

Paper in manufactures : The gold medal, or fifty guineas, being the premium offered for preparing the greatest quantity, not less than twenty pounds weight, of opium, ... was this Session adjudged to Mr. Thomas Jones, of Fish-Street-Hill, ...

Contributors

Jones, Thomas, of Fish-Street-Hill, London.
Society for the Encouragement of Arts, Manufactures, and Commerce (Great Britain)

Publication/Creation

[London] : [publisher not identified] : [1800]

Persistent URL


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P A P E R
IN
MANUFACTURES.



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C H E M I S T R Y.

The GOLD MEDAL, or FIFTY GUINEAS, being the Premium offered for preparing the greatest quantity, not less than twenty pounds weight, of OPIUM, from POPPIES grown in Great-Britain, and equal in quality to the best foreign OPIUM, was this Session adjudged to Mr. THOMAS JONES, of Fish-Street-Hill, from whom the following Papers were received, and who made choice of the pecuniary Reward.

S I R,

I N the summer of 1794 I cultivated a considerable number of White Poppies (entitled in the New London Pharmacopœia, *Papaver Somniferum*, and, in another place, *Papaver Hortense semine albo*), when a few of the heads or capsules

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having been broken off by the wind, I observed at the extremity of the stalks a substance in every respect resembling Turkey Opium. This accidental circumstance bringing to my recollection its method of production, as related in the Encyclopædia and elsewhere, I wounded a considerable number of them with my penknife, and, in the course of the day, collected a small quantity of the above-mentioned substance. As this circumstance took place while we were cutting lavender, it happened that an old and experienced servant, who was afterwards to distil it, was directing and assisting, and we agreed that it was probably in effect equal *to*, and was certainly more pure than any we had ever seen.

From this period I have never entirely lost sight of the object I am now to consider; but, on account of various avocations, and particularly my Rhubarb plantation, which at this time required all the attention I could well spare, it was
not

not in my power to engage in an undertaking of such magnitude ; and more especially on a scale so extensive as that which I had already determined to adopt, under a persuasion that experiments, when more confined, are for the most part fallacious.

As preparatory, however, I have not failed every year to repeat the operation, at once establishing its practicability, and availing myself of many advantages which can only be derived from observation and experience.

The inclosed Certificates will inform the Society that at length my plan has been carried into execution, but not with the degree of success that ought, and might have been expected to attend so large and expensive an experiment.

It must be confessed, that had I been at all aware what an almost Herculean labour I was about to encounter, I really suspect whether my resolution would have been equal to the task. Lest, how-

ever, this should discourage others from prosecuting this object, it is necessary to be more explicit.

Difficulties, and such indeed as are considerable, must necessarily attend most undertakings which have been hitherto unattempted ; but the disappointments I sustained, though more numerous than generally fall to the share of a person under such circumstances, and more aggravated, did not all arise out of the undertaking itself, but from causes, some of which may be easily guarded against in future, while others may never again occur.

Two years have passed in producing what, I flatter myself, the Society will consider deserving their Premium, particularly if I am enabled to render the operation much more simple than may at first sight be supposed.

The claimant, I observe, is required to submit to the Society his particular method of cultivating the Poppies. As
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the mode adopted in the present instance arose rather from necessity than choice, I must go back as far as the autumn of 1797, to show how it happened.

Five acres of ground and upwards, situated in the parish of Enfield, in the county of Middlesex, I appropriated to this experiment, at the period above mentioned; which, being ploughed several times previous to the following March, were then sown broad-cast; and the weather proving favourable, the seed soon vegetated, and appearances were very promising. From the neglected state of the land, however, to which I was unfortunately a stranger, such a profusion of weeds sprang up among them, that, after many fruitless efforts at recovery, I was under the mortifying necessity of ploughing them all up together. This circumstance not taking place till the latter end of April, the season for re-sowing was elapsed; and as to cropping my field with oats or barley, a measure

very strongly recommended to me, I considered it as a deviation from my original purpose, and therefore, without paying any attention to it, gave the field a summer-fallowing, conceiving that Poppies might be sown with equal and perhaps greater advantage in autumn.

