

Appendix A

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appointed me as the Commissioner to constitute the Commission.

Pursuant to s.4(1) I am required to report to His Excellency the Administrator on the conclusions to be drawn from the evidence and material information received by me on the matters set forth in the recitals to the Act, which are in the following terms:

"1. On 29 October 1982, in the Supreme Court of the Northern Territory -

- (a) Alice Lynne Chamberlain was convicted on a charge of murdering her daughter Azaria at Ayers Rock on 17 August 1980; and
- (b) Michael Leigh Chamberlain was convicted of being an accessory after the fact to that murder.

2. Doubts or questions have arisen as to their guilt or as to evidence in the trial leading to their conviction."

By Letters Patent issued by His Excellency the Governor-General of the Commonwealth of Australia on 2 April 1986 pursuant to the Royal Commissions Act 1902 (Cth), I was appointed to be a Commissioner to inquire into the same matters as are referred to in the recitals to the Act.

Copies of the Act and the Letters Patent are respectively Appendices A and B to this report.

Since I am required by the terms of the Act and of the Letters Patent to inquire into and report on identical matters it will be convenient hereafter to refer collectively to the two inquiries as "the Inquiry" and to the two Commissions as "the Commission". In fact the two inquiries were conducted simultaneously.

Mr John Flynn was appointed Secretary of the Commission.

Prior to the first hearing of the Commission advertisements were inserted in a number of newspapers which are referred to in Appendix C. The text of the advertisements and dates on which they appeared are also recorded in that Appendix. Similar advertisements were published throughout Australia on 21 and 23 July 1986.

The first sitting of the Commission was held at 22 Mitchell Street, Darwin on 8 May 1986, when I granted leave for the following to appear:

Mr C.A. Porter, Q.C. and Mr W.W. Caldwell to assist me

Mr I. McC. Barker Q.C. and Mr M.F. Adams for the Northern Territory Government and the Northern Territory Police Force

Mr J. Winneke, Q.C. and Mr B. Woinarski for Mr and Mrs Chamberlain

Mr M.R. Einfeld, Q.C. and Mr R. Bennett for Ian Stanley Cawood, Valerie Grace Cawood, Debbie Therese Connor, Arthur Derek Roff, Francis John Morris, Margaret Annette Morris, and Lynette Joy Beasy

Subsequently, Mr Barker Q.C. announced that he also appeared with Ms E. Fullerton and Mr Winneke Q.C. announced that he also appeared with Mr. K. Crispin.

On 10 June 1986 Mr A.S. Gillespie-Jones Q.C. applied for leave to appear for Mr P. ward and Mr D. McNicol. Mr Gillespie-Jones stated that his clients wished to be represented because they believed their credit might be attacked during the course of the Inquiry as a result of a book written by ward relating to the events surrounding Azaria's disappearance. Mr Gillespie-Jones submitted that his clients should be granted leave to be represented on the grounds of natural justice. I refused leave to Mr Gillespie-Jones to appear because at that stage of the proceedings no allegation had been made against his clients except for civil claims by several persons that they had been defamed in Ward's book. I informed Mr Gillespie-Jones that he could renew his application for leave to appear should subsequent events give rise to a situation where his clients' interests could be adversely affected by the proceedings of the Commission. However, he did not renew his application. The leave to appear granted to Mr Einfeld Q.C. and Mr Bennett was withdrawn shortly after 10 June 1986 as their clients no longer had any interest in the evidence led thereafter to the Commission.

I decided, without objection from any party, that I would admit as evidence in the proceedings before the Commission the evidence tendered at the two coronial inquests into the death of Azaria Chamberlain and at the trial. Senior counsel assisting me made it clear that he proposed to call as witnesses before the Commission the principal witnesses who had given evidence in the earlier proceedings and, with the exception of one witness who was prevented by illness and another who had died since the trial, all the witnesses who gave significant evidence in the earlier proceedings also gave oral evidence before me.

Since the convictions giving rise to the Commission were recorded in proceedings brought against Mr and Mrs

Chamberlain in the Supreme Court of the Northern Territory it was appropriate that a significant part of the Commission's proceedings should be heard in the Territory. Indeed, since the Commission's inquiry was so intimately connected with the enforcement of the criminal law in the Northern Territory I was reluctant to take evidence elsewhere. Most of the non-scientific evidence was taken in Darwin because that city was as convenient as any other city in which to take this evidence. However, there were a great many scientific witnesses resident in Sydney, Melbourne and Adelaide. To have required these witnesses and witnesses from overseas to give their evidence and in Darwin would have considerably increased the cost of the Commission and, accordingly, I took most of their evidence in Sydney, the balance being taken in Melbourne. The evidence of these witnesses was lengthy and, in the result, much more time was spent taking evidence in Sydney than in Darwin. However, I was at all times conscious that it was in the public interest that the Commission should sit in the Northern Territory since it was embarked upon an inquiry upon matters arising out of convictions recorded there. It was particularly appropriate that the final addresses of counsel should be heard in Darwin so that members of the Northern Territory public could, if they so wished, observe the proceedings and hear counsel's submissions on the evidence furnished to the Commission.

I indicated at the outset of the Commission that all witnesses except Mr and Mrs Chamberlain were to be called by counsel assisting me. Evidence was called on some 92 sitting days and was taken from 145 witnesses. All the evidence was taken in public. Counsels' final submissions occupied a further 9 days. ■ also received comprehensive written submissions.

Searching enquiries and investigations were made by those assisting me in an effort to ascertain any evidence which might bear upon the circumstances surrounding Azaria's disappearance and the guilt or innocence of her parents. As a consequence of these enquiries the evidence before the Commission was much more extensive than the evidence at the trial.

It would not be profitable to refer in this report to all the evidence which was before the Commission. ■ I shall refer to the most significant of it in later chapters. I set out in Appendix D some of the more important topics in respect of which evidence was given, and the witnesses who gave evidence on those topics. Where a witness gave evidence on more than one topic his or her name has been included under several headings. For the sake of completeness I have included in Appendix D the names of a few persons whose statements were tendered in evidence but who were not called to give oral evidence. Mr and Mrs Chamberlain gave evidence on most issues and their names are not included under any particular topic.

Many of the witnesses whose names are referred to in Appendix D are experts of considerable distinction and experience in their particular disciplines. They are listed separately in Appendix E.

CHAPTER 2 THE NATURE AND SCOPE OF THE INQUIRY

It is plain that the words used in the Letters Patent and in the Act to define the nature and scope of my Inquiry have been borrowed from s. 475 of the Crimes Act 1900 (N.S.W.). Indeed, both the Letters Patent and the Act (s.4(2)) provide that in determining the nature and scope of the Inquiry I am to be guided by the meaning given to like terms in sub-s. 475(1) of the last-mentioned Act.

Section 475(1) provides as follows:

"475. (1) Whenever, after the conviction of any person, any doubt or question arises as to his guilt, or any mitigating circumstances in the case, or any portion of the evidence therein, the Governor on the petition of the person convicted, or some person on his behalf, representing such doubt or question, or the Supreme Court of its own notion, may direct any Justice to, and such Justice may, summon and examine on oath all persons likely to give material information on the matter suggested."

I am of the opinion that since I am required by the Letters Patent and the Act to inquire into the matters which have been referred to me and to report thereon it is inappropriate to treat any party appearing before the Commission as carrying an onus in the strict legal sense. I do not think that it is proper to regard Mr and Mrs Chamberlain as carrying an onus to establish that there is a doubt as to their guilt. Nor is it proper to regard the Crown as carrying an onus of establishing that there is no doubt as to their guilt. I am of the view that to resolve the question whether there is a doubt or a question as to Mr and Mrs Chamberlains' guilt, or as to the evidence at their trial, I must ask myself whether the evidence persuades me beyond reasonable doubt that they are guilty or that the evidence at their trial is free from doubt. Counsel who appeared for the North rn Territory Government and for Mr and Mrs Chamberlain agreed with this formulation of the approach which I should take in resolving the doubts or questions upon which I have been asked to report. In effect, what I am requ cd to do is to consider the whole of the evidence led before me and, without placing an onus of proof on any party, to decide whether there is a doubt as to the Chamberlains' guilt. In determining whether I am persuaded beyond reasonable doubt of the Chamberlains' guilt they, of course, are entitled to the benefit of any reasonable doubt which I may hold.

My view as to the nature of my task is consistent with the view taken by judges of the Supreme Court of New South Wales who have undertaken inquiries under s. 475 of the Crimes Act (N.S.W.). Thus in his report into the convictions of Timothy Edward Anderson, Paul Shawn Alister and Ross Anthony Dunn, Wood J. said (p. 60):

"I am satisfied that the direction of an Inquiry pursuant to Section 475 of the Crimes Act, although predicating the existence of a doubt or question as

to the guilt of the Petitioners, does not involve a revival of the presumption of innocence in their favour, or impose an onus on the Crown to produce evidence to remove the doubt and re-establish their guilt. A submission to this respect was rejected by Slattery J. in his report of the Inquiry into the conviction of Loraine May Price (October 1984) As his Honour there said:

(p.7) 'This section is available where a person has been convicted of an offence and a doubt or question is postulated as to guilt or to a mitigating circumstance in the *r.nse* or to any portion of the evidence therein. The section contemplates that His Excellency the Governor, after receipt of a petition, or a Supreme Court Judge of his own motion, may direct a Justice of the Peace to conduct an inquiry on the "matter suggested", that is, the postulated doubt or question as to guilt or as to any mitigating circumstance or as to any portion of the evidence, as the case may be.'

I am similarly satisfied that the section does not impose any onus on the Petitioners to establish that their convictions were wrongly procured. Questions of onus appear to me to be foreign to the type of Inquiry the section contemplates.

The Inquiry must commence with the fact that a conviction has been recorded, and that questions or doubts have been raised sufficient to justify the Governor, on the petition of the person convicted or some person on his behalf, or the Supreme Court of its own motion, to direct a Justice to conduct an Inquiry and to summon and examine on oath all persons likely to give material information on the 'matters suggested'."

And at p. 63 of his report Wood J. said:

"I respectfully accept as correct the conclusion of Slattery C.J. at C.L. in the Price inquiry, so far as that concerns the task of the Justice when inquiring into questions or doubts concerning guilt. It is my view that I should consider the evidence at and the conduct of the trial, in the light of the further evidence and submissions received in the Inquiry, in order to determine

whether the questions or doubts as to guilt have been resolved or remain. In this regard, I take the view that guilt has the meaning given to it in the trial process, that is, guilt established beyond reasonable doubt. So far as any question or doubt may concern a conflict of evidence or the reliability of a witness, or may depend on fresh evidence concerning aspects of the case proved by the Crown, it seems to me that I must weigh those matters and express my own opinion in the report.

So far as the question or doubt may concern a possible miscarriage of justice or involves the possibility that the convictions were improperly obtained, due to some error in the trial process, it seems to me that I must explore whether or not there was a mishap, and report my conclusion both as to its occurrence and as to its significance in relation to the guilt found by the convictions."

I do not mean to convey by what I have written that it would be proper for me to find that there is a doubt as to the guilt of Mr and Mrs Chamberlain if the evidence before me were substantially the same as the evidence at their trial. If that were the case and if, unlike the jury, I entertained a personal doubt as to their guilt, the question would arise whether such a doubt is a doubt as to their guilt within the meaning of those words in the Act and in my Letters Patent. That is a question which does not arise because the evidence before me is much more extensive than, and in important respects different from, the evidence at the trial.

CHAPTER 3 PROCEEDINGS LEADING TO THE CONVICTIONS

Two coronial inquiries were held into the circumstances surrounding the disappearance and presumed death of Azaria. The first inquiry concluded on 20 February 1981 when the coroner, Mr D. Barritt, S.M. found that Azaria met her death when attacked by a wild dingo whilst asleep in her family's tent at the top camping area at Ayers Rock shortly after 8 p.m. on 17 August 1980.

On 18 November 1981 an order was made by Toohy J. in the Supreme Court of the Northern Territory quashing the previous inquest and directing that another inquest be held.

A second coronial inquiry concluded on 2 February 1982 when the coroner, Mr G. Galvin, C.S.M. decided that Mrs Chamberlain should be charged with the murder of Azaria. He further decided that Mr Chamberlain should be charged pursuant to s. 9 of the Criminal Law Consolidation Act that he, between 17 August 1980 and 16 December 1981 at Ayers Rock and other places in the Northern Territory did receive

or assist his wife who to his knowledge was guilty of the offence of murdering Azaria. Accordingly he charged him with those offences.

C By an indictment presented to the Supreme Court of the Northern Territory on 13 September 1982, Mrs Chamberlain was charged that on 17 August 1980 at Ayers Rock she did murder Azaria Chantel Loren Chamberlain. By the second count of the indictment Mr Chamberlain was charged as an accessory after the fact, the particulars being that between 17 August 1980 and 16 December 1981 at Ayers Rock, Alice Springs and other places in the Northern Territory he did receive or assist his wife, who to his knowledge was guilty of the offence of murdering Azaria, in order to enable Mrs Chamberlain to escape punishment. Each pleaded not guilty. The trial was lengthy and the jury did not return their verdicts until 29 October 1982 when it found both Mr and Mrs Chamberlain guilty as charged. Mrs Chamberlain was sentenced to imprisonment for life. Mr Chamberlain was sentenced to eighteen months imprisonment, but the trial judge ordered that he be released upon him entering into a recognizance to be of good behaviour.

Mr and Mrs Chamberlain appealed against their convictions to the Full Court of the Federal Court of Australia. That Court (Bowen C.J., Forster and Jenkinson JJ) dismissed the appeals (see 46 ALR 493). An application for special leave to appeal against that decision was made to the High Court. The application was granted, but the High Court (Gibbs C.J., Mason and Brennan JJ, Murphy and Deane JJ. dissenting) dismissed the appeals. (See 153 C.L.R. 521).

CHAPTER 4 THE EVIDENCE AT THE TRIAL

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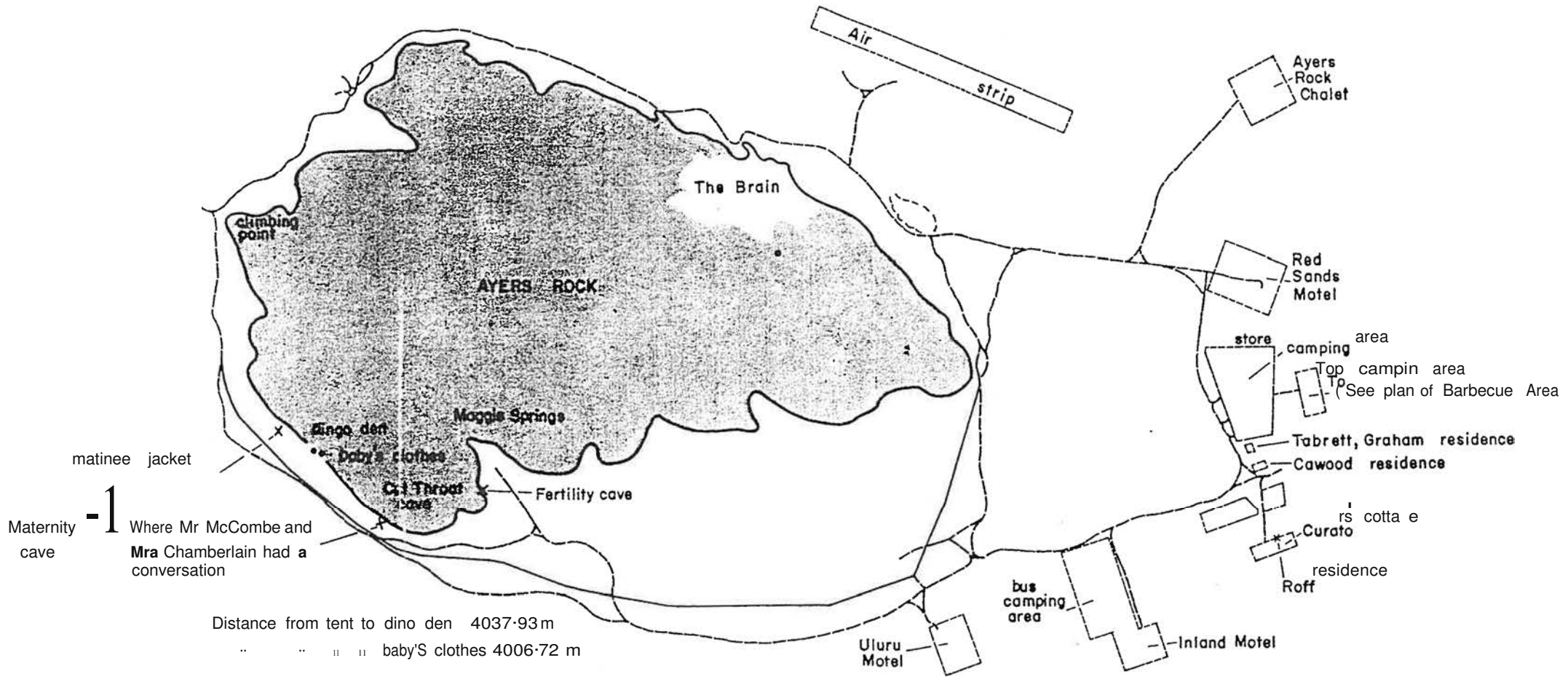
The trial was lengthy and occupied some 35 days. The evidence before the jury was exhaustively examined on the hearing of the application for special leave to appeal to the High Court. Comprehensive summaries of the most significant evidence appear in the joint judgment of Gibbs C.J. and Mason J. and in the judgment of Brennan J. I have freely borrowed from those judgments in making the following summary of the more important evidence upon which the Chamberlains' guilt was established to the satisfaction of the jury.

On 13 August 1980 the Chamberlain family left their Mount Isa home in their yellow hatchback Torana car to travel to Central Australia for a holiday. They arrived at Ayers Rock late on the evening of Saturday, 16 August and pitched their tent next to their car in the top camping area situated to the east of the Rock itself. The position of the top camping area in relation to the Rock and its surroundings can best be appreciated by reference to the

plan identified as "Plan of Ayers Rock and Environs" which is reproduced.

Azaria disappeared from the tent about 8 p.m. on the evening of Sunday, 17 August. The evidence at the trial was that at the time of her disappearance there were five families camped in the top camping area and that Mr and Mrs West and their 12 year old daughter were camped furthest to the north. However, it emerged in evidence to the Commission that another family, Mr and Mrs Dawson and their three children were camped north of the West family. The Chamberlains were camped next to the Wests. Much further to the south were the Haby and Whittaker families. Mr and Mrs Lowe and their daughter aged 18 months were camped in a tent pitched more or less due west of the Chamberlains' tent. With the exception of the Lowes' tent, all the other tents were more or less in a row. To the west of these tents and parallel to them was a low post-and-rail fence which separated the tents from a barbecue area. Between the fence and the barbecue area there were some low bushes and vegetation and there was another low post-and-rail fence close to and on the eastern boundary of the barbecue area. To the east of the tents was an unsealed roadway and further again to the east were low red sand dunes covered by dune vegetation.

The barbecue area was about 20-25 metres west of the Chamberlains' tent. It was illuminated by a 100-watt yellow portable flood light attached to a post. The light shone across the barbecue area in an easterly direction so that, according to at least some of the evidence, some of the light reached the Chamberlains' tent. There was no other light in the immediate vicinity of the Chamberlains' tent at the time of Azaria's disappearance. The Chamberlains' tent had flaps which opened to the west, that is, facing towards the barbecue area and the Rock. The

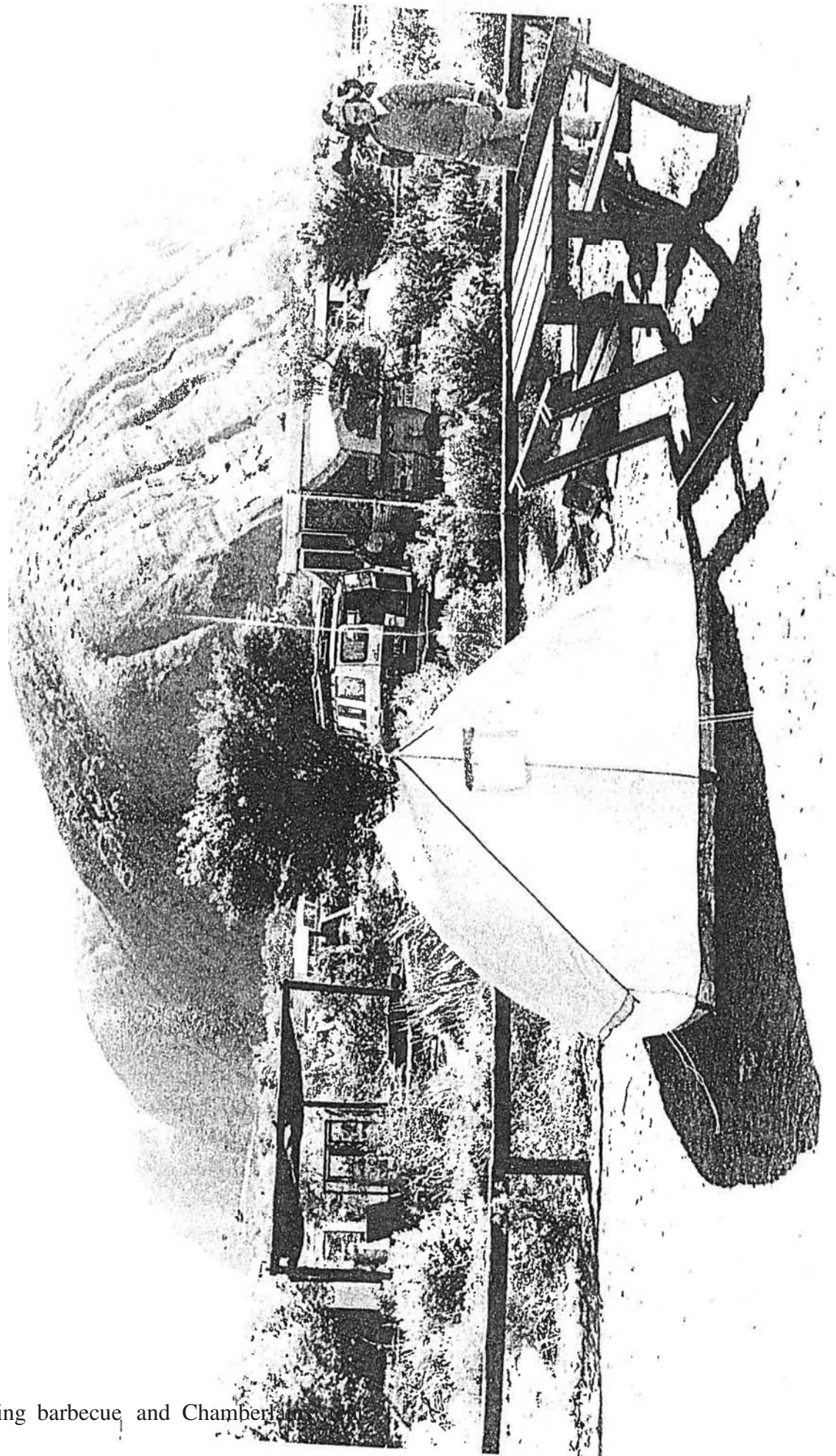


AYERS ROCK AND ENVIRONS

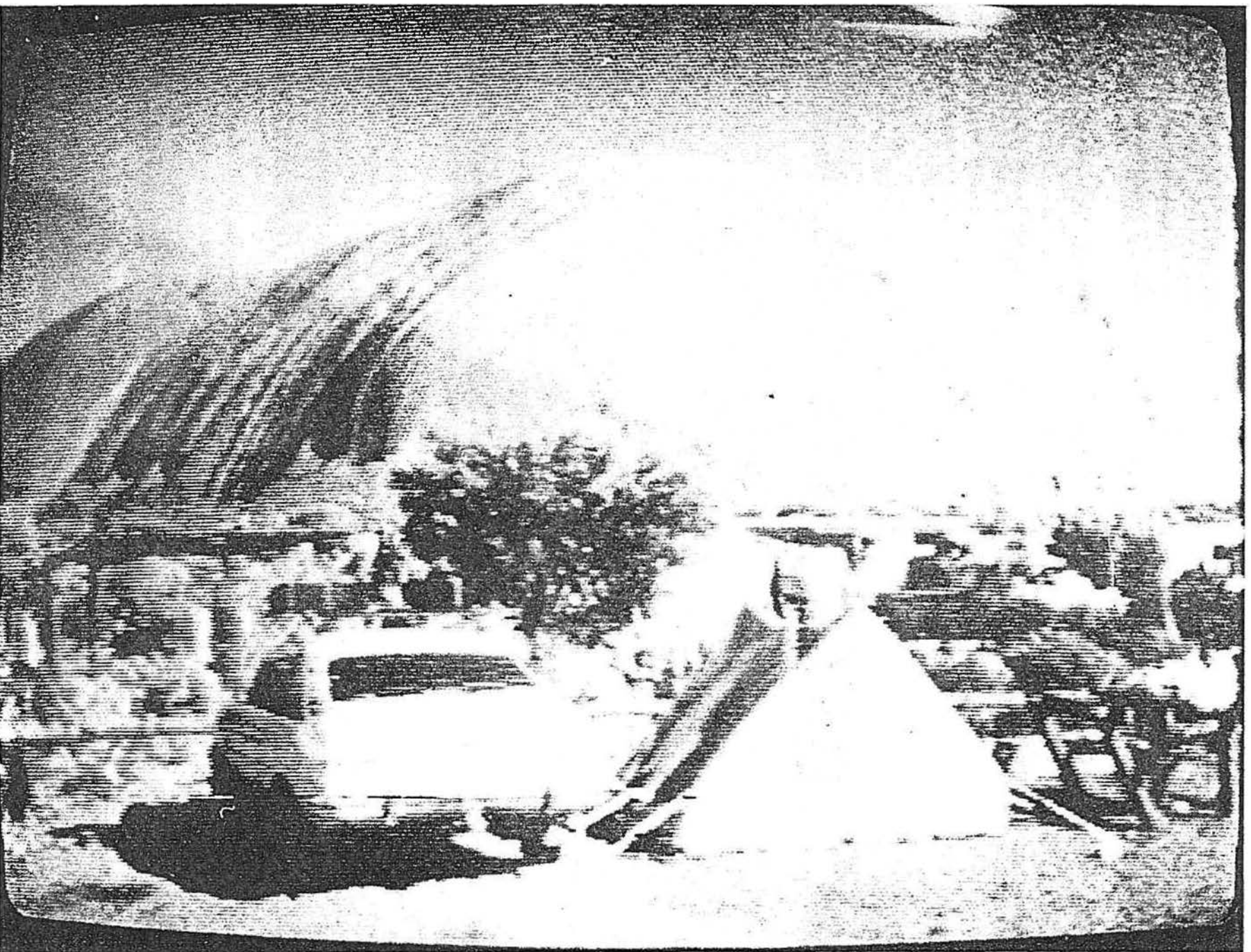
positions of the various tents in relation to the barbecue area can be seen on the plan identified as "Plan of Barbecue Area" which is reproduced. The photograph identified as "Camping Area Showing Barbecue and Chamberlains' Tent" shows the barbecue area and the position of the Chamberlains' tent on the night of 17 August. The photograph identified as "Chamberlains' Car and Tent" shows the approximate position in which the Chamberlains' car was parked at the time of Azaria's disappearance. The car was, in fact, facing slightly north-west. Both photographs are reproduced.

At the time of the alleged crime Mr and Mrs Chamberlain were aged 38 and 34 respectively. They were married in 1969. They had two sons- Aidan, who was then aged 6 years and 10 months, and Reagan, then aged 4 years and 4 months. Azaria was a normal healthy baby aged 9-1/2 weeks. The Chamberlains were persons of unblemished character. He was the pastor of the Seventh Day Adventist Church at Mount Isa and she shared his religious beliefs. The evidence established that Mrs Chamberlain was a devoted mother in good mental and physical health. There was no evidence to suggest that she suffered from post-natal depression following the birth of Azaria, indeed the medical evidence was to the contrary.

Shortly before 8 o'clock on the evening of 17 August Mr and Mrs Chamberlain were at the barbecue for the purpose of preparing their evening meal. Aidan and Azaria were with them, but Reagan was already in the tent and apparently asleep in his sleeping bag. Mrs Chamberlain was nursing Azaria. She was sitting on a rail at the barbecue chatting to Mr and Mrs Lowe who were also preparing their evening meal. She appeared contented and exhibited no signs of stress, anger or mental instability. It was common ground at the trial that Azaria was then alive.



Camping area showing barbecue and Chamberlain



Chamberlains' car and tent.

Mrs Chamberlain left the barbecue area carrying Azaria and followed by Aidan. She walked in the direction of her tent with the apparent intention of putting both children to bed. Her account of what then occurred was as follows. She returned to the tent, and placed the baby, who was then asleep, in a bassinet and tucked her under the blankets. The bassinet was at the rear of the tent. Aidan said that he was still hungry so she went to the car and obtained a tin of baked beans. She returned to the tent and then went back to the barbecue area with Aidan. There is no doubt that Mrs Chamberlain did return to the barbecue area accompanied by Aidan and carrying a tin of baked beans. Estimates of the length of time she was absent from the barbecue area varied at the trial from 5-10 minutes. When she returned to the barbecue area she appeared normal and composed.

"

The Crown case was that during this short absence from the barbecue area, Mrs Chamberlain took Azaria from the tent into the car, sat in the front passenger seat and cut the baby's throat. The Crown alleged that Azaria's dead body was probably initially left in the car (possibly in a camera bag) and later the same evening buried in the vicinity of the barbecue area by Mr or Mrs Chamberlain.

According to Mrs Lowe, after Mrs Chamberlain had returned to the barbecue area with the can of beans she (i.e. Mrs Lowe) heard Azaria cry. Her evidence included the following:

"A.--- Well she was just standing there. ■ heard the baby cry, quite a serious cry but not being my child ■ didn't sort of say anything. Aiden (sic) said: 'I think that's bubbie crying', or something similar. Mike [Mr Chamberlain] said to Lindy [Mrs Chamberlain]: 'Yes, that was the baby, you better go and check.' Lindy went immediately to check. ■

saw her walk along the same footpath that they'd been on.

Q. What happened next? A.---She was in the area on that footpath closest to where the car and tent was, only inside the railings, and yelled out the cry: 'That dog's got the baby.'"

According to Mrs Lowe, the cry which she heard definitely came from the tent. She was positive that it was the cry of a small baby and not that of a child. She said the cry was loud and sharp and that it seemed to stop suddenly. Mr Lowe, who was engaged in conversation at the time, did not hear any cry. He said that Mr Chamberlain said to his wife: "Was that the baby?", that Mrs Chamberlain went to check on the baby and that when she was about 5 yards away she cried out: "That dog's got my baby."

Mrs West, who was in her tent at the time, said that she heard the growl of a dog from the direction of the Chamberlains' tent and that some time afterwards she heard Mrs Chamberlain cry out: "My God. My God. A dingo has got my baby." She variously described the interval of time between hearing the dingo growl and hearing Mrs Chamberlain cry out as fairly soon afterwards and 5 or 10 minutes later. Mrs West's husband also said that he heard the growl of a dog.

It was a dark night and the only significant source of light in the vicinity of the barbecue area and the Chamberlains' tent was the floodlight to which I have referred. The evidence at the trial varied as to whether the effect of the lamp was to provide a strong light or a very poor light at and in the tent. However, it was clear that people standing at the barbecue area might not have been able to see a dog or dingo at or near the tent since,

quite apart from the lighting conditions, their vision would have been obscured by the low vegetation between the barbecue area and the tent and the post-and-rail fence to the west of the Chamberlains' tent and car.

Mr Lowe's description of what happened immediately after Mrs Chamberlain cried out was as follows:

"Well she [Mrs Chamberlain] chased in a direction where she was pointing where she said a dog had gone, and then she veered back towards the tent and checked the tent to find out whether the child was still in the tent or not, but by this time of course the outburst had raised a hue and cry and Mike and I raced from the barbecue site across to the tent and asked which direction the dog had gone, and we proceeded to search immediately."

1

Initially, when the alarm was raised, some of the people who were in the vicinity of the barbecue area went searching on the sand dune to the east of the camping area on the other side of the road which passed behind the Chamberlains' tent. Mrs West said that Mr Chamberlain, who appeared to be very distressed, came running up and said that he wanted to get into his car but that he could not find the keys. In his evidence, Mr Chamberlain said that he wanted the keys to operate the ignition so that a spotlight which plugged into the car's cigarette lighter could be turned on. The keys were found later in the evening. Mrs Chamberlain said that she had put them under a pillow in the tent because she had no pockets in her clothes. She did not remember her husband asking her for the keys.

Very soon after Azaria disappeared Mr Chamberlain approached the Whittakers' tent. At the time the Whittakers were listening to a programme of Christian hymn singing being broadcast on the radio. According to Mrs Whittaker, Mr Chamberlain said:

"If you are Christian people can you be praying? A dingo has taken our baby. She was nine weeks old and she is probably dead by now."

Another of the campers, Mr Haby, said that Mrs Chamberlain approached him and said: "A dingo or a dog has taken my baby - have you got a torch? - I need a torch." Mr Haby said that he asked Mrs Chamberlain how she knew and she replied that she had seen a dog or dingo coming out of the tent when she was walking to the tent and that she had looked in the tent and found that the baby was missing. Mr Haby said: "Did you see the dingo-dog carry out the baby?", to which Mrs Chamberlain replied: "No, it wasn't carrying anything." She said that the dingo had gone in the direction of the sand dune which Mr Haby then proceeded to search.

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Mrs Chamberlain told Mrs Whittaker that she thought at first that the baby had fallen out of the bassinet and that she searched around and could not find it. At about 8.25 p.m. when Mr Derek Roff, the ranger in charge of the area, first arrived on the scene she told him that she did not see anything in the dingo's mouth. Constable Morris, a local police officer, said when he first arrived she told him that the dingo appeared to have something in its mouth, and about an hour later she said that, when she had seen the dingo near the entrance to the tent, it had had nothing in its mouth. She also said that she did not recall making her earlier statement.

On 18 August, when interviewed by Inspector Gilroy, Mrs Chamberlain said that she did not see anything in the dingo's mouth "because that was below the level of the light". She said that she saw the dingo coming out of the tent flaps, yelled at it to get out of the road and "dived straight for the tent to see what had made the baby cry".

When she was further interviewed by Detective Sergeant Charlwood at Mount Ica on JO September 1980, Mrs Chamberlain said: "n lfway hak T saw the head and chest of a dingo trying to get out of the tent. It was shaking its head from side to side with its nose down, the way it was shaking it looked like it was trying to get something through the tent fly. Our shoes were all along the inside of the tent, whatever it was the dingo was having difficulty getting it out. I thought it may have had my husband's shoe and it was swinging by the laces." Later in the same interview, she said: "When ■ had previously yelled at the dingo it had run out of the tent across the front of the car and into the shadow. As I was calling to Michael I was running in a direction the dingo had gone around the front of the car. Michael said 'What'. As I reached the front carner of the car leff hand corner at the time Michael answered I noticed the dingo standing motionless and slightly behind the rear of the car in its shadow. Approximately the middle of the distance between the two railings. It had its back to me but at a slight angle with its whole body visible, its head was turned slightly as if listening. I did not see anything in its mouth, my mind refused to accept what was happening, I'm glad I did not. As I appeared it ran swiftly on an angle to the right into the scrub towards the sand hills. I did not hear it move, the night was very quiet."

At the first inquest Mrs Chamberlain said: "When ■ last saw it (the dingo) before I went into the tent - the last time ■ saw it it was heading out of the tent past the car. I didn't follow it with my vision because ■ was more interested in what was in the tent than following it".

Mrs Chamberlain's evidence at the trial included the following:

"Q.- What was the dog doing when you yelled out?

A.- Shaking its head.

Q.- It was the focus of your immediate attention, of course? A. - Yes.

Q. Here was a dog emerging from the tent, shaking its head, with, as you believed, your baby in its mouth? Is that right? A. - With, as I believed, a shoe in its mouth.

Q. - When did you decide it was the baby? A. - Well, I realized just a split second after that, that she'd cried and been disturbed, and started to run, and as I neared the tent, I could see it was empty. That's when I realized it was the baby.

Q. - The dog was then, what, going past the front of the tent? A. - I couldn't tell you where the dog was, when I thought that.

Q. -When you wee at the rail, the dog was within your vision, was it not? A. - I think - no; it'd gone before that.

Q.- You watched it leave? A. -I watched it leave just a few feet, that's all; just in a split second.

Q. - It turned and went south, did it? A. - It came out the tent, going south.

Q. - You watched it? A. - Like I said, just for a split second. I wasn't concentrating on what it was doing.

Q. - Is it the position that you did not see the baby in its mouth? A. - That's correct.

Q. - Did you see anything in its mouth? A. - No.

Q. -Why? A. - Its nose was below the light level from the barbecue. It was obscured by the scrub and the railing, from where I was at that time.

Q. - Do you say that it had vanished by the time you got to the rail? A. - That's right.

Q. - You say, do you, seriously, that you did not see the baby in the dog's mouth'? A. - That's right.

Q. -At any stage'? A. - That's right.

Q. -As it went past the tent, did it appear to be carrying anything'? A. - I couldn't see what it was carrying, I could only just see the top of its head."

Mrs Chamberlain's description of the animal she had seen included the following statements. She told Inspector Gilroy on 18 August that she had seen "a youngish dog, and certainly a very fit dog" come out of the tent when she was half-way back to the tent from the barbecue area. She said that she had seen a similar dingo earlier that day. In referring to these same dingoes, she said to Detective Sergeant Charlwood in an interview on 30 September 1980: "They were both the same golden colour neither had dusty coats. The shape of the bridge of the nose was similar, the pointed ears were straight on both sides and had a few longer hairs on the outside edge making them look a little distinctive."

After a short time a large number of persons joined in the search. These persons included Mr Roff and Constable Morris. They organized a search party consisting of some 250-300 people who combed the sand dune to the east of the tent and areas to the north and south of it until about 3 a.m. Some tracks and drag marks apparently made by dingoes or dogs were found, but the baby was not, nor has her body ever been found.

Mr Haby found truck tracks on the sand dunes east of the camp site. The biggest of the tracks, which he said were easy to follow, led to a place on the top of a ridge. In his opinion, a dog or dingo had put something down there.

He said that it "had left an imprint in the sand which to me looked like a knitted jumper or woven fabric and then it obviously picked it up because it dragged a bit of sand away from the front and kept moving ...". He described the impression as being roughly oval in shape and approximately 7 inches by 5 or 6 inches in size. He also said that near the imprint on the sand was a drop which, according to him, could have been blood or saliva. He said that it was dark in colour but not red. The place where he made these observations was about 100 yards from the tent. He said that he showed the imprint to Mr Roff and Constable Morris.

Mr Roff gave evidence that he was told that a track had been found on the top of the sandhill and that he went to see it. He saw a drag mark about 8 or 10 inches in width and followed it. He described the mark as follows:

"Well, it was a shallow drag mark and obviously something had been dragged along, and obviously in that track in areas there was dragging vegetation, leaves and grass material, and there were other points where I formed the impression, an object had been laid down, forming an impression, the pattern of which I related at the time in my mind, and I have had no occasion to change that concept; a pattern very similar to what I would relate, or I did relate, to a crepe bandage."

He said that the impression could have resembled a mark made by a knitted garment and that the object which had been carried seemed to have been quite heavy and that there were three areas where it had apparently been put down. He saw the drag mark again the following day. He then joined a group of Aborigines, who were following the tracks of a large dingo which they thought might have been associated with the drag marks.

Constable Morris also saw two sets of drag marks. One was a deep drag mark, possibly half an inch deep by half an inch wide, and the other a short and shallow mark about one-eighth of an inch wide. The tracks seen by Haby and Roff led to near the Anzac Memorial, which was on the top of the dune to the south-east. On the evening of 17 August Constable Morris also saw on the southern side of the tent some dog or dingo tracks that apparently ran eastwards towards the sand dunes. On the following afternoon he saw what appeared to be fresh tracks hard up against the rear of the tent. The bassinet had been standing in that corner of the tent. On the same afternoon Inspector Gilroy saw some large paw prints at the rear right hand corner of the tent and also at the front of the tent close to the tent. These prints appeared to be fresh. Mr Roff said that he did not see any dingo tracks near the entrance to the tent on the night of 17 August, although he examined the entrance of the tent to try to see any dingo tracks which might have been there. The ground at the entrance to the tent was sandy, and many people had walked over it that night.

A number of witnesses saw blood in the tent, although the lighting conditions made observation difficult. There were spots or sprays of blood on the blankets and other articles in the tent. Mrs Lowe was the only person who saw what she described as "a dark red wet pool of blood", about six inches by four inches in size. The floor of the tent was practically covered by blankets, sleeping bags and other articles and these were subsequently examined by Dr. Andrew Scott, a forensic biologist. He found three stains of blood, the largest about half an inch across, on one blanket, and a thin smear on another. According to Mrs Chamberlain these blankets were wrapped around Azaria when she was placed in the bassinet. There were small quantities of blood on a sleeping bag. There was also a large area of blood staining on a floral mattress, and some smeared blood

on a parka. The articles on which blood was found were in various parts of the tent. There was no blood on the bassinet, which was positioned in the right hand rear corner of the tent.

There were some very small spots on the flyscreen of the tent and on the rear window. These spots were not shown to be blood. There was also a spray pattern on the outside of the southern wall of the tent. Dr Scott thought that spots making up this pattern were blood, but not human blood. No-one observed a trail of blood leading from the tent. It was common ground at the trial that the blood on at least some of the articles in the tent was baby's blood and was that of Azaria.

It was the Crown's contention that the blood in the tent was transferred blood, i.e. that it had come from the person or clothing of Mrs Chamberlain when she re-entered the tent after having killed the baby in the car. According to the Crown, much more blood would have been expected to have been in the tent if a dingo had taken the baby in its jaws and carried it from the tent. However, counsel for Mr and Mrs Chamberlain submitted that the teeth of the dingo may have occluded the wounds made by its bite and thus prevented blood from escaping from the wounds.

There was evidence that there were many dingoes in the vicinity of the camping area at Ayers Rock and more in the surrounding area. Dingoes had become accustomed to human beings at the Rock and had lost some of their natural fear of them. They were accustomed to foraging around the camping area and had been known to bite children. Mr Roff said that he had become so concerned by the conduct of the dingoes that he had written to his superiors expressing his concern and stating that "children and babies can be considered possible prey". There was evidence that, two

days before the disappearance of Azaria, a dingo had taken a cushion from under a woman's head while she was sleeping. The dingo later attempted to pull a sleeping bag from her feet. Several young children had been bitten by dingoes near Ayers Rock during July and August 1980. On 16 August a boy of 9 and a girl of 12 were attacked in separate incidents. There was also evidence that dingoes had sufficient strength to carry a wallaby up to 25 lbs. in weight. At the time of her disappearance, Azaria weighed only 9-1/2 lbs.

After she returned to Mount Isa, Mrs Chamberlain sent a pair of her tracksuit pants to be dry cleaned. There were marks on these pants which resembled blood stains and which responded to a cleaning agent for blood. The marks were on the front and below the knee. The pants were made of a dark blue material with green insets towards the bottom of the legs. All the marks were on the dark blue material. The Crown case was that Mrs Chamberlain must have been wearing the pants when she committed the murder. She was not wearing the pants either when she left the barbecue area carrying the baby or when she returned to it after she had obtained the tin of baked beans. If she killed the baby and was wearing the pants at the time of the murder, she must have put them on in the tent and taken them off again before she returned to the barbecue. Mrs Chamberlain said that she put the pants on about three-quarters of an hour or an hour after Azaria disappeared because it was cold. No other witness could remember her wearing the pants on the night of the 17th. Mrs Whittaker said that during the evening Mrs Chamberlain had no covering on her legs except socks. However, another witness, Mrs Elston, had, before the trial, made a statement in which she had said that she had seen Mrs Chamberlain wearing pants some time after 10 o'clock, but at the trial she could not remember whether Mrs Chamberlain had worn the pants. It appears to have been all but conceded

at the trial that there was blood on the pants, but it was suggested by the defence that the blood must have dropped on to the pants while they were lying folded in the tent.

