toil and Labour. And yet in truth 'tis only the barrenest Parts that they have cultivated, by tilling and planting only the High-Lands, leaving the richer Vales unstirr'd, because they understand not any thing of Draining. So that the richest Meadow-Lands, which is one third of the Country, is Boggy, Marsh, and Swamp, whereof they make little Advantage, but lose in them abundance of their Cattle, especially at the first of the Spring, when the Cattle are weak, and venture too far after young Grass. Whereas vast Improvements might be made thereof; for the generality of *Virginia* is a sandy Land with a shallow Soil: so that after they have clear'd a fresh piece of Ground 21 Ground out of the Woods, it will not

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bear Tobacco past two or three Years, unless Cow-pened; for they manure their Ground by keeping their Cattle, as in the South you do your Sheep, every Night confining them within Hurdles, which they remove when they have sufficiently dung'd one spot of Ground; but alas! they cannot improve much thus, besides it produces a strong sort of Tobacco, in which the Smokers say they can plainly taste the fulsomness of the Dung. Therefore every three or four Years they must be for clearing a new piece of Ground out of Woods, which requires much Labour and Toil, it being so thick grown all over with massy Timber. Thus their Plantations run over vast Tracts of Ground, each ambitious of engrossing as much as they can, that they may be sure to have enough to plant, and for their Stocks and Herds of Cattle to range and to feed in; that Plantations of 1000, 2000, or 3000 Acres are common, whereby the Country is thinly inhabited; the Living solitary and unsociable; Trading confused and dispersed; besides other Inconveniences: Whereas they might improve 200 or 300 Acres to more Advantage, and would make the Country much more healthy; for those that have 3000 Acres, have scarce cleared 600 Acres thereof, which is peculiarly term'd the Plantation, being surrounded with the 2400 Acres of Wood: So that there can be no free or even Motion of the Air, but the Air is kept either stagnant, or the lofty sulphureous Particles of the Air, that are higher than the tops of the Trees, which are above as high again as the generality of the Woods in *England*, descending when they pass over the cleared Spots of Ground, must needs in the violent Heat of Summer, raise a preternatural Ferment, and produce bad Effects. Nor is it any Advantage to their Stocks, or Crops; for did they but drain their Swamps, and Low-lands, they have a very deep Soil, that would endure planting twenty or thirty Years, and some would scarce ever be worn out, but the longer the better, for they might lay them all Winter, or when they pleased in Water, and the Product of their Labour would be double or treble, whether Corn or Tobacco; and that this is no fond Projection, (though when I have discoursed the same to several, and in part shewn them how their particular Grounds might be drained at a very easie rate) they have either been so conceited of their old way, so sottish as not to apprehend, or so negligent as not to apply themselves thereto. But on the Plantation where I lived, I drain'd a good large Swamp, which fully answered Expectation. The

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Gentlewoman where I lived, was a very acute ingenious Lady, who one Day discoursing the Overseer of her Servants, about pitching in 22 the ensuing year's Crop; the Overseer was naming one place where he designed to plant 30000 Plants, another place for 15000, another for 10000, and so forth, the whole Crop designed to be about 100000 Plants: Having observed the Year before he had done the like, and scattered his Crop up and down the Plantation, at Places a Mile, or a Mile and a half asunder, which was very inconvenient, and whereby they lost much time. I interposed, and asked, why they did not plant all their Crop together? The Fellow smiled as it were at my Ignorance, and said, there was very good Reason for it. I replied, that was it I enquired after. He returned, the Plantation had been an old planted Plantation, and being but a small Plot of Ground, was almost worn out, so that they had not Ground all together that would bring forth Tobacco. I told him then they had better Ground than ever yet they had planted, and more than their hands could manage. He smil'd again, and asked me, where? I then named such a Swamp. He then said scornfully, he thought what a Planter I was; that I understood better how to make a Sermon, than managing Tobacco. I replied with some warmth, tho' I hoped so, that was Impertinence, and no Answer. He then said, that the Tobacco there would drown, and the Roots rot. I replied, that the whole Country would drown if the Rivers were stopt, but it might be laid as dry as any Land on the Plantation. In short, we discoursed it very warmly, till he told me, he understood his own Business well enough, and did not desire to learn of me. But the Gentlewoman attended somewhat better to my reasoning, and got me one Day to go and shew her how I projected the draining of the Swamp, and thought it so feasible, that she was resolved to have it done; and therefore desired me I would again discourse her Overseer, which I did several times, but he would by no means hearken thereto, and was so positive, that she was forced to turn him away, to have her Servants set about the Work; and with three Men in thirteen Days I drained the whole Swamp, it being sandy Land, soaks and drains admirably well, and what I little expected, laid a Well dry at a considerable distance. The Gentlewoman was in *England* last Year, and I think Dr. *Moulin* was by when she asked me, to teach her how she might make her Tobacco that grew in the Swamp less, for it produced so very large, that it was

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suspected to be of the *Aranoko* kind: I told her, though the Complaint was rare, yet there was an excellent Remedy for that, in letting every Plant bear eight or nine Leaves instead of four or five, and she would have more Tobacco, and less Leaves. Now you must know they top their Tobacco, that is, take away the 23 the little top-bud, when the Plant has put forth as many Leaves as they think the richness of the Ground will bring to a Substance; but generally when it has shot forth four or six Leaves. And when the top-bud is gone, it puts forth no more Leaves, but Side-branches, which they call Suckers, which they are careful ever to take away, that they may not impoverish the Leaves. I have been more tedious in the Particulars, the fullier to evince how resolute they are and conceitedly bent to follow their old Practice and Custom, rather than to receive Directions from others, tho' plain, easie and advantageous. There are many other Places as easie to drain as this, tho' of larger Extent, and richer Soil, for some of which I have given Directions, and have only had the return perhaps of a flout afterwards: Even in *James Town Island*, which is much-what of an oval Figure, there's a Swamp runs diagonal-wise over the Island, whereby is lost at least 150 Acres of Land, which would be Meadow, and would turn to as good Account as if it were in *England*: Besides it is the great Annoyance of the Town, and no doubt but makes it much more unhealthy. If therefore they but scoured the Channel, and made a pretty ordinary Trench all along the middle of the Swamp, placed a Sluce at the Mouth, where it opens into the back Creek; for the Mouth of the Channel there is narrow, has a good hard Bottom, and is not past two Yards deep when the Flood is out; as if Nature had designed it beforehand: They might thus drain all the Swamp absolutely dry, or lay it under Water at their pleasure. I have talked several times hereof to Mr. *Sherwood*, the Owner of the Swamp, yet nothing is essayed in order thereto. And now since we are speaking of *James Town*, give me leave to adjoyn some Reflections as to the Situation and Fortifications of the Place. The natural Situation of the Place is such, as perhaps the World has not a more commodious Place for a Town where all things conspire for Advantage thereof.