Finding that the broad-cast method of sowing precluded the possibility of hoeing where the land is much infested with weeds, I now adopted a different mode, and drilled in the seed with a very simple yet efficient machine, which I purchased of Mr. Macdougall, of Oxford-Street: but, as the weather began to be very severe so early as November, and continued so with few intermissions, the succeeding March found me very little forwarder. Yet still I persevered, and once more resolved to drill the whole five acres: they came up extremely well, and, as I expected, accompanied with innumerable weeds; but these by well-timed application were eradicated, though

though not without considerable difficulty.

I now thought myself secure; for nothing could assume a better appearance, till the beginning of May. Alas! I could not foresee the cold and remarkably dry weather that ensued, and prevailed, I believe, for six weeks successively. Hence the growth of some became stunted, and others were entirely destroyed; but happily some warm refreshing showers fell just time enough to rescue the remainder.

From these I have procured upwards of twenty-one pounds of Opium, five of which, in compliance with the Society's requisition, I have sent for their inspection and examination.

At one time I began to despair of even procuring this, comparatively speaking, small quantity, though it is not a fifth part of what I ought to have had, owing to the extraordinary rains and

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winds which we experienced through the whole of the summer months.

This recital, as I have before observed, ought on no account to intimidate others from a co-operation ; for it is obvious, that the former inconveniences originated in my own ignorance, whilst the latter depended upon causes that in all probability may never happen again.

Mr. Ball, in a letter published in one of the volumes of the Society's Transactions, advances an opinion which I consider as very fallacious, respecting the quality of land adapted to the growth of Poppies. He seems to be very little concerned about this point, and hints the probability of their being cultivated almost every where. I well know that Poppies, like many other vegetables, will grow in soils of every description ; but of this I am fully assured, that, like the rest, they have their particular and favourite soil, viz. a sandy loam, and that the better this is, the more advantages

tages will accrue to the cultivator. For it should be considered, that, in bad, as well as good ground, the same expences of cultivation, scarification, and collecting, will be incurred, for perhaps a fourth share of the produce.

There is also another error in the same communication, which, having a tendency to mislead, ought to be pointed out. He tells us, to use his own words, "That, by a calculation he has made, supposing one Poppy growing in one square foot of earth, and producing only one grain of Opium, more than fifty pounds (I suppose he means, of course, apothecaries weight) will be collected from off one statute acre of land." Now, as there are no more than 43,560 square feet in an acre, and allowing one grain for each, the produce can be no more than ninety ounces and six drachms. This calculation appears to me to be as much in the extreme one way, as that of
Mr.

Mr. Ball is in the other. The medium is most probably nearest the truth; but upon this point I cannot at present speak with any degree of precision, on account of the scattered situation of my crop, and the extraordinary intemperance of the last season. Judging, however, from the number of heads we preserved, and comparing them with the total quantity, they seem to have yielded three-fourths of a grain each, upon an average, large and small.

I shall now lay before the Society some general remarks on the cultivation of Poppies, and then conclude with submitting a few hints and directions respecting the preparation of Opium.

Having a tap-root, their size will consequently be proportionate to the depth of earth they are enabled to penetrate. Hence the necessity of land that will admit of deep ploughing. The fineness of the surface too is very essential. As
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the seed is so small, and the plants, on their first coming up, so exceedingly tender, the bush-harrow should always be used after those which are commonly employed. By this mean a greater number are likely to vegetate, and their roots being better protected, are less liable to injury.

Poppies (and when I use this name, I mean that particular kind before specified) may be cultivated both by the drill and broad-cast mode of husbandry; at the same time it must be remembered, that the land for each requires a different disposition. In the former this is not so material, the sowing-machine regulating the distances of the rows according to the will of the operator: these ought to be nine inches or a foot asunder, and in beds containing four rows, allowing a foot and a half between each. But, with respect to the latter, this point must be strictly attended to: the ridges should never exceed four feet in
breadth ;

breadth ; so that the furrows will answer the double purpose of preserving the land throughout the winter, and, in the season for collecting the Opium, serve as paths for the workmen.

