VIII. *Account of the Discovery of Silver in Herland Copper Mine. By the Rev.* Malachy Hitchins. *Communicated by the Right Hon. Sir* Joseph Banks, *Bart. K. B. P. R. S.*

Read February 12, 1801.

HERLAND Mine is situated in the parish of Gwinear, about seven miles N. E. of St. Michael's Mount, on the southern coast of Cornwall; and two miles and a half from the mouth of the river Hayle, on the northern coast of the same county: it is contiguous to Prince George Mine.

It commences in a valley on the west, and passes through a hill, which is first of steep and then of moderate ascent, for upwards of half a mile eastward; when the principal copper lodes, which follow this direction, meet with a large cross lode, by which, and by other cross courses and flookans, which intersect them in their farther progress, they are repeatedly heaved, and so disordered by these heaves, in their form and position, and so changed by them, in respect to their composition, as hardly to be recognized.

The strata of the district in which this takes place, consist of the common metalliferous sort of argillaceous slate called *Killas*.

The copper lodes of this district are remarkable for the shortness of their continuity; for, whereas other lodes may be traced to an indefinite extent in the same line of direction, these, on the contrary, are observed to taper away gradually, and

terminate, to all appearance, at a short distance, completely and irrecoverably.

This mine was worked about twenty years ago, when it was sunk to the depth of one hundred fathoms from the surface. It was again set to work about eight years since; has now four fire-engines and two steam-whims on it; and is sunk to a depth of one hundred and fifty-five fathoms below the surface, or, as the miners call it, from *grass*.

It is in this latter period of its history, that a discovery has been made of a considerable quantity of silver ore, in a particular part of the mine, the singularity of which discovery, in this country, has much excited the curiosity of the public.

For, although the numerous veins of lead in Cornwall are richly impregnated with silver, and occasionally yield small quantities of silver ores, and even specimens of native silver, yet, hitherto, no instance had been known of their yielding this precious metal in such abundance; nor had any circumstances, in the natural history of the mineral veins of this country, borne any analogy to those which accompanied the present discovery.

These circumstances therefore, having been examined with more attention than usual, shall be stated with as much precision as it is possible to obtain, from the report of those practical miners only who have hitherto inspected them.

The facts which deserve to be first noticed are, the confined and insulated position of the mass of silver ore; its great depth from the surface of the mine; and its contiguity to a copper lode.

The lode in which it occurs is one of those cross courses, as they are here called, which intersect and derange the copper lodes, and consequently are of a more recent formation.

Lodes in this direction are usually filled with quartz, but frequently produce galena; and sometimes, instead of galena, sulphurated antimony. They appear here to conform to the same laws, except in the particular instance now to be described, which forms, indeed, a very remarkable exception.

No ores of silver were observable in this lode, until at the depth of one hundred and ten fathoms from the surface, or eighty below the adit or level; and, at the farther depth of thirty-two fathoms, they disappeared.

They have been discovered only in the neighbourhood of one of the intersected copper lodes, extending no where above twelve feet from this lode, on the north, or above thirty-two feet from it, on the south, and acquiring this their greatest extent at the deepest level; for, the usual dimensions of the silver ore are not more than six feet in the former situation, and twelve feet in the latter.

It is remarkable, that at the point of contact or intersection, the contents of the silver lode are so poor as to be scarcely worth saving; and those of the copper lode are much less productive of copper than at a little distance from this point. Moreover, that the copper lode, in the vicinity of the intersection, seems to have been influenced by the same causes of improvement and declension as the cross lode; being richer or poorer in copper, as the latter was, at a correspondent level, in silver.

The richest mass of silver ore was found at the depth of two fathoms above the level at which it disappears.

After this brief account of the most striking facts, it may be proper to enter into a more particular description of the two

lodes which appear, by their intersection, to have generated this body of extraneous matter.

The copper lode bears nearly east and west by the compass; the cross lode nearly north and south, or at right angles to it.

