

AN
ESSAY

Concerning the CAUSE of the

ENDEMIAL COLIC

OF

DEVONSHIRE,

Which was read in the Theatre of the College of Physicians, in
London, on the Twenty-ninth Day of June, 1767,
By George Baker,

Fellow of the College of Physicians, and of the Royal Society, and Phyfician to her Majesty's Houfhold.

London
Printed by J. Hughs, near Lincoln's-Inn-Fields.
M DCC.LXVII

TO
SIR RICHARD WARWICK BAMFLYDE,
BARONET,

AND

JOHN PARKER, ESQUIRE,

THIS

ESSAY,

ON A

SUBJECT PARTICULARLY INTERESTING
TO THE COUNTY, WHICH HAS THE
HAPPINESS OF BEING REPRESENTED
BY THEM IN PARLIAMENT,

IS,

WITH THE GREATEST RESPECT, INSCRIBED

BY

THEIR MOST OBEDIENT,
AND MOST HUMBLE SERVANT,

GEORGE BAKER.

AN
ESSAY

Concerning the CAUSE of the

ENDEMIAL COLIC

OF

DEVONSHIRE

A Very small acquaintance with the writings of Physicians is sufficient to convince us, that much labour and ingenuity has been most unprofitably bestowed on the investigation of remote and obscure causes; while those, which are obvious and evident, *que ante pedes sunt*, which must necessarily be acknowledged as soon as stumbled upon, have been too frequently overlooked and disregarded. Such a spirit of investigation has, in several instances, been the parent of dangerous error in practice; inasmuch as Men are apt to be as partial to their own offspring; and seldom forget opinions at the bedside, which have been the result of much contemplation at home. It must however be acknowledged, that such a spirit is a fault not so much to be imputed to the present, as it was to the last age. We have now learned to attend to Nature; to observe diseases, and the genuine effects of medicines on the human body; and to make experiment the great basis of our reasoning. And although, in many cases, we subscribe to the doctrine of that sect of Physicians, who, according to Celsus, called themselves experience, *ab experientia, that non inter fit quid morbum faciat, sed quid tollat*; yet we are not such Empirics, in the modern sense of the word, as to pay no regard to those causes, which

which are manifest and within our reach; such causes more especially, as lead us directly either to the cure of diseases, or to the prevention of them.

With respect to the provincial disease, which is the subject of this essay, I shall at present content myself with considering its origin. And if I am not mistaken in that, it would seem that, in this instance, *cognitio causae morbum tollet*; that an obvious method is pointed out, by which this colic may become no longer and endemial disease in one part of England; and perhaps, in other parts, less frequent than it is at present. A malady, so formidable as well in its immediate effects, as in its more distant consequences, it is an office of humanity, as much as possible, to prevent. We may gain credit even in avoiding an enemy of superior force; and when we find ourselves unequal to the contention, it is a kind of victory to make our escape,-

Faller & effugere est triumphus.

The earliest account of the Devonshire colic, which I have met with, is in Dr. William Mufgrave's *Dissertatio de Arthritide Symptomata*, published in the year 1703. In the fifth section of the tenth chapter *de Arthritide ex calica*, is the following passage. "Alia vero colica, apud Damnonium, ex pomaceo immitti et acido, nimis usurpato, derivatur; id quod ex eo liquet, siquidem illos folum infestat, qui potioni isti affueti: sic ut iis tempestatibus, quae pomaceo abundant, creascant, & in vulgus ea graffetur; contra vero, Pomona copiam negante, rarius obverfetur." It seems very particular, that Dr. Mufgrave should say so much of this colic, which is represented to be the effect of cyder; and not mention those essential and pathognomonic symptoms, by which it is at this time distinguished. Are we to suppose that, when Dr. Mufgrave lived, this species of colic had not been observed to terminate in palsy, or epilepsy? Or is it more probable, that his attention was so engrossed by the general subject of his dissertation, that he forgot to mention such remarkable *phaenomena*? That he was well acquainted

acquainted with a disease exactly similar to Dr. *Huxham's morbus colicus Damnoniorum*, namely the colic of Poitou, is very certain; for in the fourth history of the same tenth chapter, he mentions the case of a gentleman, who “aetatis fore, colica, quam Pictonicam
 “appellat, aliquamdiu vexatus, ex more et progressu istius mali
 “ordinario, incidit in paralyfin; artus exinde marcidos, graciles,
 “imopen habens; per reliquum vitae clinicus. Paralyfi fu ejus
 “initium acceperunt dolores erratici, incerti, horum, illorum
 “artuum internodia cruciante automno et tempestate pluvia
 “maximopere faevientes, et ad amuffim rheumatifmum
 “simulantes.”