Some time after Azaria disappeared the Whittakers' daughter Rosalie procured a gas light and placed it near the front of the Chamberlains' tent. This appears to have provided quite a good light in the vicinity. However, no one saw any sign of blood on any article of clothing that Mrs Chamberlain was wearing that night. In September 1980 she handed the track shoes that she had worn on 17 August to the police at Mount Isa and said that they had previously had blood on them which had been removed by washing. She said that the blood must have got on to the shoes when she crawled inside the tent. The shoes were tested for blood, but the test proved negative.

According to Mrs Chamberlain an article which she described as a space blanket was in the tent at the time of Azaria's disappearance. She said that when she returned to Mount Isa she observed dusty paw marks on the space blanket and pointed them out to a police officer who took possession of the blanket. Constable Brown of the Queensland Police gave evidence that he picked up the space blanket from Mrs Chamberlain's home but could see no paw marks on it. Mrs Chamberlain said that she drew the paw marks to the attention of the officer who picked up the blanket. She did not identify the officer. She also said that other members of her family had seen the marks on the space blanket, but they were not called at the trial to support her statement.

Mrs Chamberlain also said at the trial that she saw tear or cut marks in a blanket that had been in the tent and suggested that these may have been caused by the dingo. Professor Chaikin said however that the marks had been

caused by moths, some of whose larvae were still in the marks.

After Azaria's disappearance Mrs Chamberlain appeared distressed and shocked. For most of the evening, until she left the campsite with her husband at about midnight, she was in the company of other campers. According to the evidence at the trial there were two or three occasions on which Mr and Mrs Chamberlain went away together. On one or two occasions they were away for about 10 minutes, and on another occasion for about 15 or 20 minutes. They said that on these occasions they were joining in the search for Azaria. It was not suggested by any witness that their actions were in any way unusual and they were not seen carrying anything resembling the body of a child or anything in which the body of a child could have been concealed. Nor were they seen to be carrying any digging implements. Several people entered, or looked into, the tent and no one saw Azaria's body. Mrs West remained near the car from the time when the alarm was given until Mr and Mrs Chamberlain left the camping area and Mrs Lowe was also there until about 10 p.m. Neither saw anyone remove anything from the car during that period.

There would have been little opportunity for Mr and Mrs Chamberlain to clean up any obvious blood in the car. There does not appear to have been any wash basin in the tent. There was an ice cream container which was believed to have had bottle teats in it floating in a sterilizing solution but there was no evidence that the solution contained blood. None of the persons who went into the tent noticed that it did. When the contents of the tent were being packed later in the evening Mrs Elston saw Mrs Chamberlain pour the solution on to the ground. There was no evidence at the trial to explain how Mrs Chamberlain could have washed her hands to remove any blood which might

have been on them after she murdered Azaria, if indeed she did. The only water supply in the area was in an ablution block situated to the south-west of, but near, the barbecue area.

Mr and Mrs Chamberlain stayed at the camping area until about midnight when they were persuaded to spend the rest of the night at the Uluru Motel nearby. Some of their belongings were packed into their own car and the balance into a police car. Mrs Chamberlain and the two boys were driven to the motel in the police car. Mr Chamberlain drove to the motel in his own car, accompanied by Mrs Elston who sat in the front passenger's seat. She saw, in front of the driver's seat, a camera bag which she described as being very full. She asked Mr Chamberlain if he would like her to hold the bag while he was driving, but he said "that it was okay, and that he always kept it there, because he kept his cameras in it and when he was driving along he could take pictures of things as he saw them". There was evidence that this was in truth his practice. Mrs Elston helped load the car and unload it at the motel, but noticed no blood.

Aidan was not called to give evidence at the trial. According to Mrs Lowe, he told her some time after the search had begun that the dog had got the baby in his tummy. Mrs West said that during the evening she asked Aidan if the dingo had taken the baby, and he replied that it had.

Mr and Mrs Chamberlain remained at the Uluru Motel until Tuesday, 19 August. On the day following Azaria's disappearance neither Mr nor Mrs Chamberlain joined in the search for her, nor did they enquire about the progress of the search. They returned to the camping area where Mr Chamberlain took photographs which he dispatched to a newspaper. On the night of the 17th Mr Chamberlain made a statement to Mr Roff that he and his wife were reconciled to

the fact that they would never see the baby alive again. He said this only about 25 minutes after the alarm was raised. Furthermore, at about 8 o'clock on the following morning, before he had received any report of the search that had taken place prior to that time, Mr Chamberlain told his mother in the course of a telephone call: "We don't ever expect to find the body". On 19 August Mr and Mrs Chamberlain left Ayers Rock to return to their home in Mount Isa.

On 24 August Mr Goodwin, a tourist, found clothes which Azaria had been wearing when she disappeared. The place where the clothes were found was about 200 metres from the road on the south-west side of the Rock about 4 km from the camping area. It was located among the boulders near the base of the Rock, not far from two dingo dens. There were dingo pads and tracks in the vicinity of the dens. The Chamberlains visited this area on 17 August during which time Mr Chamberlain, who was a keen photographer, took photographs.

At the time of her disappearance Azaria had been wearing a white cotton singlet, a disposable nappy and bootees which were all covered by a white cotton and nylon towelling jumpsuit fastened with press studs from the crotch to the neck. According to Mrs Chamberlain, Azaria was also wearing a matinee jacket but no trace of the jacket had been found as at the date of the trial. ■ shall refer later to the finding of this jacket in February 1986. When Azaria's clothes were found, at least the four top press studs of the jumpsuit were open. The back of it was against the ground and the feet were facing up in the air. The two bootees were inside the feet of the jumpsuit. The singlet was inside out, opposite to the way in which Mrs Chamberlain said that Azaria had been wearing it when she disappeared. The disposable nappy was damaged. According to Mr Goodwin,

the singlet was in the jumpsuit when he first saw it, but Constable Morris' recollection was that the singlet was not in the jumpsuit but was lying nearby. Mr Goodwin's recollection was that the clothing was in a more compact or tidy arrangement than Constable Morris remembered.

There was no trace of the baby's body, or any remains of it, in the vicinity of the clothing. The collar of the jumpsuit and the top section of the singlet were heavily blood stained. A portion of the left arm of the jumpsuit appeared to have been torn or ripped out. There was a hole and what appeared to be a linear cut on the collar of the jumpsuit. There was some vegetation and dirt on the clothing. There was evidence at the trial that dingoes sometimes bury their prey. There was also scientific evidence from which it would have been open to the jury to infer that the clothes had been buried, not near the base of the Rock where they were found, but in an area with a different type of soil. One such area was under bushes on the side of the sand dunes about 100 metres east of the camp site, but there were other areas of a similar soil type.

There was evidence from which it might have been inferred by the jury that the jumpsuit had been rubbed with vegetation and that Azaria was not in the jumpsuit when the vegetation was rubbed on to it. The vegetable matter on the jumpsuit and singlet came from plants which grow in the area where the clothing was found. The principal deposit of vegetable material consisted of fragments of the plant parietaria, a plant which grows only in shady conditions and in damp soil such as is found near the base of the Rock. It does not grow on sand dunes or on the plain. Some of the fragments of parietaria had become embedded in the fabric of the jumpsuit, some of it adhering to the inside back of the garment, within the V formed by the undone top studs. This

part of the garment could not have been rubbed directly on to the ground or on to a parietaria bush if Azaria had been inside the jumpsuit at the time. The vegetable material on the singlet was on the outside of the garment, i.e. the side which would have been closest to Azaria's body and which became the outer surface after it had been removed from her body. The singlet also had three crease lines which protected a clean segment of the garment when dirt had come into contact with its surface.

Expert witnesses called at the trial differed as to the cause of the damage to Azaria's clothing. According to the Crown's witnesses, the damage was the result of cutting by a sharp instrument, probably a pair of scissors, and was not caused by the teeth of a dingo. The Crown's witnesses included Dr. Brown, a forensic odontologist, Mr Sims, Senior Lecturer in Forensic Odontology at London Medical College, Professor Chaikin, Head of the School of Textile Technology at the University of New South Wales, Professor Cameron, Professor of Medicine at the University of London, and Sergeant Cocks, a senior police officer who conducted some experiments on a jumpsuit.

Professor Chaikin examined the jumpsuit under a scanning electron microscope. In his opinion the jumpsuit had been cut, probably with very sharp scissors. He concluded that the damage to the jumpsuit was not caused by a dingo and based this conclusion on his observation that all fibres at the end of the yarn were in the same plane, whereas when fabric is torn there is a distortion which prevents the fibres from coming together. He also particularly based his conclusion on his finding of small cotton tufts adhering to the fabric at the edge of the damaged areas of the jumpsuit which he said occur as a result of cutting, but not as a result of tearing. He described this as "the strongest evidence". He concluded

that the apparent tears on the left arm, left shoulder and collar of the jumpsuit and a small hole in the back of it had been cut with sharp scissors. He was of the opinion that the damage to the garments could not have been caused by a dingo.

There was no evidence of the presence of tissue remains or blood stains on the cut edge of the hole in the left arm of the jumpsuit, except for a drop of blood below the hole apparently unconnected with any injury to the baby's left arm. Dr Scott tested the jumpsuit for proteins that are found in dingo and dog saliva, but could find none. However, it was recognized at the trial that if Azaria had been wearing a matinee jacket at the time of her disappearance saliva may have been deposited on that garment. In addition; any saliva which may have been on the jumpsuit may have been washed away by a shower of rain which fell in the area before 24 August. There were two holes in the back of the singlet, although there was no damage to the corresponding position of the jumpsuit. Professor Chaikin's opinion was that the holes were made either by cutting or by holding the singlet under tension and puncturing it with possibly a knife or the blades of scissors. He was unable to produce such holes by mechanically driving a dingo's tooth into the fabric. However, he would not exclude the possibility that an animal could cause damage of the kind observed in the singlet by holding part of the garment in its paws and part in its teeth and thus placing the fabric under tension. There was other evidence at the trial confirmatory of Professor Chaikin's opinion.

A witness called by the defence, Dr Orams, a Reader in Dental Medicine and Surgery at the University of Melbourne, asserted that the damage to Azaria's clothes could have been caused by the teeth of a dingo. Dr Orams is

an expert in the field of animal dentistry and skulls, but does not have expertise in textiles. He was of the opinion that the damage to the jumpsuit and singlet was consistent with damage done by the dingo's carnassial teeth. He based this opinion on his knowledge of the scissor-like action of those teeth and upon his belief that there were tears, as he described them, in the clothing. However, he agreed that the scissors-like teeth of a dingo leave an uneven shredded edge unlike the cut edge made by sharp scissors.

Some evidence was directed at the trial to the question whether a dingo could have removed the baby from the jumpsuit. The defence relied upon an experiment in which a dingo had removed the carcass of a kid from a similar jumpsuit, leaving only two press studs.

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There was no evidence at the trial which directly showed that Mr or Mrs Chamberlain was responsible for cutting Azaria's clothing or putting it where it was found. There was evidence that on the day before the baby's disappearance Mr Chamberlain had taken photographs of the place where the clothes were later found. However, it is clear from other evidence that Mr Chamberlain was a very enthusiastic photographer and took many photographs of the Rock and its environs.

Mrs Chamberlain had seen a dingo early on the day of 17 August near an area known as the Fertility Cave at the base of the Rock. She said this dingo was similar to the one that she alleged she had seen outside the tent. The Fertility Cave is at the south-west base of the Rock, but it is some little distance east of where Azaria's clothes were found.

There was much evidence at the trial as to the blood stains on Azaria's singlet and jumpsuit. According

to Dr Scott, the volume and pattern of blood were consistent with an injury to the major vessels of the neck. Dr Jones, a pathologist, said that the most likely injury which would have caused the staining of the jumpsuit, assuming Azaria to be inside it, was a lacerated or incised wound across the front of the neck. However, he agreed that the blood stains were also consistent with massive head injuries producing substantial bleeding. Professor Cameron said that, in his opinion, the blood staining to the jumpsuit and singlet could not have been caused by any injury except a cut throat. However, he qualified this opinion by conceding that he could not totally exclude some head injuries, but he was positive that the principal injury was a cut throat. He also said that he could see on the jumpsuit what appeared to him to be the impression of a small adult hand in transferred blood. Dr Plueckhahn, a pathologist, who was called for the defence, expressed the opinion that the pattern of bleeding on the baby's clothing was consistent with heavy bleeding from either the throat, neck or head. He did not agree that it could be said that the bleeding resulted from a cut throat rather than from any other form of head injury.

The police did not take possession of the Chamberlains' Torana car until 19 September 1981. The car, and a number of articles which Mr and Mrs Chamberlain told the police were in the car or in the tent on the evening of 17 August 1980, were thereafter tested in order to determine whether there were any stains or traces of blood on them and in particular whether any blood found contained foetal haemoglobin. Foetal haemoglobin, except in amounts of less than 1%, is normally only present in babies under six months old.

There was a great deal of conflicting scientific evidence given at the trial in relation to this issue. It

is sufficient for present purposes to say that Mrs Kuhl, a forensic biologist employed by the Health Commission of New South Wales, carried out a number of tests between September 1981 and January 1982. She acted under the general supervision of Dr Baxter, who was then the senior forensic biologist of the Health Commission. He agreed with the conclusions which Mrs Kuhl expressed in evidence. In making her tests Mrs Kuhl used a number of plates and gels to determine whether samples of stains and deposits taken from the car and its contents contained foetal haemoglobin. These plates and gels were destroyed soon after the tests were made. This was in accordance with the practice of the Health Commission's laboratory at that time. Mr Culliford, the Deputy Director of the Metropolitan Police Laboratory in London read Mrs Kuhl's evidence and her laboratory work notes, and said that he approved of her methods and conclusions. However he, in common with the experts called for the defence, were unable to see the plates or gels used by Mrs Kuhl in her testing.

The samples taken from the Chamberlains' car included samples taken from the floor under the front passenger's seat, a bolt hole under that seat, the hinge on the off-side of that seat, the vinyl behind the hinge, a ten cent coin found on the floor, the carpet at the side of the driver's seat near the door panel, a small pair of scissors, a towel, a chamois container, the zip clasp and side buckle of the camera bag, and from under the glove box.

Samples of blood found on Azaria's clothes were found on analysis to contain 25% of foetal haemoglobin to 75% of adult haemoglobin. Immunological tests were applied to the samples, using an anti-serum which was intended to react specifically with the antigens associated with the distinguishing molecular chains (called gamma chains) of the foetal haemoglobin molecule. The immunological tests

applied by Mrs Kuhl were known as the Ouchterlony Test, the Cross-over Electrophoresis Test and the Tube Precipitin Test. According to Mrs Kuhl's evidence, 22 of the samples gave positive_reactions to the anti-serum. The experts for the defence disputed that the anti-serum that was used in the tests was, in the concentrations used, specific only to antigens associated with gamma chains. They contended that the concentration of adult haemoglobin antigens in the samples tested may have reacted with unwanted antibodies in the anti-serum to give a reaction falsely interpreted as a reaction with foetal haemoglobin antigens and accordingly that the anti-serum was not mono-specific.

Another test, the haptoglobin test, was carried out by Mrs Kuhl upon two samples which did not require the use of anti-serum. Professor Boettcher, one of the defence experts, rejected the validity of this test in the absence of a control which was known to contain foetal and adult haemoglobin. Professor Boettcher is Professor of Biological Science at the University of Newcastle.

Evidence was given that in October 1981 Detective Metcalfe observed a spray pattern under the dashboard next to the glove box compartment. The pattern felt sticky to the touch. This could not have been Azaria's blood since her blood would have dried within about two hours after it had been shed. Mrs Kuhl's testing of the spray pattern area using the Ortho-tolidine Test proved negative. Later, in November 1981, Dr Jones saw a metal plate welded under the dashboard. The plate appeared to have on it spots consistent with blood. A presumptive Ortho-tolide Test carried out on these spots by Constable Max Scott proved positive. Dr Jones collected four samples from under the dashboard. He sent three of these to Mrs Kuhl, one of them being taken from the metal plate and two from another part of the glove box support area. He observed two patterns of

staining on the metal plate. One pattern appeared to be a splash pattern of large drops along the front edge, and the other a spray pattern of droplets. The latter spray pattern was described in evidence as being of the kind which would be formed by ejection of blood from a small artery. Testing the three samples by the use of the anti-HbF anti-serum, Mrs Kuhl concluded that each contained foetal haemoglobin. Mrs Kuhl concluded that a sample taken from the edge of the metal plate was not blood.

In May 1982, Mr Culliford was given a number of samples, including one from the steel plate. With one exception, he was of the opinion that the samples were of blood. One of the samples which he thought was of blood was taken from the leading edge of the metal plate.

The Chamberlains' car had been used as a demonstration model by a dealer from September 1977 until Mr Chamberlain bought it in December 1977. There was evidence that Mr Chamberlain discovered, in another 1977 Torana car, a metal plate on which there was a similar pattern to that found on the plate removed by Dr Jones from his car.

The defence relied upon the evidence of Mr Tew, who did some electrical work on the car in November 1980. He said he saw some blood stains on the console of the car but did not notice any blood under the dashboard although he did work in the area in which the spray was said to have been.

Except in relation to the marks observed under the glove box, the defence did not dispute that blood was found in the car. It was proved that a Mr Lenehan was, on 17 June 1979, involved in an accident near Port Douglas and was picked up by the Chamberlains and driven by them to Cairns in their Torana car. He bled profusely from a scalp wound. He said he lay in the back of the car, which was a

hatchback, with his head towards the front passenger's seat. To enable him to lie in this fashion at least one of the rear seats appears to have been lowered to make a flat surface upon which he could lie. There was also evidence that Aidan and Reagan had nose bleeds while travelling in the front passenger's seat of the car and that Azaria sometimes vomited when sitting on her mother's knee on the front passenger's seat. There was also evidence that children were often carried in the car and that sometimes they would have bled from minor injuries.

The Crown called evidence of an experiment on a car seat similar to the front passenger's seat in a Torana. The experiment showed that when someone was sitting on the seat and blood came in contact with the side of the seat, the blood would flow down the side in a pattern which corresponded to the pattern which Mrs Kuhl observed on the side of the front passenger's seat of the Torana and would flow or drip behind the hinge and into the bolt hole.

Mrs Kuhl tried to ascertain the group to which the blood found in a number of samples belonged. She found that the blood was probably group O, and that its Phosphoglucomutase (which is an enzyme) grouping was PGM 1+. The grouping as group O is insignificant, but since Mr Lenehan's PGM grouping was PGM 2+1+ the test, if accurate, shows that the blood tested was not his. However, Dr Cornell, a consultant biochemist, gave evidence that it is difficult to obtain a reliable PGM grouping from blood which is old and denatured. Mrs Kuhl did not ascertain Azaria's PGM grouping, as she could have done by testing the blood on the jumpsuit. Instead she relied on the fact that Dr Scott, using a method permitting a less detailed classification, found Azaria's blood to be PGM 1. If Mrs Kuhl's tests were correct, the blood she tested could have been Azaria's.

There was other evidence before the jury, but the evidence to which I have referred formed the substantial basis for the Crown's case on the one hand and the defence on the other.

CHAPTER 5 THE CASE PUT TO THE JURY BY THE PROSECUTION

The evidence at the trial being as I have described it in Chapter 4, the Crown Prosecutor submitted to the jury that a strong case had been made out establishing Mr and Mrs Chamberlain's guilt. I shall refer later in this report to several important respects in which the evidence before the Commission differs from the evidence at the trial upon which the prosecutor based his submissions. It is convenient to refer to these submissions for the purpose of later demonstrating that some of the most persuasive of them could not have been put to the jury, and others could not have been put with the same force, had the evidence been as it is before the Commission.

It should make it plain that no criticism can be made of the manner in which the Crown Prosecutor addressed the jury. No complaint was made, nor could it have been made, by defence counsel that the Crown Prosecutor was not entitled to address the jury in the terms which he used.

The Prosecutor put to the jury that the evidence before them left no room for any conclusions other than that Azaria had been taken by a dingo or murdered by her mother. The jury was invited to accept that the evidence pointed overwhelmingly to Mr and Mrs Chamberlain's guilt and that the notion that a dingo had taken Azaria was preposterous and not capable of belief.

It was conceded that the Crown had not established any motive for the alleged murder and the jury were invited not to speculate as to what the motive might have been. Counsel submitted that the amount of blood found in the tent was inconsistent with Azaria having been attacked there by a dingo and invited the jury to disregard the evidence of Mrs Lowe that she saw a pool of blood in the tent shortly after Azaria's disappearance." It was further submitted that the periods of time when the Chamberlains were alone after Azaria's disappearance were of sufficient duration to enable them to have buried her body in the area to the east of the camp site without being observed by searchers or persons in the vicinity of the barbecue area. That the child had been buried in that area was said to be established by the presence in her clothing of soil found only in the area near the camp site. The Crown claimed that the evidence established that Azaria's clothing had been deliberately rubbed in vegetation which grew only near the base of Ayers Rock and that this indicated human involvement rather than dingo activity.

The jury were invited to disbelieve Mrs Chamberlain's evidence that she saw a dingo at the tent. Her statement that she had not seen Azaria in the dingo's mouth was said to be part of a deliberately vague account of the alleged sighting of the dingo so as to better achieve her object of deceiving people into thinking that a dingo was indeed involved in the disappearance of her child. The

absence of blood or drag marks on the ground outside the tent and the fact that the child's clothing was found 4 km from the camp site without it having collected anything in the nature of seeds, sticks or other vegetation along the way were said to demonstrate that the child had not been taken to the base of Ayers Rock by a dingo.

It was submitted that Mrs Chamberlain had given different and unsatisfactory accounts of the movements of the alleged dingo after she first saw it, and that her statements as to its existence and movements should be disbelieved.

The Crown claimed that her statement that she had seen a dingo looking at her near the Fertility Cave was a deliberate attempt to implant in the minds of investigating police the idea that a dingo may have taken Azaria to a place somewhere in the vicinity of that cave so that a subsequent search would reveal the presence of the child's clothes in that area.

It was asserted that it was "overwhelming and unassailable that the jumpsuit was cut by scissors" and that if the jumpsuit had been damaged by scissors so as to simulate damage by a dingo it was obviously done by Azaria's parents or one of them. Reliance was placed upon Professor Chaikin's evidence that the jumpsuit had not been torn, that the fibre ends in the severed fabric were all in the same plane and that the damage to the fabric could not have been caused by a dingo biting it.

Great emphasis was placed upon the evidence that there was blood containing foetal haemoglobin in the front of the Chamberlains' car and on articles found in the car in September 1981. Since this evidence appears to have been of such crucial importance at the trial and was so heavily

relied upon by the Crown, it is appropriate to quote part of prosecuting counsel's address to the jury on this matter:

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"What I say to you is this: that you've got Mrs Kuhl, who in her routine daily work as a forensic biologist using anti-serum tested to her satisfaction and to the satisfaction of Doctor Baxter, doing standard tests using standard techniques on old blood, managed to get 22 positive results for foetal haemoglobin. Which said to her that she was dealing with the blood of a child under 3 months old. You've got Dr Baxter, another government employee, checking the work of one of his biologists and he agreed with her 22 times, and you've got Mr Culliford, totally detached from it all, checking her notes, her evidence, her work methods, and agreeing with her 22 times. Now clearly this is very prejudicial and embarrassing evidence to the accused. Clearly it is damaging to them to have a car with traces of foetal blood in it; to have camera bag with foetal blood on it, and notice that it's not suggested how that might have got there. Not even Mr Lenehan can be blamed for the blood found on the zipper because the bag was only acquired 3 months before the event. I'm not going to go into Joy Kuhl's findings in detail because you remember them. You remember where she found foetal blood. You remember the scissors and the inside of the chamois container. You remember under the dash- I'll take you to that in a minute. You remember under the passenger's side seat, the 10 cent coin, the stains around the bolt hole, all of which have been photographed. You remember the stains down the vinyl of the passenger seat. You remember how she simulated similar bleeding to show how it happened. You've got the photograph there, how you have to sit on the seat for the blood to flow down under the hinge, and you remember the blood that she found under the hinge. Now you'd think, wouldn't you, that this would require a great deal of explaining even if it's adult blood. She says it is foetal blood, and I suggest to you that she ought to know, and Dr Baxter ought to know what it is he's dealing with, because you know really, if the suggestions made about their work in this court have any substance, people in New South Wales are in constant danger of being wrongly convicted whenever there's some blood involved, and it's really, I suggest, rather too ridiculous to contemplate that she would come into this, in the course of her daily work, as a professional

forensic biologist, and muck it all up not knowing whether she was dealing with adult blood or the blood of a child under 3 months of age. What we ask you to do is to respect her opinions."

The jury were invited to prefer the evidence of Mrs Kuhl and Dr Baxter to that of Professor Boettcher because he was an academic who was not actively engaged in the routine work of testing blood stains. The same criticism was offered of Professor Nairn's evidence.

It was submitted that the blood in the car could not have come from Lenehan as it was in the wrong group and was not foetal.

The concession was made that the Crown had not proved that Azaria's body or her clothes had been placed in the camera bag. However, much was made of the evidence as to the finding of blood on the camera bag. This was put to the jury:

"What we do say is that the positive reactions to the ortho-tolidene tests which were obtained by Mrs Kuhl, and before that by Doctor Scott, indicate quite clearly that there has been blood in the bag, that the foetal haemoglobin identified on the zipper, was a remnant of the child's blood, and at one stage there'd been a lot more there.

The position is as follows the ortho-tolidene test gives a presumptive reaction. It's a two stage test. You only get the reaction to blood, when you add the hydrogen peroxide, and then you get a distinctive blue stain. The experienced forensic biologist will usually recognise it as a typical blood reaction, and there are very few things which will give that typical blood reaction.

There are things which will react to the test, positively, but they are distinguishable in appearance. I think 2 of the things suggested here by Mrs Kuhl, which can give this reaction, are some sorts of rust, and water from the River Murray. I respectfully suggest you may discount the latter as

having any relevance, and it's difficult to see why a camera bag would be filled with rust, sufficiently to give positive reactions to the ortho-tolidene test.

... But you don't look at the evidence of the positive reactions to the ortho-tolidene test in isolation. When you've got - you have typical blood reactions inside and the positive findings of foetal haemoglobin outside, you don't have to be a genius, do you, to conclude that there was blood both on the inside and on the outside at some stage. And it was put to you, that, look, we didn't say the body was in there, because there'd be so much blood that you would expect to have found a lot more. Well, that rather begs the question if the bag in the meantime has been washed.

Well, we can't prove it was washed. But how - let's assume for the moment that the positive reaction she obtained on the inside of the bag from those inside surfaces, was in fact a human blood. How did it get in there, and what happened to it. Why wasn't there enough for her to identify as blood by one of the confirmatory tests. If there'd been blood on the surfaces of the inside of the bag, if there was enough there to give her a reaction, it's pretty obvious that at some stage it's been washed off. That's a fairly simple equation. The blood was there- it's been cleaned off.

Still, there was enough on the zip to produce a positive reaction to protein and foetal haemoglobin."

Great reliance was also placed on what was asserted to be an arterial blood spray pattern on the metal plate which had been removed from under the dashboard of the Chamberlains' car. After putting to the jury that Mr Culliford had confirmed that the substance on the plate was blood, counsel said:

"It's not paint or gum arabic or anything else, it's blood, and we suggest to you that the obvious conclusion that you can reach when you consider

that the other 3 samples were found to contain foetal haemoglobin is that the blood all came from the one place, and you remember that it's coming upwards on a trajectory of about 45 degrees. That was the evidence of Dr Jones, which is why we say it's consistent why Dr Jones said it is consistent with having come from an artery. It is baby's blood. It came, the Crown says, from the child when she was killed."

I don't know that you're asked to find that all Toranas are sprayed under the dash with the blood of an infant of some sort of benedictine

or ceremonial right when the cars are sold. We know that on the real plate there's blood. We know the blood is part of the pattern. It's been dug out of the pattern."

It was submitted that Mrs Chamberlain's statement that she saw a paw print on the space blanket was a lie, and comment was made upon the failure of the defence to call other persons, such as Mrs Chamberlain's mother, her brother and her sister-in-law, who Mrs Chamberlain claimed also saw the paw marks.

It was put to the jury that Mrs Chamberlain changed into the tracksuit pants after she left the barbecue area and before murdering Azaria and that the marks seen on the pants were of blood which splashed on to the pants after Azaria's throat was cut.

It was further submitted that Mrs Chamberlain lied to the jury when she said that the cuts or marks on the purple blanket were caused by a dingo. These marks, so it was said, were caused by insects, and must have been known by Mrs Chamberlain to have been so caused.

Mr and Mrs Chamberlain's conduct immediately after Azaria's disappearance was said to be inconsistent with the behaviour which might have been expected of them if their child had been taken by a dingo. It was claimed that Mr

Chamberlain's failure to make an extensive and continued search for his child showed that he knew what had happened to her. The failure was also said to have been due to his desire to stay near the car.

It was put to the jury that no hairs which could be attributed to a dingo were found on the blanket, jumpsuit or singlet. Reliance was placed upon Dr Harding's evidence that he obtained hairs, which were probably cat hairs, from the purple blanket and upon his evidence that three non-human hairs obtained from Azaria's singlet were also probably cat hairs. It was asserted that at least one dingo hair would have been found on some article of Azaria's bed clothes or clothing if she had been carried off by a dingo. The absence of saliva or dingo hairs was described as "negative evidence pointing to a positive conclusion which is this: that the baby was not taken by a dingo. Therefore she was murdered."

The prosecution relied upon other facts which I have not mentioned but to which reference has been made in Chapter 4.

The Crown's case as put to the jury is encapsulated in the following remarks with which the Crown Prosecutor concluded his address to the jury:

"Ladies and gentlemen, we say that no dingo had anything to do with the death of Azaria Chamberlain. You're entitled to find that there were no dingo hairs, there was no saliva, there was no dingo damage to the clothes. The damage to the jumpsuit was caused by a pair of scissors. The soil in the clothes came from under the thryptomeme bushes on the dune east of the tent, and the child was buried there. The plant fragments came from the clothes being rubbed in vegetation where they were found. The clothes were taken there by human beings, by road, and not through the bush. That they were laid down in a way no dingo would leave

them at a place not far from the Uluru Motel. The booties and singlet were left in the jumpsuit, and there was no dingo damage to the blanket - or the space blankets. The insignificant quantity of blood in the tent came from the accused, Alice Lynne Chamberlain, when she returned to the tent, because she had on her the blood of the child.

The blood in the car came from Azaria. The blood in the camera bag, came from Azaria. All these things, we put to you, you are entitled to find as facts. If there was no dingo, the child was murdered. The question, who did it, is brutally answered. You can leave out Michael Chamberlain, and you can leave out the two boys, and no-one else was there. It is not consistent with reason to suggest that it was anyone but the accused, Alice Lynne Chamberlain.

You are entitled to find that she invented the dingo lie. She had blood on her pants and her shoes. She had the opportunity. She's lied about the animal; its appearance, what it did, where it went, what she did. She's lied about the blood in the car, the tracksuit pants, the dress, the giggle hats, the space blanket, and the baby's blankets. We submit to you, with respect you are entitled to find that she's lied constantly and persistently and so has her husband.

Well, what does all this mean. In our submission this case has strength, it has cohesion, and it has volume, and each bit supports the others, but the whole case does not depend on every part. It's not a chain which each link depends upon another. It's the proverbial bundle of sticks - if you put them altogether, they can't be broken. And if you put only part of them together, you can't break the bundle. There's only one conclusion, we say, there's only one verdict open to you, and that is that each accused should be found guilty."

The Crown's case at the trial was that Mrs Chamberlain took Azaria from the tent to the front passenger seat of the car and there cut her throat. I invited counsel for the Crown to identify an alternative location where Azaria may have been murdered but none was put forward.

There is agreement among the experts that a mortal wound to the throat would have caused copious bleeding, and probably would have caused the person doing the deed and the front seat area of the car to be spattered with blood. The experts are agreed that even if a towel or similar object were used to stem the flow, it would have been very difficult to prevent the spread of observable amounts of blood on the person and on some parts of the car. Before considering the scientific evidence as to the presence of blood in the car, it is necessary to consider the evidence of lay witnesses relating to the question whether blood was spilt in it on 17 August 1980.

Mr and Mrs Andrew Demaine lived in a caravan in the top camping area and were alerted to the disappearance of

Azaria at about 8.30 p.m. on that night. They went immediately to join in the search with their red setter cross dog which was on a lead. In response to a request by Mrs Chamberlain that the dog help in tracking the baby, Mr Demaine took the dog to the passenger side of the car, where Mrs Chamberlain reached into the passenger door (it being a two door car), picked up an article of Azaria's clothing from the back of the car and put it under the dog's nose. The dog and Mr and Mrs Demaine were standing beside the passenger door when it was open for this purpose. They then went off with the dog to assist in the search. It would have been foolhardy for Mrs Chamberlain to have acted as she did if she was aware that fresh blood had been spilt in that area only a very short time before.

At the trial, counsel for the prosecution submitted to the jury that they should conclude that Mrs Chamberlain had endeavoured to keep people away from the car after Azaria's disappearance for fear that they might notice signs of the alleged murder. It appears that the Demaines were present at the trial under subpoena, but were not called to give evidence. Their evidence would have greatly weakened this submission.

O There is a body of evidence relating to the question of the opportunity Mrs Chamberlain may have had to clean up a spillage of blood in the car. Since she was away from the barbecue area for only about 5-10 minutes there would have been very little time for her to have cleaned up the car thoroughly. She was under observation by others, particularly Mrs Whittaker and Mrs West, for most of the time between the raising of the alarm and her departure for the motel later in the evening. Except for the occasion described by Mr and Mrs Demaine, Mrs Chamberlain was not seen to enter the car. She was under the observation of other persons throughout this period except for the

occasions on which she was seen to go off into the darkness with her husband. It therefore appears that she had little or no opportunity to clean up any blood in the car after the alarm was raised and before leaving for the motel.

Mrs Elston travelled in the passenger seat of the car to the motel around midnight. She did not see, feel or smell any blood and she did not pick up any blood on her clothing. She was an experienced nurse and believed that, if there had been a large amount of blood around, she would have detected the smell of it. Mrs Whittaker also had experience as a nursing sister and believed that blood, particularly when fresh, has a distinctive smell. When the car was being packed prior to the Chamberlains going to the motel, she stood near the open driver's door but did not see or smell any blood. However, some of the expert medical witnesses doubted whether it was possible to smell pure blood in the absence of other tissues. Mrs Elston also observed the loading of camping gear from the tent into the car and said that this was done by some person other than Mrs Chamberlain. Mrs Elston also spent some ten minutes in the driver's seat of the car on the following morning but did not notice any blood.

In addition to Mrs Whittaker, Constable Noble and Mrs West assisted in the packing of the car on the night of 17 August and Noble participated in its partial unpacking at the motel. Neither of them saw any blood.

On 18 August, Pastor Cozens packed items into the car. He did not see any sign of blood. After the Chamberlains returned to Mount Isa, Mrs Chamberlain's brother, Alex Murchison, cleaned the car inside and out. To dry it down he used the chamois which was in the car at that time. He did not see any blood on the car or on the chamois.

On 1 October 1980 at Mount Isa Senior Constable Graham carried out an inspection of the interior of the car. Graham's inspection took not less than 2 hours to complete, using a powerful torch, in the late afternoon and evening. He examined the interior of the car thoroughly, taking up the front floor carpet, but not the underfelt. He did not find any suspicious staining. He looked not only for blood, but for signs that blood might have been removed. Had blood been removed from the carpet he would have expected to see signs of it, such as a clear spot if the carpet had been spotted or staining on the underside of the carpet where moisture had penetrated. He would have expected to have been able to identify signs of removal of blood from the vinyl or metal surfaces of the car, since there would have been variations in surface textures and colours if stains had been removed without using the same method on the whole of the surface. He did not detect any sign of blood having been removed from the car.

Graham made a report of his examination to Inspector Charlwood. In their evidence to the Commission Charlwood and Graham raised doubts as to whether the examination of the car was rendered unsatisfactory by poor lighting. However, in a statutory declaration made before he gave evidence Graham made no mention of his inspection being in any way hampered by inadequate lighting. I am satisfied that Graham was able to carry out a proper and thorough inspection of the car for the purposes he described.

Mr and Mrs Demaine, Constable Noble, Pastor Cozens, Mr Murchison and Senior Constable Graham did not give evidence at the trial and the evidence of Mrs Elston and Mrs Whittaker was more limited on that occasion.

Evidence was given at the trial by Rohan Tew and Floyd Hart, Mr Tew's employer, in relation to work done on the car in November 1980 when they installed a cassette player and speakers. Tew was called by the Crown to give evidence of his observation of spots which may have been blood on the side of the console. Although a contradictory statement had been taken from Hart by Senior Constable Metcalfe on the same day as a statement was taken from Tew, Hart was not called by the Crown. Metcalfe informed Hart that he would not be required to give evidence, and assured Hart that his statement would be given to defence counsel. This assurance was not complied with. However, after seeing a report of Tew's evidence in a newspaper Mr Hart rang the representatives of the defence and he was later called as a defence witness. Hart's statement was not drawn to the attention of the Crown Prosecutor, although Metcalfe handed the statement to his superior officer. On evidence, I am unable to say precisely why the statement was not drawn to the attention of the Crown Prosecutor and was not given to the defence.

Hart gave evidence at the trial and again before the Commission of his inspection of the car when the work was carried out and of his failure to see any sign of blood, despite his careful inspection. Tew's evidence at the trial and before the Commission was somewhat confusing. I accept his statement that, in relation to any spots in the car that he might have seen, he could not be sure whether or not he had bled in the car himself. Accordingly, little of significance can be drawn from his evidence.

It is in this context that the scientific evidence as to the presence of blood must be considered.

car and from articles in the car were then tested for the presence of blood and for the presence of the blood of a young baby. Attempts were made to determine blood grouping where the quantity of material allowed.

The results obtained by Mrs Kuhl and their proper interpretation were the subject of much evidence at the trial. They were the subject of much more lengthy and complex evidence before the Commission. They give rise to three main questions:

- (i) Did the tests establish the presence of a young baby's blood?
- (ii) Did the tests establish the presence of any blood and; if so, in what quantities and in what places?
- (i i i) If the presence of blood was established, was its quantity and location consistent only with it being Azaria's blood or was its presence reasonably explicable otherwise?

At the trial, while the defence disputed that baby's blood had been detected in the car, it did not dispute that blood was found there, except in relation to the marks observed under the glove box, and attempted merely to explain its presence. Before the Commission, no doubt in the light of the further scientific evidence which had emerged, the identification of any blood at all was disputed. As will be seen, some of the evidence which is now relied upon by the Counsel, in particular that of Dr Lincoln, was available before the trial but was not called. Whether the failure to call Dr Lincoln was due to considerations of expense, his home being in London, or to

other considerations was not explained. Nevertheless, there has been no challenge to the reliability of that evidence on the basis merely that it was not called at the trial.

Initially I shall direct my attention to the first of these questions although aspects of the second will also arise in the course of such consideration.

It is necessary to explain in some detail what was involved in the tests that Mrs Kuhl carried out. The preliminary or "screening" test for the presence of blood used by Mrs Kuhl was the ortho-tolidine test. A dry filter paper is rubbed on the substance or surface to be tested, a drop of the reagent ortho-tolidine is then added to the paper and the paper is observed for any colour development. If there is no colour development at this stage, a drop of hydrogen peroxide solution is added to the same spot on the paper and it is again observed for colour development. The presence of blood, and some other substances, is indicated by a bright blue colour which develops very quickly after the application of the hydrogen peroxide solution. The test depends upon the peroxidase-like activity, as a catalyst, of the haem molecule occurring in red blood cells. It is a very sensitive test and the presence of blood and some other substances will be detected in minute quantities which are not visible to the naked eye. At the trial, considerable reliance was placed by the Crown on Mrs Kuhl's results using this preliminary test. The conclusions which can be drawn from these results are considered below.

After applying this screening test, Mrs Kuhl obtained samples from a number of objects and surfaces by scraping or swabbing and then tested these samples using immuno-chemical methods. These methods depend upon the exposure of the sample in solution to various anti-sera, each of which is designed to react with a specific blood or

component of blood. Each anti-serum contains antibodies to antigens present in a particular type of blood. Where antibody and antigen are brought together in appropriate conditions they will combine and a visible band of precipitation will appear, thus indicating the presence of the appropriate antigen.

C Mrs Kuhl used three methods of exposing the samples to anti-sera. The method used in most of her tests was cross-over (or counter-current) electrophoresis. A layer of gel is applied to a glass plate and a number of holes, in groups of two, are cut into the gel to form wells. A solution of the sample to be tested is placed in one of the holes in each group and in the other is placed an anti-serum. An electric current is then applied across the plate causing the migration of particles from each well towards its adjoining well. If conditions are appropriate, where particles meet between two wells and they constitute antigen and antibody, the precipitin band will be formed. Further details of the washing and staining of such plates are discussed below.

00 The second method used by Mrs Kuhl was the Ouchterlony (or immuno-diffusion) test. This also involves the cutting of wells into a layer of gel on a glass plate. Normally a central well is surrounded at the same distance by a number of other wells. Again the sample in solution is exposed to various anti-sera placed in adjoining wells. However, there is no use of electric current. The plate is allowed to rest in a humid chamber for a period, usually 24 hours, while the particles gradually disperse from the wells through the gel. Again, where antigen meets antibody, a visible precipitin band should be formed. In a number of respects, the results obtained from this test are different from the cross-over test and relevant comparisons are made in relation to specific tests later in this report.

A third method adopted by Mrs Kuhl was the tube precipitin test. An anti-serum is placed in a tube and the sample in solution is then layered carefully with a micro-syringe over the anti-serum, so that there is no mixing between them. Where the antigens to the antibodies in the anti-serum are present in the sample, in appropriate conditions one will see a precipitation line at the interface between the two liquids.

In many tests, Mrs Kuhl exposed samples from the Chamberlains' car to several different anti-sera. The particular anti-sera used varied from test to test, but included anti-human, which reacts with a number of proteins found in the serum of human blood; anti-haemoglobin, designed to react with the haemoglobin in red blood cells; anti-adult haemoglobin and anti-foetal haemoglobin. Various anti-animal anti-sera were also used.

A very important aspect of Mrs Kuhl's testing was the use of the anti-foetal haemoglobin anti-serum. It is necessary to explain in some detail the basis upon which it was used. Human blood contains a number of different types of haemoglobin, the two principal types being adult haemoglobin and foetal haemoglobin. At birth, approximately 50-80% of a baby's haemoglobin is of the foetal type. Over the first six months of life, the proportion of foetal haemoglobin rapidly declines and that of adult haemoglobin increases so that, from about six months onwards, a child will have less than 1% foetal haemoglobin, with most of the remaining haemoglobin being of the adult variety. The only exceptions to this are people with certain extremely rare blood diseases. The molecular chains making up adult and foetal haemoglobin have what are called alpha chains. The adult type also has so-called beta chains, whereas the foetal type has gamma chains. Thus, the anti-foetal haemoglobin anti-serum is designed to react

with the gamma-chains of the foetal haemoglobin molecule. An anti-serum which also reacts with alpha chains would not be specific to foetal haemoglobin, but would also react with adult haemoglobin.

It was found that Azaria's blood contained haemoglobin in the approximate proportions of 25% foetal and 75% adult. It follows that, in order to use the anti-foetal haemoglobin anti-serum to distinguish between Azaria's blood and adult blood (a term generally used to apply to the blood of a child over the age of six months), it must be used in such a way that a 25% proportion of foetal haemoglobin will be detected but a proportion of less than 1% will not be detected, or a determination of relative proportions must be made.

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A number of other tests were conducted by Mrs Kuhl, and an explanation of these appears below where specific tests are considered. However, since her tests using immuno-chemical methods are critical to a conclusion as to whether the blood of a baby was detected in the car, it is desirable to discuss some of the general difficulties raised by the use of these tests for this purpose, before dealing with individual tests. A great deal of the detailed evidence before the Commission on these general difficulties was not given at the trial.

