fatty and resinous substances being well known, and also the unsparing manner in which it is used upon many delicate fabrics without injuring them.

A certain portion of the bruised leaf was taken and digested in hot water for two hours. It was then boiled two hours longer with 12 per cent. of common soda soap, before it affected the leaf so that it would clean with the nail. The fibre so obtained, when scraped, appeared to be everything that could be wished for, being remarkably soft and flexible, but with a faint shade of green colour, indicating probably that no decomposition of the fibre had taken place. When the sample of fibre so prepared had been kept for one year, it appeared to be equally as strong as at first; and indeed flax so prepared four or five years since, still remains unaltered from the state it was in when first dressed.

A much larger quantity of soap did not hurt the fibre, hence its use is free from those objections which attach to the use of acid or alkalies. The high price of the soap, however, would entirely prevent any adoption of this process, as it would entail a cost of twenty pounds upon every ton of clean fibre. The expenditure of soap, however, can be greatly reduced in two ways. 1st. By washing the flax repeatedly in warm water, and then adding the soap to the necessary amount. 2nd. Before adding the soap, by neutralizing with carbonate of soda the water in which the flax has been boiled, as it acquires an acid reaction. In each case the proper quantity of soap is that which gives to the warm solution a permanent froth upon its surface when stirred about. The first process of washing is preferred on account of its greater cheapness, and also because it avoids the danger of using the excess of alkali to which the latter is subject. In regard to the second process, the quantity of alkali necessary will vary with the season, but, at the time of the experiment (autumn), 3·5 per cent. of common washing soda, or 1·3 per cent. of the dry carbonate of soda was found to neutralise the acid substances of the flax. In either case about one or two per cent. of soap would be necessary. The cost of chemicals would be £4 to £5 to produce each ton of clean fibre by the first process, when soap is used alone; and by the second or neutralizing process, about £6 or £7. As will be inferred, an abundant supply of hot water is necessary. Perhaps the readiest and most economical way to maintain this would be to connect the steam pipe of a boiler with a perforated coil lying at the bottom of the vat or tub in which the operation is carried on.

Fermentation.—It has been thought by some that possibly flax might be worked profitably for alcohol; but as it was found to contain but 1 to 1¼ per cent. of sugar (grape sugar), even in the autumn, it would not answer at all for this purpose. It was, however, attempted to turn this process to account in the manufacture of prepared fibre in the following manner:—The bruised flax was treated with hot water, and allowed to steep therein for three hours at 130°; sulphuric acid in the proportion of two grains to the ounce of flax being previously added to facilitate the change of the gummy matters, starch, &c., into sugar; the object being to ensure a good and rapid ferment, in order to break up the cells of the plant, if such was possible. The whole was then cooled down to 80°, and yeast added; fermentation soon commenced, and went on pretty fast, but when completed the fibre was found to be still difficult to clean, although considerably altered.

The liquor from the preceding experiment was perfectly clear, of a pale yellow color, and had to a remarkable extent the odour of bitter beer, and undoubtedly a kind of beer could be made from a strong infusion of flax mixed with a moderate quantity of sugar, and then fermented.

Retting.—The last process tried was retting, to which process the varnish on the outer part of the leaf has hitherto proved an insuperable obstacle.

It was thought, however, if the leaves were first broken up by rollers or stampers—or, still better, by a comb with teeth set wider in the back, so as to separate the leaf into filaments without any bruising—so that the gummy matters which bind together the flax fibres could be placed at once in direct contact with water, these would soon enter into a state of decomposition, and communicate this to the more inert portions of the plant, and which, if stopped before it had extended to the fibre of the flax by its removal from the solution, would give us a product as nearly similar as possible to the home flax just after retting, and consequently in a fit state to be scutched, with its natural strength of fibre but little affected. Several experiments were therefore made to test this, and some of the results certainly appeared to be very favourable.

The following is a brief description of the particular methods employed:—

As nearly as possible the first experiment was made to approximate to the ordinary process of retting generally adopted, excepting that the leaves were first well bruised. One week after immersion in cold water the flax was nearly as green as ever, and even three weeks after the commencement of the experiment no decided change in its texture could be discerned, though its green colour had by this time given way to a pale yellow. At this stage the experiment was broken off, on account of the coldness of the weather. No opinion can therefore be formed of the value of the common retting process upon bruised flax; other experiments at a more favourable season of the year are necessary.

In another case the flax, bruised as before, was heated to a temperature of 150° Fah. and then set aside. In one week after the leaf appeared to be much modified, and in a few days more it could be cleaned pretty readily while still moist from the liquid, the strength of the fibre not appearing to have been in the least degree impaired. During the latter portion of the retting, gas was given off in some quantity, attended by an unpleasant smell.

Lastly, another portion of the bruised flax was heated with water to a temperature of 150° Fah. for a short time, after which the temperature was allowed to fall to 100°, at which it was kept for twelve hours, and though suffered to cool each night, was warmed to the same degree each morning, and kept at this for the remainder of the day. By this means the length of time which the operation required was greatly reduced, and the product was even more readily cleansed than before.

There is one circumstance especially worthy of note in these results, viz., the ease with which each bundle of fibres can be resolved into the separate hair-like filaments which compose them; by no other process was their coherence so far reduced.

General Remarks.—On reviewing these experiments we find that acids generally have the property of rendering the gummy matter, which bind the fibres together soluble; but though this makes the leaf more easy to clean, still there is always a hardness and an inflexibility in the fibre so