It is indeed possible, that Dr. Mufgrave might not often have seen the colic, which he mentions as peculiar to the drinkers of cyder; for, as I am informed, orchards were not in his time much cultivated in the country near Exeter, where Dr. Mufgrave resided; and there was not county-hospital at that time established. And Dr. Huxham testified in the year 1739, that there was at that time ten times more cyder made and drunk in the County, than there had been about thirty or forty years before.

Dr. Huxham's *opusculum de morbo colico Damnoniorum*, which he first published in the year above-mentioned, contains a very full description of the malady, which is the subject of our present inquiry. He informs us, that “in the beginning of the
 “Autumn of 1724, it spread itself over all the county of Devon,
 “among the Poulace especially, and those who were not very
 “elegant and careful in their diet; and that, though it may not rage
 “with the same degree of violence, and may affect a vastly less
 “number of People, yet it infects that County more or less every
 “Autumn.” Whoever peruses Dr. Huxham's description, will readily determine the *morbus colicus Damnoniorum* to be precisely the same disease, which in the year 1617, was described by Francis Citois, a native of Poitiers, afterwards Physician to the King of France, and to the Cardinal Duc de Richelieu, under the title of *novus*

novus & popularis apud Pictones dolor colicus biliofus. Indeed it seems to be acknowledged by Dr. Huxham, that what is called Colica Pictonum, “which kind of disease,” says he, “is very “common in the West-Indies,” is familiar to the disease which he “describes; arising from a familiar cause, to wit, too * great an use “of the very acid juice of lemons, and requiring much the same “method of cure.”

Dr. Huxham’s refers the cause of the Devonshire colic principally to a very gross, essential, acid salt, or tartar, with which the expressed juice of apples, whilst unfermented, abounds. He thinks that “by long and frequent drinking a liquor of this kind, such a quantity of crude, gross tartar is thrown into the blood, that it thence becomes very acrid; and not only the blood, but, from that impure source, all the humours thence secreted. So that instead of a very soft, lubricating mucus separated by the glands, discovered by Dr. Havers, we have as it were a sharp, coagulated matter, whence arises a great pain in the joints, and impotence of their motion. – Instead of an exceeding soft lymph to moisten the nerves, a corrosive ichor; and hence epileptical attacks. Moreover, the blood being saturated with such a great quantity of salts, they attract one the other strongly, and form greater molecules than can pass through the lymphatic arteries, scarce indeed through the sanguineous capillaries; hence various obstructions, and great irritation on the nervous extremities. At length even the very Bile, that variously useful balsam of the body, becomes corrupted and quite enervated by the super-abundant apple-acid, though in its natural state it was designed to correct acidity.”

Thus I have extracted a specimen of Dr. Huxham’s doctrine; and for the remainder of his very ingenious theory I shall refer you to the treatise itself; where you will find a sentiment, which perhaps is

* I am credibly informed, that, at this time, both in the West Indies, and in the northern colonies of America, the juice of lemons and limes is not only much trusted to as the cure of this disease, but that it is esteemed to be a preservative from it.

is applicable on the present occasion.- “Sine experientia vana
“omnis theoria, bella fit utcunque.” For, notwithstanding the
deference, which I always pay to the authority of this celebrated
Physician, I have for some time conceived doubts concerning the
solidity of this doctrine. When I have considered, that there is not
the least analogy between the juice of apples, and the poison of
lead; and that this colic Devonshire is precisely the same disease,
which is specific effect of all saturnine preparations; it has not
seemed to me at all probable that two causes, bearing so little
relation to one another, should make such similar impressions on
the human body. No author, whom I have had an opportunity of
consulting, has given any intimation of having conceived the same
suspicion with myself, except only the anonymous author
(supposed to be M. Bouvart) of *Examen d’un livre qui a pour titre
T. Tronchin de Colica Pictonum, par un Medecin de Paris*. This
writer says, in a cursory manner, and without seeming to lay any
stress on what he throws out, “Il est possible, que les vins, dont
“parle Citois, et les cidres, don’t parle M. Huxham, aient etc, sans
“qu’ils l’aient pu decouvrir, alteres avec la litarge, ou quelque
“autre matiere semblable.”

It is evident however from what this Author afterwards says, in the
forty-sixth page, that he was very far from forming any settled
opinion on this subject. “Ces trois causes, savoir la bile, les
matieres minerales venimeuses, et les vins verts et austeres,
quoique differentes en apparence, produisent, malgre ce qu’ on
peut dire M. Tronchin, des coliques a peu pres de meme espece.”

