

Experiments and observations on the cortex salicis latifoliae, or broad-leaved willow bark; illustrated by a coloured plate. Interspersed with general observations and remarks on the different species of the cinchona, &c.; General history and progressive introduction of the salix latifolia; with a variety of experiments, tending to elucidate its properties. Illustrated by cases demonstrating its superior efficacy above the cinchonae in various diseases, more particularly that branch of the healing art termed medical surgery / by G. Wilkinson.

Contributors

Wilkinson, George.

Bywaters, E. G. L. (Eric George Lapthorne), 1910-2003 (Donor)
Royal College of Physicians of London

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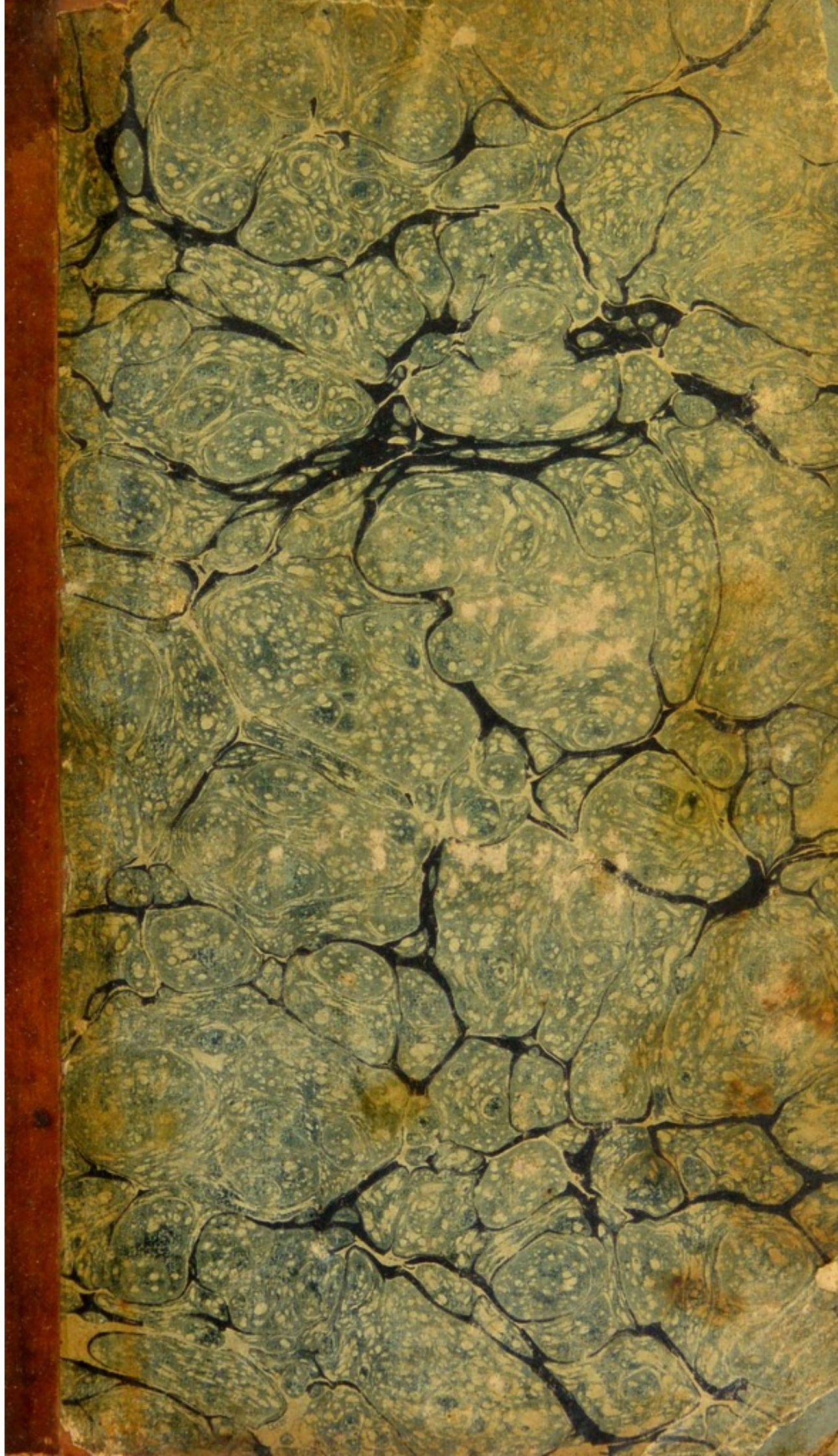
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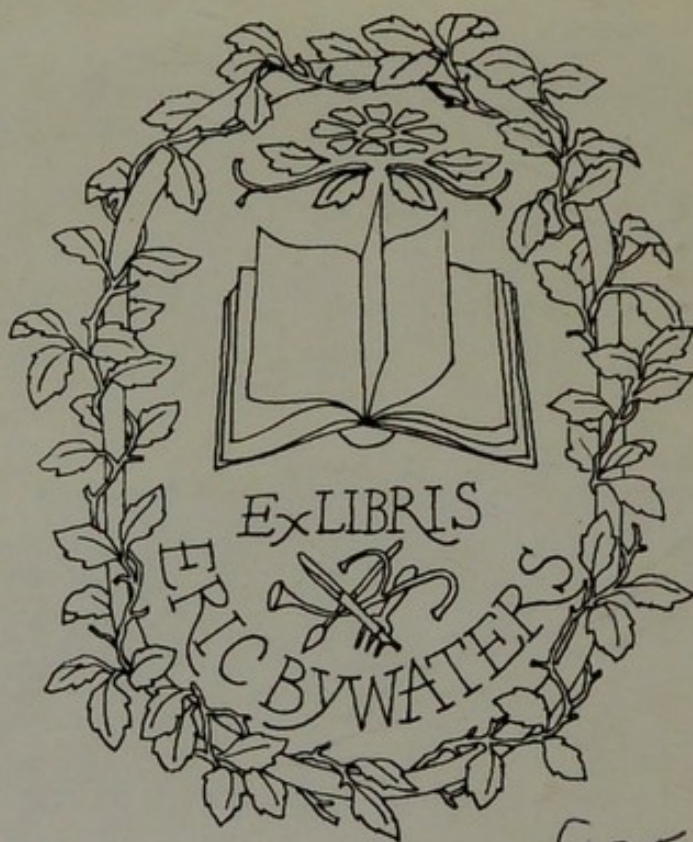


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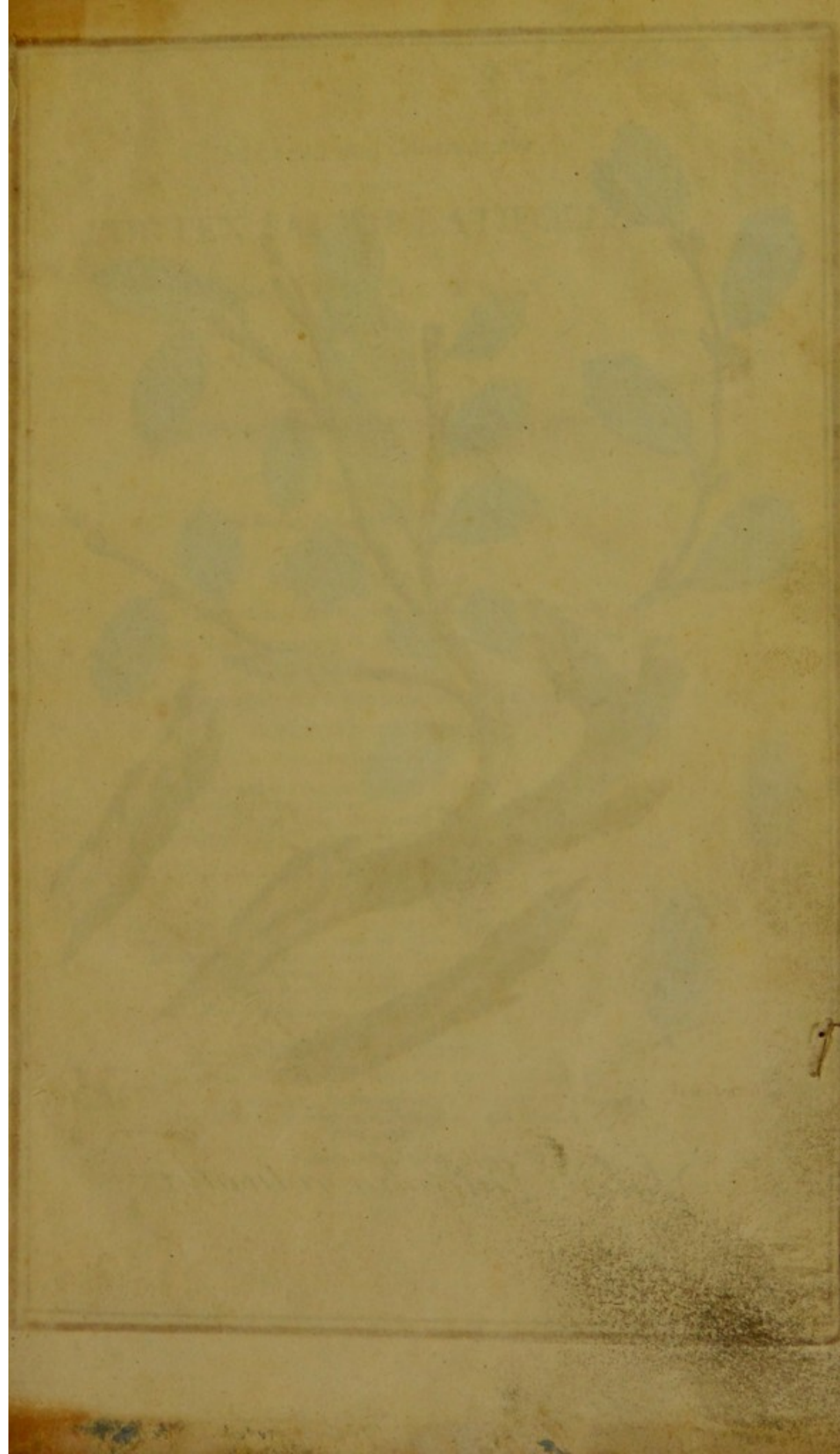


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Assiotti fecit

Bewick Sculp

Salix Latifolia rotunda.

I. M. P. D.

Experiments and Observations
ON THE
CORTEX SALICIS LATIFOLIAE,
OR
BROAD-LEAFED WILLOW BARK;
ILLUSTRATED BY A
COLOURED PLATE.
INTERSPERSED WITH
General Observations and Remarks on the different Species
OF THE
CINCHONA, &c.
General History and Progressive Introduction
OF THE
SALIX LATIFOLIA;
With a Variety of Experiments, tending to elucidate its Properties.
Illustrated by Cases demonstrating its superior Efficacy above the Cinchona
IN VARIOUS DISEASES,
More particularly that Branch of the Healing Art termed
MEDICAL SURGERY.

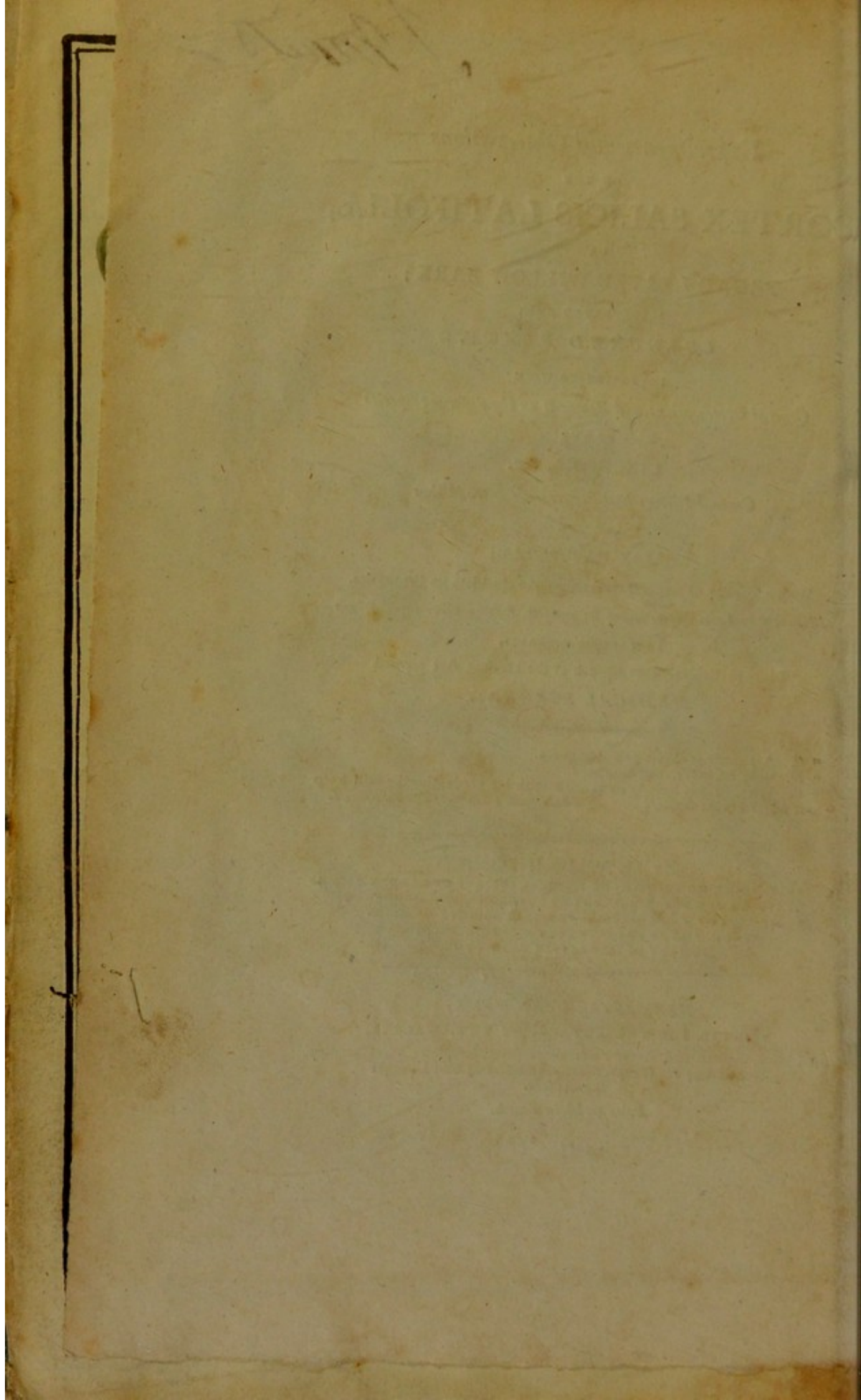
—
“ C. A Tanner will last you nine years.
“ H. Why he, more than another?
“ C. Why, sir, his hide is so tanned with his trade, that he will keep
“ out water a great while.” *Shakespeare's Hamlet, Act V. Scene I.*

—
By G. WILKINSON,
CORRESPONDING MEMBER OF THE MEDICAL SOCIETY OF LONDON, LICEN-
TIATE OF THE ROYAL COLLEGE OF SURGEONS, AND HONORARY
MEMBER OF THE CHIRURGO-PHYSICAL SOCIETY OF EDIN-
BURGH, AND OF THE LITERARY AND PHILOSOPHICAL
SOCIETY OF NEWCASTLE UPON TYNE.
—

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1803



TO
JOHN SHELDON ESQ. F. R. S.
*Professor of Anatomy in the Royal Academy of Arts,
&c. &c.*

WORTHY SIR,

I HAVE presumed to dedicate this work to you, not on account of its originality, or any intrinsic merit it may possess, but from motives of real respect and esteem for the many kindnesses and acts of friendship I have repeatedly experienced from you.

Upwards of twenty years have elapsed since I was your pupil: from your private as well as public instructions, I became early acquainted with many valuable and original improvements in *anatomy*, *physiology*, and *surgery*, prior to their being publicly announced, and which are still announcing by others, who have claimed them as their own.

To notice these in this dedication is unnecessary, and of course I shall avoid all frivolous disputes.

No one, however, can well dispute your right to the discovery of the improved surgical treatment

▲

of fractures of the *Olecranon*, &c. &c. nor will they deny you the merit of the discovery (at least in this country) of the orifices of the *laeteals*, by your naked eye, in the *human subject*, which I fortunately witnessed with others, at the time you saw them on the subject I was then dissecting, and from which your accurate plates were delineated.

In thus publicly noticing these particulars, without asking your permission, I may have taken too great a liberty,—be this as it may, *I have done it*.

It is a fact indisputable, that *many* (but particularly my late ingenious friend Mr J. Hunter, after developing his truly eccentric and invaluable doctrines, in his public lectures on the animal economy) found these illiberally assumed by others, who eagerly published them as their own.

The crime of *plagiarism* is the more to be reprobated, because it can be chastised by *the literary tribunal* only, while at the *legislative* it escapes with impunity.

I shall forbear apologizing for these observations : by some I expect to be censured, while

others, feeling fore from the same unhandsome treatment, will not think me unjust.