Besides two chances of a crop, I am decidedly in favour of autumnal sowing ; and the first week in September seems to be the most favourable period for this purpose. If the weather continues open, they will make such a progress as to be capable of resisting the severity of an inclement winter, without on the other hand being too forward ; a circumstance highly dangerous, as the first severe frost is inevitably destructive.

On this account, whether by the drill or otherwise, a larger proportion of seed should be sown at this season, for the plants will defend each other ; and as all the plants will not be equally forward, so, let the winter prove as it may, provided the seed has vegetated freely, there will be great probability of a good appearance

ance in spring. If unfortunately, however, such a winter as the last should again occur, and the whole plantation fail, a circumstance which has happened to myself, the spring sowing ought not to be deferred longer than the first week in March.

I do not, without sufficient reason, recommend that this operation should be performed in autumn. The Poppies are not only generally larger, but even, when this is not the case, I know from experience, that they will yield a much larger proportion of Opium: for it seldom happens that a spring Poppy will bleed, as we term it, more than twice, while the others will bear scarifying till they are nearly ripe. This I imagine can only arise from the length of time the one has been in the ground in comparison with the other. Indeed, the difference is so striking, that if the present winter destroys my plants, I shall be almost tempted to dispose of my spring-sowing to other purposes.

purposes. In drilling, the necessity of covering the seed by harrowing is suspended by the operation of the machine; and, in the broad-cast method, a shower of rain will have all the effect without further trouble or expence.

Excepting great additional care, turnip and poppy hoeing are similar, and in every respect may be conducted in the same manner. I believe the turnips are rather benefited, they certainly are not injured by being shaken, and will recover from the effects of a wound; but if the Poppies are accidentally touched, they will either exhaust themselves by bleeding, or dwindle so as to be of no value. But it is high time to proceed to the last point I proposed to consider, namely, the production and preparation of Opium.

In ordinary seasons, the heads or capsules of the autumnal Poppies will be large enough for our purpose in the month of June; for at this time they will have attained about half their growth,
or

or be equal in size to a small tea-cup. I have invented a variety of instruments as scarificators; but as only two kinds were actually used, I am unwilling to trouble the Society with a description of any other.*

Seven, and sometimes eight boys, were employed from eight to twelve years of age, together with a man as a superintendant. The children's book, which accompanies the

* *Mr. Jones has since added the following Description of the Instruments, and their mode of application. They remain in the Society's Repository.*

The first of these instruments consists of two thin steel blades fixed by a wedge in a wooden handle, so as to make incisions about one fourth of an inch from each other.

The other is made entirely of steel, and resembles in form the tuning-fork of a harpsichord. It consists of four bars, proceeding from a handle of a convenient length, a quarter of an inch wide, and two and a half long, each terminating with a bolster, through which a screw passes that fixes the scarificators. The centre bars should be so elastic as to yield to the curvature of the capsule, upon the outer ones being pressed by the finger and thumb; and by this means four incisions are made at once, at equal distances. This instrument is an inch and three quarters in width; but, from the two outer blades, only an inch and a quarter. The bolsters are a quarter of an inch in diameter, and the scarificators a proportionate length, namely, three eighths. The wedge in the former, and a longitudinal aperture in the scarificators, or blades, of the latter, will regulate the depth of the incisions, at the will of the operator. It is of the utmost importance that these should not be made through the inner coat of the capsules.

the instruments, contains only an account of six, as the eldest, being the son of my gardener, is included in another book. To the youngest I gave three-pence per day, and, if tractable and well disposed, an additional penny for every additional year.

The steel instrument was used by the latter, and the others by the former. I have great reason to be satisfied with their construction ; for, notwithstanding their simplicity, they proved themselves fully equal to my purpose ; and so considerable a trial has not suggested any other improvement, than that in the largest the two inner bars only should be elastic ; for the continual pressure of the finger and thumb on the two outer ones, which is absolutely necessary for the others to act, would be avoided, and consequently much fatigue and inconvenience prevented.

