Scientists receive Nobel prize for unravelling secrets of smell

Geoff Watts *London*

As winners of the 2004 Nobel prize in physiology or medicine, Richard Axel and Linda Buck have a double claim to knowing more than most about the sweet smell of success. Cited by the Nobel Foundation "for their discoveries of odorant receptors and the organisation of the olfactory system," the two researchers have done much to explain the workings of this least understood sense.

To humans, smell has long been less than essential. But for many animals, high and low, it is central to their interpretation of the world. Yet until Professors Axel and Buck published their findings in 1991, no one had fathomed the principle by which the mammalian brain can distinguish between, and remember, several thousand odours. The explanation lay in the genes.

The first point of contact with any odour molecule is an array of odorant receptors: a family of protein molecules located on the surfaces of the olfactory receptor cells. Professors Axel and Buck, then work-

ing together on mice at New York's Columbia University, discovered that the information required to make these odorant receptors relied on no less than 3% of the mouse's genes. Mice have about a thousand receptor types. Humans have fewer genes involved in coding for odorant receptors.

The surface of each olfactory cell carries receptors of only one type. When triggered by its complementary odour molecule the receptor changes shape. Via several biochemical intermediaries, this change fires a signal that travels along the cell's nerve processes to a specific region of the olfactory bulb—the first relay station on the way to the brain.

Although one receptor recognises only one type of odorant molecule, odours in the real world normally comprise a characteristic cocktail of molecules. With each ingredient activating a different receptor type, the combined outcome is an "odorant pattern." Consequently a thousand genes specifying a thousand receptor types are able

Scenting success: Professors Linda Buck (left) and Richard Axel

to distinguish between 10 times as many odours.

The specificity of the receptors is maintained in the olfactory bulb, where nerve processes from each receptor type are brought together in one place. The nerves that carry the information on to the brain deliver their information to corresponding micro-regions of the cortex, where odour sensations are consciously perceived and memorised.

As with many Nobel prizes in the biological sciences,

the implications for clinical medicine, if any, remain unpredictable. "The discovery of this large family of genes has revolutionised our understanding of this major sense," says Peter Brennan, research fellow in olfaction and behaviour at the University of Cambridge. "Although this work is not directly related to any major human diseases, it has opened new windows on the way the brain interprets the world around us." □

GMC decision on Southall is challenged as "unduly lenient"

Clare Dyer *legal correspondent, BMJ*

The General Medical Council's decision to bar a leading consultant paediatrician, David Southall, from child protection work for three years is to be challenged as "unduly lenient" in the high court by the healthcare professions' watchdog, the Council for Healthcare Regulatory Excellence (CHRE).

Professor Southall was found guilty of serious professional misconduct after he accused Stephen Clark of murdering his two infant sons on the basis of

seeing him interviewed in a television documentary. Mr Clark, whose wife Sally's conviction for murdering babies Christopher and Harry was later overturned on appeal, was describing a nosebleed experienced by Christopher at a London hotel in 1996. Christopher died at home aged 11 weeks, nine days after the incident. Professor Southall concluded that Mr Clark must have tried to smother Christopher. He contacted the child protection team and

later wrote a report claiming that Mr Clark's guilt was "certain or near-certain."

The GMC's professional conduct committee, which imposed the ban last August, said Professor Southall had failed to take reasonable steps to verify his allegations when he produced a report on the Clark family in August 2000. He had not apologised or taken any steps to withdraw his allegations.

But after receiving a large number of testimonials arguing that his 30 year record of pioneering work should be taken into account, the committee decided not to suspend Professor Southall from practice or to strike him off the medical register. Doctors who spoke up for

him said that striking him off would have a catastrophic effect on the already low morale of paediatricians doing child abuse work.

Sandy Forrest, CHRE's director, said: "I can confirm that following a case meeting of council members, the CHRE has referred the decision of the Professional Conduct Committee of the General Medical Council in relation to the Professor Southall case to the High Court."

CHRE has acted under powers in the NHS Reform and Health Care Professions Act 2002 to refer "unduly lenient" decisions by regulators to the High Court in the interests of public protection. □