By you, sir, I was made acquainted with the importance and necessity of the cultivation of medical surgery, a science, which, till lately, has been but little regarded even among hospital surgeons, but which, I trust, will, in future, be considered as a *sine qua non* of the healing art. I could say more, but if what I have already said should prove of the smallest utility to *medical science*, my intentions will be satisfactorily accomplished. I am,

WORTHY SIR,

With sincere esteem,

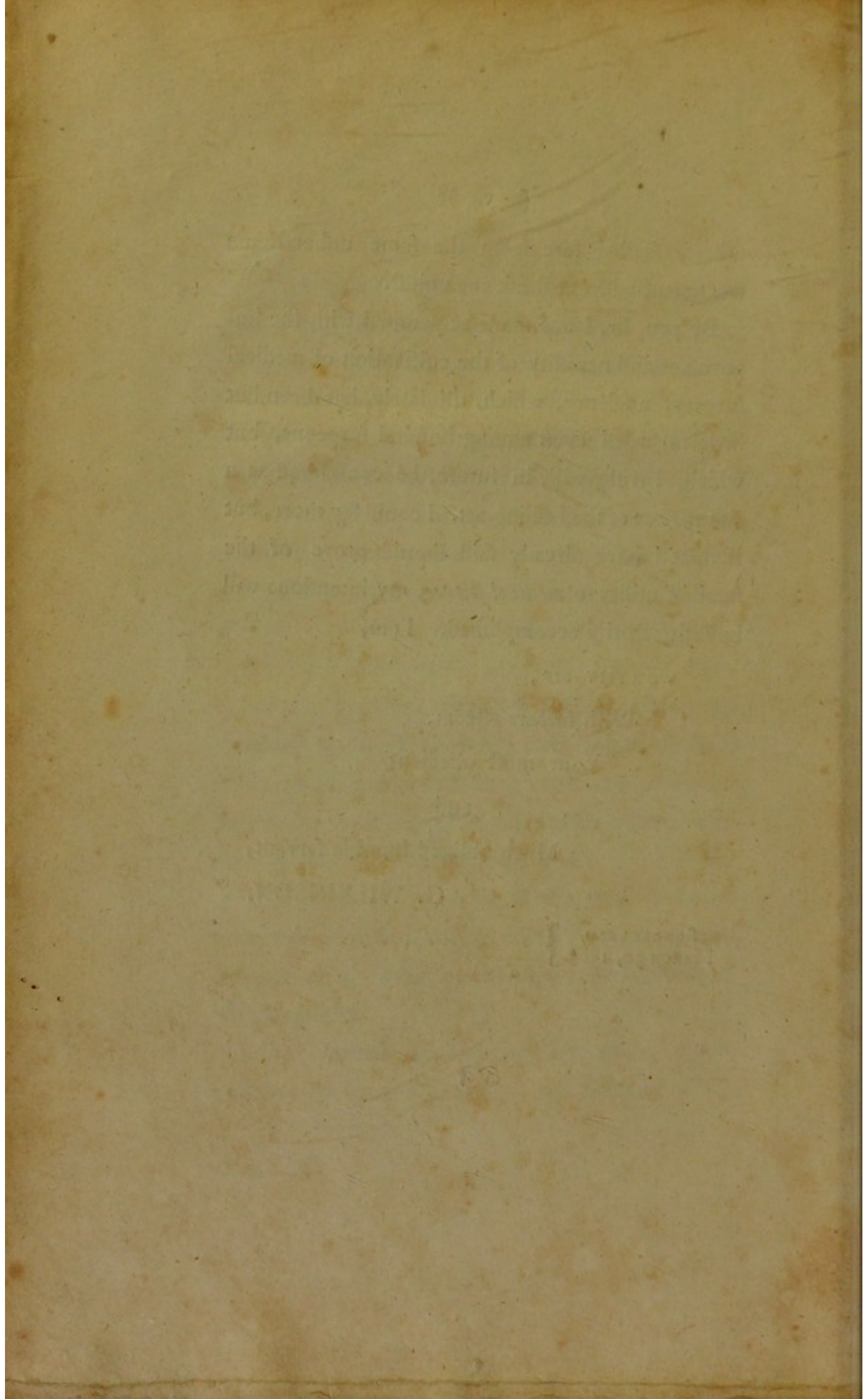
Your most obedient

and

Much obliged humble servant,

G. WILKINSON.

SUNDERLAND, }
MARCH 30, 1803. }



PREFACE.

AFTER what has already been written on the willow bark, by Mr James, and Mr White, it may, perhaps, be deemed, by some, a work of supererogation in me to say any thing more on this subject. But, as some things are passed over, by these gentlemen, which, on the perusal of this essay, will be found of some importance, not only with respect to the preparation of the bark, the time of gathering it, the necessity of its being accurately distinguished from others of the same genus, that may be substituted or mixed, should it become an article for sale in the shops of druggists, together with other considerations that will occur in the course of this work, I trust it will appear obvious, that a further investigation of the comparative merits of this indigenous vegetable, will not prove altogether uninteresting.

In contrasting this bark with the various species of the *Cinchona*, it was deemed by no means improper, or unnecessary, to notice briefly their general history; more especially as the article I am now about to recommend, is intended not only to supply their place as a substitute, but in many instances to su-

perfede their use, particularly in that department of the art, termed MEDICAL SURGERY.

How far this may prove the case, must be left to time, and the experience of others, who may be induced to give it fair and decisive trials.

It is full ten years since Mr James announced it to the public, and nine have elapsed since I first began its use. It cannot, therefore, be said, that I have been in too great haste to give the result of my experience, which, during that period, has been pretty extensive; and when I venture to assure the public, that care and attention has not been wanting to discriminate its real merits, they will not, I apprehend, censure me for the diffusive *minutiæ* I have adopted, in the relation of some of my cases. This, which will be deemed a fault by those who are veterans in medical science, may by others be accounted of some importance.

It cannot, however, be denied, that *nature* will do much; but, it must be allowed, she will do more, when her efforts are carefully assisted. For this reason it is that I have dwelt at some length, not only on the treatment adopted in conjunction with the *Medicines* administered, but have glanced *en passant*, at what I deemed errors in practice, so far as these did not coincide with my experience.

The experiments I have related, have been re-

peated more than once, and many of them several times, where accuracy seemed requisite; but the results are fairly detailed. I do not, however, pretend to say they are quite perfect, or might not have been more accurately performed by persons more conversant in such processes, and having apparatus for such pursuits much more complete; but I trust they will be found so far satisfactory, as to answer the purposes intended.

The cases I have narrated, though not so numerous as those of Mr White, which on his part are completely decisive and satisfactory, will, it is hoped, tend to prove this bark not undeserving of more general attention; and if due care be taken in its preparation, and it be faithfully administered, I trust it will not fall short of the character I have given it.

To decide impartially on the merit of works whose tendency is to recommend substitutes for medicines that are already in established use, is a task of considerable difficulty; and it cannot be denied that many unfair *sentences* have been precipitately hazarded by men otherwise enviable for their literary talents, which by the discernment of an enlightened public have been totally disregarded.

I do not mean by these reflections to arraign *indiscriminately* the conduct of the arbiters of litera-

ture ; I well know the vast utility and importance, not to say the absolute necessity, of able and judicious critics. To such respectable umpires I cheerfully submit my labours. I pretend not to elegance of diction, which in a work of this sort seems not absolutely necessary. I by no means presume to dare criticism ; but I invite a fair and liberal enquiry into the merits or defects of this performance, and any hints that may be offered for its improvement or correction, will on due conviction of their importance, be thankfully received and adopted, should the public require a second edition.

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ERRATA.

- PAGES 18 and 19, for *Cinchona ruber*, read *rubra*.
 PAGE 25, for *arboresence*, read *arborescens*.
 — 27, in the note, for *Medical Tracts*, read *Medical Facts*.
 — 28, line 15, for *Fallis*, read *Foliis*.
 — 39, line 10, for *camp.* read *comp.*
 — 52, lines 4, 12, 17, for *superincumbent*, read *supernatant*.
 — 78, line 23, for *gr. x.* read *gutt. x.*
 — 87, line 14, for *viscous*, read *viscus*.
 — 93 and 94, lines 26 and 1, for *protuded*, read *protruded*.

INTRODUCTION.

ALTHOUGH medicine is a science, or art, which, when compared with various other learned studies, seems pretty generally allowed to be far distant from a state of perfection, yet the rapid improvements and truly valuable discoveries which it has acquired within the last century, must be acknowledged abundantly to transcend those of our predecessors: and were I to add, that more real, substantial, and solid information has been acquired in the period alluded to, than in all former times, from the earliest introduction of medicine, I should by no means exaggerate.

Confident as I am of the truth of these observations, which to some, may, perhaps, appear doubtful, it cannot, however, be denied, that much yet remains to be developed: but when I seriously reflect, which I do with heart-felt satisfaction, that the present enlightened age, not only allows, but seems freely to invite, a candid, liberal, and unfettered enquiry into every branch of science, none of which can be considered as arrived at their *ne plus ultra* of perfection, I cannot but hope, that whatever may appear obviously useful in medical sci-

ence, and is demonstrated to be so, will not be deemed, by men of liberal sentiments, altogether unimportant.

The great benefits derived from the Cinchona, a remedy primarily introduced into practice for the cure of intermittents and other fevers, but which has since been discovered to be eminently useful in a variety of other complaints, and which happened to be brought into practice when such diseases were considered as the *opprobria medicorum*, undoubtedly made its acquisition of considerable importance; yet, notwithstanding its first introduction was by the then illustrious society of Jesuits, * although it was sold enormously dear, and even performed prodigious cures, yet we find, like almost every other important discovery, which has hitherto been promulgated, (not even excepting *Variola Vaccina*) that it did not fail to excite considerable opposition.

Nor was it till long after, that its real value and worth became firmly established; and this was owing above all others, to the exertions of our own countrymen:† for the prejudices first entertained against this drug, by foreign physicians,

* Cardinal De Logo, chief of the Jesuits, brought it to Rome in 1649.—Vide Pomet's History of Drugs, and James's Dispensatory, p. 167.

† Particularly Sydenham, Morton, and afterwards Huxham, Fothergill, Cullen, Fordyce, Percival, &c.

are by no means completely eradicated, even at this period. I do not, however, pretend to determine precisely how far such prejudices may be just, nor shall I presume to enter into any other than those general causes that may occur to my mind in the course of this treatise.

Perhaps it may be said, that while the use of this remedy was more limited, while it was more cautiously administered, and its consumption much less than at present, it probably was more pure and genuine, and less adulterated by the admixture of other barks, since introduced in consequence of the demand for it having much increased. To the introduction, afterwards, of the pale bark, and the small quilled sort, so much inferior in power to that of a larger kind, although most in request, together with the careless and indiscriminate mode in which it still continues to be used, even in cases diametrically opposite to each other, (not to mention its inertness when long kept in powder, with its frequent adulteration in that state,) must be imputed much of the disappointment experienced. And when we reflect that several remedies of established reputation in certain specific diseases, have been, and still are, brought into disgrace by being employed where no prospect of success could be hoped for, and these also combined according to the fancy of the prescriber, with others that may influence their *modus ope-*

randi we shall cease to wonder why many ingenious practitioners have been led to consider the *Cinchona* in common use, as an inert and useless substance.

The fortunate introduction of the *Cinchona ruber* into this country, having excited general attention, the labours of the ingenious Dr Saunders * made us not only better acquainted with the general history of that in common use, but by comparative trials of its effects with the red, enabled us more clearly to appreciate their respective merits. He says, " he had long suspected that the Peruvian bark in common use was very inferior in power and efficacy to that recommended by the early writers on the subject, more especially by our countrymen Sydenham and Morton, and that in their time the quill bark (at least such as is now in use) was not mentioned ; their cotemporaries, writers on the *Materia Medica*, describe the Peruvian bark of a larger size, of more compact pieces, and of the colour of the rust of iron, which are very expressive of the red Peruvian bark." Dr Saunders is also of opinion with many of his ingenious correspondents, that the want of efficacy in the common bark is owing to its being of the quilled sort, which had been erroneously preferred to the larger kind, which he esteems to

* Vide Saunders's observations on the red Peruvian bark, 1782.

be the *Cinchona ruber*, and which is much stronger in its taste, more resinous, and much more efficacious in practice. He is fully persuaded as well as many others, that the *Cinchona ruber* is not only the true Peruvian bark used by Sydenham and Morton, and others of the sixteenth century, but that it and the *Cinchon. officin.* are one and the same species, viz. that the *Cort. rub.* is the bark of the trunk or larger branches of the tree, and that the quilled sort is taken from the smaller twigs, or obtained from very young trees. That this *may* be true, I shall not positively deny; but the manifest and obvious difference between these two barks, not only in their texture, specific gravity, flavour, and colour, in every form, as in decoction, infusion, tincture, extract, &c. independent of the experiments I have made with them, in conjunction with various other barks, as will be hereafter mentioned, induce me, however presumptuous it may appear to differ from such respectable authorities as Dr Saunders, and his correspondents, to consider the *Cinchona ruber* as a distinct species from the common pale bark. The evidence and arguments adduced by Dr Saunders in favour of his opinion, though plausible, do not appear sufficiently satisfactory to me to warrant his conclusion, and the remarks he has adduced in the introduction to the second edition of his pamphlet, instead of convincing, tend to confirm me more strongly in my opinion. Be this as it may, such a differ-

ence of opinion can neither influence its consequence as a drug, or its effects as a medicine, nor shall I tenaciously adhere to this notion, when more certain and convincing proofs are advanced to the contrary.

Dr Relph in his useful inquiry concerning the efficacy of the yellow bark, * has presented us with the description and arrangement of no less than nine different species of the *Cinchona*, from professor Vahl, published in the Transactions of the Natural History Society of Copenhagen : this, exclusive of its demonstrating to us the different species that seem to be accurately ascertained, will serve to account for the facility with which the bark in common use, may be mixed, or sophisticated, and the strict attention it is requisite for professional gentlemen to pay in order to have the different sorts of these articles pure and genuine. After remarking on each of these species, he conceives it a task of the utmost difficulty to refer the barks now employed to one or other of the species he has mentioned. It was these considerations which induced him to give fair and decisive trials to the yellow Peruvian bark, which he found not only vastly superior to the common *Cinchona*, but to excel even the red. The same testimony has been advanced in its favour by the ingenious Dr W. Vaughan, whose truly va-

* Vide Relph's Inquiry into the efficacy of the yellow bark.

luable work on this subject * reflects great credit on his genius and industry.

From what has been already noticed respecting the various species of *Cinchona* by Drs Relph and Vaughan, it would plainly appear, so far as it seems to accord with popular opinions in this country, that the species of the *Cinchona* in general use are the pale, red, and yellow barks. These have their respective advocates, and at this time retain no small rank in medical practice.

The *Cort. Angustura*, (more than a dozen years ago introduced into notice by my ingenious friend, Mr Brand, † whose valuable work on this bark does him great credit, aided by the testimonies of many respectable gentlemen, his correspondents, in its favour; to which may be added, the papers written by my amiable friend, Dr Lettsom, ‡ not omitting Dr Winterbotham, § and towards which I also have contributed my mite, ¶) notwithstanding its being ascertained not to be on equal terms with the *Cinchona* as a febrifuge, yet is regarded by Dr George Pearson “ as a medicine that will produce the effects of the warm vegetable bitters,

* Vaughan on the yellow bark.

† Brand's Experiments and Obs. on the Angustura Bark.

‡ Memoirs of the Medical Society of London, vol. 4. p. 191.

§ Medical Facts and Observations, vol. vii. page 41.

¶ London Medical Journal, vol. xi. p. 333. Medical Facts and Observations, vol. 2. p. 54.

“ especially of the camomile, but with more ef-
 “ ficacy, and more agreeably to the palate and
 “ stomach ; and consequently render all the other
 “ articles under the head of *Amara Calida* unneces-
 “ sary.”

It would appear from the advanced price that it has reached, that its reputation is not at all lessened ; and when we reflect from the experiments of Mr Brand,* that its antiseptic powers are superior to the *Cinchona*, and that much less doses are requisite to accomplish its effects, together with its agreement with many stomachs that will by no means relish the *Cinchona*, and that in many desperate cases where the *Cinchona*, though indicated, could not be retained by the stomach or intestines, this bark produced the most decisive and salutary effects ; it will evidently appear, that its introduction into the materia medica was a very valuable acquisition.

* Brand's Experiments and Observations, p. 125.

GENERAL HISTORY OF THE SALIX LATIFOLIA.

To the modest and candid Mr James, * surgeon, of Hoddesden, in Hertfordshire, we were indebted ten years ago, for the introduction into practice of the *Salix Latifolia*, and as he has hinted, excepting himself, “no Englishman has written at large on its virtues.” More than three years experience in many remarkable cases, has enabled this gentleman to prove its decisive superiority over the *Cinchona*: nor has this useful vegetable escaped the notice of that indefatigable and humane friend to the human race, the illustrious Dr Beddoes, who has praised it in the course of his works; and some of the writers in the Medical and Physical Journal have also spoken of it in the most respectful terms.

The testimony of Mr White, apothecary to the Bath City Infirmary and Dispensary, published in the year 1798, † not only confirms what has been advanced by Mr James, but puts it beyond a doubt, that we possess at our own doors, a vegetable bark as much superior to the Peruvian, as the vaccine disease is superior to the variolous. And although some of the cases related by these gentlemen may,

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* Observations on a particular species of Willow, 1792.

† Observations and Experiments on the Broad-leaved Willow bark, by W. White, &c. 1798.

to some readers of a sceptical turn, appear to participate somewhat of the marvellous, yet from Mr White's testimony in its favour, under the eye of the physicians of both charities, I think that neither of them can be suspected of having over-rated its real worth, or exaggerated its virtues.