The former is about two feet broad, on an average; and it dips or underlies south, one foot in a fathom. The breadth of the latter is about two feet and a half, on an average; and its underlie is east, about eight inches in a fathom.

The heave of the copper lode is about eighteen or twenty inches to the right, in the language of the Cornish miner; the expression being so far appropriate and convenient, as it refers to the usual situation of the observer in the heaved lode.

The copper lode is filled with layers of ore and stony matter, the latter of which is here called *Caple;* but the ore is usually found contiguous to the walls of the lode.

The contents of the cross lode are more singular, in respect to their local position, and more various. Only the eastern side of it produces silver ore, the breadth of which is in general about six or eight inches, although in some places it is greater. The other part of the lode is chiefly composed of quartz, intermixed with iron, manganese, and wolfram, together with a small portion of cobalt and antimony.

The silver ore, strictly speaking, is a mixture of galena, native bismuth, grey cobalt ore, vitreous silver ore, and native silver; which, in respect to their proportions, follow the order in which they are here enumerated, the galena being the most prevalent. The native silver, of which specimens of the greatest beauty have been reserved for the cabinets of the curious, is found chiefly in a capillary form, in the natural cavities of the lode.

About one hundred and eight tons of this ore have been raised. The miners continue to sink near the same point of intersection; and seem confident that both lodes will soon become richer, because similar instances of declension and recovery have frequently occurred in the copper lodes of this mine, and because the two lodes appear to have a reciprocal influence on each other.

Unfortunately, however, the extent of their speculation is limited by the great depth of the present workings; for, forty-five fathoms have been sunk since the first discovery of the silver; and twenty, or twenty-five fathoms more, are as much as can be sunk in this mine, with its present mechanical powers of drawing the water; at which level, viz. one hundred and eighty fathoms from the surface, it would be somewhat deeper than any mine in Cornwall, and about one hundred and thirty fathoms below the level of the sea, at low water mark.

The other cross lodes in this mine produce no silver; most of them being flookans, or lodes which are essentially different from the argentiferous cross lode, in the nature of their constituent mass. There is one, however, in the eastern part of the mine, which, from its resemblance to that, is thought likely to produce silver, whenever it shall be explored to the same depth, at its point of intersection; although these hopes may probably be fallacious, for the argentiferous lode intersects five other copper lodes, viz. two on the north, and three on the south side, without producing any silver.