It is of very little consequence whether the first incisions are made horizontally or vertically, with this instrument ;
for

for however luxuriantly the milk may flow, by making four at one time, it so divides the stream that seldom any escapes. With the smaller ones we most commonly made them horizontally, beginning as near the top of the head as possible, and for this reason—all the juices, if the first incision was made at the bottom, would be naturally attracted by the aperture, and render every other completely fruitless, besides occasioning the certain loss of a considerable quantity, by falling on the surrounding leaves; whereas, on the other hand, a proportion of milk will exude from each, and the Opium be equally distributed over the whole surface of the head.

No particular directions seem necessary for repeating this operation, any farther than that each time it should be performed in a contrary direction, and continued till no more will exude, at intervals of four or five days or more, according to circumstances; for, as the

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weather

weather proves rainy or fair, they will be shorter or longer, the heads being sooner replenished in the one than the other.

Each of the children being provided with a tin cup, having one handle, so contrived as to fix itself to a girdle fastened round his waist, with a common gardening knife they scraped off the Opium that appeared upon the heads in a soft ash-coloured substance. Dewy mornings are best calculated for this purpose, and it should be discontinued so soon as the sun has gained a sufficient power to dissipate it; for, if persevered in throughout the day, some of the Opium will recede into the interstices, and more, in defiance of every endeavour, will remain upon the heads. The principal quantity exudes in the course of the night, and, uniting with the dew, it is taken off as readily and completely as with a sponge.

Several regulations were adopted to excite, as much as possible, a spirit of emulation. The name of each boy was
written

written upon his cup, so as to ascertain, on their return from collecting, who had been the most active. And although, in consequence of the unsettled state of the weather, this part of our process continued so long as from the 6th of July to the second week in September inclusive, the good effects were felt to the last. And, as for the reason already mentioned, an hour in the morning became so invaluable, those who appeared in the ground at five o'clock, at the most busy period, became entitled to an additional penny to their daily pay. This measure succeeded at first only with a few; but the remainder, overcome by shame, at length attended equally well. In addition to this encouragement, I am under an engagement (in case I succeed with the Society), to such whose behaviour has been uniformly good, to celebrate the circumstance by a public dinner.

The interval from breakfast time to sun-set, if the weather assumed a set-

tled appearance, was occupied by scarifying. And here I again felt the good effects of stimulating measures : certain places were allotted to particular children, according to their ability, so as to discover who scarified the most and the best ; the superintendant occasionally following all of them, to observe whether any work was left unfinished, and, if there were any, to complete it. If, in our progress, any one proved refractory, which happened in more instances than one, rather than have recourse to severity, and for the sake of example, he was immediately discharged. I had numerous applications, and the first on the list always had the preference as his successor.

Upon the whole, considering it was the first attempt of the kind, every thing proceeded very regularly ; and had the summer been propitious, notwithstanding my former disappointments, I should have had great cause for satisfaction.

The

The largest quantity that my man, seven children, and myself, were able to procure in one morning, from five to nine o'clock, was one pound and a half: this happened when the dew was remarkably great, and succeeded one of the warmest days in the summer.

From the experience I have had, the precariousness of our climate appears to me the only obstacle to the production of Opium in this kingdom. It may be said that the same inconvenience attends every other agricultural pursuit; and that hay, and a variety of productions, particularly hops, are much prejudiced from the same cause. I allow that they are so; but the evil produced by a sudden alteration in this case is irreparable; for, should it happen after a fine scarifying day, we do not only lose the labour of that day, but all its produce. It becomes obviously necessary, therefore, to be particularly circumspect; and this is the only remedy we are able to procure.

The Poppies will receive no damage from remaining entire, while, on the other hand, impatience may be injurious, if not destructive.

As my notes furnish me with no further particulars, I have very little more to add. The Opium, when first collected, from its union with the dew, is much too soft to be so formed as the Society will receive it.