Among the old botanical writers which I have seen, none of them have noticed, or described, the *various* species of the *Salix* or willow genus, with any degree of precision. All or most of them appear to confound them under the general term of the *Salix* or willow *genus*, without adverting to their particular *species*, if we except Caspar, J. Bauhin, Tournefort, our countryman Ray, and Linnæus, in his *Spec. Plantarum*. Mr Evelyn, in his discourse on forest trees, mentions the existence of thirty-one different species, and has accurately described fifteen from various authors. Stephen Robson, author of the British Flora, a valuable scientific work, published in 1777, has accurately described eighteen species, and both Mr Evelyn and himself have noticed this under the appellation of the *Salix Caprea* : nor have any of the old writers on the *Materia Medica* that I can find, pointed out their specific virtues, or uses in medicine, from well-founded experience.

It is true that Mr Stone, an English clergyman, communicated to the Royal Society a paper, in 1763, on the beneficial effects of the *willow* in

agues and intermittent fevers ; * but this appears to be quite a different species from that of which I am now treating. He acknowledges that it sometimes failed, but imputes this failure (perhaps not altogether justly) to the difference of the soil on which it grew. It must, however, be recollected, that the plant he was then speaking of was the *Salix vulgaris alba arborescence* of C. Bauhin, or what is usually termed the white willow, which Mr James found by repeated trials, much inferior to that which he has recommended.

From the favourable account given by Mr Stone of the *Salix Alba*, Dr Cullen has strongly recommended it as a substitute for the *Cort. Peruv.* in agues and intermittents. After noticing its sensible qualities, he says, “ these qualities persuade me “ that it is a valuable medicine, and as promising “ a substitute for the Peruvian bark, as any I have “ known to be offered.” These remarks prove the doubtful effects of the *Cinchona* ; and had the doctor lived to have noticed the superior effects of the *Salix latifolia*, there is no doubt but it would have made a conspicuous figure in his work on the *Materia Medica*. †

But although Mess. James and White seem to

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* Vide Philosophical Transactions, vol. liii. p. 197.

† Vide Cullen's *Materia Medica*, vol. ii. p. 114.

have expected that this bark might, or ought to have been more particularly noticed, and brought forward into more general practice, not only on account of its being more easily procured, but also from its being far less expensive than the *Cinchona*, yet when we reflect on the rooted unwillingness, perverse obstinacy and tenaciousness, that mankind in general have ever shewn to adhere to early impressions habitually fixed, it can be no wonder that it has met the fate of almost every thing newly offered, be it what it may, which ever will meet with some opposition.

Among the impediments to its general introduction into practice, exclusive of the unwillingness of many practitioners to lay aside what they are led to suppose a certain for an uncertain, or an old for a new, remedy, and exclusive of the natural aversion they have to forego old forms and fashions, is the no small embarrassment they feel, when urged to the exertion of their reasoning, or intellectual faculties, by the introduction into practice of a new article, which happens not to be sanctioned by the college of physicians, or is not kept in the shops of the druggists, and for which they are to search themselves. This compels them to reflect, examine, and enquire for the thing in question; a task to many men, however trifling it may be to others, of much difficulty: hence those who act from the force of mere habit or imitation, rather than original think-

ing, sooner than give themselves the trouble of arriving at truths or facts by a close investigation, entirely give up the pursuit.

Prior to my becoming acquainted with the use of the *Salix latifolia* which as I before observed, was some years ago, and that through the medium of Mr James, I had paid particular attention and given many trials to, made several chemical experiments, and published two papers on, the *Cort. Angustura*. * I had often experienced the inefficacy and palpable insufficiency of the common bark, which, with the advanced price of the red (for the yellow was not then made known) and indeed the general disrepute into which the former had fallen, as well as the large doses that were obliged to be given in many cases, prompted me very early to the use of the *Angustura*; and in very many instances (though not in all,) I found it superior. But the idea of obtaining a cheap, easily procurable substitute, as represented by Mr James, induced me to direct my attention to the *Salix latifolia*. In the prosecution of my enquiries, I found myself very amply compensated, and so far was I from being disappointed of what he has ascribed to it, that I found it fully adequate to the purposes for which it had been recommended. The satisfaction I de-

* London Medical Journal, vol. xi. p. 333. Medical Tracts and Observations, vol. xi. p. 54.

rived from considering that we could be supplied with a substitute for the *Cinchona*, of superior efficacy, and indigenous to this country, was a sufficient inducement to prompt me to persevere in my researches.

Botanical Description.

SALIX.

DICECIA. DIANDRIA.

Masc. Amenti Squamæ. Cor. O. glandula bascos nectifera.

Fem. Amenti Squamæ. Cor. O. Stylus bifidus
Caps. unilocularis bivalvis. Semina papposa.

* * * * Foliis subserratis villosis.

SALIX CAPREA.

Fallis ellipticis subserratis, rugosis, supra villosis subtus tomentosus.

Salix latifolia rotunda Raii Syn. 449.

Salix foliis ovatis rugosis subtus tomentosus undatis superne denticulatis. LINN.

SALIX CAPREA.

Description. *

“ It grows to a tolerable large tree, covered with

* Suite de la matière médicale de M. Geoffroy, des Plantes de notre pays. Tom. 2. A. Paris, 1750.

“ a greyish bark, a little bitter. Its leaves are
 “ rounded, large, nervous, * of a deepish green
 “ uppermost, whitish and a little velvety under-
 “ neath; having the foot stalks generally orna-
 “ mented at first coming out, with two little leaves
 “ like ears, of an astringent taste, which is neither
 “ sharp nor bitter. The catkins in flower and
 “ pollen, come forth alike on separate stalks.

“ This species of willow varies very much in
 “ the shape of its leaves. It grows in damp woods,
 “ by the sides of rivers, and ditches. It is com-
 “ mon also in hedges, sometimes even distant from
 “ waters: for although it prefers damp places, it
 “ is not so averse to dry soils as the generality of
 “ the other species of willow.

“ It blossoms in March and April, and emits a
 “ fine flavour, according to *Camerarius*: its wood,
 “ although weaker than the white willow, serves
 “ for many purposes, above all to make hoops for
 “ small casks.”

In Dr Withering's Systematic Arrangement of
 British Plants, 4th edition, published by his son, it
 is thus described, vol. 2d, page 54.

“ (4) *Leaves somewhat serrated, woolly.*

“ S. Leaves egg-shaped, wrinkled, cottony under-
 “ neath, waved, toothed towards the end.

“ *Hoffman. fol. i, 3. 5. 4. Foliage of the different*

* Or marked with a net-work of veins.

“ *varieties*, i. 21. 1-*Fl. dan.* 245-*Ger.* 1203.

“ 3-*Ger. em.* 1390. 3-*Park.* 1432. 1-*a leaf, Fl.*

“ *lapp.* 8. s.

“ No species of *Salix* requires such a dry soil as
 “ this does. It sometimes becomes a tolerable sized
 “ tree. *Branches*, when young, palish, downy.
 “ *Buds*, the lower producing leaves, the upper cat-
 “ kins. *Leaves* slightly tapering to a point at each
 “ end, above green and scarce sensibly downy, un-
 “ derneath pale green with a very thin woollen-
 “ ness; edge marked with some notches, but not
 “ obvious unless carefully examined, but from the
 “ middle downwards evidently waved. LINN.—
 “ *Bark* ash-coloured, cracks very fine. *M. Catkins*
 “ egg-oblong, one to two inches long, often one
 “ inch broad, on short fruit-stalks, which are
 “ woolly, furnished with eight to twelve leaflets, in
 “ a double or triple series; the upper catkins
 “ flowering first. *Stam.* 1. *Nect.* 2. *F. Catkins*
 “ oblong or cylindrical, one to two inches or more
 “ in length, half an inch broad, on fruit-stalks
 “ which have six or seven leaflets. *Leaves* round-
 “ ish, egg-shaped, inversely egg-shaped or egg-ob-
 “ long; four or five inches long, about three
 “ broad, either smooth or downy above, dark
 “ green; bluish grey and cottony on the back, and
 “ marked with a net-work of veins. *Stipule* only
 “ to the uppermost leaves, roundish, finely scallop-

“ ed. Gleditsch found on this species both male
 “ and female flowers, and others that were her-
 “ maphrodite. HOFFMAN.—*S. latifolia rotunda*.
 “ R. Syn. 449.”

Description of the Plate.

This was taken on a reduced scale, to render it
 suitable to the size of the book; it was copied from
 a recent branch of the tree, and will be found suf-
 ficiently accurate to enable any one to ascertain
 this species from others of the same genus.

- No. 1. A branch from the tree, with its leaves.
- 2. A piece of the fresh bark.
- 3. The same in a perfectly dried state.
- 4. A specimen from a *hortus siccus*, which
 shews the egg-shaped leaves remarkably :
 the dark leaves shew the outer surface,
 and the light ones the under, which
 is downy. The little knobs or protu-
 berances on the stalks appear to be the
ears.
- 5. The blossoms or flowers taken from a
 dried specimen.

The foregoing descriptions will, I trust, be found
 as accurate and complete as any that are extant,
 and perfectly suitable to botanical, as well as other
 readers. To prevent mistakes, as the number of

the species of the willow genus is so great, a coloured plate of that which is the subject of this treatise, with its bark, &c. seemed necessary. This idea did not occur to my mind till the middle or latter end of July last, and I then caused the drawing of the plate to be made. This is the reason it is not represented in its fresh florescent state, which is in April, and May, and sometimes before. At that time its leaves are not come to perfection, and many of them are not completely developed, so as to ascertain it correctly, neither is it quite fit for *bark-ing*. I have, however, introduced a specimen of its leaves and flowers, from a *bortus siccus*, and hope the representation upon the whole will be found to answer its purpose satisfactorily.

This species of *Salix* may be distinguished by the *shape* of its leaves, as Mr White justly observes, from all others, except the *Salix Pentandra*, or bay-leaved willow. The leaves of the latter are smooth, and shining, and of a deeper green, neither have they the downy appearance on the under surface, which is so remarkable in the *Salix Caprea*.*

Mr James says, “ it is to be found in the woods
 “ and hedges of hilly situations, and grows to the
 “ size of fifteen or twenty feet : almost every soil
 “ will suit it, but it seems to delight in cold, clayey,
 “ moist grounds.”

* Observations and Experiments on the Broad-leaved Willow bark, p. 6.

The same gentleman observes, " that the mode
 " of propagating it, is by cuttings of two or three
 " years growth, and of about three feet long,
 " which should be stuck half way into the ground
 " in the latter end of autumn, or beginning of
 " spring: It grows rapidly, extending to the
 " height of eight feet in three years." From the
 ease with which it may be raised, being remarka-
 bly rapid in its growth, there can be little doubt
 that its cultivation and increase will hereafter be-
 come of considerable importance, and many pieces
 of ground, otherwise unproductive and of little
 use, may perhaps be planted with a tree that can-
 not but bring profit, and which will amply com-
 pensate for the little trouble employed in its culti-
 vation, especially as it may be conveniently plant-
 ed in hedges, where little or no room will be taken
 up. When the bark once gets generally intro-
 duced into practice, it must become an object with
 the druggists to keep it in their shops, to supply the
 apothecaries.

The most proper time of gathering the bark is in
 May, June, and until the middle of July, as after this
 period, it is found to adhere so firmly to the tree,
 as not easily to be peeled off, neither does it appear
 so vigorous or juicy, as I have found from experi-
 ence. It should be cut into pieces, not more than
 five inches in length, and the large thick bark to be
 one or two inches in breadth. This must be done

while green, and then it should be dried in the house, in a place where no sun or fire comes. This renders it convenient and neat, for stowage, or packing for carriage, dries it more regularly, and fits it for the mortar, either for decoction or infusion. That of a finer sort to be exhibited in substance, should it not be sufficiently dry for pulverising, may be exposed to a very gradual and moderate heat in an oven, which will facilitate its reduction into a very fine powder.

Its sensible Qualities.

This bark evinces to the taste a considerable degree of astringency, and, when recently gathered, some bitterness; but the latter goes off almost entirely when dried. It differs much from other willows, such as the *Salix alba* and *Salix pentandra* or bay leaved willow, which are more intense in bitterness, and infinitely less in astringency. The vegetable I have found most to resemble it is the *Radix Tormentillæ*, which has nearly the same taste; but from several experiments hereafter to be related, I have found it much stronger in its astringency.

The strong decoction of this bark resembles port wine in colour, for which, by several persons who have seen it in vials, it has been mistaken. I should have remarked that the bark when dry, generally becomes of a reddish rusty colour on its interior surface, somewhat like cinnamon, and when long kept,

bears some resemblance to the red Peruvian bark; but some pieces will be remarkably pale. This difference of colour, I am of opinion, proceeds from its being gathered late in the season. Its exterior surface then, is not much altered in its colour from the recently gathered bark. It may not be here unnecessary to remark, that those persons who are employed by gentlemen to collect the bark, should be enjoined to bring with them a branch of the tree, with its leaves, &c. This I have found necessary, as I have had it brought home mixed with the bark of the *Salix pentandra*. It must also be recollected that the *latter* not only appears to be of a darker green colour on its exterior surface, but is in a recent as well as dry state, of a pale or whitish colour on its interior surface, not shewing the dark rusty colour of the *Salix caprea*, and as has already been remarked, is more bitter and much less astringent.

Preparation and mode of Exhibition.

This bark gives out its virtues more freely to soft water in decoction, than in infusion. I have never given it, in any case, in powder, as has been done by Mr White, though he seems to have thought that it answered the purpose. The well known inertness, and inefficacy, commonly found in vegetable substances, which are kept any length of time after pulverisation, not only from the effects of atmospheric air, but even from the action of light, have

prevented my depending much upon their effects in that state. In the form of extract I have never employed it, nor do I expect any great degree of active efficacy to be derived from it in such a form. Mr White says, that rectified spirit of wine is capable of extracting a much greater proportion of its active principles than water ;* but in this my experience leads me to suspect he mistakes, as will be demonstrated hereafter. Mr James has not given any regular or precise prescription for a decoction ; he has indeed given one which he used as an infusion, but neither he nor Mr White have said whether the quantity ordered, which is two ounces, is to be the recent bark, or that in a dried state. The vagueness of this direction I must own embarrassed me, when I reflected on the great difference between the green fresh bark, and that in a dried state ; but I conjectured that an ounce and a half, or a little more, according to the length of time it had been dried, would make a decoction sufficiently strong for almost any medicinal purpose ; and this on experiment I found answered my intention perfectly. By this œconomy, which I have constantly practised, I have been enabled when I found my stock low in the winter, to keep it up till I got a fresh supply at the proper season.

Perhaps what I have further to remark on this subject, and which has been entirely passed over

* Vide Observations and Experiments, &c. p. 20.

by Messrs White and James, will be another matter of no small importance in its preparation, which is this,—that taking it for granted, that whenever this bark is prescribed, it must be understood to be more or less in a dried state, it will by all means be adviseable to pound or bruise it well in a brass or iron mortar, prior to its being used for any purpose. I do not say it is necessary to powder it fine, except when it is used as powder, but we must allow that if it be put in whole, or very slightly and carelessly bruised, it will fall very far short of its proper strength, be the quantity ever so large: and should time permit, I have found it no small addition to the goodness and efficacy of the decoction in particular, (for I consider a mere infusion in hot water, not properly calculated to extract its whole powers) to infuse it for a few hours in the same water previous to its being boiled. I think there is no absolute necessity to consume one half of it by boiling, as is directed by Mr White in his Formula, fifteen or twenty minutes at the most, in a boiling state, seems quite sufficient, and if this be done on a moderate fire and slowly, I am convinced less of the decoction is wasted, and the preparation is much better. *

* It is well known that the strength of many medicines may be ascertained by tasting them. This I would advise to be done, as I am afraid it is too much neglected by many of

It must, however, be observed, that the decoction I am speaking of will not keep fit for use more than two, or at most three days, as at that period it is apt to deposit a brownish sediment, except in cold weather, when it retains its freshness some time longer.

FORMULA.

R. corticis salicis latifoliae siccati ℥iſs, in pulverem crassum redige, et macera in aquæ fontanæ libris duabus per horas sex; deinde coque leni igne per quartam vel tertiam partem horæ, et cola pro usu. Capiat æger cochlearia duo vel tria larga decocti ter vel quater de*

the profession, who trusting wholly to their shopmen or assistants in the compounding of their prescriptions, not only suffer very materially in their reputations from inattention, but what seems to be of more importance, bring the very articles they have been prescribing, into unmerited disrepute. It is by no means my intention to insinuate that professional men should be, what I know the avocations of many will not permit, always present to superintend the composition of their prescriptions; but by doing it as often as business permits, and habituating themselves to taste them, they will be sufficiently recompensed by detecting errors of this sort; and although it must happen that compositions will be sent to patients, in cases of absence, prior to their being seen, or examined by those, who are certainly answerable for their effects, yet it may not be amiss for such gentlemen on visiting their patients, to examine and taste the medicines, with a view to ascertain the fact of their accurate and faithful preparation.

* I have sometimes, in urgent cases, encreased the quantity to two ounces.

die ; sed in febre intermitente, dare oportet unciam unam aut duas secundâ vel tertiâ quaque horâ absente paroxysmo.

Of late I have in some cases of dyspepsia, combined with this decoction, a small portion of the *Lign. Quassia*, by boiling it with the bark. It may be tinctured more or less strongly with it, according to the intention of the prescriber, and I sometimes add to it a few drops of the *tinct. lavend. camp.* When thus mixed, it strongly resembles in taste, the decoction of *Cort. Peruv.* This method has also been used by Mr White. From various experiments, which will hereafter be detailed, I find that the decoction, above all other preparations, whether tincture, cold, or warm infusion, is much stronger, and more fit for medical purposes. I cannot speak from experience on its effects in powder, spirituous, or watery extract; but I strongly suspect it will be found much less efficacious and more uncertain in these last forms, exclusive of their being more expensive than the decoction.