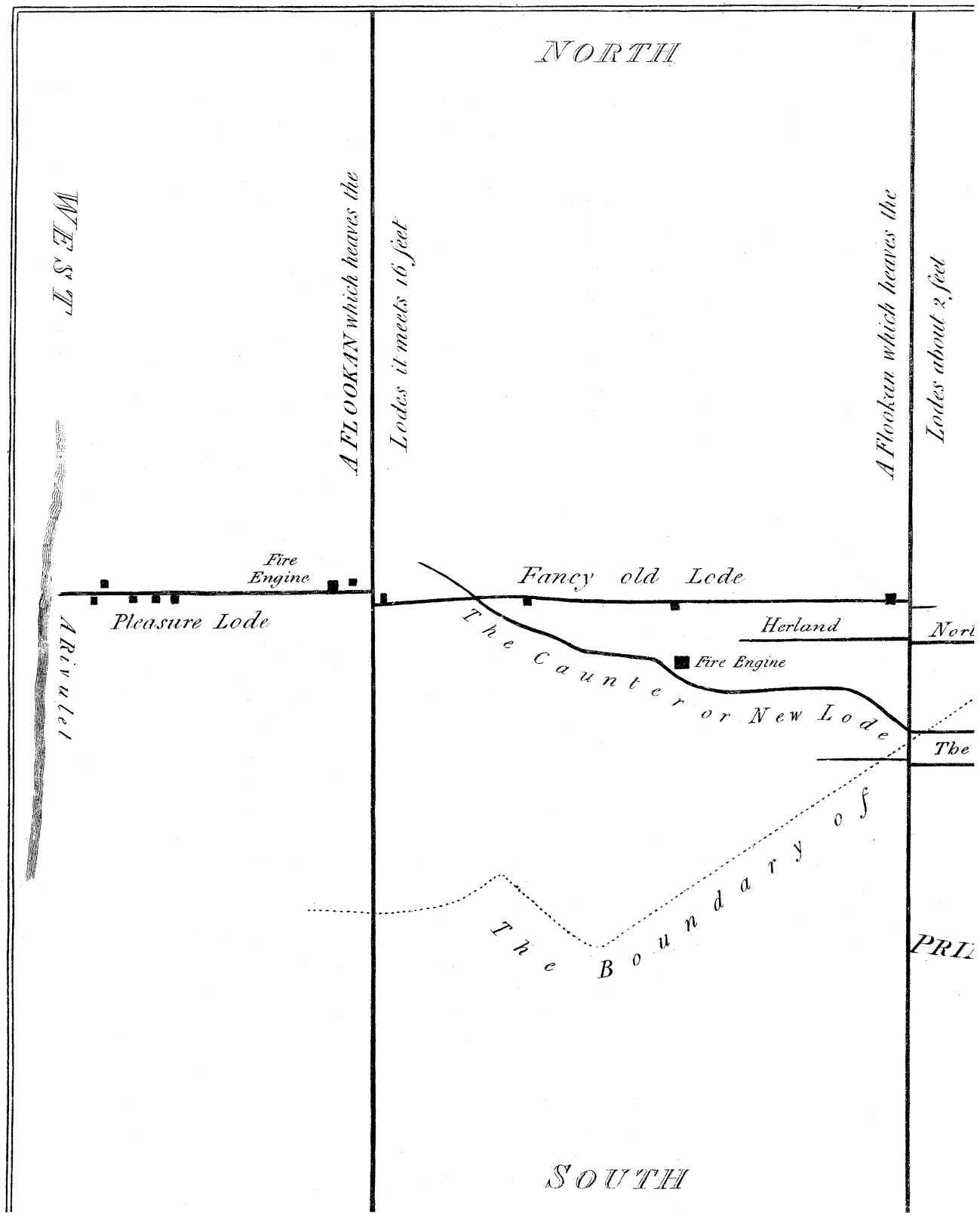
EXPLANATION OF THE PLATE.

