

# Aloe and its Quality Control

## Checking Upon the Genuineness of Products

by Dr Lawrence G. Plaskett

It is the straightforward requirement of the consumer to be supplied with Aloe Extract which is genuinely from the Aloe plant and which has not been contaminated with anything else. The consumer can come to realise that some preservatives are needed, otherwise the Aloe vera Extract cannot possibly be stabilised for distribution and marketing.

### **About the Author**

Dr Lawrence G. Plaskett obtained his doctorate in biochemistry at the University of London in 1960. Lawrence Plaskett is the Founder and Principal of a College of Nutrition and Nutritional Medicine has trained some 1,600 students in the last 14 years. He is a respected and recognised innovator in the field of mineral nutrition. He is the author of many articles on Nutritional Medicine dealing with individual nutrients and their relationship to certain named clinical conditions. He has completed a monograph on the Health and Medical Use of Aloe vera, plus a series of biomedical newsletters on Aloe vera, Phospholipids and Proanthocyanidines. He consults with US and UK and European companies on Aloe vera and has a working connection with the International Aloe Science Council of Dallas, Texas. He has completed monographs on Nutrition and the Menopause on the medical use of nutrients.

It is the straightforward requirement of the consumer to be supplied with Aloe Extract which is genuinely from the Aloe plant and which has not been contaminated with anything else. The consumer can come to realise that some preservatives are needed, otherwise the Aloe vera Extract cannot possibly be stabilised for distribution and marketing. So far as that is concerned, he or she will always want to see the amount of preservatives kept down to the minimum needed and will also want to be sure that only the most benign preservative compounds are employed. So far as any other additives are concerned, the consumer would usually rather be without them, but, where they are used, the most important thing is that full information should be given so that it becomes clear to the consumer that certain named brands of Aloe are either diluted with water or adulterated with cheap non-Aloe solids, enabling rational purchase decisions to be made. The tendency, which has long been rather rife in this Industry, to sell very diluted products, or to sell products adulterated with cheap non-Aloe additives, without any clear label declaration, is to be deplored.

The essentiality of the preservatives is an important matter for the consumer to understand. If 100% pure Aloe vera juice was to go out for distribution it would rot or ferment long before reaching the point of sale. That means that any liquid product on the market which claims to be "100% Aloe vera" cannot be genuinely quite 100%, although it can be very nearly so. And any liquid product which claims "no preservatives" has got to be wrong unless it were canned or otherwise sterilised or was on very short term distribution – rather like fresh milk. The Industry is based almost entirely upon stabilising the product for the market and hence the preservatives are unavoidable.

There is also the practice of describing a product as being "made with 100% Aloe vera". This will usually mean that some percentage of the total product will be composed of 100% Aloe vera, but there will be other ingredients as well and the Aloe vera component may be quite a small amount. This could, and does, easily mislead the uninitiated.

This field is one where the consumer understandably feels powerless because the laws which

govern the sale of Aloe vera products in most countries are wholly inadequate to ensure that the consumer receives a good quality product. The consumer's recourse to Law is therefore usually going to avail him or her nothing. In the UK the Trades Descriptions Act may seem to provide blanket coverage by legislating against the false description of products generally. However, in practice the regulatory agencies are inhibited by the lack of any nationally recognised standards for Aloe. In the absence of such statutory standards governing e.g. the water content of Aloe products, it seems that any effective action is unlikely. This is a situation which leaves the policing of dishonest or misleading Aloe vera products largely to the Industry itself. That is difficult – inherently so – since it is the Industry itself which has been offending in these matters. Fortunately, there are operators in the Industry who fully realise that the Industry itself, more than anything else, needs the setting of standards. The Industry and the product can be brought into disrepute if the public is repeatedly charged good money for false or debased products. The remarkable qualities of Aloe will come to be seen as a myth by the great majority of consumers who have never experienced them for themselves, simply because certain big operators within the Industry are so unprincipled as to continuously and deliberately sell diluted and debased Aloe products in place of the real thing. The only possible defence for the Industry – which cannot opt to bring in the Law as it would like to do, to control some of its own members – is to try to introduce the necessary voluntary controls for themselves and to either persuade or shame the less than honest operators into changing their policy without the help of statutes.

## The Problem of Dilution

The oldest trick in the trade in selling any valuable product in solution is to dilute it with more water. That can sometimes be true of Scotch Whisky, though there is a limit to which the dilution can be taken before the consumer begins to notice that something is missing. In the case of Aloe vera, it seems that the consumer is very insensitive to noticing the effects of dilution. Lee Ritter, in his book *Aloe vera – a Mission Discovered* quotes one Dr R McDaniel as having tested over 200 Aloe vera beverages in the mid 1980s (presumably in the United States) and having found that of these only three "contained sufficient Aloe to be of any medical value to the consumer". He goes on to say that at the time of writing (1993) according to his own tests "less than one percent of readily available brands contain acceptable levels of Aloe vera".

