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A rapid method of DNA isolation using laundry detergent

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A number of methods have already been described for the isolation of genomic DNA. Some methods of DNA isolation, for example CsCl-gradients, require large amounts of tissue, and are not suitable for the isolation of DNA from small tissue samples. Protocols that yield DNA in quality from small amounts of tissue frequently involve detergents (cetyltrimethylammonium bromide, SDS) or enzyme treatment (e.g. proteinases) in specialized buffer systems, whose preparation is often time consuming and expensive. We therefore developed a rapid method of DNA isolation using commercial biological laundry detergent concentrate (*Persil Mega Perls*® and *Frosch*®) as detergent/buffer-system.

Tissue (500 mg) was ground with sea sand in a 1.7 ml Eppendorf tube containing one spatula point of washing powder (40 mg) dissolved in 1.5 ml deionized water. The tissue/laundry detergent-mixture was then incubated overnight at 37°C, and half of the resulting homogenate (750 ml) was extracted once with phenol–chloroform–isoamylalcohol (25:24:1), followed by RNAse treatment for 1 h at 37°C (0.2 mg/ml), and one extraction with chloroform–isoamylalcohol. The DNA was precipitated overnight at –20°C by adding 0.1 vol 3 M sodium acetate and 2 vol ice-cold 98% ethanol and centrifugated for 15 min (14 000 *g*, 4°C). The DNA pellet was washed twice with 70% ethanol, air dried and dissolved overnight at 4°C in 100 µl TE (1).

Our results show that high molecular weight DNA could be successfully extracted from several types of tissue (human, lizard, snail, tobacco), using detergent from different manufacturers (Fig. 1A). This new protocol was tested by comparison with a DNA isolation method sucessfully used for several animal and plant tisssues in our laboratory (2). No significant differences in quality and yield of isolated DNA could be detected between either method (data not shown) and the extracted DNA was suitable as template for PCR reactions (Fig. 1B). Since in some countries powdered detergent is becoming less common, we additionally tested our isolation procedure with liquid detergent (*Persil Supra*® *Liquid)*. We recommend ~100 µl liquid detergent dissolved in 1.5 ml deionized water to obtain adequate results (data not shown). The DNA extracted both with powdered or liquid detergent was digestable with restriction enzymes (Fig. 1C). Thus, DNA isolated with laundry detergent can be used for most molecular procedures. Particularly, in molecular ecology analyses (e.g. population genetics with RAPDs or mtDNA), workers in the field often have to cope with the storage of plant or animal tissues for many hours before DNA isolation. We tested our new method by incubating tissue/laundry detergent-mixture for 14 days at 37°C. Our results show that after this period high molecular weight DNA could be isolated with this procedure, but not with the buffer we used previously (Fig. 1A).

In conclusion, since most of the commercial washing powders contain a mixture of detergents (designed for removal of organic material), enzymes (e.g. proteases, lipases) and chelating complexes (e.g. EDTA) as in most of the conventionally used buffers, our new method described here can be employed to rapidly isolate high molecular weight DNA. Moreover, unlike many buffer systems, the components of laundry detergent are not harmful, are available everywhere and are economical to use.