The age of any blood in the car

Normally the blood tests referred to above are carried out in forensic laboratories within a relatively short time after the blood is shed. The forensic biologists who gave evidence were mostly experienced in testing samples a few months old or less. If Azaria's blood was shed in the car, it would have been at least 13 months old by the

time it was tested by Mrs Kuhl. If any of the blood tested was that of Mr Lenehan, who bled in the car on 17 June 1979, it would have been at least 27 months old. Blood shed as a result of many of the other incidents referred to by Mr and Mrs Chamberlain is also likely to have been more than 13 months old. In J.97q, the car was in use by the Chamberlains at Innisfail, Queensland, and, during 1980, at Mount Isa. It was brought to Cooranbong, New South Wales, by Mr Chamberlain in December 1980.

While the car was usually garaged in both Innisfail and Mount Isa, one would expect that in the course of ordinary use it would from time to time have been parked in the sun. The interior temperature of a car parked in the sun in a hot climate will increase significantly above the exterior shade temperature. Although there are many variables which may affect the temperature reached, if a car is exposed to a temperature in the order of 40°C for an hour with the windows closed, the interior temperature may rise by as much as a further 40°C above the exterior temperature. In the summer months at Mount Isa, high temperatures are experienced. During November 1980, the temperature was frequently above 38°C and, on three days, was over 41°C. It is therefore likely that any blood in the car was exposed to very high temperatures - possibly as high as 80°C. The question arises as to whether the immuno-chemical tests used by Mrs Kuhl could produce reliable results in respect of samples of such an age and which had been exposed to such high temperatures.

Dr Siegfried Baudner, the production manager of Behringwerke, a company based in Marburg, West Germany and the manufacturer of the anti-foetal haemoglobin anti-serum, gave evidence in relation to the effect of heat upon the properties of blood. He said that if blood is exposed to a temperature of 80°C for half an hour, it will not produce

any immuno-chemical reaction. The loss of such reactivity is a function of temperature and time. Mr Anthony Raymond, a forensic scientist and head of the Biology Department at the State Forensic Science Laboratory of Victoria, who carried out a great deal of work at the request of the Commission, said that temperatures above 60°C have a deleterious effect on the nature of blood. Mr Peter Martin, a forensic biologist and the Deputy Director of the Metropolitan Police Forensic Science Laboratory, London, said that in his experience denaturation of proteins occurs quickly under hot humid conditions. "Denaturation" is a word used frequently in this context to refer to the process of modification of the molecular structure of a protein as a result of aging, and/or exposure to adverse conditions, with a resulting alteration of its properties.

If, as a consequence of aging and exposure to adverse conditions such as heat, the immuno-chemical reactivity of blood merely lessened or disappeared, this may not prevent such tests being used reliably upon old blood stains. It was Mr Peter Martin's experience that, as dried blood stains age and, as long as they stay dry, reactivity just disappears. The experience of Dr Patrick Lincoln, senior lecturer in blood serology in the Department of Haematology at the London Hospital Medical College, was similar, although neither he nor Mr Martin could rule out the possibility of denaturation of blood causing false results. The difficulty is that, as Mr Martin pointed out, relatively little work has been done on immuno-chemical testing of stains more than one year old. Dr Lincoln said such testing was novel. He had never heard of anyone performing the task which Mrs Kuhl was asked to perform - namely the detection of foetal haemoglobin in a family car where any possible sample would be more than a year old. For these reasons, the assistance that can be derived from

the experience of scientific witnesses with forensic experience is limited.

More assistance is to be derived from the evidence of three witnesses with a great deal of relevant research experience. Professor Orjan Ouchterlony is Emeritus Professor of Bacteriology in the Medical Faculty in the University of Goteborg, Sweden. Amongst his many achievements was the introduction, in 1948, of the technique referred to from time to time in this report as the Ouchterlony plate or method. He expressed the view that immuno-chemical reactions with denatured blood may occur in a different way from those occurring with fresh blood. When an antigen/antibody reaction occurs, the antibody is linking up with parts of the molecular structure of the protein which are called^J antigenic determinants or epitopes. These determinants may be on the surface of the molecular structure or within the structure. If denaturation has occurred, the molecular chains may unfold and the determinants may change place. They may come out from a hidden position to an open position and those which originally were in an open position may go into a hidden position. This may have a significant effect on how the molecules react immunologically.

Professor Richard Charles Nairn is Emeritus Professor of Pathology and Immunology at Monash University. He agreed with Professor Ouchterlon¥ on this question. He explained that, with denaturation, more primitive protein antigens are likely to be exposed from the interior of the molecules and these are likely to be common to, in this particular case, gamma chains, beta chains and alpha chains. Accordingly he thought it not at all unlikely that a different kind of specificity could be obtained as a result of denaturation.

More particular views about the anti-foetal haemoglobin anti-serum ~~11sect~~ by Mrs Kuhl were expressed, both by Professor Nairn and by Professor Simon Leach, Emeritus Professor of Biochemistry at the University of Melbourne. They considered the way in which the anti-serum was prepared by Behringwerke and concluded that the anti-serum was likely to contain a proportion of about 10% of antibodies to denatured foetal haemoglobin.

The significance of this to Mrs Kuhl's tests was explained by Professor Leach. The beta chains distinctive of adult haemoglobin and the gamma chains distinctive of foetal haemoglobin possess molecular structures which have a great deal in common. The distinguishing characteristics are on the exterior of the folded up chains. The common components are in the interior of the molecules and these are exposed when haemoglobin becomes denatured. Accordingly, the antibodies which are reactive to denatured gamma chains in foetal haemoglobin possess a reactivity to the internal antigenic determinants of the gamma chain, which are very similar to the internal antigenic determinants of the beta chain. These internal determinants are available for reaction in denatured adult haemoglobin. This leads to the possibility of cross reactivity and false positive results when testing denatured adult haemoglobin with this anti-serum. Although Professor Leach did not know whether the proportion of antibodies to the denatured haemoglobin would be great enough to produce a visible band of precipitation, and therefore a false result, his view was that the anti-serum can only be used to distinguish between denatured adult and baby's blood if the anti-serum is purified, so as to remove the antibodies to denatured haemoglobin, before it is used.

These views do not appear to be inconsistent with the evidence of Dr Ba dner. He maintained that the anti-

serum was specific when used with fresh samples. However, he agreed that, as blood denatures, the structure of the protein alters and the anti-serum may pick up and react with denatured protein other than foetal haemoglobin. He had noted in 1983 that non specific immune reactions can be observed under certain conditions due to denaturation of adult haemoglobin in adult blood.

Mr Leo FreRey, a senior forensic scientist attached to the Queensland State Health Laboratory, expressed his view in more picturesque terms. He agreed that testing a blood stain 13 months old is very unusual and said:

" It's what I call tiger country, the old stains: you've got to be very careful with them."

Although Mrs Kuhl might not be expected to have been aware of all the difficulties posed by the age of any blood in the car and the temperatures to which it had been exposed, they do raise doubts as to the reliability of her immuno-chemical results and, in particular, those depending upon the use of the anti-foetal haemoglobin anti-serum.

Distinguishing specific immune-chemical results from non-specific results

All of Mrs Kuhl's immune-chemical results depended upon the sighting of precipitin bands, which she recorded in her work notes and in the laboratory's result book as specific antigen/antibody reactions. However, in each of the three types of test used by her, other reactions can occur which produce the appearance of a band of precipitation but which are not the desired specific antigen/antibody reactions. These are generally described as "non-specific reactions". These may occur as a

consequence of a reaction between proteins or between a protein and a carbohydrate or as a consequence of other causes. Since, in accordance with the laboratory's standard practice, the plates upon which the tests were conducted were not retained and no photograph was taken of them, it has not been possible for any other expert except Dr Baxter to consider the proper interpretation to be placed upon the appearance of the bands of precipitation observed by Mrs Kuhl. Dr Baxter gave evidence at the trial and before the Commission of his observation of plates upon which positive findings of foetal haemoglobin were made, and I shall consider this evidence later in this report.

The question arises as to whether the methods used by Mrs Kuhl and he; experience were sufficient to distinguish accurately between the specific and non-specific reactions which she observed.

Whether non-specific reactions wash out

In her use of the cross-over electrophoresis method, Mrs Kuhl customarily washed the plate in saline solution over night after electric current had been applied across the plate. Where she had doubt about the appearance of any bands, she gave the plate an extended washing for 48 hours or over a weekend. In her experience, often but not always such extended washing caused such non-specific reactions to wash out. In order to distinguish non-specific reactions, she appears to have relied upon this washing out and, in respect of such bands as remained after washing, the observation of reactions with all anti-sera or at least with an animal anti-serum.

Professor Ouchterlony, Dr Baudner and Mr Peter Martin agreed that non-specific reactions may be obtained

which may or may not wash away. Mr Raymond, who thoroughly tested the car in 1986 at the request of the Commission, subjected 32 samples taken from the car or from Azaria's clothing to the cross-over technique. He obtained reactions in respect of 18 of these tests but, upon further confirmatory testing and drawing upon his experience, he rejected the results in all of these, except that in relation to the jumpsuit, as being true specific reactions, although the signs of precipitation were not removed by washing. In respect of all but one of these tests, Dr Baxter agreed with Mr Raymond's findings.

It therefore appears that, while many non-specific precipitates wash out, the failure to wash out cannot be depended upon in making this important distinction.

Whether non-specific reactions will be indicated by reactions with all anti-sera

If bands of precipitation remained after washing, Mrs Kuhl apparently relied upon her observation of reactions between the sample and anti-animal anti-sera on the same plate. In many of her tests, samples were exposed to one or more of a selection of animal anti-sera, such as anti-dog, anti-pig or anti-sheep. In her view, a non specific reaction would be indicated by the presence of a reaction against the anti-animal anti-sera, or certainly against at least one of them. In contrast, although several of the reactions which Mr Raymond obtained when testing samples from the car using the cross-over electrophoresis method occurred when the sample did not react against all anti-sera, they were rejected by him as being spurious and not true antigen/antibody reactions. Professor Barry Boettcher, Professor of Biology at the University of Newcastle, agreed that non-specific reactions which do not

wash out will not always be indicated by a reaction to all anti-sera. As Professor Ouchterlony pointed out, in the cross-over electrophoresis test, it is possible to obtain precipitates which are not immune-precipitates and the use of controls is not sufficient to differentiate between these. In order to do so, other methods of testing must be used. One such test is to use the Ouchterlony plate in a comparative way, with identical controls, so that the bands of precipitation, when they coalesce, indicate that the substances forming the adjoining bands of precipitation are identical. The usual thing is to run the cross-over electrophoresis test as merely a presumptive or preliminary test, which is then verified or confirmed. Dr Baudner agreed that it is possible to obtain precipitates which cannot be distinguished, as being specific or non-specific, in the absence of identical controls producing lines of identity as on the Ouchterlony plate. This was not possible upon the cross-over electrophoresis plates used by Mrs Kuhl.

It appears, therefore, that Mrs Kuhl depended upon bases for distinguishing between specific and non-specific reactions which, in the particular circumstances of this case, may have been unreliable.

General reasons for suspecting that reactions obtained were non-specific

As referred to above, Mr Raymond exhaustively examined and tested the car in 1986. He obtained a number of positive responses of varying qualities to the ortho-tolidine screening test and subjected some 32 samples, including one from Azaria's jumpsuit, to the cross-over test against various anti-sera. Of these, some 18 samples produced reactions which were subjected to confirmatory

Ouchterlony tests. Only one of these produced lines of identity indicating a true immuno-chemical reaction, and that was in respect of the jumpsuit. From these tests, his experience and a further screening test discussed below, Mr Raymond concluded, with Dr Baxter's concurrence save in one instance, that all the reactions obtained using the cross-over technique, with the exception of that in respect of the jumpsuit, were non-specific or spurious. It therefore appears that, in 1986, there was present in the car some substance which was capable of throwing up non-specific or spurious reactions upon cross-over electro-phoretic plates. Mr Raymond could not of course be dogmatic about whether similar reactions would necessarily have been obtained by tests of the same areas in 1981. However he did express the view, which was clearly warranted, that there were avenues where persons might be mistaken if what they were doing was not properly controlled and they were not fully competent.

The question whether adequate controls were used is considered below.

A further basis for doubt as to Mrs Kuhl's distinction between specific and non-specific reactions is seen in her work notes of individual tests. Although these reveal quite a number of reactions which she found to be non-specific, there are other reactions where she described the bands of precipitation with anti-foetal haemoglobin anti-serum as being "fuzzy", but nevertheless recorded a positive finding of the presence of baby's blood. Items 34 and 35 of her work notes, being separate scrapings from the area under the glove box of the car, are examples. According to Mr Martin, such fuzzy bands do not meet the criteria necessary for detecting immuno-chemical reactions and they would be inconclusive in determining the presence of foetal haemoglobin. Mr Raymond agreed. Mrs Kuhl's

readiness to interpret these bands as being specific reactions raises the question whether there were other results recorded as positive which were similarly doubtful.

Professor Boettcher also saw an indication of non-specific reactions in Mrs Kuhl's recording of stronger reactions between samples and the anti-foetal haemoglobin anti-serum than with other anti-sera. Professor Nairn agreed that this feature of Mrs Kuhl's notes was strange, particularly when the recorded result was stranger with anti-foetal haemoglobin anti-serum than with anti-haemoglobin. This was because only 25% of the haemoglobin present would be of the foetal type if the blood were Azaria's, whereas 100% of the haemoglobin present would be reacting with the anti-haemoglobin anti-serum. Mrs Kuhl's response was to point out that these tests, as conducted by her, were non-qualitative in the sense that the results did not permit the concentrations of particular antigens to be measured. While this is clearly correct (and the Crown pointed to other recorded results in experiments conducted by Dr Baxter and a Mr Rees in 1974 to show that this sort of thing was not unknown) in the absence of a clear explanation of why it occurred in particular instances it remains a matter of concern.

Among other possible causes of non-specific reactions which were suggested was the presence of ammonia. Mrs Kuhl had difficulty dissolving some of the material found in the car, and eventually used a 5% ammonia solution to dissolve it. While the ammonia in such a solution is easily got rid of, an extract cannot be tested directly in ammonia solution, since ammonia may react with anti-sera to produce a precipitate. Dr Baxter agreed that testing of samples without ensuring that the ammonia has evaporated out of the solution can cause error. Mrs Kuhl herself suggested that certain positive results obtained when

checking the anti-serum in 1982 may have been a consequence of hasty testing without ensuring that the ammonia had gone. Mr Raymond said that from a practical point of view swabbing with ammonia has an impact on the nature of material present, unless it is tested quickly after extraction. Professor Leach expressed the view that, if dissolved in ammonia, denatured blood may exhibit immuno-chemical reactions which are different to those of fresh blood, since the molecules may be opened up.

Limitations of the anti-foetal haemoglobin anti-serum

One of the questions raised in relation to this anti-serum is whether it was specific only to foetal haemoglobin when tested with fresh samples or whether it had a secondary specificity. This will be dealt with below. Assuming for the present that the anti-serum was specific in this manner, a number of questions arise as to the way in which it must be used in order to effectively distinguish between adult blood and the blood of a young baby.

Residual foetal haemoglobin in adult blood

As mentioned above, to be effective in this fashion, the anti-serum must be used in such a way that a 25% proportion of foetal haemoglobin is detected, whereas a proportion of less than 1% is not. Mrs Kuhl's method of achieving this was to dilute the sample with a view to achieving a concentration of between one part in 500 and one part in 1000 parts. At these dilutions, it is probable that the normal residual component of foetal haemoglobin in adult blood would not be detected. While Mr Raymond detected reactions with adult blood in concentrations up to 1:250, he considered that reactions at a concentration of 1:500 were a

possibility. In his experience the concentration of 1:2000 would be reasonably safe. There was evidence from other experts as to detection of reactions in concentrations up to about 1:250. On this basis, in order for Mrs Kuhl to be confident that she was not detecting reactions with the residual component in adult blood, it was necessary that her dilutions of samples be done with reasonable accuracy. Questions raised in relation to the accuracy of these dilutions are considered below.

The necessity for detailed testing of the anti-serum before use

The anti-serum produced by Behringwerke was not designed for routine laboratory work. It was produced as a research product and Behringwerke had made it clear that its diagnostic significance was limited and should be established by interested scientists working in clinical laboratories. It was not commonly used in forensic science laboratories. In these circumstances, particularly because the samples of suspected blood being tested were more than a year old, it has been well established by expert evidence before the Commission that great care was required in devising and conducting a testing programme for the anti-serum, before it was used. This was essential to ensure that the anti-serum was functionally specific for the task to be performed, namely the distinction between baby's blood and adult blood.

Mr Martin said that the task which Mrs Kuhl was asked to perform was a most difficult exercise. One would normally try to confirm results by another test and not rely solely on the anti-sera. However, he considered that this would probably have been impossible as other tests generally will not work after a year and, in respect of most of the

samples taken by her, there was insufficient extract to so test. There were some variations between the experts in the emphasis which they thought should be given to particular aspects of the testing programme before use of the anti-serum. However, it was accepted by them that, in order to interpret the results of such use reliably, it was necessary to test the anti-serum against a range of adult and infant bloods and at a range of dilutions, under the same particular conditions and using the same controls as used later in testing unknown samples.

The testing of the anti-serum before use

Mrs Kuhl did not carry out any testing of the anti-foetal haemoglobin "anti-serum before she used it. She relied upon the general system of testing of anti-sera as new batches arrived at the laboratory. According to Dr Baxter, up to the middle of 1981 there was no set practice for testing anti-sera. About that time he arranged for Mr Legge, the Senior Technical Officer, to carry out routine tests. From then on, according to Dr Baxter, there was "some sort of system", which he agreed was not very good, and of which he could not specify the details, for testing anti-sera for use in the laboratory. Mrs Kuhl and Mr Legge described a system, whereby as a new batch of anti-serum arrived at the laboratory it would be tested by the Senior Technical Officer against its known reactant, and against some others. If the results of these tests were appropriate, the anti-serum was placed in a particular rack in a refrigerator for use in case work. It is unclear what Mr Legge regarded as a "new batch" for the purpose of this procedure. The anti-foetal haemoglobin anti-serum used by Mrs Kuhl was from batch number 2456, but the Health Commission's laboratory had been receiving anti-serum of this batch number for a substantial period beforehand. It

is apparent that not every bottle received was tested, and bottles with the same batch numbers would tend not to be tested unless there was a substantial time lapse between deliveries. As Mr Legge said, there was no hard and fast rule about it. There was no way to check whether a particular bottle of anti-serum had been tested, since no written record was kept. Further, there do not appear to have been any requirements as to the particular known samples with which there were to be tests. As might be expected, Mr Legge had no recollection of what particular testing had been done in relation to the anti-foetal haemoglobin anti-serum. I am therefore unable to conclude whether the particular bottles used by Mrs Kuhl were tested in this way or not.

It is apparent that, whatever testing was carried out by Mr Legge, it did not place Mrs Kuhl in the position that she might have been in if she had carried out detailed and systematic testing with known controls and had continued to use the same controls in her tests of the unknown samples, as suggested above. It therefore appears that she suffered from a significant handicap in the accurate interpretation of the results which she obtained with the anti-serum.

The testing of the anti-serum after use

In March, August and September 1982, Mrs Kuhl conducted a series of tests of blood stains retained in the laboratory against the anti-foetal haemoglobin and other anti-sera. The purpose of this series of tests appears to have been to see whether the anti-serum would pick up residual foetal haemoglobin in adult bloods. The results were relied upon in Mrs Kuhl's evidence at the trial in support of the contention that, as used by her, the

anti-serum was specific only to foetal haemoglobin. Even if the results of these tests had not been controversial, such testing would not have fulfilled the role of thorough and systematic testing of the anti-serum before use. After the anti-serum had been used and the reactions with it interpreted and recorded, it appears to have been too late, and no attempt was made, to vary such interpretations in reliance upon the subsequent testing.

In her evidence at the trial, Mrs Kuhl said:

"I have screened over 230 adult bloods in the range of dilutions that the technique is operable in, as well as the nil bcr of different adult controls that were used during the course of the investigation, and the anti foetal haemoglobin has never reacted against an adult blood."

At another point in her evidence at the trial, she said:

"Not one adult blood that I have screened has shown any foetal component in the dilutions that I am using, which is between 1 in 500 and 1 in 1,000"

Examination of the records of the laboratory revealed that, in six of the tests conducted in March and August 1982, blood stains from persons aged 1-1/2 years or more gave positive reactions with the anti-foetal haemoglobin. The result book shows that these particular samples and other samples were tested again on 10 September 1982 and, on this occasion, gave no reaction to the anti-foetal haemoglobin. In evidence before the Commission, Mrs Kuhl insisted that the evidence she gave at the trial was still correct since, in her view, the positive reactions obtained with adult bloods had not been true immuno-chemical reactions. She said that the March 1982 tests were suspect because the extracts were prepared as a batch and not under strict case conditions. Accordingly, in her view, it was possible that

one or more of the extracts could have retained some ammonia which gave a false reaction. As to the results obtained in August, she said that the entries in the result book for 31 August 1982 enabled her to recall that, on that day, she called a halt to all testing and supervised a general overhaul of the testing equipment, because the results had indicated that technical problems were present. The nature of these technical problems was not explained.

Assuming this explanation is correct, the apparent recording of the results in the result book as being genuine immuno-chemical precipitates and the lack of any precise explanation as to how they came about adds weight to the concerns about reliability of interpretation to which I have already referred. If the wrong results arose from the presence of ammonia or technical problems in 1982, it is very difficult to be confident that, without a comprehensive system of pre-use testing and confirmatory testing of the results from particular samples, the plates were correctly interpreted in 1981.

Mrs Kuhl also said that when she gave evidence at the trial she was unaware of the fact that, in the testing in March and August 1982, adult bloods had reacted positively with the anti-foetal haemoglobin, since she was then not aware of the ages of the blood donors. She said that she had only relied upon those results which had been confirmed as positive results by the re-testing, under strict case work conditions, in September 1982. If this was her approach at the time, it involved the implicit rejection on her part of the validity of the results obtained in many of her 1982 tests. She agreed that, on this basis, approximately one-third of those results would have been worthless. These doubts were not mentioned at the trial.

On the evidence, I am unable to conclude whether any of the six positive results with adult bloods was the result of a genuine immuno-chemical reaction or not. However, it seems that, for inadequate reasons, Mrs Kuhl accepted as correct results which tended to confirm the specificity of the anti-serum and rejected those results which cast doubt upon it.

The cross-over electrophoresis test

This was the main method relied upon by Mrs Kuhl as producing results which established, in her view, the presence not merely of blood but of baby's blood. In the light of the difficulties involved in the testing of material from the Chamberlains' car the question arises whether this test produced results which enabled sufficient identification of the reactions taking place to justify the conclusions drawn by Mrs Kuhl. If Mrs Kuhl saw a band of precipitation upon a particular cross-over plate and recorded it, such plate now having been destroyed, can one be assured that the band seen by her was not the result of a non-specific reaction between the anti-serum and some contaminant in the sample tested rather than blood? May the band have been the result of a reaction with a protein denatured by age and heat, or a reaction between a protein present in the anti-serum and present in the sample, or a reaction between the anti-serum and some contaminant in the sub-stratum from which the sample was taken? - to name some of the apparent possibilities.

It appears from evidence before the Commission not given at the trial, that this method is less effective than others in enabling the operator to eliminate these other possibilities. While the use of an extensive range of known controls against the anti-sera and the observation of

their reactions on the same plate will provide further information, this method does not, it seems, provide the certainty flowing from other tests that the substance in the unknown sample producing a reaction is identical with a known control which also produces a reaction. In contrast, the Ouchterlony method enables such identification to be made where the unknown sample and the known control are placed in adjacent wells and the bands of precipitation with the anti-serum coalesce, forming so-called "lines of identity". As Professor Ouchterlony pointed out, even with a proper set of controls on the same plate as the sample, with everything right in the cross-over test, the operator can be misled as there is no real verification of the correlation of precipitates. He said that the cross-over test was developed as a technique for rapid clinical diagnosis identifying antigen or antibody and for verification of what is there the operator should use other techniques, such as immuno-diffusion. Mr Martin said that one would normally try to confirm results from this test by another test because of the difficulty of the exercise. Dr Baudner referred to the many problems in using the cross-over technique, emphasizing the consequence of the application of electric current in driving proteins from the anti-serum and the sample together, to give reactions with proteins other than the desired antibodies. For these reasons he was not content with this technique. He preferred to use the Ouchterlony test, where the operator has the additional confirmatory evidence on the plate. Reference has already been made to the large number of tests conducted by Mr Raymond on the car in 1986, where he rejected all the reactions seen on cross-over plates after conducting Ouchterlony tests, on which the confirmatory evidence did not appear.

Many of the forensic biologists who gave evidence frequently use the cross-over electrophoresis method in

routine tests. I do not suggest that results obtained from such use by a competent biologist taking all proper precautions and in relation to blood stains not denatured would not be acceptable. However, it appears that its use in this case may have prevented Mrs Kuhl from eliminating other possible causes of the reactions seen.

The necessity for proper controls

The necessity for the use of known controls and the observation of the appropriate reactions between such controls and anti-sera has already been referred to. Generally speaking, to be assured that the anti-sera are working properly under the conditions upon any particular plate, both positive and negative known controls should be included. In other words, there should be controls which should produce a reaction with a particular anti-serum and there should be controls which should not produce any reaction with that anti-serum. As Dr Andrew Scott, a very experienced forensic biologist employed by the State Forensic Science Division of South Australia, observed, if the controls do not react appropriately, the plate should be rejected entirely.

There is some diversity of opinion among the various experts as to the controls which ought to have been used in testing the samples from the car. It would not serve any useful purpose to refer to all their views. It was common ground that a control of known adult blood was necessary, at least on one of a batch of plates tested on the same day, if not on every plate tested. Some tests were carried out by Mrs Kuhl without any adult control upon the plate or upon any plate in the same batch. Although some of the forensic scientists disagreed, Professor Ouchterlony expressed the view that such a control must be on the same

plate as every sample, because there are variations in conditions, even between plates run at the same time. I accept that the presence of such a control on the particular plate would add to the operator's confidence in the correctness of his conclusion.

Professor Ouchterlony and Dr Baudner also considered that, to establish the presence of baby's blood, it is necessary to have controls of purified foetal haemoglobin and adult haemoglobin. Mr Martin did not agree that these controls would be necessary. He thought that if the anti-serum worked when tested in blind trials, then a satisfactory system had been established. I consider that while Mr Martin may be able to produce acceptable results without such controls after thoroughly testing the performance of his anti-sera, the lack of such controls, without prior testing, is a deficiency which might affect the correctness of the conclusions reached.

Mrs Kuhl did not use purified haemoglobins of either type in her tests. She did use, from time to time, an adult blood stain control and also fresh cord blood (i.e. the blood of a baby at birth) as a control. Having regard to the discussion above as to the denaturing effects of age and heat on blood, the question arises as to whether the use of fresh cord blood as a control was adequate in the circumstances. The known blood of Azaria found on her clothing would have been a much more satisfactory control and would have afforded more confidence in the results obtained, despite the fact that there were probably significant differences in the conditions to which blood on the jumpsuit and any sample in the car would have been exposed. Professor Boettcher said that a proper system of verification would require the controls to have been artificially aged so that they matched, so far as possible, the unknown sample. The difficulty is that, where the

operator does do not know what the conditions have been to which the test sample has been subjected, he can never be certain that his controls will be adequate. Having regard to the risks of misleading results referred to above, it appears that the use of fresh cord blood as the positive control was inadequate.

Other controls suggested were of animal bloods. Mr Raymond said that the operator would need to be satisfied that animal anti-sera on the particular plate are viable. He thought there should be, not necessarily on the same plate but in the same time framework, known animal blood stains reacting well with anti-animal anti-sera. Otherwise, the operator may be confused by the lack of reactivity on the part of the animal anti-sera. There does not appear to be any record of Mrs Kuhl's use of a known animal blood stain for this purpose during the period when she was testing samples from the car.

A further control to assist in avoiding the wrong conclusions from reactions is a substrate control. When samples are taken from some articles, this is important. Dr Lincoln said that when something like a towel is tested misleading reactions can be thrown up by other substances in the towel, such as dirt and soap. One should therefore take as a control an extract from an area of the towel which is not positive to a blood screening test and has no staining on it. Mr Raymond also said that a substrate control should be used where possible. As previously mentioned, Mr Raymond found in 1986 that there was something in the car which tended to give non-specific reactions, although he could not suggest what it was. If the same material was in the car when it was tested in 1981, the testing of a substrate control would have assisted in determining whether a reaction between an anti-serum and a sampled stain was a specific immuno-chemical one. Mr

Raymond concluded that someone doing tests on the car without the proper controls could be misled by the 'false positive' reactions he observed in a number of places to human anti-sera. Mrs Kuhl did not use substrate controls.

It is apparent, therefore, that the use of proper controls in the methods adopted in testing the samples from the Chamberlains' car was essential in arriving at correct interpretations of the results. Certain important controls were lacking in Mrs Kuhl's tests. The adequacy of controls in particular tests will be considered below.

Dilution of samples

The need to dilute samples in order to prevent the anti-foetal haemoglobin anti-serum from detecting the presence of the small percentage of foetal haemoglobin in adult blood has been discussed above. The method adopted by Mrs Kuhl for measuring the dilution of samples was to correspondingly dilute a fresh blood control and the sample until the dilution of the control was between 1:500 and 1:1000 and the colour of the solution of the sample matched. Mrs Kuhl gave evidence at the trial to the effect that, by using this method, the concentration of the sample should not vary from that of the control by more than 10%.

Professor Ouchterlony and Mr Martin said that Mrs Kuhl could not, by eyesight, dilute a sample to an accuracy of 10% or to anywhere near that percentage. It was Mr Martin's experience that it can be difficult to check the dilution of an old stain against the colour of diluted fresh blood. With a stain a year old, he would be happy to get any colour at all into the solution. According to Dr Lincoln, because of the difficulties in measuring the dilution of samples, particularly with old denatured blood,

it is better and standard practice to dilute the anti-serum to a point where the unwanted reactions cannot be seen, because the operator can control the dilution of the anti-serum much more carefully than the dilution of the sample. This procedure was not followed by Mrs Kuhl.

It seems fair to conclude that, if there were errors in dilution because of the age or contamination of blood stains, it is most likely that the sample solution tested was more dilute than the desired 1:750, rather than less dilute. The part of blood giving its red-brown colour is the haem molecule, which is the most stable. If it was less soluble because of age or if it was mixed with a contaminant that provided colour, then the effective dilution of the blood may have been greater than the comparison would indicate by sight. However, the bottom end of the range of dilutions used by Mrs Kuhl, namely 1:500, is at a level where Mr Raymond considered that it was possible that foetal haemoglobin in adult blood may be detected. If her dilution by colour comparison allowed a margin of error of well in excess of 10%, then dilutions at the bottom end of her range would appear to stray into an area where foetal haemoglobin in adult blood might possibly have been detected. Dr Baxter agreed that, both in respect of the tests upon the samples from the car and her tests of the anti-serum in 1982, an explanation for false positives may have been that the dilutions were wrong.

In Professor Boettcher's opinion, there were also dangers in dilutions that were too great. I discuss elsewhere his belief that there was a secondary specificity of the anti-serum which manifested itself when a sample was tested with a low concentration of adult blood. If there was such a secondary specificity, then the reduction in solubility of old blood and the possibility of a contaminant providing colour would have made it very difficult for Mrs

Kuhl to ensure that the effective dilution of a sample was not so great as to allow this secondary specificity to produce misleading reactions.

The procedure in relation to dilution is also something which should be established, in accordance with good practice, before testing of samples starts. Mr Martin, when asked whether a dilution of 1:1000 would be satisfactory, replied that he would have to relate it back to the testing that he had done in the first place, using extracts of dried blood stains as controls. Without such testing of the anti-serum beforehand with known controls, it seems that there must be some doubt whether the variation of dilution of samples produced misleading reactions in Mrs Kuhl's tests.

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Whether the anti-serum was specific to foetal haemoglobin

A great deal of evidence at the trial and before the Commission was directed to the question whether the anti-serum was mono-specific. In the High Court, Gibbs CJ and Mason, Murphy and Deane JJ. agreed with the view of Jenkinson J in the Federal Court that the evidence of Professors Boettcher and Nairn was such as to have necessarily raised a doubt in the reasonable mind as to the correctness of the results using this anti-serum (153 CLR 521 at pp. 559, 575 and 627). At the trial, the challenge to mono-specificity seems to have been treated as of paramount importance. Before the Commission, it became apparent that the possibility of other specificities is only one of a range of difficulties which Mrs Kuhl faced in carrying out these tests and in correctly interpreting her results. The methods used in applying the anti-serum are probably more important for present purposes as Professor Boettcher readily conceded that, even if an anti-serum has

more than one specificity, it may be used quite successfully so long as it is tested very carefully beforehand and the conditions under which it can successfully be used are known. For example, Professor Boettcher was happy to concede that Dr Andrew Scott had successfully used the anti-serum when testing for baby's blood on Azaria's clothing and on the articles from the tent. He also conceded that the anti-serum could be used effectively to distinguish between foetal haemoglobin and adult haemoglobin when used under standardized conditions with fresh blood samples of known concentrations. This concession is consistent with the evidence in relation to use of the anti-serum by Mr Martin, Dr Lincoln, Dr Scott, and Mr Raymond, although Mr Raymond's work was with an anti-serum of a different batch. All of these scientists used the anti-serum without finding that it reacted with adult blood, provided that such blood was sufficiently diluted. Of course, this experience does not detract from the likelihood of a secondary specificity with denatured adult blood.

Professor Boettcher's concern relates to a secondary specificity with the alpha globin chains common to both foetal and adult haemoglobin which would affect the testing of either fresh or denatured blood. He carried out or participated in a number of tests which he relied upon as showing this secondary specificity. He also pointed to a number of plates and photographs of plates produced by Mrs Kuhl, Dr Baudner and Dr Ziegler, Senior Lecturer in Paediatrics at the University of New South Wales, as indicating the secondary specificity. In relation to these results conflicting interpretations were proffered to explain the appearance of bands of precipitation as the product of occurrences other than immuno-chemical reactions.

Professor Boettcher's view was given considerable support by the evidence of Professor Ouchterlony who, after

consideration of a number of plates and photographs of plates said that certain bands and double bands may well have been the products of a second specificity of the anti-serum. Professor Ouchterlony rejected the opposing explanations offered by Mr Martin and by Dr Baudner and, although he could not definitely determine whether the bands he saw were the product of true immuno-chemical reactions, in his view a second specificity remained as a possible cause. In these circumstances, he would be hesitant to use the anti-serum. Professor Nairn also gave evidence supporting these views.

Professor Boettcher gave evidence of a number of tests in which, as he saw them, the results supported his belief that there was a secondary specificity of the anti-serum particularly when the concentrations of blood tested were low, thus allowing the antigen and the weak presence of secondary antibody to be in the range of equivalence necessary to produce a precipitin band. He explained the absence of reactions with adult blood at higher concentrations by referring to what is known as the "prozone effect", where the presence of too much antigen for a small amount of antibody will prevent the formation of a precipitin band.

The Crown submitted that Professor Boettcher had become partisan in the matter, that he had lost his objectivity as a scientist and had therefore misinterpreted results. It particularly relied upon his evidence at the trial in relation to the results upon a particular Ouchterlony plate (Exhibit D135). Without going into the complex detail surrounding this plate, it is clear at least that his evidence in relation to it was in error and had to be corrected before the Commission.

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Professor Boettcher clearly did become committed to the Chamberlains' cause after the trial, if not before. I do not criticize Professor Boettcher for his part in a campaign attempting to put right what he saw as an injustice. However, his commitment to that cause does require his evidence to be treated with caution and I would hesitate to accept his evidence on such a controversial issue unless it were well supported by other scientific opinion. In relation to a number of tests his views do receive a large measure of support from Professor Ouchterlony and, generally, from the evidence of Professor Nairn. While the scientific opinion to the contrary expressed both at the trial and before the Commission was impressive, some of the proponents of such opinion had significant reservations. For example, Dr Baudner, while being confident that there would be no cross-reactivity with adult blood using the Ouchterlony method could not be certain in relation to use of the cross-over method. Mr Martin, while disagreeing with Professor Boettcher's theory in relation to cross-reactivity at low concentrations, conceded there had been tests which demonstrated a cross-reactivity with adult haemoglobin in some circumstances. While the anti-serum did not cross-react in his tests, using the cross-over method, he said that it would be a foolish man who would say it never can, and this demonstrated the need for the operator to know the limitations of the anti-serum.

For these reasons, I could not be satisfied beyond reasonable doubt that this anti-serum, when used in the cross-over electrophoretic technique or the tube precipitin technique, was specific only to foetal haemoglobin. There remains the possibility that it reacted under some circumstances with adult haemoglobin.

Conclusion

It will be seen from what I have so far written that the task which Mrs Kuhl was called upon to perform in testing the Chamberlains' car and its contents posed most substantial difficulties, even for the most highly skilled and experienced forensic biologist. It was much more apparent before the Commission than it was at the trial that there were many traps for the unwary in carrying out immuno-chemical tests upon samples which were old and which had been exposed to severe conditions. In the circumstances great caution was required in setting up the testing procedures and in interpreting the results observed.

At that time, the standard practice in the Health Commission of New South Wales, Division of Forensic Medicine, was to destroy the plates upon which such tests were conducted and not to retain any photograph of the plates. This system has now been changed. Under such a system, not only is the defence deprived of the opportunity to examine the plates to determine whether the interpretation offered was justified, but the Crown is obliged to rely upon the evidence of the operator as to what was seen on the plates.

That this is a relatively subjective matter was indicated by a dispute as to the correct interpretation of a plate run by Mr Raymond during the testing of a sample from a metal part of the camera bag. While Mr Raymond and Dr Baxter observed the tests and the resulting reactions, they disagreed on the conclusions which could be drawn from them.

It is apparent that the Health Commission's system not only had adverse consequences for the defence but also put the Crown in the position of having to depend upon Mrs

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Kuhl's skill and experience to support the conclusions drawn from these difficult tests.

A. FINDINGS OF BABY'S BLOOD

At the trial, Mrs Kuhl gave evidence of tests of some 22 samples from various parts of the car in respect of which she found the presence of baby's blood. Twenty of these tests were immune chemical tests of the three kinds already described. Two of them involved the use of a haptoglobin plate which will be discussed below. It is necessary to consider in detail the tests of each of these areas in the light of both the general matters affecting the testing system discussed in Chapter 7 and particular matters regarding each test.

(1) THE SPRAY PATTERN UNDER THE DASHBOARD

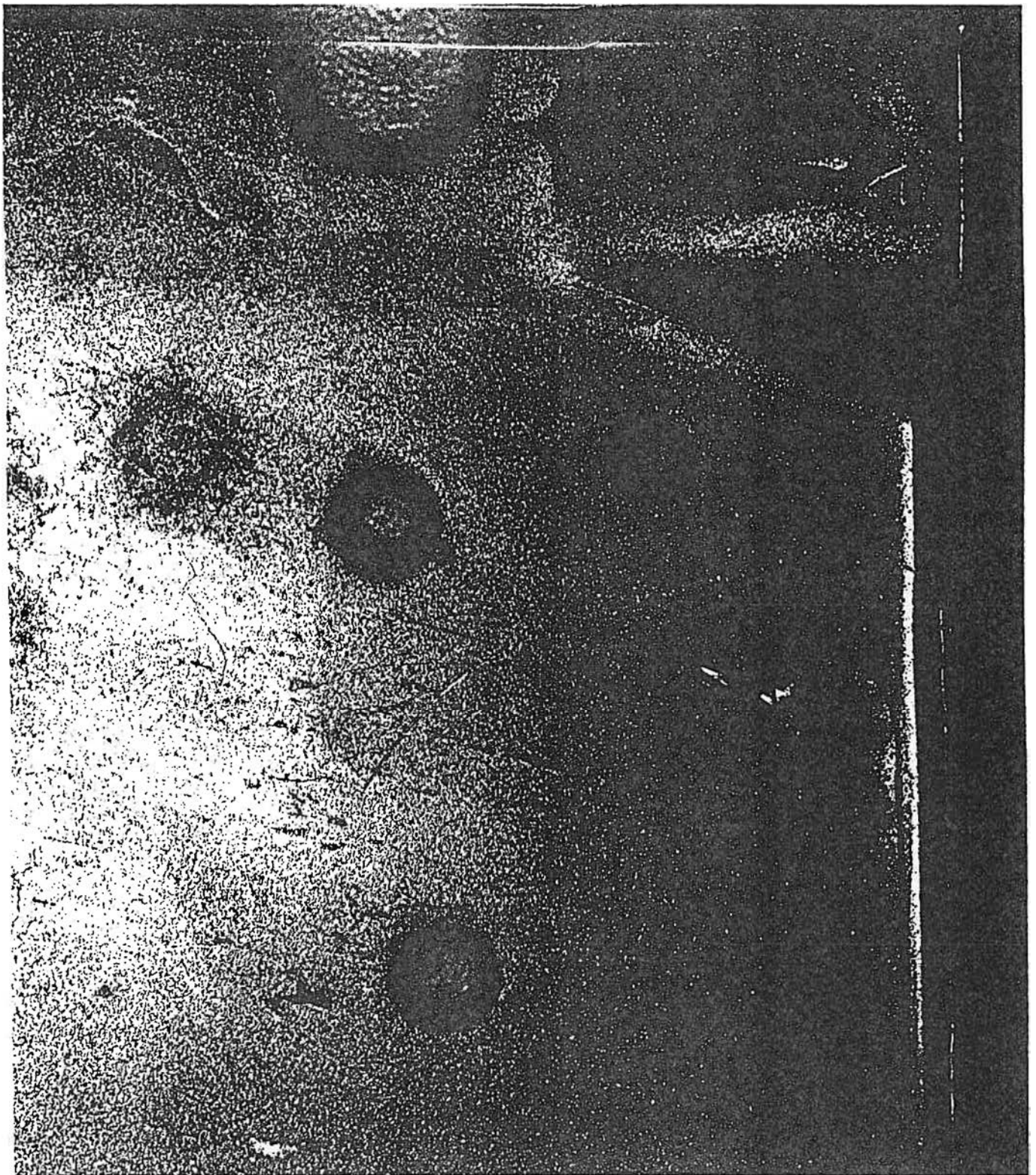
(a) The various tests

When Mrs Kuhl and Senior Constable Metcalfe carried out screening tests on the car on 8 October 1981, a spray

pattern was noticed under the dash next to the glove box compartment. It felt sticky to the touch. An ortho-tolidine test of the area produced no reaction. Mrs Kuhl suggested to Constable Metcalfe that perhaps the spray was soft drink or something similar. Later, she obtained some positive results in respect of the side of the passenger seat of the car and telephoned Constable Metcalfe in Darwin and suggested that the area under the dashboard be further investigated. In consequence Metcalfe, Dr Anthony Jones, a pathologist, and Constable Max Scott, a forensic biologist serving with the Northern Territory Police in Darwin, inspected the car at Alice Springs on 10 and 11 November 1981.

Dr Jones and Constable Scott carried out further ortho-tolidine tests which produced some reactions which were slow to appear. Some of the reactions were weak. There is doubt as to whether the correct method was followed in these tests. Dr Jones then cut out a section of steel plate from under the glove box. The plate became exhibit 90 at the trial. He lifted a number of small areas of stain or spots from this plate and from nearby areas. These samples were the subject of later testing by various persons. It is necessary to consider each of these samples in some detail. An understanding of this evidence may be assisted by reference to the photograph identified as "Underdash plate showing 'arterial spray'" which is reproduced.

The first sample was a spot lifted from the spray pattern on the front of the flat surface of the plate. Part of this sample was delivered by Senior Constable Metcalfe to Mrs Kuhl. This was tested by her, as item 33, and she concluded that baby's blood was present. The remaining part of this sample was tested by Constable Scott using the Ouchterlony method and, although his tests may be said to be



Underdash plate showing "arterial spray".

unsatisfactory in certain respects, he obtained no reaction and could not conclude that there was any blood present.