But to return to Dr. Huxham. – And first, how much soever our
Cyder may agree with Rhenish and Moselle wines in the
circumstance of containing a large quantity of essential salt, of a
familiar figure; no argument, from analogy, will be here be valid,
unless it can be shown that Rhenish and Moselle wines have ever
produced the colic of Poitou in an unadulterated state *.

Secondly, if Cyder is the cause of this disease, as being an
acid,

acid, why is the colic of Poitou very little known in the eastern countries, where the Turks, whose religion obliges them to abstain from wine, drink every day very large quantities of an acid herb? Does the experience of Jockeys, who, in order to reduce themselves to a certain standard of weight by sweating, are said to drink largely of vinegar, strengthen such an observation? Do you find it to be true, that children, and valetudinary people, and particularly choleric girls, whose *primae viae* abound with acid, are on that account subject to this colic? Is not a *Diarrhoea*, or *Cholera*, the ordinary effect of eating unripe fruit immoderately? What reason can be given, why the poorer inhabitants of the counties of Worcester, Gloucester, and Hereford, who use, as their common drink, a weak acid cyder, are subject to no such colic? Why is this disease no longer endemic in the province of Poitou? Is it that the grapes are brought to more maturity, than they were formerly? Has the Sun more power now, than in the time of Cato? Why, in the Bahama-islands, is this disease unknown? I am informed by a gentleman, who lived there many years, that this has been the case, ever since rum has been no longer distilled in those islands. The same gentleman informs me, that the inhabitants drink very large quantities of small punch, made extremely acid with the juice of limes; the labouring people to the amount of two gallons of it every day. And lastly, is it reasonably to be suspected, that the essential salt of a vinous liquor can raise such tumults in the bowels, whether by corrupting the Bile, or otherwise; when it is vulgarly known, even among the Miners in Derbyshire, that Patients, afflicted with this same disease, do not receive a more immediate, or more important relief from any medicine whatever, than by taking large and repeated doses of this very essential salt, the *Cremor Tartari*; and when it appears, that Dr. Hillary greatly depended on it for the cure of the dry-belly-ach in the West-Indies? Zeller, in his *docimasia, figna causae, & noxa vini lithargyrio mangonifati*, gives an account of the revival of the adulteration of wine with litharge in

in the Duchy of Wirtemberg, in the beginning of the present century. In this dissertation he asserts, that though the wines, in the neighborhood of Tubinga, were as acid as vinegar, the inhabitants had long drunk them with impunity, 'till this fraud was introduced. "Constat viciniam nostram, ubi alias montes lachrymantur, acetum, "et istiusmodi vina immatura et acida per plures annos, imo lustra "ab incolis & militibus largiter hausta fuerunt, ab omnibus tamen "his symptomatibus penitus liberam fuisse, cum a furo quoque "libera fuerit: Imo in ipsa hac nostra Civitate quae ante duo lustra "truculentia hac tantum non oppressa fuit, postquam fraudem hanc "plurimi tam Vietores, quam Caupones, tecte quidem exercuerunt, "omnes isti, qui a Cauponibus vinum vel non emerunt, vel in "eorum aedibus non biberunt, a torminibus et cruciatibus hisce "immunes evaserunt; licet eorum domestici per aliquot annos "austerum & acidissimum hauserint vinum, ut acidius gustari vel "dari nequeat; aliis interea, quos dulcedo inescavit, miserrime "patientibus, aut evervatis, elumbibus redditis, pendulis artibus et "refolutis incedentibus, aut neci traditis; plurimi enim miserrime "perierunt."

The experiment, mentioned by Zeller proves nothing against the general wholesomeness of acids. Upon his giving to a Dog three ounces and an half of very strong vinegar, the respiration of the animal immediately became laborious and difficult; and he died in the third hour after he had swallowed the vinegar, having thrown up great quantities of froth, which at last was mixed with blood. The Dog being opened, no signs of inflammation appeared in the stomach: the mischief is described to have been in the lungs only. Some of the vinegar probably found its way into the lungs; and suffocation seems to have commenced in the very act of swallowing. Whereas Brunnerus, (*Ephemerid. Germanic. an. 4. Observat. 92.*) who killed a Dog with an ounce of powder of litharge, dissolved and boiled in vinegar, found the effects of that poison to be principally in the stomach, intestines, urinary bladder, and the rest of

of the *vifcera* of the *abdomen*.

I fhall only add one more obfervation concerning acids. Phyficians, who have refided fome time in the hotter countries, k have teftified, that there are no better remedies againft fpafms, dyfenteries, and the other endemial difeafes in hot climates, than the acid vegetables, with which Nature has moft liberally fupplied the warmer countries. This opinion is expreffed in a ftrong manner by Jacobus Bontius in his *Hiftoria Naturalis Indiae Orientalis, lib. vi. cap. 27.* “Videtur Natura vouiffe ex profeffo multas acidas et “conftringentes herbas e terra producere contra violentos & “endemios morbos, dyfenteriam nempe, choleram, & fpafmum, “plerumque a Bile ortos: ut quafi digito monftraret, ubi haec vel “familia mala nafcuntur, ibi locorum remediorum manifefta et “etiam culta qualitate pugnantium penuriam non fore.”