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James Town Island is rather a *Peninsula*, being joynd to the Continent by a small Neck of Land, not past twenty or thirty Yards over, and which at Spring-tides is overflowed and is then an absolute Island. Now they have built a silly sort of a Fort, that is, a brick Wall in the shape of a Half-Moon, at the beginnig of the Swamp, because the Channel of the River lies very nigh the Shoar; but it is the same as if a Fort were built at *Chelsea* to secure *London* from being taken by Shipping. Besides Ships passing up the River are secured from the Guns of the Fort, till they come directly over-against the Fort, by reason the Fort stands in a Vale, and all the Guns directed down the River, that 24 that should play on the Ships, as they are coming up the River, will lodge their Shot within ten, twenty, or forty Yards in the rising Bank, which is much above the Level of the Fort; so that if a Ship gave but a good Broad-side, just when she comes to bear upon the Fort, she might put the Fort into that Confusion, as to have free Passage enough. There was indeed an old Fort of Earth in the Town, being a sort of *Tetragone*, with something like Bastions at the four Corners, as I remember; but the Channel lying further off to the middle of the River there, they let it be demolished, and built that new one spoke of, of Brick, which seems little better than a blind Wall, to shoot wild Ducks or Geese.

If they would build a Fort for the Security of the Town and Country, I conceive it should be on *Archer's Hope Point*, for that would stop the Ships from passing up the River, before they come to the Town, and would secure the Town from being blocked up by Sea. The Channel at *Archer's Hope Point* lies close by the Shoar, and makes such an Angle there by reason of *Hog Island*, that going up or down the River, let the Wind be where it will, they must there bring the contrary Tack on Board, and generally when they about the Ship as they call it, they are so near the Shoar, that a Man may almost fling a Finger-stone on Board. How much this hinders the Motion of a Ship, and what Confusion it must be to them to bring a contrary Tack on Board, whilst they have all the Guns of a Fort playing so nigh upon them, may readily be conceived. *Archer's Hope* is a neck of Land, that runs down three Miles long, not much past half a Mile broad betwixt the main River and *Archer's Hope Creek*, which has large Marshes and Swamps; so that a Citadel built upon the

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Point, would almost be impregnable, being it could be attack'd no way but one, which is so narrow a slender Neck of Land, that it would be difficult to take it that way: And it would secure *James Town* from being blocked, being it would not be past a Mile by Water, to the Point of *James Town Island*. The Island is so surrounded with Water and marshy Land, that the Town could never be bomb'd by Land. But now to return to the Reflections of improving, and manuring of Land in *Virginia*; hitherto, as I have said, they have used none but that of Cow-penning; yet I suppose they might find very good Marl in many Places, I have seen both the red and blew Marl at some Breaks of Hills: This would be the properest Manure for their sandy Land, if they spread it not too thick, theirs being, as I have said, a shallow, sandy Soil, which was the Reason I never advised any to use Lime, 25 Lime, tho' they have very good Lime of Oyster-shells; but that's the properest Manure for cold Clay Land, and not for a sandy Soil. But as most Lands have one Swamp or another bordering on them, they may certainly get admirable Slitch, wherewith to manure all their Uplands. But this, say they, will not improve Ground, but clods and grows hard; 'tis true, it will do so for some time, a Year or two at the first; but did they cast it in heaps, and let it lie for two or three Years after a Frost or two had seized it, and it had been well peirced therewith, I doubt not it would turn to good Account: And for this too I have something more than bare Conjecture; for discoursing it once with a good notable Planter, we went to view a Heap thereof, that casually he had cast up 'twixt three and four Years before, and we found it not very binding, but rather a fine natural Mould, whereupon he did confess, he then remembred that out of a Ridge of the like Mould he had very large Plants, which must have been of the like Slime or Slitch cast up before: But said, that himself and others despaired of this Manure, because they had taken of this Slitch fresh and moist out of the Swamp, and fill'd Tobacco Hills with it, and in the midst of it planted their Plants, which so bound the Roots of their Plants, that they never came to any thing. But he said, he then saw his Error, yet I have not heard he has remembred to correct it. But 'tis strange in how many things besides they are remiss, which one would think *English Men* should not be guilty of. They neither House nor Milk any of their Cows in Winter, having a Notion that it would kill them; yet I persuaded the afore-mentioned Lady where I lived, to milk four

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Cows the last Winter that I staid in the Country, whereof she found so good effect, that she assured me she would keep to my Advice for the future; and also as I had further urged, house them too, for which they have mighty Conveniences, their Tobacco Houses being empty ever at that time of the Year, and may easily be fitted in two or three Days time without any Prejudice; whereby their Cattle would be much sheltered from those pinching sharp Frosts that some Nights on a sudden become very severe. I had another Project for the Preservation of their Cattle proved very successful; I urged the Lady to sow her Wheat as early as possible she could, so that before Winter it might be well rooted, to be early and flourishing at the first of the Spring: So that she might turn thereon her weak Cattle, and such as should at any time be swamp'd, whereby they might be recruited and saved, and it would do the Wheat good also. I advised her likewise to save and carefully gather her *Indian* Corn-tops, and Blades, and all her 4 26 her Straw, whatever could be made Fodder, for her Cattle; for they get no Hay, tho' I was urging her to that too, and to sow *Saintfoin*; for being a sandy Soil, I am confident it would turn to very good Account. They have little or no Grass in Winter, so that their Cattle are pined and starved, and many that are pined and starved, and many that are brought low and weak, when the Spring begins, venture too far into the Swamps after the fresh Grass, where they perish; so that several Persons lose ten, twenty or thirty Head of Cattle in a Year: I observed this was much owing to their Inadvertency and Error in their way of managing and feeding them; for they get little Fodder, but as they think Corn being more nourishing, feed them with their *Indian* Corn, which they give them Morning and Evening; they spend thus a great Quantity of Corn, and when all's done, what signifies two or three Heads of Corn to a Beast in a Morning? it makes them only linger about the Houses for more; and after that sweet Food they are not so prompt to brouze on the Trees, and the coarse Grass which the Country affords; so that thus their Guts shrink up, and they become Belly-shot as they call it. I advised therefore never to give them any thing in a Morning, whereby as soon as they were set forth of the Cow-pens, they would fall a feeding, and tho' they filled their Bellies only with such coarse Stuff as had little Nourishment in it, yet it would keep out their Bellies, and they would have a better Digestion; and then when they were come home at

