“Dentists were able to identify approximately 95 percent of the British tsunami victims from their teeth”

An interview with forensic dentistry specialist Professor David K. Whittaker, UK

David K. Whittaker is Emeritus Professor of Forensic Dentistry at Cardiff University, Wales. He is the author of a standard text on forensic dentistry in the UK (“Colour Atlas of Forensic Dentistry”, Wolfe Medical Publications) and the author of more than 100 publications. As a practising expert witness for 50 years, he has written more than 450 reports and statements and regularly appears in Crown, Appeal, Magistrates and Coroner Courts. Over this period he has built up service to the police, home office pathologists, lawyers and forensic scientists. In his role as an expert witness he acts for both the prosecution (CPS) and the defence throughout the UK. He has also attended court in the USA, Australia, Norway and Trinidad.

During the 2007 FDI World Dental Congress in Dubai, Dental Tribune International editor Claudia Salwiczek had the opportunity to speak with him about his fascinating work in forensic dentistry.

Claudia Salwiczek: What are the main principles and procedures of identifying a dead person using dental information?

Prof. Whittaker: It is quite complicated to go into all the methods in a short time, but in principle you try to investigate the teeth in detail, eg, take x-rays and photographs and/or make casts. In other words, the goal is to find out as much information as you can from the dead person’s mouth, as to tell the type of dentistry they have had done over the years and unusual anatomical features. Most people’s teeth differ slightly, even if no fillings have been put in. There are slight differences of position, of angulation, of size and shape.

When you have a dead body to deal with and you do not know anything about it, you start by collecting all that information. In my opinion, it is best to do that first, even if you already have a set of dental records or a set of x-rays the police have produced from somewhere thinking it could be this person. It is better to ignore all of this information, put it aside, seal it in an envelope and even say to the police “do not give it to me” so you are not trying to fit what you see in the mouth to some dental record. It is the other way around. You are trying to describe what the person’s mouth and face look like. It’s not just the teeth you are looking at. It’s also the shape of the face and lips. Dentists are trained not just to look at teeth but to look at palates, tongues and the mouth in general, the shape of the jaws, the growth, etc. All of this is part of their professional training.

So you sit down with a blank pad, and as you were going to write a detective’s Thriel, you start with names and no knowledge whatsoever. And then you start building up little bits of information.

You will look at the body as a whole, if you got a whole body, and firstly determine whether this is male or female. Even if it is decomposing or just a skeleton you can usually determine if its male or female because of the pelvis, but even from the shape of the skull. For example, most men surprisingly have a forehead that slopes backwards a bit. Most women have one which is vertical. Men’s jaws tend to be much squarer and they tend to flare at the back. Also, the big bones under the eye called the mastoid that has muscles attached to it, is usually bigger and more marked in male bodies. I can go on, but there is a quite a lot of differences. It is usually not very difficult to determine if the body you are looking at is male or female. That way you are not wasting your time looking for the wrong sex.

Then you start to look at the age of the person, when they died. As I said in my lecture, you can do that because the teeth actually start to develop when you are still in the womb—only six weeks after conception. The human foetus is only a centimetre or a half long, but his teeth are beginning to form. By the age of about 2/3, all the baby teeth will have erupted into the mouth. Then there is a kind of plateau, nothing seems to be happening, but in fact the permanent teeth, which also already started to develop in the womb, come through when the child is about 6 years old, and they grow up through to the age of 28 and they are still growing until the age of 21. These are approximate figures. So from six weeks after conception to 21 years of age you can look at these teeth developing, either under the microscope or on x-rays or by just looking into the mouth. It is a sequential pattern that we know a lot about.

So the real problem is the determination of the age after 21 years of age when everything sort of shuts down. We usually do that by taking one tooth out of the body and slicing it under a machine, usually lengthwise, and we put that under a microscope and measure certain changes of the root of the tooth. The older you get, the root of the tooth becomes transparent, because the mineral that deposits in it makes it transparent, and that transparency starts to develop around the age of 25 and it spreads through the tooth until old age. So we can measure the extent of that and we can work out how old they were when they died.

If we want to have it more accurately than that we can do the determination of the age from the biochemistry of the tooth. We can get a lot of help of the amino acids, the building blocks of life. In the teeth they are preserved, and this is a very complicated transport system for these amino-acids to the teeth. It can only handle lefthanded ones, so all our teeth become as if they were lefthanded. And then, because we know all about the amino acids, we can simulate the amino acids and rotate inside your teeth until, if you lived long enough, half of them would be lefthanded and half of them would be righthanded and then they would cycle around after. So we take out the teeth of the dead body, remove the amino-acids in the laboratory and analyse for left- and righthandedness.

How long does it take them to turn?

Well, it actually takes hundreds of years, but in fifty years a small percentage of them will have rotated and our method is accurate enough to pick out that percentage. So we can determine how long it has been going on and, therefore, how old the person is.

The examination of mummies showed that you can go back in time as long as you want to reconstruct the teeth and to figure out what sex the person had.

Well, it depends to some extent on how the person has been preserved since death. Most of the Egyptian mummies were preserved in different ways depending on which century they are from and, therefore, the methods ofummification were slightly different. We do not know a lot about the effect it has on the teeth, but we think that some of these changes happened in these mummies so we can use them in the same sort of way. We have to be a bit careful about that because we can’t go back and check it scientifically, so we have to make some assumptions. But I think it works quite well.

And in a ‘regular’ case, when a dead person is, let’s say, left on a field?

Then we do know that some changes occur in the teeth, mostly a fungus occasionally penetrating the teeth and that may take many years. But that can change the structure of the teeth. If it is just a matter of months or a few years it is not usually a problem, unless the body has been subjected to very poor conditions of preservation like a very acidic environment. We have to try to find a lot more about those changes, which are actually called taphonomy. But this can be quite difficult at times due to social and religious reasons. We can’t dig...
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out bodies to find out what happened to them. People like me see a lot of dead bodies—I mean I’ve seen hundreds and hundreds. Each one of them is somewhat unique and you cannot assume that one change wasn’t necessarily occurring in another and vice versa, so you have to try to compromise.

What have been the most interesting and challenging criminal cases you have worked on?

It is difficult to say because some of them are very interesting from the legal point of view. Some of them are very interesting because the situation is very unusual and some because they are my challenging cases and set new problems. So it is almost impossible to pick one. In terms of murder, the biggest one I have worked on was the Frederick and Rosemary West murders in Gloucester in 1994, sometimes also called the Cromwell Street murders. Back then, I had to set up a special laboratory to deal with that because of security reasons and because of the amount of work. I worked more or less about 10 in the whole of the 20th century and not really one yet in this century.

What made it so difficult?

The sheer number of cases and dead bodies. We were dealing with a serial killer and a lot of female victims. They were all fairly young and we had no idea who they were. You can read about the Cromwell Street murders, there have been at least three books written about it. We thankfully do not have many serial killers in the UK. There were about 10 in the whole of the 20th century and not really one yet in this century.

Do you normally work on criminal cases only, or are cases like the mentioned above also common in your everyday praxis?

I work on both, but the majority of cases are criminal cases like murder and rape and grievous bodily harm (GBH) cases. These are cases where the victim survives, but has been badly injured. Those are the three main types of cases that I work on.

In the UK we have the adversarial system of law. When a person is arrested, the crown prosecute..."