It feems therefore not to have been without fufficient foundation, that I have for fome time fufpected, that the caufe of this Colic is not fought for in the pure Cyder; but in some, either fraudulent, or accidental, adulteration.

Upon inquiry, I find that the difeafe is very common all over the county of Devon; but that it particularly infefts thofe parts of the county, where the greateft quantities of Cyder are made. I likewife find that it is not only common among the lower clafs of inhabitants; but that it is much more frequent among people of all ranks, than in other parts England; and that it is not intirely confined to that autumnal feafon. Not long ago I had an opportunity of feeing feveral wretching victims to this cruel difeafe; who answered to the representation drawn by Citois. “Per “vicos, veluti larvae, aut arte progredientes ftatuae, pallidi, “fquallidi, macilenti confpiciuntur, manibus incurvis et fuo “pondere pendulis, nec nifi arte ad oset caeteras fupernas partes “fublatis, ac pedibus non fuis, fed crurum mufculis, ad ridiculum, “ni miferandum, inceffum compofitis, voce clangofa & ftrepera.”

I lately received from Dr. Andrew of Exeter the following account

account of all Patients, under this difeafe, admitted into the hofpital at Exeter fince September 1762.

From Sept. 1762 to Sept. 1763 – 72

Sept. 1762 to - 1764 – 75

Sept. 1764 to Lady-Day 1766 – 86

Lady-Day 1766 to July 6, 1767 – 52

285

Of this number 209 were cured.

Dr. Andrew likewife informs me, that Patients are brought to the Exeter hofpital from all parts of the county; but chiefly from thofe parts, where moft cyder is made. – That the moft violent fymptoms of this diforder, fuch as pain and coftivenefs, are generally removed, before the fick are brought to the hofpital; and that nothing commonly remains but a paralytic weknefs in the arms. Dr. Andrew adds, “I have known this complaint cured “radically; tho’ I confefs, a return often happens. When the difeafe “proves obftinate, we always endeavor to get our Patients into the “hofpital at Bath; the Bath-water, tho’ not a fpecific, being “efteemed by us the moft effectual remedy, both interally and “externally ufed.”

According to my information, eighty Patients, under the effects of the Devonfhire colic, were admitted into the Bath-hofpital in the courfe of the laft year; forty of whom are faid to have been cured, and thirty-fix went away greatly relieved. I likewife am informed from the Bath-hofpital, that the proportion of fuch Patients from Devonfhire, to that from the counties of Hereford, Gloucefter, and Worcefter, is generally as eight to one.

In fome letters, which I have lately received from Dr. Wall, of Worcefter, the following facts are mentioned. “The counties of “Hereford, Gloucefter, and Worcefter, are not, fo far as I know, “fubject to the colic of Poitou, or any other endemic illnefs, unlefs “it may be the rheumatifm; which, I think, the inhabitants of “Herefordfhire

“Herefordshire are more liable to, than those of some other
“counties. There is no Lead, which can give occasion to that colic,
“used in any part of the apparatus for grinding or pressing the
“apples, or fermenting the liquor. Once indeed, in a plentiful year
“of apples, I knew a Farmer, who wanting casks, filled a large
“leaden cistern with new cyder, and kept it there, till he could
“procure hogheads sufficient to contain the liquor. The
“consequence was, that all who drank of it were affected by it as
“the Lead-workers usually are. We had eleven of them, at one
“time, in our Infirmary.

“I have lately had two or three Patients in that distemper,
“occasioned by their having distemper, occasioned by their having
“drunk cyder made in a press covered over with Lead. But this fact
“of a cyder-press covered with Lead, is a singular, and perhaps the
“only instance of the kind in this part of England. It happened in a
“part of the county of Worcester, adjoining to Warwickshire, where
“very few apples grow; and the bed of the press being therefore
“cracked by distemper, the sagacity of the Farmer contrived this
“covering, to prevent a loss of his liquor. In general, the cyder-
“drinkers with us are healthy and robust; but for the most part lean.
“The liquor is clear, and passes off readily by urine and
“perspiration; which enables the common people to drink immense
“quantities of it when at labour, to the amount of several gallons in
“day. I have heard it observed by a Physician, late of this place,
“who was much concerned in the cure of Lunatics, that more of
“those unhappy Persons came to him from Herefordshire, than any
“other place. The fact, if true, may possibly arise from the quantity
“drunk, rather than the quality.”

