

this cement. Against this view it is urged that the hand-dressed fibre of the Natives which is extracted without chemicals, or even washing, is quite free from this cement, as in it the lateral adhesion of the ultimate fibres is at the minimum, while the longitudinal adhesion of the *fisculi* is at the maximum.

It is of course to be taken into account that the Natives use only a small proportion of the fibre in the leaf, but the quantity they can extract is greatly increased by the cultivation of the plant and judicious selection of the leaves.

The comparative examination, therefore, of the fibrous bundles which the Natives reject, or in other words those on the back of the leaf, with the fibre they take, is of great importance to the inquiry.

The investigations required may be subdivided under the following heads:—

1. Comparative microscopic analysis of the structure of different parts of the fresh leaf:—
 - a.* Butt; *b.* blade; *c.* tip; *d.* glossy surface; *e.* bloom surface; in each case showing the relative proportions and arrangement of the various tissues in the various parts.
2. Prepared fibres—microscopic comparison of the varieties of *Phormium* fibre, Manilla hemp, Irish flax, Russian flax,—showing relative form and dimensions of the ultimate fibre, and the mode in which they are in contact laterally.
3. Chemical analysis of the proximate constituents of the different parts of the *Phormium* leaf, for the purpose of determining the chemical reaction of the different gummy and extractive matter, and the relative proportion in which these exist in the butt and blade of the leaves. A most desirable point to determine chemically is whether any change analogous to ripening takes place in the juice of the leaf which would indicate the best period for cutting it.
4. The tables of the relative strength of fibres given in books being defective, it is desirable that a series of experiments should be undertaken to determine the breaking strain of all the different kinds of fibre in the market, tested both as straight fibre and when twisted into strands.
5. The investigation of the peculiar action of sea water on rope made of *Phormium* fibre, and the reason for its not absorbing tar, as has been alleged, will naturally form part of the third branch of the subject already indicated.

JAMES HECTOR,
Chairman of Flax Commission.

SAMPLES of FLAX, numbered from 1 to 15, accompanying this Memorandum.

Native-dressed.

No. 1. *Harakeke*.—Common swamp flax from Otaki; stripped and scraped with a shell, then washed for a few minutes in running water. Selected leaves of twelve or eighteen months old.

No. 2. The same as No. 1, but not washed at all.

No. 3. From the same plants as Nos. 1 and 2, but stripped from the opposite (or under) side of the leaf. The tissue obstinately adheres to and discolours these fibres.

No. 4. From the same leaves as No. 1, but further prepared for the manufacture of the *Kaitaki* or fine mats, by soaking in running water for several days, and then beating with a stone or mallet.

No. 5. Common swamp flax from Otaki; merely stripped with a shell, as sold to rope-spinners at 1½d. per lb. Neither scraped nor washed.

No. 6. Same as No. 5, but hand-hackled by rope-spinners. Shows that the fibre is discoloured by being allowed to remain in contact with the tissue in which it was embedded.

No. 7. A superior sample from the Waikato, furnished by Sir George Grey five or six years ago. Native-dressed, and further prepared by mechanical or chemical action. Process unknown.

Machine-dressed.

No. 8. Mr. Stonyer, Okoka Mills, Kaiapoi.—Passed twice through stripping machine, soaked in water for one hour, sun-dried, scutched, and hackled. (Took first prize of Canterbury Flax Association.)

No. 9. Captain F. W. Hutton, Waikato—Machine-stripped, then washed and sun-dried.

No. 10. T. S. Macfarlane, Auckland—Similar process to No. 9, but with more prolonged washing or steeping, and wet-scutched.

No. 11. G. Booth, Waikoura Mills—Three times passed through stripper, washed, and dried. (See page 53, D. No. 14.)

No. 12. Riky's process—Boiling with wood ashes, and combing when wet; prepared in four hours.

No. 13. McFarlane and Wilson, Whakatane—Stripped by machine, then passed through India-rubber rollers, and bleached by fumigating with sulphur.

No. 14. John Journeaux, Wellington—Steamed, rolled, and fermented. (See page 51, D. No. 114.)

No. 15. C. J. Pownall—Scraping, washing, and sun-drying. (See page 50, D. No. 14.)

(No. 40.)—CHAIRMAN to MR. MORRISON.—29th December, 1870.

I have the honor to inform you that a further sum of £200 (in addition to the £50 that was sent to you last month) will be transmitted to you by this mail to meet expenses that you may incur on account of the Flax Commission, and I beg also to acquaint you that Dr. Hooker, C.B., F.R.S., has been requested to select a person to conduct a chemical and microscopical examination of the *Phormium* plant and fibre, to whom, when the work has been completed, you will have to pay such fees and expenses as Dr. Hooker may authorize.

The Commissioners have forwarded some samples for examination direct to that gentleman, and they are about to send home supplies of seven or eight tons of different varieties of the prepared fibre, with respect to which you will be further advised when they have been shipped.