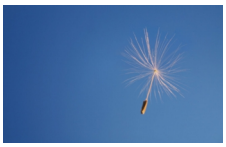

Seeds

Education and Culture
Lifelong learning programme
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Title	**DNA EXTRACTION FROM BANANA** Laboratory Protocol by ITAS – F. Bocchialini
Description	DNA is the essential molecule in all living organisms: it encodes the genetic instructions used in their development and functioning, which make of each one of them a unique being. In fact, biodiversity stems first of all from a genetic diversity, which is carried right in the DNA of the various organisms. Though still a widespread and very much debated subject, only a few people know that DNA can be also fairly easily observed in laboratory. So, here we have an easy-to-do test to extract DNA from fruit. Obviously, the DNA we will obtain will not come out particularly purified, but rather still contaminated by other molecules and, probably, partially degraded by nuclease. This protocol, however, will allow us to easily visualize it and appreciate its filamentous appearance.
Materials and Time needed	Materials for the test: a banana, a beaker, washing-up liquid, a precision balance, a Bunsen burner, a double boiler, a bowl filled with ice cubes, a funnel, filter paper, a pineapple, denatured alcohol, a wooden rod, glass test tubes. The kit will supply a thermometer Time needed: about 30 minutes
Instructions	• Put in a beaker about 100 gr. of pulped banana, 80 ml of water, 3 gr. of salt (it helps breaking the link with the proteins -HISTONES- in which DNA is enveloped), 10 cc. of washing-up liquid (it melts down the DNA membrane which consists of phospholipidic molecules). • Mix properly to homogenize the solution. • Warm up the solution in a double boiler at 60°C for 15 minutes; this enhances the DNA eduction and denatures the enzymes such as Dnase. Checking the time is essential to prevent DNA's degrading and fragmentation. • Block the thermal process, cooling the solution down by immersing it for 5 minutes into a bowl filled with water and ice cubes while stirring the mixture in order to make the temperature variation uniform. • Strain using a funnel and (coarse) filter paper . • Pineapple juice is optional -it contains bromaline to enhance the histones digestion- Add to 25 ml of filtrate, 5ml of pineapple juice. Wait a few minutes to allow bromaline to act. • At this point, each group of students will put about 5ml of filtrate in a test tube and then add 5ml of cold denatured alcohol, making sure to pour it very slowly in order to prevent the two liquids to get blended. DNA is water-soluble and as such invisible; it is however insoluble in alcohol where it tends to precipitate in the shape of a small gelatinous mass, becoming this way observable.

	Take a sample of DNA using the rod and carefully observe its filamentous structure. If you prefer, you could also take a sample with a hooked spatula, put it on a slide, adding a drop of water, after tinting it with methyl blue, and then examine it carefully with a microscope.
In-depth study	It would be possible to use also other kinds of fruit, such as kiwi fruit or strawberries. DNA can easily be extracted also from other matrixes, such as calf's thymus or the oral mucosa flaking cells.