As a tonic or stomachic, in dyspeptic cases, &c. it has long been the custom to give the *ext. et pulv. Cinchonæ*, with steel and other powerful ingredients, in the form of pills, electuaries, boluses, tincture, &c. witness those of Huxham, and the late professor Whytt of Edinburgh. Each of these modes have been, and are still, esteemed by their advocates, and no doubt considerable benefit has been derived

from their use, but as bark alone, whether in powder, tincture, or extract, has been found incapable of producing the same effects as when combined with these powerful auxiliaries, it may fairly be presumed, that the same effects would have ensued, had it been entirely left out of the composition. All vegetable substances whatever will sooner or later lose their efficacy by long keeping, and exposure to light and atmospheric air, particularly in powder. It is therefore of vast importance not only to have them of the best quality, but also fresh powdered when wanted, by the apothecary, or others under his inspection.

Previous to the detail of my experiments, in which I have included several other barks, more especially those which relate to the astringent, or what is more properly termed the *tanning principle*, (*Fr. tannen*) I have deemed it not altogether unnecessary, for the satisfaction of those who may be unacquainted with the subject, to insert an abstract of what has been offered to the public in a valuable and ingenious work, intituled, "*Rapport au Comite de salut public, sur les nouveaux moyens de tanner les cuirs, propos par le Citoyen Amand Seguin, 3 Brumaire, an 3 de la republique.*" (1795.)

He remarks that "Water poured into a vessel upon *tan*, acquires after some hours infusion, at the common temperature of the atmosphere, a brown colour, an astringent taste, and be-

“ comes charged with the most soluble substances
 “ contained in the *tan*; that by drawing off the
 “ water, and adding a similar quantity to the *tan*
 “ repeatedly, the whole of the soluble parts may
 “ be successively extracted, the water ceases to ac-
 “ quire colour, and there remains in the tub a
 “ mere fibrous matter, or parenchymatous tex-
 “ ture, insoluble in water, and no longer adapted to
 “ the operation of *tanning*. It is therefore in this
 “ water of infusion, or the lixiviations of *tan*, that
 “ we must seek for the soluble substances which
 “ alone are efficacious in TANNING.

“ On examination of the last filtration, it is
 “ found to be not only clearer, less impregnated,
 “ and less acrid than the water of the first lixivia-
 “ tion, but likewise that it possesses all the proper-
 “ ties of the *gallic acid*. It reddens the infusion of
 “ *Heliotropium* (*tunsole*), acts upon metallic
 “ solutions, and, more particularly, precipitates a
 “ black *fæcula* from sulphat of iron, &c.; and it is
 “ also found, that a piece of fresh skin, divested of
 “ its fat and sanguineous humours, and macerated in
 “ this liquor, instead of becoming compact, is sof-
 “ tened and swelled up.

“ The liquor of the first infusion is of a differ-
 “ ent character, is more coloured and astringent,
 “ not only exhibiting the properties of the *gallic*
 “ *acid*, by the alteration it causes in the blue co-
 “ lours of vegetables, and the black precipitate it

“ forms with the sulphat of iron, but it likewise
 “ has the remarkable quality of forming with ani-
 “ mal *gelatin*, or glue, a yellowish, abundant pre-
 “ cipitate, insoluble in water, not putrescible, and
 “ which becomes hard and brittle by drying ; and
 “ if a piece of skin, properly prepared, be immer-
 “ ed in this fluid, it becomes gradually compact,
 “ and is converted into leather.

“ There, therefore, exists in this fluid two very
 “ different substances ; the one, which precipitates
 “ a black matter from iron, is the *gallic acid*, or
 “ principle ; the other, which precipitates animal
 “ *gelatin*, or glue, is called the *tanning principle*, on
 “ account of its efficacy in the preparation of lea-
 “ ther.

“ To leave no doubt on this important point, it
 “ was proved by a number of experiments easily to
 “ be repeated,

“ *First*, That the liquor of the last lixiviation,
 “ though coloured, and of an astringent taste, af-
 “ fords no precipitate with animal *gelatin* ; a fact
 “ which seems to shew, that the *gallic acid* contain-
 “ ed in the bark, is less soluble than the *tanning*
 “ *principle*. In fact, as has already been remark-
 “ ed, when water is poured successively on the
 “ *tan*, an infusion is at last obtained, which no
 “ longer precipitates glue, though it precipitates
 “ sulphat of iron very well.

“ *Secondly*, The liquor of the first lixiviation,
 “ after having been saturated with glue, or ani-
 “ mal *gelatin*, and forming an abundant precipitate
 “ with that substance, is entirely deprived of the
 “ tanning principle. It no longer differs from the
 “ liquor of the last filtration, and contains merely
 “ a portion of the *gallic acid* : hence the addition of
 “ sulphat of iron, affords a new precipitate with
 “ this liquor.

“ *Thirdly*. As the *tanning* principle has a
 “ stronger attraction to the animal *gelatin*, with
 “ which it always forms an insoluble precipitate, this
 “ property affords a very convenient re-agent to
 “ ascertain its presence in any fluid immediately,
 “ and to determine with precision its quantity.
 “ Accordingly, the infusion of *tan* poured into
 “ *milk, whey, serum, broths, &c.* forms with these
 “ liquors a precipitate more or less abundant, ac-
 “ cording to the quantity of the *gelatin* they
 “ contain.

“ *Fourthly*. The *gallic acid*, or if other terms be
 “ preferred, the principle which precipitates the
 “ sulphat of iron, is often found alone, or at least
 “ without being accompanied by the *tanning* prin-
 “ ciple. Thus quinquina, crude, or torrifed coffee,
 “ the roots of the straw-berry plant, scrophularia,
 “ millefolium, arnica, gentian, flowers of camo-
 “ mile, and a multitude of plants vaguely com-
 “ prized under the title of astringents, contain the

“ *gallic acid* only. All these form with the sulphat
 “ of iron, a precipitate more or less coloured and
 “ abundant, but none of them produce the slightest
 “ change on the solution of animal *gelatin*; on the
 “ contrary, the *tanning* principle has never been
 “ found alone, but always united to, or com-
 “ bined with the *gallic acid*.

“ It was long supposed to exist exclusively in the
 “ oak, the nut-gall, and sumach, the only sub-
 “ stances used in the *tan* works; but it is found
 “ more or less abundantly in the *silaquastrum*, the
 “ *rose* tree, the *laris*, several species of *pin*es, the
 “ *acacia*, the *lotus*, the *squill*, the roots of the
 “ *bistort*, *rhubarb*, *cinquefoil*, and several other
 “ plants. We have also found this principle in
 “ the products of distillation of different vegetable
 “ substances, where it was in some measure formed
 “ during the operation.

“ From these different considerations, founded
 “ on experiment, the following general principles
 “ may be deduced.

“ *First*, Every substance of which the infusion
 “ is capable of precipitating animal *gelatin*, possesses
 “ the *tanning* principle.

“ *Secondly*, Every substance which possesses the
 “ *tanning* principle, likewise precipitates the sul-
 “ phat of iron black.

“ *Thirdly*, Every substance which precipitates

“ the sulphat of iron, but not the solution of glue,
 “ does not possess the *tanning* principle.

EXPERIMENTS.

The subsequent experiments are faithfully detailed, in the exact manner in which they were performed. How far they may prove satisfactory, is not for me to determine. I trust, however, they will appear less obscure, and perhaps more decisive, than those of my predecessors, Messrs James and White, not only on account of the superiority of the tests employed, but from the number of substances which I have compared with each other. In speaking my sentiments thus freely, I do not claim any merit to myself; for the credit due to those in which the astringent, or *tanning* principle, forms a part, belongs to the author of the preceding work on *tannen*.

Experiment I.

Half an ounce of each of the gross powders of Oak and Salix barks was separately infused in eight ounces of fresh rain water, warm. Into each of these, kept in earthen vessels, was put, when cooled, a fresh piece of sheep skin, of exact sizes, prepared, and divested of the wool. On examining them daily, I discovered immediately the superiority of the salix. The skin in that vessel was firm even while

that in the oak infusion was yet soft and spongy. At the end of eight days they were taken out, and the Salix was found the much better tan.

Experiment II

Was made with half an ounce of each of the same barks,—the oak to six ounces, and the salix to twelve ounces of the same water, with two pieces of skin. The results were the same; the skin in the Salix infusion being found infinitely superior, and more firmly tanned than that in the oak.

Experiment III.

The surprize I felt at finding the salix so much superior to the oak in its astringent principle, induced me to compare it with the Tormentil root, which I did by immersing two pieces of prepared skin, of equal sizes, in infusions made of equal strengths, as was done in experiment the first, with twelve ounces of water. The piece in the tormentil very soon became contracted, and continued progressively to surpass in power the salix, as the latter had done the oak; at the end of seven days they were taken out, but the tormentil was found vastly superior.

Experiment IV.

Infusions of the barks of oak, salix, and tormentil root, were made in the following proportions,

viz. half an ounce of the first, to six ounces; three drachms of the second, to nine ounces; and two drachms of the last, to ten ounces of the same water. Into each of these were put three pieces of prepared skin of equal sizes. At the end of seven or eight days, the skin in the tormentil was more firmly tanned than that in the salix; but that in the oak, although kept in the liquid two days longer, was less so.

Experiment V.

Three pieces of calf-skin, prepared for the purpose, and of equal dimensions, were immersed in cold infusions of the following strengths:—first, half an ounce of oak bark, in six ounces, two drams and a half of the salix, in ten ounces, and two drachms of tormentil in twelve ounces of water. At the end of twelve days, they were taken out and examined. The tormentil stood first, the salix next, being equal, if not superior, to the oak.

Experiment VI.

This experiment was made to determine *comparatively*, the *tanning* or *astringent* principle contained in the barks in common use, viz. yellow, common peruvian, red, and angustura barks. A warm infusion was made of half an ounce of each of these, in eight ounces of water. When cold, four pieces of prepared skin, of equal dimensions, were put into the separate vessels. More than two days passed

over, before any visible alteration could be perceived, except in that in the yellow bark, which had assumed a firmness and beginning contraction; and in eight days appeared pretty well tanned: the common peruvian was next in order, though soft and spongy; the red more so, but the angustura not at all affected. In ten days, the piece in the yellow bark was taken out, being well tanned; the others were retained for eighteen days, but appeared to be soft and spongy. The experiment was repeated with other infusions of the yellow, common, and red barks; the first with three drachms to twelve ounces, and the last two with half an ounce each to six ounces of water, with the same results, the yellow bark still evincing its superiority in tanning.

The whole of these experiments, though varied and repeated, were similar in their results. It therefore appears, that the ratio of their tanning powers may be estimated thus:—*first*, tormentil; *second*, salix; *third*, oak; *fourth*, yellow bark; *fifth*, cinchona offic.; *sixth*, red bark, the angustura possessing none. Sometime after this, having become acquainted with the peculiar property of animal gelatin in immediately ascertaining the presence of *tan*, I flattered myself it might enable me more justly to determine the accuracy of those experiments already detailed.

Experiment VII.

Three cold infusions made with half an ounce each, of tormentil, salix, and oak, all fresh powdered, to ten ounces each of fresh rain water, stood for twelve hours. Into each phial of the clear infusion, containing two ounces, I dropt nearly two drachms of animal gelatin, * which was sufficient to saturate them completely. A considerable precipitation of the *tan* took place in clouds, which proved much more abundant in the tormentil than in either of the others, the quantity in the oak infusion being very little.

Experiment VIII.

The same experiment was repeated with infusions made with hot water. These were found to possess a higher colour, and appeared more impregnated than the former. After being filtered through paper, they were precipitated with animal *gelatin*. The tormentil required about three drachms, the salix not quite so much, and the oak much less, to separate the *tan*, which in this proved more abundant than in the former experiment.

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* This was made in the proportion of four drachms of isinglass to twelve ounces of warm water.

Experiment IX.

Half an ounce of each of the same ingredients were boiled separately for fifteen minutes in sixteen ounces of the same water. After filtering, two ounces of each infusion were put into separate phials, and one drachm of animal *gelatin* dropt into each of them, when a very large quantity of precipitate appeared in thick floculi so abundant as to prevent further precipitation. On the addition of half an ounce of water to each, the sediment, after some time standing, subsided; more *gelatin* being added, another copious precipitation ensued in the manner of floculi, till another half ounce of water was put to each of them, when the sediment again fell down. The *gelatin* was continued till they were each of them saturated so as to cease letting fall their sediment. The oak infusion required about two and a half drachms, but the tormentil infusion took little more than half an ounce to exhaust it of its *tan*. The *salix* required about three drachms to complete its saturation. After the sediments had completely settled, the liquor of the oak was found to be of a very high colour; the others had become almost colourless. As the quantity of *tan* in this last experiment, *according to my expectations*, was found much more abundant than in those of the preceding, it was carefully collected from each phial by filtering through fine cloth, and put on separate pieces

of glafs to dry. The products of each, when accurately weighed, were oak $6\frac{1}{2}$, falix $15\frac{1}{4}$, and tormentil $23\frac{1}{2}$ grains.

Experiment X

Was made with decoctions of the yellow, common peruvian, and red barks, exactly in the fame proportion as in the laft experiment, and filtered through paper. The yellow bark took fomewhat more than one drachm of *gelatin* to precipitate its *tan* completely; and on adding more, the precipitation ceafed. The two others became only turbid on the addition of a fmall quantity of *gelatin*, but the common peruvian fhewed more fediment than the red. A cold infufion of the fame barks, yielded but little fediment; but on repeating the experiment with a warm infufion, which had flood for four hours, the quantity of the fediment or *tan* proved more abundant than in either of the two former experiments.

From the foregoing experiments it appears that the tormentil, falix, and oak yield more of their tanning principle to a decoction, than to warm, or cold infufions, and that a warm infufion of the *Cinchona* gives out more of its *tan* than either the decoction or cold infufions. Of courfe it would appear, that fkin might be more readily tanned by keeping the liquor in a moderate degree of heat, than in a cold medium, and may ferve to prove

that the tanning process in manufactories of leather, goes on faster in summer than winter.

Experiment XI.

I put one ounce of each of the superincumbent liquors of the decoctions of tormentil, salix, and oak, remaining after the precipitation of their *tanning* principle, into three separate phials, to which I added twelve drops of a saturated solution of sulphat of iron. A copious precipitation of black sediment immediately ensued. The same number of drops were put into three other phials containing a like quantity of the superincumbent liquors remaining after the precipitation of the *tan* contained in the warm infusion of the three peruvian barks, and with the same effects. After the whole of them had stood three days, till the black precipitate had subsided, and the superincumbent liquors were quite transparent and colourless, I dropped into each of the three last-mentioned phials twenty-five drops of sulphuric acid diluted, which immediately restored them to their former colour, and dissipated the black sediment; but dropping this acid into the oak, salix, and tormentil, the *first* took 40 drops, the *second* 46, and the *third* 52 drops to restore them to their original transparency. This experiment seems to prove that those substances which contain the greatest quantity of *tan* also possess a great

quantity of *gallic acid* ; and *vice versa*, those which possess the least *tan*, contain but little *gallic acid*.

Experiment XII.

To prove the existence of the *gallic acid* in certain vegetables not possessing the *tanning* principle, I made infusions of angustura bark, Seville orange peel, gentian root, marsh trefoil, camomile flowers, wormwood, and lesser centaury, in the proportion of half an ounce to twelve ounces of warm water, and two drachms of green and bohea tea, to six ounces of the same water. To two ounces of each of these infusions in phials, I put some animal *gelatin*, but no precipitation, or appearance of *tan* took place, except in the green and bohea teas, which became turbid. Into two ounces more, put into separate phials of each of these infusions, I dropped from fifteen to twenty drops of the solution of sulphat of iron. The angustura became a little turbid, but produced no blackness; the colour of the orange peel was somewhat darker; the gentian assumed a deeper colour, and became afterwards of a purplish hue; the marsh trefoil, camomile, and wormwood infusions were of a purplish black, the first two strongly tinged; the lesser centaury was very little altered, although 100 drops of the sulphat were used, till the end of two days, when it became of a light purplish hue; but the *tan* infusions were of a deep black colour.

Experiment XIII.

I put one ounce of each of the decoctions of tormentil, salix, and oak, made of equal strength, into three times three phials. Into the first three were put 30 drops of diluted sulphuric, to the second 25 of muriatic, and to the last three 20 of the nitric acid, these quantities proving just sufficient to decompose the whole of their sediments. After some hours standing to settle, I found those into which I had put the sulphuric and muriatic acids, exhibited nearly the same results, the quantity of sediment being nearly equal, the salix rather most, the oak next in quantity, and the tormentil least. The colours of the decoctions in the first and second three, were much lessened by the sulphuric and muriatic acids: but in the last three phials, to which I put the nitric acid, the precipitate was not only more in quantity, but the colours less injured or deprived, than in the former two.

Experiment XIV.

This and the following experiments were made to determine, comparatively, the strength of water to that of rectified spirit, in extracting the virtues of the salix, the latter being esteemed by Mr White the most potent for extracting its astringency.*

* Vide White's Observations on the Broad-leaved Willow, p. 18.