Another sample was removed by *Dr Jones* from the flat surface of the plate and this was given to Constable Scott for testing. Again, he obtained no reactions and could not conclude that any blood was present. Constable Scott had little experience in these tests and some of his controls failed. Accordingly, his finding must be treated with reserve.

On 17 November 1981 a sample was removed from the leading edge of the plate. This was tested by Mrs Kuhl and she obtained reactions to various anti-sera including anti-sheep. Accordingly she concluded that the reactions were non-specific and that the sample was not blood. In March 1982 a further sample was taken from this area of the plate. It was divided into two parts. One part was sent {at the request of the Crown} to Mr Bryan Culliford, a very experienced forensic biologist who was then the Deputy Director of the Metropolitan Police Forensic Laboratory in London, and the other part was sent {at the request of the Chamberlains} to *Dr Lincoln*. In respect of this and some other items from the car to which reference will be made, Mr Culliford gave evidence at the trial that he identified blood thereon, but was unable to identify it as human blood. At the trial, he was not asked to explain in detail what tests he carried out to confirm the existence of blood. He was prevented by illness from giving oral evidence to the Commission, but I had the benefit of a written statement from him. It appears that he has no recollection of the particular tests he applied to these samples and there are no records available to be checked. He believes he would have applied the haemochromogen test, which is a quite specific test for the presence of blood. Mr Culliford did not refer to this test in his evidence at the trial. He

then referred only to the ortho-tolidine test as used by Mrs Kuhl and expressed the opinion that it could be used by an experienced biologist to detect blood, without such a person being misled. He did not say then whether or not he used this test on the samples he received. The efficacy of this test will be further considered below.

Upon examination of his part of this sample, Dr Lincoln obtained no positive reaction to screening tests for blood and no activity in immune chemical tests. Thus, Mr Culliford's finding was inconsistent with the results obtained both by Mrs Kuhl and Dr Lincoln. That finding is now incapable of scrutiny. In the circumstances, I could not be satisfied that there was blood on the leading edge of the steel plate. Dr Lincoln was not called at the trial and the Crown relied upon Mr Culliford's finding to submit that blood was present on this part of the plate.

Two other samples were taken by Dr Jones from spots under the dashboard alongside the steel plate. These appeared to be not part of the same spray pattern of small droplets on the plate, but were from a different "splash" pattern of spots. These were delivered by Senior Constable Metcalfe to Mrs Kuhl for testing, as her items 34 and 35. She concluded from her tests that baby's blood was present.

At the request of the Commission, the plate and the areas around it under the dashboard were subjected to further examination and testing by the Victorian State Forensic Science Laboratory. The substances remaining upon them were examined microscopically and chemically analysed. Mr Raymon'd and Mr Peter Ross gave evidence, which was not challenged, that the spray pattern on the plate was in fact a sound deadening bitumenous compound. It had been sprayed into the wheel well upo the outside wall of the passenger compartment and had passed through a drain hole in that wall

to spray out upon the steel plate. This had occurred during the manufacture of the car, it being apparent under microscopic examination that the last two coats of interior paint had been applied over the top of the sound deadener. These findings confirmed the accuracy of conclusions reached in 1983 by Mr Leslie Smith, who had conducted investigations of this car and other similar Torona cars on behalf of the Chamberlains.

As to the other spots still appearing upon the area under the dashboard, not upon the plate, these did not have the appearance of blood under the microscope. On scraping they appeared to become a grey coloured powder, but still adhered together, unlike blood which tends to flake off in a brittle manner. Such spots gave weak ortho-tolidine responses, but were negative to the Kastle-Meyer screening test and gave strong non-specific reactions on the cross-over test. Further, they did not go into solution in the manner of old blood and, upon testing, there was nothing to indicate that they were blood. Dr Jones agreed with Mr Raymond's findings.

From the position of the "leading edge" of the plate, situated as it was under the dashboard, it is likely that the samples removed from it also formed part of the spray pattern of sound deadener. The position of the edge was such that it was exposed to the spray from the drain hole. It appears to have shielded part of the flat surface of the plate while allowing the visible spray pattern to fall upon that part of the plate upon which it was found.

(b) Evidence at the trial

At the trial, Mrs Kuhl gave evidence of her tests and Mr Culliford gave evidence of his results. Dr Janes

described the reactions obtained when he and Constable Scott used the ortho-tolidine tests at Alice Springs as being "blood reactions". Constable Scott did not give any evidence on this issue and as I have already observed Dr Lincoln was not called to give evidence. Furthermore, Dr Jones said that, assuming the pattern on the plate was blood, a spurt from a small artery, coming from below the glove box, would be the mechanism for that kind of spray pattern. Professor James Cameron, Professor of Forensic Medicine at the University of London, London Hospital Medical College, said that, if the spray on the plate was blood, it was consistent with a small arterial spurt or a small spurting blood vessel. He said this could be caused after death by squeezing over the cardiac region, but the pattern suggested to him bleeding rather than squeezing. Under cross-examination, Mrs Chamberlain offered no suggestion as to how the spray came there, but agreed that it could not have come from Mr Lenehan or from a nose bleed of one of the Chamberlain family. On the basis of this evidence senior counsel for the Crown, in his closing address to the jury, submitted that this was blood which came from Azaria when she was murdered. I have referred in Chapter 5 to the relevant parts of his address.

(c) Appearance of the "arterial" spray

In 1981, Dr Jones examined the spray pattern in Darwin under what he described as a poor stereo-microscope. He said that, while the droplets he saw were not absolutely characteristic of blood, they might have been. A number of forensic pathologists and biologists have since looked at the spray pattern with the naked eye and under microscopes. All now agree that it does not look like blood, in either the shape of the droplets or the pattern of the spray. Dr Jones did not see the signs of paint over the droplets of

stain until he used the microscope at the State Forensic Science Laboratory of Victoria.

(d) Mrs Kuhl's positive tests

Mrs Kuhl concluded that baby's blood was present in three of the samples tested by her from this area. The first of these was taken from the plate. She described the precipitin bands obtained upon the cross-over electrophoresis test in respect of foetal haemoglobin as being "excellent sharp bands". There are, however, a number of reasons for doubting the correctness of this conclusion, apart from the general difficulties referred to in Chapter 7.

The first is the finding of Messrs Raymond and Ross that the spray pattern on the plate is made up of bitumenous sound deadener. With this may be considered the fact that, when the area was screened initially with the ortho-tolidine test, there was no indication of the presence of blood. This test is so sensitive that it will pick up the most minute invisible particles of blood. Both Dr Baxter and Mr Martin, who were called to support the Crown case, said that their practice was not to continue testing an area or sample which responded negatively to ortho-tolidine testing, unless there were exceptional circumstances.

In the light of the finding of Messrs Raymond and Ross, any droplet of blood present must have been superimposed on the bitumenous spray pattern. If it was, why it would not have been detected by the ortho-tolidine test is not apparent. For it to have remained undetected, it must have been covered by another substance. There is no evidence of the existence of any such substance. A

satisfactory explanation of these results, consistent with the presence of blood, did not emerge in the evidence.

Secondly, in the testing of this sample, Mrs Kuhl obtained results which are inconsistent with the positive reaction with the anti-foetal haemoglobin anti-serum. Her ortho-tolidine test of the particular sample was extremely weak and slow and the reaction with anti-adult haemoglobin was weak. A result which did not appear in her work notes produced at the trial, but did appear in the laboratory's result book was a negative with anti-haemoglobin anti-serum. Mrs Kuhl's explanation for the anti-adult result was that the foetal haemoglobin molecule is more stable than the adult haemoglobin. She conceded at the trial, however, that if the foetal haemoglobin molecule is less stable than, or of the same stability as, the adult molecule, then there is no proper explanation for tests where a weaker reaction is found for the latter than the former.

Since the trial, further work has been done on testing the comparative rates of denaturation of these haemoglobins. Dr Baxter and Professor Boettcher both found that they appear to denature at the same rate. Mr Raymond's experience is the same. Accordingly, Mrs Kuhl's results appear to be anomalous. This supports the view that the reactions she observed were non-specific.

Thirdly, the recording of results in the result book in relation to this test and to the other two samples from the underdash area is unsatisfactory. Neither Mrs Kuhl nor Mr Legge, the technical officer who assisted her, now remembers what happened in relation to these tests. The result book discloses twelve occasions when the recorded results of the tests of these three samples were crossed out or changed. In contrast, it is quite unusual to find results crossed out or changed in the rest of the book. In

relation to this particular sample, a question mark is placed against the positive result recorded to anti-human anti-serum, and it appears that the question mark has later been crossed out. One can only assume that this reaction was at some stage doubtful.

Particular doubts arise as to the use of animal controls.

It appears that the anti-sheep anti-serum was originally proposed to be used, but was not. As for anti-pig, the entry in relation to it appears to have been altered twice, the last entry being a recorded negative. However, the explanation for these changes is speculative and one can only doubt whether, in relation to this test, any animal control was used.

A fourth problem affects this and the other two tests. Mrs Kuhl gave evidence that she never looked at plates immediately after running the electric current across them and that she always allowed them to be washed for 24 hours before reading them. Senior Constable Metcalfe gave evidence that he delivered these samples to Mrs Kuhl at her laboratory at about 9.30 a.m. on 12 November 1981, that he may have been present with Mrs Kuhl when she conducted preliminary testing, that she told him to expect the results of the tests by 2 p.m. on that day, that at 3.45 p.m. on that day he telephoned her and was informed by her that she had found the presence of foetal blood, and that at 3.48 p.m. he telephoned Superintendent Plumb of the Northern Territory Police and informed him of this finding. His evidence is confirmed by written notes he made at the time and by an entry in the police running sheets, recording the communication of a finding of foetal blood in respect of the first sample and human blood in respect of the other two. Mrs Kuhl's evidence was of finding baby's blood in all three samples. She said that so far as she could recall, she had not departed from her practice of not reading plates before washing. She and Metcalfe both rejected the suggestion that she had been placed under pressure to do the tests and to

give a quick result. However, he said that he did ask Mrs Kuhl to test the samples as soon as possible and give him the results and that he was anxious to get the results because his superior wanted to know what they were.

Since Senior Constable Metcalfe's evidence is well supported by contemporary written records, I accept it as establishing the probability that Mrs Kuhl did read and report on the results of these tests before washing the plates. She agreed that if she had done this it would have been improper since she would have been committing herself to a result before she could have been scientifically satisfied of that result. Of course it is now impossible to say whether this had any effect on the conclusions she reached. However the fact that Mrs Kuhl was prepared to do this in response to requests by the police is a matter of concern.

A fifth matter relating to each of these three tests is that Mr Raymond found positive reactions to the cross-over test from the area under the dashboard, to various anti-sera, but these reactions were invalidated by non-specific activity. It was his view that a person doing the cross-over test without proper controls could be misled by these false positives.

The other two samples from the under dashboard area produced less satisfactory results. The bands of precipitation with the anti-foetal haemoglobin anti-serum were recorded as being quite fuzzy and, according to Mr Martin, these would not meet one of the criteria necessary for detecting immune-chemical reactions, namely, clear and precise bands. Such results were therefore inconclusive. The laboratory's result book revealed that the first test of an extract from one of the samples was negative for all anti-sera, and the first test of an extract from the other

sample produced non-specific reactions to most anti-sera. It was unsatisfactory that neither of these tests was mentioned in the work notes which were produced at the trial and which were represented to be a complete record. It is also unsatisfactory that they were not mentioned by Mrs Kuhl when she was questioned about these samples in the witness box. She explained that the first tests were of supernatants after centrifuging a solution of the sample containing solid matter, whereas the second samples of each contained more of the solid material. However this does not appear to dispose of the objection that she relied upon the second tests and ignored the first. Both of the reported second tests included negative results to the anti-adult anti-serum, which were inconsistent with the presence of human blood.

Another unsatisfactory matter appearing in Mrs Kuhl's worknotes is an entry on the reverse side of the page immediately before the entries relating to the samples from under the dashboard. The entry reads: "No reactions with animal anti-sera (pig, sheep)". When compared with the entries in the result book, it became apparent that, in respect of the first test of one of these samples, no animal anti-serum was used at all and the crossing out of others raised doubts as to whether they were used.

Positive results to anti-human anti-serum were recorded in the second tests of each sample. Mr Martin said that he would accept the presence of human serum proteins in the samples, but not foetal haemoglobin. However, he agreed that such human serum protein would be likely to be found in breast milk, vomit regurgitated by a baby after being breast fed or in baby's or adult's saliva.

(e) Conclusion as to the spray pattern

For these reasons, I do not consider that the presence of baby's blood, or any blood, has been established upon the area under the dashboard. Further, on the basis of the findings of Messrs Raymond and Ross and the lack of any ortho-tolidine reaction on the initial testing by Mrs Kuhl, the strong probability is that any sample lifted out of the spray pattern on the metal plate was sound deadening compound and contained no blood at all. The sample tested as item 33 was dug out of the spray pattern with a scalpel, but Mrs Kuhl concluded that baby's blood was present in it. The fact that she could come to such a conclusion about something which was, very probably, sound deadener casts doubt upon the efficacy of her testing generally and upon the accuracy of her other results.

(2) THE CARPET ON THE DRIVER'S SIDE

Mrs Kuhl found baby's blood to be present in a sample taken from the carpet on the floor of the car in front of the driver's seat. She gave evidence of obtaining a positive reaction to the anti-foetal haemoglobin anti-serum in the cross-over electrophoresis test. Beforehand, she had found that the carpet gave positive ortho-tolidine reactions in some spots, and marked out the area of these spots to form a rectangular pattern which was seen as being similar to the base of the camera bag, immediately in front of the driver's seat.

Several matters must be considered in relation to this result. First, it appears that three samples taken from this piece of carpet were tested. Two of them produced non-specific reactions and only one produced reactions which were read as positive for foetal and adult

haemoglobins. The tests of the first two samples indicated the presence on the carpet of a substance other than blood which produced unexplained precipitations with the anti-sera. This would raise concern about the accuracy of the results with the last sample, unless such results could be repeated. Secondly, this last sample did not produce a positive reaction with anti-human anti-serum. Mrs Kuhl explained this by saying that, since the anti-human detects proteins in the serum part of the blood, this may denature faster than haemoglobin, thus preventing its detection. This view did not accord with the experience of other scientists who gave evidence. Dr Andrew Scott found that the anti-human was the most sensitive anti-serum and that, even with aged samples, it was more sensitive than anti-foetal haemoglobin. Professor Boettcher found that anti-human gave reactions to denatured blood well after anti-foetal haemoglobin and anti-adult haemoglobin failed to give reactions, and that anti-human reacts against serum albumin which is quite stable to heat. Mr Martin's experience was similar to Dr Scott's. Mr Martin considered that the detection of the presence of human blood is a criterion for any other testing and accordingly, this test was inconclusive. Professor Ouchterlony also considered that if the anti-human result is not positive, then other results cannot be relied upon.

Mrs Kuhl suggested to the Commission a further possible explanation for the lack of reactivity of the anti-human anti-serum. She said that, at about the relevant time, her laboratory had difficulty with the particular anti-serum and it was diluted in order to remove a secondary specificity. However, at the trial, Mrs Kuhl referred to this dilution, of 1 in 4, as being normal and said that the various anti-sera were of a workable comparative sensitivity, presumably as they were then used. In any event, one could not make a finding that these

particular negative results were the consequence of any such dilution of the anti-human anti-serum and it does not overcome the objections of the other experts.

Thirdly, the plate on which the positive reactions were obtained did not have a known adult blood control upon it, nor did any other plate run at the same time. Mrs Kuhl accepted that the presence of such a control, at least upon a plate run at the same time, was essential.

Fourthly, Mr Findlay Cornell, a consultant clinical biochemist, tested the carpets from the car in September 1982 for the presence of protein, using the method of iso-electric focussing. He obtained no positive result. Had there been any blood present in quantity of more than a drop, on this testing Mr Cornell would have expected to see evidence of the presence of protein, especially haemoglobin.

In relation to the positive ortho-tolidine reactions and the comparison with the camera bag, Mrs Kuhl told the Commission that she had obtained no reactions to the bottom of the camera bag and that it would be quite wrong to draw any correlation between the camera bag and the pattern of reactions obtained on the carpet, as had been done at the trial.

It is apparent on the weight of the expert evidence that a conclusion cannot be drawn that baby's blood, or any blood, was present on this piece of carpet.

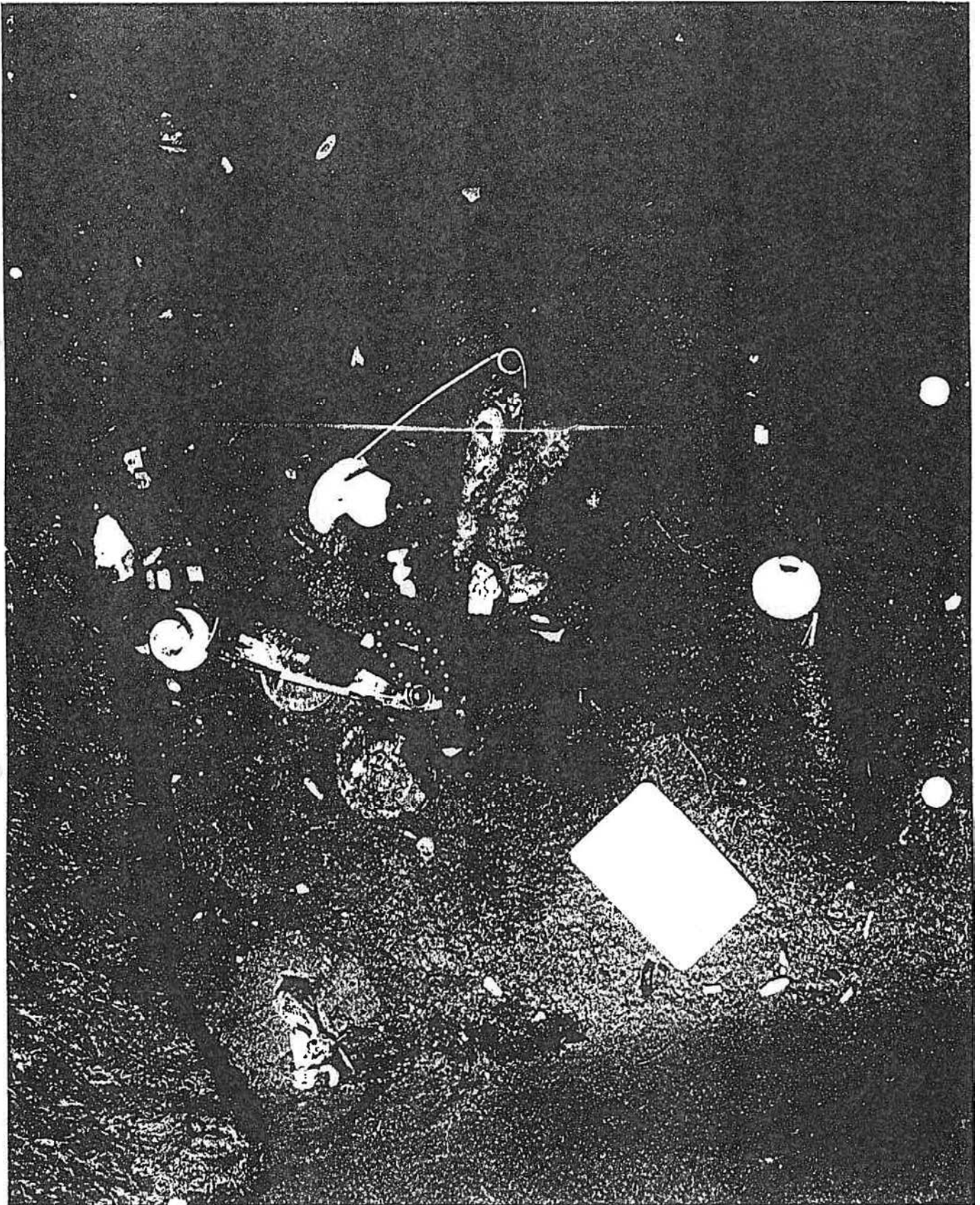
(3) THE OFFSIDE REAR OF THE PASSENGER SEAT AND THE
FLOOR BENEATH

Several of Mrs Kuhl's tests from which she concluded that baby's blood was present related to this

area. The Crown claimed that these results supported a finding that baby's blood had been shed above the hinge joining the vertical part of the passenger seat to the horizontal part on its offside, that this blood had run down into the space between the hinge and the vinyl covering of the seat (such a gap being opened-up by the weight of a person sitting in the seat), that such blood had continued on downwards and fallen from the seat on to the bracket holding the seat to the floor and a bolt hole in the floor where the seat was secured. It was further claimed that the blood had then spread to leave a stain in an elliptical shape in the floor well beneath the seat and beneath the carpet. It was also said that a ten cent coin which was found with other debris in the floor well had been stained by the blood. It is necessary to examine in some detail the various tests and their evidence in relation to the way in which such blood might have flowed. The photographs identified as "Floor beneath passenger side front seat" and "Front passenger seat showing hinge area" may assist in understanding some of the matters dealt with in this section. These photographs are reproduced. The ten cent coin in the former photograph is slightly to the left of the place where it was initially found.

(a) The ridge of the hinge

When this section of the seat was dismantled, Mrs Kuhl and others saw flakes of material adhering to the hinge and to the vinyl of the seat beneath the hinge. Some of these flakes fell away when the hinge was removed. The flakes had an appearance consistent with that of blood stains. The material on the vinyl beneath the hinge initially proved negative to the ortho-tolidine test, but after it was rubbed and dug into with a scalpel, a positive ortho-tolidine response was obtained. Samples from the



Floor beneath passenger side of front seat.

Front passenger seat showing hinge area.



ridge of the hinge produced no reactions with anti-sera using the cross-over technique, but Mrs Kuhl then tested them using the tube precipitin technique. She recorded positive findings of foetal haemoglobin with samples from the ridge of the hinge, from flakes from the vinyl behind the hinge, and from the back surface of the hinge.

Mrs Kuhl included these tube precipitin results in the 22 positive tests for foetal haemoglobin to which she referred at the trial. However, she agreed that she would not regard this test as sufficiently accurate to report it as a finding on its own. She said that she was using this test merely as a "screening test" and that it would have to be confirmed by other tests before she reported it. This method is an old one with acknowledged drawbacks. It is particularly dependent upon the extract from the blood stain being crystal clear. There are many things that might render the extract cloudy and, under those circumstances, Mrs Kuhl agreed that the test would be useless. Further, in order to detect foetal haemoglobin reliably, it is clear that the use of a known adult blood as a control and the obtaining of appropriate results would have been necessary. At the trial, Mrs Kuhl said that she used adult and foetal controls for all these tube precipitin tests. However, they are not recorded in her work notes, there is no laboratory result book record of the tests at all, and before the Commission she said that her evidence at the trial was incorrect and there were no adult controls in these tests.

In addition, Mrs Kuhl's notes record the reaction of a foetal haemoglobin control to the anti-serum as being plus or minus with a question mark. Mrs Kuhl suggested that the reason for the failure of this control to work properly was a "prozone" effect, where the antigen is present in an excessive concentration compared to that of

the anti-body, thus preventing the lattice comprising the two types of molecule from forming so as to produce a visible precipitate. However, this explanation may be unsatisfactory. Professor Boettcher said that in the tube precipitin test a higher concentration of haemoglobin is the most desirable situation for production of a clear result. In any event, as discussed below in relation to the testing of the scissors, the failure of controls should lead to rejection of the result.

The tube precipitin tests do not establish to my satisfaction that there was baby's blood, or any blood, on the hinge or in the flakes from the vinyl behind the hinge.

(b) The flakes from the vinyl behind the hinge

In addition to the tube precipitin results Mrs Kuhl found the presence of foetal haemoglobin in a sample from this area using the cross-over technique. The records of this test do not include any record of a test of the sample against anti-adult haemoglobin anti-serum. It was Mr Raymond's opinion that, in order to interpret such a result as showing the presence of baby's blood, the operator must further test the sample at various dilutions against both the anti-foetal haemoglobin and anti-adult haemoglobin anti-sera. He said that this was necessary in order to come to a conclusion as to the ratio of the concentrations of the two haemoglobins. According to Mr Raymond the test is not properly controlled without this procedure. A second difficulty in relation to this result is the fact that the initial ortho-tolidine test of the area was not positive. How a deposit of blood there could be coated by some other substance so as to prevent detection by that method was not satisfactorily explained.

When opportunities occurred for the confirmation of the presence of baby's blood in these samples, such confirmation was not forthcoming. Mr Culliford tested one half of a section of vinyl cut from this area of the seat. He gave evidence at the trial that he detected blood on it, but could not identify its origin. On the other hand, when Dr Lincoln tested the other half of the same section of vinyl, his Kastle Meyer screening test for blood was negative. Mr Culliford's finding here is subject to the same limitations to which ■ have referred above. Taken together these tests do not afford confirmation of Mrs Kuhl's result.

Further, Mrs Kuhl's result in the cross-over test on this sample appears to be inconsistent with the negative results upon testing of the material taken from the ridge of the hinge and on the back surface of the hinge, if one assumes that it was the same material which caused these stains, as she contended. Mrs Kuhl suggested that the material adhering to the hinge itself may have been "more denatured", but the reason for this was not established.

Taking into Recount these criticisms and the general difficulties discussed earlier, ■ am not satisfied that the presence of baby's blood has been established in this sample. The question of the presence of blood of any kind will be considered below.

(c) The haptoglobin tests - the passenger seat hinge

Mrs Kuhl subjected a number of samples from the hinge area to a different test involving the use of a haptoglobin plate. This involves the placing of the sample in a gradient gel under electrophoresis, so that the

components pass through the gel and are deposited in bands at various positions which depend upon the molecular sizes of the various components. The gradient gel acts as a "molecular sieve" through which molecules of varying sizes may either pass or be trapped at different levels. The primary purpose of the test is to detect the presence of haptoglobin, a protein occurring in the serum of the blood, of various types. However, other components of blood may appear as bands upon the haptoglobin plate, such as different types of haemoglobin. The assessment of what makes up a particular band principally depends upon its position on the plate.

Mrs Kuhl conducted haptoglobin tests on a number of samples from the hinge area. She obtained no haptoglobin bands upon any of them, but, in respect of two samples, from the back surface of the hinge and from a swab from the vinyl behind the hinge, she recorded that she saw a foetal haemoglobin band on the plate. The observation of a band of adult haemoglobin is not recorded, but Mrs Kuhl said that, if it had not been visible, the plate would not have been read. Dr Baxter said that he remembered one of these tests, and that he saw a very obvious foetal haemoglobin band. He also said that due to a comparison of the colours of the bands he estimated that foetal haemoglobin was present as 50% of the haemoglobin present.

There are a number of aspects affecting these conclusions. First, the weight of scientific opinion expressed before the Commission is that the haptoglobin plate cannot be used to distinguish haemoglobins in aged blood. According to Dr Scott, Mr Raymond and Professor Boettcher the bands of adult and foetal haemoglobin are unlikely to be distinguished after a period of a few months.

Secondly, it appears that healthy adult blood can produce two bands in the haemoglobin position on a haptoglobin plate. The precise explanation for this phenomenon is unknown, although possible explanations for the phenomenon were given by some of the experts.

Thirdly, a difficulty in accepting Mrs Kuhl's interpretation of these plates is the fact that no control of baby's blood or foetal haemoglobin was used, to enable a comparison to be made of positions on the plate. Dr Baxter said that, without this control, the operator cannot know with any degree of certainty that the second band is one of foetal haemoglobin. Particularly with old and denatured blood, it is possible to obtain other bands forming in different positions on the gel. Dr Andrew Scott agreed. It is to be noted that Dr Baxter's evidence as to 50% of the total haemoglobin being of the foetal type is inconsistent with the proportion present in Azaria's blood, which was approximately 25%.

Finally, Dr Baxter expressed the view that on the basis of this test alone, he could not conclude that foetal haemoglobin was present. He said that it could only be a confirmatory test.

For these reasons I have reached the conclusion that Mrs Kuhl's recorded results do not establish the presence of baby's blood in either of these two samples. The results may support a conclusion that some blood was present in the vicinity of the hinge. The results must be compared with others in relation to the general area and will be considered below.

(d) The bracket beneath the hinge

The Crown claimed that blood flowing down between the hinge and the vinyl would drop from the hinge to the bolt bracket beneath. However, a cross-over test of the samples from this bracket produced a positive reaction only with anti-haemoglobin anti-serum. Since there was no reaction with the other anti-sera, including anti-human, it cannot be regarded as a reliable indication of the presence of human blood.

(e) The bolt hole area of the floor

Beneath the bracket is a bolt hole in the floor of the vehicle. It serves as an anchor point for the offside rear corner of the seat. When the seat was removed in October 1981, Mrs Kuhlsaw a k brown stain in an elliptical shape which appeared to her to be emanating from the position of this bolt hole. A swabbed sample from around the bolt hole was subjected to the cross-over test and Mrs Kuhl recorded a positive reaction with the anti-foetal haemoglobin anti-serum. However, she obtained no reaction to the anti-human anti-serum and, for the reasons expressed above, one could not rely upon this test as establishing the presence of blood. Further, the sample was not tested against anti-haemoglobin or anti-adult haemoglobin anti-sera and, accordingly one could not conclude from the reaction with the anti-foetal haemoglobin anti-serum that baby's blood was present. The test of this sample upon the haptoglobin plate is recorded as revealing a haemoglobin band. Mr Martin gave evidence that he would therefore conclude that blood was present. The significance of these results to the question whether blood other than baby's blood was present will be considered later in this report.

(f) The floor well beneath the passenger seat

From the stained area of the floor well beneath the passenger seat, carpet and underfelt, Mrs Kuhl tested two samples, one prepared from scrapings from this area, and the other from a swab of the area. Both were tested using the cross-over technique. The scrapings produced no reaction with two different bottles of anti-foetal haemoglobin anti-serum and no reaction with anti-human, but a reaction with anti-haemoglobin anti-serum. For the reasons expressed above, since the reaction with anti-human was not positive, the other results could not be relied upon. However, the testing of both scrapings and swab samples upon a haptoglobin plate produced haemoglobin bands for each, indicating the presence of blood.

Mrs Kuhl gave evidence of a positive reaction between the swab sample and anti-foetal haemoglobin anti-serum in a cross-over test. In her work notes, tendered at the trial, this was indicated by two plus signs, one above the other. At the second inquest, she gave an explanation that she quite often recorded a double plus, or very good result, in this way. Before the Commission, the laboratory's result book was available, showing a plus sign above a minus sign, indicating a questionable result. Mrs Kuhl agreed in evidence that her notes which were produced at the trial had been changed by her from a plus/minus to a double plus, but said that this was because a clear band became visible after weekend washing. If this were the case, it might have been expected that the result book would have been altered similarly. I am left in doubt as to what the result was.

There are other problems with this result. First, there is no reaction with the anti-human anti-serum on the same plate. In these circumstances, the anti-foetal result

cannot be accepted as reliable. Secondly, there is no record of the testing of the sample against anti-haemoglobin anti-serum or anti-adult haemoglobin. The requirements of Dr Andrew Scott for both positive and negative controls and of Mr Raymond for further testing against anti-foetal and anti-adult haemoglobin anti-sera (as mentioned above) were not met. Thirdly, the result appears to be inconsistent with the negative result to the cross-over test of the scrapings from the same area, which one would expect to be the same material. Fourthly, while there was some underfelt fibre in the floor well which produced ortho-tolidine positive reactions, the carpet and underfelt above the staining and a number of objects lying in the floor well, including a safety pin lying in the middle of the stained area and some nail clippers, produced no response to the screening test. A ten cent coin also lying in the floor well was an exception.

Opportunities to confirm the finding of baby's blood did not provide confirmation. Mr Culliford tested a sample of scrapings from the floor well and detected blood, but was not able to identify it as human blood. His finding suffers from the same limitations as apply to his finding in respect of the steel plate, as discussed above. Dr Lincoln tested scrapings taken from the floor well and, while they gave a very weak positive reaction to screening tests, immuno-chemical testing produced non-specific reactions with all anti-sera. Scrapings from the bolt hole area were available for testing by Messrs. Raymond and Ross in 1986. They said that this material, and the material remaining on the ten cent coin contained sucrose as well as protein material. This material did not have the appearance of blood and there was no indication that there was more than one kind of liquid included in it. Under the microscope most of the material tended to have a similar appearance, if the pieces of fibre, dirt and so on embedded in the material

were ignored. The material was consistent with it being a sweetened milk drink, a fruit drink or the like which had been spilt and dried. Mr Raymond obtained a number of misleading reactions in immuno-chemical testing from the floor under the passenger seat, particularly the bolt hole area. In his opinion, there were ways in which an operator testing this area might be mistaken if the tests were not properly controlled and the operator was not fully competent.

A final obstacle to a conclusion that there was blood in the floor well which had flowed down the side of the passenger seat is the difficulty in explaining how it might have got there without staining the carpet or the underfelt covering the floor well. When Senior Constable Metcalfe and Mrs Kuhl removed and inspected the carpets in 1981, there was no staining of the carpet or the underfelt above the staining in the floor well. When tested by Mrs Kuhl and Mr Cornell, the carpets produced no results supporting the presence of blood. If even a small trace of blood had been there, one would have expected Mrs Kuhl's ortho-tolidine test to have detected it.

In 1986, Sergeant Henry Huggins, attached to the Victorian State Forensic Science Laboratory, investigated the path taken by the liquid to the stained area which was still evident in the floor well of the car. He concluded that the stain as observed by Mrs Kuhl could have arrived there in three ways: first, from the rear mounting bolt hole of the centre console, but only if the vehicle was parked facing down a steep slope, to enable it to run in the direction apparent; secondly, from liquid being forced up through the rear offside bolt hole under the passenger seat if the bolt was not a good fit, when the car was driven through water; or thirdly, from above, through the hole in

the carpet and underfelt cut out so that these would fit around the offside rear support of the passenger seat.

As to the second of these possibilities, Mr and Mrs Chamberlain gave evidence of driving the car through water which had come up above the floor level on more than one occasion but Mr Chamberlain said that the water had not entered the car. While the other two explanations appear to be possibilities, the most likely appears to be the third, namely the spillage of liquid from above. However, as Sergeant Huggins pointed out, because of the fit of the carpet so as to cover the mounting bracket and underfelt in their original positions, liquid flowing down off the seat could not go straight on to the floor, nor directly on to the mounting bracket, but would have to drop on to the carpet first.

In November 1981, Mrs Kuhl and Senior Constable Metcalfe conducted an experiment with a similar car seat in which 5 mL of blood were poured between the hinge and the vinyl making up the side of the seat. Photographs were produced showing the pattern in which the blood flowed down between the hinge and the vinyl and dropped off the lower part of the seat on to the surface below. I accept the conclusion of Sergeant Huggins that, on the basis of this experiment as revealed in the photographs, blood flowing down in this manner would drop in two separate positions on to the carpet beneath.

It is apparent that, **if** blood had soaked through through the carpet, it would have left staining on the carpet and on the underfelt. No such stain was found. Further, even if the carpet and the underfelt was originally stained and subsequently cleaned as to remove the stain, it is probable that traces of blood detectable by the

ortho-tolidine test would have remained, and that signs of the staining or cleaning would have been visible.

(g) The ten cent coin found in the floor well

When Mrs Kuhl removed a ten cent coin from the floor well, she found a dark sticky substance adhering to one side and a dark brown/red stain on the other, which she swabbed off. In the cross-over electrophoresis test, she recorded the presence of "excellent bands" of precipitation with the anti-foetal haemoglobin anti-serum. Before the Commission, Mrs Kuhl strongly relied upon this result as showing the presence of baby's blood. She also relied upon her observation of a haemoglobin band from this sample on a haptoglobin plate, as indicating the presence of blood.

Her conclusions from the cross-over test are open to a number of criticisms, apart from the general difficulties referred to in Chapter 7. First, she did not run a test with anti-haemoglobin anti-serum, so her testing was deficient in this respect. Secondly, the sample was not tested against anti-adult haemoglobin anti-serum. In

Mr Raymond's view, one cannot interpret the result as showing the presence of baby's blood without further testing the sample at various dilutions against anti-foetal and anti-adult haemoglobin anti-sera to decide the ratio in concentrations of the two haemoglobins. Without this, the test, in his view, was not properly controlled. Thirdly, there was no apparent check on the viability of the anti-pig and anti-sheep anti-sera used on the plate at or about the same time, to ensure that she was not being misled by a non-specific reaction. Fourthly, Mrs Kuhl said that the coin was actually sitting in the most heavily stained area of a pool under the seat. If it were blood upon the coin, the question arises as to why baby's blood was not

detectable upon the other items found in this area such as nail clippers and a safety pin, upon the scrapings of the stain from the floor well, and upon the carpet and underfelt. When the coin was tested by Messrs Ross and Raymond in 1986, no blood was detectable upon it, but the sucrose and protein components of the staining on the floor of the car were also found on the coin.

This suggests that the coin was in the floor well when some of the staining of it occurred. However, if the stain tested by Mrs Kuhl was a different substance, then one could not infer that it came upon the coin while it was in that position. There were slits in the carpet so that it fitted around the base points of the seat and, presumably, the coin at some time fell into one of these slits and worked its way into the floor well. One cannot say where the coin was when this stain occurred.

Mr Raymond expressed the view that having regard to what he thought were inadequate controls used in testing the coin, and to some of the general difficulties referred to in Chapter 7, he would not have relied upon the results of Mrs Kuhl's tests as demonstrating there was baby's blood on the coin. I share Mr Raymond's view.

(h) Conclusions

It is clear that there are fundamental objections to the acceptance of Mrs Kuhl's findings of baby's blood in the area of the offside rear hinge of the passenger seat and the floor beneath. This would be the case even upon a consideration of only the general difficulties referred to in Chapter 7. These fundamental objections are reinforced by the additional matters to which I have referred.

(4) OBJECTS IN AND ASSOCIATED WITH THE CAR

In the paragraphs above, the findings of baby's blood in parts of the car itself have been considered. The remaining findings of baby's blood were in samples taken from articles found in the car on 19 September 1981, or upon Mr Chamberlain's camera bag which had been taken to Ayers Rock and which was produced to the police in September 1981.

(a) The scissors

On 19 September 1981, a small pair of nail scissors was found in the console of the car. The console was then in the boot of the car having been removed from its usual position in the car to enable repair work to be carried out. Mrs Kuhl gave evidence that there were small areas of visible staining upon them, reddish brown in colour, in the grooves on the handles and in the joint between the two blades. She obtained positive ortho-tolidine responses from certain areas shown on a diagram in her work notes and then subjected a sample swabbed from the entire surface of the scissors to an Ouchterlony test. A diagram of the result appears in her work notes. It shows a faint line between the sample and one of two anti-foetal haemoglobin wells. She noted, and gave evidence at the trial, that there were indications of the presence of foetal origin.

There are a number of unsatisfactory features of this test. First, it is odd that although Mrs Kuhl's work notes include a diagram of the scissors referring to the ortho-tolidine positive areas, there is no reference to the visible staining. This is to be compared with the other articles and parts of the car tested, where any visible staining has been carefully described, in accordance with normal laboratory practice. Secondly, there was a lack of

adequate controls, particularly an adult control on the plate. Thirdly, most of the controls on the plate failed to work. In particular, control samples of cord blood failed to show reactions with either of two wells of anti-foetal haemoglobin anti-serum or with anti-haemoglobin anti-serum. Altogether, there were five reactions which did not appear on the plate which ought to have appeared if the test ran satisfactorily and the sample contained baby's blood. Raymond, Scott, Baxter and Martin were in agreement that when controls fail in a test such as this, the result should be rejected as worthless.

Mrs Kuhl sought to explain the failure of the controls by referring to the "prozone effect", the cord blood control being too concentrated for the anti-serum. Following this test, she checked the dilutions and found that the controls were too concentrated, but kept no record of her checks. She also carried out recent tests which, in her view, support her opinion that the failure of the controls was due to the prozone effect.

A good deal of evidence was given about the original test and its interpretation at the trial and before the Commission. It would serve no useful purpose to canvass it in detail. Mrs Kuhl's explanation of the failure of controls was rejected by other experts, including Professor Ouchterlony. He said that it was impossible to accept that no result was originally obtained and that a result was obtained in subsequent testing of the controls, with a dilution changed merely by a factor of two.

While it appears that Dr Baxter discussed the result with Mrs Kuhl in September 1981 and made some suggestion that she could report indications of foetal blood, Dr Baxter has now said that, considering all the failures in the test, it should have been forgotten. ■

accept this as the appropriate assessment of the result. Mrs Kuhl ultimately told the Commission that, if she had reported this test as she had wished, she would have said that the testing did not confirm the presence of blood or species. There were no instructions within the Health Commission as to what a biologist should or should not report in a situation such as this.

In 1986, Mr Raymond obtained weak ortho-tolidine reactions from the scissors and non-specific reactions in immuno-chemical tests. This indicated that, at least by 1986, there was a substance upon the metal surface of the scissors which produced such non-specific reactions but which was not blood.

Some factual evidence before the Commission not given at the trial was that, on 1 October 1980, Senior Constable Graham thoroughly examined the interior of the car and found no cutting implement of any kind. Mr and Mrs Chamberlain said that a pair of scissors of one kind or another was usually kept in the car, but they did not know whether this particular pair was in the car in August 1980. On the evidence, one could not even find that the scissors were in the car at Ayers Rock in August 1980.

(b) The towel

On 21 September 1981, a cotton towel was found in the boot of the car. It was yellow and white with a floral pattern and had many stains over both surfaces. Mrs Kuhl's notes refer to the presence of rust and dirt. She concentrated upon a "fairly heavy dark brown stain with sprays or splashes" on one hem of the towel and "two light smears or wipes" across the centre of the towel.

Samples from the towel were subjected to a large number of tests over the next two months. The orthotolidine screening test was positive with these stains and the responses recorded in Mrs Kuhl's notes varied from "somewhat slower than normal but good colour" to "strong positive". However, Takayama tests, which are very specific tests for the presence of haemoglobin, Ouchterlony plates, haptoglobin plates and iso-electric focusing plates used in an attempt to detect enzymes did not demonstrate the presence of blood at all. Nor did the absorption/elution test to obtain ABO blood groupings. This is one of several techniques for grouping bloods, by reference to certain antigens in red blood cells, into four main groups, A, B, AB and O. It is further discussed below.

A number of cross-over electrophoresis tests produced no reactions. However two of such tests produced reactions which must be considered in more detail. The first, on 22 September 1981, is recorded as producing positive reactions with anti-human anti-serum and to one anti-foetal haemoglobin anti-serum. There was another well of anti-foetal haemoglobin anti-serum on the plate and, in relation to it, Mrs Kuhl's work notes tendered at the trial recorded the reaction with it as being positive. However, in the laboratory's result book, "this reaction is recorded as being negative. Mrs Kuhl told the Commission that the recording in her notes was an error.

There are two factors detracting from the reliability of this recorded positive result with anti-foetal haemoglobin. First, there is recorded in Mrs Kuhl's notes a note- "bands not very strong or distinct". Such band" would therefore appear not to comply with Mr Martin's criteria for interpretation as specific immune-chemical reactions. Secondly, her notes do not record a second matter which appears in the result book,

namely that one of the wells of anti-foetal haemoglobin anti-serum failed to react with a known cord blood control.

■ have already referred to the general principle that, if the controls do not work appropriately, the results should be rejected.

On 12 October 1981, another sample produced a positive reaction with anti-foetal haemoglobin in the cross-over electrophoresis test. However, the same sample failed to react with anti-human or anti-haemoglobin anti-sera and, for the reasons referred to above, one could not treat this result as reliable. In addition, there was no known adult blood control on this plate or on any plate run at the same time. Mr Raymond said that the appropriate reaction with such a control is essential to interpret the reaction with the anti foetal haemoglobin anti-serum.

