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## DNA dating: has science unlocked the secret of a perfect match?

**DNA is bringing a new dimension to the search for true love. And the key lies in a sweaty T-shirt. Charlotte Hunt-Grubbe sniffs around the new field of genetic dating**

"I have noticed," says my handsome 55-year-old date, settling back in his chair, his deep-brown eyes misting slightly, "that certain women in my life have asked to keep particular items of my clothing. Like my Calvin Klein underpants. Apparently, it makes them feel good." He smiles. "One woman rings me up, years after our relationship, and says, 'I want to let you know? I'm naked and I'm wearing your shirt.'"

My mind floods with images of jilted exes slouching on sofas in nothing but my date's oversized boxers. It seems strange to me that anyone should find his old clothes erotic. But to Dr Tamara Brown, a Croatian geneticist based in Zurich, this makes total sense. For five years she has been investigating what creates that initial "spark" between two people, and she believes that the answer lies in smell — secret signals we pick up subconsciously. These scents lurk in our body odour, created by the genes involved in our immune system. More specifically, a section of DNA called the human leukocyte antigen, or HLA.

The catalyst for her journey was the "T-shirt experiment", a Swiss study at the University of Bern carried out in the mid-1990s that screened the DNA of male and female volunteers, then asked the women to smell T-shirts that the men had worn for two consecutive nights and rate them for "attractiveness". The women, it turned out, preferred the smell of men with genes that were different from their own in this HLA section. All the women, that is, except for those on the contraceptive pill, which seems to affect their sense of smell. The study provoked headlines suggesting that women who came off the contraceptive pill might also go off their mates.

Dr Brown, an elfin 32-year-old, has thought a great deal about what she calls the "chemistry of attraction". "Somebody might not be Brad Pitt-good-looking," she says, "but there's just something about them and you can't put your finger on it. Matchmakers and online dating sites often have people coming back after a first date saying, 'We had a great time, he's a great guy, but there's no spark.' So I figured that there's a need to let people know the chemistry before they meet."

In 2003, Brown started researching her own formula for attraction by looking at these HLA genes. "Everybody knows there is 'chemistry' between people — but at the time I didn't know if we'd find out something worthwhile or economically viable as a business concept."

Her research at the Swiss Institute for Behavioural Genetics, from 2003 to 2007, convinced her she was on to something. She believes she has found the attraction formula — based on patterns in the HLA genes — and turned it into a computer program, an algorithm that she is keeping to herself.

Since it launched last autumn, her Zurich-based company, GenePartner, which charges clients \$99 for a genetic match, has been covered by, among others, ABC's Good Morning America, the Discovery Channel and New Scientist.

I check out her website. A smiling, blue-eyed couple frolic on a sparkling white beach next to the words "GenePartner. Love is no coincidence! Matching people by analyzing their DNA". If couples are a good



(Sholto)

Charlotte Hunt-Grubbe

“biological match”, says the site, there is more chance of “forming an enduring and successful relationship; having a satisfying sex life; higher fertility rates and healthier children”.

All this from DNA samples?

“We don’t claim to provide the ideal partner based purely on DNA,” Brown says. She adds that people also need to match on a social level — to have similar life goals, ideals and education levels. To make these matches, she has teamed up with more conventional online dating sites.

According to the instructions, all I have to do to find my ideal match is to take a cheek swab, which picks up cells from my cheek lining and acts as a sample of my DNA, and send it off to Zurich. But I must have people to match myself to. Brown offers to test five men (ones that I already know a bit about, to cover the “social compatibility” requirement), so for a few days I am casting a critical eye over potential mates in my building. As it turns out, getting men to give up their DNA is easy. “It’s just a cheek swab,” I say. Only one refuses.

GenePartner is not the first company to use DNA testing as an extension to the online dating market. The Florida company ScientificMatch started in December last year, about the same time as GenePartner, offering DNA matching for a lifetime membership fee of \$1,995.

Start-ups in fuzzy areas of genetics have always attracted scepticism. When, in 2001, an enterprising company called Sciona took advantage of the soft legislation in place at the time in the UK and offered to test people’s DNA to “understand how your genes impact your diet and lifestyle”, the alarm was soon raised. Within months, groups that monitor genetic technology in the UK, among them GeneWatch UK, forced Sciona to relocate to the US.