For this purpose I made a decoction of two ounces of grossly powdered salix bark into two pints of rain water, which was suffered to boil gently for fifteen minutes. A tincture was also made with four ounces of rectified spirit, to two drachms of finely powdered bark, which is exactly in the same proportion as the decoction. After repeated trials made in the mode recommended by Mr White, the results turned out so uncertain, and contradictory, that they could not be trusted to ; I therefore chose the following method to ascertain this fact more accurately : a phial being selected of a conical shape, and accurately weighed, the same water with which the decoction was made, was put therein, till it arose to such a height as exactly weighed two ounces. This being carefully marked on the outside with a diamond, the water was poured out, the phial wiped clean, and suffered to drain till dry. It was then filled to the same mark with the decoction, and found to weigh eleven grains heavier than with the water. As the specific gravity of rectified spirit is much less than that of water, two ounces of this of course occupied more space in the phial, which was also marked after the same manner. After being weighed with spirit, it was filled with the tincture that had digested for four days, and found to weigh exactly six grains and a half more than the spirit.

Experiment XV.

To the two ounces of decoction weighed in comparison with water in the former experiment, I put one ounce of water. It was precipitated completely, but took four drachms and a half of animal *gelatin*. The sediment being carefully collected, as in experiment IX, weighed exactly twenty-five grains and a half. To the same quantity of the tincture, weighed in comparison with the decoction, was added nearly six times its quantity of water. This was deemed necessary to promote its precipitation of *tan* freely with the animal *gelatin*. No decomposition, or any precipitation of sediment took place on mixing it with the water, or any change of its colour, except its becoming a little paler; but on dropping in the animal *gelatin*, a vast precipitation followed in the form of light clouds, which differed from the former experiment, which precipitated floculi of a more solid form. The precipitation took up a considerable time, and the *gelatin* was added as the sediment fell to the bottom. Nearly the same quantity of *gelatin* was used in this experiment as in that with the decoction; but as the *tan* here was far less in quantity, it only mixed with the superincumbent liquid. It remained so long suspended, as to take up four days to settle it firmly to the bottom of the phial. After cautiously filtering it through cloth,

it was collected on glass, dried, and found to weigh nine grains and one-fourth.

Experiment XVI.

Twenty-five grains of each of the following powders, viz. tormentil, salix, oak, yellow, red, common, and angustura barks, were well triturated with one ounce of warm water in a marble mortar, and put into seven separate phials, each containing half an ounce of putrid ox gall. An eighth phial containing warm water and gall alone, was kept as a standard. These were placed in a covered vessel, and by means of a water bath, kept in a heat varying from 96 to 100 of Fahrenheit's thermometer. On mixing the liquids containing the powders of salix and tormentil, with the putrid gall in the phials, a partial coagulation was instantly produced, and on being well shook, their offensive smell was powerfully corrected, whereas on the union of the other compositions with the putrid gall, no such phenomena could be perceived, excepting the angustura, which though it exhibited no appearance of coagulation, was greatly corrected in its fœtor. After four hours digestion, the putrid smell of the gall was lessened in all the phials, and even appeared to be somewhat corrected in the standard.

In eight hours, the phial containing the tormentil was entirely divested of its fœtor. The

salix was nearly as sweet, the oak rather less so; the yellow bark, and angustura, were nearly on a par, though the former excelled in purity; the red and common barks smelled rather putrid, but the standard was very offensive. In twelve hours I found the oak, yellow bark, and angustura more pure, but the latter less so than the former two. The red and common barks had acquired a viscid flavour, and were acidulous, the former being most so. The standard still continued putrid. At the end of twenty-four hours, they were again examined. The tormentil, salix, and oak, were sweet, and free from foetor; the yellow bark retained a little of its foetor; the angustura much more; but the red and common barks possessed still more, particularly the former. The standard remained extremely foetid.

Experiment XVII.

To seven phials, (each containing two ounces of infusion of the same ingredients as in experiment XVI. recently powdered, made in the following manner, viz. one drachm of each, triturated in a marble mortar, with three ounces of warm water, and infused two hours,) were added two drachms of fresh lean beef, cut small. In another phial were put beef and water only, as a standard. They were then placed in the same degree of heat as the former. After twelve hours digestion, no change

was perceived, except in the standard, which smelled a little. In eighteen hours, the standard was tainted; the red, angustura, and common barks, smelled a little; the yellow bark, oak, falix, and tormentil were sweet.

In twenty-four hours, the standard became quite foetid, the red bark offensive, the common peruvian and angustura rather so, but the yellow bark less. The oak, falix, and tormentil, were still sweet. In thirty-six hours, the standard became very putrid; the red bark foetid, the common and angustura much the same as before, but rather more putrid; the tormentil a little changed, the falix somewhat more so, the oak rather offensive, and the yellow bark somewhat acidulous, and smelled a little. At the end of fifty hours, the red bark became very offensive; the common and angustura the same; the foetor of the yellow bark was increased; and the oak, falix, and tormentil were comparatively more offensive. At the expiration of sixty hours they were again examined, and found to possess their comparative degrees of putridity as before stated, the tormentil and falix excepted, which now retained little, if any foetid odour; the red, angustura, common, and yellow, were all very foetid, the last two not so much as the others; however the oak was foetid, the falix a little so, but the tormentil still preserved its purity, and had no foetor. All the phials excepting the falix and tor-

mentil, were now removed ; the latter continued in the bath. Eight hours after this the salix was much improved, but the tormentil was free from smell, with the exception of having acquired an acidulous musky flavour, and the beef remained at the bottom of the phial ; in the others it had ascended to the top of the liquid in the phials, as they advanced in putrefaction.

Experiment XVIII.

The putrid liquids from the red, common, yellow, angustura, and oak barks of the preceding experiment being strained through cloth, one ounce and a half of each were put into five separate phials, and to each of these were added twenty grains of their respective powders. Being placed in the same degree of heat, after two hours digestion, the red retained its putrid smell the most ; the angustura was next in foetor, the common peruvian still less, and the yellow bark and oak were the sweetest. In four hours, the red and angustura seemed less offensive than before, the common peruvian, however, was less so than the two former ; the yellow was greatly amended, but the oak more so. In twelve hours they retained the same comparative degree of foetor as before stated, but were all amended. Night intervening, I was prevented from examining them till 24 hours had elapsed, when

they were found nearly restored to their original flavour, particularly the yellow bark, and oak.

Experiment XIX.

To determine how far the antiseptic principle is to be ascribed to the intense bitterness of vegetable substances, or to their astringency or *tan*, I made strong infusions of wormwood, lesser centaury, gentian root, lign. Quassia, and the yellow bark, in the proportion of two drachms of each, to six ounces of hot water. As the first four ingredients contain no *tan*, and the yellow was much more bitter than the red, or common peruvian bark, though possessing greater astringency, I deprived it of its *tan* by animal gelatin, its bitterness still remaining in the superincumbent liquor.

To two ounces of each of these infusions I put half an ounce of a very putrid liquid, consisting of serum and coagulable lymph, sometime before taken from a patient in an operation in a case of hydrocele of the tunica vaginalis testes. After shaking each phial, and placing them in the water bath, they were several times examined, and continued at the end of twelve hours, without any abatement of their foetor. I then added to the different phials a scruple of the following powders, viz. tormentil, salix, oak, red, and common peruvian barks, and on examining them at the end of six hours, the foetor was very much corrected in

all, particularly the tormentil, falix, oak, and yellow bark. Four hours after this, the fœtor was quite gone, the infusions retaining their natural odour.

This experiment was repeated with the putrid ferum of human blood, in the same manner, including the infusions of camomile and angustura bark, and with the same results; excepting that the two latter proved nearly equal to the red and common barks in correcting the fœtor, and were superior to the other bitters. The putrid ox gall experiment was also repeated, and the angustura seemed to prevail above the red and common barks.

Conclusions drawn from the Facts demonstrated in the preceding Experiments.

1. That the falix possesses the astringent or *tanning* principle more largely than any of the barks subjected to the same experiments, the tormentil excepted.

2. That vegetables containing the astringent principle or *tan*, also possess the *gallic acid* * which is precipitated by the sulphat of iron, in the form

* As *tan* is always accompanied by the *gallic acid*, though the latter is sometimes present when the former is wanting, may it not be inferred that these two properties so combined, are as essential to their perfection in medicine as in tanning?

of a black fœcula, even after the tan is extracted.

3. That these principles, viz. *tan*, and *gallic acid*, are not invariably united in the same substances, as many which contain the latter, do not possess the former.

4. That the *gallic acid* seems to be more abundant in those substances which possess *tan*, than in those which do not, and *vice versa*.

5. That sulphat of iron is not a certain *test* to ascertain the existence of astringency, or *tan*, however useful it may be, to detect the *gallic acid*.

6. That although animal gelatin appears hitherto to be the most accurate *test* to discover *tan*, yet it must be allowed, that a portion of the *gallic acid* remains combined with the precipitate, or leather, *even* after the extraction of the *tan* from its solution.*

7. That the decoctions of oak, salix, and tormentil are much stronger, or, at least, give out more *tan*, than their warm, or cold infusions.

8. That the red, common, and yellow barks,

* Whether the *gallic acid* has ever been completely separated from *tan*, or in other words, whether *tan* has been by any chemical process completely freed from *gallic acid*, is to me unknown: certain, however, it is, that skin, and even animal gelatin used in the extraction of the *tan*, always contains more or less *gallic acid*.

give out more *tan* in warm infusions than cold, or in decoctions.

9. That nitric acid seems to act more powerfully on vegetables containing *tan*, by causing a more copious precipitation of their contents, than the sulphuric or muriatic acids.

10. That water is a more powerful solvent for extracting the medicinal properties of the *salix*, and other vegetables containing astringency or *tan*, than rectified spirit, * or any other menstruum yet discovered.

11. That the antiseptic property, or power of correcting, or resisting, the putrefaction of animal substances, seems to prevail in vegetables possessing the largest portion of *tan*, is proved by the tormentil, *salix*, oak, and yellow barks; the red, common, and angustura barks, being less antiseptic. †

12. That the opinion which has hitherto obtained, that the bitterness contained in vegetables was the antiseptic principle, appears not well found-

* The same experiments were made with the tinctures of the oak and tormentil, with similar results.

† Why the angustura should excel the red and common barks, particularly in the putrid ox gall experiment, perhaps may be accounted for from its bitterness, if we compare it to the Columbo root.* In the other experiments it seemed to fall short of the red and common peruvian barks.

* Vide Percival's Essays, Medical and Experimental, vol. 2. An invaluable work, to which I feel myself much indebted for the assistance it has afforded me in the prosecution of my experiments

ed, as may be seen by the last experiments; the camomile and angustura having been opposed as exceptions, but were found to fall short of those possessing the tanning principle.

CASE I.

Jane Drew, of a fair complexion, blue eyes, light brown hair, and delicate constitution, had, from an early period of life, till within about a year of her illness, which happened in the year 1793, when she was nearly forty years of age, used herself to much active exercise in the open air; had worn light cloathing, and was in the habit of going at all seasons up to her middle in the sea or rivers, to gather coals. She paid no regard to wet feet, or wet cloaths, and could bear any sort of weather with impunity, never using any hat, or covering, to shade her head. She was married in her twentieth year, and had borne several children: she had always easy and safe labours; but whether from an original delicacy, or hereditary disposition in the constitutions, or from the effects of *dentition*, or *hydrocephalus internus*, none of them lived two years.

An amendment in her pecuniary circumstances inducing her to lay aside her usual mode of living, and indulge herself, she became remarkably suscep-

tible of the vicissitudes of the seasons ; her frame of body was debilitated ; she was what is usually termed *nervous* ; became *dyspeptic*, irregular in the *catamenia*, with fluor albus, was often constipated, and at other times affected with diarrhœa ; her complexion was altered from a healthy fresh, to a pale colour, and her legs and ankles were at times painful, and sometimes *œdematous*.

For these complaints, the usual *routine* of practice was adopted, and she experienced some benefit from it ; but her state of health was far from being restored. Among these, she took emetics, gentle laxatives, and the peruvian bark in various forms, with nervous medicines, tonic pills, angustura bark, &c. The latter she acknowledged did her service when she took it. This was her situation in the greater part of the year 1793. It must, however, be remarked, that she never observed any regularity in taking her medicines, and frequently left them off for those of advertising quacks, and such as were recommended by the good ladies.

In the beginning of September, 1794, finding herself still more impaired in her health, and reflecting on what I had said of her imprudent conduct and irregularity with regard to her diet, medicines, &c. for I had declared to her, that until I was assured of her steadiness and perseverance, I would prescribe nothing further, she promised faithfully to comply with my rules.

At this period the catamenia were irregular, more abundant than common, of a bad colour, and she had violent pains in the back, loins, and thighs, with an increase of *leucorrhœa*, depraved appetite, hectic heats, and thirst. At other times her pulse was low and feeble, skin dry, legs and feet oedematous, her belly usually costive, but she appeared quite free from cough or any symptoms of pulmonary affection.

I began with recommending flannel as a covering, thick shoes, lamb's wool stockings, and gave her a gentle emetic, which operated well, but not severely. After this, she continued for some days the use of a laxative absorbent mixture. This was followed by the *decoct. cort. salicis*, of which she took \frac{ss} . every two days regularly, for six or eight days. Finding herself, as she told me, more benefited by this last medicine, than by any thing she had ever taken in her life, she assured me she would go on with it, which she did for about a month, when it appeared obvious that her health was abundantly improved. I now joined with the decoction, a few grains of the *ferrum vitriolatum*, and occasionally, a few grains, by way of laxative, in a bolus, of the *hydrarg. muriat. mit.* At the end of seven weeks, the leucorrhœa was much better, and her catamenia also became regular; the colour of her complexion, muscular strength of body, appetite, &c. were greatly improved. So truly sensible

was she of the good effects of this bark, that when I told her she might discontinue it, as her health was completely restored, she begged me to let her take it for some time longer. At this I was much surprised, as before this I could scarcely prevail on her to persevere in the course of any medicine that I prescribed. This certainly afforded a positive proof of its efficacy.

Two months after this period, i. e. after taking the salix, she waited upon me, and with great anxiety, told me the catamenia had left her, and appeared much alarmed; but on enquiry, I found her state of health perfect in other respects, and that she exhibited symptoms of pregnancy. This information calmed her fears, and she left me quite satisfied. Upwards of three years had elapsed since she had had a child; and when we reflect that it was owing to her want of health that she had remained free from pregnancy so long, it certainly affords a convincing proof of the benefit she gained by the use of this medicine. She went to her full period, and was safely delivered.

CASE II.

Mrs E. H. a married lady, aged 38 years, had borne one child, but afterwards had two miscarriages. This was about thirteen years before I was consulted. In the mean time her state of health became precarious, she was what is usually

termed nervous, dyspeptic, and laboured under a general debility of the system; but above all, was severely affected with *leucorrhæa*, pains in the back, loins, &c. She took many medicines of the tonic and nervous class, from which she experienced some benefit.

In the latter end of the year 1791, she was much troubled with the above-named complaints, and consulted a professional gentleman, particularly recommended to her, of considerable eminence, who unfortunately treated her case (and that without enquiring in any manner how far it might be fit) with mercurials; the effects of which soon became obvious. A pretty severe *ptyalism*, with sore mouth, accompanied with its remarkable *halitus*, evinced to herself, and husband, what was doing. Instead of deriving benefit from this mode of treatment, the very reverse happened: the *leucorrhæa* grew more obstinate and troublesome, her nervous system more irritable, and she became subject to a tremulous shaking of her head, which prevailed more or less constantly. Sea-bathing, *cortex*, and various other means were used after this, but to very little purpose.

In the summer of the year 1793, she applied to me. Her complexion was palid, pulse languid and feeble, appetite depraved, with indigestion, belly somewhat costive, catamenia irregular, occurring once a fortnight or three weeks, more profuse than

usual, and of a bad colour: the *leucorrhœa* was still very troublesome, accompanied with severe pains in the lumbar region; her skin chiefly dry, and cold, and she had little perspiration. The shaking of her head still remained, and she feared after what she had already experienced, that her case was hopeless. I ordered her to wear flannel, and gave her a gentle emetic, which was afterwards repeated, with good effect: to these were joined gentle laxatives *ex magnes. alb. pulv. rhæi, kali tartarizat.* afterwards pills composed *ex ext. gent. p. rhæi, myrrhæ, et ferrum vitriol.* These with the use of the *infus. cort. angust.* and the same in powder, continued for about five or six weeks, improved her health greatly. The catamenia became regular, her appetite and digestion were restored; although the *leucorrhœa* did not quite leave her, the shaking of her head went quite off: an event I scarcely durst hope for. Sea bathing after this afforded her great benefit, by communicating strength to her system.

At certain periods in the ensuing year, 1794, she was sometimes indisposed, but not so much as formerly, although she still was affected with the *leucorrhœa*. She was however free from the nervous affection of her head, and took occasionally, with good effect, the tonic pills already mentioned; but her propensity to quackery, a fault by far too prevalent in the sex, caused her frequently to tamper

with her constitution, and supposing that the *cort. angust.* &c. I had given her was the peruvian bark, she took quantities of it in port wine, and in decoction, of her own accord, but this so far from relieving her always disagreed with her stomach. Sea voyages, and sea bathing did her good, and she often went on these excursions with her husband. She never was quite free from Leucorrhœa, although several remedies particularly adapted to her situation were tried, not even excepting injections of various sorts, which only afforded her partial benefit, although in other cases of this sort, they proved salutary. I never could ascertain, although strict enquiry was made, that the vagina or uterus was affected with any local disease, except this debility.

