Available online at www.sciencedirect.com
ScienceDirect
Forensic Science International 168 (2007) 89–94
Forensic Science International
www.elsevier.com/locate/forsciint

Review

The forensic expert witness—An issue of competency

Jehuda Hiss [a], Maya Freund [a], Tzipi Kahana [b,*]

[a] National Centre of Forensic Medicine, 67 Ben Zvi Street P.O. Box 8495, Tel Aviv 61085, Israel
[b] Division of Identification and Forensic Science, Israel National, Police, Headquarters, Jerusalem, Israel

Received 1 March 2006; received in revised form 14 May 2006; accepted 4 June 2006
Available online 13 July 2006

Abstract

Scientists submitting expert opinions within the legal system are expected to be knowledgeable in the forensic aspects of their particular science, as well as to be ethical and unbiased.

Scientists are seldom able to decline a request to provide an expert opinion in their field, even when their forensic expertise is minimal. The competence of scientists providing expert opinions in forensic cases is reviewed here. Three examples of the perils of uninformed ''expertise'' in forensic biology, medicine and anthropology are presented.

Keywords: Expert witness; Forensic medicine; Forensic biology; Forensic anthropology; Professional competence

Contents

1. Introduction

Within the legal system witnesses might only testify concerning what they themselves experienced with their five senses, testimony regarding their opinion is not allowed. An exception to this rule is the testimony of the expert witness who is permitted to offer his opinion pertaining to matters in dispute [1].

Expert witnesses are individuals competent in any science, art, trade or occupation: ''Persons who through education or experience have developed skill or knowledge in a particular subject so that he or she may form an opinion that will assist the fact finder'' [2].

Considering that the expert opinion is rendered to fill gaps resulting from the tribunal's inability to draw upon its own technical experience to reach conclusions, the report created by the expert witness and the subsequent oral testimony should be based on sound scientific practice, acceptable interpretation of the facts by the vast majority of the scientific community and un-tainted by foreign interests. Objectivity and impartiality should be the guiding rules of an expert witness [3].

Although nobody can accurately claim to be an expert witness by profession, some are more competent than others. Experts tend to be of two kinds; the legitimate expert who is truly fluent in the proclaimed field, and the one who attempts to join the brotherhood without qualification and experience. These unqualified experts fail to attain the required practice, education, training or a combination of the three [4].

One of the most common criticisms raised against expert is that of competency. A competent expert witness must be a

* Corresponding author. Tel.: +972 3 5127857; fax: +972 3 683 3813.
E-mail address: tzipi.kahana@forensic.health.gov.il (T. Kahana).

0379-0738/$ – see front matter © 2006 Elsevier Ireland Ltd. All rights reserved.
doi:10.1016/j.forsciint.2006.06.004

specialist in the pertinent field; the courts expect to be able to rely on the evidence offered, evidence that must be properly researched, balanced and not misleading [5]. Scientific evidence necessitates an especial test for competence; historically since 1923 the U.S. courts adopted the Frye test, i.e. whether the science on which the evidence is based, was ''generally accepted'' as being valid, usually through published reports in peer reviewed journals. The rapid advance of science required a new ruling for the competence of scientific evidence and since 1993 a four part test was adopted (Daubert v Merrill Dow Pharmaceuticals, 113 S.Ct 2786 1993), i.e. (a) testing the evidence by scientific methods, (b) peer review of the theory or techniques and publication in the professional literature, (c) reliability of the results in terms of potential error rate, and (d) general acceptance as in the Frye test. Courts in other countries, like the U.K. and Israel, have not challenged the status of competence of expert testimony and its admissibility. The duties of the expert are set out in various cases; for instance the expert should be able to provide evidence that is not clear to the ordinary person and the status of scientific evidence inherent to the expert opinion should reflect a reasonable body of work within the scientific community, even if there are opposing opinions [6].

Most scientific fields have branched out into forensic sub-disciplines where the application of science to questions of interest to the legal system is addressed. The specialists in forensic fields are well aware of the compelling effect of their expert opinion on the fate of defendants and of forensic sciences as a whole. The non-forensic expert who might be qualified in his or her specialty, such as zoology, or clinical medicine is not necessarily competent to render opinions in the forensic sub-discipline of their field and the harm of doing so, to the justice system, to the defendants, victims, and law enforcement is considerable.

The following are three examples of the perils of incompetent forensic expert opinions.

2. Forensic biology

Molecular biology is one of the most powerful tools in criminal and civil investigations. Positive identification of unknown human remains, as well as parental testing based on DNA analysis are among the main subjects of forensic biology.

Every discipline involved in molecular biology analysis either for solving scientific hypotheses or for diagnostic purposes, implements working standards to assure the reliability of the results and their reproducibility. The forensic and the parental testing laboratories have very strict guidelines and requirements in light of the immediate repercussions on the individual's destiny. These standards include procedures to avoid cross contamination between samples and using well established analytical systems and commercial kits which are implemented by the specific laboratory after performing validation studies.

PCR based analysis requires essential controls, i.e. positive and negative amplification controls, reagent blanks (contamination controls), allelic ladders and/or internal size markers for variable number tandem repeat sequence PCR based systems. When one of these controls is eliminated the results may be misinterpreted [7]. The following case is an example of such a misinterpretation.

During the late 1940s, a large wave of immigrants from Yemen arrived in Israel, many of them undernourished and in precarious health condition. As part of the incorporation process into the Israeli society, social workers and health officials of the Ministry of Absorption toured the transitory camps where the immigrants were housed, and removed children deemed in a weak health status to hospitals and temporary health facilities.

The difficulty of traveling from the absorption camps to the hospitals often impeded the parents from daily visits to their children. Their lack of language knowledge further complicated communication with the authorities and in some instances, when they came looking for their children, the parents were informed of their death, received laconic information regarding the gravesite and were dismissed.

Some 20 years latter, the Israeli Yemenite community accused the Government of participating in an illegal adoption scheme, claiming that hundreds of their children didn't die during their hospitalization but were abducted by para-governmental authorities and given for adoption to childless European immigrants.

Various official Governmental committees were appointed to investigate the disappearance of Yemenite children in the years 1948–1954. Up until 1997 despite the numerous claims, there was no concrete evidence of any living Yemenite individual illegally adopted, or of empty graves marked as containing bones of the Yemenite babies.

In 1997 a middle-aged woman (''the daughter'') claimed to be one of the Yemenite children adopted during the late 1940s. Through her legal aid she located another woman that had lost her baby, professing to be her mother (''the mother''). To prove their case the two agreed to have DNA tests performed at a prominent university genetics laboratory, which concluded that they were indeed mother and daughter with a probability of 99.9%. The results were based on the comparison of 15 genomic markers. This was the first solid evidence of abduction since the Yemenite children went missing.

Doubts regarding the kinship between the two women were raised by a governmental committee based on a document that indicated that while the adoption procedure had taken place in Israel in November of 1948, the woman claiming to be the biological mother of the adopted child immigrated to Israel from Yemen only in 1949.

The National Centre of Forensic Medicine in Tel Aviv was chosen to re-conduct the DNA tests. The genetic analysis was carried out using 13 genomic loci and mitochondrial DNA HV1 and HV2 regions. The results of these tests excluded the possibility that the two women were mother and daughter, i.e. in the genomic profiles there were five excluding loci and in the mitochondrial DNA the two profiles did not match in 15 nucleotide positions.

The contradiction between the results of the two laboratories was immediately reported by the media, raising a national uproar and questioning the reliability of DNA analysis as a method for proving parental relations. The public, lacking the