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IX Notes on Specimens of Nephrite from British Columbia.

B. J. Harrington

IX.—*Notes on Specimens of Nephrite from British Columbia.*

By B. J. HARRINGTON.

(Read May 29th, 1890.)

In 1887 Dr. G. M. Dawson published a paper on the occurrence of jade in British Columbia, in which he called attention to the fact that implements composed of jade (nephrite), or some closely allied material, were widely diffused in that province.[1] The materials included under the term jade varied considerably in character, and only one specimen had been examined critically. This, however, had been shown by the present writer to be a true nephrite.

In 1888 Messrs. F. W. Clarke and G. P. Merrill, of Washington, published a valuable paper on nephrite and jadeite, which contains descriptions and analyses of a number of Alaskan nephrites, including specimens actually found *in situ* by Lieut. G. M. Stoney, of the American navy.[2] Native reports had pointed to a source known as the Jade Mountains, north of the Kowak River, about 150 miles above its mouth, and Lieut. Stoney succeeded in finding the spot and in obtaining the specimens afterwards so carefully investigated by Clarke and Merrill.

In British Columbia no nephrite has been found *in situ* as yet, but in addition to the numerous implements referred to above, unworked jade, in the form of small boulders, has, as observed by Dawson, been found in a number of localities. Many green stones of undetermined character, but certainly not nephrites, occur in the same regions, and some of these have also been employed for making adzes, arrowheads, &c. In order to prove that the specimens referred to nephrite really consisted of that material, four of them have been studied, and the object of the present notes is to give the results obtained.

SPECIMEN NO. I.

(Fig. 1.)

This was found by the writer in 1888 at the old Indian burial-ground, near Lytton, on the Fraser. It was a boulder of several pounds weight, showing slight schistose structure, and having the surface rounded and worn perfectly smooth. The colour of the stone on fresh fracture is olive-green, polished surfaces being of rather darker tint.

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On thin edges, or in thin fragments, the mineral is sub-translucent. A surface cut transverse to the foliation, and then polished, is seen to be traversed by numerous wavy lines, with a general similarity of direction, and corresponding to the foliation. The mineral has the wonted toughness of nephrite, and hardness a little over six. The specific gravity was found to be 3.0278, and chemical analysis gave the following percentage composition:—

Silica	55.32
Alumina	2.42
Ferrous oxide	5.35
Manganous oxide	.52
Lime	14.00
Magnesia	20.16
Loss on ignition	2.16
	99.93

Examined with the microscope in ordinary light, thin sections are nearly colourless (excepting occasional greenish patches) and non-pleochroic. The section is traversed in places by wavy lines, and also by occasional dark cracks or rifts. The fibrous structure of the material is distinctly seen in places, especially with moderately high powers. Between crossed nicols the so-called "nephritic structure" is brought out very distinctly, and the section is seen to be composed of wavy fibres and scales, which, while having a general direction corresponding to the schistose structure, often vary widely from this.

Specimen No. II.

(Fig. 2.)

This specimen, as well as Nos. III and IV, was kindly sent to me for examination by Dr. Dawson. It is a small portion of what has apparently been an adze, and came from the old burial-ground near Lytton. It is greyish-green in colour, somewhat mottled, slightly schistose, and breaks with a splintery fracture. The specific gravity is 3.003 and the percentage composition as follows:—

Silica	56.98
Alumina	.18
Ferrous oxide	4.59
Manganous oxide	.17
Lime	12.99
Magnesia	22.38
Loss on ignition	2.64
	99.93

Examined with the microscope in ordinary light, the thin section is mostly colourless and non-pleochroic, but in spots contains quantities of minute dark inclusions of undetermined nature, though probably ferruginous. These are no doubt the cause of the clouded appearance already referred to. Between crossed nicols, like the other sections examined, it breaks up into ill-defined, brightly polarizing areas, which rapidly change their tints as the stage is rotated. The fibrous, tufted and scaly character of the material is also made evident.

Specimen No. III.