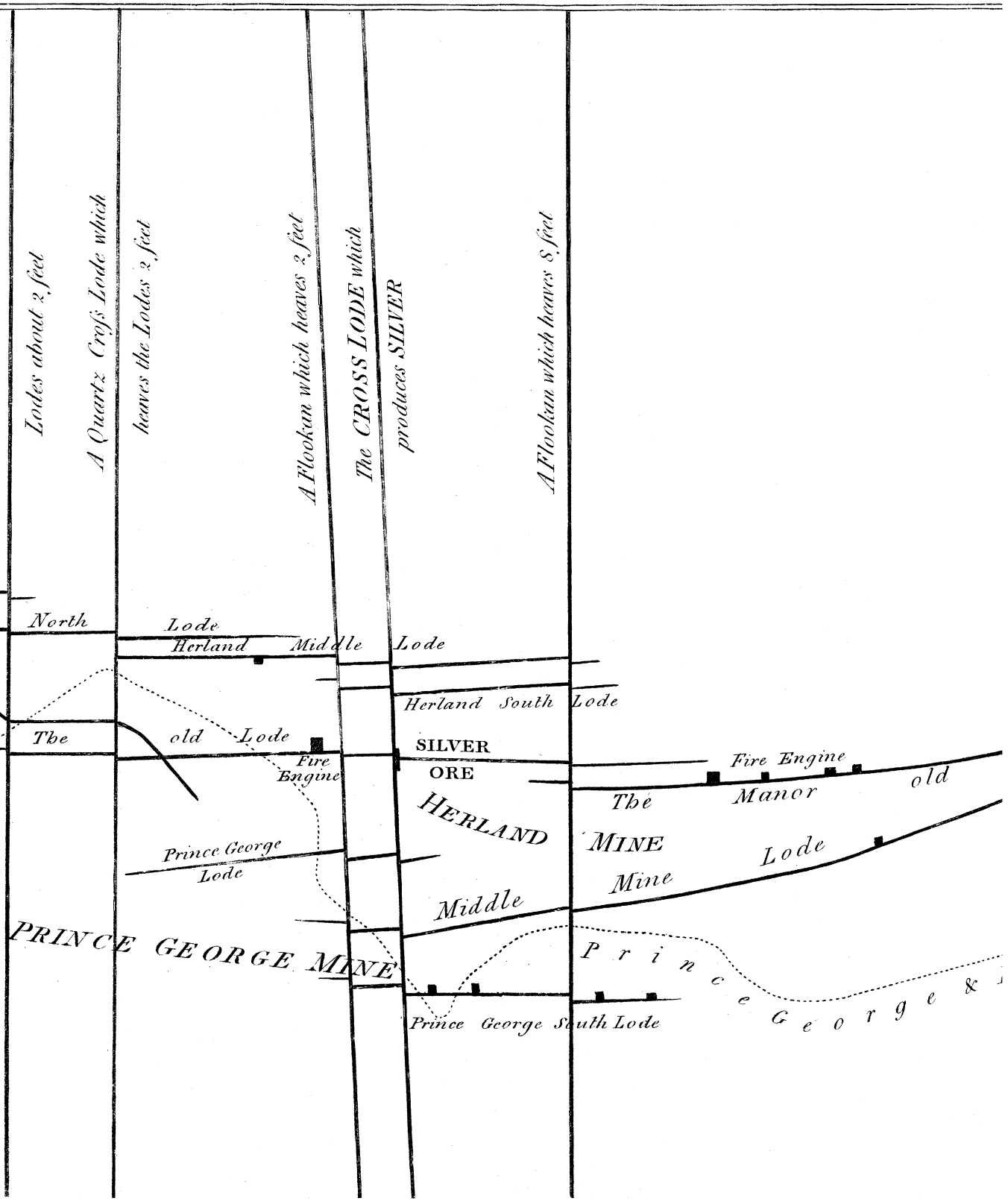
Plate XI. represents the lodes of Herland and Prince George copper mines, on a plane parallel to the horizon, at one hundred and ten fathoms below the surface of the earth.

This plan is drawn on a scale of one inch to seventy-two yards.

The size of the lodes, and the distance of their heaves, are, for the sake of distinctness, represented too large in proportion.

The small black squares represent the shafts.


NORTH
ZEAM
A FLOOKAN which heaves the
Lodes it meets 16 feet
A Flookan which heaves the
Lodes about 2 feet
Fire
Engine
Fancy old Lode
Pleasure Lode
Herland
Fire Engine
The Counter or New Lode
The Boundary of
SOUTH