All of this is the background to why, in the name of science, I am having lunch in a London bistro with my date. This is the last of five dates. I have left the most promising match until the last. We have both sent cheek swabs off, and GenePartner has run our DNA through its computer and revealed that we are an “80% biological match”. This is very impressive, apparently. “I think you’ll definitely like him,” says Brown. I also look at the results the company has e-mailed over.

It rates me and my date on overall biological compatibility (80%), “symmetry of attraction” (very high), “type of interest” (high), and, bizarrely, “probability of a successful pregnancy” (again, high).

In the restaurant, things are going well, but not perhaps that well. I’ve overlooked my date’s efforts to get our very pretty waitress to join us. Bearing in mind the sweaty T-shirt experiment, I ask if I can smell his. I had previously instructed him to wear it without deodorant or aftershave for two consecutive nights. At the time, he looked excited and offered me his underpants. I also overlook this. We are, after all, a top “biological match”.

I smell his T-shirt, stare into his eyes, talk long and in depth about sexual prowess (his, not mine). He is funny, insightful, handsome and wealthy. And, if I believe the scientific studies showing that women like wealthy men with symmetrical faces who make them laugh, there are good reasons why I would be attracted to him — and none of them has anything to do with DNA, scents or sense of smell. On the minus side, my date smokes, and despite our “probability of a successful pregnancy” being high, he’s had a vasectomy. DNA can’t tell me that.

Brown is frustrated when people blame their date’s lifestyle choices or character traits for putting them off. “That’s why we’ve teamed up with dating sites — so that aspect is taken care of prior to meeting,” she says.

But how can I tell if I’m genetically attracted rather than socially attracted to a date? I turn to the GenePartner website. “With genetically highly compatible people we feel that rare sensation of perfect chemistry. This is the body’s receptive and welcoming response when immune systems harmonize and fit well.”

Why would I want to “harmonize” my immune system with my date’s? The science journals help me here. Research in animals, mostly mice, suggests that they pick up body scents instinctively so as to choose a mate with a very different immune system from their own. The idea is that any offspring will be healthier, because they will have immunity to fight a wider spectrum of disease. Although the science is sketchy, the sweaty-T-shirt experiment suggests that the same mechanism may be at work in humans.

We may have specialised scent-receptors in the lining of the nose that respond to other people's scents — without our being aware of the fact — and attract us to those whose genes differ from our own.

What studies has Brown done herself? "We often get questions about whether our research is published or whether it will be published," she says. "Of course, as a scientist, I would love to publish this in a prestigious science journal, like *Nature*, *Cell* or *Science*. But the truth is, at the moment, it has to be protected by secrecy so nobody else can copy it." This is the first time I've ever heard of a scientist turning down the opportunity of a paper in *Nature*.

When I ask Brown if she can tell me about her experiments, she stops talking in her usual melodic lilt and becomes slightly guarded. "We wanted to know if there were some combinations of HLA genes that are more common in long-established couples," she says. "We tested 250 couples and that's what we saw.

"We also had a questionnaire. We wanted to find out several things: whether, for example, they met on the internet and if they were satisfied with their sex lives. We had about 54 couples that we had to take out because they were friends before they started their relationship, and we wanted people with chemistry that starts as soon as they meet each other."

What do other scientists make of her work? It appears that none of her findings have been shared with her scientific peers. Brown says that, in time, when she has "a solid database of people", this customer base will give her a market advantage over future competition and that "then we can publish, at least partially, things we've discovered".

Her clients, who now number about 500, have joined GenePartner from the US, Germany and the UK. And, thanks to Brown's razor-sharp business mind, the company is growing at a breakneck pace. Just a few weeks ago GenePartner joined forces with Facebook, the fastest-growing social-networking platform in the world, which gives it a potential 200m customers. To encourage GenePartner users to get their Facebook contacts to download the application, Brown is offering a financial incentive: \$10 for each new person they introduce to the site. The people who are recommended also get a \$10 discount, and Brown is even discussing a GenePartner London Facebook group so users in the City can match their DNA against each other.

Brown, herself on the right side of the internet generation, has an insight into how young people might use the service. With a fun downloadable application you can share with friends, there's a chance that what she's suggesting could be very successful. It is, after all, an intriguing test to take. Who wouldn't be happy to meet someone this way if there is a chance of a great relationship, a fantastic sex life and a high likelihood of successful pregnancy? Especially if scientists say the test is beneficial to your future.