(Fig. 3)

This is a small specimen of worked jade from the vicinity of Lytton, being that referred to by Dr. Dawson in his paper in the 'Record of Science', (p. 366). The structure is slightly schistose, and the fracture splintery. Surfaces of fracture are rather pale green, polished surfaces, darker. The specimen shows numbers of little prisms and blades, apparently of tremolite, running more or less transverse to the direction of foliation, and ranging from one millimeter or less up to three or four millimeters in length. The specific gravity of this specimen proved to be 3.01, and analysis gave :—

Silica	56.54
Alumina	.40
Ferrous oxide	3.61
Manganous oxide	.16
Lime	13.64
Magnesia	22.77
Loss on ignition	2.92
	100.04

In ordinary light, with microscope, the thin section is colourless, with the exception of a few brown ferruginous stains, and devoid of pleochroism. In places the fibrous structure is distinctly seen, and here and there a few dust-like inclusions. The microscopic crystals and blades mentioned above as probably consisting of tremolite, show the cleavage of hornblende and are mostly surrounded by a fringe of minute fibres arranged approximately at right angles to their contour. Between crossed nicols the section presents a felted appearance, and is seen to be largely composed of fibres which are less curved or wavy than those in some of the specimens examined. The fibres are more or less aggregated into bundles, and most of them show a general parallelism corresponding to the slight foliation of the nephrite. The polarization colours are lively. The imbedded hornblende crystals give extinction angles varying from 8° to 18°.

Specimen No. IV.

(Fig. 4.)

This consisted of a few fragments broken from a small boulder of nephrite found by Mr. W. Ogilvie, on the upper part of the Lewes River, not far from the Alaskan boundary. The fragments are pale greyish-green in colour, tough, splintery in fracture, and show slight schistose structure. The specific gravity was found to be 3.007, and analysis gave :—

Silica	56.96
Alumina	.51
Ferrous oxide	3.81
Manganous oxide	.53
Lime	13.29
Magnesia	22.41
Loss on ignition	2.91
	100.42

The thin section is colourless and non-pleochroic. It presents a slightly schistose appearance, and contains small quantities of dust-like inclusions. Between crossed nicols it shows bright aggregate polarization, as in the case of the other specimens; the structure is also similar, but finer and more uniform.

On examining the foregoing analyses, it will be seen that the composition of the British Columbia nephrites is closely analogous to that of nephrites not only from Alaska, but from other parts of the world, and also that it is practically the same as for ordinary actinolite. This will be made apparent by the following table:—

	I.	II.	III.	IV.	V.	VI.
Silica	55.32	56.98	56.54	56.96	56.08	57.11
Alumina	2.42	.18	.40	.51	1.01	2.57
Ferrous oxide	5.35	4.59	3.61	3.81	7.67	5.15
Manganous oxide	.52	.17	.16	.53	trace	trace
Lime	14.00	12.99	13.64	13.29	13.35	11.54
Magnesia	20.16	22.38	22.77	22.41	19.96	21.38
Loss on ignition	2.16	2.64	2.92	2.91	2.03	2.06
	99.93	99.93	100.04	100.42	100.10	99.81
Specific gravity	3.027	3.003	3.01	3.007	3.01	2.922

	VII.	VIII.	IX.	X.	XI.	XII.
Silica	56.85	57.38	57.10	56.58	56.83	56.77
Alumina	.88	.19	.72	.92	...	.97
Ferric oxide	4.33	4.43	....	....	....	....
Ferrous oxide	1.45	1.25	3.39	4.12	6.70	5.88
Manganous oxide	trace	trace	....	....	.58	....
Lime	13.09	12.14	13.48	12.92	13.02	13.56
Magnesia	21.56	22.71	23.29	21.65	20.35	21.48
Loss on ignition	1.76	1.73	2.50	3.25	3.18	2.20
	99.92	99.83	100.48	99.44	100.66	100.86

I. to IV.—Inclusive—analyses of British Columbia nephrites already given.
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IX. New Zealand—analysis by Scheerer, (From Dana's Mineralogy.)
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XII. Analysis of actinolite from Arendal, by Rammelsberg. (Dana's Mineralogy.)