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Nights, to fodder them, beginning with Straw and their coarsest Fodder, which they would learn to eat by degrees, before they tasted that which was more delicate, and whilst their Digestion was strong, would yield them Nourishment to keep them still so; afterwards when the Winter pinched, their fine Fodder then would stand them in stead; and hereby they might preserve their weakest Cattle. By these Methods, and the Help of the Wheat-patch, she, the Gentlewoman where I lived, saved all her Cattle, and lost not one in two Winters after, that I staid there; besides she saved above Twenty Barrels of Corn, as I remember that she told me she used to spend upon her Stock; and a Barrel of Corn is commonly worth Ten Shillings. Nay further, the last Spring she fed two Beasts a Bullock and a Cow, fat, upon her Wheat, with the Addition only of a little boiled Corn, and yet the Wheat was scarce eat down enough. But to return again to the Nature of the Earth, which may be pretty well gathered from what I have already said; I have observed, that at five or six Yards deep, at the Breaks of some Banks, I have found Veins of Clay, admirable good to make Pots, Pipes or the like of, and whereof I suppose 27 suppose the *Indians* make their Pipes, and Pots, to boil their Meat in, which they make very handsomely, and will endure the Fire better than most Crucibles: I took of this Clay, dried, powdered, and sifted it; powdered and sifted Potsherds, and Glass; three parts, two parts and one part as I remember, and therewith made a large Crucible, which was the best I yet ever tried in my Life; I took it once red hot out of the Fire, and clapt it immediately into Water, and it started not at all. The Country abounds mightily with iron Oar, that as I have been assured by some upon Tryal, has been found very good. There are Rocks thereof appear at the precipice of Hills, at the foot whereof there runs a River fit for a Forge, and there's Wood enough to supply it with Charcoal; as I have heard there was formerly some Persons undertook the Work, and when they had made but a small Quantity of Iron, which proved very good, the *Indian* Massacre happened, and they being higher seated than the then inhabited Part of the Country, were all cut off, and the Works demolished; so that it has frightened others I think from the like attempt; besides, such a Work requires a greater Fund, and Bank of Money to carry it on, than any there are able to lay out; and for Persons in *England* to meddle therewith, is certainly to be cheated at such a Distance; some *Indians*

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brought Col. *Bird* some black Lead, whereof he told me there was great Store. There's very curious Chalk towards the Falls of *Rapahanock* River, which they burn, and make a delicate White-wash of it. The Secretary of State Col. *Spencer*, has assured me, there were vitriolick or alluminous Earth on the Banks of *Potomack*. And thus far of what my Memory supplies me, referring to the Earth; in the next place I shall give a short Account of the Birds.

Of the BIRDS.

I Had indeed begun once whilst I was in that Country to have made a Collection of the Birds, but falling sick of the Griping of the Guts, some of them for want of care corrupted, which made them fling others away that I had thoroughly cured; for I was past taking care of them my self, there remaining but small hopes of my Life.

There are three sorts of Eagles, the largest I take to be that they call the grey Eagle, being much of the Colour of our Kite or Glead.

The second is the bald Eagle, for the Body and part of the Neck being of a dark brown, the upper part of the Neck and Head 28 Head is covered with a white sort of Down, whereby it looks very bald, whence it is so named.

The third is the black Eagle, resembling most the *English* Eagle, they build their Nests much after the manner of that Dr. *Willoughby* describes, and generally at the top of some tall old Tree, naked of Boughs and nigh the River-side, and the People fell the Tree generally when they take the young; they are most frequently sitting on some tall Tree by the River-side, whence they may have a Prospect up and down the River, as I suppose to observe the fishing-Hawks; for when they see the fishing-Hawk has struck a Fish, immediately they take Wing, and 'tis sometimes very pleasant to behold the Flight; for when the fishing-Hawk perceives her self pursued, she will scream and make a terrible noise, till at length she lets fall the Fish to make her own Escape, which the Eagle

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frequently catches before it reach the Earth or Water. These Eagles kill young Lambs, Pigs, &c.

This fishing-Hawk is an absolute Species ora Kings-fisher, but full as large or larger than our Jay, much of the Colour and Shape of a Kings-fisher, tho' not altogether so curiously feather'd; it has a large Crop as I remember; there is a little Kings-fisher much the same in every respect with ours.

If I much mistake not, I have seen both Goss-Hawk, and Falcon; besides there are several sorts of the lesser Kind of Stannels.

There is likewise the Kite and the Ringtail.

I never heard the Cuckow there to my remembrance.

There's both a brown Owl and white Owl, much what as large as a Goose, which often kills their Hens and Poultry in the Night; the white Owl is a very delicate feathered Bird, all the Feathers upon her Breast and Back being Snow-white and tipp'd with a punctal of Jet-black: besides there is a Barn Owl much like ours; and a little sort of Scritch-Owl.

There's both the Raven and the Carrion-Crow; I do not remember I ever saw any Rooks there. Dr. *Moulin* and my self, when we made our Anatomies together, when I was at *London*, we shewed to the *Royal Society*, that all flat-billed Birds that groped for their Meat, had three pair of Nerves, that came down into their Bills; whereby as we conceived they had that Accuracy to distinguish what was proper for Food, and what to be rejected by their Taste when they did not see it; and as this was most evident in a Duck's Bill and Head, I draw'd a Cut thereof, and left it in your Custody: A Duck has larger Nerves that come into their Bills than Geese or any other Bird that I have seen and therefore quaver and grope out their Meat the most: But I had then discover'd none of these Nerves in Round-bill'd Birds: But since in my Anatomies in the Country, in a Rook I first observed two Nerves came down betwixt the Eyes into the upper Bill, but considerably smaller than

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any of the three pair of Nerves in the Bills of Ducks, but larger than the Nerves in any other round-bill'd Birds; and 'tis remarkable these Birds more than any other round-bill'd Birds seem to grope for their Meat in Cow-dung and the like: Since I have found in several round-bill'd Birds the like Nerves coming down betwixt the Eyes, but so very small that had I not seen them first in a Rook I should scarce have made the Discovery; in the lower Bill there are Nerves have much the same Situation with the flat-bill'd Birds, but very small, and scarce discernable, unless to the Cautious and Curious.

The night Raven, which some call the *Virginia* Bat, is about the Bigness of a Cuckow, feathered like them but very short, and short Leg'd, not discernable when it flies, which is only in the Evening scudding like our Night Raven.

There's a great sort of ravenous Bird that feeds upon Carrion, as big very nigh as an Eagle, which they call a Turkey Bustard, its Feathers are of a duskish black, it has red Gills, resembling those of a Turkey, whence it has its Name; it is nothing of the same sort of Bird with our *English* Turkey Bustard, but is rather a Species of the Kites, for it will hover on the Wing something like them, and is carnivorous; the Fat thereof dissolved into an Oil, is recommended mightily against old Aches and Sciatica Pains.

I think there are no Jackdaws, nor any Magpys; they there prize a Magpye as much as we do their red Bird.

The *Pica Glandaria*, or Jay, is much less than our *English* Jay, and of another Colour, for it's all blue where ours is brown, the Wings marbled as curiously as ours are, it has both the same Cry, and sudden jetting Motion.