Were the *apparatus* for making cyder the same in all the
cyder-counties, it would appear very remarkable, that the
inhabitants of one county should experience such terrible effects
from the use of this liquor, while those of the other counties drink it
with impunity. But, if we inquire into the method of making cyder
in

in the county of Devon, we shall be able to conjecture with some degree of probability, what it is that occasions such a difference. The large circular trough, is generally composed of several pieces of moor-stones, cramped together with iron, some melted Lead being poured into the interstices. It frequently happens, that these stones, which are thus to be joined, are unequal, and do not correspond with each other; so that considerable chafms are left between them; and these chafms are filled up with Lead. In this case the apples, ground by the pressure of the roller, immediately come in contact with no small quantity of this poisonous mineral.

It is likewise common, in several parts of the county, either to line the cyder-presses entirely with Lead, in order to prevent their leaking or to make a border of Lead round the presses, in order to receive the juice of the apples, and to convey it into a vessel, made of wood or stone, placed underneath. And in many other places, where these methods are not used, it is common to nail sheet-lead over any cracks or joints in the presses; and likewise to convey the juice of the apples from the presses in the leaden pipes. Moreover I am informed, that it is the practice of some Farmers, in managing their weak cyder, made early in the year, before the apples are ripe, to put a leaden weight into the casks, in order to prevent the liquor from growing sour; and that this cyder is the common drink of their fervents and labourers. But I am willing to believe, that this pernicious method of adulteration (against which several laws have been enacted, as well in France as in Germany, and which crime, in both countries, is deservedly punished by death is not often practised by our countrymen.

Dii meliora piis, erroremque hostibus illum!

Dr. Wall informs me, that in some parts of the counties of Hereford, Gloucester, and Worcester, the mills, in which the apples are ground, being 16, 18 and 20 feet in diameter, consist of several pieces of stone or timber, joined together with cramps of iron, joined

joined together with cramps of iron, fastened with Lead: but that these cramps are fixed in the *bed* of the mill, or on the outside of the curb, and not in the groove where the apples are ground. The same Gentleman observes, that, if many apples, full of juice, lie long on the *bed* of the mill, (where the apples are placed in an heap, that they may be ready to be thrown into the groove,) some of which may perhaps be rotten, others bruised in the gathering, and a moisture spread over the whole, from the fermentation and sweating of the fruit, it may perhaps be doubted, whether there some part of the Lead, used in the cramps, may not be dissolved; tho' it must be, at most, in a quantity extremely small; there being but very little Lead used in the junctures; and the surface exposed to the apples being almost imperceptible. But I am informed by another person, that in many parts of Herefordshire, and the neighboring counties, the stones of the mills, are joined together with putty; (which is whiting, mixed with oil into a tough paste) and that neither iron nor Lead are originally used in the construction of them; but that, if any of the joints, in wearing, happen to start (which is sometimes the case) they are repaired with iron cramps fastened with lead.

These facts having been well ascertained, I determined to make use of the first opportunity, which might occur, of informing myself by experiment, whether or no there are really marks of solution of Lead in the cyder of Devonshire. Being therefore, in the month of October 1766, at Exeter, I procured some of the expressed juice of apples, as it flowed from a cyder-press, lined with Lead, in the parish of Alfington. On this I made and repeated several experiments by means of the *atramentum sympatheticum*, or *liquor vini probatorius* described by Neumann; and of the volatile tincture of sulphur. These experiments entirely satisfied me, that the Must contained a solution of lead. The same experiments were made of some cyder of the preceding year. This likewise showed evident signs of lead contained in it; but in less proportion

proportion than in the Muft.

But, being unwilling to make any positive assertion, solely on the authority of my own trials, more especially as I had been under the influence of a preconceived opinion; I brought with me a London fume of the fame Muft, which I had examined at Exeter. This Muft, together with fome Devonshire cyder of the preceding year, which I purchafed of the maker, (who affured me that he ufed no Lead in any part of the apparatus for making cyder, except only what is neceffary for compofing the trough, as was mentioned above,) were the fubject of fome experiments, in making which, Dr. Saunders, in an ingenious Gentleman, who teaches Chemiftry, kindly gave me his affiftance.

Before I give an account of the feveral experiments, which we made, in order to afcertain this adulteration, it may be proper to make a few obfervations, which will perfectly explain the mode of union, which takes place between wine, or cyder, and lead.