The foregoing descriptions and analyses suffice to prove that true nephrites have been found in British Columbia; but among the other green substances occurring there in both the rough and worked states, jadeite has not as yet been identified. Looking at the question from an ethnological point of view, the writer fully agrees with Meyer, Dawson, and Messrs. Clarke and Merrill, in considering that the nephrites of British Columbia and Alaska have no special significance, and that they tell us nothing with regard to the origin or migrations of the early inhabitants of the region.

EXPLANATION OF PLATE.

The figures are from microphotographs taken, in polarised light, by Mr. Albert Holden, Secretary of the Natural History Society, Montreal. They show the general "nephritic" character of the sections, but not the minuter structures.

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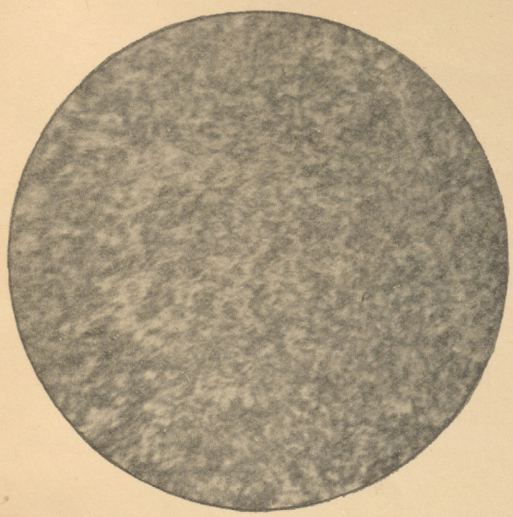

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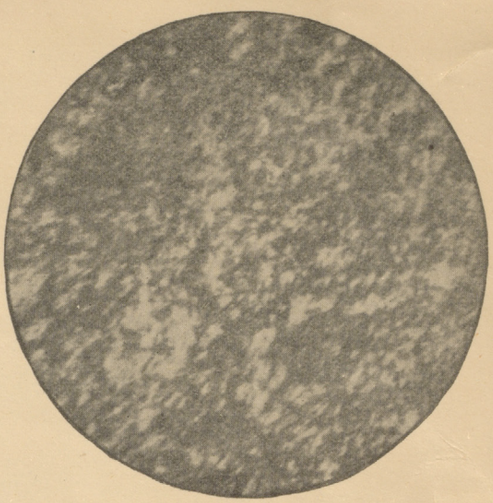

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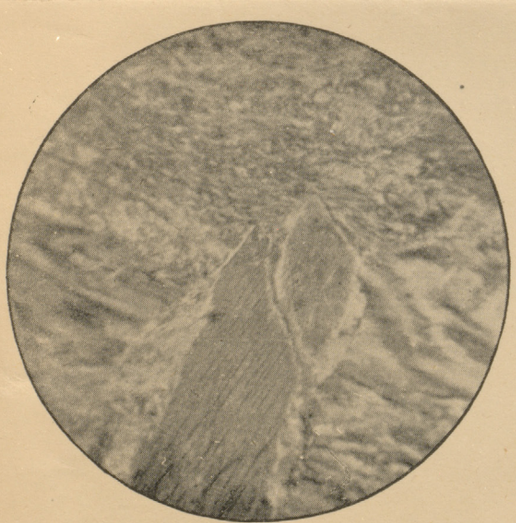

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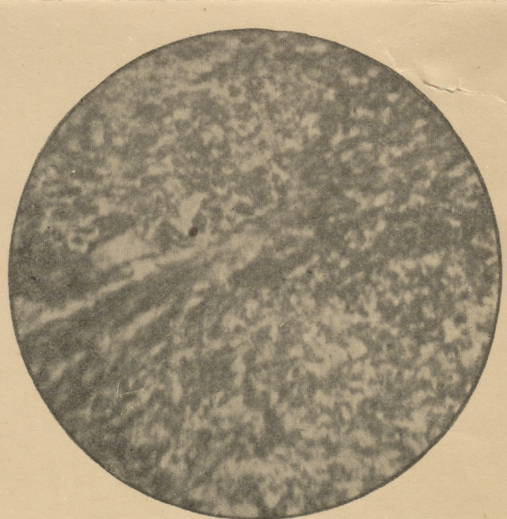

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MICROSTRUCTURES OF NEPHRITES FROM BRITISH COLUMBIA.

