

Forensic science

The glass menagerie

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A technology that mimics nature should allow sensitive biological samples to be stored at room temperature

EVEN miracles have their price. When DNA fingerprinting was introduced in 1984, it was an extraordinary advance in forensic science. It was also an irresistible temptation to the public authorities to build databases of their criminal (and often their not-so-criminal) citizens' genetic profiles. Regardless of the rights and wrongs of those decisions, these databases have created a need for the mass storage of biological samples.

Keeping samples in refrigerators—the familiar way of preserving them—is precarious. Power supplies can be interrupted. Thermostats may be mis-set. Things can go missing because they have been stuffed at the back of the fridge and forgotten about, rather than having been stored with other, less perishable evidence. And even then, preservation is not perfect. The average sample lasts for about a decade, which is not really long enough if the sample itself, rather just a computer record of its details, is needed for future reference.

It would be far better if there was a way of keeping such samples at room temperature. And now there is. Biomatrica, a firm based in San Diego, California, has taken a leaf out of the book of the humble brine shrimp in order to dry samples rather than freeze them.

Readers of a biological bent may recall buying “Sea Monkeys” in their youth. These creatures (or, rather, their eggs, which are sold dried in packets) magically came to life when put in water. The eggs are able to survive desiccation (to a water content of less than 1%) because their cellular structure is stabilised by sugar molecules that act like a glass casing. Biomatrica is applying this principle to storing DNA and other biosamples, with the role of the sugar molecules being taken by a special polymer that dissolves in water, wraps itself around the DNA of the sample, and then holds on to and protects that DNA as the sample is dried out.

According to Judy Muller-Cohn, Biomatrica's boss, the firm has simulated long-term storage equivalent to 13 years at room temperature, by applying higher temperatures than samples would normally endure. Such storage costs a third as much as freezing the samples would. And when a sample is needed for analysis, you just add water à la Sea Monkey.

The market for this sort of stuff is potentially huge. America's Federal Bureau of Investigation alone has a backlog of more than 200,000 unprocessed DNA samples from convicted criminals (about 85% of the samples it has collected during the past six years). This number has almost doubled in the past year, yet it may grow even faster in the future since what was once a procedure required only for sex offenders has now become obligatory for a range of felons from murderers to drug-addicts. Moreover, starting next year, both the federal authorities and a number of states will cast an even wider net by collecting DNA from everyone they arrest (as now happens in Britain). That will swell the haul of samples by at least half a million specimens a year.

Nor is the market restricted to forensic science. Cambridge Biostability, a British company, has developed a sugar-based stabilisation technique to store vaccines at room temperature. GenVault, a firm based in Carlsbad, California, which uses a type of high-tech blotting paper to dry out sample materials, has signed a deal with the government of Quebec to build a "biobank" of samples for medical research. And Biomatrix itself is being used by GlaxoSmithKline to transport samples between seven of its laboratories in America and Britain. Even NASA, America's space agency, is in on the game. It reportedly wipes down its spacecraft when they return in case they are carrying traces of alien genetic material. Any Martian murderers must be quaking in their boots.