The expreffed juice of the grape, or of the apple, has a confiderable quantity of acid united with the faccharine matter. This juice, when fubjected to fermentation, has its acid, during the progrefs of that fermentation, gradually affimilated and converted into an alcohol or inflammable fpirit. But if the original juice, or Muft, be crude and acid, without having much faccharine matter in it, the native acid is with difficulty affimilated; or, when it arrives at the proper period of affimilation, it does not remain there ftationary, but haftens on to the acetous fermentation. When lead is added to fuch wines, their acidity is covered; a fweetnefs is communicated to them; and their acetous fermentation is checked.

The richer wines, of which the original juice contains a larged proportion of faccharine matter, are lefs liable to adulterations of this kind, than the poorer wines of northern climates, fuch as the Rhenifg and the Mofelle wines, and our Englifh cyder.

It is here to be obferved, that the vegetable acid, either in its native

native state of Muft, or in its fermented state of vinegar, or in its intermediate state of cyder, very readily receives an impregnation from Lead, whether it be applied in its metallic or calcined state. We are therefore to consider Lead, when united with wines, as in the condition of *faccharum Saturni*.

By attentively observing the variety of changes produced by certain bodies, when added to a solution of *faccharum Saturni*; and by applying these observations to the wines, which are the most frequent subjects of this adulteration, Chemists have been enabled to detect such frauds, wherever they have existed.

EXPERIMENT I.

A small quantity of Devonshire cyder being exposed upon clean paper to the fumes of the volatile tincture of sulphur, became immediately of a darkish colour, approaching to black. And we could only imitate this colour by exposing a dilute solution of *faccharum Saturni* to the same fumes. A small quantity of cyder, made in the county of Hereford, exposed in like manner to the same fumes, exhibited no such appearance, until a few drops of a solution of *faccharum Saturni* were added to it.

OBSERVATION I.

From this experiment we are to understand that the acid, before united with the Lead in the cyder, before united with the Lead in the cyder, and the volatile alkali in the tincture of sulphur, mutually attracted each other; and that it was the precipitate of the Lead united with the sulphur, which produced the dark colour above-mentioned.

EXPERIMENT II.

A

A small quantity of *Hepar Sulphuris* (prepared by digesting together in a sand-heat one ounce of orpiment, and two ounces of quick-lime, with twelve ounces of water, in a close vessel) being added to some Devonshire cyder, in a few minutes occasioned a darkish colour in the body of the liquor, approaching to black; and the whole became very opaque. No such change was produced in the cyder of the county of Hereford, until a few drops of a solution of *faccharum Saturni* were added; when the same appearance, which was produced in the Devonshire cyder, was perceived.

OBSERVATION II.

The reasoning, made use of in the former observation, is applicable here. The decomposition of the *faccharum Saturni* and of the *Hepar Sulphuris* was effected by the same laws of elective attraction.

EXPERIMENT III.

To a small quantity of Devonshire cyder a few drops of *Hepar Sulphuris* (prepared by boiling equal parts of fixed vegetable alkali and sulphur together in water) were added; and a precipitation of a very dark colour was produced.

When some Herefordshire cyder was treated in the same manner, the precipitate produced was as white as milk; and it was only upon the addition of a few drops of a dilute solution of *faccharum Saturni*, that a precipitate of the same colour with the former could be obtained.

OBSERVATION III.

There is some nicety required in making this experiment. The *Hepar Sulphuris* is not to be added in any large quantity; for as

as all the lead is precipitated upon the first addition, it is easy to perceive the several successive shades of colour in the precipitate, until all the lead is separated; and then the precipitate, upon a farther addition of *Hepar Sulphuris*, assumes the whiteness of the precipitate obtained from the Herefordshire cyder, which intitles it to the appellation of *Lac Sulphuris*. If a large quantity of *Hepar Sulphuris* be at once added, the whiteness of the too copious precipitate is such, as to render the dark colour of what is first precipitated imperceptible.

EXPERIMENT IV.

Some Devonshire cyder was examined by means of the volatile tincture of sulphur, as in Experiment III. A very dark coloured precipitate was obtained. A similar precipitate could be only obtained from Herefordshire cyder, after that a weak solution of *faccharum Saturni* was added to it.

Some of the Muft (taken from the pears in the parish of Alington, as was mentioned above) treated in the same manner with the cyder, produced precipitates of a deeper black colour. This sufficiently shews, that the solution of Lead in the Muft was stronger than that in the cyder.

It is a matter of no consequence, whether the Lead, the existence of which is proved, was applied to the cyder in its state of Muft, or in that of a vinous liquor. However, as the muft afforded more considerable signs of impregnation than the cyder, it would seem probable that the lead was added to the Muft; and that, as the acid, during the fermentation, is in a great measure converted into alcohol, a proportional quantity of lead will consequently be precipitated.