In the latter end of December, 1799, on exposure to cold, she became affected with violent cough, pains in the chest, with thin mucal expectoration and feverishness, which by venesection, and the use of anodyne pectoral medicines, soon went off.

After this period, viz. in 1800, she became so firm in her health, and changed in her constitution, that her subsequent indispositions (which were cough, head-ach, &c.) partook so much of an inflammatory nature, as always rendered it necessary for her to lose blood; but as the fluor albus still remained, it occurred to my mind that the *decoct. cort. salicis* might perhaps be useful: she took it for three or four weeks, *cochl. iii. vel. iv. ter*

de die, and to my no small astonishment, it quite removed this very troublesome and obstinate complaint.

CASE. III.

Mrs A. P. aged 48 years, consulted me in 1799. She had borne several children; her labours were severe, and she had nursed the children too long. Among other complaints to which she was subject, such as dyspepsia, general debility, pains in her lumbar region, thighs, &c. she was much affected with *leucorrhœa* and *prolapsus uteri* for about ten years. The latter did not protrude completely, but was at times lessened on her keeping herself quiet, and free from exertions, and her belly open. She took some gentle laxatives, wore flannel, and took also *cochl. iv ex dec. cort. salicis ter vel quater de die* for eighteen days. The discharge went quite away; her appetite was restored, as well as her muscular strength; and the pains in her back and thighs left her. As she used the decoction somewhat weaker in the form of injection, the *prolapsus* was so much better as not at all to protrude. To prevent its falling down, I advised the use of a pessary, but could not prevail on her to comply with this direction. Some months after this I saw her, and she informed me it had begun to return. At this I was not surprized, for she was so indolent, and careless of her health, as to pay but very little regard to it. She often stood for

hours in the open air in the market, and could not be prevailed upon either to continue the decoction, or apply the pessary recommended.

CASE IV.

In the month of March, 1802, a lady of remarkably delicate stamina, aged 30 years, who had borne and nursed four children, besides experiencing two abortions, and whose labours were tedious, and attended with profuse uterine hemorrhages, consulted me, after weaning her last child, for the following complaints, viz. violent pains in the loins and thighs, accompanied with fluor albus to a great degree, and prolapsus uteri. Her appetite was depraved, tongue white, with thirst, skin for the most part dry and cold, though she frequently felt feverish, her pulse feeble, *catamenia* irregular, and profuse in quantity, and the whole of her general habit much debilitated.

The long continuance of her complaints, and the little benefit she had derived from the variety of medicines prescribed for her in the usual *routine*, such as *cortex peruv. tinct. rosar. acid vitriol. ichthyocolla*, as well as other remedies recommended by the good ladies, gave her but small hopes of experiencing benefit from a farther use of medicine. But as I assured her that her case appeared to me, from accurate enquiry, to proceed more from a want of energy and vigour in her system, than from any internal

local affection in the thoracic or abdominal viscera, she being free from those symptoms which indicated such a tendency, I induced her to hope for success. Previous, however, to her entering on the use of the salix, as she was by no means of a constipated habit, I prevailed on her to wear flannel, and she then took *cochl. iii. vel iv. ex decoct. cort. salicis ter de die*, which was combined with a small portion of *lign. quassia*. This she continued for about three weeks; but after the end of four days, she told me she had never found equal benefit from any thing she had taken before. When ten or twelve days had passed over, she assured me her discharge had nearly gone off, and the prolapsus uteri was very nearly gone, together with the pains in her loins, &c. expressing at the same time a wish to leave off taking her medicine, which I refused; but being costive she took some laxative pills. The whole of the decoction I could get her to take was only eight half pints. She, however, recovered so well, as in a very little time after to become pregnant, and is now in an excellent state of health.

CASE V.

In the year 1798, September 5th, I visited W. Hoggit, a stout robust man, aged 32, who had formerly been subject to scrophulous affections in several of the lymphatic glands; some of these had

broke out on the *carpal* bones, and neck, and one near his ankle. At this time he had a wound, or sore, of this sort, near the angle, or insertion of the left inferior *maxilla*, and another situated on the right side of the posterior part of his head, near the junction of the occiput to the parietal bone. Into this a hard tent had been thrust, which kept up a large discharge, and rendered it completely fistulous. He was also affected with a quartan ague, and had taken, without any apparent relief, two or three ounces of peruvian bark, as well as other remedies prescribed by his neighbours. When he applied to me on account of his sores, he said he would not take internal medicines, as he conceived them to be of no use for the ague, which, he said, few doctors could cure. I told him, if he would trust to me, I would cure him without the bark: this was meant of the *cinchona*. He was then in a severe hot fit, attended with considerable fever, head-ach, pains in his limbs, thirst, &c. but had no nausea, or sickness. His skin was dry, but he was not costive. *Pulv. Ipecac. comp.* gr. x. in a bolus, were given, and repeated in six hours: this produced a copious sweat, from which he found much relief, the pains in his head and limbs having gone off. Anxious to ascertain the powers of the salix in this case, and wishing to perform a promise I had made perhaps too precipitately, that he should have no more fits, I gave him twelve ounces of strong de-

coct. salicis; he took *cochl. iv. tertia quaq. hora*. This was continued till he had taken two pints; no more fits ensued, and he recovered perfectly. His sores healed up by the use of simple dressings, leaving out the tent; and, notwithstanding I urged him to take more bark to prevent a relapse, and offered it to him free of expence, he refused it; but ever after this he enjoyed good health. He had been affected with the ague upwards of three months.

CASE VI.

Thomas Williamson, seaman, aged 20 years, had been attacked with several fits of a tertian ague, which recurred regularly every other day. At the beginning of his fit, he took three boluses *6to. quaq. hora ex pulv. antimon. pharm. Lond. gr. vi.* with a saline mixture, *cochl. ii. 3tia quaq. hora*. The antimonials produced a most salutary effect, by causing him to perspire freely; and, proving gently emetic; they greatly relieved his head-ach, of which he complained much, besides shortening the duration of the fit. In the absence of the last fit, he took *decoct. cort. salicis*, every three hours, about a pint in the whole, which completely put a stop to his ague for some days. He had also taken a cathartic bolus to keep him open. As he lived at a distance, I heard nothing of him for some time, till his father called to tell me his ague had returned.

It was on the 18th of March, 1799, that he first consulted me, and on the 25th of April that he relapsed, a period of 37 days, and about 34 days from his ague having left him. I saw him in this fit, which had come on before I arrived. He complained of violent head-ach, pains in his back, limbs, &c.; tongue white, but clean; pulse 120; skin dry, and hot. The same treatment was adopted as above mentioned, with the same success; but, as he disliked the decoction I had given him, the solutio mineralis, as recommended by Dr Fowler, was given him thrice a-day, in draughts of ten drops for a dose at first, and then augmented to fifteen. In the use of this he continued for six or seven days, but his fits did not quite leave him, although they were less violent. I then pressed him to reassume the *decoct. cort. salicis*, assuring him it was preferable, and more safe: to this he consented, and took in the whole eight half pints of it, though not with regularity. His fits entirely left him on the 4th of May, but he took the decoction till the 16th, and remained quite free from his complaint.

CASE VII.

William Crank, seamen, aged 18 years, was from exposure to cold and wet, attacked with febrile symptoms on the 1st of April, 1799. His illness commenced with a shivering fit, accompanied with head-ach, sickness, pains in the loins and

limbs, pulse 124, skin hot and dry, tongue parched, with great thirst, and his belly somewhat costive. He took exactly the same remedies as had been at first prescribed for Williamson. On the second day he was much better, had perspired freely, and vomited several times a viscid yellowish fluid. His head-ach, and pains in the limbs, were better, tongue moist, thirst moderate, and his pulse fell to 90. On the third day, he took a bolus *ex calomel. c. pulv. cathart.* which opened him freely. The next day, being the fourth from the first attack, he was sent, contrary to my express desire, to sea. I sent on ship-board *℥iſs. or ℥iij. decoct. cort. salicis*, two opening boluses, and two dozen powders *ex cort. angust. a gr. xv.* with directions to keep him free from work until he got strength. The ship met with contrary winds, the weather proved stormy, and compelled her to return. His disease assumed the tertian type, regularly attacking him every other day. On the 16th of April, twelve days after he sailed, I saw him just when he had recovered from a fit of his ague, and put him on the *solutio mineralis gr. x ter de die absente paroxysmo*; the dose was increased to twenty drops. The medicine was continued to the 26th or 27th, although he had but one fit after he began with it. As his appetite was small, and his strength little, I gave him *pulv. cort. angust. gr. xii. bis in die*, till the 2d of May, when he grew stronger, but his

master setting him too soon to some hard work, he was seized with another fit on the 10th. On the 12th, I gave him the *decoct. cort. salicis cochl. iii 3tia quaq. hora*. This he continued for about eight days, without any return of his ague. He took in all five half pints, and got perfectly well.

CASE VIII.

William Grozier, seaman, aged 43 years, was, while at sea in the beginning of August, 1800, attacked with symptoms of *pyrexia*, attended with a smart shivering fit, pains in his limbs, violent head-ach, nausea, sickness, &c. By keeping in bed, and taking warm diluting liquids, this attack, as he informed me, went off by a profuse perspiration, so that he hoped he was recovering, being then free from the fever. The day following, however, he was seized with another fit exactly similar, but by this time he had arrived at his port. After this he took an emetic, and some other medicines, and, from the ceasing of the second fit, commenced with the peruvian bark, in powder, every two or three hours. It did not, he observed, put a stop to the fits at once, as he had still another; but, by perseverance, the ague left him. On the 23d of August he arrived at home, his ague returning when at sea twice. The same day I saw him; his fit had commenced, his skin felt hot and dry, and he had violent pains in his head, loins, &c. tongue

parched, pulse 118, but he was not costive. I prescribed a saline sudorific mixture, a dose every third or fourth hour. On the 24th he felt easier, had perspired, and his pulse lessened to 90. He then took the decoction every third hour, to the quantity of one ounce and a half each dose. The 25th being his bad day, his fit had returned, but proved not so violent as the former. The mixture was repeated, and he took an opening bolus *ex calom. c. p. cathart.* to procure stools. The decoction was persevered in as before. On the 27th no fit occurred. He used his decoction on the 28th, and the day following continued free from any attack; but being costive, the bolus was prescribed as before. The decoction was continued till the first of September, and to improve his appetite *gr. xii. pulv. cort. angust.* were given twice a day in white wine and water. The whole of the decoction which he took amounted to about seven half pints, and his cure was effected in about nine days.

CASE IX.

W. Walker, aged 18 years, was seized on the 7th of January, 1802, with a considerable depression of strength, chilliness, quick pulse, dry skin, thirst, want of appetite, nausea, head-ach, pains in his limbs, and costiveness in his belly. The day following I saw him, and ordered *pulv. antim. gr. iii. hydrarg. muriat. mit. gr. i. cons. ros. q.*

s. ft. bol. 6ta. quaq. hora secundus. This produced a mild *diaphoresis*, and operated by vomiting, which lessened the quickness of his pulse, diminished his head-ach greatly, and the pains in his limbs, but did not procure any evacuation by stool. On the 10th, he took a bolus, *ex calom. gr. iii. p. rhæi gr. viii., jalap, gr. ix.*; but this not operating, he was ordered *sal. glaub. ℥i. manna ℥ss. aq. tepid. ℥iv.* which had the desired effect. On the 11th his fever left him, although his appetite was poor, and he was much debilitated. He was ordered *p. cort. angust. gr. x. bis in die.* On the 15th, he appeared much better, his appetite having returned, but he complained of a pain or stitch in his left side, to which a blister was applied. Not seeing him again until the 19th, I found he had been attacked the preceding day with a cold fit, succeeded with violent heat, and feverishness, which lasted for some hours. I ordered him *absente paroxysmo, cochl. iii. decoct. cort. salicis 3tia, quaq. hora*; this was repeated the day following, and he seemed fast recovering, but refused to take any more medicines till the 26th, when the decoction was repeated, he having the day before had another fit. On the 27th and 28th, the decoction was repeated. His fit shewing no tendency to return, he left off taking his medicines; but on the 3d of February, he relapsed again, and, with reluctance, took three more phials, each containing eight

ounces of the decoction. As I caused him to wear flannel, his disorder at length left him. My visits were discontinued from the 10th. The great irregularity of this patient made his cure much more tedious than it would otherwise have been. The whole of the decoction which he took amounted only to eight half pints.

CASE X.

Mrs B. aged 75 years, a robust woman, of a plethoric habit, was seized on the 21st of March, 1802, with symptoms of pyrexia. Her pulse was 110, full and hard, head-ach severe, skin hard and dry, eyes painful and inflamed, belly costive. I bled her to $\frac{3}{4}$ x or more, which diminished her pulse in its hardness, but did not reduce it in its frequency, although the pain of her head and eyes was relieved. She took *gr. iii. ex pulv. antim. c. calom. gr. i.* in a bolus, H. S. This operated by perspiration, and a moderate stool, and her fever went off by the next day. As she complained of a troublesome cough, I gave her some pectoral medicines, which relieved her. On the 23d, she was attacked with a shivering, which was succeeded by a hot fit, which lasted for some hours, I questioned her whether she had ever been subject to the ague; she told me she had twice in her life, but declared she would take no bark, (meaning the cinchona.) I assured her she should have none,

as I had long difused it in cafes of this fort. She took ℥ss . of the *decoct. falicis*, in the ufual dofes, every two hours, beginning after the fit had ceafed, and a cathartic bolus to open her body. The fit did not return. I fent her another decoction, but ſhe abſolutely refuſed to take it. Calling to ſee her eight days after, I found her ill of another fit, in bed. I propoſed ſending her ſome medicines, but ſhe refuſed, telling me ſhe had the bottle of *ſtuff* by her, which ſhe would take. She did ſo after the fit had left her, but would on no account take more. The fit did not return, and ſhe remained quite cured.

CASE XI.

M. W. aged 52 years, a fat, grofs, large woman, much addicted to intemperance and hard drinking, after being for a long time a patient in a public charity, ſolicited my aſſiſtance in the beginning of March, 1798. Some months prior to my ſeeing her, a violent pain, with ſhivering fits, attended with a ſmart fever, ſeized her on the right ſide of the *regio umbilicalis*. The inflammation being deeply ſeated in the *membrana adipoſa*, formed a large abſceſs, but whether it broke, or was opened by the apothecary of the charity, I do not recollect. It was not only poulticed at its commencement, but long after its being an open wound, and was crammed with lint, and even

tents. This practice astonished me, as it differs so much from the improved state of modern surgery. The fore was completely fistulous, and a large sinus extended considerably backwards and downwards, nearly in contact with the spinous process of the right *os illii*. Another abscess had also broke out after this, on the contrary side of the *umbilicus*, somewhat lower down than the former. It was also fistulous from the same mal-treatment, but not so extensive as the former. The edges of these wounds were hard, jagged, very wide or gaping, and appeared loosened from their adhesion to the abdominal muscles. The discharge was ichorous, often tinged with blood, sometimes foetid, acrimonious and painful. The surrounding integuments appeared tinged with a dingy brown reddish hue.

Towards the evenings, she was affected with feverish heats, had restless nights, thirst, and loss of appetite. She appeared much shrunk in her muscular system, much of her usual fat was absorbed, her abdomen, which was tense and firm, now became loose and pendulous. About a fortnight after she had come under my care, a cuticular eruption, resembling *psora*, broke out over her whole body, particularly on her breast and abdomen, and when warm in bed, plagued her intolerably. For this she took pills *ex hydrarg. muriat. mit.* and some gentle purges. From the

24th of March, to the 14th of April, by these medicines, and the assistance of Sir John Pringle's ointment, mentioned in his book on army diseases, which she used now and then, she got cured of this teasing complaint. As she had taken great quantities of the *cinchona* in powder, and decoction, but more of the former, I enquired if she found any benefit from it? She replied in the negative, saying it disagreed with her stomach, and she hoped I would give her any thing else, as she could take no more bark.

In the latter end of April, she began with ten ozs. of the *salix* decoction; had the same May 2d, 5th, 7th, and 9th; and finding herself better, the discharge more consistent, and the wounds less painful, she continued it until the middle of July, a period of about eight weeks. The wounds were dressed, with dry lint applied on their exterior surfaces, occasionally sprinkled with *hydrarg. nitr. rub.* and covered with a large pledget of tow, with ointment composed *ex. ung. resin. flav. cerat. et ung. gum. elam. p. æ.* dissolved over a slow fire, a most useful application in many surgical cases. These (with the assistance of a double headed flannel roller, applied round the abdomen, so as to decussate each other, and by that means not only serve to produce an adhesion of the detached integuments, but bring the edges of the wounds into close contact, and also press out the matter,) were of essen-

tial use. The cure was nearly completed about the beginning of August, excepting a small space which now and then discharged a little, and upon which I put an adhesive plaister; the bandage I advised to be worn even after the sores had healed. This case did not appear to me convenient for Baynton's straps, although they are an excellent invention. Twice in the course of her cure, the decoction was omitted for some days, with a view to determine what effects would ensue from its suspension, the discharge was less bland and puriform, and she always felt herself so much worse, as to complain, and request to have it repeated.

CASE XII.

About the latter end of November, 1798, the wife of Peter Burn, of Hilton Pottery, aged 46 years, was attacked with symptoms of *pyrexia*, pain under the ribs of her right side, frequent rigors, succeeded by hot fits, and accompanied with profuse sweats. Her belly was costive, nights restless, with feverish heats, thirst, loss of appetite, &c. At intervals, she seemed much better for a few days, but her cold and hot fits frequently recurred, and a hard swelling arose in the right side, which gradually encreased to a considerable size.