There are great Variety and Curiosity in the Wood-peckers, there's one as big as our Magpye, with blackish brown Feathers, and a large scarlet Tuft on the top of the Head: There are four or five sorts of Wood-peckers more, variegated with green, yellow and red Heads, others spotted black and white, most lovely to behold. There's a Tradition amongst them, that the Tongue of one of these Wood-peckers dryed will make the Teeth drop out

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if pick'd therewith, and cure the Tooth-ach (tho' I believe little of it, but look on it ridiculous) yet I thought fit to hint as much that others may try; for sometimes such old Stories 30 Stories refer to some peculiar Virtues, tho' not to all that is said of them.

There be wild Turkies extream large; they talk of Turkies that have been kill'd, that have weigh'd betwixt 50 and 60 Pound weight; the largest that ever I saw, weigh'd something better than 38 Pound; they have very long Legs, and will run prodigiously fast. I remember not that ever I saw any of them on the Wing, except it were once: Their Feathers are of a blackish shining Colour, that in the Sun shine like a Dove's Neck, very specious.

Hens and Cocks are for the most part without Tails and Rumps; and as some have assured me our *English* Hens after some time being kept there have their Rumps rot off; which I'm the apter to believe, being all their Hens are certainly of *English* breed. I'm sorry I made no anatomical Observations thereof; and Remarks about the Use of the Rumps in Birds, which at present I take to be a couple of Glands, containing a sort of Juice for the varnishing of the Feathers; having observed all Birds have much recourse with their Bills to the Rumps when they dress their Plumes, whereby they scud thro' the Air more nimbly in their Flight.

Partridges there are much smaller than ours, and resort in Covies as ours do; their Flesh is very white, and much excels ours in my mind, *Sed de gustibus non est disputandum*.

Their Turtle-Doves are of a duskish blue Colour, much less than our common Pigeon; the whole Train is longer much than the Tails of our Pigeons, the middle Feather being the longest. There is the strangest Story of a vast Number of these Pigeons that came in a Flock a few Years before I came thither; They say they came thro' *New England, New York* and *Virginia*, and were so prodigious in Number as to darken the Sky for several Hours in the place over which they flew, and brake massie Boughs where they light; and many like things which I have had asserted to me by many Eye-witness of Credit, that to me it was without doubt, the Relators being very sober Persons, and all agreeing in

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a Story: Nothing of the like ever happen'd since, nor did I ever see past ten in a Flock together that I remember. I am not fond of such Stories, and had suppressed the relating of it, but that I have heard the same from very many.

The Thrush and Feldfare are much like ours, and are only seen in Winter there, accordingly as they are here.

Their mocking Birds may be compared to our singing Thrushes, being much of the same Bigness; there are two sorts, the grey and the red, the grey has Feathers much of the Colour of our 31 our grey Plovers with white in the Wings like a Magpye; this has the much softer Note, and will imitate, in its singing, the Notes of all Birds that it hears, and is accounted much the finest singing Bird in the World. Dr. *Moulin* and I made in our Anatomy many Observations of Singing-Birds to this effect: The Ears of Birds differ much from those of Men and Beasts, there's almost a direct Passage from one Ear to the other of Birds, so that prick but the small Membrane call'd the Drum on either Ear, and Water poured in at one Ear will run out at the other: But this is not all, but what is much more remarkable, they have no Coclea, but instead thereof there's a small Cocleous or twisting Passage that opens into a large Cavity that runs betwixt two Sculls, and passes all round the Head; the upper Scull is supported by many hundreds of small Thread-like Pillars or Fibres, which as we supposed had another use also, to break the Sound from making any confused Eccho, and to make it one and distinct; this Passage we observed betwixt the two Skulls was much larger in singing Birds than in others that do not sing, so very remarkable that any Person that has been but shew'd this may easily judge by the Head what Bird is a singing-Bird, or has Aptitude thereto, tho' he never saw the Bird before, nor knew what Bird it were: This has often made me reflect how much the Modification of Voices depends upon the Accuracy of the Ear, and how deaf Persons become dumb: and since I have observed that many Children, that have an acute Wit enough, that are slow of Speech, that is, long before they speak, are much longer before they can pronounce those Letters that are Sharps, as *g. h. r.* and never have an Aptitude to learn to sing. Hence I judge that Songs that have many Sharps in them are the difficultest to

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sing well, and discover any Persons Skill upon the trial of Musick most. This I suppose only, having no Skill in Musick my self, nor having ever discoursed any Person about it. As I remember we shewed some of these things to the *Royal Society*, and I drew some Cuts thereof, and gave the Doctor, upon Promise that he would put these and many other our joint Observations in Print, but I hear he is since dead. I have anatomized most sorts of Creatures, and never found any four-footed Creature with an Ear like a Bird, unless a Mole; and a Mole has an Ear much like them, with a very thin double Scull, and a great Cavity like a Bird, and is very acute of hearing; the Scull by reason of the large Cavity is very slender and easily crush'd, so that a Mole is quickly kill'd with a Bruise on the Scull like a Lark, and upon the Bruise the Membranes of the Scull turn black; whence *Segerus*'s Mistake, *Membranæ 32 Membranæ Cerebri in superficie exteriori omnino nigræ visæ*. But when I have taken care not to bruise the Scull the Membranes were not black at all, both *Segerus* and *Severinus* I think had some perceptions of the different Structure of a Mole's Ear, but not any thing of its Analogy to a Bird's Ear; they speak of a Bone *Egregie pumicosum*: And *Segerus* says there's a *Ductus ad ossis usque petrosi cavitatem protensus, plurimis fibrillis Membraneis annectabatur*. But to return, this mocking Bird having its Name from *Mimicking* all other Birds in singing, is a wonderful mettled Bird, bold and brisk, and yet seems to be of a very tender Constitution, neither singing in Winter, nor in the midst of Summer, and with much Difficulty are any of them brought to live in *England*.

The red Mocking is of a duskish red, or rather brown; it sings very well, but has not so soft a Note as the gray mocking Bird.

Of *Virginia* Nightingale, or red Bird, there are two sorts, the Cocks of both sorts are of a pure Scarlet, the Hens of a duskish Red; I distinguish them into two sorts, for the one has a tufted Cops on the Head, the other is smooth-feather'd. I never saw a tufted Cock with a smooth-headed Hen, or on the contrary; they generally resorting a Cock and Hen together, and play in a Thicket of Thorns or Bryars in the Winter, nigh to which the Boys set their

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Traps, and so catch them and sell them to the Merchants for about six Pence apiece; by whom they are brought for *England*; they are something less than a Thrush.

There's a Bird very injurious to Corn, they call a Blackbird; I look on it a sort of Starling, for they cry something like them but do not sing, are much what of the same bigness, have Flesh blackish like theirs; they resort in great Flocks together, they are as black as a Crow all over, their Bills and all, only some of them have scarlet Feathers in the Pinions of their Wings. *Quære*, whether a distinct Species?