It has also become known that one well-known U.S. brand of Aloe vera effectively contains no Aloe at all. It has been claimed to be a distillate of Aloe – a claim which seems to signify that water is turned into steam in the presence of some Aloe leaves. The steam which comes off is purported to carry with it volatile constituents of Aloe. The trouble with that is that the product apparently contains not enough of these to be readily detectable. The question arises as to how much Aloe is actually used in this boiling off operation – can it be possible that the same Aloe leaves are used over and over again? The question is academic anyway, because all the research on Aloe shows that its active constituents are components of the solid fraction of the plant and would not be volatile in steam and would not distil over. The product which gets sold from this operation is the condensate of the steam, and it has been described as nearly pure water. The present author, upon walking through the production plant of a U.S. Company which makes genuine Aloe Extract, noticed the exhaust pipe from an evaporator which was engaged in converting Aloe Whole Leaf Extract into a concentrate by the removal of some of the water. The exhaust consisted of a dribble of water into a drain plus a little vapour. The Production Manager pointed to it and remarked: "In this factory we put this liquid down the drain – but it is what some of our competitors sell as product!"

So, to what extent are consumers in the United Kingdom immune from this type of profoundly misleading practice which has been so commonplace in the U.S.? Well, it would be really

surprising if there were to be any immunity at all. Most of the Aloe sold in the U.K. comes from the United States – from Florida, Texas or California. The other principal quantities come from areas of Mexico or from plantations in Central American States or the Caribbean, which are very often under the control or influence of U.S. Companies. U.K. suppliers are for the most part dependent upon U.S. producers and middlemen. Recently, Aloe Vera Information Service went out and bought three brands of Aloe on general sale in the U.K. (we have since tested several more). The analytical findings indicated that one of these was nearly pure water, a second contained at best 10% or 15% of Aloe with major adulteration and a third was probably a slightly under-strength Aloe vera Gel product. The names involved were either respectable or even prestigious ones in the market place. This did not bode very well for the interests of British consumers.

Dilution – or even the selling of products as Aloe which may owe nothing at all to genuine Aloe – still seems to go on in today's market in the U.K. The temptation is there in a major way. Genuine Aloe Whole Leaf Extract at a 1:1 strength may, perhaps, command a variety of different prices in the market. However, quite a common price under the money and market conditions of 1997 would be, say, £15 or £16 per litre. Naturally, if that is a typical price for Aloe vera extract at natural strength, it follows that concentrates of Aloe, if genuine, at from two to several times natural strength, command correspondingly higher prices at retail level. The cultivation of the plants, the processing, the transportation across thousands of miles in liquid form, plus the marketing and distribution costs dictate that that should be so. Product which has been dried in the U.S. and sent over in powdered form for re-constituting could easily be cheaper but would be open to question on grounds of biological activity. The temptation to sell water, or something close to water, for £15 or more per litre, is a crude temptation of human greed. The lack of control – and the real difficulties which exist in organising efficient control – are to blame for this situation.

Another aspect is that the best quality of Aloe vera is that which has not been put through either a high level of concentration by evaporation or a drying process, both of which cause some degradation of biological activity. Many suppliers sell product which has been highly concentrated and then diluted again, or products that have been dried and then redissolved. Once again there is no harm in this so long as the consumer is clearly informed. The problem is that usually the consumer is not informed. In the UK and European markets, selling "reconstituted" products, as they are called, is very widespread indeed, mainly because of the cost savings available on freight if small volumes or weights of concentrated or dried product are dispatched across the ocean from the producing country. By contrast the seller of non-reconstituted products, at single or double strength, pays heavily for transoceanic freight but delivers the consumer (other things being equal) a significantly better product. Since there are no labelling requirements which would distinguish these two quite different situations, the consumer is once again usually ill-informed about this and companies therefore compete on very unequal terms with products that may look the same but which deliver significantly different value for money.

## **The Detection of Dilution**

If the supplier is quite simply adding a major amount of water to an Aloe vera product, this will become obvious as soon as one measures the "total solids" of the product. An Aloe vera Gel product typically contains about 0.46% or 0.6% solids. The reader may be surprised that the concentration is so low. However, one should remember that Aloe vera gel is the water-storage organ of the plant. Hence the above figures are normal values – i.e. they are what one expects Aloe Gel to contain. If a party were to dilute the Gel ten-fold, this would become 0.05% to 0.06%. The picture is likely to be complicated by the addition of preservatives. What would happen in this case is that the preservatives content would tend to dominate the Aloe content

because the latter had fallen to such low levels. Ultimately one may need to elucidate the preservative content separately. However, the fact remains that if the solids content of the whole product is extremely low, much less than the normal content of solids in Aloe vera Gel, then dilution has certainly occurred. The usual method of measuring the total solids level is to evaporate a known volume of the solution to dryness in a vacuum oven and carefully weigh the residue.

## **Adulteration with Cheap Non-Aloe Solids**

Clearly, the people who sell almost pure water and pass it off as Aloe are easy to detect and, equally obviously, they are not afraid of being detected. The circumstances just have not been created yet to make life sufficiently uncomfortable for them, even though the Trades Descriptions Act gives the theoretical ability to take action.