The same experiments were afterwards tried on several other specimens of Devonshire and of Herefordshire cyder. The result of them was constantly and uniformly the same as has been described.

described.

It has been proposed by several Authors, to detect such adulterations of wines by means of the vitriolic or of the muriatic acid; which, by uniting with the lead, will make it precipitate. But it is ascertained by the experiments, made with the acids, are less conclusive than those which have been described.

EXPERIMENT V.

In order to leave the matter entirely without doubt, an extract from 18 common quart bottles of Devonshire cyder (first strained through a cloth) which had been in my cellar more than three months, was prepared. This extract, being assayed with the black flux, a quantity of Lead, weighing four grains and an half, was found at the bottom of the crucible. These experiments were made in October 1766.

In the latter end of the last century, when the physicians of Germany (particularly Vicarius, Cockelius, and Brunnerus, whose dissertations of this subject may be found in the *Ephemerides Germanicae*) had taken great pains to discover the true cause of the epidemic colic, which, to use the language of Brunnerus, (*Ephemerid. Germanic. Dec. 3. an. 4. Observat. 92*) “non minus aegrotantium viscera, quam medentum animos, torferat;” And when they had at last demonstrated, that this disorder was wholly to be referred to small acid wines, adulterated with litharge, there appeared a writer (a certain Seerup, a physician of Copenhagen) who endeavored to exhibit a specimen of his reading and ingenuity, by maintaining a bold paradox. This man, in very pompous language, and with an air of the greatest confidence, asserted in his *triumphus lithargyratorum*, that no danger was to be apprehended from wines in which litharge was dissolved; and that all the ill effects, supposed to have been derived from that cause, were really to be attributed to the austere acid of wine made of unripe grapes. This

This opinion he endeavors to defend by the authority of Drawitzius, Sennertus, Van Helmont, Theodorus Zwinger, Boyle, Wepfer, and several other Writers. He likewise quotes several authors, to shew the salutary effects produced in the human body by the internal use of lead; and infits, in the virtue of their testimony, that it had cured affections of the spleen, arising from an acid cause; the hypochondriacal disease; sudden inflammations; colics occasioned by the Bilis aeruginosa; obstinate quartan fevers; ulcerations of the lungs, as well as other parts; and the plague itself. He adduces other authorities to shew, that the *Aqua Saturni* had been of very great use in disorders occasioned by worms; that the *Spiritus Saturni* had cured the leprosy; that Paracelsus held it to be a specific remedy in madnes; and that in the smallpox, and all other inflammations, it had been proved to be an efficacious medicine: That it was the great sudorific medicine of Faber; and that it was Myoficht's secret for the cure of the phthisis, and diseases of the spleen and colic; and that the great success, which had attended the practice of Petrus Matthias was to be ascribed to the use of *Saccharum Saturni*, and other preparations of lead: and lastly, that a constipation of the belly could not justly be attributed to *Saccharum Saturni*, since Antonius de Heide asserts, in his medicinal observations, that he cured that disorder by administering to his Patients five grains of that remedy, mixed with Crabs-eyes.

It is presumed that, the preference of lead in the Cyder of Devonshire being demonstrated, there is no one, at this time of day, likely to revive the argument of Seerup, and still insist on the deleterious quality of the acid: For a poison is discovered, which is experimentally known to be adequate to all those dreadful effects, so pathetically described by Dr. Huxham. It likewise presumed that no opinion, unsupported by facts and experience, (how respectable soever the character of its author may be) will be admitted in evidence, when contrasted with the authority of a fact, which seems to

to be clearly demonstrated to our senses.

The general character of lead, and the preparations of lead, when given internally, has been, that they cool, increase, repel, absorb, and obtund acrimony. And it is very well known, that their real power has, in many instances, seemed to answer to such a general character; for there are scarcely any medicine, which produce their effects more immediately, or with greater certainty, in colliquative sweats, in fluxes, and in haemorrhages. But it is as well known, that the relief given, which for the most part, is only temporary, has been frequently followed by violent pain in the bowels, obstinate constipations, suppression of urine, tremors, spasms, palsy, asthma, and suffocation. And altho', if we give credit to the testimony of credible writers, we must allow that Patients, of certain constitutions, may have taken these medicines with success, and with impunity; yet surely Physicians cannot be too cautious in avoiding the use of medicines, the effect of which, for aught that they can presume to ascertain, may be more formidable than the diseases to which they are opposed. That preparations of lead were formerly very fashionable medicines, we may judge from the oldest dispensatories, in which we find an almost infinite number of Magisteries, Elixers, and Balfams, which have that metal for their basis.