Approximately $\frac{5.0}{1}$

To illustrate Dr. B. J. Harrington's Paper.

Canadian - Birds

(2062)

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by

W. J. Harrington

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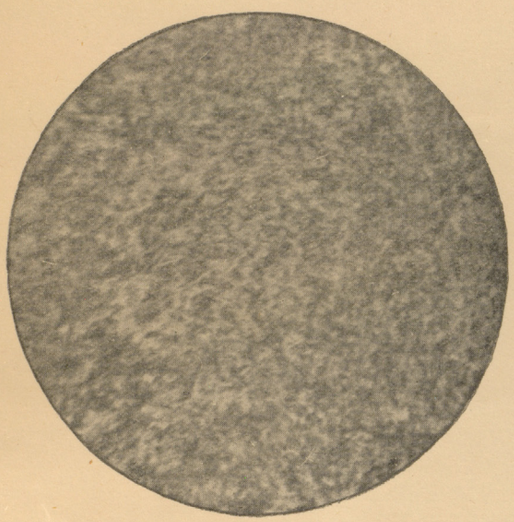

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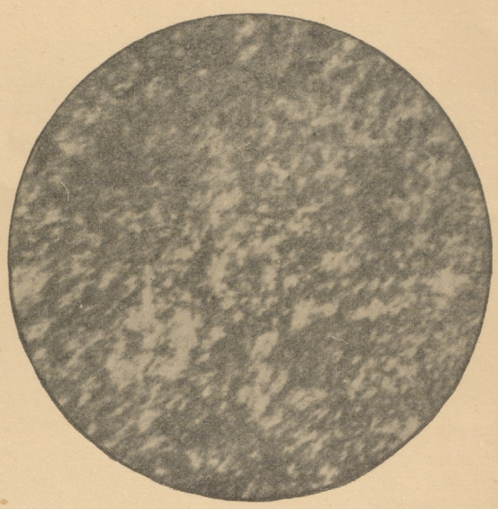

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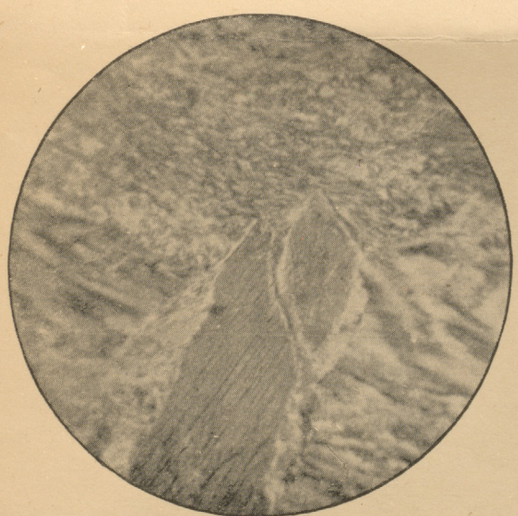

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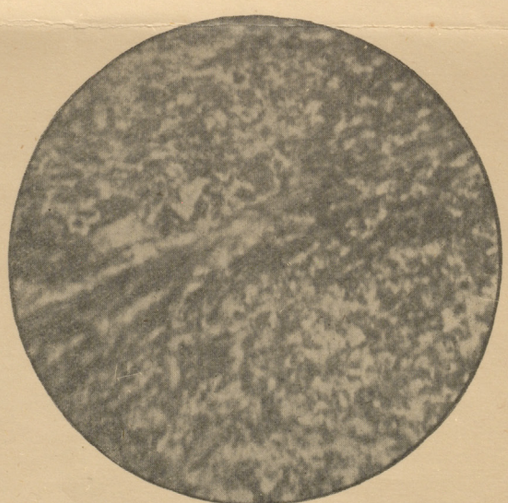

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