Mrs Kuhl conducted tube precipitin tests which also produced positive reactions with anti-foetal haemoglobin. However, in the first batch of these tests, no negative control was included, such as an anti-animal anti-serum, and for all any observer could tell, the reactions may have been non-specific. Upon testing a second batch of three samples with the tube precipitin test, including anti-pig and anti-sheep negative controls, two of the three samples produced cloudy extracts and could not be read. A third sample was recorded as producing positive reactions with anti-foetal, anti-human and anti-haemoglobin, with appropriate negatives for the anti-animal anti-sera. However this result was inconsistent with a negative cross-over electrophoresis result with a sample from the same area and Mr Martin said the cross-over test is normally more sensitive than the tube precipitin test. Further, no adult control was tested at the same time as this sample and ■ therefore could not rely upon the positive reaction with

the anti-foetal haemoglobin indicating the presence of baby's blood.

Dr Lincoln tested a square of material cut from the towel including the larger smear. He obtained no confirmation of the presence of blood. Had blood been present, Mr Martin would have expected to obtain responses to screening tests and immuno-chemical reactions, in the light of Mrs Kuhl's results. Mr Raymond said that he would have expected to obtain some confirmation in 1986 of the presence of blood on the towel if Mrs Kuhl's results had been correct, but he obtained no such confirmation.

Mr Martin and Dr Lincoln said that a used towel is a very difficult article to test for the presence of blood because of the danger of misleading reactions with residual soap and dirt on the towel. Mr Martin said he would not test anything on a towel for blood unless he was compelled to do so and that he would not expect any clear result. According to Dr Lincoln, if he were going to test something like a towel, a substrate control would be important. A part of the towel without any stain and without a positive reaction to the screening test should be selected and tested as a control, to give a basis for concluding that a positive reaction with the sample is not soap or something in the towel itself.

The fact that Mrs Kuhl obtained no reaction in the absorption/elution test for ABO blood grouping would support the view that there was no blood on the towel. This test is extremely sensitive. The ABO blood group antigens are very stable and will still be detectable after blood has been exposed to extreme heat. They are notoriously long lasting. Professor Boettcher and Dr Baxter were in substantial agreement that the failure to obtain reactions

to this test, if the test were conducted properly, would indicate that no blood was present.

It can be seen that the positive results in relation to this towel are unsatisfactorily supported and are contradicted by many other results. It was clearly a very difficult item to test with any degree of reliability. I do not consider that the presence of baby's blood or of any blood on the towel has been established.

If the towel was used to wipe a murder weapon or to clean up blood from the car it is difficult to accept that the Chamberlains would have left the towel in the boot of the car for over 13 months, particularly if it had been their intention to clean up the traces of blood in the car. The lack of a sensible explanation for such strange conduct would raise doubts about the evidence of baby's blood on the towel, even if the results of the tests were much more acceptable than they are.

(c) The chamois and its container

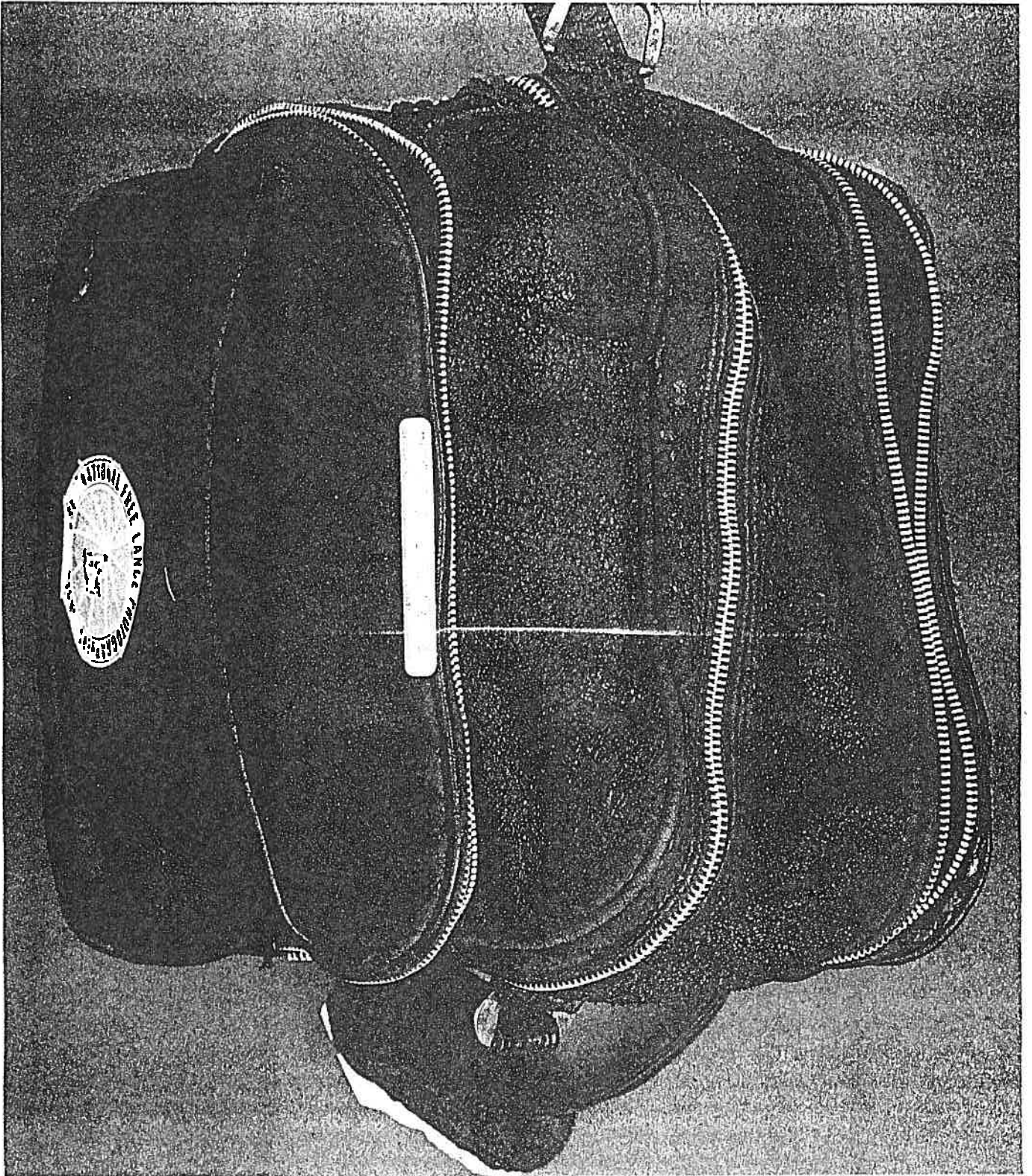
A synthetic chamois in a plastic container was also found in the boot of the car. The chamois is recorded as producing quite strong positive responses and the inside surface of the container strong responses to Mrs Kuhl's ortho-tolidine test. A swab taken from the entire inside surface of the container, when subjected to the cross-over electrophoresis technique, produced positive reactions with anti-foetal haemoglobin and anti-human anti-sera. This was relied upon by Mrs Kuhl as proving the presence of baby's blood. She was concerned that the reaction produced was one with the synthetic material of the chamois itself so she went over the chamois inch by inch with ortho-tolidine, and concluded that it was not such a reaction.

The chamois was damp when Mrs Kuhl removed it from its container. It was common ground among the experts who gave evidence to the Commission that the conditions in which the chamois was kept, namely in humidity and heat, were the most conducive to denaturation of blood stains. Mr Martin said that, under these circumstances, he would not have tested the chamois or its container. Professor Nairn said that he would be astonished to get a result on something like these articles. Mrs Kuhl agreed that she was surprised by her result. Her surprise was not expressed at the trial.

A second reason for doubting this result is the absence of a control of known adult blood, either upon the same plate or a plate run at the same time. It was common ground among the experts that such a control is necessary. The absence of such a control was not apparent at the trial since Mrs Kuhl's work notes included a note at the bottom of the relevant item referring to controls being good and specifying those controls as "human adult" and "human (cord blood)". It is apparent from the laboratory's result book that the former was not used. The making of this incorrect entry in the notes was not satisfactorily explained.

A further matter in relation to this positive result is the fact that the reaction with anti-haemoglobin anti-serum was recorded as plus/minus and was therefore weaker than the reaction recorded with anti-foetal haemoglobin. For the reasons expressed above, this is anomalous and supports the view that the reactions were non-specific.

For these reasons, I do not consider that the presence of baby's blood or of blood has been established upon the chamois or its container.



(d) The camera bag

This item was a black vinyl camera bag which was not in the car when it was taken by the police on 19 September 1981, but was handed over by the Chamberlains on that day. It was in the car on the night of 17 August 1980. A photograph of the camera bag is reproduced.

Mrs Kuhl examined the bag during the course of the second inquest, in January 1982. She observed that the vinyl was in poor condition and that rust was apparent on the metal attachments. She examined the bag in the most exhaustive way. She took some four days to screen it with ortho-tolidine and to carry out tests. She obtained various ortho-tolidine reactions which she described as "quite strong", "strong", and "definite positive". She saw some visible staining on a zip clasp of one compartment which she subjected to the Gross-over electrophoresis test and obtained a positive reaction with anti-foetal haemoglobin anti-serum. She obtained a similar result with an extract from a buckle on the outside of the bag. Other samples tested proved negative and three of those tested gave non-specific reactions to all anti-sera or to the animal anti-sera.

These results were relied upon by the Crown as establishing the presence of baby's blood on the camera bag. As I have observed in Chapter 5 it was submitted by counsel for the prosecution in his closing address that such results and the ortho-tolidine responses throughout the rest of the bag indicated that the murdered baby or her clothing had been placed in the bag. He also relied upon Mrs Kuhl's evidence that she thought that the camera bag had been washed. In the High Court, Gibbs C.J. and Mason J. said that the condition of the camera bag suggested that it had

been cleaned but not with complete effectiveness (153 CLR at p.567-8).

Before the Commission, the significance of tests of the camera bag made by other scientists before and after Mrs Kuhl tested it became apparent. Dr Andrew Scott examined it before the second inquest. He saw nothing that would indicate blood upon it. He tested some areas very carefully with ortho-tolidine. He obtained very weak reactions of the sort that would normally be ignored. He then sprayed it with luminal, a screening substance which fluoresces on contact with blood and other substances. The entire zip of the camera bag fluoresced, but this was not unusual with metal objects of that type. Accordingly, there was nothing to indicate to him the presence of blood in significant amounts. He thought there was nothing that required further testing. Nothing appeared to him to indicate that the camera bag had been washed.

Dr Lincoln examined and tested the camera bag in May 1982. His screening tests did not demonstrate the presence of blood.

So far as Mrs Kuhl's ortho-tolidine reactions are concerned, it is significant that she obtained them with small amounts of grit found in the bag. In contrast, she did not obtain positive reactions with the stitching in the seams of the bag. Dr Scott and Mr Martin expressed the view that if blood stained clothing had been placed in the bag and it had later been carefully washed and wiped, as was suggested by the Crown, one would be most likely to find remnants of blood in the stitching of the seams of the bag. They said that it would be very difficult to remove all blood from the stitching. Obtaining positive reactions with grit suggests that the grit contained some substance other than blood which produced the appropriate chemical

reaction. This possibility will be considered in more detail below. In her evidence before the Commission, Mrs Kuhl accepted that there appeared to be inconsistency between the results she obtained and the notion that the camera bag had been washed to remove blood.

Mr Raymond also tested the bag in 1986. It is significant that he, Dr Scott and Dr Lincoln all obtained reactions from the metal parts on the outside of the bag. Using the cross-over electrophoresis method, Mr Raymond obtained non-specific reactions from the clasp which, to him, looked real before the plates were stained. Had he done the ortho-tolidine test and cross-over with ut staining and without any other confirmatory test such as the Ouchterlony, he would have interpreted the cross-over result against anti-human anti:..serum as positive. He said this clearly indicated to him the possibility of a person falling into error if he tested the metal parts of the bag without undertaking full testing. The fact that Mrs Kuhl recorded the presence of rust on both the zip clasp and the buckle from which the positive results were obtained further supports the need for caution. Mrs Kuhl did not use any substrate control in her tests and the findings of the other experts indicate that such a control was necessary before one could interpret the reactions as having been produced by a stain rather than the metal surface. The non-specific activity detected by Mrs Kuhl in respect of three of her samples would support the necessity for such a control.

Mrs Kuhl concluded that baby's blood was present on both the zip clasp and the buckle of the camera bag, notwithstanding that, in relation to the second of these, the reaction to anti-human anti-serum was a doubtful plus/minus as recorded in the result book. Without satisfaction that this was an immune-chemical band showing a

reaction with the more sensitive anti-human anti-serum, the other results could not be relied upon.

For these reasons, I consider that it has not been established that baby's blood was present on the camera bag. The question of the presence of any blood on it will be further considered below.

B. SUPPORT FOR MRS KUHL BY OTHERS

) The accuracy of Mrs Kuhl's conclusions was given considerable support at the trial by Dr Baxter and Mr Culliford. Dr Baxter said that he saw the plates and gels used by Mrs Kuhl in her experiments and agreed with her conclusions. Mr Culliford said that he had read Mrs Kuhl's laboratory work notes and her evidence and approved of her methods and conclusions.

Before the Commission, Mrs Kuhl said she was certain that Dr Baxter had seen all her results, whether they were positive or negative. Dr Baxter disagreed. It was his recollection that before the testing began he instructed Mrs Kuhl before the testing began that he should check any results positive for foetal haemoglobin and any blood groupings subsequent to this. He remembered only one result with clarity, that being a haptoglobin plate upon which a second band appeared in the position of a foetal haemoglobin band. He did not know whether or not he looked at every positive result Mrs Kuhl obtained. He looked at what she showed him. He may have looked at some negative results, but he could not say. He agreed with her conclusions in respect of what he was shown. He did not think he had seen any **Of** Lhe stains which were thought to be blood. Dr Baxter was on leave from the laboratory between 13 and 21 October 1981. The result book shows two

cross-over plates were run on 12 October and, in the ordinary course, these would not have finished the washing process and would not have been read until 13 October. It therefore seems unlikely that Dr Baxter checked the results of these plates, or the results of the plate recorded as having been run on 15 October. Mrs Kuhl thought otherwise. Dr Baxter doubted whether he had seen these, and various other plates, as they were unusual in their lack of controls or in other respects, and he would have remembered them had he seen them.

There was no system in the laboratory whereby a second biologist who checked a result signed or initialled the result book or the work notes. Hence, there is no written record of whatever checks Dr Baxter may have done. In relation to her war in the Chamberlain case, Mrs Kuhl prepared six written reports. It was the practice for handwritten drafts of such reports to be approved and initialled by Dr Baxter before they were typed, unless he was not present. It is surprising that, in a case where Dr Baxter had given special instructions, at least to the effect that he be shown positive results, three out of the five handwritten draft reports tendered to the Commission were not initialled by **Ilut**. This suggests that the checking of Mrs Kuhl's work was not as extensive as it might have been. Overall, Dr Baxter's lack of recollection of the results he saw and the failure to record his checking of any results significantly diminish the weight of his support for Mrs Kuhl's conclusions.

So far as Mr Culliford is concerned, the approval he expressed at the trial of her methods and conclusions could not be further explored since he was too ill to give evidence to the Commission. However, Mr Martin, Mr Culliford's successor at the Metropolitan Police Forensic Laboratory in London said that, although he had not read all

of Mrs Kuhl's evidence, he found her work notes extremely confusing. On the information before him, it was impossible for him to pass judgment on the reliability or accuracy of her testing procedures. He said it would have been necessary for him to have been there, to know precisely what she did and what she found.

Accordingly, the Crown was obliged to rely to a large extent upon skill and experience of Mrs Kuhl in the conduct of the tests and the interpretation of what she saw on particular plates.

C. MRS KUHL'S EXPERIENCE

Mrs Kuhl obtained the degree of Master of Science from Sydney University. Before examining the Chamberlains' car, she had had, with interruptions, approximately four years' experience in forensic biology. She had used the cross-over electrophoresis technique frequently but had had very little experience with the Ouchterlony test. The tube precipitin test was not a technique that was used very often in the Health Commission's laboratory. She had obtained much experience in using the ortho-tolidine test, but had only applied it to old blood stains, being more than a year old, on a very few occasions and had not experienced the second stage reactions with copper compounds discussed below.

While she had used the anti-foetal haemoglobin anti-serum in one case prior to the Chamberlain case, she had not used it and, so far as she was aware, no one else had used it previously in the cross-over electrophoresis method in connection with old blood stains. It appears from the matters considered in Chapter 7 that she depended upon bases for distinguishing between specific and non-specific

reactions in the cross-over test which, in the particular circumstances of this case, may have been unreliable. From her failure to use any controls taken from Azaria's jumpsuit or any other controls of aged samples, it would appear that she was unaware of the dangers posed by the likely denaturation of any blood in the samples tested.

These matters and the conclusions I have drawn in Chapter 7 that Mrs Kuhl failed to carry out essential pre-use testing of anti-sera and that she failed to use necessary controls indicate that she lacked the considerable experience required to enable her to plan and to carry out these complex and difficult testing procedures, at least without careful guidance from a more experienced biologist. Indeed, there appears to be doubt whether any practising forensic biologist would have been sufficiently qualified to perform these tasks without extensive consultation with leaders in immunological research.

D. PGM GROUPING TESTS

In relation to material found in the area of the hinge on the passenger seat, Mrs Kuhl sought to group the material using a test for phosphoglucomutase (PGM). This is an enzyme found in the red blood cells, but also found in many other living things and in many other cells apart from blood. Until recent years, the method used for detection of the different types of PGM was starch gel electrophoresis, which permitted PGM to be divided into three types, i.e. PGM 1, PGM 2-1 and PGM 2. These showed up as bands at three different places on a starch gel plate. Dr Andrew Scott tested blood samples taken from Mr and Mrs Chamberlain using this method and, from the results, concluded that Azaria's blood must have been PGM 1.

It is now possible to ascertain PGM groupings for blood using the method of iso-electric focusing. This is a method whereby various proteins in a sample are separated according to their iso-electric points, i.e. the pH at which each protein has no net charge and therefore will not migrate in an electric field. A stable pH gradient is established in a gel on a plate and, under the influence of an electric field, the proteins in the sample will move so as to line up in bands at their iso-electric points. Such bands are made visible by fixing and dyeing chemicals. This method has enabled ten types of PGM to be identified, showing as bands at ten different positions on an iso-electric plate. In the PGM 1 region there are the sub-types 1+, 1+1- and 1-; within the 2-1 region there are the sub-types 2+ 1+, 2+ 1-, 2- 1+ and 2- 1-; and in the 2 region there are the sub-types 2+, 2+ 2- and 2-.

While it is difficult to reconcile the number of PGM tests recorded in Mrs Kuhl's notes with the number recorded in the laboratory's result book, it would appear that she conducted tests in respect of ten samples from the hinge area, eight of which were inconclusive and two of which were recorded as showing a PGM 1+ result. Six of the inconclusive results were described as having a "shadow band in the one region" or the like.

The Crown relied upon these results as indicating the presence of blood which was Azaria's and was not that of Mr Lenehan, whose blood was grouped as PGM 2+ 1+.

There are a number of reasons for doubting this conclusion. First, Mrs Kuhl did not try to ascertain Azaria's PGM grouping by testing the blood on the jumpsuit, but merely relied upon Dr Scott's conclusion using the more limited starch gel electrophoresis method. While PGM 1+ might have been appropriate for Azaria's blood, her blood

could have been either of the other two sub-types of PGM 1. Secondly, these tests were conducted almost 14 months after Azaria's disappearance. While Mrs Kuhl contended that her laboratory was in the forefront of the accurate use of the iso-electric focusing method of PGM grouping, the weight of the expert evidence before the Commission is to the effect that it would be most unusual to obtain a PGM result after a period of between 13 and 14 months. In the experience of Mr Raymond, Mr Martin and Dr Scott, it is generally only possible to classify PGM in stains up to eight months old.

One of the samples for which a result was obtained came from the back surface of the hinge, although Mrs Kuhl had been able to obtain only a very limited immuno-chemical result from this area. With age and denaturation, enzymes such as PGM lose their activity and according to Martin and Raymond it is unusual to find PGM activity if immuno-chemical results cannot be obtained.

A third matter affecting the interpretation of PGM results is the necessity for controls. Mr Martin said that for accurate typing, it is necessary to have very good controls. Mr Cornell, who has had very extensive experience in the use of the iso-electric focusing method in respect of proteins and enzymes, said that it is always necessary to have a number of controls, even with ideal samples, to ensure that the test is working properly. He said this becomes more important when the sample is or may be denatured. In his view, proper controls would include "positive" controls being blood from a number of known individuals, showing the positions of the normal bands on the plate and a "negative" control, using a substance which should not give any PGM bands, such as blood that had been so heated as to destroy all of its PGM activity. A third control would be a sample which, so far as possible, has been stored under the same conditions as that of the unknown

sample being tested. For this last control, Mr Cornell suggested that the blood from Azaria's jumpsuit would have made a very good control against which to compare the samples. On the PGM plate from which Mrs Kuhl obtained her PGM 1+ results, the only controls were blood of PGM 2+ 1-. Such controls would not even have permitted a direct comparison between the position of the bands produced by the unknown samples and a known PGM 1+ band. Mr Cornell's second and third types of control were lacking. Whilst Mrs Kuhl's evidence was that this plate had been shown to and approved by Dr Baxter, he had no clear recollection of his reading of it.

A fourth matter is the absence of any result to absorption/elution tests conducted upon samples from the same areas as those from which these PGM results were obtained. These tests are further discussed elsewhere in this report. The absence of any result to them supports the view that there was no blood present in these areas.

For these reasons, there appears to be considerable doubt as to whether what appeared on these PGM plates was correctly interpreted as giving PGM 1+ results.

There are other reasons for concern as to whether bands in the PGM 1+ region of the plate were produced by blood of that PGM type. As Mr Cornell explained, the observation of bands on the plate depended on two types of activity, which may be affected by denaturation. The first is the movement of the molecules under the influence of the electric field to the appropriate position on the plate. The second is the enzymic activity which produces a reaction with an added chemical so as to make the band visible. Denaturation of blood may cause changes to either type of activity - it may cause a particular band to appear at a different position on the plate, or, if the enzymic activity

is lost, that band may not become visible. From Mr Cornell's work with proteins, he considered it was possible that blood of the type PGM 2+ 1+ may, as a result of denaturation, show up as PGM 1+ on the plate. Mr Cornell's experience was with liquid blood rather than blood stains. The view of the forensic biologists with experience of the test with blood stains was that the position of PGM bands on the plate was less likely to be affected by aging than in liquid blood. It was Dr Baxter's view that, with time, the protein merely becomes inactive. However, this opinion was not based on his own experience and he was not aware of any work having been done on the comparison of changes in PGM results from liquid and dried blood. Mr Martin's experience was that the PGM bands tended to degrade at the same rate and that in most cases the intensity of the band in the 2+ region was greater than that in the 1+ region. Accordingly, in his opinion, blood of PGM 2+ 1+ type was not likely to show up as PGM 1+, but there was a small chance that it could, upon fading of the 2+ band.

A consideration of some of these factors led Professor Nairn to the view that the PGM results were highly suspect. I accept this as a fair assessment. The possibility that any blood in the hinge area was of a PGM group consistent with Lenehan's blood has not been eliminated. If the PGM 1+ grouping was correct, and there was blood of this grouping, then these tests do not identify the blood as being Azaria's. Such blood would be consistent with the blood of a very large number of persons, including the other members of the Chamberlain family. The fact that results were obtained, having regard to the customary difficulty in obtaining any results with blood over the age of eight months, itself suggests that any blood producing such results was shed after 17 August 1980. Accordingly, I do not think that any conclusion adverse to the Chamberlains can be drawn from these results.

E. WHETHER ANY BLOOD WAS FOUND

{1) RELIANCE UPON THE ORTHO-TOLIDINE TEST

C Mrs Kuhl's results with this test were relied upon by the Crown as establishing the presence of blood in a large number of places in the car. In his opening address at the trial, senior counsel for the Crown said that much of this blood, because of contamination and denaturation, could not be identified as "foetal blood". The evidence of the Crown's experts at the trial was to the effect that, while other substances will react with ortho-tolidine, many will react at the first stage (before addition of the hydrogen peroxide solution) and the reactions produced by other substances which occur at the second stage are distinguishable from the colour and pattern produced by blood. The view was expressed by Mrs Kuhl, Dr Baxter and Mr Culliford that an experienced biologist would not confuse the reaction produced by blood with that produced by other substances. In her evidence at the trial, Mrs Kuhl described the reactions given to this test in many areas of the car as being "strongly positive for blood" and she referred to substances obtained which "reacted strongly as blood". At the trial, except in relation to the marks observed under the glove box, the defence did not dispute that blood was found in the car but merely attempted to explain its presence.

Before the Commission there was a good deal of further evidence about the use of the ortho-tolidine test. Mr James Fowler, a forensic scientist employed at the South Australian Forensic Science Centre, carried out tests on surface scrapings and dust containing copper compounds obtained in Mount Isa and found that the reactions were similar in blue colouration to those normally given by blood stains, although in general the rate of reaction was

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somewhat slower. In his opinion, the results were such that an experienced forensic analyst would be unlikely, on the basis of this test alone, to distinguish readily between blood and such copper compounds. Dr Andrew Scott agreed with these views and said that he was quite satisfied that the reactions to copper dust could be mistaken for blood. Professor Boettcher tested washings from the floors of three vehicles from Mount Isa and obtained weak positive ortho-tolidine reactions from many locations on those floors. He said that reactions to some of the particles found in those vehicles were immediate, were "peacock blue" in colour, and that he would not have been able to say that they could not have been given by blood. Mr Freney, who had extensive experience at Mount Isa and was called at the request of the Crown, said that he did not think that he would be confused by these results, but was not prepared to say that other competent people would not be. On the basis of Mr Fowler's report, Dr Baxter accepted that an experienced observer might be mistaken by a copper salt reaction, especially if the comparison is with the slower reaction often obtained from denatured blood.

The Chamberlains' car had spent almost a year based in Mount Isa before Mrs Kuhl tested it, although there was a period when it was at Cooranbong. It seems not unreasonable to assume that there were traces of dust from Mount Isa still in the car in September 1981. When Mrs Kuhl's tests were carried out, neither she nor Dr Baxter was aware that copper compounds gave something in the nature of a second stage reaction to the ortho-tolidine test.

It was accepted by the experts who gave evidence to the Commission that a positive response to the ortho-tolidine test was not evidence of the presence of blood, but was merely a "screening" result which should lead to further testing. They agreed that the presence of blood could not

be confirmed without appropriate results to other tests. Freney, Martin and Baxter were in agreement that it would be quite misleading to suggest that blood had been indicated because of a positive ortho-tolidine result.

It was also generally agreed that the ortho-tolidine test is more likely to give "false" reactions to substances not blood than is the Kastle Meyer screening test. Both are very sensitive and will detect and react with minute particles of blood, the ortho-tolidine test being the more sensitive. Both of these reagents may detect blood when it is not visible, for example, when there has been a small spillage of blood and it has been cleaned up, leaving only minute particles.

It appears that the possible sources of blood which may be detected by the ortho-tolidine test in a car are many and varied. As Mr Martin pointed out, a nose bleed, coughing or sneezing may well scatter minute particles of blood. A cut finger, leaving a tiny lesion on the finger which might hardly be noticed, could leave minute particles of blood on, say, the door handle of a car. If blood forms a dry stain, particularly on metal, it will tend to flake off and spread around a car. Dr Baxter agreed that dried blood can form a powder and can easily be scattered, for example by brushing. He agreed that such small quantities could produce positive ortho-tolidine reactions. For this reason, in his view it would be difficult and dangerous to estimate the volume of blood that might be present unless it can be physically seen.

In respect of a number of places in the car, the Crown relied at the trial upon the ortho-tolidine result alone as showing that blood was present. These areas included a fabric panel on the driver's seat, stains on the cross bar under the passenger seat, the clips along the base

of that seat, the carpet inside the console, an area down the left hand side of the console, a groove at the front of the console, around the openings where the radio fitted into the console, the surface of the chamois and the inside of the camera bag. In the light of the evidence before the Commission, it is apparent that the ortho-tolidine results obtained from those areas did not establish the presence of blood. Even if the reactions observed were the product of blood, it could have been of such a small amount that its presence there would not justify the drawing of any inference adverse to the Chamberlains.

(2) FINDINGS OF HUMAN BLOOD NOT ALREADY CONSIDERED

In respect of several areas of the car, Mrs Kuhl conducted tests in addition to ortho-tolidine screening. On the basis of these tests she concluded that she had detected human blood in those areas, although she was unable to conclude that it was baby's blood. These tests will be shortly considered below.

(a) The window handles

After obtaining positive results from ortho-tolidine tests on the window handles on both the driver's and passenger's sides of the car, Mrs Kuhl took swabs and subjected them to the cross-over electrophoresis test. Both gave a positive reaction with anti-human anti-serum, but no reactions with anti-foetal haemoglobin and anti-human haemoglobin. Mrs Kuhl concluded that human blood was detected and that the pattern of the ortho-tolidine results was consistent with a wipe over the surface. No staining was visible on the handles.

If the anti-human anti-serum was not as sensitive as the other anti-sera, as Mrs Kuhl contended by way of explanation of other results, then this result would not support the finding of blood. Mr Martin considered that the presence of blood was not confirmed by these results. The anti-human anti-serum recognizes the serum proteins which may be present in body fluids apart from blood, such as saliva, nose secretion, breast milk, etc. Mr Martin said that one of his criteria, if he is to report the presence of blood, is that he would have to see something that looks like blood.

I am unable to conclude from these results that the presence of blood was established.

(b) The nearside hinge of the driver's seat

On 10 November 1981, when the car was at Alice Springs, Constable Metcalfe removed a flake of material from the nearside hinge of the driver's seat and forwarded it to Mrs Kuhl for testing. Prior to its removal, there was a plastic cover over this part of the hinge. Mrs Kuhl observed a very strong positive ortho-tolidine reaction with it. When subjected to the cross-over electrophoresis test against various anti-sera, after weekend washing she noticed very weak reactions with anti-human and anti-human haemoglobin anti-sera, but no other reactions. Mrs Kuhl concluded that human blood had been detected.

Mr Martin found these results to be inconclusive as to the presence of blood. Very weak reactions with anti-sera did not fulfil his criteria for accepting the bands as immuno-chemical. Further, he thought the positive to anti-human was explicable by the presence of body fluids other than blood.

A sample was taken from the seat bracket and spring forming part of this hinge, and halves of it were sent to each of Mr Culliford and Dr Lincoln in May 1982. Mr Culliford reported, as in the case of most of the other samples sent to him, that he identified blood, but could not identify its origin. For the reasons discussed above, there are limitations on the weight that can be given to this finding. Dr Lincoln obtained no reaction with the Kastle Meyer screening test and no activity with various anti-sera.

When Mr Raymond carried out tests on the car in 1986, there was still staining present in this area which gave reactions to anti-human and anti-haemoglobin anti-sera, but the bands were fuzzy and he interpreted them as being non-specific. He obtained no reaction with the Kastle Meyer screening test, but a weak ortho-tolidine response. Under the microscope, the particles did not have the appearance of blood. In his view, there was certainly contaminant material there which was not blood.

Finally, the manner in which blood could have got on to this hinge when it was covered by a plastic cap has not been explained.

It should also be noted that samples tested by Mrs Kuhl from the bracket and the floor, inside the bolt hole beneath this hinge, although recorded as giving strong ortho-tolidine reactions, gave reactions on the cross-over test to all anti-sera used, including anti-pig. This indicated that a contaminant giving non-specific reactions and, presumably, the positive ortho-tolidine reactions, was present in the area. These results support Mr Raymond's conclusions as to the likely presence in the car of something which threw up misleading non-specific reactions.

For all these reasons ■ am unable to conclude that there was blood on this hinge.

(c) Camera bag - zip clasp of middle compartment

In relation to one sample tested from the camera bag, that from the zip clasp of the middle compartment, Mrs Kuhl recorded a positive reaction with anti-haemoglobin anti-serum, but no reaction with the other anti-sera. For the reasons referred to above, the failure to obtain a reaction with the anti-human anti-serum indicates that one cannot rely upon the other result obtained. I have already referred to the likelihood of the metal surfaces in the camera bag producing non-specific reactions.

As to the other results obtained from the camera bag, it is apparent that, from the inside of the bag, the only positive results obtained were with the ortho-tolidine test. For the reasons I have already given, these reactions did not establish the presence of blood. So far as the positive immuno-chemical results obtained from the zip clasp and buckle on the outside of the bag are concerned, for the reasons discussed earlier, there is such uncertainty in relation to these results that ■ cannot conclude that the presence of blood upon these parts was established.

Even if it were shown that a small amount of blood (not shown to be baby's blood) was present, this could be readily explicable by the use of the a bag by someone with a minor cut to a finger. It would not justify the drawing of any inference adverse to the Chamberlains.

(3) WHETHER THERE WAS ANY BLOOD IN THE AREA OF THE
OFFSIDE HINGE ON THE PASSENGER SEAT OR ON THE
FLOOR BENEATH

In my consideration earlier in this report of the results obtained by Mrs Kuhl when testing samples from these areas, the question whether the presence of blood of any kind had been established was left open. Since the Crown claims that all the staining in these areas came from the same source, i.e. blood dropping from above the hinge and flowing downwards on to the floor and thence to the ten cent coin, it is appropriate to consider the evidence in relation to all of these samples together.

First, there is the appearance of stains on the hinge. These were seen by a number of people experienced in identifying blood stains. They said that the appearance of the staining was consistent with that of dried blood. Mr Raymond, on inspection of a photograph of the staining, agreed that it had the appearance of blood.

Secondly, the presence of blood is strongly supported by the observations of haemoglobin bands on the haptoglobin plates. The laboratory's result book records that, upon a haptoglobin plate run on 29 September 1981, haemoglobin bands were visible in respect of samples taken from three different areas of the hinge, a swab from around the bolt hole, scrapings from the floor well, a swab from the floor well and a swab from the ten cent coin.

Thirdly, the presence of blood is supported by the finding of PGM activity in two samples. However, this is subject to the qualifications already discussed.

Fourthly, there are the immune-chemical tests against various anti-sera. As the discussion above has

shown, the results of this testing are not without difficulty. Nevertheless, the samples taken from the hinge area of the passenger seat, the floor well beneath and the ten cent coin showed a large number of reactions, not merely with the anti-foetal haemoglobin anti-serum, but with anti-haemoglobin and anti-human anti-sera. Even if some mistakes were made in the interpretation of these plates, one would not expect such a multitude of positive results to be thrown up if human blood was not present.

There are a number of matters which, it has been suggested, indicate that human blood may not have been present in the car.

First, there is the fact that Mr Raymond was unable to detect blood in the car in 1986, after the most exhaustive screening of the car with both the ortho-tolidine and Kastle Meyer tests and immuno-chemical testing of swabs taken from the areas of the car and the articles from which Mrs Kuhl had obtained results and other areas. In Mr Raymond's opinion, if Mrs Kuhl's conclusions about the presence of blood were correct, his testing ought to have detected remnants of such blood upon the hinge, in the floor well beneath and upon the towel. Dr Lincoln thought Mr Raymond's findings were very significant in confirming his (Lincoln's) findings in 1982. Mr Raymond found that quite a number of areas gave weak positive ortho-tolidine reactions, but no Kastle Meyer reactions, and blood was not confirmed in these places by immuno-chemical testing. This suggested to him that there was something in the car giving a false positive reaction to ortho-tolidine, but which would not react to the more reliable Kastle Meyer test. Professor Boettcher agreed that, if blood was present in 1981, its presence ought to have been demonstrable by Mr Raymond in 1986.

Mr Martin agreed that Mr Raymond's results with the screening tests mirrored the positive results to ortho-tolidine that Mrs Kuhl obtained and the lack of any Kastle Meyer response in the hands of Dr Lincoln, and that this supported the view that the ortho-tolidine response was not one to blood.

While Mr Raymond's results raised doubts about Mrs Kuhl's findings, he was careful to emphasize that other possible explanations for such results were that all of the blood present in 1981 had been removed or that the blood had been altered in such a way as to be not detectable in 1986. Overall, Mr Raymond considered that, although he might not have agreed with Mrs Kuhl's interpretation of results, the fact that she detected activity in the PGM and immuno-chemical tests and on the haptoglobin plate in relation to samples from the hinge are wRs imp0rtant and he found it extremely difficult to conceive that she could be so wrong as to obtain these results from something that was not blood.

) The second matter is the absence of any result of the absorption/elution tests conducted by Mrs Kuhl. Such tests were conducted upon all of the areas sampled by her from the vicinity of the hinge of the passenger seat and the bolt bracket beneath and the main area of staining upon the towel. She recorded that no reactions were obtained and that her controls v>f>P. excellent. This test is one for determining the ABO grouping of blood. According to the scientific opinion expressed before the Commission, it is an extremely sensitive test, the antigens detected by it are very stable ones and, accordingly, it can be used reliably on blood stains of considerable age and which have been exposed to extremes of heat. Professor Boettcher and Dr Baxter were in agreement that, if Mrs Kuhl had carried out

the tests properly, the absence of any reaction indicated that there was no blood present.

The third matter affecting any conclusion in favour of the presence of blood is the apparent failure on the part of the Crown to ensure that material tested by Mrs Kuhl was kept for confirmatory testing by the defence. Mrs Kuhl said that when she finished her testing there was still a considerable amount of fibrous material "still heavily soaked in blood", on the back of the hinge. However, when she was handed the hinge in court at the trial, she was very surprised to see that the hinge had virtually been scraped clean. In March 1982, the Chamberlains' solicitors requested that they be given any remaining samples from the car. Some were provided and were further tested by Dr Lincoln for the Chamberlains and by Mr Culliford for the Crown. One of such samples was a piece of vinyl from the area under the hinge but no material from the hinge itself was included. The hinge was tendered at the second inquest and no doubt was handled by a number of persons. However, no explanation has been given for the disappearance of the material which had been on the hinge. I do not attribute blame or fault to any person for this. However, by its disappearance the Chamberlains were deprived of the opportunity to have the material tested. In these circumstances, I would hesitate to draw any inference as to the content of that material.

A fourth consideration, particularly relating to the floor beneath the passenger seat, is the absence of an explanation as to how blood might have flowed there without staining the carpet or the underfelt. The evidence, to which I have already referred, indicates the unlikelihood of blood having found its way from the hinge area beneath the seat without there being detectable staining of the carpet and underfelt.

Having regard to all these considerations I would not conclude beyond a reasonable doubt that blood was present in the car, even upon the hinge area of the passenger seat. However, having regard to the number of positive results from the various tests obtained by Mrs Kuhl in relation to the area of the hinge of the passenger seat and the floor beneath, I think it is more probable than not that, at the time of her testing, some blood was present in these areas.

F. THE VOLUME OF ANY BLOOD

At the trial, there was very little evidence as to the volume of blood said to have been detected. In an experiment conducted on a similar car seat, Mrs Kuhl and Senior Constable Metcldlfe found thaL 5 mL of blood, when poured on the side of such a seat with a person sitting in it, would flow between the hinge and the vinyl side of the seat and drip on to to the surface below in a way similar to the apparent flow pattern of the substance on the side of the seat in the Chamberlains' car. In addition, the large amount of material said to be adhering to the hinge, the quantity of flakes which fell off when the hinge was removed, the large area of staining under the seat, the spray pattern under the glove box, the imrnuno-chemical results from other places and the wide-spread parts of the car from which positive ortho-tolidine results were obtained were relied upon by the Crown as justifying a conclusion that blood had been spilt over a wide area. A diagram was tendered at the trial showing the areas where positive ortho-tolidine tests indicated trace amounts of blood. The presence of blood in places other than under the glove box was not contested by the defence. A fair impression to be gained from all of this evidence was that formed at the

trial by Professor Nairn, that "the car floor was awash with blood".

Most of the areas in which it was said that there were traces of blood did not exhibit any visible staining. From the consideration of the evidence in relation to the ortho-tolidine screening test referred to above, it is now apparent that the reactions obtained on this test may not have been with blood and that, if they were with blood, it may have been present in most minute quantities. As Dr Baxter pointed out, it would be very hard and very dangerous to estimate volumes of blood present unless it can be seen.

Putting aside the stains seen under the glove box and upon the hinge of the driver's seat (which have not been shown to be blood) the only areas on which there were visible stains were the hinge of the passenger seat, beneath the hinge and upon the vinyl, the bolt hole below the hinge, the floor well and the ten cent coin. When Mrs Kuhl was asked to estimate the quantity of blood required to produce the staining under the seat and upon the ten cent coin, she said it would be at least 1 mL, if not 2 mL, of blood. She was doubtful because of the difficulty in estimating how much was soaked up by the fibrous material and the metal.

Even if it be accepted that Mrs Kuhl's testing established the presence of blood in the areas where stains were visible, one could not estimate with any accuracy what amount of blood was present because there was clearly other material present, forming at least part of the staining. On the vinyl of the seat, Mrs Kuhl detected a greasy substance in addition to the flakes which she thought were dried blood. In the floor well of the car, she found a lot of underfelt fibre and dirt in the stained area. As I have already observed when the remaining scrapings from the bolt hole area and the remaining staining on the ten cent coin

were tested by Raymond and Ross in 1986 they found that some food substance had flowed down into the floor well under the seat, from which sucrose and other substances were detectable.

Other experts found it very difficult to arrive at any estimate of the volume of blood from Mrs Kuhl's work notes and evidence. However, having regard to the number of samples taken by her and the fact that Mr Raymond was unable to detect the presence of any further blood in 1986, there was general agreement between the various experts who gave evidence to the Commission that if there were blood present in the car when it was first tested, there could have been only a very small amount of it. Dr Lincoln referred to Mrs Kuhl's difficulty in getting reactions and her using up of all of *the* material that was present in all areas, except on the hinge. He expressed the view that the amount of blood found by Mrs Kuhl must have been very small. Mr Martin considered that, if there was blood present and it had all been removed, there must have been only very small quantities present. It had always seemed to him that the quantities of blood in the car were very small, since they had been used up doing what he regarded as a very minimal amount of testing. Similar views were expressed by Professor Nairn, who said that, if there was any blood at all, it was "an extremely small amount".

It was open to the jury, on the evidence before it to conclude that when the car was first tested there was a wide distribution of significant quantities of blood in it. In contrast, I conclude on the evidence before the Commission that, if blood was present in the car, it was there in very small quantities.

G. EXPLANATIONS OF BLOOD IN THE CAR

If there was a small quantity of blood, not shown to be baby's blood, in the area of the hinge of the passenger seat and beneath this seat, the question remains whether the presence of such blood would justify the drawing of some inference favourable to the Crown case. When Mr and Mrs Chamberlain were questioned at the second inquest about any bleeding in the car, they referred to a number of occasions on which blood had been shed in it.

(1) MR LENEHAN

Mr and Mrs Chamberlain both referred to the shedding of blood by Mf Lenehan when he was picked up by them after he had been involved in a car accident on 17 June 1979 and taken to Cairns Base Hospital. Mr Lenehan's scalp was lacerated on the right-hand side of his head and he bled profusely. He climbed into the Chamberlains' car through the rear hatch and lay in the area of the rear seat, with it folded down. His head was on Mrs Chamberlain's knee. She used a gauze bandage and had a towel upon her knees in an attempt to staunch the flow of blood. The trip to the hospital took approximately 45 minutes and his head continued to bleed.

At the trial, Mr Lenehan's evidence as to the position of his head while he was lying in the back of the car was not particularly clear. He said that his head was up near the passenger seat of the car, that he recalled that the Chamberlains could not stop his bleeding, and that he could feel the blood flowing down his face. From Mrs Chamberlain's evidence that Mr Lenehan had his head on her knee very close to the edge of the back seat Gibbs C.J. and Mason J. concluded that there would have been an appreciable

distance between his head and the front seat and that, therefore, it was unlikely that Mr Lenehan's bleeding caused blood to flow down the side of the front passenger's seat in the way found by Mrs Kuhl (153 CLR at p.553).