They have a Lark nothing differing from our common Lark; they have another Bird which they call a Lark that is much larger, as big as a Starling; it has a soft Note, feeds on the Ground, and, as I remember, has the specifical Character of a long Heel; it is more inclined to yellow, and has a large half Moon on its Breast of yellow; if it have not a long Heel, *Quære*, whether a Species of the Yellow-hammer?

They have a Martin very like, only larger than ours, that builds after the same manner. The honourable Col. *Bacon* has remarked for several Years, that they constantly come thither on the tenth of *March*, one or two of them appearing before, being seen hovering in the Air for a Day or two, then go away, and 33 and as he supposed, returned, with the great Flock. The Colonel delighted much in this Bird, and made like Pigeon-holes at the end of his House with Boards purposely for them.

Their Swallow differs but little from ours.

They have a Bird they call a Blue-bird, of a curious azure Colour about the bigness of a Chafinch.

There be other sorts of Goldfinches variegated with orange and yellow Feathers, very specious and beautiful.

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Sparrows not much different from the *English*, but build not in the Eaves of Houses that ever I saw.

The Snow-bird, which I take to be much the same with our Hedge-sparrow; this is so called because it seldom appears about Houses but against Snow or very cold Weather.

The humming Bird that feeds upon the Honey of Flowers: I have been told by some Persons, that they have kept of these humming Birds alive, and fed them with Water and Sugar: they are much the smallest of all Birds, have long Bills and curious coloured Feathers, but differ much in Colour.

Hérons three or four several sorts, one larger than the *English*, feathered much like a *Spanish Goose*.

Another sort that only comes in Summer Milk white, with red Legs very lovely to behold.

The Bittern is there less than in *England*, and does not make that sounding Noise that ever I heard.

Curlews something less than our *English*, tho' bigger than a Wimbrel.

The Sandpiper much resembling the *English*.

The Snipe, two sorts, one resembling ours, the other much less.

The Tewits are smaller than the *English*, and have no long Toppins, but just like a young one that begins to fly.

There are a great number of wild Swans.

Wild-geese and Brent-geese all winter in mighty Flocks, Wildducks innumerable, Teal, Wigeon, Sheldrakes, Virginia-didapers, the Black-diver, &c.

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In my return home for *England* May 1686. off the Banks of *Newfound-land*, when we were, according to Account, a Hundred Leagues from the Shoar, we saw several prodigious floating Islands of the Ice, no less to our Wonder than Terror, for they were very dangerous: I got the Master to sail one Day as nigh one of them as we securely durst, which we judged to be full a League in length, and was higher above Water than the top of our Main-mast; the Snow drove to and fro upon it as upon a large Plane. There was a great Flock of small Black-divers, that 5 34 that were not much bigger than a Feldfare, came to us a little before, but all of them then left and betook themselves to this Island of Ice. They dived the constantliest, and the longest at a time of any Bird that ever I saw. We saw, as I remember, nigh thirty of these Islands of Ice. Captain *Rider* being some few Days later in his Passage, and bearing more to the *Nore*, told me, he saw many more of these Islands of Ice, and some much larger.

There are in *Virginia* a great many Cormorants; several sorts of Gulls, and in about the Bay many Bannets. Thus much for the Birds,

Yours, &c. A Con-

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A Continuation of Mr. Clayton's Account of Virginia. Of the Beasts of Virginia.

THERE were neither Horses, Bulls, Cows, Sheep, or Swine, in all the Country, before the coming of the *English*, as I have heard, and have much reason to believe. But now among the *English* Inhabitants there are good Store of Horses, though they are very negligent and careless about the Breed: It is true there is a Law, that no Horse shall be kept stoned under a certain size, but it is not put in Execution. Such as they are, there are good Store, and as cheap or cheaper than in *England*, worth about five Pounds apiece. They never shoe them, nor stable them in general; some few Gentlemen may be something more curious, but it is very rare; yet they ride pretty sharply, a Planter's Pace is a Proverb, which is a good sharp hand-Gallop. The *Indians* have not yet learnt to ride, only the King

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of *Pomonkie* had got three or four Horses for his own Saddle and an Attendant, which I think should in no wise be indulged, for I look on the allowing them Horses much more dangerous than even Guns and Powder.

Wild Bulls and *Cows* there are now in the uninhabited Parts, but such only as have been bred from some that have strayed, and become wild, and have propagated their kind, and are difficult to be shot, having a great Acuteness of Smelling. The common rate of a Cow and Calf is 50 s. sight unseen; be she big or little, they are never very Curious to examine that Point.

Their *Sheep* are a midling Size, pretty fine fleeced in general, and most Persons of Estate begin to keep Flocks, which hitherto has not been much regarded, because of the Wolves that destroy them; so that a piece of Mutton is a finer Treat than either Venison, Wild-goose, Duck, Widgeon, or Teal.

Elke, I have heard of them beyond the Inhabitants, and that there was one presented to Sir *William Berkly*, which he some time kept.

Deer, there are abundance of brave red Deer, so that a good Woodsman, as they call them, will keep a House with Venison; the *Indians*, they say, make artificial sorts of Heads of Boughs of Trees, which they consecrate to their Gods, and these they put on to deceive the Deer when they go a Shooting, or Hunting, as they call it, and by mimicking the Feeding of the Deer, they by degrees get within Shot. *Swine*,

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Swine, they have now in great abundance, Shoats or Porkrels are their general Food; and I believe as good as any *Westphalia*, certainly far exceeding our *English*.

Rackoone, I take it to be a Species of a Monky, something less than a Fox, gray-hair'd, its Feet formed like a Hand, and the Face too has likewise the resemblance of a Monky's,

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besides being kept tame they are very Apish: They are very prejudicial to their Poultry, as I remember.

An *Opossum*, as big and something shaped like our Badgers, but of a lighter dun Colour, with a long Tail something like a Rat, but as thick as a Man's Thumb; the Skin of its Belly is very large, and folded so as to meet like a Purse, wherein they secure their Young whilst little and tender, which will as naturally run thither, as Chicken to a Hen; in these false Bellies they will carry their Young, they also feed on and devour Corn.

Hares, many will have them to be a Hedge-Rabbit, but I know not what they mean thereby. I take them to be a perfect Species of Hares, because I have seen Leverets there with the white Spot in the Head which the old ones have not, so it is in *England*; and the Down is perfectly of the Colour of our Hares, they sit as our Hares do, and make no Holes and Burrows in the Earth; true they are but about the bigness of an *English* Rabbit, and run no faster; they generally take into some hollow Tree within a little space, which then the People catch by gathering the withered Leaves, and setting them on fire within the hollow of the Tree, and smoaking of them so till they fall down, sometimes they take long Bryars, and twist them in the Down and Skin, and so pull them forth.

