

It will here be seen that the cellulose and fibre were divisible into three parts, by a successive treatment by Schultze's process, (I); by the acid and alkali process, (II); and by the H₂ SO₄ or sulphuric acid process, (III). The results may be thus rendered:—

	Per cent.
<i>Phormium</i> fibre, No. 1. Crude Cellulose=64.25	
Made up of	12.03 insoluble by I. soluble by II.
	51.74 insoluble by II. soluble by III.
	.48 insoluble by I., II. and III.
<i>Phormium</i> fibre, No. 13. Crude Cellulose=63.00	
Made up of	16.55 insoluble by I soluble. by II.
	45.75 insoluble by II. soluble by III.
	.70 insoluble by I., II. and III.

§ 5.—ACTION OF WATER AT VARIOUS TEMPERATURES UPON THE FIBRE OF PHORMIUM TENAX, &c.

I. Clean Flax fibre (linen), in the form of Swedish filtering paper, was first tried.

Boiled with distilled water for twelve hours it gave up to the water about one per cent of organic matter, and about three quarters of a per cent of mineral matters, chiefly silica. The numbers were as follows:—

	Grams.
Swedish filter employed weight	.55
Weight of dry substance extracted	.0095
Of which the Ash amounted to	.0040
And the organic matter dissolved	.0055

The water did not become acid in this experiment.

II.—A similar filter to that used in experiment I, was digested with water in a sealed tube at a temperature fifty degrees above boiling water, namely at 150° Centigrade. The digestion was continued four hours. The water became of a straw yellow colour, but remained neutral to test paper.

	Gram.
Swedish filter employed	.55
Weight of red-brown extract dissolved by water	.016
Weight of ash in this residue	.0055
And the organic matter dissolved	.0105

III.—When .5 gram of *Phormium* fibre (No. 1) was boiled twelve hours with distilled water, the liquid remained neutral to test paper; on evaporating to a small bulk the residual solution did show a faint acid reaction. The dry matter in this solution corresponded to 3.6 per cent. of the fibre taken.

IV.—When .5 gram of *Phormium* fibre No. 2 was digested with distilled water, in a sealed tube, at 150° C. for four hours the water became turbid and of a distinct acid reaction, with smell of burnt sugar. On washing the fibre with water, a pink colouring matter was developed. The amount of substance removed from the fibre at 150° C. by water, amounted to 19 per cent. of the original weight taken. It was a brown soluble substance, which gave a ready precipitate of red copper suboxide when boiled with Fehling's test for sugar. This result may have been due, however, to the presence not of any kind of sugar but of "pyrocatechin," or some allied product. The solution was sweet, with a bitter aftertaste.

V.—Manilla hemp, similarly treated, gave similar products, amounting to 15.4 per cent.

VI.—Irish flax, similarly treated, gave similar products, amounting to 10.4 per cent.

VII.—St. Petersburg hemp, similarly treated, gave similar products, amounting to 10.0 per cent.

TABLE containing SUMMARY of RESULTS obtained in EXPERIMENTS on the ACTION of WATER upon PHORMIUM TENAX and other FIBRES.

	Per centage of organic matter dissolved out of the fibres by water, at the temperature of	
	100° C.	150° C.
Linen filter paper	1.0 per cent.	1.9 per cent.
<i>Phormium tenax</i> , Sample No. 1	3.6 "	...
" " " No. 2	...	19.0 "
" " " No. 13	...	24.4 "

From the foregoing results, it will be seen that prepared and cleansed New Zealand flax fibre is acted upon by boiling water to more than three times the extent to which flax from *Linum usitalissimum* is affected by the same treatment. And at the higher temperature, from one-fifth to one-fourth of the whole *Phormium* fibre is dissolved by water, while the true flax fibre does not lose more than two per cent. of its weight under the same circumstances.

These facts point to an inherent difference in the quality of the organic substances, making up the material of the *Linum* and *Phormium* fibres.