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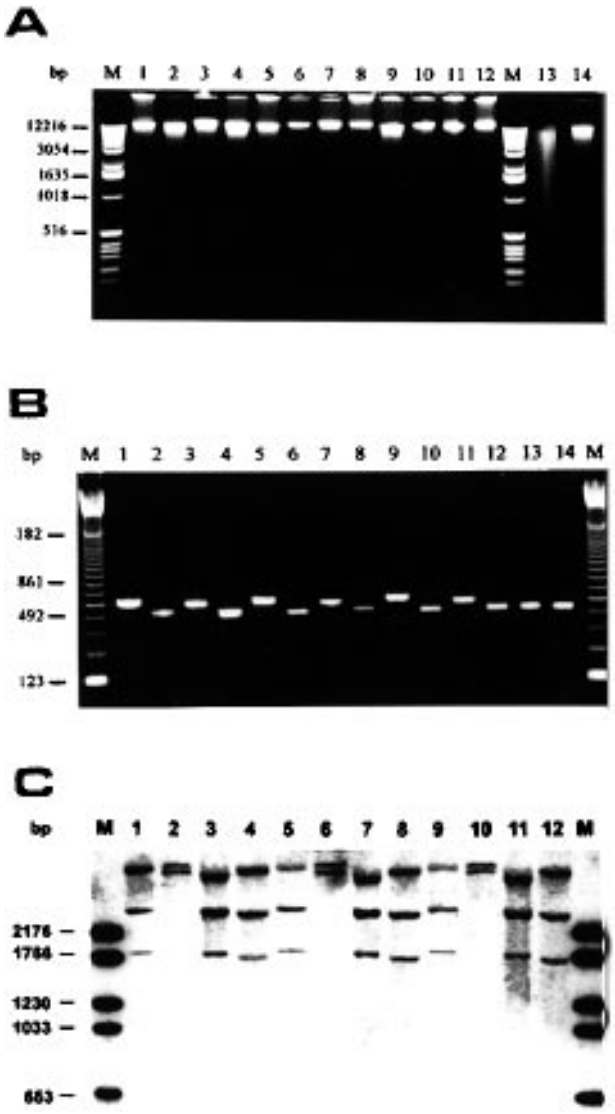

Figure 1. (**A**) DNA extracted using different isolation procedures. Lanes 1–4, DNA extracted using our standard isolation protocol. Lanes 5–8, DNA isolated with *Frosch*® laundry detergent. Lanes 9–12, DNA extracted using *Persil Mega Perls*®. The DNA isolation procedures were tested with tissue from human (lanes 1, 5 and 9), tobacco *(Nicotiana tabacum,* lanes 2, 6 and 10), lizard *(Podarcis muralis,* lanes 3, 7 and 11) and snail (*Trochoidea geyeri,* lanes 4, 8 and 12). Lanes 13 and 14 correspond to DNA isolated after incubating lizard-tissue for 14 days at 37°C using our standard protocol (13) or *Frosch*® laundry detergent (14). Marker (M), 1 kb ladder (Gibco BRL). (**B**) Amplification of a mitochondrial 16S DNA fragment using 5 ng template DNA from the samples 1–14 described above. The PCR was performed in 12.5µl in a PTC 100 thermocycler (MJ Research) under the following conditions: 1× amplification buffer (Eurogentec), 0.1 mM of each dNTP, 0.2 µM of each primer [according to Hoelzel and Green (3)] and 0.4 U *Taq* polymerase (Goldstar Eurogentec). The PCR program was 92°C for 5 min, 39 cycles at 94°C for 30 s, 55°C for 30 s, 72°C for 40 s and a last cycle at 72°C for 2 min. Lanes M correspond to the 123 bp ladder (Gibco BRL). (**C**) Digestion of DNA extracted using our standard isolation protocol (lanes 1–4), *Persil Mega Perls*® (lanes 5–8) and liquid detergent (*Persil Supra*®, lanes 9–12). DNA (~3 µg) from human (lanes 1, 5 and 9), lizard (lanes 2, 6 and 10), tobacco (lanes 3, 7 and 11) and snail (lanes 4, 8 and 12) was digested with *Eco*RI. After electrophoresis and transfer onto nylon membrane the DNA was hybridized to a digoxigenin-labelled cDNA probe of the transcribed region of the 28S rDNA. Detection of hybridization signals were performed using chemoluminescence (Boehringer, Nucleic Acid Detection Kit). Lanes M correspond to dig-labelled marker VI (Boehringer). All electrophoreses were performed in 1.4% agarose gels in 1× TBE buffer. The gels (A) and (B) were stained with ethidium bromide.