On the 26th of January, 1799, I saw her. She appeared much emaciated, her skin yellow, urine

highly tinged, belly constipated, stools white, pulse quick and feeble, tongue white, with frequent sickness, nausea, and extreme languor. A large hard tumour occupied the right *hypocondrium*, and was painful when pressed: this pain extended to the top of her shoulder, and she was unable to lie on the contrary side, had difficult respiration, some cough, but no expectoration. She had had no regular advice, but something to keep her open, and rub on the swelling, procured from a druggist, who never saw her. At this period, suppuration had actually taken place in her liver; and her great debility and emaciated condition, gave little prospect of her recovery, except the diseased viscous should adhere to the parietes of the abdomen, or make its exit through the intestinal canal.

To obviate costiveness, pills *ex ext. cath. e hydrarg. mur. mit.* were given, and the *ung. hydrarg. c. camph.* rubbed in small quantities on the tumor night and morning. Gentle anodynes were administered occasionally, and when the cathartics were omitted, the *pil. hydrarg.* with the *unction* were continued. At the end of twelve days a *ptyalism* came on, which was regulated according to circumstances, by suspending, or going forward with the mercurial course. *Pulv. angust. gr. xii. bis in die*, were occasionally given, which improved her appetite and digestion. About the latter end of February the tumor softened, grew less painful, more promi-

nent, and indicated a tendency to break externally. By the use of cataplasms, fomentations, &c. it became soft, and the integuments appearing thin, and discoloured, I made an opening on the 8th of March, which discharged above half a pint of good pus. By my finger, introduced, the cavity of the abscess did not appear deeply seated, but on pressure, the matter appeared to come mid-way from the spine. As it did not discharge quite freely, but shewed a tendency to heal, I kept it open with a sponge tent, as she positively told me she would not suffer (if required) the operation to be repeated. It continued after this to discharge freely; but the alterative course was deemed necessary to be pursued, on account of the tumor still remaining hard, and enlarged in its circumference, till the middle of April, when it greatly lessened. Her health before this was much improved, her stools regular and natural, her appetite mended, and she took the benefit of walking out. The angustura bark certainly afforded her much benefit, agreed with her stomach, and was given her in the suppurative stage; but after the abscess was opened, paroxysms of fever supervening, with thirst, quick pulse, and restless nights, I gave her (not having the pulv. angustura ready at hand) ten ounces of the *decoct. salicis*, which she took three or four times a day in the usual dose. The superior benefit she derived from this was such, that she found her recovery go on

more rapidly, the feverish symptoms very soon leaving her. She took in the whole only two pints ; but assured me it had done her more service than the whole of the powders. Her expression was that *it made her hearty*. From the latter end of April, she daily grew better. The sponge tents some time before this, had been disused, and the wound closed, except a small oozing. She recovered so well about the end of July, as to work at the harvest, and has since continued in health.

CASE XIII.

A Soldier's wife, aged 25 years, six weeks after delivery, which was favourable, felt a dull pain in the region of her left kidney, which became enlarged. This increased in violence towards night. Her urine was not suppressed, or diminished in quantity, but she felt more uneasy when costive. A variety of applications had been ineffectually used for seven weeks, to disperse it, till I saw her, on the 26th of October, 1799, and found a large prominent tumour situated on the *latissimus dorsi*, its length more than seven inches, and its breadth above five inches. It extended near to the posterior spinous portion of the *os illii*, and seemed deep seated : but my ingenious friend, Dr W. Scott, surgeon to the Northumberland militia, who examined her afterwards, agreed with me, that it was not a psoas abscess, or had communication *ab interno*.

The symptoms not being strongly marked by any great pain, on pressure, or the skin discoloured, though quite thin, induced him to suppose it an encysted abscess. It was deemed proper to leave it to its own course, only using mild poultices. On the 8th of November it appeared inflamed, and had broken into a small aperture, into which I introduced a curved bistory, and enlarged it two inches; nearly three pints of well-digested pus, with a large cyst, detached from the cavity, followed. It was dressed slightly, and discharged freely for two days; but, the orifice contracting, hindered the exit of some hydatids that presented themselves, and induced me to put in a sponge tent. A number of hydatids came forth, of different sizes, from that of a large nut-gall to a small pea. The fluid they contained was transparent. After some days, the whole being discharged, I removed the tent, and, by means of a broad flannel roller, to bring the edges in contact, the wound healed by the 10th of December. A few days after the operation, her appetite failed, and she was affected with symptomatic fever, thirst, &c. This was removed by the *decoct. salicis*, of which she took, in all, six half-pints. During the whole of her illness, she nursed her child, which remained in good health.

CASE XIV.

Thomas Smith, a strong man, aged 52 years, was attacked three weeks before I saw him, with violent pain in the fleshy part of his right thumb, ball of his hand, and wrist, accompanied by strong rigors, and violent fever, with thirst, even to a state of delirium. He was bled freely, took anodynes, &c. used fomentations and cataplasms, till I saw him on the 6th of May, 1800, when I found the whole of his hand, fingers, thumb, and wrist, much tumefied; the suppuration appeared deeply seated among the tendons of the hand, and fingers, even underneath the wrist and flexor tendons; the inflammation extending up the fore arm, contracted his fingers and wrist. He appeared much exhausted, his pulse quick and feeble, with great thirst, &c. added to great dejection of mind, from the terror of losing his arm, as the gentleman whose patient he had been, in consultation with another, had decided for amputation. I consoled him with the hopes of saving it, by assuring him, that nothing short of a mortification should induce me to adopt this plan; and, were it to take place, it could not be safely attempted, till nature had set the boundaries where to begin the operation. Thus encouraged, he became more chearful, and in better spirits. As he complained of increase of pain at every application of the hot poultices, I ventur-

ed to lay them aside, and applied others composed *ex aq. saturn. c. sp. vin. camph.* nearly cold: this I did with a view to moderate the profuse suppuration that threatened, being perfectly convinced it could not act here as a repellent. The pain gradually diminished; and, instead of the *cortex peruv.* which he had been taking, and with which he appeared disgusted, the *d. cort. salicis* was given every three or four hours, with anodynes at bed-time. To remedy the contraction of the fingers and wrist, which, for want of care, often remain useless, I opened the abscess underneath the arm, and applied under it, and to his hand, an excavated board, above the dressings, retained by a double-headed roller, with gentle pressure. The matter, after this, appeared on the upper part of his hand, among the bones of the *carpus*, *metacarpus*, and more than half way up the arm, occupying the interstices of the flexor, and extensor muscles. The inflammation had extended even to the elbow joint, and a collection of matter had formed on the upper part of the arm, above the protuberance of the *ulna*, *radius*, and *carpus*. Into this I made an opening, which discharged prodigiously. This took place on the 16th, ten days after I first saw him. All the dressings were now laid aside, except large pledgets of tow, spread with digestive, dry lint being first applied to the wounds, and over these soft linen compresses, dipt in *aq.*

faturn. and a double headed roller (decussating) over the whole; whereby the matter was not only pressed out in every direction, but the atmospheric air excluded, and union promoted. Under the whole arm was put a broad piece of strong tin, made concave, its edges turned over, with holes punched so as to admit its being sewed, after being stuffed with tow, and covered with oil cloth. The extremity of the tin splint was expanded so as to admit his hand, and as much of his contracted fingers as was convenient; and the ball of the former was padded with soft cloth to overcome the contraction of the tendons, which by degrees became lessened. Two or three of the fingers and the fleshy part of his thumb were opened in the direction of the muscular fibres; above all, the little finger, which I was afraid would be lost on account of the matter having nearly separated it from its junction with the metacarpus, and its being also seated under the *musculus abductor minimi digiti* induced me particularly to apply the knife, which saved it.

I should have observed, that after the matter had freely discharged itself from the opening made on the upper part of the wrist, the extreme end of the *ulna* protuded, being completely separated from its articulation with the carpus. In fact, the radius was also loose, and the hand seemed held together merely by the tendons of the muscles. While the

ulna protuded in this way to nearly half an inch from the wound, I saw that it was entirely deprived of its periosteum, and must exfoliate, or be sawed off. The latter I forbore, for fear of the injury it would sustain from vibration in operating. It very soon exfoliated, and granulations appearing, the wrist became firm sooner than I expected. One of the carpal bones, prior to the adhesion of the ulna, slipped out ; it was quite found, and proved to be the *os pisiforme*.

At the time of my first attendance in May, the patient was so much weakened as to keep his bed ; but becoming more lively, he got up at times, till after some days he was obliged to continue in bed, being seized with a violent pain in his right hip, extending down his thigh. This was attributed to cold, and the pain encreasing with his symptomatic fever, his thigh encreased to a vast size, threatening a great suppuration. It was suffered to break of itself ; and the matter getting vent through a small aperture, a little below the great trochanter, I enlarged it by a small incision, through which issued about two quarts of well formed pus, the whole not being suffered to be discharged then. Three days after this, he was attacked by profuse diarrhœa, accompanied with some griping pains in his bowels, which continued four days, when they ceased by the use of wine, cordial medicines, and the *infus. angust. c. julep. e. cret. et tinct. theb. &c.* It is

enough for me to say, (and it was what I did not expect,) that this alarming abscess was completely healed up, solidly, in one month from its breaking. No poultices were used before or after it had broke, but flannels moistened, a little warm, with fomentations *ex absinthii cham. &c.* The wound was dressed simply in the same way as the hand and arm, my chief dependence being on a double headed flannel roller, applied in the same manner, and with the same views, viz, to exclude air, press out the discharge, and promote the union of the muscles, and integuments. The *decoct. salicis*, which had been laid aside during his diarrhœa, was reassumed; for although this bark is powerfully astringent, yet the experience I had acquired respecting the good effects of the medicines that were used, induced me to prefer them in this instance.

From the vast discharge that took place from his thigh, arm, hand, fingers, &c. together with the diarrhœa, he was so reduced as not to leave his bed, till the beginning of July, when he began to recover his strength gradually, and to walk out, and by the end of August waited on me to be dressed. The wounds in his arm and wrists still remained unhealed; but the discharge was trifling to what it had been; many large sloughs, with the tendons of the fore and little fingers, besides a small exfoliation from the first metacarpal bone, were thrown

off. Still, however, as was to be expected, his hand and fingers appeared a mere disorganized mass. To reduce this, I plainly assured him much time was necessary, and that he was not to expect his hand would be restored so as to enable him to use his fingers, which were half bent, and his wrist, though quite free from its bend, nearly ankylosed. It was enough that his hand had been saved from the knife: more than this I could not promise, nevertheless the contraction which had taken place was giving way, and his hand promises to become useful. It was not till near two years had elapsed, that his hand became lessened to a moderate size. About a year after his attack, his hand not discharging, except from one or two small wounds, he frequently worked in his garden, and afterwards commencing the business of travelling as a carrier of small ware with a small cart, he became quite hale and strong. At the period I am writing, October 20, 1802, he has one small wound remaining on the third bone of the metacarpus through which a piece of bone is exfoliating. Of all the medicines prescribed for him, the decoction of the salix pleased him most. The quantity he took was considerable, and when it was suspended, which now and then happened for two or three days, from his not sending for it, he assured me he felt the same degree of disappointment as he had experienced at times when deprived of his tobacco.

CASE XV.

William Swales, aged 17 years, consulted me on account of a pain in his back, with weakness in his lower limbs, which often caused him to fall down when off his guard in walking. On examination, his spine shewed an incipient projection of the fourth and fifth dorsal vertebræ. This was in the beginning of September, 1797. Caustics were applied on each side of the projection, the sloughs separated, and each issue held from five to six beans. In less than a month he was taken out of my care, and sent to his native place; and in about two months more his issues were suffered to heal. In the spring of 1798, I heard he was much worse, and in May following sent to the county hospital. At this time I saw him. His vertebræ projected much more; his spine was more curved, his belly almost flat to his back, his thighs and the calves of his legs were much pined, and his limbs could scarcely support his body. When he had remained in the hospital two months, he was discharged, after taking a large quantity of *cinchona*, to bathe in the sea. On the 13th of August, he again applied to me, and the caustics were reassumed, and kept discharging freely. In the beginning of November, he was so much mended, as to throw away the staff that supported him in walking; his whole frame appeared much improved; his legs and thighs were more

muscular, and his belly more prominent. At Christmas he was so well as to dance at a merry meeting. His issues were still kept open, the number of beans in them were reduced to two in each, and his health nearly restored ; and in the beginning of April, 1799, he went to sea.

He began the use of the salix decoction, August 17, 1798, and continued it with some intermissions till March 13, 1799. He had before taken the *cinchona* in the hospital, which disagreed with his stomach, often made him sick, and sometimes purged him. After taking the salix decoction for a month with success, I discontinued it for some days to determine the consequences. The issues looked inflamed, or rather flabby, the discharge became thin and acrimonious, and he felt hot and feverish. On repeating the decoction, his amendment appeared evident. From the inattention of my shopman, the decoction was sometimes omitted, and at other times made weak, by putting in too much water. All this was guessed at, and found out from the appearance of the issues, and of course remedied. He took in all about 40 pints of the decoction. His spine did not recover its form, although the curvature was lessened. He has since left off going to sea, and although he is now employed as a weaver, is still in a tolerable state of health.

Two other cases of incurved spine, have been successfully treated since under my care, and in these the *decoct. salicis* was used with the most decisive benefit.

CASE XVI.

Benjamin Johnson, now 26 years of age, was, in the summer of 1794, attacked with measles, which left a tenderness in his eyes, and a bodily weakness. In September, the same year, from getting cold, he became feverish, and a swelling or tumour arose in the calf of his left leg. It was poulticed and rubbed with various applications, but afterwards broke into a small aperture, discharging a thin serous fluid; the external covering was also thickened, and the sore became fistulous.

In January, 1795, he applied as a patient to a public charity. No internal medicines were given him during eleven weeks, but a common dressing, which he usually applied himself to his leg. By this time another opening came below the first, through which a probe was inserted. After this a professional gentleman laid open the sinus into one wound, which discharged freely, but evinced no disposition to heal. While he was in this state, a tumefaction took place in his heel, extending to the instep of his foot. This afterwards broke, and discharged from a small aperture on the interior part of the heel the same sort of crude matter; and

this was followed by another opening nearly opposite to the former, with the same effect. Added to these, in the spring of the year 1796, arose a similar enlargement, or tumour, in the calf of his right leg, which also broke, and was laid open, but without amendment, either in the wounds, or his habit of body. He was sent on the 9th of June, the same year, to the county hospital, where he remained nine months, took the cinchona in powder, for near six, and a decoction for the other three months. Common dressings were applied to his wounds. At the end of February, 1797, he was sent home to bathe in the sea. The wound of the heel remained open, but that in the same leg was healed.

In May following, he began sea-bathing, and continued it for a month without advantage. The latter end of July he went again into the hospital, where he remained four months, three of which were spent in taking the nitric acid, which at first made his mouth sore, till he sucked it through a glass tube. From this he found no benefit, except that of increasing his appetite; and he shrewdly remarked, that this was the more hard, as they gave him no better diet, and did not increase his allowance.

In the year 1798, a humane worthy gentleman, for whom he sometimes worked in his business, bestowed on him two guinea, and about six half-guinea, bottles of Dr Brodum's botanical syrup,

which he took regularly, but felt no alteration or effect on his health, appetite, or the state of his wounds. He compared this to thick *liquorice water*, said it was not unpleasant, and had a dark black sediment in it. In the month of February, 1800, a gentleman, then surgeon to the parish workhouse, saw him, probed his wounds, used simple dressings, and gave him for about a month, what appeared to me the *muriated barytes*, but without benefit. In the middle of April, he, in consultation with another of the faculty, advised an amputation of the left leg, where the heel was diseased, which was agreed upon. In the interim Dr W. Scott, already mentioned, was requested to be present at the operation. The apparatus was ready, and even the tourniquet applied: two other gentlemen, the operator, and Dr Scott, were present. Prior to the commencement of the operation, the doctor examined the lymphatic glands of the groins, which had not before been attended to, in both of which he found enlargements. Fortunately for the poor fellow, he gave his opinion against the operation, which providentially was relinquished. Having heard much concerning this affair, and the man possessing an excellent character, I applied to the good gentleman, his patron, with whom I was on intimate terms, to learn the state of his case, but could obtain nothing satisfactory. He deplored his situation as hopeless, and emphatical-

ly remarked *that every thing had been done, as he had been under the care of the first professional folks in the county, and had the best advice.* I ventured to assure him, that he might *possibly* be mistaken, that I would see him, and if any prospect offered of doing him good, attempt it. The next morning, the 10th of March, 1801, I visited him; he appeared much emaciated, remarkably thin in the face, and his arms, legs, and thighs, had quite lost their plumpness; his pulse was slow, his appetite little, his skin without the least moisture, generally cold, and his face and whole body remarkably pallid. His urine and stools were regular, and from interrogating him closely, I was clearly of opinion that his thoracic and abdominal viscera were sound. His left limb was much wasted; the whole of the os calcis appeared greatly enlarged, the foot, particularly the instep, much tumefied. The integuments, especially those covering the wound on its exterior surface, were of a dull crimson colour. A small wound was visible, upon which I pressed my finger, and discovered a spongy feel of the bone. I told him the whole of the heel bone would exfoliate, as it was carious. Next day he shewed me his other leg: the great toe was enlarged, and appeared diseased with caries, and a wound in the calf still discharged. I noted down, at different times, the narrative of his case, till this period, and found

him very correct in his details. It was from the *salix* that I hoped to derive some benefit, although, at first, my expectations were not very sanguine. His heel and toe were dressed lightly with lint, dipt in pure *acetous acid*, mixed with a small portion *extinct. lavend.* first placed on the wound, and covered with a pledget of digestive. The acid I had used on similar occasions, as it gave little or no pain, and evidently promoted exfoliation. After ten days dressing, the diseased bone pushed out of the wound, and the heel exfoliated in about six weeks; but the toe was much longer. The bone from the heel was remarkably large and honeycombed, and weighed, though deprived much of its earthy particles, one ounce and a quarter. In the interim he took some alterative pills *ex merc. muriat. mit. c. sulph. antim. gr. i, bis in die*, with the *salix* decoction. His medicines agreed with him remarkably well, especially the decoction, which he compared to port wine. The large wound in the heel, from which the exfoliation proceeded, healed very fast. Very simple dressings were applied, but no cramming with lint, or tents, was allowed. Some weeks after using the decoction, his appetite and strength encreased, with plumpness in his muscles, so that his cloaths would not fit him. At the end of six months, supported on a crutch and stick, he called at my house, his wounds being nearly consolidated,

except the toe, which would not allow him to bear upon it. The heel was quite firm.