Before the Commission, Mr Lenehan was questioned in more detail about his position in the car. He said he was lying on his back on the folded down near side of the rear seat, with his feet at the rear of the vehicle and his head in the space between the front of the folded down rear seat and the back of the front passenger seat, supported by Mrs Chamberlain's knee as she sat on the rear seat. He said that Mr Chamberlain, in his haste to get to the hospital, took the car around corners quickly, causing him to roll around somewhat. As the car was braked from time to time he slid forward to a point where his head was at the rear of the centre console between the two front seats and virtually level with the back of the front seats. While he could not say whether his head came into contact with the front passenger seat, he thought that it was possible. When he arrived at the hospital, he was conscious of the fact that his head was still wet with blood, despite the attempt to bandage it. I have no reason to doubt the correctness of his evidence.

Mr and Mrs Chamberlain gave evidence which was consistent with Lenehan's account. Mrs Chamberlain said, in addition, that Reagan sat in the front passenger seat during the journey. While Mr Lenehan did not remember this, it is clear that Reagan must have sat somewhere in the car and this appears to be the logical place for him to have sat.

Mrs Kuhl and Senior Constable Metcalfe found in their experiment that in order for blood to flow down between the hinge and the vinyl side of the seat, it was necessary that someone be sitting in the passenger seat. It

is likely that Mr Lenehan's head was in an appropriate position at the time when he was bleeding for his blood to have fallen in the area of the back of the passenger seat and the hinge on its off side.

(2) OTHER EXPLANATIONS

When Mr and Mrs Chamberlain were examined at the second inquest, they were asked to exhaust their recollections of persons who had bled in the car. They recalled that their sons, Aidan and Reagan, had bled in the car. Reagan had bled from the forehead on one occasion and from a cut lip on another. Aidan had bled from the nose. Mrs Chamberlain recalled Aidan having a nose bleed after 17 August 1980. They both recalled other children bleeding in the car from time to time, when they were in the car for outdoor activities connected with their Church.

I consider that for present purposes, it is unnecessary to decide whether these accounts of bleeding, other than that of Mr Lenehan, should be accepted. It is sufficient to say that the other incidents of bleeding would be consistent with ordinary family usage of a car over a period of some four **yc rs**,

H. CONCLUSIONS

If there was any blood present in the car, it was present in only small quantities in the area of the hinge on the passenger seat and beneath. I conclude that none of Mrs Kuhl's tests established that any such blood was Azaria's. The blood shed by Mr Lenehan could have been the source of stains in the area of the hinge of the passenger seat and beneath.

So far as the PGM grouping tests are concerned, I conclude not only that the PGM results were highly suspect but also that they did not eliminate Mr Lenehan as a possible source. If the PGM results were accurate, they would have been consistent with the blood being that of a large number of people including any other member of the Chamberlain family. However, the detection of PGM activity and the detection of a clear band of haemoglobin on the haptoglobin plate would not be expected from a de-natured blood stain after 13 months. Thus, if the results are relied upon, they suggest that any blood in the hinge area was shed after 17 August 1980. Whether this be correct or not, the presence of a small quantity of blood in this area would not justify the drawing of any inference adverse to the Chamberlains.

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There was no dispute at the trial or before the Commission that Azaria's blood was found on a number of items which were in the tent when she disappeared. The subject of dispute was whether the distribution, quantity and appearance of the blood stains indicated, as the Crown contended, that the blood had been transferred to these items from Mrs Chamberlain's person and/or clothing or that, as the Chamberlains contended, the blood had dropped from Azaria while she was being taken from the tent by a dingo. A considerable amount of opinion evidence was given both at the trial and before the Commission on this question. In order to assess this opinion evidence, it is necessary to summarize the evidence as to the blood identified upon these items and as to further blood which may have been present upon such items.

The items stained

Several of the items in the tent were delivered to Dr Andrew Scott for examination before the end of August

1980. Other persons saw them, but it was he who first carefully examined and recorded what was detected upon them. He also carried out the necessary tests to establish that the blood on them was Azaria's.

The blankets in the bassinet

There were two purple blankets which were said by Mrs Chamberlain to have been around Azaria in her bassinet. The larger of the two was found by Dr Scott to have three blood stains in a row upon it, 3 or 4 em apart, the largest stain having a diameter of approximately 1 em and the other two having diameters of approximately 2 mm. He described the volume of blood on them as being very small and no more than a few drops. The blood had sunk quite deeply into the material of the blanket and, in his view, it could have come from blood dropped directly on the surface and smeared just a little, or from contact with another object very well soaked in blood.

As to the smaller of the blankets, Dr Scott saw a thin stain on the surface of it which, in his view, was made by a very small amount of blood, no more than half a dozen drops. It looked like a smear due to contact with a blood stained item.

Mr Chamberlain's sleeping bag

Dr Scott received three pieces taken from this sleeping bag in August 1980. On the first of these, there were three stains, one about 1 em across, and another about 4 mm across. The third was a mere pin prick spot. It would have taken only a couple of drops of blood to make these stains. On the second piece, there appeared numerous small

blood stains the largest being about 8 mm across and the smallest being just numerous pin prick spots of less than 1 mm. On the third piece there were three discrete areas of blood stain about 8 mm across. It would have taken up to three or four drops of blood to make these stains. They were consistent with being transferred from another blood soaked item.

In September 1981, Dr Scott received the complete sleeping bag for the first time and found a couple of further very small spots of blood. In his view, these resulted from a direct application of a couple of small drops of blood.

When asked whether the stains on the sleeping bag got there by being directly placed on the bag or by being transferred, by whatever means from a source outside the tent, Dr Scott replied:

"The only thing I think you can say positively is that there were a considerable number of very small spots, symmetrical spots of blood, on at least one of these pieces. Now that sort of pattern is generally characteristic of blood which has been a spray of blood, a splash of blood on to it. For example, if you drop blood on to a surface from a height it will impact and small spots will in fact spray off and form these tiny spots around it. Now those obviously had been directly transferred. Others, it's more difficult to say. They're not symmetrical stains. They're spread around and they're quite thin. Given the nature of the material it's difficult to express an opinion on those particular stains."

This evidence, coming as it does from one of the Crown's experts, presents a difficulty in the way of accepting a vital part of the Crown case. If the blood found in the tent was initially shed in the car (or elsewhere) and transferred to the tent on Mrs Chamberlain's

hands or clothing, then her hands must have been dripping with blood or her clothing soaked in blood to such an extent that it dropped on to one or more articles in the tent. The improbability of this having occurred is discussed in the penultimate paragraph of this chapter.

Reagan Chamberlain's parka

On a green parka usually worn by Reagan Chamberlain Dr Scott found quite a number of areas of blood. There were thick smears on the right sleeve, the end of the left sleeve, the right side of the hood and on the right front. These were not large smears in themselves, but together they covered significant areas of the garment.

The floral mattress

Another item which was apparently in the tent was a foam rubber mattress with a floral patterned cover. When it was inspected by Dr Scott in September 1981 he saw an area of blood stain about 50 cm from one end of the mattress and about 5 cm in from one edge which was approximately 4 cm in diameter but asymmetrical in shape, with a streak coming out from one side of it. The stain had a very clean outline. Underneath the stain on the cover there was an amount of blood soaked into the foam mattress. He considered that the volume of blood required to make such a stain was between less than a millilitre and a couple of millilitres. In his view, the blood may have dripped on to the mattress directly from a wound or it may have been deposited as the result of contact with another object which was so soaked as to be quite dripping with blood.

All of the blood staining on the items to which I have referred was found by Dr Scott to be consistent with blood from Azaria.

The tent itself

Dr Scott carefully inspected the whole of the tent and tested anything visible. A number of very small spots on the fly screen at the front of the tent and on the rear window and one on the edge of the roof of the tent gave positive reactions to the ortho-tolidine test, but the amount was very small and Dr Scott could not confirm that they were blood. There were two small areas of a very fine spray pattern on the outside of the wall of the tent which was its southern wall *ai* the tent was pitched at Ayers Rock. They were less than 10 cm above the ground. Dr Scott found that these fine sprays were blood, but they did not respond to the usual tests for the identification of human blood.

Dr Scott attempted to ascertain whether there was something in the fabric of the tent which interfered with the reactions to his tests by placing a similar small amount of blood on to a piece of material from the tent, leaving it for five weeks and then attempting to group it as human blood. He found that there was no difficulty in doing this. He considered that it was possible that it was human blood, since sometimes such tests do not work for no apparent reason. However, since he would have expected to obtain reactions identifying the blood as human if it had been such, he concluded that it was highly unlikely that it was human blood.

He also found that there were two small spots on the rear of the tent which he thought were on the outside, although he could not be certain. He detected the presence

of haemoglobin in these spots, indicating that they were blood, but they did not react to tests for human blood. Subsequently Dr Scott identified a stain on the tent pole as being blood, but he could not identify its species.

Mrs Chamberlain's sleeping bag

This item was not seen by Dr Scott until after it had been cleaned in Mount Isa. He did not detect any blood upon it, but this does not seem surprising. Elizabeth Prell gave evidence to the Commission that was not given at the trial. She was employed at the Uluru Motel and took breakfast to the Chamberlains' room at about 7.30 a.m. on the morning of 18 August 1980. She noticed what appeared to be a blood stain 'of approximately three inches in diameter towards the foot of a sleeping bag which she saw at the bottom of the bed. She described what she saw as a "solid blob of blood". She had described this in a statement made to the police dated 12 September 1980.

At the trial, Mrs Joan Hansell, who had worked at a dry cleaning shop in Mount Isa, gave evidence that Mr Chamberlain brought a sleeping bag to her shop for cleaning in August 1980 and told her that it had Azaria's blood on it. The bag was put through a hot wash and afterwards there was still some sign of the staining. Before the Commission, there was further evidence from Mrs Hansell and another employee at the dry cleaning shop. Jennifer Bell recalled that, about a week after the Chamberlains arrived back from Ayers Rock, Mr Chamberlain brought an adult's sleeping bag to be cleaned and told her there were some blood stains on it. She saw spots of blood on the top of the bag. She recalled that there were about 7 or 8 of them, some a bit smaller and some possibly a bit larger than a one cent piece. The edges of the blood spots appeared to be blurred

rather than sharp. They appeared to be splashed on to the bag. This witness had made statements to the police which were consistent with this evidence in September 1980 and September 1981.

At the second inquest, Merva Beaman gave evidence of seeing small spots of blood on this sleeping bag at the dry cleaning shop. She could not remember the number or size of the spots but merely recalled them as being speckled.

There are discrepancies between the descriptions of the blood staining given by Ms Prell and by the dry cleaners. It is not certain that Ms Prell saw the same sleeping bag, although the stain seen by her was a good deal larger than any of those identified on Mr Chamberlain's sleeping bag by Dr Scott. A possible explanation is that some staining may have disappeared from Mrs Chamberlain's sleeping bag before it was presented for cleaning. Dr Scott said that the sleeping bags and parkas had non-absorbent surfaces and could well have lost much of the blood staining on them due to physical handling, causing blood to powder off. It seems probable that there were a number of spots of Azaria's blood on Mrs Chamberlain's sleeping bag and that one of them was a substantial stain approximately three inches in diameter.

Mrs Chamberlain's running shoes

On the night of 17 August 1980, Mrs Chamberlain was wearing running shoes. In her record of interview on 1 October 1980 and at the trial she said that a few days after the family had returned to Mount Isa she found what she thought were blood stains on these shoes. She said that, the day after Azaria disappeared, she thought the

staining was of blackcurrant juice. However, when looking at them in Mount Isa, she realized there were two different coloured stains, with half of the staining looking like blood and the other half looking like blackcurrant juice. Before the Commission, this evidence was corroborated by Mrs Chamberlain's mother, Mrs Avis Murchison, who said that she washed the running shoes in Mount Isa at Mrs Chamberlain's request. Mrs Murchison saw what she thought were "smudgy marks of blood", which came off immediately with water, and other spots on the shoes which she could not remove. When the shoes were examined by Dr Scott in September 1981, he did not detect any blood on them.

Mrs Chamberlain informed the police about the shoes at a time when no witness, other than her mother, had noted the staining on them. Her statement that there was blood on them might be said to be against her own interest and was in fact relied upon by the Crown at the trial to support the allegation that Azaria's blood had dropped on to the shoes when Azaria was murdered.

In the absence of scientific evidence I cannot be certain that Azaria's blood was on the running shoes. However, I see no reason to reject her account of what she saw and accordingly I conclude that the shoes were probably blood stained. Mrs Chamberlain's explanation of the staining is that there must have been a pool of blood on things inside the door of the tent and that when she crawled into the tent the blood rubbed off on to the top side of the shoes, where she saw it. This explanation receives support from the evidence of Mrs Lowe as to a pool of blood (discussed below) and the new evidence of Ms Prell referred to earlier in this chapter. It appears that Mrs Chamberlain could not have been aware of the observations of these two witnesses when she made her statement on 1 October 1980. In these circumstances, her explanation of the blood

on her shoes seems reasonable, and is supported to some extent by other witnesses and I would not reject it in the absence of other evidence.

Aidan Chamberlain's parka

C_ Mrs Chamberlain gave evidence that she noticed a blood stain on the cuff of Aidan's parka at Ayers Rock on 18 August 1980 and that after the family returned to Mount Isa, she noticed what she thought were spots of blood on the inside of this parka. She thought the staining on Aidan's parka was brought to the attention of Constable Morris on the morning of 18 August 1980. Constable Morris recalled at the first inquest that a child's parka was shown to him on that morning, that it had what appeared to be blood stains on it, and that he agreed with the Chamberlains that they might retain it so that it could be worn. However, it is not clear whether he was shown Aidan's parka or Reagan's. When Aidan's parka was eventually examined by Dr Scott, he did not detect any blood on it.

(Although a possible explanation for Dr Scott's failure to detect blood on this parka is that it had been abraded off the garment, some reaction at least to presumptive testing by Dr Scott would have been expected.

I am not satisfied there was blood on Aidan's parka.

The volume of blood

Dr Scott said that the volume of blood required to cause the staining which he saw on the various items was very difficult to estimate. He could reproduce all of the

staining with between 2 and 3 mL of blood, but in his view this was a minimum as inevitably some of the blood on the items would have rubbed off and been lost in handling. He thought it was quite likely that the volume of blood had been considerably more than 2 or 3 mL.

Professor Ferris relied upon his experience of stains caused by particular volumes of blood and suggested that the total volume apparent upon items in the tent may have been less than that indicated by Dr Scott. He demonstrated that, on some materials, a small amount of blood may produce a reasonably large stain. However, Professor Ferris did not see most of the stains.

With the qualifications which Dr Scott expressed in relation to his opinion, I accept his evidence as to the minimum volume being between 2 and 3 mL. To this there should be added the volume of blood needed to stain Mrs Chamberlain's sleeping bag and running shoes.

was the blood dropped directly or transferred from another blood soaked item?

At the trial, it was contended by the Crown that the blood on the items in the tent was transferred there from the person **or clothing** of Mrs Chamberlain, when she returned to the tent after killing the child. A distinction was drawn between the appearance of blood stains produced by transfer of blood from another object and of those produced by blood dropping directly upon the item. Dr Scott gave evidence that all of the blood on the items in the tent could have been produced by transfer from blood stained hands or clothing. However, in cross-examination he qualified this by saying that the blood on the floral mattress was more likely to have come there directly.

Before the Commission Dr Scott explained in greater detail what he meant by "transferred" and "direct" blood. He said that "direct flow" blood could have come on to an object either directly from a wound or as drips from another blood soaked object. Smearred blood stains could be direct flow blood that had been rubbed or smearred while on the item or they could be blood transferred by another blood smearred or soaked object coming in contact with the item. He said that when looking at stains, basically all one can say is that a stain looks like something that has dripped directly on to the item, or that it is smearred.

It is clear that on the night Azaria disappeared a number of people entered the tent shortly after her blood came upon the relevant items. Things were moved around in the tent in the search to ensure that Azaria was not hidden under something in the tent. If there were blood drops with defined edges on any of the items it is quite possible that such activity may have caused the drops to have become smearred across the items on which they were found. It therefore appears tht littlR nf sisnificance can be drawn from the fact, if it be the fact, that some of the stains were smearred or may have been transferred by contact.

Some of the evidence of what was seen in the tent on the night of 17 August is relevant in this context. Before the Commission, Constable Morris said that he saw very small spots of blood on a purple blanket and on a sleeping bag which did not appear to have been smearred. Mrs Judith West described a "fine spray" of blood which she saw on the blankets from the bassinet. Mrs Sally Lowe said that she saw drops of blood and an area of blood which appeared wet. She had described this at the trial as a "pool" of approximately 6 inches by 4 inches. The blood did not appear to her to be smearred. She could not say what the blood was on.

At the trial, the prosecutor submitted that Mrs Lowe had imagined the pool of blood, since no one else had seen it that night and the "pool" she described was larger than the stain subsequently found on the floral mattress. Before the Commission, she said that the size and shape of the pool she saw was consistent with photographs of the stain on the floral mattress. She could not recall seeing the mattress. Allowing for some variation in dimensions, her description of the pool is not inconsistent with the description given by Ms Prell of the stain she saw on a sleeping bag the following morning. Given the lighting conditions inside the tent, I would not attach much significance to the fact that other persons did not notice this area of blood staining during that night.

In the light of all the evidence I conclude that it is more probable than not that many of the stains were caused by blood dropping directly, either from a wound to Azaria or from another object very heavily soaked in blood. I am unable to conclude from the appearance of the stains which of these two causes was in fact responsible for the stains.

The distribution of the blood stains in the tent

No blood was found on the baby's bassinet or on the mattress, wet sheet, sheet, pillow, pillow case or bunny rug which were in the bassinet. The Crown submits that this was inconsistent with Mrs Chamberlain's account of a dingo taking Azaria out of the bassinet. This submission is entitled to considerable weight. However, blood stains were found on the two purple blankets which, according to Mrs Chamberlain, were around Azaria in the bassinet.

The bassinet was in the south eastern corner of the tent. Mrs Chamberlain described the position of the other

items in the tent as she had placed them earlier in the evening of 17 August 198n. The ndults' sleeping bags appear to have been in the northern half of the tent, with the foot of Mrs Chamberlain's bag at the eastern end and the foot of Mr Chamberlain's bag at the western end, near the entrance to the tent. The precise position of the floral mattress and the part of it found to be stained is unclear. The boys' parkas were said to be at the western end near the entrance.

Mrs Lowe said that, when she entered the tent, she saw the blankets from the bassinet in a position "yanked out" of the bassinet, lying a little to the side, but out towards the entrance to the tent. The drops of blood which she saw gave her the impression that they were heading in the direction of the entrance. The "pool" of blood she saw was about a third of the way into the tent and more on the right than on the left. However, it appears that she could only have seen some of the blood stains later detected.

After the contents of the tent were moved on the night of 17 August, it became impossible to determine the precise positions in which the various items lay before Azaria disappeared, or to determine precisely where, in the tent, blood was deposited. Since those items virtually covered the floor of the tent, it does not seem surprising that no blood was found on that floor. However, from the evidence to which ■ have referred, it appears that there were numerous blood stains, some being spots of a reasonable size but most of them being quite small, upon various items which lay in the tent, generally speaking, between the baby's bassinet and the entrance to the tent. Whether or not those stains formed any sort of trail from the bassinet to the entrance has not been shown.

Comparison with the blood on the clothing

At the trial Dr Jones and Professor Cameron gave evidence that the absence of blood in the baby's bassinet and the absence of a clear trail of blood through the tent was inconsistent with a dingo inflicting the wound which caused the blood on the jumpsuit or gripping the baby's neck or head. They said that such dingo activity would have caused copious bleeding, such as to give rise to much more blood in the tent. This would have been particularly the case if a dingo had shaken its head with the baby in its mouth. It was submitted by the Crown that this indicated not merely that Azaria was not killed in the tent but also that a dingo was not involved.

That submission may well have had a good deal of force when supported by expert evidence to the effect that the bleeding which caused the blood staining on the jumpsuit occurred before Azaria's death. It would have derived more support from an assumption that, for a dingo to have removed Azaria from the tent silently (at least after the cry that was allegedly heard by Mrs Lowe) it would have been necessary that she be killed in the tent.

Before the Commission, it was accepted by the various expert witnesses that more blood would have been expected in the tent if all of the bleeding giving rise to the staining on the clothing had occurred there. However, as concluded in Chapter 10, it has not been shown that the staining of the clothes occurred before Azaria died. Further, since Azaria's failure to cry out (at least after the cry that Mrs Lowe said she heard) would be explicable by either death or unconsciousness, it is necessary to consider other possibilities before coming to any conclusion about the alleged inconsistency between the quantity of blood in the tent and dingo involvement.

Whether the small quantity of blood in the tent was
inconsistent with dingo involvement

Evidence was given to the Commission by a number of persons experienced in the behaviour of dingoes. Dr Laurence Corbett, senior research scientist with the CSIRO, said that making the assumption that a dingo killed the baby in the tent, he would expect there to be blood there. Depending upon the mode of attack, there could be a lot of blood spilt. However, it could be a small amount of blood. In his experience, dingoes may kill small prey by breaking the neck or by crushing the chest or head. Grasping around the back of the neck may have the effect of asphyxiation as well as, perhaps, breaking the neck. Each of these methods of killing prey may shed little blood. Dr Corbett also spoke of the ability *of* dingoes to carry things, such as their pups, in their jaws without causing injury.

Dr Alan Newsome, senior principal research scientist with the CSIRO referred to a study done of a large number of kangaroos killed in the Sturt National Park by dingoes where it was observed that, unless the dingo had eaten the kangaroo, there was usually no visible sign of injury, but occasionally the fur at the throat was slightly blood tinged. It was also Dr Newsome's own experience that dingoes frequently killed wallabies by crushing the upper part of the rib cage or by a single bite puncturing the cranium with very little bleeding apparent externally. Mr P.C. Thomson of the Agriculture Protection Board of Western Australia described similar results of work analysing the killing by dingoes of kangaroos, sheep and rabbits. Mr Derek Roff, who had extensive experience in relation to dingoes and other predators, considered that a normal method of killing by dingoes was suffocation, by pressure applied to the throat or, in small prey, to the diaphragm. He had no difficulty in acccptin0 th t the taking of a small baby

by a dingo could be associated with the spillage of only a very small amount of blood.

Views were expressed on this question by pathologists. At the trial, Professor Cameron said that, if a dingo closed its teeth on a baby's head (assuming it could open its jaws so wide) he would expect severe crushing with marked bleeding from arteries and veins. However, he conceded that, if the gripping with the teeth was of a carrying nature, the bleeding need not necessarily be excessive. Before the Commission, Professor Ferris said that there may well be circumstances in which a dingo could take a child as prey and leave very little evidence in the form of blood. He thought it would be difficult for a canid to cause rapid death by shaking a baby in its mouth but he agreed that there were number of possible ways of killing an infant without loss of blood. In Dr Plueckhahn's view, a dingo grabbing the head or neck of an infant and shaking it could cause death by compression of the spinal cord without necessarily breaking the neck. He also referred to traumatic asphyxia as a consequence of a crushing of the thorax or neck which, as he understood it, would be a method similar to that used by dingoes in killing small kangaroos. He could not see that there would necessarily be any blood in the tent if a dingo had taken Azaria and he would have been surprised, assuming it had been done suddenly, if there were large quantities of blood in the tent.

Professor Bradley considered that, if the teeth of a dingo were placed around the neck of a baby, the teeth could penetrate and compress the vertebral arteries. If this happened, the child would lose consciousness within a very brief time. If the pressure were maintained, there would be very little bleeding because the wounds would be plugged by the teeth. He said that if the grip were maintained while the child was carried away, there might not

be much blood at all. Professor Ferris considered it was unlikely that the teeth of a dingo could occlude wounds to the scalp so that no significant bleeding would occur. In his view, the gripping and dragging components of such an injury would be likely to result in significant haemorrhaging. On this question, Professor Plueckhahn considered that the teeth of a dingo could occlude wounds and the gums and lips of the dingo could further prevent the dispersion of blood in the tent, so that one would not necessarily expect large volumes of blood to be found there.

Dr William Rose, an experienced physician and pathologist, said that the application of pointed objects such as an animal's teeth to the skull of a baby of Azaria's age could cause a significant depression of the skull without there being any bleeding on the surface of the skin. He said such a depression of the skull could cause unconsciousness without killing the baby.

Opinions on this matter were also expressed by odontologists. Professor Gosta Gustafson, Emeritus Professor in Oral Pathology at the University of Lund, Sweden, said that when a dog picks up an object with a grasping motion, the object is not necessarily damaged, as dogs are very economical in their grasping and do not expend any more energy than is necessary. Further, in his opinion extensive bleeding would not necessarily result from canine teeth penetrating the skin of a baby. The canine teeth can compress the flesh and, if there is no movement, occlude the wound something like a cork in a bottle. Professor Ronald Fearnhead, presently Professor of Dental Anatomy at Tsurumi University School of Dental Medicine in Japan, gave similar evidence and referred to the capacity of any dog to be gentle with its teeth when gripping objects. On flesh, only a bruise may be caused and the flesh not penetrated.

It is plain ^{that} an attack by a dingo upon the exposed head and neck of a baby might well cause the shedding of copious amounts of blood. However, from the evidence referred to above I would conclude that a dingo would be capable of killing a baby or rendering it unconscious and carrying it away without the spillage of large amounts of blood. I therefore conclude that the quantity of blood found in the tent is not inconsistent with dingo involvement.

The Crown relied upon Mrs Chamberlain's evidence of seeing a dingo shaking its head while it was inside the tent with its head at the entrance. It submitted that, if a dingo had shaken its head while Azaria's head or neck was in its jaws, then a substantial spray of blood would have been thrown upon the article lying close to the entrance of the tent. This submission was supported by evidence from pathologists who considered that there would have been such a spray of blood from lacerations to the head or neck. However, the evidence before me establishes that it would have been quite possible for Azaria to have been removed from the tent by a dingo without her head or neck being in its jaws. The evidence supports the view that a dingo would have been capable of causing death or unconsciousness in one of the ways referred to above and then grasping her around the body, where she would have been protected by her clothing. A second possibility which is well open on the evidence is that, if a dingo took the child, some blood could have been shed in the tent and could have fallen on several articles in it as a consequence of the dingo's shaking its head. Counsel for the Chamberlains raised a third possibility that two dingoes may have entered the tent and that the one seen by Mrs Chamberlain was not the one who carried away Azaria. This is discussed elsewhere in this report.

Comparison with the quantity of blood in the car

At the trial, the prosecution invited a comparison between the quantity of blood found in the tent and that found in the car. The jury were asked to consider which was more likely, a dingo crushing Azaria's skull in the bassinet, where, so it was contended, there was no blood, or Mrs Chamberlain cutting her throat in the car, where plenty of blood was found. Having regard to the conclusions drawn in Chapter 8, such a submission could hardly have been put to the jury. Although the estimates of the volumes of blood in each location have been expressed only tentatively, and I cannot come to any firm conclusion about them, it may very well be the case that the quantity of Azaria's blood found on items in the tent exceeded any quantity of blood in the car.

General

It was the Crown case that Azaria was killed in the car. It seems absurd to suggest that Mrs Chamberlain carried Azaria's bleeding body from the car back to the tent, where she would have been under Aidan's observation. The presence of Azaria's blood in the tent, unless it be shown to have been transferred there upon Mrs Chamberlain's person or clothing, is inconsistent with the Crown case.

■ have concluded earlier in this chapter that many of the stains found on articles in the tent were probably caused by blood dropping directly either from a wound or from a blood soaked object. As ■ have said in that paragraph ■ am unable to conclude from the appearance of the stains which of these two sources of the blood stains is the more likely. However, the proposition that all the blood stains found in the tent came from the blood stained hands

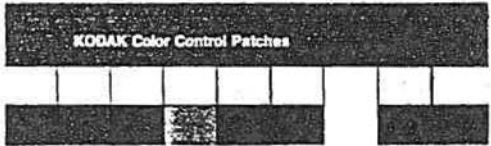
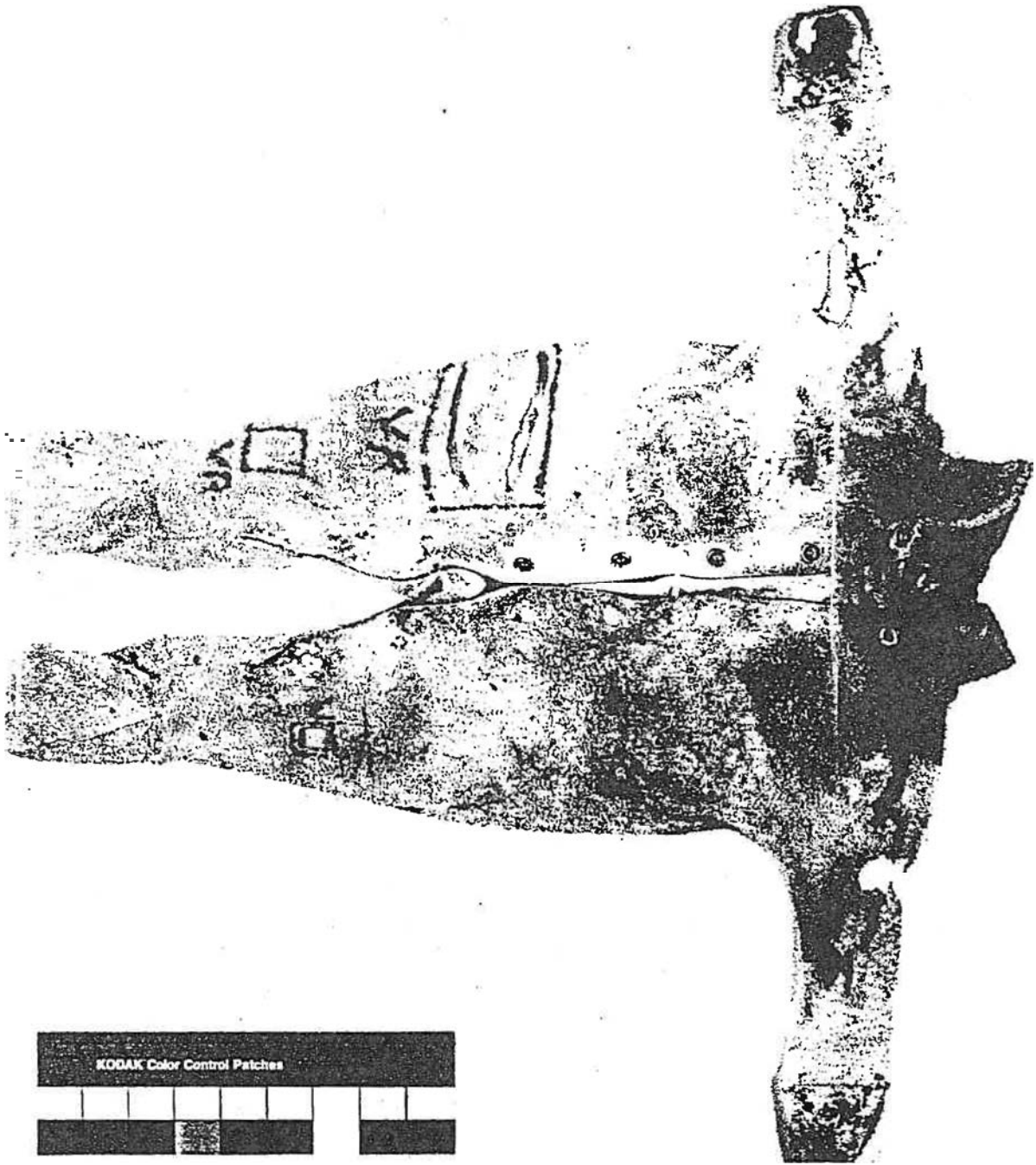
or blood soaked clothing of Mrs Chamberlain has inherent improbabilities. According to Dr Jones and Dr Scott for this to have happened it would have been necessary that her hands or clothing be literally dripping or soaked with blood. There is no evidence supporting the existence of any clothing or article blood-soaked in this way. Had such a quantity of blood been on Mrs Chamberlain's hands, there are difficulties in explaining how it would not also have been upon her clothing in large and visible quantities, given the short time she had to clean-up before her return to the tent and barbecue area. Further, it seems inherently improbable that she would have run the risk of Aidan seeing

her hands dripping with blood. The allegation that she returned to the tent in blood-soaked clothing or with blood stained hands does not sit easily with the Crown's allegation that she cleaned up the blood in the car after the murder.

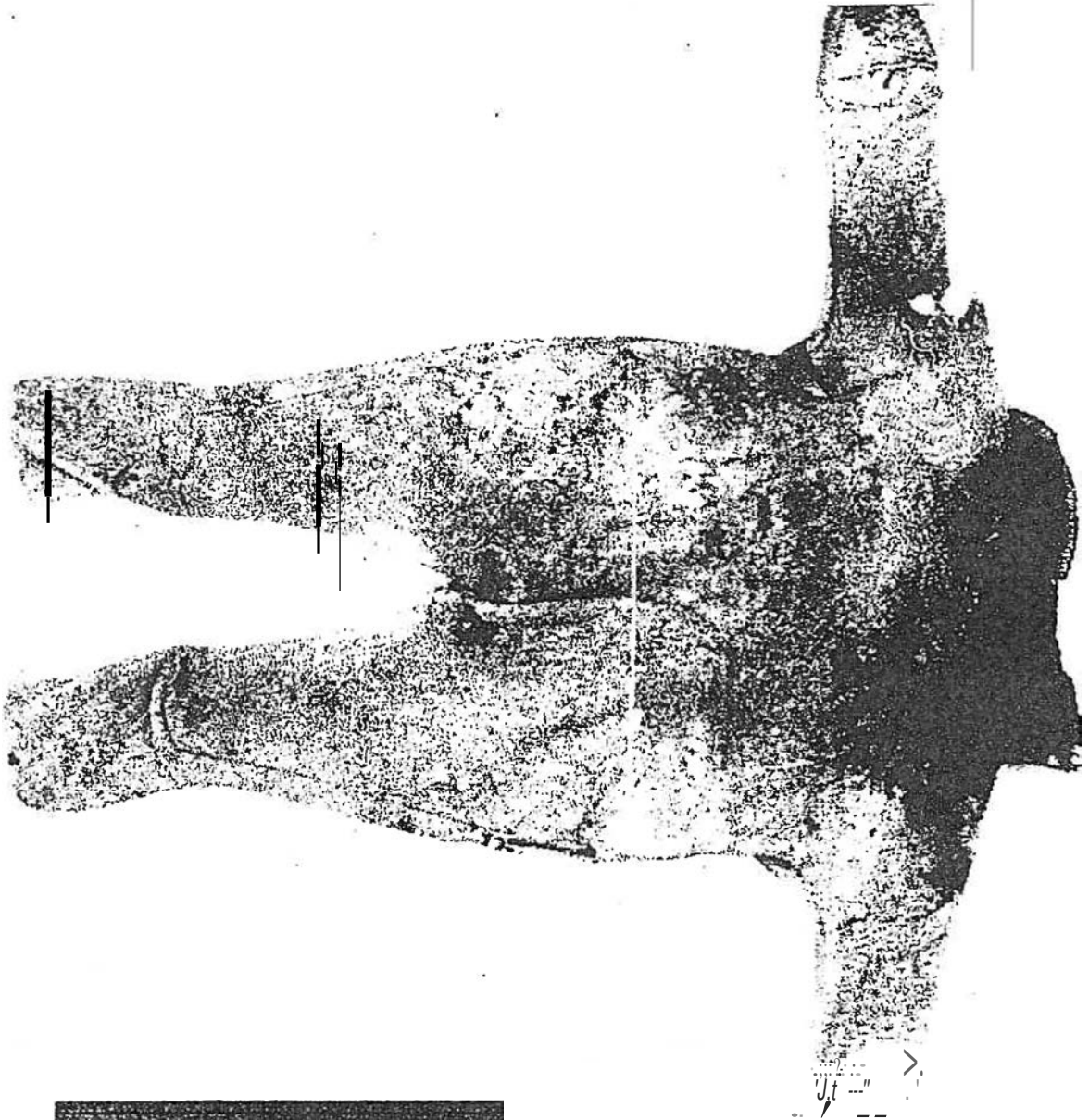
It has not been shown by the Crown that the blood in the tent was transferred there from the clothing or person of Mrs Chamberlain. On the contrary, the evidence points to this being an unlikely occurrence. Having regard to the evidence concerning the capabilities of dingoes referred to elsewhere in this report, I conclude that the blood found in the tent was as consistent with dingo involvement as it was with the murder of the child in the car.

Description of staining

When the clothing was found on 24 August 1980, the jumpsuit was stained with blood around the collar and neck. At the front the blood staining extended down to just below the first press-stud on both the right and left hand sides. There was what appeared to be a run of blood down the front of the left shoulder. There was staining across the back of the neck extending down the back of the right shoulder. The heaviest staining was on the collar at the back of the neck. There were spotted blood stains on the front of the left mitt, and on both the front and back of the right mitt. There were other spots of apparent blood staining sparsely distributed. Most of the garment was quite dirty, being soiled with minute particulate sandy material. This material had a brownish red colour very similar to blood. An appreciation of the staining on the jumpsuit can be gained from the photographs which are reproduced and identified as "Jumpsuit - front view (Taken 1986)" and



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"Jumpsuit - rear view (Taken 1986)" and "Jumpsuit - front view (Taken 1982)". The lastmentioned photograph may give a clearer impression of the staining on the front of the jumpsuit at the time of the trial.

Azaria's clothing was first forensically examined by Dr Andrew Scott who found that the blood staining upon it was of a group and contained a proportion of foetal haemoglobin consistent with Azaria's blood. His findings have never been questioned.

When the matinee jacket was found on 2 February 1986, it was extremely weathered and soil stained. The heaviest staining was around the neck and shoulders on the exterior of the jacket. When tested this area produced weak positive ortho-tolidine results. weak positive Kastle-Meyer screening results were also obtained on the exterior of the upper right shoulder and the neck region. However, immune-chemical and haemochromagen tests did not produce any result and, accordingly, the presence of blood on the jacket could not be confirmed. The disposition of the heaviest staining on the jacket is generally consistent with the area of blood staining on the jumpsui . The presence of blood spots on the mitts of the jumpsuit coupled with the very limited staining on the arms indicates that the sleeves but not the mitts were covered at the time of the bleeding. This is consistent with the matinee jacket being worn, leaving the mitts exposed, when the blood was shed.

Since the first inquest, it has been accepted that the quantity of blood on the jumpsuit and singlet indicated that Azaria had died. At the trial, experts expressed opinions as to the cause and manner of Azaria's death based on the distribution ild pparent flow pattern of the blood staining upon the clothing. Before the Commission, a good

deal of further opinion evidence was given in relation to this and other questions. I now consider these questions.

Where were the injuries on Azaria's body?

It was common ground between the forensic pathologists and biologists who expressed views on this matter that most of the blood staining on the jump suit originated from the outside of the fabric, that the majority of the blood staining to the back of the collar was consistent with the baby's body having been supine for a period while her blood was shed and that the blood staining on the left shoulder was consistent with the torso of the baby being in an upright position while the blood flowed. It was therefore accepted that most of the blood staining originated from injury to the neck or head of the baby, with the blood flowing down the outside of the collar and neck area and soaking through to the singlet beneath.

At the trial, Professor James Cameron expressed the firm view that the pattern of blood staining on the jumpsuit was consistent only with a cut throat, although an additional head or scalp injury was possible. Dr Jones also considered that an injury to the neck region was indicated. This view was supported by the results of experiments with dolls and jumpsuits carried out in 1982 by Dr Graeme Snodgrass, consultant paediatrician at London Hospital, in which he found that the best replication of Azaria's blood stained jumpsuit was produced by simulated venous bleeding from the neck in a supine position. However, he also concluded that to produce an evenly blood stained collar the cutting of the neck need not necessarily have been circumferential, because blood would have been absorbed through the fabric. Dr Snodgrass was not called at the

trial or before me, but his report was tendered to the Commission.

Both at the trial and before me, opinions were expressed that the head and/or back of the neck was the site of the injury. According to Dr Andrew Scott all he could say was that the blood came from the head and neck area. Professor Keith Bradley, Emeritus Professor of Anatomy at the University of Melbourne and a practising neuro-surgeon for nearly 40 years, said that a circumferential pattern of bleeding around the neck could be caused if the back of the neck of a person lying face down is punctured. Professor Plueckhahn said that the pattern was not such as to enable a conclusion to be drawn that the injury was to the neck or throat but that, if he was forced to engage in speculation, he would conclude that an injury to the head area or higher up the neck than around the throat was more likely.

Professor James Ferris of the University of British Columbia considered that the exact nature and location of the wounds which were the source of the blood staining could not be precisely determined but that the pattern of staining was consistent with a major incised wound to the neck and would not be typically associated with scalp or facial injuries. He favoured the suggestion of an injury to the throat, but this was not his firm conclusion.

These opinions were expressed by men with a great deal of experience in investigating causes of death and in examining the bodies of persons who have died violently. Nevertheless, their task was a most unusual one - namely, the interpretation of the cause of blood staining on clothing, in the absence of the body from which the blood flowed. Professor Cameron, a pathologist of great experience in London, could only suggest one other occasion on which he had been asked to express an opinion about the

cause of staining on clothing in the absence of a body, and this was in respect of the Shroud of Turin. I do not understand that any of the other pathologists had been called upon to express views in a similar context. The question is one which lies on the boundary of the field of expertise of the forensic pathologist. While experience in that field may provide some assistance in the interpretation of such blood staining, I do not consider that, in relation to this question and others referred to below, it provides the basis for firm conclusions. For this reason, and in view of the diversity of opinion, I am unable to conclude whether the blood staining on Azaria's clothing originated from injury to her head, neck or both.

Did bleeding which caused the blood staining occur before or after Azaria's death?

At the trial, Professor Cameron expressed the firm view that the distribution of blood on the jumpsuit necessarily involved the baby being alive at the time of bleeding. He considered that it was primarily venous bleeding, although there was an element of arterial bleeding. Since the amount of blood on the clothing was sufficient to indicate that Azaria had died, his evidence was a sufficient foundation for a conclusion that it was the injury producing the blood staining that killed Azaria.

At the trial, Professor Plueckhahn disagreed with this opinion. He expressed the view that, since considerable oozing of blood can occur after death, it could not be said whether the bleeding took place before or after death.

There was a great deal of further evidence before the Commission upon this question. Professor Plueckhahn

maintained his view that the bleeding could have occurred initially while Azaria was still alive and immediately afterwards, or within a period of some hours after she died. Professor Nairn, Dr Jones and Mr Raymond considered that the pattern was consistent with either ante-mortem or post-mortem bleeding. Professor Cameron was less dogmatic in his opinion saying that the bleeding took place at or about the time of death, and that he saw nothing to indicate arterial bleeding.

Professor Ferris favoured the view that the bleeding was post-mortem. According to him the signs characteristic of venous and arterial bleeding could not be seen and there were other characteristics of the bleeding which were more typical of blood dropping from an accumulated area of blood. The blood spots on the mitts of the jumpsuit indicated passive bleeding from an accumulated area of blood and were the type of droplets that one would see when arterial or venous bleeding had not taken place, or had stopped taking place.

He took the position that there was no evidence to indicate that the bleeding occurred prior to death and that, on balance, there were certain characteristics which suggested post-mortem bleeding. This view was given some support by the report of Dr Snodgrass following his experiments in 1982. He suggested as a possibility a wound to the neck shortly after death, which would explain the absence of arterial bleeding, and the presence of what he saw as venous oozing.

While Professor Ferris' opinion would tend to support a conclusion that some of the blood on the clothing was shed after death, I do not consider the evidence would justify a conclusion that all of it had been. On the evidence, it is impossible to conclude with certainty whether or not the bleeding took place before or after the time of death. In this situation, as Professor Ferris

pointed out, the evidence does not indicate what the cause of death was or how the baby died. Professor Ferris gave evidence to the Commission at the request of the Crown.

It should be noted that if Professor Ferris' preferred view were adopted the most serious difficulties would arise for the Crown case. His view would make impossible of acceptance the pivotal point in the Crown case put to the jury based on Professor Cameron's evidence, namely that Azaria died when her throat was cut with a sharp instrument.