Squirrels, there are three sorts. The first is the great Fox Squirrel, much larger than the *English*, and gray, almost as a common Rabbit. These are very common, I have eaten of them at the best Gentlemen's Tables, and they are as good as a Rabbit. The second is the flying Squirrel, of a lighter dun Colour, and much less than the *English* Squirrel; the Skin on either side the Belly extended is very large betwixt the Fore-Leg and Hind-Leg, which helps them much in their skipping from one Bough to another, that they will leap farther than the Fox-Squirrel, though much less, yet this is still rather skipping than flying, though the Distinction be well enough. The third is the Ground-Squirrel, I never saw any of this sort, only I have been told of them, and have had them thus described to me, to be little bigger than a Mouse finely spotted like a young Fawn; by what I further apprehended, they are an absolute sort of Dor-Mouse, only different in Colour. *Musk-Rats*,

Musk-Rats, in all things shaped like our Water-Rats, only something larger, and is an absolute Species of Water-Rats, only having a curious musky Scent: I kept one for a certain time in a wooden Chest; two Days before it died it was extraordinary odoriferous, and scented the Room very much; but the Day that it died, and a Day after the Scent was very small, yet afterwards the Skin was very fragrant; the Stones also smelt very well. They build Houses as Beavers do, in the Marshes and Swamps (as they there call them) by the Water-sides, with two or three ways into them, and they are finely daubed within. I pulled one in pieces purposely to see the Contrivance: There were three different Lodging-Rooms, very neat, one higher than another, as I conceive purposely made for Retirement when the Water rises higher than ordinary; they are considerably large, having much Trash and Lumber to make their Houses withal; I suppose they live mostly on Fish.

Batts, as I remember at least two sorts; one a large sort with long Ears, and particularly long stragling Hairs. The other much like the *English*, something larger I think, very common.

I never heard of any *Lions*; they told me of a Creature killed whilst I was there, in *Glocester* County, which I conceived to be a sort of Pard or Tyger.

Bears there are, and yet but few in the inhabited part of *Virginia*; towards *Carolina* there are many more. There was a small Bear killed within three Miles of *James City* the Year that I left the Country, but it was supposed to have strayed, and swam over *James River*. They are not very fierce, their Flesh is commended for a very rich sort of Pork; but the lying Side of the Bear, as I remember, is but half the Value of the other, Weight for Weight.

There are several sorts of *Wild-Cats* and *Poll-Cats*.

Beavers build their Houses in like manner as the Musk-Rats do, only much larger, and with pieces of Timber make Dams over Rivers; as I suppose either to preserve their Furs dry in

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their Passage over the Rivers, otherwise to catch Fish by standing to watch them thereon, and jumping upon them on a sudden; they are very subtil Creatures, and if half the Stories be true that I have been told, they have a very orderly Government among them; in their Works each knows his proper Work and Station, and the Overseers beat those young Ones that loiter in their Business, and will make them cry, and work stoutly.

Wolves there are great store; you may hear a Company Hunting in an Evening, and yelping like a pack of Beagles; but they are very cowardly, and dare scarce venture on any thing that 38 that faces them; yet if hungry, will pull down a good large Sheep that flies from them. I never heard that any of them adventured to set on Man or Child.

Foxes, they are very much like ours, only their Fur is much more grisled, or gray; neither do I remember ever to have seen any Fox-holes but of this I am not positive.

Every House keeps three or four mungrel *Dogs* to destroy Vermin, such as *Wolves*, *Foxes*, *Rackoons*, *Opossums*, &c. But they never Hunt with Hounds, I suppose, because there are so many Branches of Rivers, that they cannot follow them. Neither do they keep Grey-hounds, because they say, that they are subject to break their Necks by running against Trees, and any Cur will serve to run their Hares into a hollow Tree, where after the aforesaid manner they catch them.

They have great store both of Land and Water *Tortoises*, but they are very small, I think I never saw any, in that Country to exceed a Foot in length; there is also another sort of Land-Tortoise, different from the common sort, with a higher ridged Back, and speckled with a red sort of Spots.

Frogs they have of several sorts, one of a prodigious largeness, eight or ten times as big as any in *England*, and it makes a strange Noise, something like the bellowing of a Bull, or betwixt that and the hollow sounding Noise that the English Bittern makes.

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Another very common sort, which they call *Toads*, because black, but I think differs nothing from our black Frog. They have Toads also like ours in *England*; and another small sort of Frog, which makes a Noise like Pack-horse Bells all the Spring long. Another little green Frog, that will leap prodigiously, which they therefore call the flying Frog. There is frequently heard in the Woods a shrill sort Of Noise, much like that which our shrew-Mouse makes, but much sharper; I could never learn the certainty what it was that made this Noise, it is generally in a Tree, and some have asserted to me, that it was made by the green Frog, yet I scarcely believe it. Mr. *Banister* assured me it was made by a sort of *Scarabæus* Beetle, that is I think full as big as the humming-Bird; but neither do I believe that, and for this Reason, for I never saw that Beetle so low as the Salts, but always as high up in the Country as the Freshes, and that Noise is frequent all over the Country.

Lizards, that are gray and very common, the Snakes feed much on them, for I have taken several of them out of the Bellies of Snakes.

Snakes, about seven several sorts. The rattle-Snake, so called ed 39 from certain Rattles at the end of the Tail: These Rattles seem like so many perished Joints, being a dry Husk over certain Joints, and the common Opinion is, that there are as many Rattles or Joints, as the Snake is Years old. I kill'd four or five, and they had each eleven, twelve, or thirteen Joints; but the young Ones have no Rattles of a Year or two, but they may be known notwithstanding, being very regular diced or checker'd, black and grey on the Backs. The Old shake and shiver these Rattles with wonderfull Nimbleness when they are any ways disturbed; their Bite is very deadly, yet not always of the same Force, but more or less mortal, accordingly as the Snake is in Force or Vigour, and therefore in *June* or *July* much worse, and more mortal, than in *March* and *April*. This Snake is a very majestick sort of Creature, and will scarce meddle with any thing unless provok'd; but if any thing offend it, it makes directly at them. I was told a pleasant Story of an old Gentleman, Col. *Cleyborn* as I remember was his Name, the same that sent the Rattle-Snakes to the *Royal Society* some Years since. He had an odd Fancy of keeping some of these Snakes always in Barrels in