Lodes about 2 feet
A Quartz Cross Lode which
heaves the Lodes 2 feet
A Flookan which heaves 2 feet
The CROSS LODE which
produces SILVER
A Flookan which heaves 8 feet
North
Lode
Herland
Middle
Lode
Herland South Lode
The
old
Lode
Fire
Engine
SILVER
ORE
HERLAND
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Fire Engine
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Manor
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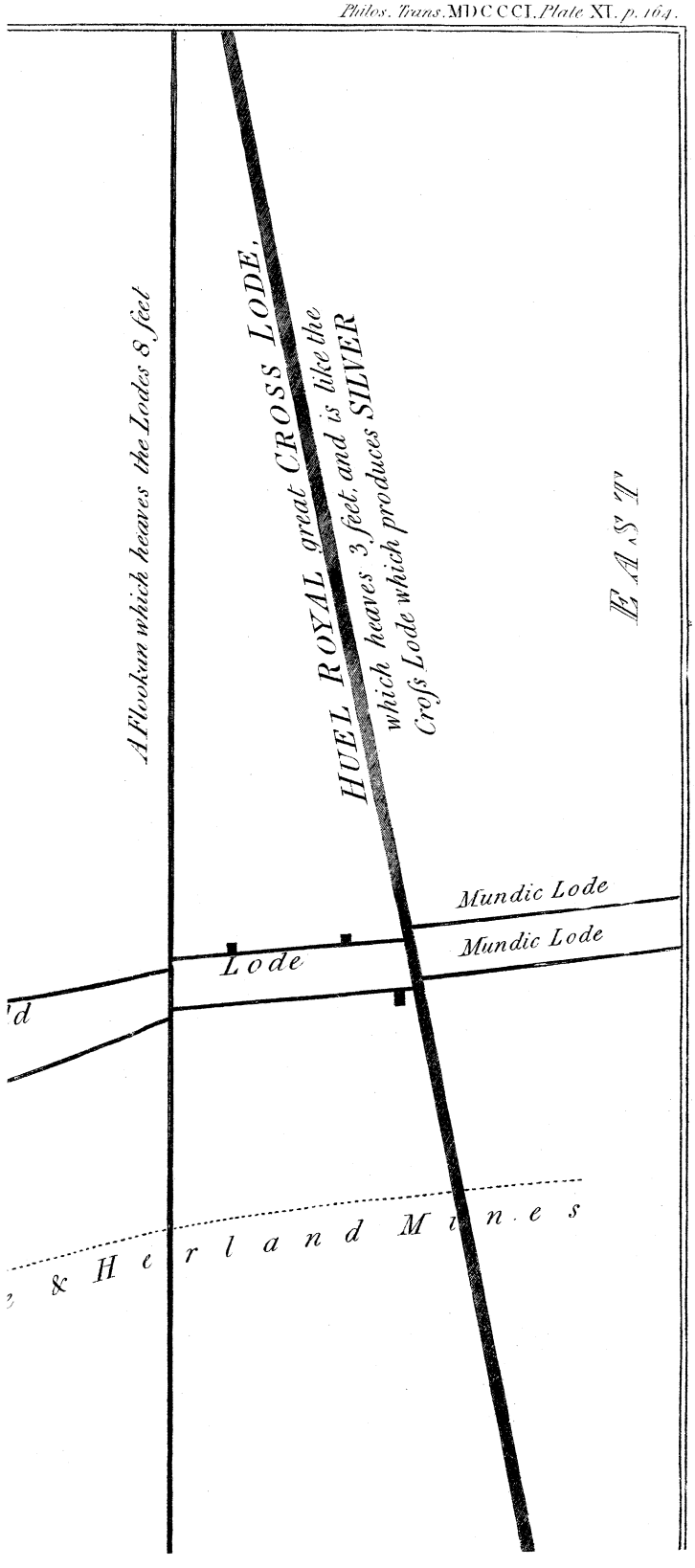
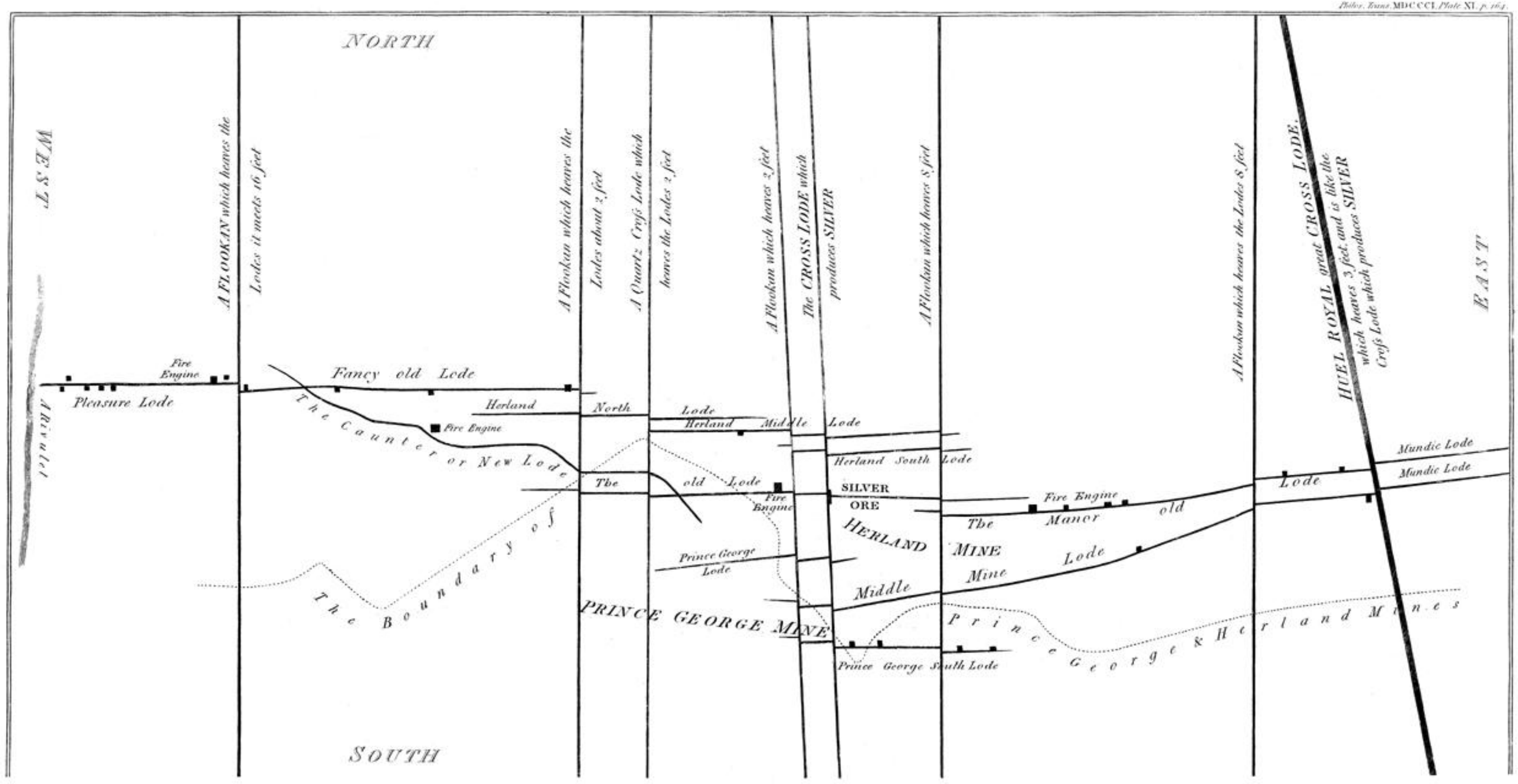
Prince George
Lode
Middle
Mine
PRINCE GEORGE MINE
Prince George South Lode


A Flookum which heaves the Lodes 8 feet
HUEL ROYAL great CROSS LODE,
which heaves 3 feet, and is like the
Cross Lode which produces SILVER
EAST
Mundic Lode
Mundic Lode
Lode
& Herland Mines


NORTH
WEST
EAST
SOUTH
A FLOOKAN which heaves the Lodes it meets 16 feet
A Flookan which heaves the Lodes about 2 feet
A Quartz Crofs Lode which heaves the Lodes 2 feet
A Flookan which heaves 2 feet
The CROSS LODE which produces SILVER
A Flookan which heaves 8 feet
A Flookan which heaves the Lodes 8 feet
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Fire Engine
Pleasure Lode
Fancy old Lode
Herland North Lode
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The Boundary of
PRINCE GEORGE MINE
Prince George South Lode
Prince George & Herland Mines