A kiss is another way to pick up the DNA scent signals that we give out, Brown says. Studies suggest that women may use kissing more than men to assess subconsciously whether they have found a suitable mate or not. "Because whatever it is you are sensing in the body also gets secreted in the saliva and the urine." I decide not to mention this to my date. He's three drinks down and his conversation is rapidly veering south. Instead, I wonder why he gave me his DNA so easily. He was so trusting.

Later I ask the one man who didn't agree to give me a swab why he didn't. "It seems intrusive," he says. "People might know too much about me. What if it gets lost in the post? I might end up linked to some crime scene or something."

I'm not relaxed about shipping my DNA around the globe either. I made sure when I sent my cheek swab to be analysed that it was under a different name and that anyone else who was tested as part of the exercise was anonymous. Among my concerns is that, if an insurance company got hold of my DNA results in the future, it might refuse me cover if it had data showing I am at risk of a serious disease.

Brown says that GenePartner sailed through all the legal checks. But is it ethical? She refers me to the Swiss National Ethics Committee for Human Medicine, explaining that, as her product is not classified as medicine, it is not constrained by medicine's ethical controls. "We are striving to get some kind of formal approval by the Swiss authorities," she says. "But I can't tell you when it will come. I assume with the surge of similar products the need will become more apparent."

She stresses how safe her DNA collection procedure is, how the DNA samples are destroyed once the test is done, and how careful she is to keep all her clients' personal information separate from their DNA

results, which are kept on a secure server in Switzerland that also stores data for hospitals and banks. Does nobody have access to names and DNA information at the same time? “Only very few people in the company have access to both the HLA results and personal details,” she says.

Given the controversy surrounding DNA databases, how is she able to test the DNA at all? Brown explains that in Switzerland all genetic testing needs to have a doctor’s approval — apart from screening for cystic fibrosis, blood type and HLA. HLA is excluded because these genes are important in organ donation and therefore need to be screened quickly. The labs in the US and Germany where she sends her clients’ swabs mostly analyse HLA with a view to matching patients with a new heart or kidney. Brown pays them to look at specific genes in the HLA that are “hot spots” for her secret dating formula.

Yet there is a crucial reason for protecting information about our HLA genes. It turns out that the HLA region reveals something much more fundamental than potential romantic matches — it is the part of our DNA that tells us most about our risk of contracting certain diseases in the future.

“If there’s a bit that you’re most worried about someone getting hold of to make predictions about disease, it’s this,” says Professor Peter Donnelly, who directs the Wellcome Trust Centre for Human Genetics in Oxford, which examines the genetic bases of common diseases.

I put this to Brown. “There are studies that relate certain HLA genes with higher incidence of certain diseases,” she concedes. “But the solid scientific data is not there yet, and we are certainly not looking at any such aspect at all.”

This sounds strange. Brown is a geneticist and her credentials seem top-notch: a master’s degree in molecular genetics, a PhD in neuroscience from the acclaimed FMI in Basel, Switzerland, and work as a senior clinical manager at Novartis, the Swiss-based pharmaceutical firm. How can she not be aware that there are “solid scientific data”? It takes one Google search to find the relevant research.

To double-check, I put my concerns to a second expert, Dr Benedicte Lie, a senior geneticist at the University of Oslo. She looks for genes linked to diseases and works with this region of the DNA every day. She is audibly amazed. “Saying that the association between HLA genes and certain diseases is not scientifically proved is absolutely wrong! This is well established and beyond any doubt in the genetic community.” She then lists some of the horrible diseases linked to genes in the HLA region. They include multiple sclerosis, type-1 diabetes, ankylosing spondylitis (a debilitating disease that fuses the spine) and coeliac disease.

I ask my experts about Brown’s other claims. What about the “probability of a successful pregnancy”, for example? Again the answers don’t look good. “That’s just worrying,” says Donnelly. “There are a multitude of factors that affect pregnancy — no DNA test can tell you that.”