We are informed by Mr. De Haen, that the use of these medicines is much more common even now than is generally imagined. He thinks that the number of Patients, affected by the colic of Poitou, is immensely increased by such means. He mentions the formula of a medicine, compounded of Saccharum Saturni, of Ceruffe, and of water. By this medicine taken cochleatim, a Patient, he says, was cured of a gonorrhoea; but soon afterwards was seized with the most excruciating pain in his bowels, followed by a vomiting of his excrements. He adds, that this man, tho' he escaped death, even after three years, felt and lamented the reliques of that most dreadful cure. I could quote from

from my own experience more than one instance of cafes, in several respects similar to this, which I have taken from Mr. De Haen's *ratio medendi*.

What then can we think of the practice of the Chinese, who very frequently administer internally various preparations of lead, to which they ascribe extraordinary virtues? The observation made on this subject by Mr. Malouin, in his *Chymie Medicinale*, seems judicious. "En réfléchissant sur l'usage intérieur que les Chinois font du Plomb, on est porté à croire que ces peuples font différemment concrets ou tempéres; ou que leur Plomb diffère du notre."

Dr. Huxham finds it a difficulty to account for the reason, "why the juice of apples in one year produces a costive belly, with violent colical pains, but in another, a loose belly with scarce any gripes attending." I have been informed by others, that small quantities of new cyder will frequently produce a *diarrhoea* in every year. But Citois observes, that the colic, which infected the inhabitants of the province of Poitou, was often attended, "per initia praefertim, cum alvi frequenti, sed non ita copioso, fluore, faepius cum eisdem adstrictione." M. Douzam, who writes on this disease in the journal de médecine for the month of October, 1760, affirms that "Il en est plusieurs, qui non seulement n'ont point éprouvé de constipation mais même qui se font plaints d'un flux de ventre." The same thing is sometimes observed in the café of painters, and of other workmen employed about Lead. Some of them are cured by a spontaneous loosening of the belly. Mr. James Wilson, who (in the *Essays and Observations physical and literary*, published at Edinburgh, Vol. I. Art. 22.) gives an account of a disease, called by the miners Mill-reek, which all the inhabitants of Lead-Hills are subject to, but particularly those, whose daily business it is to melt down the Lead, observe, that, in the first stage of this disease, a diarrhoea sometimes makes a cure.

A question may be asked, "If the mischiefs occasioned by Cyder,

Cyder, particularly when it is new, arise from the poison of lead dissolved in it, how happens it, that all, who drink this liquor, do not suffer in proportion to the quantity of poison swallowed; and that some people, who have long accustomed themselves to it, have never experienced any of its bad effects?" this difficulty, (which is in its full force, whatever general cause be supposed) can only be solved by recurring to that inexplicable *idiosyncrasia*, in which there is so remarkable a difference among men. But it is likewise to be remembered, that the Physicians of Germany, who, in the latter end of the last, and in the beginning of the present century, wrote concerning wine adulterated by litharge, and the general effects of it, made the same observation. The words of Zeller are, "Multi tamen, imo innumeri ab eo laesi non fuerunt, ut ut ad ebrietatem usque illud hauserint; alii leviter tantum."

I shall only add, that it will not be easy to determine the exact quantity of lead dissolved by the acid of Cyder, unless an evaporation and an assay be made, as soon as the juice is expressed. For it seems probable, that, as it happened in the case of the adulterated wines of Germany (which, we are informed, after a few months, lost that apparent, but pernicious improvement, which a fraud had given them) the Cyder may, in some time, deposit the greatest part of its poison. But that a very small quantity of this poison is capable of producing most terrible effects, is certain from what was formerly observed in Germany. For a calculation having been made, according to the method of adulterating wines which is described by Cockelius, a measure of wine, called the *menfura Wirtenburgica major*, (which Reifelius estimates at sixty-four ounces) scarcely contained one half of a grain of litharge.

May not I presume to hope, that the present discovery of a poison, which has for many years exerted its virulent effects on the inhabitants of Devonshire, incorporated with their daily liquor, unobserved, and unsuspected, may be esteemed by those who have power,

power, and who have opportunities to remove the source of so much mischief, to be an object worthy of their most serious attention? I have long lamented, that a County, which is distinguished by some peculiar blessings, should likewise be distinguished by a peculiar calamity, as it were in consequence of its fertility. The subject therefore having appeared to me important, I have spared no pains in this investigation; and I am assured of my reward in the consciousness of having endeavored to preserve my countrymen and fellow-creatures from one of the most dreadful diseases, incident to the human body.

This essay will probably be hereafter be published in a medicinal collection. Some copies of it are now printed, with a particular view of giving to the inhabitants of the county of Devon the earliest intimation of their danger; in order that they may take the proper steps to preserve their health, and to secure the value of their property.

FINIS

The above material is under the public domain.