To reduce it to a proper consistence, taking nature for our guide, it should be thinly spread in shallow dishes, and exposed, under glasses, to the rays of the sun. My opinion is, that Turkey Opium suffers considerably from the operation of fire; certain it is, that, with respect to its effluvia, it undergoes a complete alteration. I have covered it with its own leaves, thinking this a very convenient mode of package, and conceiving it to be important, in every new undertaking, by studying appearances, to yield to the general prejudices which
naturally

naturally prevail in favour of the article to which we have been accustomed.

I have several times trespassed on the patience of the Society ; on the present occasion I have again been seduced into prolixity. I hope they will receive the same apology now as before, knowing so well how acceptable every communication of this kind, though extended even to minuteness, is to the interested inquirer. To the utmost of my power I have complied with the requisition of the Society in Class 175, in describing the mode of cultivating the Poppies, and preparing my Opium ; and, in doing this, I can truly say, that every thing which I have advanced is founded on the evidence of facts. I have been unwilling to indulge myself in mere speculation, being of opinion, that a paper of such a description as the present, would prove much more acceptable if confined to experiment alone.

Had it been necessary, I could have introduced a variety of quotations on this subject, describing the method of preparing Opium in other countries ; but surely this would have been foreign to the subject. The information which the Society and the public require, is what really has and may be done, as related in this paper. This information does not consist of vague evidence, collected from accounts of doubtful veracity, and of course more calculated to mislead than instruct ; on the contrary, I have closely adhered to what I conceived to be the principal intention of the Society ; have related nothing but what I actually saw ; have confined myself to a bare recital of circumstances ; and have only occasionally ventured to make deductions.

I acknowledge, with heartfelt pleasure, the repeated honours with which the Society has distinguished me ; and am not without hope, that this additional proof of perseverance and exertion will
also

also receive its approbation. With the certificates, I have inclosed a very flattering letter from Dr. Woodville, author of the Medical Botany. It in a great measure proves, that if the practicability of preparing this inestimable medicine in this kingdom can be established, the Opium itself possesses every quality that can be desired.

I remain, SIR,

Your most obedient servant,

THOMAS JONES.

No. 3, Fish-Street-Hill.

MR. TAYLOR.

SIR,

I CALLED yesterday morning to examine the Opium collected by you from the capsules of the White Poppy; and I have no doubt, from its taste, smell,

smell, colour, and purity, but that it is more powerful and efficacious than the best foreign Opium imported into this country.

The late Dr. Alston, when Professor of Botany and the Materia Medica in the University of Edinburgh, informed the public, more than sixty years ago (see Med. Essays, vol. V), that the milky juice, drawn by him from the heads of the White Poppy, soon acquired the consistence of Opium, when its taste, smell, faculties, &c. were the same as those of that drug.

In the year 1791 I convinced myself of the truth of his assertion, by repeating his experiments, which I noticed the following year in my Medical Botany. Soon after this time I appropriated a part of the garden at the Small-pox Hospital for the growth of the *Papaver Somniferum*, from the green capsules of which were collected between two and three ounces of Opium, which was found
to

to be more efficacious than that of the exotic, as appeared upon trials of it made by several of my medical friends. But the great trouble and length of time required for the collection of the juice, induced me at that time to think, that the manufacture of this valuable medicine in England, did not hold forth any prospect of commercial advantage. However, since I have seen the great quantity of it collected under your direction, I sincerely hope that the above opinion will prove to be unfounded, and congratulate you on your success.

Your obedient servant,

W. WOODVILLE,

Ely Place, February 25, 1800.

Mr. JONES.

SIR,

I BEG leave to acquaint you for the information of the Society instituted for the Encouragement of Arts, &c. that
I have

I have this day ascertained the weight of a parcel of Opium, collected by Mr. Thomas Jones, of Fish-Street-Hill, from his plantation of Poppies at Enfield, and find that it amounts to twenty-one pounds seven ounces.

I conceive, from its pungent and bitter taste, that it is equal to the best Opium we receive from Turkey, with the advantage of its exceeding in purity any parcel of this drug I have ever seen imported from thence. I cannot but remark the ingenuity of the imitation of its form, which resembles many of the pieces we are accustomed to receive it in from the Levant.