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the House, and one time an *Indian* pretending to charm them so as to take them by the Neck in his Hand without biting of him; the old Gentleman caused a rattle-Snake to be brought forth; the *Indian* began his Charm with a little Wand, whisking it round and round the rattle-Snake's Head, bringing it by degrees nigher and nigher, and at length flung the Switch away, and whisked his Hand about in like manner, bringing his Hand nigher still and nigher, by taking less Circles, when the old Gentleman immediately hit the Snake with his Crutch, and the Snake snap'd the *Indian* by the Hand, and bit him very sharply betwixt the Fingers, which put his Charm to an end, and he roared out; but stretch'd his Arm out as high as he could, calling for a String, wherewith he bound his Arm as hard as possibly he could, and clapped a hot burning Coal thereon, and singed it stoutly, whereby he was cured, but looked pale a long while after. And I believe this truly one of the best ways in the World of curing the Bite either of Viper or mad Dog. I was with the honourable Esquire *Boyle*, when he made certain Experiments of curing the Bite of Vipers with certain *East-India* Snake-stones, that were sent him by King *James* the Second, the Queen, and some of the Nobility, purposely to have him try their Virtue and Efficacy: For that end he got some brisk Vipers, and made them bite the Thighs of certain Pullets, and the Breasts of others: He applied nothing to one of the Pullets, and it died within three Minutes and a half, as I remember; but I think 40 think they all recover'd to which he applied the Snake-stones, tho' they turned wonderful pale, their Combs, &c. immediately, and they became extream sick, and purged within half an Hour, and the next Morning all their Flesh was turned green to a wonder, nevertheless they recovered by degrees. The manner of the Application was only by laying on the Stone, and by two cross-Bits of a very sticking *Diaculum* Plaister binding it on, which he let not lie on past an Hour or two, but I think not so long, took the Stone off, and put it into Milk for some time; some Stones were of much stronger Virtue than others. I proposed a piece of unquench'd Lime-stone to be apply'd to see whether it might not prove as powerful, but know not whether ever it was tried. But here one telling Mr. *Boyle* the Story of this *Indian*, he approved the method of Cure, and said, an actual Cautery was the most certain Cure. The Poison, both of Viper and mad-Dog (as I conceive) kill by thickning of the Blood, after the manner that Runnet congeals Milk

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when they make Cheese. Vipers, and all the viperous Brood, as rattle-Snakes, &c. that are deadly, have I believe their poisonous Teeth fistulous, for so I have observed that Vipers Teeth are, and the rattle-Snakes very remarkable, and therefore they kill so very speedily by injecting the Poison through those fistulous Teeth into the very Mass of Blood; but the bite of mad-Dogs is oft of long Continuance before it get into and corrupt the Mass of Blood, being it sticks only to the outsides of the Teeth, and therefore when they bite thro' any thickness of Cloaths, it rarely proves mortal, the Cloaths wiping the Poison off before it come to the Flesh. A Girl that was bit about *New-Years Day*, continued well till *Witsuntide*, when coming to see certain Friends in our parts, she fell very ill, and being a poor Girl, they came to me; it pleased God I recovered her. Sometime after she returned to give me thanks for saving her Life, being two Persons that were bit with the same Dog, were dead, whilst she remained under Cure, and therefore she was the fullier convinc'd she owed her Life to me; but of this I shall give a more particular Instance by and by. But the Poisons of Vipers seem to be like the injecting of Liquors into the Veins of Creatures; Dr. *Moulin* and I made many Experiments of this Nature together, and I have made many more by my self. We once, I remember, injected half a Dram of Allom into the jugular-Vein of a Dog before the *Royal Society*, (the Allom being only dissolved in a little Water) which within something less than one Minute's time was so absolutely dead, as not to have the least convulsive Motion; and I have done the like with many other things besides Allom, but with 41 with some things it is more curdled and broken, than with others; and will differ much both as to colour and consistence. Salt-Petre kills much as quickly as Allom, but then the Blood in the Heart looks very florid, smooth, and even. I wish some Person of Observation and Leisure would prosecute these sorts of Experiments, and make Injections of the several things most used in Physick into the Veins of Creatures, both in Quantities, and into different Veins, as into the thigh-Veins of some Dogs, and Jugulars of some others, and in much lesser Quantities of such things as kill suddenly; for in the little time I have spent in these sort of Experiments, I easily perceive notable Discoveries might be made thereby: One Dog that lived became lame and gouty; another with Quick-Silver died in about sixteen Weeks time, consumptive, and I discovered Quick-Silver in the impostumated parts of

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his Lungs. *Query*, Whether some Persons that have been flux'd, or used Quick-Silver Ointments, and the like, and afterwards become consumptive, owe not their Distemper to the abusive use of a most excellent Remedy? Much after the same manner, the subtile Quick-Silver getting into the Mass of Blood by degrees, through its Ponderosity settles in the Lobes of the Lungs, and causes Ulcers there. But to return: The Poison of Vipers and mad-Dogs I suppose kill by thickning of the Blood, as many malignant Fevers also do; in all which Cases, I look on volatile Salts to be the properest Physick, as keeping the Blood from congealing. I had a singular Instance hereof in a Gentleman of *Yorkshire*, bit with a Grey-hound on the *Thursday*, not three Minutes before the Dog died mad; he bit him in several places of the Hands, as he was giving him a Remedy: The *Monday* following the Gentleman was very ill, and came to our Town to an Apothecary his Acquaintance, who knowing not what to do, desired my Assistance. When I came, the Gentleman could talk, but every two or three Minutes he had violent Fits, and would tell us when they were over, that his Brains worked like Birm in an Ale-Fat, and seemed to froth up at every Fit. The Apothecary had no volatile Salt of Vipers; so I took the volatile Salt of Amber, and ordered him ten Grains in Treacle-Water every half Hour: He told me every Dose seem to clear his Brain, and cool it as perfectly as if a Bason of cold Water were poured on his Head, but it returned by degrees again: Having then a volatile Salt by me that vomits very well, I gave him a Dose thereof; it worked very well, and he was much better after it: I then ordered him to continue the volatile Salt of Amber once every four Hours, and at each two Hours end, that is betwixt, *Spec. Pleres Archonticon* and *Rue 6 42 Rue powder'd ana gr. 15.* whereby he was so well recovered, that within two Days he would needs go home, to look after some urgent Affairs, and afterwards found himself so well, that he forgot to return, and perfect the Course; and I heard no more of him for half a Year, when I was fetched one Morning to him in great haste. He had been abroad, play'd the good-Fellow, and in his return home having rode a great Day's Journey, being weary, and I suppose finding himself indisposed, he staid all Night in our Town, it being fortunately in his way. In the Morning when he should have got up, he could not stand, whereupon the Apothecary was sent for, and a Surgeon to bleed him, which was accordingly done, but