About the month of April, 1802, the whole of his wounds were healed up, he having been my patient thirteen months. He took more than 40 pints of the decoction; but like many others who have been in the habit of using it with benefit, found great uneasiness when deprived of it for any length of time.

Summary Remarks and General Observations on the Medical Properties and Effects of the Salix Latifolia, compared with the Cinchona; with some Reflections on Tonics and Antiseptics, &c.

FROM the foregoing experiments and cases, I trust it is proved that the salix is greatly superior to the *cinchona*, and that very little doubt will remain in the minds of the candid and liberal part of the profession, of its deserving much more notice and attention than it has hitherto received.

Being much less expensive than the *cinchona*, I found many favourable opportunities of dispensing it among the poor, labouring under almost every variety of disease, in which the use of the peruvian bark was indicated. The farther I extended it, the more I was convinced of its pre-eminence over the barks in common use, and except when prescribed

by physicians, have now adopted it as a substitute for the *cinchona*.*

It very seldom disagrees with the stomach or bowels; but it ought not to be administered without being preceded by an emetic, or gentle laxative, in cases where such preparatives are clearly indicated.

With cold stomachs, or such as appear to be morbidly affected by the powerful stimulus of ardent spirits, or excessive use of port wine, it has been *sometimes* found to disagree, and requires to be combined with aromatics, as *tinct. lavend. cardamoms, pimento*, and the *lign. quassia*. Like good port wine, which often proves disagreeable to those unused to it, it becomes more and more agreeable by perseverance. It does not produce such a degree of constipation as need be considered dangerous, or morbid, or which can be less easily obviated than that costiveness which arises from taking powdered *cinchona*, and as often produces the same effect, as it were *mechanically*, by adding to the hardness of *scybala*, in patients habitually disposed

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* This is to be understood of the pale and red barks, which I have rejected from my practice. The yellow and augustura barks, I consider in some peculiar instances as capable of performing what may not be expected from the *salix*; but the latter I esteem as most to be depended on as a febrifuge, and in cases of medical surgery.

to constipation. Hence arises its usefulness in debility or want of tone of the *primæ viæ*.

Like the cinchona, it does not purge, nor is it likely to produce any such effect in decoction, whatever it may do in powder, in which state I have never yet employed it. The obvious properties which it seems to possess in competition with the barks we have compared it to, are, 1. Its superior quantity of astringency, or *tanning* principle. 2. Its superabundance of *gallic acid*, which in those substances that abound with *tan*, is more prevalent than in those which do not. 3. Its solubility in water, which appears to be the most powerful menstruum for the extraction of its virtues. 4. Its effects on dead animal substances evince its tonic powers to be superior to every vegetable substance with which I have compared it, (the tormentil excepted), * and this power, or principle, from its correcting and resisting the putrefaction of animal matter more effectually than the *cinchona*, appears to be the real *antiseptic* principle, erroneously supposed to reside in the bitterness of vegetables.

As these two principles, viz. tonic and antiseptic, have been considered by some as one and the same,

* Of this root, which I introduced in comparison with other substances, in my experiments, I can say little from experience of its effects, except that it is useful in some cases of diarrhoea. It is known, however, to produce costiveness, to which the *salix* in very few cases is liable.

while others have deemed them altogether distinct and separate properties, it is no wonder that such doubt and obscurity hangs over the systems and theories advanced to explain their action on the living body, as still to leave us in perplexity.

If we reason from analogy, by comparing their effects on the dead, with the living animal fibre, those vegetables possessing the largest share of *tanning* principle, ought certainly to be esteemed the most powerful tonics.

The peruvian barks have been, and still are, esteemed by some of the first professional characters, as the best vegetable tonics; the yellow bark particularly, from the intensity of its bitterness above the common, and red. Be this as it may, its excellence as a tonic is not only proved from our *tests*, but the voice of common fame continues to declare in its favour.

As the common bark contains a small portion of *tan*, with little bitterness, and the red a similar portion of the former with more of the latter, the yellow possessing more of the two principles than either, it may fairly be inferred, that the *tanning* principle is the tonic power, or *vice versa*, the tonic power is the *tanning* principle.

The *salix latifolia*, when compared with the whole of the barks subjected to my experiments, evinced by its effects on the system as a medicine,

superior powers to the *cinchona* ; * and these powers seem to proceed from its possessing a larger portion of the *tanning* principle ; and this principle proving, as has already been demonstrated, to be its *antiseptic* power, † will evince that it is not to bitterness that we ought to refer this latter power, either on the dead or living animal body. And it may justly be questioned, whether the tonic, astringent, or *tanning* principle, which from its effects on dead animal matter, appears to be *antiseptic*, ever produces similar effects on the living system, even were we to admit of the real existence of putrid diseases, which by many ingenious physicians is disputed.

The ingenious Dr W. Vaughan observes, that
 “ the peruvian barks have been long since cele-
 “ brated as *antiseptics*, by those who hold that pu-
 “ trefaction takes place in the circulating blood,
 “ and that there are diseases which deserve the
 “ name of *putrid*. But if it had never been a
 “ received opinion that medicines act in the same
 “ manner upon dead as upon living bodies, it is
 “ highly probable that the epithet *putrid*, would

* It may not be improper to remark, that my conviction of the superior powers of the *salix* to those of the *cinchona*, proceeded rather from my *experience* of its effects as a medicine, than my *experiments* to ascertain its properties, which have been but recently made, and that purely to ascertain from what source such effects might proceed.

† Vide experiments xvi, xvii, et seq.

“ not have been employed to express the nature of
 “ the disease. And if this had never been em-
 “ ployed, it is morally certain we never should have
 “ talked as we do now about *antiseptics*. The
 “ rationale of medicine has been little cultivated,
 “ and the maxim *medicamentum non agit in cadaver*.
 “ has been repeated, but not understood ; or
 “ what is worse, not regarded.” Vegetables pos-
 sessing bitterness, are accounted *tonics*, and even
 have been considered as *antiseptics*, though not pos-
 sessing *tan*. The same terms have been applied to
 such as contain *tan* and bitterness, * though with
 more propriety than in the former case. Be this as it
 may, it seems pretty generally admitted, that vege-
 tables not possessing *tan* have fallen short of those
 which contained it, e. g. cham. gentian, cort. au-
 rantior-amara, angustura, quassia, &c. are inferior to
 the *cinchona* as *febrifuges*, while the *salix latifolia* and
 others of a similar quality appear, even *sine amaritie*
 to excel the *cinchona*.

How far bitterness may be essentially necessary
 for the perfection of vegetable tonics, as *febrifuges*,
 is not for me to determine. In the cases of inter-
 mittents and typhus, in which I have administered

* Intense bitterness in vegetables possessing *tan*, is not, per-
 haps, so common, as in those that contain little or none. The
salix pentandra, or bay-leaved willow bark is, however, found
 very similar to the *cort. flav.* as it possesses *tan* and bitterness
 nearly equal to it.

the *salix*, it did not appear defective from want of this property; nor for any thing we know, is it essential to its effects in preventing the return of the paroxysms of febrile diseases, whatever it may be in certain diseases of the chylopoetic viscera, in which bitters combined with tonics are known to prove salutary. Nor would it be fair to determine on its effects *comparatively* with the *cinchona*, by combining it with bitterness, or any other principle that might influence its operation as a medicine, more especially in those cases where the *cinchona* is trusted to as the sheet anchor.*

All forms of the peruvian bark, such as decoction, tincture, extract, powder, &c. notwithstanding the experience of their inefficacy, when given singly in certain diseases, have been found, when combined with intense bitters, chalybeats, and other powerful medicines, to be attended with uncommon success: this has induced me strongly to suspect its real utility in these cases, more especially as it cannot be denied but that the same ingredients, *sine cortice*, have been known to produce similar effects.

* This is to be understood in cases of intermittents, fevers, gangrene, weakening discharges from abscesses &c. and even in those fevers termed putrid or malignant; in which latter cases Mr White fears to trust it; not from any facts or proofs he has adduced of its failure in those instances, but merely from what he imagines its deficiency of antiseptic power.—Vide White's Observations and Experiments, p. 52.

I advance not these remarks from caprice or prejudice against the *cinchona* ; they are adduced as, at least, presumptive proofs of imperfections that exist in no small degree in medical practice, and which regular practitioners would do well to turn over in their minds, thereby to enable them to ascertain with accuracy, the specific, or active properties, resident in powerful remedies. We might, however, presume to except the *cinchona flav.* which from its considerable quantity of *tan*, and intense bitterness, appears so much superior to the other *cinchonæ*, as not only to require smaller doses, but to stand in less need of auxiliaries to assist its effects.

After all that has been said by ingenious systematic writers on the *tonic* or *antiseptic* effects of barks, and similar astringent vegetables, on the living system, and in what these two powers consist, particularly the latter, it does not yet appear, although these important questions have been frequently canvassed by the greatest luminaries of medical science, that they have been satisfactorily explained.

Even the illustrious Dr Cullen, in his elaborate and ingenious chapter on *antiseptica*, seems not only at variance with himself, but appears to have formed no decisive conclusions respecting such remedies. Yet his opinion concerning the effects of the peruvian bark as a medicine, is such, that I

have ventured to apply it, (as Dr Vaughan has to the *cinchon. flav.**) and I trust with propriety and justice, to the *cort. salicis latifoliae*, more especially as it appears to possess similar powers, and those in a greater degree.

“ This bark (the peruvian) is well known to
 “ practitioners, to be highly useful in all cases of
 “ febrile putrescency, when it is employed in suffi-
 “ cient quantity. Whether, however, its effects
 “ are to be ascribed to its *tonic*, or to peculiar *anti-*
 “ *septic* powers, I cannot certainly determine, but
 “ I am disposed to think the former opinion better
 “ founded.”

If therefore the *cort. salicis latifoliae* should be found, from repeated experience of its effects, to excel the *cinchona*, as it has appeared to Mr James, Mr White, (though the latter *imagines* it not equal as an *antiseptic* to the *cort. flav.*) and myself, differences of opinion respecting its precise qualities, will prove no obstacle to its use in practice.

Its admirable effects in various cases of intermittents and typhus fever, some of the former of which I have detailed, together with its producing very remarkable and salutary effects in certain affections proceeding from general debility, and irritability of the system, even in periodical head-achs, painful affections of the face, in *leucorrhœa*, *menorrhagia*, *scrophula*, and in almost every case of surgery, in-

* Vide Vaughan on the yellow peruvian bark.

dicating the use of the *cinchona*, impressed me the more strongly in its favour; because while it seemed requisite that the *cinchona* should be administered largely and repeatedly in substance, to prevent the return of the paroxysms, and that it was sometimes rejected by the stomach, and often by the intestines, exclusive of its proving disagreeable to that viscus, even when retained, not to mention its inefficacy after long perseverance in its use; the *decoction* alone of the *salix bark*, after all, proved efficacious.

If we reflect seriously on the frequent failure of the *cinchona*, large and repeated quantities of which are deemed necessary to overcome agues, and intermittents, and the general disgust arising in the minds of patients, we shall not wonder at the introduction of the *solutio mineralis*, and other precarious remedies, which have been had recourse to on these occasions. Dr Fowler* is certainly deserving of great praise, as well as Dr Willan†, for their cautious and skilful mode of exhibiting this solution.

Dr Winterbottom was so truly sensible of the imperfection and want of success of the *cinchona* in the climate of Sierra Leona, and the disgust his

* Vide Medical Reports, &c. by T. Fowler, M. D.

† London Medical Journal, vol. VIII.

patients had to it, that he alternately gave the *cort. angust.** and this solution, with uncommon success in intermittents.†

It cannot, however, be denied, that the *cort. jalicis latifoliae* is less exceptionable than the *mineral solution*, and infinitely more certain in its effects than the gum kino, so much recommended by Dr A. Fothergill.‡ It is at any rate more safe than the former, and should it be granted that the *cinchona* is not to be laid aside, but where it disagrees or produces no good effects, it surely will be equally, if not more, prudent to resort to the *salix*, than to more dangerous or doubtful remedies.

It is true the *cort. angustura* has succeeded in some cases of agues, in which I have given it, but not by any means equal to the bark I am recommending.

As a warm corroborant, and stomachic, in some diseases of that organ, and the intestines, where bile abounds, and where the columbo root has been found efficacious, the angustura, probably from its agreeable bitterness, and the peculiar power it seems to possess in certain internal diseases, has proved of infinite service. This seems to have been the case in the pestilential malignant fever, introduced from Bulam to Grenada, in which dis-

* Medical Facts and Observations, vol. VII. †Vol. VI.

‡ Vide Memoirs of the Medical Society of London, vol. II, page 93.

ease Dr Chisholm found it to produce the most salutary effects, in many instances where the *cinchona* had proved useless or hurtful.*

In thus noticing the failure of the *cinchona* in some of the fevers of the West Indies, and I may add in the yellow fever of Philadelphia, where from the testimony of Drs Chisholm and Rush, † it proved hurtful, I shall not attempt to assign the true causes of its failure, which I do not at present recollect has been done by those who have exhibited it. The inference I would draw is, that similar cases may occur, in which this may happen in the use of the *salix latifolia*.

I should have remarked, that exclusive of the singular efficacy I experienced from the *salix* in the variety of diseases assuming an intermitting, or a periodical type, I have found it superior to the *cinchona* in what may be termed that species of pulmonary hectic so often the consequent attendant of long continued catarrhs, and acute pneumonic inflammations, and which may be justly esteemed among the leading causes of phthisis pulmonalis.

The advantage the *salix* appears to possess from its superior tonic powers above the *cinchona*, which last has so frequently disappointed me while pursu-

* Essay on the malignant fever of Grenada, &c. by C. Chisholm, M. D. 1795.

† An account of the bilious remitting yellow fever of Philadelphia in the year 1793, by Dr Rush.

ing the tonic plan of treatment so strongly recommended in pulmonary hectic by Drs R. Kentish,* Percival,† May,‡ and others, induces me strenuously to recommend the former to the particular attention of medical practitioners, and the more so as on account of *diarrhœa*, aversion of the patient, or its disagreement with the stomach, the latter has been often laid aside. I urge this more strongly, from the unexpected success I have experienced in four cases of this sort, in three of which the patients were indebted for their recovery to the free use of the *salix* decoction, even after having used the *digitalis*, and the *cinchona*, without any manifest benefit. In the first of these instances though continued for some time, the *digitalis* proved on the whole injurious, by debilitating the system. The symptoms were incessant cough, purulent expectoration, profuse colliquative sweats, great emaciation, frequent rigors, &c. One case was accompanied with diarrhœa, and in another the disease appeared to originate from *hæmoptysis*. The cures were aided as usual, by anodynes and demulcent pectoral remedies to appease the cough, with the assistance of a nourishing diet.

* Vide Differt. de Phthisi pulmonali. Auct. R. Kentish, M.D. 1784.

† Memoirs of the Medical Society of London, vol. II. p. 288.

‡ London Medical Journal, vol. ix. p. 268. vol. xi. p. 255.

And here I think it not improper to observe that it may be thought by many, that I have expressed myself in terms too sanguine in favour of the *salix* to the prejudice of the *cinchona*, as may have been the case with others respecting the *digitalis*, in drop-fies, phthisis pulmonalis, &c. but this, whether true or not, must be left to time and experience to determine. It has proved in my practice abundantly more efficacious than the *cinchona*; and when it is considered that it is a much less dangerous remedy than the *digitalis*, the risque attendant on its exhibition as a substitute for the *cinchona*, cannot be esteemed of that importance as to deter any one from giving it fair trials.

Mr White says,* “ Since the introduction of
“ this bark into practice, at the Bath City Infirmary
“ and Dispensary, as a substitute for the *cinchona*,
“ not less than twenty pounds a year have been
“ saved to the charity, which circumstance will
“ render it a very valuable article to all hospitals
“ where much bark is used.”

What opposition may probably arise to the introduction of the *salix*, from dealers and speculators in the *cinchona*, as an article of commerce, I cannot say. But if once this domestic vegetable gets fairly introduced into general use, those very persons, and our *good friends*, the

* Vide his Observations and Experiments, p. 3.

Spaniards, will be enabled (if not compelled) to furnish us with cinchona more genuine than, from its extensive consumption, they have hitherto done; and it will be less liable to be adulterated at home with other barks of an inferior quality.

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