Other suppliers who dilute Aloe try to make out that they are not diluting it, by adding back some solids of a different kind, i.e. non-Aloe solids. When this is done, simple measurement of the total solids in the product is no longer capable of exposing the dilution of the Aloe. Total solids can be made to look normal, but the point is that the solids are of the wrong kind and will not possess the biomedical properties of Aloe. This calls for a slightly more sophisticated form of chemical analysis which is capable of distinguishing between Aloe solids and non-Aloe solids.

## **Chemical Analysis to Detect Adulteration**

To attempt to distinguish between one plant extract and another by chemical analysis is not easy without resorting to degrees of sophistication which make the whole process too expensive for routine use. This arises from the fact that all plant extracts from different species have numerous components in common. However, Aloe can be distinguished from other species to a certain degree by its special polysaccharide (carbohydrate) component, called "glucomannan". Tests to distinguish the glucomannan clearly from the other polysaccharides of other plant species would have to be sophisticated. However, testing for the presence of polysaccharide per se is not. It is done by means of a test called the "alcohol precipitable hexose" test. The plant extract is first mixed in fixed ratio with alcohol (often methanol is used) and this produces a precipitate (ie. a coming out of solution) of a material which contains the Aloe carbohydrate. This precipitate can be separated out and weighed to give a measure of the amount of "methanol precipitable solids" (MPS) present in the sample. Because these "methanol precipitable solids" contain the actual polysaccharide component of Aloe, values of MPS are often quoted by suppliers to give a crude measure of the biological activity of their product. This "MPS" value is certainly better than nothing. For example, we can be sure that if a product gave an "MPS" value of zero, then the product would contain none of the type of biological activity which is associated with the polysaccharide fraction.

This analytical value is very crude, however, because some of the organic acids of the Aloe (which have no biological activity) co-precipitate with the polysaccharides in the "MPS" fraction and increase its weight without contributing anything useful.

Therefore, a much better measure is to determine how much carbohydrate is actually in the "MPS" fraction, thereby excluding these co-precipitating acids. This leads directly to the "alcohol precipitable hexose" test, in which the "MPS" are first precipitated and then an analysis

is done to find out how much carbohydrate (as hexose sugar) is present in this "MPS" fraction. This succeeds in drawing a distinction between polysaccharide in the "MPS" and the inactive organic acids which are also part of the "MPS".

The "alcohol precipitable hexose" test is therefore the best routine test we have at present for finding out how much potentially active polysaccharide is present in an Aloe sample. It is important to stress "potentially active" because if the Aloe has been incorrectly handled in processing this polysaccharide, which records itself as "alcohol precipitable hexose" will lack activity, even though the analytical result will be unchanged. Also, it is most useful when no other plant extracts are admixed with the Aloe. Some other plant extracts (but not all) will bear an "alcohol precipitable hexose" component which will analyse like Aloe polysaccharide but carry none of Aloe's biological activity.

The most common substance used for the adulteration of Aloe is maltodextrin – a cheap carbohydrate material obtained from corn starch. In the chemical analysis maltodextrin records largely as "alcohol precipitable hexose", and is potentially very misleading because it could make it look as if the Aloe sample was supremely good in respect of its "alcohol precipitable hexose" content even though, of course, it has absolutely no biomedical activity. Fortunately, though, the maltodextrin can be detected as an adulterant because it always raises the result of the "alcohol precipitable hexose" test to quite abnormally high levels which never would be attained with real Aloe. Hence the artificiality of the position becomes exposed.

This was the position with the one U.K. brand of Aloe which we found to have been adulterated. The "alcohol precipitable hexose" test produced such bizarre high results that the product could not possibly be Aloe.

Maltodextrin is not the only substance used for adulteration of Aloe products. Glucose and glycerine have also been used.

## **The International Aloe Science Council's Certification Programme**

The International Aloe Science Council, based in Texas provide Certification of products as being genuine Aloe. The Council does not only certify products that are close to 100% Aloe but also products down to 15% (sometimes 10%) Aloe. This means that certification in itself does not guarantee 95-100% Aloe but one should view the certification along with the label. Some products include only 15% Aloe with every justification; for example, the other 85% may consist mostly of fruit juice to make a drink combining the health aspects of Aloe with an attractive and refreshing flavour. Once again, the key here is information to the consumer. So long as the consumer is in a position to know just what he/she is buying, and the description of the product is correct, whether certified or not, the position is satisfactory.

The key to understanding how different classes of Aloe product compare is in familiarising oneself with the different categories of product defined by the International Aloe Science Council. There are 17 such categories – a number of which may be highly desirable to permit accuracy of description, but which most consumers are unlikely to grasp. Aloe vera "Juice" must be 95% Aloe vera to be correctly described. Aloe vera "Beverage" must contain not less than 50% Aloe vera Juice. Aloe vera "Drink" may contain as little as 10% Aloe vera Juice for the reasons described above. Aloe vera "Concentrate" must have had some of the water removed to attain a desired strength, though no lower limit of such water removal is specified. Obviously it is very important for the consumer's sake that these different types of product are clearly identified on

labels.