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he grew worse; for in this Case I look upon bleeding to be very prejudicial, as well as in most malignant Fevers, for thereby the Spirits are diminished, and the Blood congealed the sooner. When they had done all they could, and the Symptoms still increased, they at length sent for me. I never saw Man or Creature in that Agony in all my Life, that I found him in, senseless, and mad, when at best, but every Minute the fiercest shiverings ran through him, his Eyes would first roll and then set, as if ready to start out of his Head, but above all, the Swelling and Luctation at his Breast, was as if he would burst, which went off with a prodigious sigh: All this I judge the effects of the heart labouring to discharge itself of the stagnating Blood, and the Nervous Convulsions as Consequences thereof. And I am the more confirm'd in this, from what I saw in a Woman that was bit also with a mad-Dog in the Leg, and fell in the very day that she had paid the Chirurgeon for her Cure; and notwithstanding all that could be done, growing worse, they sent for me; I went, and found her with what is called a *Hydrophobia*: She would look earnestly after Drink or Water, and seem to desire it, but as soon as she began to drink, away it went, be it what it would, with the greatest Violence she could possibly fling it. I gave her the Vomit hereafter and also before mentioned, but she got but little of it down, and I had no more with me; nevertheless it so brought her to her self, that she could answer Questions, and I asked her, whether she was afraid of the Drink and Water, when she flung the Cups in that violent manner from her? She said no; but when she offered to drink, her Breast and Heart would not let her. I asked whether through any A version or Fear? She said no, she was very thirsty; but when she offered to drink, it struck to her Heart, and stopped her Breath. That is, as I apprehend, the cold Drink passing down the Throat struck a Chilness in the Blood, and made it readier to stagnate: Besides the very Act of 43 of Drinking, hindring the free Breathing, conduced also much thereto; and therefore the Heart was so suddenly oppress'd, that she could not forbear flinging away whatever she had in her hand. She complained also of a great Rigor and Stiffness or Straitness of the Muscles of her Breast; so that possibly the spirituous Liquor that flows in the *Genus Nervosum* may be congeal'd as well as the Blood; or the same effects may be supposed notwithstanding to be the result of the condensed Blood clogging both the Heart and Lungs, so that the

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Breast may seem to be straitned therewith. The same I judge to be the cause of all the violent Luxations in this Gentleman, whose Fingers I looked on, and found the Places where he had formerly been bit turned blackish, and much inflamed about them, which confirmed me in my Sentiment, that it was a Relapse of its former Distemper, that is, of the Bite of the mad-Dog. I told them, if any thing in the World would save his Life, I judged it might be the former Vomit of volatile Salts; they could not tell what to do, nevertheless such is the Malignancy of the World, that as soon as it was given, they ran away and left me, saying, he was now certainly a dead Man, to have a Vomit given in that Condition. Nevertheless it pleased God that he shortly after cried, *this Fellow in the Black has done me good*, and after the first Vomit, came so to himself, as to know us all. I vomited him every other day with this Vomit for three times, and made him in the interim to take volatile Salt of Amber, and the aforesaid Powders, and to wash his Hands, and Sores in a strong salt Brine: to drink Posset-Drink with Sage and Rue, and by this Course, and the Blessing of God, his Life was saved, and he perfectly cured, for it was now four Years since, and he had had no Relapse. I have cured several others by the same Method. Coll. *Spencer*, the Secretary of State in *Virginia*, a very serious and ingenious Gentleman, told me that his Servant brought him word once that a Sow having farrow'd, a rattle-Snake was got into the Den, and had killed the Piggs. The Colonel went to see the Snake, which they said was still coyl'd in the Den; there followed them two or three mungrel Curs, and they sat one of the Dogs at the Snake, which was too quick for the Dog, and snapt him by the Nose, whereupon he set a howling, and run immediately into the adjacent River, and died very shortly after. Another of the Dogs upon the like attempt was bit by the Snake also, and fell n howling, and frothing, and tumbling; but being he dyed not so soon as the other Dog did, they fetched some of the Herb which they call Dittany, as having a great traditionary Virtue for the Cure of Poisons; they pounded it, and 44 and adding a little Water, express'd the Juice, and gave the Dog frequently thereof, nevertheless he dyed within a Day or two. The howling of the Dogs he supposed gave notice to the Sow, and made her come furiously brisling, and run immediately into her Den; but being likewise bit by the Snake, she set up a terrible Squeak, and ran also into the River, and there died.

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A Gentlewoman, that was a notable female Doctress, told me, that a Neighbour being bit by a Rattle-Snake, swelled excessively; some Days afterwards she was sent for, who found him swelled beyond what she thought it had been possible for the Skin to contain, and very thirsty. She gave him *oriental Bezoar* shaved, with a strong Decoction of the aforesaid Dittany, whereby she recovered the Person: To the best of my Remembrance, it was he that told me, asking him afterwards, what he felt when the Snake first bit him? He said, it seemed as if a flash of Fire had ran through his Veins.

Besides the Rattle-Snake there is the Blowing-Snake, an absolute Species of a Viper, but larger than any that I have seen in *Europe*; it is so called, because it seems to blow, and spread its Head, and swell very much before it bite which is very deadly. It is remarkable that there is none of their Snakes there, make any of that hissing Noise that ours in *England* make, but only shoot out their Tongues, shaking them as ours do, without any Noise at all; this is a short thick sort of Snake, there is another sort of Deadly Snake, called the *Red-snake*; I once narrowly escaped treading on the Back of one of them: They are of an ugly dark brown Colour, inclining to red; their Bellies are of a more dusky White, with a large streak of vermilion Red on either Side; this too is of the Viper kind, but is not so short, but its Tail is more taper and small. The *Horn-Snake* is, as they say, another sort of deadly Snake; I never saw any of them, unless once, shortly after my Arrival in that Country, which I cannot attest to be the Horn-Snake, for I could not distinctly view it, being in a Thicket of *Sumach*; it was perch'd up about two Foot high in a *Sumach* Branch, its Tail twisted about the Shrub, and about a quarter of a Yard stood bolt forward, leaning over the forked Branch thereof: I could not see the Horne, which they say it has in its Front, wherewith it strikes, and if it wounds, is as deadly as the Rattle-Snake's Bite. The Gentleman that was with me, told me it was the Horn-Snake; but being in hast, and on Horseback, and the Snake in a Thicket, I could not see the Horn; but had I thought I should never have seen more of them, I should have took a little Pains to have been better satisfied. This I think may not improperly be referred to the *Dart-Snake*. The

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The *Black-Snake*, is the largest I think of all others, but I am sure the most common; I have kill'd several of them full six Foot long, their Bite is not deem'd mortal, but it swells, and turns to a running Sore; they feed upon Lizards, Mice, Rats, Frogs, and Toads, which I have taken out of their Bellies. I was once a Simpling in the Woods, on a fair Sun-shine Day, when I saw a Snake crawling on a Tree that was fallen, and licking with its forked Tongue as it moved; I stood still to observe it, I saw it lick up small Insects and Flies with wonderful Nimbleness, catching them betwixt the Forks of its Tongue.

The *Corn-Snake*, most like the Rattle-Snake of all others in Colour, but the Checker are not so regular, neither has it any Rattles: They are most frequent in the Corn-Fields, and thence I suppose so called; the Bite is not so venomous as the Black-Snakes.

The *Water-Snake*, a small Snake, I never saw any of them above a Yard long, though I have sometimes seen Forty or Fifty at once; they are of an ugly dark blackish Colour: They say, they are the least venomous of any.