At the trial and before the Commission a great deal of evidence was given by the pathologists as to the way in which particular injuries to the head or neck of the baby may have resulted in death, the time taken for death to occur and the type of bleeding which would be caused. Some of this evidence has been referred to in relation to questions concerning the blood found in the tent, and it would not serve any useful purpose to further canvass this evidence here. It does not appear to assist in drawing any firm conclusion from the pattern of blood staining.

What caused the injury which produced the bleeding - blade or canine teeth?

(a) Professor Cameron's evidence

At the trial, Professor Cameron said that what he saw on the clothing indicated that the baby's throat had been cut by a cutting instrument wielded by a human hand. Without any objection to his qualification to express such an opinion, Professor Cameron told the jury that he could see no evidence on the baby's clothing to suggest that any member of the canine family had been involved with it.

Professor Cameron's statement of 11 September 1981, which apparently precipitated the re-opening of the investigation and the quashing of the finding at the first inquest, reveals his reasons for these conclusions. He relied upon Dr Andrew Scott's failure to detect the presence of dingo saliva as establishing that there was no saliva on the clothing. That this was not a proper inference to draw is pointed out elsewhere in this report. He also relied upon an absence of tearing damage to the clothing associated with bleeding and an absence of grip or drag marks which he would have expected if a member of the canine family was involved. In this statement, Professor Cameron said:

"From past experience of assaults by members of the canine family on human victims (both victims that were assaulted by one or more dogs or assaults or alleged assault on humans by police dogs of the alsatian variety) I did not require experimental evidence."

It appeared that his experience was of a number of dog or suspected dog attacks on humans, the number being in double figures. He had no experience of the way in which a dingo or other wild animal would treat a clothed baby as prey and, except for his efforts with the hroud of Turin, he had no experience in ascertaining the cause of death where only blood stained clothiof the decea P.d is available.

It is doubtful whether Professor Cameron would have been permitted to give this evidence at the trial, had objection been taken. In the light of the consideration of the damage to the clothing in Chapter 11, particularly the results of experimental work with dingoes, it is clear that Professor Cameron was not justified in holding the opinion that he did not require experimental evidence.

Professor Cameron's statement shows that he proceeded upon assumptions that the clothes were found in a neat bundle, that only the top two press studs of the jumpsuit were undone and that the nappy had been pulled off intact. These assumptions were incorrect and, no doubt, influenced Professor Cameron in arriving at his opinion.

In the opinions of other witnesses, there were indications from the staining on the jumpsuit that there had not been a deliberate cut to the baby's throat with a blade, with the intention of causing death. They said that had such a wound been inflicted, there would have been arterial spurting of blood from the throat or, at least, a heavy flow of venous bleeding which would have manifested itself by heavy staining down the front of the jumpsuit. This was not apparent, there being far less evidence of bleeding at the front than at the back of the suit. Professor Plueckhahn emphasized these considerations. Dr Andrew Scott expressed a similar view. Professor Ferris favoured the view that the bleeding was post-mortem. He said that if the wound which caused the death was a knife wound intended to kill the child, he would expect evidence on the clothing of active bleeding, and this was not apparent. These views conform with what can be seen on the jumpsuit and the photographs of it.

I conclude that the pattern of blood staining does not support the contention that there was a cutting of the throat with a blade done with an intent to kill the child. This is not to say that the pattern of blood staining is inconsistent with a more tentative cut to the throat or neck, whether done by blade or other means.

(b) The absence of tissue other than blood

An approach suggested by Professor Ferris in determining whether the wounds to the baby were caused by a

blade or by canine teeth was examination of the clothing for the presence of human tissue, hair, bone, mucus and other pieces of the body apart from blood. In his experience of animals, including canines biting humans, the injuries tend to be messy and tissue, particularly small globules of fat, tends to spread around the wound and on the fabric or clothing nearby. In the absence of evidence of such other tissue he thought there was no indication that a dingo killed Azaria. He accepted that the force of this view was limited, since he had no experience of a member of the canine family treating a baby as prey and he had no precedent to guide him.

Professor Ferris assumed that tissue other than blood was absent. There appear to be a number of reasons for doubting the validity of this assumption. First, if a dingo killed Azaria it is possible that any remaining tissue was removed by licking. Professor Ferris did not know whether that would have left some secondary evidence of the dingo's licking. Secondly, if there were small pieces of tissue, such as globules of fat, remaining on the jumpsuit when it was left by a dingo, they may not have remained upon it. It is likely that the clothing was exposed to the weather for nearly a week before it was discovered and there is evidence that it may have rained in the area over that period. It is impossible to say whether native animals in the area, birds, or insects might have removed tissue of that sort. After the clothing was discovered, it was handled by police officers. After handling, packaging and re-packaging, it was forwarded to Dr Andrew Scott in Adelaide. The initial packaging of the jumpsuit was not preserved and any tissue which had not adhered to the clothing might have been lost.

When the clothing was examined by Dr Scott, he found no tissue, blood or bones inside the jumpsuit. His

visual examination of the clothing included an examination through a low powered stereo-microscope at a magnification which would have enabled him to recognize any item of tissue or bone down to a size of approximately 2 mm. The clothing was covered with particulate sandy material. Dr Scott said that pieces of tissue or bone smaller than 2 mm could not have been distinguished from other matter.

Further, if the assumption is made that the matinee jacket was on the baby when the blood was shed, as appears to have been the case, there is the possibility that tissue from the baby might have been deposited on the jacket while the blood flowed through it and on to the jumpsuit. Of course, by the time the jacket was discovered in February 1986, it is most unlikely that any tissue would have been present or detectable. Professor Ferris agreed that the bulk of the jumpsuit would have been so protected by the jacket, but thought that the collar would have been exposed. However, the matinee jacket was fastened with two buttons, including one at the throat. Although it may have been fastened with the collar of the jumpsuit left unfolded above it or folded down over the top of the jacket, the jacket may have been fastened over the folded down collar of the jumpsuit. In that case, little of the jumpsuit may have been exposed to the spread of other tissue from the baby's body while the jacket was over it.

The absence of the finding of other tissue on the clothing did not indicate to Professor Plueckhahn that a dingo was not involved. He regarded the question of how much other tissue would be spread around as being highly speculative. He thought that if a dingo had done very serious injury to the child's face and head with the clothing still on the body, one might expect to find fragments of tissue and bone there. However, he said that the volume of blood on the clothing could have been shed

with less serious injury, where there would be very little other tissue, perhaps just a few fat globules. He said that such tissue if left in the sun will dry out and could easily have been knocked off the clothing.

It appears from this evidence that there may have been small pieces of tissue upon the clothing at some stage and that they were lost or unable to be detected by the methods of inspection adopted in 1980. Further, if it be assumed that a dingo inflicted only such wounds above the shoulders as would immobilize the baby, carried her off and removed her from the clothing before further attacking the body, then the failure to find other pieces of tissue upon the clothing would not seem surprising. Accordingly, while that failure gives no support for dingo involvement, I conclude that it is not necessarily inconsistent with such involvement.

A related matter relied upon by the Crown at the trial was that no blood or tissue was found near the damaged area of the left sleeve of the jumpsuit. It was suggested that these would have been expected to be present if the damage had been caused by the bite of a dingo while the baby was wearing the jumpsuit. Dr Pelton and Messrs Chapman and Smith gave evidence to the Commission of close microscopic examination of the surrounds of the damage to this sleeve. They discerned a distinct stain mark on both the exterior and the interior surfaces of the fabric, apparently from a biological fluid. The nature and origin of this stain remain unknown, and its significance may be slight. However it would seem to be more consistent with canine damage than a human attempt to simulate canine damage after removal of the baby's body.

Did the damage to the clothing occur before *or* after the blood was shed upon it?

The evidence in relation to this question concentrated upon the v-cut on the right side of the jumpsuit collar. The damage to the left arm of the jumpsuit and the other holes were not thought by the expert witnesses to afford any assistance in answering the question.

The heaviest staining on the collar was at the back of the neck. It stopped short of the V-cut. With the collar folded down, on its underside there was a small area of quite clean material lying between a part of the heaviest staining and the cut. The general surrounds of the cut were otherwise more lightly stained.

At the trial, Dr Andrew Scott was asked whether the blood was still wet when that damage occurred. He said that it was difficult to say with certainty but, considering the way the edge of the cut had been affected, he thought it more likely that the cut was made when the blood was dry. This evidence was seen as having significance in supporting the Crown contention that the damage had been inflicted by human hand after Azaria was killed in an attempt to simulate dingo damage.

At the trial, Professor Plueckhahn expressed a contrary opinion. He said that, upon examination of the collar damage under a microscope he found two ends of fibres upon which there was congealed blood. He therefore concluded that, for the congealing of the blood to have occurred there, it arrived on the fibres during the life or within a few hours of the death of the baby.

Dr Scott amplified his reasons for the view he expressed at the trial. He said that if a stain dries

around a torn edge it tends to have a slightly darker and fairly pronounced edge to the stain, since the edge areas dry more quickly and a little more of the blood from the wet areas diffuses into the area on the edge. That was one indicator which, although it is not always seen, was not apparent on the jumpsuit. Further, if blood has flowed over material and dried before cutting, one finds fibres which are coated on the outside but still clean in the middle. If the blood is wet when the material is cut, the blood can run over the end of the fibres and this may be apparent. In the collar damage, Dr Scott noticed some fibres which had a clean centre. This was consistent with it being torn when dry. While he could not be absolutely certain, he saw nothing to indicate that it was wet when torn.

Mr Raymond expressed a different view. He thought that, while the first consideration relied on by Dr Scott is a satisfactory indicator for other material, it was not applicable to the jumpsuit because of the nature of the towelling material of which it was made, with little loops of cotton on both sides of the cut. He agreed that the fibres themselves in the cut appeared to be very clean. However, he saw a point on the collar at which the heavy staining of blood appeared to have ceased, just before the cut, and he believed it was probable that the cut had interfered with the flow of blood through the fabric. He therefore thought it more likely that the cut occurred before or during the period while the blood was wet.

Sergeant Cocks shared Dr Scott's view. He considered that the small unstained area on the underside of the collar near the cut would have been stained if the clothing had been cut while the blood was still wet. He inferred that the blood had dried and that the baby had been removed from the clothing before the cut was made to the collar.

I have some difficulty in accepting that the presence of the small unstained area on the underside of the collar is consistent only with the blood drying before cutting. Without the cut, one would expect the blood to be absorbed through the fabric in a regular fashion, subject to the effects of folding and the change in direction of the fabric around the neck. The small unstained area appears to interrupt that regular pattern and its proximity to the cut seems to me to suggest, if only very tentatively, some connection between the two.

If Professor Plueckhahn's evidence is accepted, it would establish that the blood was wet after the collar damage. However, it is odd that the congealed blood on the fibre ends was not seen by Dr Andrew Scott or by Mr Raymond although, in the case Of Mr Raymond, the blood might have been dislodged from the fibres in the intervening years.

Having regard to the diversity of opinion, I consider that the indications observed on the jumpsuit are inconclusive. I am unable to conclude whether the damage occurred before, during or after the bleeding.

Were there human hand prints in b nod on the jumpsuit?

In addition to the blood staining on the jumpsuit there was some diffuse staining lower down on the chest and on the back. In September 1981, Professor Cameron arranged for Mr Raymond Ruddick, a medical photographer at London Hospital Medical College, to take photographs of the jumpsuit using ultra-violet photography. Such photographs are used in medical photography to distinguish one type of stain from another and to delineate the edges of stains, by means of the differing levels of fluorescence of stained and unstained material under ultra-violet light. Professor

Cameron told the jury that, upon examination of the jumpsuit and Mr Ruddick's photographs, he saw patterns in these areas of diffuse staining which he described as impressions of the blood stained hands of a small adult. On the left side of the chest of the jumpsuit, he saw marks which suggested thumb prints, and on the left back, over the shoulder blade area, he saw marks which gave the impression to him of the heel of a hand with four extended fingers. He described a mark which suggested the thumb print of the left hand in front of the right shoulder of the jumpsuit, with marks going down vertically on the back of the right shoulder which, he suggested, were the impression of the fingers of the left hand. Professor Cameron made it clear that he was speaking of staining in blood, and that the prints would be consistent with the imprints of hands when blood was wet on them. At the trial, Dr Plueckhahn strongly disagreed that any impression of a human hand could be seen on the jumpsuit. No other witness saw the hand imprints and they were not visible to the members of the High Court when the appeal was heard. However, Professor Cameron had said in evidence at the trial that the blood on the jumpsuit had faded since he first examined it a year before.

Mr Raymond's work has demonstrated that although a little of the material making up the stains to which Professor Cameron referred is blood, most of it is sand. Professor Cameron's evidence was therefore given on the basis of an erroneous assumption. He apparently depended upon Mr Ruddick's photographs and the results of Dr Andrew Scott's testing, as he understood them. It was unsatisfactory that his opinion was placed before the jury with the weight of his great experience behind it, without adequate verification of the assumption on which it was based.

The only other expert who was prepared to give even the faintest support for Professor Cameron's opinion was

Professor Ferris. He said that the stains might convey an impression of fingers to some observers but he thought it was not reasonable to conclude that they were, in fact, impression marks of fingers. He said it was possible for folding or wrinkling and subsequent contact with a stained surface to produce similar linear marks. None of the other experts was able to detect any impression of hand or finger prints in the staining on the jumpsuit. These experts included Drs Scott and Jones, Professors Bradley and Nairn and Mr Raymond. Professor Nairn examined the jumpsuit and the photographs taken by Mr Ruddick using special goggles so that they might be interpreted more accurately. He could not define any pattern on the clothing that indicated that any particular object had ever come against it. Upon my examination of the photographs and the jumpsuit itself, I could not discern any such pattern.

I therefore conclude that there were no detectable prints of hands or fingers, whether in blood or any other material, upon the clothing.

Conclusion

The staining on the clothing is also relevant to the question whether it was buried. This is considered in Chapter 12.

The answers to the questions posed above are to a large extent inconclusive. The staining on the clothing, when considered on its own, does not provide any positive support for dingo involvement. However, in contrast with the position at the trial the staining, considered on its own, provides no positive support for the allegation of murder.

Introduction

The Crown sought to establish at the trial that Mr or Mrs Chamberlain CuAzaria's clothing so as to imitate dingo damage and thereby give credence to their story that a dingo had taken her. Two quite separate questions arose for consideration on this part of the Crown case. The first was whether the damage to the clothing was caused by human activity or by dingo teeth. The second was, assuming the damage was caused by human activity, were the Chamberlains responsible for it?

There was no direct evidence at the trial that the Chamberlains were responsible for the damage to the clothing or for it being placed where it was found. However, the Crown contended that having regard to all the evidence and to the circumstance that no one other than the Chamberlains had any motive to damage the clothing, it could be safely inferred that it was they who damaged it and placed it where it was found.

As stated in Chapter 4, the clothing was found seven days after Azaria's disappearance about 4 or 5 kms from the camping area at a location about 200 metres off the road on the south-west side of the Rock. There was a dingo den about 30 metres to the west. There were dingo tracks in the vicinity of the den. The place where the clothing was found was about 40 metres from a walking track around the base of the Rock. This track was frequented by tourists. The dingo den was concealed under a large rock and the entrance was far too narrow for human penetration.

The disposition and appearance of the clothing when it was discovered is also described in Chapter 4.

The main damage to the jumpsuit consisted of a roughly circular severance in the left sleeve measuring a few centimetres across with the circular piece missing, and a V cut on the right collar. There was a similar cut in approximately the same position on the right collar of the matinee jacket.

The V cut on the right collar of the jumpsuit was described by Dr Sanson in the following terms:

{ > "The damage essentially consists of a cut, approximately 20 mm long, through the hem and both layers of the material constituting the collar. At an angle of approximately 105° to the long cut just described, there is a shorter cut of about 15 mm in the top layer of material only, which terminates at the hem. There is a slit through both layers of material in line with the shorter cut. The slit is about 6 mm long in the lower, otherwise uncut layer leaving about 9 mm uncut. At the junction of the short cut and the long cut there are several unbroken threads which connect the edges of the material. There is a very good fit if the collar pieces are held together and there does not appear to be any material missing. The short single cut is remarkably straight and clean."

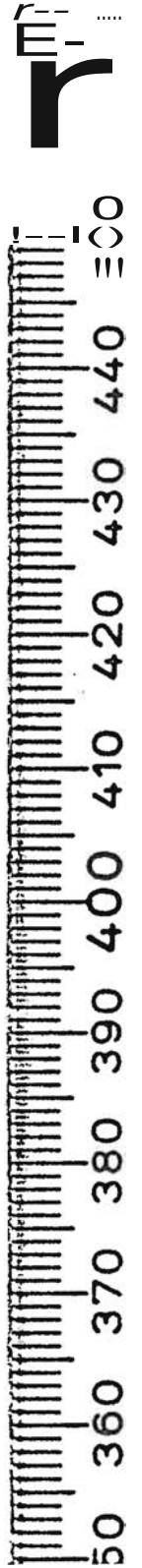
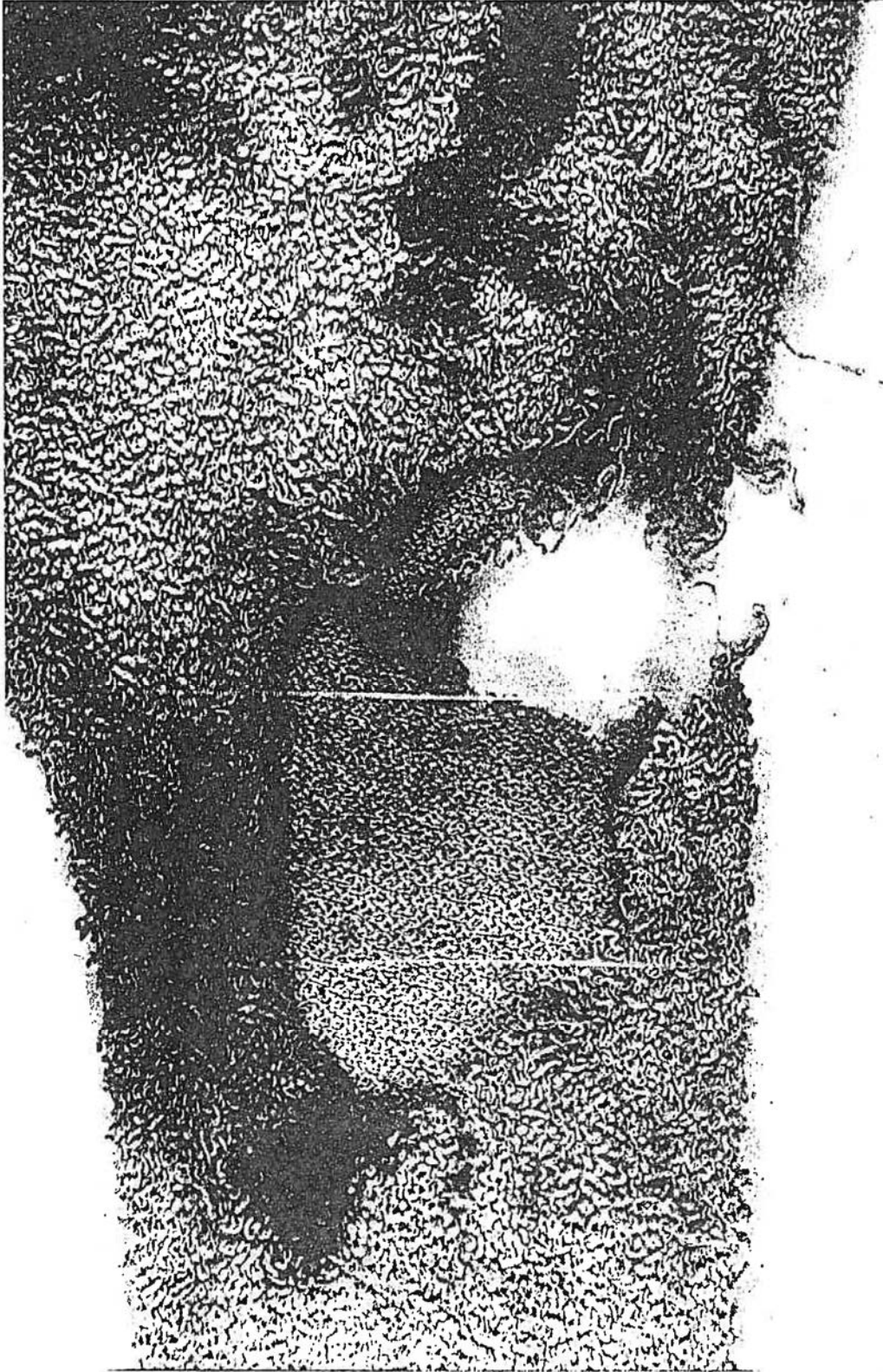
Some appreciation of the damage to the jumpsuit and matinee jacket may be gained by reference to the photographs which are reproduced and identified as "Damage to collar of jumpsuit", "Damage to left sleeve of jumpsuit" and "Damage to collar of matinee jacket"

The finding of the matinee J!:

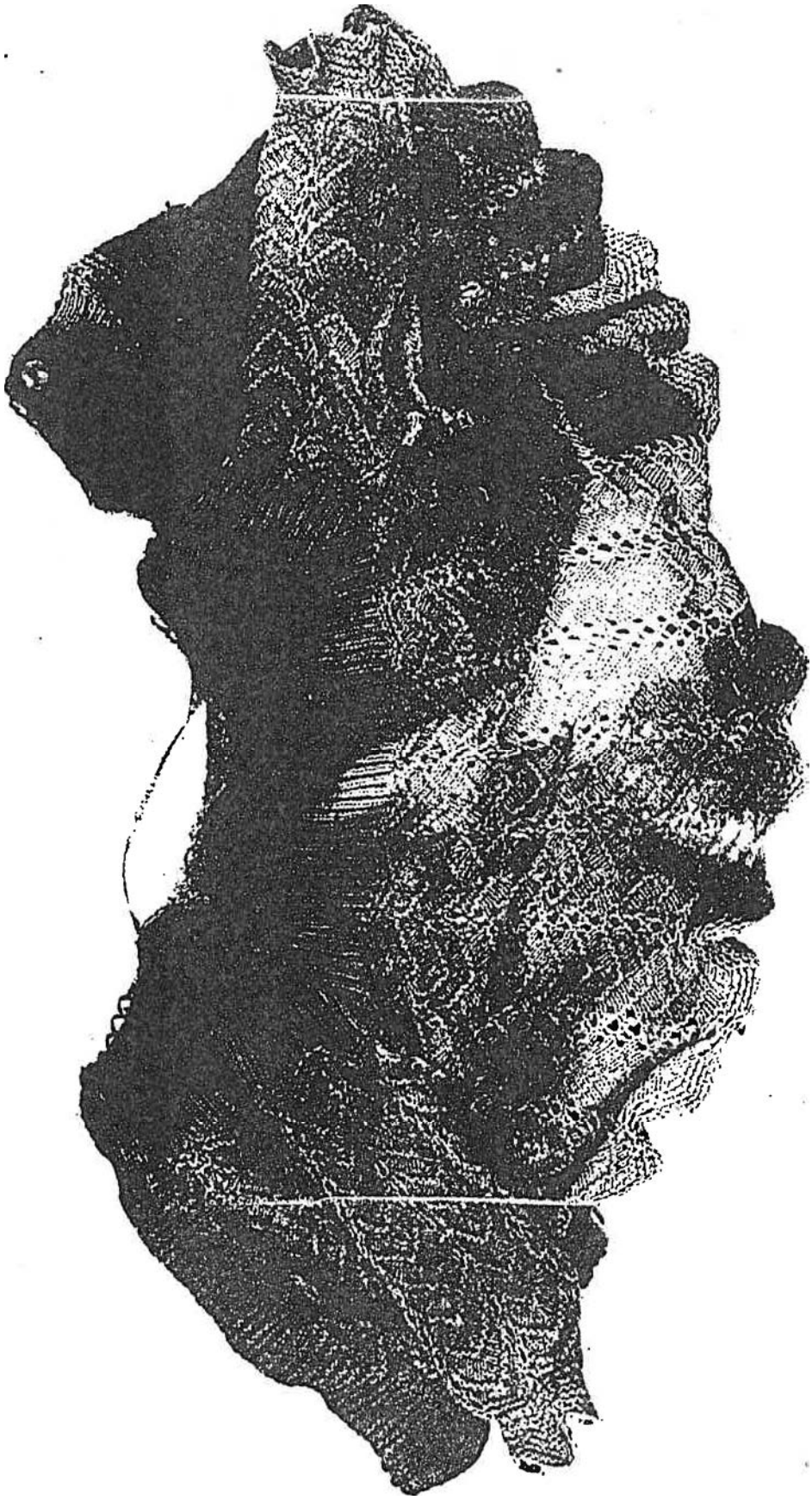
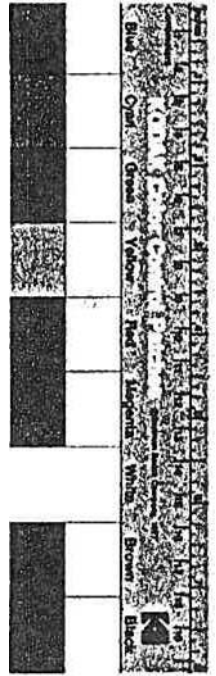
Azaria's matinee jacket was found on 2 February 1986. It was found 150 metres west of where the other clothing was found on 24 August 1980. It is not in dispute that the jacket, which Mrs Chamberlain had always maintained was on the child when she disappeared, is genuine. The matinee jacket corresponds with a detailed description of it given by Mrs Chamberlain when the baby disappeared. She identified it in evidence given to the Commission.

The jacket was examined by Mr Raymond who obtained, even 5-1/2 years after Azaria last wore it, weak positive reactions to Kastle Meyer and ortho-tolidine screening tests for blood. However, he could not confirm the presence of blood. The jacket exhibited signs of very long exposure to weather. Mr Raymond also found staining on the jacket not inconsistent with the staining on the jumpsuit. There was a small cut in the collar, in the same vertical line as the V cut in the collar of the jumpsuit. There were holes in the jacket which were not consistent with natural deterioration or handling, comprising two small holes approximately 1 mm in diameter. In each case, a number of fibres had been severed. None of the holes appeared to have any relationship with any of the others and they did not coincide with any damage to the jumpsuit or singlet. Mr Raymond also found that the top button was done up. The jacket could have been removed from the baby after the cut was made in the collar because it sufficiently enlarged it

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Damage to left sleeve of jumpsuit.



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Damage to collar of marinee jacket.

to go over the head. Of course the button could have been done up after the jacket was removed from the baby's body.

It is surprising that the extensive searches of the area on 24 August 1980 and subsequently, including police line searches, did not lead to the discovery of the jacket. The place where the jacket was found was 150 metres from the centre of the search area. However, there is evidence that the bushes and grasses in that area would have been more dense making it more difficult to see the jacket in August 1980 than in February 1986. It is possible that it may have been covered by leaves or mulch as the result of some animal activity.

The evidence at the trial

Mr Bernard Sims, Mr Kenneth Brown, Sergeant Frank Cocks, Professor Cameron and Professor Chaikin gave evidence for the Crown at the trial to the effect that the damage to the jumpsuit was the result of cuts, not tears, and was therefore the work of human hands. Sergeant Cocks said that the damage could only have been made with scissor's. He demonstrated to the jury how the damage could be caused by a series of cuts with scissors similar to those found in the car.

The Crown's experts relied upon a number of matters in support of their conclusion that the jumpsuit had been cut. One matter was the straight appearances of the edges of the severances. Another was the fact that the severed fibres in the yarns were in an even plane. This was said to appear clearly under a scanning electron microscope. A third matter was that one fibre of a nylon yarn from the jumpsuit was said to be identical in appearance with fibres severed by what was termed a classic scissor cut. Yet

another was the fact that tufts were found around the edges of the cuts in the jumpsuit. It is of significance that the distinction made at the trial between cutting and tearing was made on the assumption that dingoes cannot cut garments with their teeth. The assumption was made that if a dingo damaged a garment with its teeth, the garment would show signs of tearing, not cutting.

The Crown particularly relied upon the fact that when the fabric in the jumpsuit, which is a mixture of cotton and nylon, is cut with either scissors or a blade, small tufts are severed from the edges of the cut because of the loops in the woven material. These tufts can be found by careful examination of any cut in the fabric of the jumpsuit. Professor Chaikin described the tufts as "the strongest evidence" that the jumpsuit had been cut. He thought the damage to the jumpsuit could not have been caused by a dingo.

Dr Orams, Reader in Dental Medicine and Surgery at the University of Melbourne, gave evidence for the defence at the trial. He claimed that the damage to the jumpsuit was consistent with damage by canine teeth.

Additional evidence before the Commission

The evidence before the Commission on this issue was much more extensive. In addition to the experts called by the Crown at the trial, Dr Griffith, who had succeeded Professor Chaikin as Head of the Department of Textile Technology at the University of New South Wales, Dr Robinson, a microscopist, and Dr Sanson, Lecturer in the Department of Zoology at Monash University were called to support the Crown's case. Professor Gustafson, Emeritus Professor of Oral Pathology at the University of Lund,

Sweden, Professor Fearnhead, Professor of Oral Anatomy at the Tsurumi University School of Dental Medicine, Tokyo, Professor Bresee, Associate Professor of Textiles at Kansas State University, U.S.A., Mr Smith, a scientist employed by the Sanitarium Health Food Company, Mr Chapman, formerly the Chief Analyst at the Sanitarium Health Food Company, and Dr Pelton, Head of Home Economics in the Faculty of Food and Environmental Sciences at Hawkesbury College of Advanced Education, were called to support the view expressed at the trial by Dr Orams. Dr Pelton is a former lecturer in textile technology whose work has brought him into close contact with the textile industry. In addition to the abovementioned witnesses, two further experts gave evidence at the request of the Commission. These were Mr Raymond, Biology Division Manager of the state Forensic Science Laboratory, Victoria and Dr. Haschke, Assistant Chief of the Division of Textile Physics at CSIRO.

Dingo experiments

Prior to the first inquest Mr Brown had carried out an experiment at Adelaide Zoo with a jumpsuit similar to the one worn by Azaria enclosing the body of a young kid with its head severed and its legs shortened. The dingoes used in the experiment managed to remove the meat from the jumpsuit, opening only its top two studs. The jumpsuit suffered considerable damage in the experiment, but perhaps less than might be expected. At the trial the defence claimed that the Adelaide Zoo experiment proved that a dingo could easily undress a baby, but no reference was made to it as showing the ability of a dingo to cut fabric with its teeth.

Before the Commission was announced, in 1984 and earlier, Messrs. Bennett, Chapman and Smith, had conducted a

considerable number of experiments to determine whether dingoes could cut fabric with their teeth. They demonstrated to their own satisfaction that dingoes could, in fact, cut similar jumpsuit garments with their carnassial teeth and also with their incisor teeth. They also demonstrated that cuts caused by dingo teeth produce tufts in the same way as scissor cuts or knife cuts.

After the results of their experiments were made available to the Commission, Mr Raymond was requested to endeavour to bring the opposing experts together in order to produce agreement between them, or to reduce the area of disagreement. He conducted his own experiments obtaining both cuts and tufts as a result of dingoes biting similar jumpsuit fabric.

When Mr Raymond's findings were first drawn to Professor Chaikin's attention he considered that the tufts so obtained were different from the small snippets (as he now called them) of nylon thread upon which he had particularly relied at the trial. However, it was then demonstrated that cuts caused by dingo teeth produced the same sort of snippets. Professor Chaikin then conceded that dingoes could produce cuts in jumpsuit fabric and that the cuts would produce both tufts and snippets.

Nevertheless, he adhered to the opinion he expressed at the trial that Azaria's clothing had not been damaged by dingo activity. He based this opinion on the more limited ground that all fibres at the end of the yarn in the jumpsuit were in the same plane, whereas dingo activity led, in his opinion, to severance of fabric in such a way as to distort the fibres thus preventing them coming together in the same plane. As I have already observed this was not the most important ground upon which the professor based his opinion at the trial.

Planar array

"Planar array" was an expression used by Professor Chaikin at the Commission to describe the phenomenon he described at the trial, of nylon fibres lying together in the same plane with evenly matching ends, indicative of knife or scissor cuts in fabric. He said that this phenomenon could only be seen properly under the scanning electron microscope. It appeared for the first time at the Commission that much of the work and research upon which Professor Chaikin's opinions were based had been carried out by Dr Robinson, who specializes in the use of that particular microscope.

Dr Robinson confirmed Professor Chaikin's evidence that planar array can only be confidently detected by using the scanning electron microscope. He said that as recently as November 1986 he was able to observe the phenomenon in the jumpsuit at the V cut. It might have been thought that, by this time, the handling over the years would have disturbed the threads and removed any planar array. He showed what he saw to Mr Raymond who also observed even ends of nylon fibres extending over about 5 mm in a 14 mm cut forming part of the V cut in the jumpsuit collar. Dr Robinson at first was not sure of what he had seen when he examined the jumpsuit in 1981. Later, he remembered that he had seen about 2/3 of 14 mm of planar array in the V cut of the jumpsuit and 10-14 mm of circular planar array in the sleeve. No contemporary records were made of these observations.

Various samples of planar array produced by knives or scissors were photographed under the scanning electron microscope so as to illustrate the phenomenon. Other photographs taken under the microscope were produced by the

Chamberlains' experts and by Mr Raymond, indicative, to a limited extent, of planar array in canine teeth cuts.

Dr Robinson distinguished these latter cuts from what he said was true planar array because of the angle at which the photographs were taken. Mr Raymond maintained that since each of the features of planar array was a yarn end at a different angle, his photographs accurately depicted a planar array effect produced by canine teeth.

Dr Pelton expressed the opinion that planar array, as he understood it, was better detected with an ordinary optical microscope.

Both the Crown and the Chamberlains had approached the CSIRO for assistance on this issue, but both requests had been declined. However, at the request of the Commission Dr Haschke, the Assistant Chief of the Division of Textile Physics at the CSIRO, read the relevant evidence and examined the relevant exhibits and examined the jumpsuit. He expressed the opinion that although the existence of planar array might help to distinguish between cuts and tears, it did not reliably distinguish between fabric damage caused by canine teeth and knife or scissor cuts.

Dr Haschke was not persuaded that the scanning electron microscope was the best instrument for determining whether planar array was present in a severed fabric. He thought that use of an optical microscope could be a more useful technique to determine the relative location of cut fibres and yarns than scanning electron microscopy. His opinion on the effect of the photographic evidence was that while it was "indicative of cutting rather than tearing in the collar of the Azaria Chamberlain jumpsuit, there is no

substantiation of the claim that the cutting was done by scissors".

Mr Raymond concurred with Dr Haschke's opinion.

Professor Bresee also doubted the value of the scanning electron microscope in identifying planar array. Professor Fearnhead doubted whether sufficient background work had been done to support Professor Chaikin's reliance on the planar array test.

((To my untrained and inexperienced eye, some of the photographs produced by Dr Robinson seemed to support the view for which he contended. Nevertheless, in the light of the differences between the experts, I am unable to adopt the planar array test as a reliable test for distinguishing between canine teeth cuts in fibres and cuts caused by a knife or scissors. It may well be that the phenomenon of planar array can be used to assist in determining the difference between cuts and tears, but this is not the same as distinguishing between cuts made by canine teeth and cuts made by scissors or knives.

My reluctance to adopt planar array as a reliable test is increased by the concession made by Professor Chaikin that the other test upon which he relied at the trial has been shown to be wrong. The tests are not inter-dependent but nevertheless the concession illustrates the caution that must be adopted in acting upon opinion evidence which is contradicted by other opinion evidence. That is especially the case where the contrary evidence comes from independent experts of considerable experience and the question at issue is whether grave criminal charges have been proved beyond reasonable doubt.

The single fibre with the classic scissor cut

Dr Robinson (confirming Professor Chaikin's evidence at the trial) claimed that one nylon fibre, part of a yarn in Azaria's jumpsuit at the V cut showed a classic scissor cut under the scanning electron microscope. This scissor cut of the one fibre reliably indicated, he said, that the whole cut was made by scissors, or perhaps a knife. Dr Haschke disagreed and pointed to a similar fibre in a photograph of dog damaged material which exhibited, so he said, the same characteristics. In the circumstances it would be unsafe to base any conclusion on this part of the evidence.

Comparisons between Azaria's clothing and other clothing damaged by canids

Dr Pelton compared Azaria's jumpsuit with known dog damaged material. This material consisted of similar jumpsuits "cut" by dogs or dingoes when extracting meat tied inside them. The best results were obtained by tying meat or other food in the sleeves. • Occasionally the dog or dingo bit out a circular piece of fabric of a somewhat similar size to the piece missing from the sleeve of Azaria's jumpsuit. The dog frequently swallowed that piece.

Dr Pelton expressed the opinion that there were many similarities between Azaria's and the other damaged jumpsuits. The similarities included areas of distortion, edge contours, moisture evidence and "tails" (the protruding threads left after tearing) in the sleeve and straight pulled yarns, entangled fibres and filaments, and scalloped features in the collar. He thought it was highly likely that the damage to Azaria's jumpsuit had been produced by canine teeth.

His evidence was challenged on the basis that he relied too much on superficial similarities and on the further basis that the jumpsuit, much handled by experts over the years, was no longer in the same condition as it was when first examined by the Crown's experts. As a result, reference was made to slides taken by Mr Brown before the first inquest and to other early photographs of the jumpsuit damage. In the light of these Dr Pelton maintained his opinion, drawing attention to the features he claimed to have seen in the early photographs.

Dr Robinson and Dr Griffith rejected Dr Pelton's opinion, and found few resemblances in the jumpsuits. Dr Robinson pointed to compression of the fabric and the presence of saliva and other dry liquid in the area of the bite in the dog damaged jumpsuits, and to the absence of such indicia on Azaria's jumpsuit. Dr Haschke noticed this, but also said that such indicia were not invariably present in the many photographs of dog damaged fabric.

Mr Raymond thought that the damage to Azaria's clothing was not inconsistent with canine damage. He is not an expert in either forensic odontology or textiles. However, he took up the work of Messrs Bennett, Chapman and Smith, and by conducting independent experiments with dingoes he produced data which was used by all the experts. His conclusions were based on his own work.

Notwithstanding the views expressed by Dr Pelton and Messrs Chapman and Smith, I am not persuaded that a comparison of Azaria's and the other jumpsuits of itself leads to the view that Azaria's probably was damaged by a canid. But this is not to say that a canid could not have produced the damage. The question whether the Crown has established the negative can only be decided in the light of all the evidence. If regard is had only to the technical

evidence, I do not think it can be concluded beyond reasonable doubt that the damage to the clothes was caused by scissors or a knife or that it was not caused by the teeth of a canid.

Dr Griffith's experiments

Dr Griffith gave evidence of experiments he had carried out to show how the cut in the collar of the jacket and another small cut near the upper stud of the jumpsuit could have been produced with one knife cut using a sharp kitchen knife with a blade length of approximately 15 cm. He agreed that his experiments did not reproduce exactly all the damage apparent on the jumpsuit, but he claimed that they showed that the damage could have been produced by such a knife. Dr Pelton thought that use of a knife as in Dr Griffith's experiments would never produce all the damage observable in the jumpsuit.

Although Dr Griffith's experiments are interesting they do not persuade me that the damage to the jumpsuit was caused in the manner he suggested. My hesitation in reaching such a conclusion is increased by a consideration of the evidence of Sergeant Cocks to the effect that the V cut in the collar could only have been caused by somewhat complicated manoeuvres with small sharp scissors, which happened to resemble those found in the car.

The severance in the left arm of the jumpsuit

Dr Griffith claimed that the circular severance in the left sleeve of the jumpsuit was produced by the cutting of the bunched fabric followed by the ripping or tearing out of the incompletely severed material. Sergeant Cocks

demonstrated how he thought it was produced by the use of scissors. This evidence is too speculative to be of much value, particularly having regard to the contrary evidence given by other witnesses, especially Dr Pelton.

The evidence of the forensic odontologists

Dr Crams adhered to the opinion he had expressed at the trial that all the damage to Azaria's clothing was consistent with dingo damage. He said that he could not say precisely what had occurred in the dog's mouth to produce the V cut in the collar. With reference to the evidence of Dr Sanson, to which I shall presently refer, he thought that the grinding effect of a dingo bite might produce a sufficiently straight cut to match the cut in the collar. He drew attention to the great strength of dingo jaws and the manipulative and holding effects of a dingo's lips, tongue and gums.

Mr Sims maintained the view he expressed at the trial that the damage to the jumpsuit was not caused by a dog or dingo. He drew attention to the absence in the jumpsuit of the double impressions of matching canine teeth, that is the four long teeth at the end of a dog's jaw. However, it was not easy to find such impressions in the Adelaide Zoo experiment jumpsuit. Professor Gustafson pointed out that one long canine tooth could penetrate some material without the matching tooth doing so. He thought that teeth impressions might be useful in identifying wounds inflicted by dogs, but were not of much assistance in identifying the cause of damage to the jumpsuit. He and Professor Fearnhead disagreed with Mr Sims' opinion that duplicate canine teeth marks would be expected in fabric damaged by a dog.

Dr Sanson expressed the opinion, which was not seriously disputed by the other odontologists, that the longest cut that a dingo could make with a single bite was 10 mm. In his opinion the V cut in the jumpsuit collar, since it was longer than 10 mm could only have been achieved by a dingo if it had bitten folded fabric. Otherwise the cut would not have been straight. Mr Chapman had suggested a six layer fold of fabric could account for the V cut, but Dr Sanson considered that the bulk of the material would have been too great to comfortably fit in a dingo's mouth, and the thickness would have been such that the dingo's teeth could not have penetrated it in one bite. He thought two bites would not produce a straight cut. On this basis he rejected the reasonable possibility of a dingo producing the V cut. He did not dispute that a dingo might have produced the sleeve damage. Mr Chapman claimed that less than a six layer fold was necessary, and he carried out experiments which he said showed that dog "cuts" could be produced through multiple layers of material.

When the matching cut in the collar of the matinee jacket is taken into account, Dr Sanson's opinion gains additional weight. However Dr Pelton pointed out that the cut in the collar of the jacket does not precisely match the V cut in the jumpsuit. He thought they may have been produced at different times.

Professors Fearnhead and Gustafson expressed the opinion that the damage to the jumpsuit was not inconsistent with dingo damage. Neither of them said, as did Dr Pelton and Messrs. Chapman and Smith, that the probabilities favoured dingo damage. They are both highly qualified in the field of canine odontology.

Professor Gustafson disagreed with Dr Sanson that a dingo could not bite twice and maintain a straight line in

the bite. He, like Dr Orams, particularly stressed the manipulative and holding ability of the dingo's lips, tongue and gums, and the strength of its jaws.

I found Dr Sanson's evidence impressive, but he was prepared to admit that, in nature, unexpected things can happen, and he would not say that it was completely impossible for a dingo to have inflicted the damage on Azaria's clothing. However, he could not conceive how it could have been done by a dingo.

Damage to the nappy

Mr Raymond found indentations on the plastic lining of the nappy which he considered unusual and hard to explain in terms of human interference. The indentations matched similar indentations found in the Adelaide zoo experiment nappy. In a statement tendered to the Commission Mr Kuchel, a botanist who is now deceased, expressed the opinion that these indentations had been made by birds. However, the reasons which led Mr Kuchel to this opinion are not stated. Professor Fearnhead thought that the indentations on the nappy and indentations on the singlet were consistent with claw marks.

If a dingo killed Azaria it is surprising that the nappy was not blood stained. It was torn and there were some pieces of wadding lying nearby but there was no blood stain on it. However, the absence of staining seems consistent with the paucity of staining on the lower half of the jumpsuit. It is conceivable that the nappy could have been pulled off the child before being ripped apart and before any injury was caused to the lower half of the body. The appearance of the nappy is yet another puzzling feature of the evidence. On balance, it seems to support the theory

of dingo involvement. However it has to be borne in mind that a dingo from the nearby den could have damaged the nappy after a human being had removed it from Azaria's body.