I am, SIR,

Your most obedient servant,

JOHN HORNER.

*Bucklersbury,
February 24, 1800.*

MR. CHARLES TAYLOR.

To

*To the Society for the Encouragement of
Arts, Manufactures, and Commerce,*

I WILLIAM DUNCAN, of Philpot-lane, in the city of London, chemist and druggist, do hereby certify, that I have examined twenty-one pounds seven ounces of Opium, made by Mr. Thomas Jones, of Fish-Street-Hill, from Poppies grown on his plantation at Enfield; and I declare, that it appears to me to be as fine Opium as the best I have ever seen in the course of my experience, for upwards of thirty years: and I further declare, that the whole of the said twenty-one pounds seven ounces, is of equal quality with the five pounds sent herewith for the inspection of the said Society.

WILLIAM DUNCAN.

London,

February 25, 1800.

The

*The Committee of the Society for the
Encouragement of Arts, &c.*

GENTLEMEN,

A GREEABLY to your request to the Physicians of St. George's Hospital, conveyed in a letter of the 5th of May last, I, as one of that body, return you the result of the trials made with the English Opium, in a few cases under my care.

1st. In a case of acute rheumatism, the effects of this drug in *sweating*, in *allaying anxiety*, in *abating pain*, and in *producing sleep*, were the same as from the same doses of foreign Opium, administered in a similar manner in like cases.

2dly. In a disease of the bowels, attended by pains in different parts, with sometimes diarrhoea, and at other times with constipation and distention, the English Opium *alleviated the pain*, and *restrained the evacuations*, as might have been
been

been expected from the foreign article.

3dly. In an instance of chronic rheumatism in one thigh, the English Opium produced *rest, warmth, perspiration, relief from pain*, and occasioned *costiveness*.

4thly. The English Opium aggravated the complaints in a case of hysteria, especially occasioning *sleeplessness, vertigo, sickness at the stomach*, and a *more frequent return of the paroxysms*; and similar effects ensued from foreign Opium.

If a larger quantity of the drug, whose virtues were to be determined by experience, had been sent, more trials would have been made; but I have no doubt that the same effects, and by at least as small a dose, would have been produced by it as by the best foreign Opium.

I have the honour to be,

GENTLEMEN,

Your most obedient servant,

G. PEARSON.

Leicester Square, June 4, 1800.

To

*To the Committee of the Society for the
Encouragement of Arts, &c.*

GENTLEMEN,

A GREEABLY to your request, we have tried the Opium you were so good as to send to the Hospital, and am sorry, in the short time in which you desired an answer, that we have had only one case to give it a fair trial, namely, Elizabeth Spraghton, who has been several weeks under the care of Dr. Vaughan with a diseased state of stomach, and in whom we suspect a schirrus of that viscus. She has been in the habit of taking one grain of Opium every four or six hours, according to the violence of pain which she suffered. On the sixth of May she began with your English Opium, made into pills of one grain each, and found as much relief as she used to do from the foreign Opium. She

She has continued taking them ever since, and with the same effect.

I remain, GENTLEMEN,

Your obedient humble servant,

G. E. LAWRENCE,

Apothecary.

Middlesex Hospital,

May 21, 1800.

THE Committee of Chemistry, to whose examination the English Opium, prepared by Mr. Jones, was referred by the Society, ordered samples of the Opium to be left with several eminent chemists for their analysis and judgment; in consequence of which, the following preparations were laid before the Committee by those Gentlemen, viz.

Extract of English Opium in proof spirit.

Hard Extract of English Opium.

O

Watery

Watery extract of English Opium of the late Dispensatory.

Tincture of English Opium of the present Pharmacopœia.

Tincture of English Opium of the late Dispensatory.

English Opium powdered.

Similar preparations of fine foreign Opium were produced in comparison.

From the general result of these experiments it appears, that Mr. Jones's English Opium is equal in quality to fine foreign Opium; and the certainty of its growth in this country, preparation, and efficacy, fairly established,