Dr Lie is equally bemused. “A company that offers to give you the odds of miscarriage or tell you, from a biological perspective, what you should feel about your partner is scary. I can imagine this could influence people in vulnerable situations in a bad way.” Potentially 200m of them since the Facebook tie-up, of all ages and with little genetic knowledge. Isn’t this a bit risky?

“In the US they have the Genetic Information Nondiscrimination Act,” explains Donnelly. “People in the scientific community wanted legislation to prohibit discrimination on the grounds of genetics. We should be thinking about something similar in the UK or Europe.”

It isn’t hard to imagine what could go wrong. Start-up companies are notoriously unreliable and they regularly get subpoenaed or closed down. What if another company that had less stringent regulations acquired GenePartner and gained control over its data?

Brown seems oblivious to possible pitfalls in her system. “I’m certain that it is going to become a standard in dating,” she enthuses. “I think it will become the future. Personally, I’d like to change people’s lives for the better and improve how people find their partners and, ultimately, to make people happier.” She even hopes to create a new formula for gay couples to use.

I ask what might happen if existing couples take the test and find they are a poor genetic match. “If I had a low biological compatibility with my husband, fine,” she says. “I know that we fit socially, we have a lot of things in common that bind us together, so even if the biological part isn’t good, I wouldn’t separate for that.” But if those taking the test are led to believe that it is based on solid science, less

promising results showing a poor match or only a small chance of pregnancy could possibly spell the end of an already shaky relationship.

GenePartner and ScientificMatch have joined an increasing number of outfits offering to test people's DNA over the internet. However, the dating-test companies fall into a new category: screening DNA to "find love". With relative ease, GenePartner has penetrated the Facebook arena, dating and matchmaking sites.

Until Brown decides which to put first, science or business, she is her own main opponent. She is not going to publish her "top-secret dating algorithm" because of worries that someone could copy it; as a result, it hasn't been evaluated by other experts and her research into the "genetics of attraction" is open to suspicion. Surely her company would be stronger for having the validation of a paper in a good science journal?

As genetic screening becomes more commonplace and science finds out more about our genes, which it does every day, our DNA may become one of the most valuable assets we possess. Storing fingerprints and iris scans is a hotly debated area; our DNA is similarly unique and far more information-rich, yet we can send it off to something as frivolous as a dating site.

In a recent US article, the leading Harvard psychologist Steven Pinker described the "horoscope-like fascination" with learning about our genes. But is using our DNA to find a date one step too far? Is our fascination with what our DNA might say about us so all-consuming that we ignore companies trying to tap into it without considering the consequences? Perhaps finding "hot spots" in each other's genes will eventually become a commonplace dating option. But do we need to resort to shopping on the internet for a DNA match? Isn't it easier, safer and cheaper just to sniff your potential mate? That, after all, is what our bodies have evolved to do.

My date plays his final hand. His features assume a hangdog expression. Looking at me earnestly, he says: "I have erectile dysfunction.

" I look at him suspiciously. "I really do," he insists. Then his mouth curls and he bursts into laughter. "It won't go down!" Turning on my heel and leaving the restaurant, I hear him protesting loudly from inside — "It won't go down!"

Great. My almost perfect biological match is — almost certainly — certifiable.

### Testing times

Protecting DNA information, to stop it from being exploited or used without a person's knowledge, is currently a hot topic. Under discussion is the extent to which DTC (direct-to-consumer) companies offering online genetic testing — such as GenePartner, based in Switzerland, 23andMe (USA) and deCODEme (Iceland) — should be regulated. By going straight to the customer, these companies do not have to get a doctor to prescribe their tests.

As the testing is unregulated, there are fears of serious risk to privacy, that customers' DNA results might be sold to insurance companies, for instance. The German parliament recently approved legislation banning the use of DTC genetic tests and preventing employers and insurance companies from demanding genetic tests.

In the United States, the Genetic Information Nondiscrimination Act (Gina), signed by President Bush last May, makes it illegal for employers and health insurers to use their employees' or customers' genetic information to discriminate against them. The states of California and New York have taken action against DTC companies, ruling that since genetic tests are medical tests, they can only be ordered by a medical doctor; as a result, at least one such company has moved out of California.

In the UK, the Human Genetics Commission, the government's advisory body, is currently working on a code of practice for DTC testing. Issues under consideration include the validity of the tests, how they are used, quality assurance, data protection and the level of information that is provided to consumers.

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