XXXIX. On the heaves of metalliferous veins by cross-veins.—Part II

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It is stated that the great difficulty is to draw clear and consistent lines of demarcation between these great primary divisions. They pass into one another, and interchange some fossil species, especially near their limits. Were it not for the magnificent sections of the old red sandstone in the British Isles, and also in the north-eastern parts of Europe (as now shown by Mr. Murchison and his fellow labourers), the author asserts, that the second and third divisions would probably be confounded and eventually pass under one common name (including Upper Silurian and Devonian). In Belgium and the Rhenish provinces the demarcation between them is quite arbitrary. We there find Goniatites and long-winged Spirifers and other organic types (first supposed to characterize the "Devonian system") abundant in the Silurian rocks: and there is nothing in the physical structure of those countries to suggest the separation of these two divisions. By help of the British sections, combined with new facts brought to light in Russia and America, the second division must however maintain its place.

Between the third and fourth divisions there appears to be a much better marked separation, both physically and zoologically, than between the others. These two divisions (at least in North Wales) differ in structure, interchange hardly any fossil species, and through large districts are unconformable. Hence they belong to two *systems*, and not to *one*, if the word *system* be used in a definite sense, and be applied to the successive divisions (such as the Devonian). To avoid incongruity of language, the author uses the word *system* in a general sense; and under the name *Palaeozoic System* describes the whole series of formations comprehended under the four divisions above described. In this great descending series the "Silurian system" (in the sense in which the words were first used) stands in the place of the third, and the upper part of the fourth primary division.

XXXIX. *On the Heaves of Metalliferous Veins by Cross-veins.*

—Part II. By WILLIAM JORY HENWOOD, F.R.S., F.G.S.,
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(II.) **I**NTERSECTIONS of lodes affording different ores by cross-veins of different compositions.—Throughout tracts of small extent the composition of the rocks is usually, in some measure, uniform, so that the *lodes* within such given tracts present nearly the same characters. This general fact applies with even greater certainty to the *cross-veins*, whose characters are still more uniform; for they consist for the most part of quartz and clayey portions of the contiguous rocks; and with the exception of lead ores, and these not abundant, the metallic matters which they contain are in small quantities, and dispersed through very limited portions of them.

* Communicated by the Author: Part I. will be found in our preceding Number, p. 180.

Of the 233 intersections particularized in my last communication, 125 are by clayey cross-veins (*flucans*), and 108 by quartzose ones (*cross-courses*); being 53·7 per cent. by the former, and 46·3 by the latter.

(a) Of the 125 intersections by <i>flucans</i> —				per cent.
Those unaccompanied by <i>heaves</i> are	.	.	.	17·6
... <i>heaved</i> towards the right-hand	.	.	.	55·2
... .. left-hand	.	.	.	27·2
... .. greater angle	.	.	.	70·4
... .. smaller angle	.	.	.	12·0

Of 103 <i>lodes</i> which are <i>heaved</i> by <i>flucans</i> —				
The tin <i>lodes</i> are	.	.	.	24·2
... <i>lodes</i> yielding both tin and copper ores	.	.	.	5·8
... copper <i>lodes</i>	.	.	.	70·0

Of 22 *lodes* which are intersected by *flucans* without being *heaved*—

The tin <i>lodes</i> are	.	.	.	13·6
... <i>lodes</i> yielding both tin and copper ores	.	.	.	59·1
... copper <i>lodes</i>	.	.	.	27·3

Of 28 tin <i>lodes</i> which are intersected by <i>flucans</i> —				
Those which are <i>heaved</i> are	.	.	.	89·3
... .. not <i>heaved</i>	.	.	.	10·7

Of 19 *lodes* affording both tin and copper ores and intersected by *flucans*—

Those which are <i>heaved</i> are	.	.	.	31·6
... .. not <i>heaved</i>	.	.	.	68·4

Of 78 copper <i>lodes</i> which are intersected by <i>flucans</i> —				
Those which are <i>heaved</i> are	.	.	.	92·3
... .. not <i>heaved</i>	.	.	.	7·7

The mean distance of all the <i>heaves</i> by <i>flucans</i> is	.	.		feet	21·5
... .. the <i>heaves</i> of tin <i>lodes</i>	.	.	.		19·3
... .. <i>lodes</i> yielding both	.	.	.		
tin and copper ores	.	.	.		16·5
... .. copper <i>lodes</i>	.	.	.		22·7

The average distance of <i>heaves</i> to the right-hand by <i>flucans</i> is				
... .. left-hand	.	.	.	24·4
... .. greater angle	.	.	.	15·3
... .. smaller angle	.	.	.	21·7
... .. smaller angle	.	.	.	20·2

(b) Of the 108 intersections by *cross-courses* (quartzose cross-veins)—

Those unaccompanied by <i>heaves</i> are				per cent.
... <i>heaved</i> towards the right-hand	.	.	.	28·7
... .. left-hand	.	.	.	44·4
... .. left-hand	.	.	.	26·9

	per cent.
Those <i>heaved</i> towards the greater angle	59·3
... .. smaller angle	12·0
Of 77 <i>lodes</i> which are <i>heaved</i> by <i>cross-courses</i> —	
The tin <i>lodes</i> are	19·5
... <i>lodes</i> yielding both tin and copper ores	41·5
... copper <i>lodes</i>	39·0
Of 31 <i>lodes</i> which are intersected by <i>cross-courses</i> without being <i>heaved</i> —	
The tin <i>lodes</i> are	22·6
... <i>lodes</i> yielding both tin and copper ores	29·0
... copper <i>lodes</i>	48·4
22 tin <i>lodes</i> are intersected by <i>cross-courses</i> , and of them—	
Those which are <i>heaved</i> are	68·2
... .. not <i>heaved</i>	31·8
41 <i>lodes</i> in which tin and copper ores are mixed are intersected by <i>cross-courses</i> , and of them—	
Those which are <i>heaved</i> are	78·0
... .. not <i>heaved</i>	22·0
45 copper <i>lodes</i> are intersected by <i>cross-courses</i> , of which	
Those which are <i>heaved</i> are	66·7
... .. not <i>heaved</i>	33·3
feet.	
The average distance of all the <i>heaves</i> by <i>cross-courses</i> is	10·5
... .. the <i>heaves</i> of tin <i>lodes</i>	12·6
... .. the <i>lodes</i> yielding	
both tin and copper ores	14·1
... .. copper <i>lodes</i>	6·1
The mean distance of <i>heaves</i> by <i>cross-courses</i> towards the	
right-hand is	12·3
... .. left-hand	7·1
... .. greater angle	9·3
... .. smaller angle	16·3

It is a remarkable but well-known fact, that in Cornwall the extent of the *heaves* by *flucans* is much greater than of those by *cross-courses*. It is also not unworthy of notice that the *flucans* *heave* the copper *lodes* further than they do the others, whilst the *cross-courses* *heave* them much less. The right-hand are larger than the left-hand *heaves*, both by *flucans* and *cross-courses*; but, with the former, the *heaves* towards the larger angle are greater than those towards the smaller angle, whilst with the latter the *heaves* to the smaller are of much greater extent than those to the larger angle.

Morro Velho Gold Mines, Brazil,
December 7, 1843.

W. J. HENWOOD.