Ability of a dingo to remove the clothes from Azaria's body

The proposition that a dingo could have removed Azaria from her clothes without causing more damage than was observed on her clothes is very difficult to accept. Some of the experts with much experience of dingo behaviour expressed the opinion that they would have expected the clothes to have been grossly damaged if a dingo had removed them from the baby. These witnesses included Dr Corbett, Dr Newsome and Mr Cawood.

Professor Gustafson thought it would have been possible for a dingo to have removed the child from her clothes and leave them in the state in which they were found. Dr Sanson was of the view that although each step in the process of the removal of the clothes by a dingo was possible, the total number of possibilities involved in the entire process strained credulity. Mr Roff referred to the ingenuity of dingoes in removing wrappings from food and said that the appearance of the clothes was consistent with dingo activity. I have already referred to the Adelaide zoo experiment in which a dingo extracted a kid from a jumpsuit undoing only the two top studs. Nevertheless, the jumpsuit was much more grossly damaged than was Azaria's.

There is no recorded case of a child having been removed from its clothes by a dog or dingo. Analogies referred to in evidence of the killing and skinning of small animals are of no real assistance. Evidence was given of a number of experiments of meat, sewn into jumpsuits, being fed to dingoes. The results of these experiments are also

of no real assistance. The fact that the top button of Azaria's matinee jacket was done up does not of itself preclude dingo involvement. Mr Raymond was able to demonstrate how the cut in the collar of the jacket permitted it to be removed, leaving the top button done up. Moreover, if a dingo did consume the child it may have done so by first devouring the head. In this event the jacket, jumpsuit and singlet would all have been more easily removed from the body. Further, it was demonstrated that if, for example, a dingo placed its paws on the feet of the jumpsuit so as to steady its prey, it could have extracted the child leaving its bootees in the legs of the jumpsuit. The bootees were, in fact, in the legs of the jumpsuit when it was discovered.

If a dingo did consume the head first or if it inflicted severe head or neck injuries, as it must have done, then the absence of extensive collar damage to the jacket and jumpsuit seems surprising.

Were it not for the conflict of expert opinion on this question, I would find it difficult to accept that a dingo could have removed Azaria from her clothing without causing more damage to it than was observed. However, Mr Roff's evidence cannot be lightly dismissed. He is a practical man with much knowledge and experience of dingoes. He is a disinterested witness. As senior ranger at Uluru National Park it was not in his interests to support an allegation that a dingo had taken a child from a camping area within the Park in which he had general responsibility. It is apparent from the evidence that Constable Morris (and probably other police officers) recognized his great experience and deferred to it. Moreover, his opinion gains support from Professor Gustafson's evidence. In these circumstances, I conclude that although a dingo would have had difficulty in removing

Azaria's body from her clothing without causing more damage
to it, it was possible for it to have done so.

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was the clothing buried?

Professor Cameron gave evidence at the trial that when he examined the jumpsuit in September 1981 he noticed that it appeared to be almost uniformly stained with sand except under the arms. He concluded from this that the jumpsuit had been buried in sand and, since he observed no fold-marks indicative of variations in the staining, he further concluded that the clothing was possibly buried with the body in it. He also concluded from the variation in staining down the front of the jumpsuit (beneath the overlapping join between press-studs) that only two of the press studs were undone when the garment was covered with sand. This evidence, in conjunction with geological evidence as to the source of a small quantity of soil found in the jumpsuit, was relied upon by the Crown to found a submission that Azaria's clothed body had been buried by the Chamberlains on the sand dune immediately east of the camp site on the night she disappeared. Gibbs C.J. and Mason J. said (153 C.L.R. at p. 567) that it could be inferred with certainty that the clothing had been buried.

Professor Cameron's examination of the clothing took place approximately one year after it was found. In that period it had been handled by other persons before it was examined by Dr Andrew Scott. Thereafter it was vacuumed by Sergeant Cocks to collect the soil, plant material, hairs and any other matter adhering to it, and it was examined and handled by numerous persons in connection with the first inquest. It is therefore desirable to consider the evidence of the first scientist who examined the jumpsuit, Dr Andrew Scott. He said that it was in a generally dirty condition when he received it on 28 August 1980. Most of the sand was on the outside of the jumpsuit, but there was a considerable amount of free sandy material inside it, in the feet. He thought that it was most likely that the sand was applied when the blood was almost dry, if not completely dry, since there was no encrustation of sand in the blood stains. When blood is drying, it is quite sticky and, if it is exposed to soil or sand, a crust of blood and the other material will be formed.

Dr Scott was not asked about the question of burial at the trial. Before the Commission, he said that he did not see any indication that the clothes had been buried. Professor Cameron agreed that the handling and vacuuming of the clothing before he saw it may have caused a significant difference in the appearance of the sand upon it. He said he would defer to Dr Scott's opinion. It appears that Professor Cameron did not regard the quantity of sand on the clothing as being of significance but, in reaching the view he expressed at the trial, he relied only upon its apparently even distribution. As he saw it, burial was the most likely way in which the sand or dust could have got on it. Dr Scott said that the jumpsuit now appears much more evenly soiled than when he initially examined it.

Dr Scott carried out experiments to determine the length of time taken for blood on a jumpsuit to dry. He found that, in conditions where the rate of drying would have been faster than on the night of 17 August 1980, it took between 2-1/2 and 3 hours for significant amounts of blood, such as that found on the jumpsuit, to become touch dry. It therefore appears that, if Azaria's clothing was buried, it was not buried within approximately 3 hours of the bleeding on the jumpsuit taking place.

In the light Dr Scott's evidence, I do not regard Professor Cameron's opinion as to the burial of the clothing as convincing. The quantity of soil vacuumed from the jumpsuit clothing was about a teaspoonful. Although the clothing may have been buried, the quantity and distribution of sand on it might well have been the result of it being dragged through sand.

The origin of the soil

At the trial, evidence was given by Dr Barry Collins, a geologist and forensic scientist then employed at the Australian Mineral Development Laboratories in South Australia, of comparisons made by him between the soil taken from the jumpsuit and five other samples taken from the Ayers Rock area. Evidence was also given by Mr David Torlach, a land conservation officer employed by the Conservation Commission of the Northern Territory at Alice Springs, of comparisons made by him between some 50 soil samples collected by him in the Ayers Rock area and Dr Collins' description of the soil from the jumpsuit. While their evidence at the trial was not expressed in terms of firm conclusions, it was such as to justify the Crown in putting to the jury that the various characteristics of most of the soil in the jumpsuit could only be matched in soil

found in certain places, that one of those places was under thryptomene bushes opposite the camp site on the sand hill immediately to the east, and that it would be entitled to find, in the light of other evidence, that this was the most likely place of origin of the soil in the jumpsuit and the most likely place where the Chamberlains buried the child at some stage during the night.

Before the Commission, the original reports of Dr Collins and Mr Torlach were examined and their conclusions discussed more thoroughly. Dr Collins said that approximately 10% of the soil found in the jumpsuit could have come from the immediate area in which the clothes were found. He agreed that it was possible that the soil in the jumpsuit was not a mixture of soils from different places, but came from one place. Such a place would have to be between the site of the clothing and the camp site, where two types of soil meet and mix. However, no sample of such a nature had been collected and he favoured the view that the soil came from at least two places, about 10% from where the jumpsuit was found and the rest from elsewhere. He said that the rest could have resulted from a mixture of soil from several different places.

The three main characteristics of the soil samples relied upon by Dr Collins and Mr Torlach in making comparisons were colour, texture (particularly the size of grains of sand in the samples) and pH as a measure of acidity and alkalinity. The colour of the soil in the jumpsuit was a particular shade of red, which is very common in the Ayers Rock region. While it enabled some parts of the region to be eliminated, many samples shared this colour.

As to texture, the jumpsuit soil was sandy, with the grains varying in size generally from a diameter of 1 mm

down to below 0.1 mm. Again, there were large areas which produced samples of a similar texture and grain size, although these characteristics did permit the elimination of certain areas where the grain size was generally finer, such as on the top of the sand dunes east of the camp site, and other areas where there was a greater concentration of clay.

The characteristic which received most attention was pH. The jumpsuit sample was shown to be alkaline with a pH of 7-1/2 to 8. Although some 27 of Mr Torlach's 50 samples showed a pH of more than 7-1/2, by considering all three characteristics together, he considerably limited the number of samples which produced a reasonable match with the soil found in the jumpsuit. In his view, the alkalinity of many of the samples was the result of proximity to certain types of trees or shrubs and the effect of their litter. However, the difficulty in drawing any definite conclusions from the pH results was indicated by the fact that, where Mr Torlach took samples from the surface and from depths varying up to 30 cm at the same place, there were frequently wide variations in the pH.

In summary, Mr Torlach's conclusion was that a reasonable match could be found in soil samples taken from under two types of shrub which grow upon the sand dunes, namely *thryptomene maisonneuvii* and *grevillea stenobotrya*, and from soil taken from under the desert oak tree which grows both in the dune country and upon the plains at scattered points throughout the Ayers Rock region. Although he could not be definite about it, Mr Torlach did not favour the areas under the desert oak because of the prevalence of litter beneath such trees and the apparent absence of it from the material in the jumpsuit.

It is apparent from the evidence before the Commission that, in 1980, the thrypcornene was widespread on

the flanks of sand dunes and the grevillea was commonly found on the sand dunes in the Ayers Rock region, particularly in the area in a general easterly arc from the camp site.

In so far as the evidence enables conclusions to be drawn, it appears that most of the soil in the jumpsuit could have come from a large number of places in the Ayers Rock region, many of those places being in the sand dune country lying generally in an easterly direction from the camp site. As Dr Collins said, his findings would not be inconsistent with the jumpsuit being dragged across the sand dunes in that area.

The geological evidence did not further support the suggestion that the clothing had been buried, rather than dragged along the surface.

Samples taken from the vicinity of the Uluru Motel clearly did not match the soil in the jumpsuit. The closest place from which a reasonably matching sample was taken was from under a desert oak about 1 km from the motel. Thus there is no support for any suggestion that Azaria's clothed body may have been buried near the Uluru Motel late on the night of 17 August 1980.

The origin of the plant material

Fragments of various plants were found upon Azaria's clothing. According to Sergeant Cocks, some of these fragments were so embedded in the fabric of the jumpsuit as to indicate that they had come upon it from the inside back of the garment, within the V formed by the undone top studs. This suggested that Azaria was not in the suit at the time. The plant material on the singlet was on

its outside when found, i.e. the side which would have been next to Azaria's body and which became the outer surface when the singlet was turned inside out.

Expert evidence was given at the trial and before the Commission upon two main questions concerning this plant material. The first question is: where did the plant material come from? The second question is whether fragments of parietaria plant found on the singlet and jumpsuit were rubbed on to them by human hand.

At the trial, Mr Rex Harold Kuchel, a consultant botanist to the South Australian Police Department, examined this plant material and identified seeds of eight different plant species, and leaf fragments of some of those species. He was unable to identify some plant fragments. The largest number of seeds and by far the largest number of other fragments were identified as parietaria debilis, an extremely delicate annual that only grows in sheltered and shaded situations among rocks, where the soil receives extra water run-off from the rocks.

Mr Kuchel explained that in the Ayers Rock region, there were three distinct ecological areas, being the sand dune country which, relevantly, lay in a general easterly direction from the camp site, the plains, which relevantly lay between the sand dune country and Ayers Rock, and the rocky areas immediately around the base of the Rock. Different species of plants predominate in each of the three areas, although some species overlap and are found in two or three of the areas. Parietaria is a plant which does not occur on the plains or on the sand dunes. Its presence on the clothing therefore indicated that it had adhered to the clothing in the general vicinity of the place where the clothing was found.

Mr Kuchel described the other seven species of which seeds or fragments were found and their usual habitats and said that all of these species could be found between the place where the clothing was found and the road going around the Rock. He preferred to some other species which he regarded as typical of the plains country and the sand dune country and their absence from the clothing, with the exception of one species, namely *aristida browniana* (Kerosene grass) - of which he found very little and which could also have come from an area close to where the clothing was found.

This evidence was relied upon by the Crown Prosecutor at the trial. He put to the jury that it would have taken a very adroit dingo to carry the baby clothed in the jumpsuit through the vegetation on the sand dunes and the plains and to collect almost nothing in the nature of seeds or other vegetation along the way.

Mr Kuchel died before the Commission was established. However, I have had the benefit of his evidence at the trial and at the first inquest, and his written statement.

The botanical material taken from the clothing was further examined by two botanists, Dr Gregory Leach and Dr Peter Latz of the Conservation Commission of the Northern Territory. They identified in the fragments another three species which Mr Kuchel had not identified. They also reported upon the distribution of all of the species found in the clothing. Their views were, to a large degree, in agreement with Mr Kuchel's, but there were some differences. It is not necessary to analyse all of these in detail. Of the eleven species identified from the jumpsuit, singlet and nappy, it appears that, while all of them can be found within a few hundred metres of the place where the clothing

was found, it is only *parietaria* which grows close to the Rock and nowhere else. All of the other species grow on the plains, some being widespread, and others grow under trees or in better watered areas. Four of these species also grow in the sand dune country, although one of these species, *calotis hispidula*, is only found at the base of dunes in winter rainfall years. There was winter rainfall in 1980 and accordingly this and the other three species may well have been present at the base of dunes immediately east of the camping area.

Mr Kuchel said at the trial that he would not have expected to find one of these species, *aristida browniana*, in the sand dune country, but Dr Leach and Dr Latz confirmed that it is widespread on the dunes. Another of these species, *enneapogon polyphyllus*, had not been identified by Mr Kuchel. Leach and Latz confirmed that it was found at the base of the dunes.

In support of his conclusion that plants typical of the sand dunes and plains were at t, Mr Kuchel said at the trial that the *thryptomene maisonneuvii* bush was typical of the dunes. However, he gave evidence that its leaves are not prickly, were inclined to be rounded and did not project like many others. I doubt whether any useful inference can be drawn from the failure of any of it to adhere to the clothing. Mr Kuchel said that the main grasses on the plains country were *aristida* and *enneapogon*, and that these are the main grasses that adhere to clothing, particularly socks. It now appears that there were small quantities of seeds of both of these plants on the jumpsuit.

Dr Leach and Dr Latz also examined the plant material found on the matinee jacket in February 1986. *Parietaria debilis* was not found on it and, given the state of preservation of the other plant material found, they

expected that identifiable fragments of it would have remained if they had been there in 1980.

The predominant species of seed present on the jacket was that of *calotis hispidula* (bogan flea). This plant is known to germinate only after winter rains and, so far as Dr Leach and Dr Latz could determine, suitable conditions for the extensive germination of it had not existed in the Ayers Rock region since the winter of 1980. In their view, the large number of these seeds was consistent with their having been picked up on the jacket in August 1980. Further, that plant is ground hugging, growing to a height of perhaps 10 cm, and the seeds have barbed spikes and no adaptation for wind or water dispersal. These facts, together with the degree of entanglement of the seeds in the jacket, suggested to them that most of the seeds were present in the jacket when it arrived at the place where it was discovered.

Seeds of the two species identified by Mr Kuchel as being typical grasses of the plains country, *aristida* and *enneapogon*, were also found to be present in relatively large numbers upon the jacket.

The Commission also heard evidence from rangers at the Rock as to the quantity of plant material expected to be picked up. Messrs Roff and Cawood said that dingoes commonly used the roads and tracks to move around the area and endeavoured to avoid prickly vegetation. Mr Roff said that a dingo carrying away *Azaria* might well have used the road system to travel back to the Bnck.

In the light of what was found on the matinee jacket and the further evidence in respect of the material upon the other clothing, it appears that plant materials typical of the plains country lying between the camp site

and Ayers Rock were present in significant quantities upon Azaria's clothing. Further, it appears that seeds of four of the eleven species identified upon the jumpsuit could have come from the sand dune area east of the camp site.

The botanical evidence is not inconsistent with a dingo carrying the clothed baby from the camping area, across the plains country to the Rock.

I turn now to consider the question whether the fragments of parietaria were deliberately rubbed upon the jumpsuit and singlet by human hand. At the trial Sergeant Cocks gave evidence that the fragments of parietaria upon both items of clothing were consistent with their having been rubbed directly on to that plant. Mr Kuchel said that, in order to fragment the parietaria leaves as seen upon the garments, it was necessary to agitate them against the plant. He was shown the photographs of the place where the clothing was found and said that he could not see any bruising or disturbance to the plants in those photographs. The Crown relied upon this evidence as showing that the clothes had been deliberately rubbed in the vegetation, not precisely where it was found, but by human hand, for the purpose of creating the impression that they had been left there by a dingo.

Before the Commission Mr Goodwin, who found the clothing on 24 August 1980, said that the vegetation on the ground around the clothing had been disturbed. The rangers Cawood and Roff saw the location of the clothing on the same day. Both gave evidence of their observation of a flattening of the undergrowth in a patch which, in their view, was consistent with an animal having lain down. Further, an enlarged photograph of the ground on which the clothing was found was examined by a botanist, Mr Clyde Dunlop, and he identified pieces of parietaria plants in the photograph.

Mr Kuchel, Dr Leach and Dr Latz were in agreement that parietaria leaves fragment quite easily and would readily adhere to the jumpsuit material.

I conclude, therefore, that the seeds and other fragments of the parietaria plant found on the clothing may have come from the immediate vicinity in which the clothing was found. In my view, the evidence in relation to the plant material on the clothing does not lend substantial support for the contention that it came there by deliberate rubbing on the vegetation by human hand. The presence of the plant material on the clothing is not inconsistent with it having been picked up as a consequence of an animal agitating the clothing against vegetation.

Conclusion

The evidence concerning the soil and plant fragments on the clothing is consistent with the clothed body of the baby being dragged through sand on the dunes east of the camping area and through low vegetation of kinds which grew in that dune country and on the plains between the camping area and the Rock.

On the other hand, if the clothing had been merely taken from the car, buried, disinterred and later placed at the Rock by the Chamberlains, one can imagine that it may have picked up some plant material but it is difficult to conceive how it could have collected the quantity and variety of plant material found upon it.

While the evidence does not exclude the possibility of burial, it could not support a finding of burial. Similarly, while it is not inconceivable that the plant fragments came upon the clothing by a deliberate dragging by

human hand through a variety of low growing vegetation, in the absence of other evidence this does not seem likely.

Hairs on Azaria's clothing

The Crown relied at the trial upon the fact that no dingo hairs were found on the Azaria's clothing and that no such hairs were found in the items recovered from the tent.

On 18 September 1980 Sergeant Cocks removed four animal hairs from Azaria's jumps it and a further two from her singlet and handed them to Dr Harding. At the trial Dr Harding expressed the opinion that the hairs were probably cat hairs but he did not deny the possibility that they might be dingo hairs.

The Chamberlains had owned a cat as recently as just prior to the birth of Azaria but had not owned a dog for many years.

After the trial, the hairs were examined for the first time by Mr Hans Brunner, an expert on animal hairs. He told the Commission that after using scientific methods unknown to Dr Harding, he had been able to demonstrate that

the hairs were dog hairs. Dr Harding conceded that Mr Brunner was correct in his opinion.

It now appears also that a further two hairs found in the tent were dog hairs. Since no search was made for hairs in the tent and its contents until some considerable time after 17 August it is possible that more hairs would have been found if a search had been made immediately after Azaria's disappearance.

The experts are agreed that it is impossible to distinguish between dog and dingo hairs.

The absence of dingo saliva on the clothing

In September 1980 Dr Andrew Scott tested the jumpsuit for dingo saliva and obtained no positive result. However he thought that the lack of a positive result did not eliminate the possibility that there may have been saliva on the jumpsuit at a place not tested, or that there may have even been saliva that did not react to the novel test which he devised especially for the case. Furthermore, it is now known that the matinee jacket was on the baby and, since it would have been over the jumpsuit, it may have absorbed any saliva.

Mr Goodwin, who found the clothes, said that it had been raining on the night before the clothes were discovered. The recollection of others is different, and the local rainfall records in relation to this particular spot are equivocal. If rain did fall, it may have washed away any dingo saliva on the clothes.

Dr Scott's failure to find saliva does not disprove dingo involvement, but it fails to support it. That failure must be weighed with all the other evidence.

The place where the clothing was found

The place where Azaria's clothing was found is about 2-1/2 kms from the Uluru Motel and 1/4 to 1/2 km north west of the Maternity Cave. This cave is west of the Fertility Cave in the vicinity of which Mrs Chamberlain had seen a dingo on the afternoon of 17 August 1980. I am satisfied that the Chamberlains had the opportunity, after the baby disappeared, of going to that place and leaving Azaria's clothes there.

The motel was still serving drinks until well into the early hours of Monday, 18 August, but there was a period of two to three hours thereafter when the Chamberlains' absence from the motel would not have been noticed. The starting of a car might have attracted attention, but Mr Chamberlain at least would have been able to walk or jog to where the clothes were found and return unnoticed.

There is however, still the question as to why Mr or Mrs Chamberlain would have chosen to place the clothes where they were found. The Crown suggested that the clothes were deliberately put in the vicinity of a dingo den, but the evidence of Messrs Roff and Cawood, the Chief Ranger and his deputy, is that although they knew of other dens at the base of the Rock, they did not know about this particular den. The nearest den known to Mr Roff was a kilometre to the east. There is no evidence to suggest how the Chamberlains could have known about this den. Further, it is difficult to see why the Chamberlains would have placed the clothes so far west of the Fertility Cave where Mrs Chamberlain had seen a dingo on the Sunday afternoon.

There is a lichen formation attractive to photographers on the Rock near the site where the clothes were found. Mr Chamberlain photographed the lichen from

the road on 17 August, but having regard to his enthusiasm for photography this cannot be regarded as incriminating. In her statement to Inspector Gilroy on the afternoon of 18 August Mrs Chamberlain suggested that the dingo she had seen at the Fertility Cave might be responsible for taking her child. The Crown submitted she made this suggestion to ensure that the police searched near the cave and found the clothes. However, the submission loses some of its force when it is appreciated that the clothes were found quite some distance from the Fertility Cave.

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The arrangement of the clothing when discovered

The evidence of Goodwin and Morris before the Commission has not enabled me to resolve the dispute between them as to whether the singlet was inside the jumpsuit or beneath it. However, in the light of this conflict of evidence and of the fact that when Mr Goodwin was first examined on the matter at the first inquest in December 1980 he said that he could not tell whether the singlet had dropped out of the jumpsuit or if it was underneath the jumpsuit, I have considerable doubt about its being found inside the jumpsuit.

The evidence of Dr Corbett and Dr Newsome as to their observations of dingo behaviour reinforces my own impression that, if clothing were removed from a baby by a dingo, it would be likely to be more scattered about than this clothing was when found. However, Mr Roff did not consider the appearance of the clothes was inconsistent with dingo activity. Mr Goodwin had noticed that the vegetation on the ground around the clothing had been disturbed and both the rangers, Roff and Cawood, noticed a flattening of the undergrowth in a patch which, in their view, was consistent with an animal having lain down. Roff said that

different dingoes might leave the clothes differently arranged. He thought that "it could be scattered, and sure, it could be exactly like this". He was not prepared to hazard a guess as to how a dingo might have left the clothes, although he would have expected them to have been somewhat more scattered. According to him, dingoes have extraordinary manipulative skill and, if not under stress, could have removed the clothing from Azaria without much damage or scattering.

Tracking evidence

Of all the evidence before the Commission on the sighting of dog or dingo tracks, the most significant was that given by Constable Morris, Mr Roff, Mr Haby and Mr Nui Minyintiri. I have referred in Chapter 4 to much of the most significant evidence given by Messrs Morris, Roff and Haby, but it is convenient to refer to some of it in a little more detail.

Constable Morris said at the trial that on the night of Azaria's disappearance he saw some tracks on the southern side of the tent, between the tent and the Chamberlains' car. He said of these tracks: "There was only a couple of - couple of tracks that were - got the impression that the track was running off towards the sand ridge, but there was only just a couple of tracks there. There wasn't too many." He also said that, on the same night, he saw tracks on the top of a sand ridge or dune to the east of the tent. These tracks commenced 200 metres east of the tent and proceeded in a southerly direction for

about 20 metres, where they petered out. They were the tracks of one animal, and gave the appearance of tracks made by an animal dragging something - "possibly, a stick or a dog bone or something of- it was just a- just a continuous drag." Some distance further to the south he saw more tracks which were pointed out to him by aborigines. He could not say whether or not these tracks were a continuation of the tracks he found at the top of the dune. There were also some drag marks associated with these tracks which he described as "small indentations of something, possibly being dragged, as distinct from a continuous line that I'd just seen earlier". Morris also saw fresh tracks, at the rear of the tent, on the afternoon of the 18th. He confirmed to the Commission the evidence he gave at the trial.

Mr Roff gave evidence at the trial that on the night of the 17th he saw a track on the crest of the sand dune to the east of the tent. It was a drag mark, about 8 to 10 inches wide. He enlisted the aid of an aborigine, Nui Minyintiri, and together they followed the drag mark for some distance to the south. They then back-tracked and were able to follow the mark to *p* point directly opposite the tent and about 25 yards east of it. Mr Roff said that the tracks he saw gave him the impression that a dog or dingo had dragged something along the track. He also said that there were points along the track "where an object had been laid down, forming an impression, the pattern of which I related at the time in my mind ... (as being) very similar ... to a crepe bandage." He told the Commission that he formed the opinion that the tracks he saw were of a dingo carrying Azaria.

It emerged before the Commission that during the 16-1/2 years that Mr Roff had been at Ayers Rock (for most of that time as the ranger of the Uluru National Park)

he had learned tracking from the aborigines. He had also acquired some skill in tracking before he went to the Rock, when he was a member of the police force in Kenya.

Roff looked for, but did not find, tracks at the entrance to the tent on the night of the 17th. Bearing in mind that many people traversed that area immediately after Azaria's disappearance, his failure to find tracks in that area is not surprising.

Mr Minyintiri was not called at the trial. He told the Commission that after the police asked him to help in the search for Azaria he was taken to the sand dune in the police vehicle. He saw the track of a dingo- "it walked as though it had some load on it". He said he was able to tell that the dingo was carrying a heavy load because of the knowledge he had acquired tracking dingoes carrying kangaroos back to their pups to feed them. It seems clear that he saw the same tracks as described by Roff. Mr Minyintiri said that "hen I was tracking the dingo I knew, or I thought that it was carrying the baby for sure". He also said that he could tell from its tracks that the dingo had stopped for a rest and that "as I was following the dingo track and where it had a rest it did put down what it was carrying and then picked it up and walked off again."

Mr Haby confirmed the evidence he gave at the trial. It is sufficiently referred to in Chapter 4.

The evidence of Mr Harris, the dingo expert called at the trial by the defence, was to the effect that a dingo would normally keep its head erect when carrying prey, so that if a dingo had carried off Azaria her body would not have been dragged through the soil, thus leaving drag marks. Before the Commission other dingo experts disagreed with Mr Harris. They said that a dingo could, and probably would,

have put prey the size of a baby on the sand while it rested or changed grip. They thought that drag marks and resting marks would probably have been made if a dingo had taken the baby. I prefer the opinion of the other experts on this matter to the opinion expressed by Mr Harris at the trial, especially as it is consistent with the evidence of the aborigines.

Sergeant Lincoln (who did not give evidence at the trial) found dingo pug marks on the southern side of the tent and at the south eastern corner of it. On the southern side, between the support and guy ropes of the tent, he found further dog tracks. Also on the southern side of the tent he found some liquid droplets in the sand. These were later tested for blood by a junior constable using haemastix, with negative results. This is a "screening" test for blood using cardboard-like strips impregnated with reagent. Lincoln took photographs using Constable Morris' camera, but the camera failed.

Inspector Gilroy (who did give evidence at the trial) said he saw the same paw marks described by Lincoln. Morris also saw these marks.

Evidence was given to the Commission by a number of aborigines, including Mr Nipper Winmarti and his wife Barbara. They assisted in the search on the 18th. Mrs Winmarti firmly maintained that she found an impression made by the baby's body in the sand hills east of the tent. Roff identified that impression and its accompanying tracks with those he had seen the night before with Nui Minyintiri. Mr and Mrs Winmarti also identified these tracks and linked them with the tracks seen by Lincoln, Gilroy and Morris on the southern side of the tent. It seems likely that these last-mentioned tracks (which Roff also saw on the 18th) were

the same as the tracks near the tent seen by Morris on the preceding night.

Mr and Mrs Winmarti and other trackers tried to follow the dingo thought to have made these tracks south, but after following the tracks for considerable distances they lost the animal's trail.

The evidence of the trackers was given in Pitjantjatjara and translated into English through an interpreter. The difficulties of interpretation were, at times, manifest. It would appear that Nipper Winmarti was at the time the spokesman for the aborigines at the Rock, rather than an expert tracker. His eyesight was poor. However, the police questioned him rather than other trackers who assisted in the search. Communication in English with the other trackers would have been very difficult. It thus may well be that the persons who actually did the tracking were not questioned by the police until July 1983.

It is plain that mistakes could easily have been made by the trackers. Some of the aborigines' evidence was quite unsatisfactory and cannot be relied upon in the absence of corroboration. This observation applies to Mr Winmarti's evidence in particular. Morris said that the aboriginal trackers were at first certain that the tracks on the sand ridge were made by the same large dog which left tracks around the tent, but then uncertainty developed among them. According to him, at one stage a red setter dog belonging to the Dernblnes was followed by the aborigines when they thought they were tracking a dingo.

Having regard to the searching done on the dune on the night of 17 August it is not surprising that the tracks were lost by the aborigines the next day. It is, however,

clear that Roff's evidence at the trial is corroborated by Mr Minyintiri and Mr and Mrs Winmarti at least. Of these witnesses Mr Minyintiri is by far the most persuasive, but Mrs Winmarti's evidence is also entitled to consideration.

When the clothes were found on 24 August, some of the aboriginal trackers, including Mrs Winmarti, were called in. They saw dingo and puppy tracks near the den, about 30 metres to the west of the clothes, and other adult dingo tracks about 10 metres to the east of the clothes. They said in evidence that some of the adult dingo track were made by the same dingo whose tracks they had seen at the tent and on the sand dune to the st. Constable Morris said they did not tell him this but in fact told him the contrary. ■ accept Morris' evidence on this matter.

Counsel for the Crown submitted that ■ should place no weight on the tracking evidence. It was put that the tracks seen by Mr and Mrs Winmarti on the sand hills on the morning after Azaria's disappearance could not have been the same as those seen by Roff and Minyintiri the night before, because the feet of numerous searchers must have obliterated them. However, Mr Roff said that they were remarkably well preserved next morning when he showed them to the Winmartis. The fact that this is quite surprising, as Roff himself said, is no reason for rejecting his evidence. I found Roff to be an impressive witness, not given to exaggeration. His veracity was not attacked and is beyond question. I refer elsewhere to his great practical experience.

The fact that the Winmartis did not tell Morris in 1980 that the tracks they saw near the tent matched some of the tracks where the clothes were found is put forward as a reason for doubting their credibility. This submission has force. Nevertheless, Mrs Winmarti gave this information to Inspector Charlwood when she was interviewed by him on

23 July 1983. That was the first occasion anyone took a statement from her. Of course, that was still a long time after 24 August 1980, but it does seem that Constable Morris and other police officers used Mr Winmarti as a spokesman for all the aborigines. Barbara Winmarti herself may well not have been questioned at all because of her very poor command of English. Mr Winmarti made a statement in English to Constable Noble on 28 August 1980 and did not identify the dingo at the den with the one tracked near the tent and on the sand hills to the east. It is difficult now to say whether the Winmartis did notice such an identity of tracks on 24 August 1980. If they did, I accept that no police officer was so informed at that time.

It was suggested that the aboriginal tracker were interested to protect their camp dogs and that this inclined them to incriminate a dingo. In particular it appears that Old Toby, one of the trackers who has since died, had a dog which Constable Morris saw around the nearby aborigines' camp on the night the baby disappeared. The police were going to kill this, and perhaps other camp dogs, and made their intentions clear. As a result there was a considerable confrontation between the aborigines (especially Old Toby and his wife), and Inspector Gilroy, Sergeant Lincoln and Constable Morris. Old Toby's dog was reprieved but two other camp dogs were shot around the camping area on the evening of 18 August 1980.

This fear for their camp dogs was put forward by the Crown as a motive for the aborigines giving false evidence nearly six years later. As I have already observed there are some unsatisfactory features about some of the aborigines' evidence. However, the dispute about the possible involvement of camp dogs did not occur until 18 August. Although Morris was uncertain, Roff was definite that Old Toby did not track on the night of 17 August. If

this is so, Morris could not have raised the camp dog question with him until 18 August, and it is probable that the confrontation between the police and the aborigines did not occur until the morning of 19 August. Hence Minyintiri's comments to Roff on the night of 17 August were unaffected by the suspicion of Old Toby's dog later displayed by the police.

Mr Minyintiri was an impressive witness. He conceded the possibility that he might have been mistaken when tracking in the dark at night, but maintained that the impressions in the sand studied by him and Roff on the night of 17 August were probably made by the baby's body when it was put down on the ground by a dingo. At that time he had to inspect the tracks under the artificial light of torches and burning spinifex bundles, but the next day the Winmartis and Roff saw the same impressions in daylight. Mrs Winmarti had the reputation of being an excellent tracker.

There would have been numerous dingo tracks on the dune east of the Chamberlains' tent at any time. Aboriginal camp dogs and dingoes were frequently in and around the camping area and residents and tourists brought their own dogs there.

It is important to keep in mind that the Chamberlains have never carried the onus of showing that a dingo took Azaria, or that the tracks seen near their tent and on the nearby sand dune were made by a dingo. The tracking evidence should not be considered in isolation, but as part of the overall pattern of the evidence. Certainly, the evidence before the Commission gives greater credence to dingo involvement in Azaria's death than did the evidence at the trial.

The space blanket

According to Mrs Chamberlain when Azaria disappeared Reagan was sleeping in a position to the right of the entrance to the tent and was covered with a groundsheet, which she described as a "space blanket". If a dingo had entered the tent and taken Azaria from the bassinet in which she was sleeping it would, in all probability, have walked across the space blanket to the back of the tent where the bassinet was situated. Mrs Chamberlain gave evidence at the trial that after unpacking the family car at Mount Isa upon her return from Ayers Rock she noticed some marks on the space blanket which looked like the paw and claw marks of a dog. She said these had not been on the blanket before it was taken to Ayers Rock and that after discovering them she rang Sergeant Charlwood and that thereafter a policeman arrived at her home to take possession of the space blanket. She did not identify the policeman by name but she said she told him about the paw prints and she saw him look at them. She also said that when she next saw the space blanket at the police station the paw prints had been completely wiped off the blanket. Senior Constable (now Sergeant) Irvine Brown, a member of the Queensland Police Force, gave evidence at the trial that he collected the blanket from Mr Chamberlain on 27 August 1980. He said that he could not see any paw marks on it but he did not tell Mr Chamberlain of his inability to see them. He said he also saw Mrs Chamberlain when he collected the blanket, but only while he was viewing the space blanket with Mr Chamberlain. No evidence was called at the trial to support Mrs Chamberlain's evidence as to the existence of paw and claw marks on the space blanket or as to the identity of the police officer who took possession of it.

Mrs Chamberlain's claim that there were marks resembling dog paw and claw marks on the space blanket was important at the trial for two reasons. First, if her account of what she allegedly saw on the space blanket had been accepted it would have afforded support for her claim that she saw a dingo at the entrance to the tent at the time Azaria disappeared. Secondly, if her account was rejected it was well open to the jury to conclude that it was a deliberate fabrication which reflected adversely on her credit.

Much additional evidence was called before the Commission on this matter. Mr Chamberlain gave evidence that his family had not owned a dog for many years prior to 1980. He said that he did not see a dog print as such on the space blanket but remembered seeing what he described as a "dog claw imprint". He said he did not treat it as being of much importance and said "I just had a cursory glance at it while others had had a closer look".

Mrs Avis Murchison, Mrs Chamberlain's mother, said she was present when the police officer collected the blanket and that when her daughter held it up for him to see, he made an exclamation that conveyed to her that he could see the paw marks. She also said that she herself noticed two large paw prints on the space blanket. When Mrs Murchison first gave evidence to the Commission she had not been shown a statutory declaration purporting to have been made by her on 12 February 1981. This had apparently been mislaid by Mrs Chamberlain's solicitors and was not discovered until after Mrs Murchison had left the witness box on the first day on which she gave evidence. In this declaration Mrs Murchison stated that after seeing what she described as "claw nicks" on the space blanket, she also observed "two further marks which appeared very clearly to be full dusty paw prints". Not unnaturally, before Mrs

Murchison's statutory declaration came to light she was rigorously cross-examined to suggest that, in effect, her alleged sighting of the paw marks was a recent invention. However, I am satisfied that her statutory declaration is authentic and was, in fact, made on 12 February 1981.

Mrs Felicity Koentges, the former wife of Mrs Chamberlain's brother Mr Alexander Murchison, gave evidence that she could recall Mrs Murchison calling her to look at the space blanket. She said that there were two dog paw marks on the blanket, only one of which was clearly visible. She thought the marks were a sandy colour and she said that the marks did not look as if they "would rub off or blow off in a hurry". Mrs Murchison expressed the same opinion in her evidence. Mr Alexander Murchison gave evidence generally corroborative of the evidence given by his mother and his former wife, and stated that the paw marks "looked like the marks a dog would leave when he walked through damp soil".

According to Sergeant Brown, he went to the Chamberlains' house to take possession of the space blanket. He said that Mr Chamberlain held the blanket up to the light and indicated what he claimed were two paw prints on it. Brown said he could see the marks indicated by Mr Chamberlain, but considered them to be abrasions and not paw marks. However, he did not tell Mr Chamberlain that he could not see any paw marks on the blanket.

Brown said that he made a record in his notebook of his conversation with Mr Chamberlain, but that his notebook had been lost. I found his evidence as to the loss of his notebook less than satisfactory. When he gave evidence at the trial he refreshed his memory from a written statement which he had then prepared, the statement itself having been compiled from information contained in his notebook. Since

there is nothing in his written statement referring to the absence of paw prints on the space blanket, it seems reasonable to infer that the notebook itself contained no reference to them. He did not make any mark on the space blanket to ensure that he could subsequently locate the site of the alleged paw prints. Mrs Chamberlain denied that it was Brown who picked up the space blanket. She said it was another police officer. Brown said initially that he would have recorded in his diary the fact of his attendance at the Chamberlains' house. However, when his diary was produced it did not contain any entry to the effect that he had collected the space blanket. His diary does record that he did perform other duties in relation to the Chamberlain matter, and it is surprising that it makes no mention of him having collected the space blanket, if indeed he did.

Superintendent Robert Gray of the Queensland Police Force said that on or about 27 August 1980 either Inspector Gilroy or Sergeant Charlwood rang him and requested that he make arrangements for the space blanket to be picked up from the Chamberlains' home. He said that he asked Brown to collect it, and that upon returning with the space blanket Brown held it up and explained that there were supposed to be dog print marks on it. Gray said that he could not see any such marks on the blanket.

However Gray's evidence that it was he who was requested to arrange for the collection of the space blanket is at odds with the evidence of Inspector Gilroy, and with contemporaneous written records kept at the Alice Springs Police Station. Gilroy said that he spoke to Inspector McNamara at Mount Isa, not Gray.

According to Sergeant Charlwood there were no marks on the blanket when he first saw it at Mount Isa Police Station at the end of September 1980. When Charlwood

interviewed Mrs Chamberlain on 30 September 1980 and 1 October 1980 she asked him about the marks on the space blanket and Charlwood said the blanket was still being scientifically tested.

Although Charlwood did not observe any paw prints on the space blanket, he was prepared to concede that movement or folding of the blanket might have obliterated marks on it after it left the Chamberlains' possession. It is also to be observed that when he interviewed Mrs Chamberlain on 30 September she told him that her mother, brother and sister-in-law, amongst others, had also seen the paw marks.

It is true that there were no paw marks visible on the blanket when the first inquest was held, but by that time it had been out of the Chamberlains' custody for over three months and it is quite possible that any dust or mud marks which were on the plastic surface of the space blanket at the end of August had disappeared when the blanket was handled or moved during the intervening period.

I have not referred to all the evidence on the subject of the space blanket. In particular, I have not referred to several discrepancies in the descriptions given by the various witnesses of the alleged marks on the blanket. The discrepancies in the evidence are not surprising in view of the lapse of time since the marks were observed. Nor do I find it surprising that the witnesses are not unanimous in their evidence as to whether it was Mr or Mrs Chamberlain who contacted the police about the alleged marks on the space blanket, or as to who was present in the Chamberlain household when the marks were first observed.

It is regrettable that better police records were not kept of the circumstances in which possession was taken of the space blanket. The loss of Sergeant Brown's notebook, the absence of any relevant entry in his diary and the failure to document in any form the important fact (if it were the fact) that there were no paw or claw marks on the blanket notwithstanding Mrs Chamberlain's assertion to the contrary are very unfortunate. They leave a serious doubt in my mind as to the identity of the police officer who collected the space blanket from the Chamberlains' home. I am not persuaded beyond reasonable doubt that it was Sergeant Brown. A note made by him on or about 26 August 1980 is consistent with him having taken possession of the blanket at that time but this does not remove the doubt from my mind.

However, irrespective of who picked up the space blanket I am far from persuaded that there were no marks on it which looked like marks left by a dingo. It is indisputable that either Mr or Mrs Chamberlain drew the attention of either Sergeant Brown or some other police officer to marks which they described as having been made by a dingo. It is extraordinary that if the police officer was unable to see any marks on the blanket he did not say as much to Mr or Mrs Chamberlain. He must have appreciated that the reason why he was collecting the blanket was to enable the alleged marks to be examined. In these circumstances, I would have expected him to have at least queried the presence of the marks on the blanket had he been unable to identify them.

Moreover, it would have been extraordinary and inexplicable conduct on the Chamberlains' part if they had taken the trouble to ring the investigating police at Alice Springs to report the finding of the marks, if those marks did not exist. It might be added that had the Chamberlains

been minded to fabricate evidence of this kind it would have been a reasonably simple exercise to have a dog walk across the blanket leaving paw marks upon it.

The evidence of Mrs Murchison, Mr Alexander Murchison and Mrs Koentges must be approached with considerable caution. It is no reflection on them to observe that their family relationship and friendship with Mr and Mrs Chamberlain would strongly incline them to be favourable to their cause. Further, the failure of the defence to call them as witnesses at the trial is surprising and unexplained. Accordingly, I have carefully considered whether, under all the circumstances, their evidence can be relied upon. I have come to the conclusion that they were all honest witnesses and that they saw marks on the space blanket that they thought may have been made by a dingo. I have already observed that as early as 12 February 1981 Mrs Murchison had made a statutory declaration in which she stated that she had seen the marks she claimed to have seen in evidence before me. It can hardly be suggested, therefore, that her evidence is no more than a convenient or imagined recollection of events long past. No explanation was given for the failure to call her as a witness at the trial, but this does not lead me to disbelieve her evidence. Making full allowance for her natural desire to give any evidence and to do anything in her power to assist her daughter, I do not believe that she would perjure herself to achieve that end.

Nevertheless I am left in considerable doubt whether the marks which were observed were paw or claw prints left by a dingo. Even if a dingo had walked across the space blanket it seems improbable that it would have left the marks which were described in evidence. The soil in the vicinity of the tent was dry and sandy and, in the absence of a heavy dew, it is unlikely that a dingo's paw

(r would have become so damp as to collect sand or soil' and deposit it on the space blanket in the form described by the witnesses. On the other hand, there was a water tap within 50 metres or thereabouts of the Chamberlains' tent and it is possible that the ground in the vicinity of the tap was wet or damp and that a dingo walking across it would collect sand or soil on its paws. While there is expert evidence that canids sometimes sweat through their paws the likelihood of a dingo sweating to such a degree as to result in its paws collecting sand or soil must be remote. The small cuts and holes which can be observed in the space blanket do not impress me as having been made by canine claws. However, if Mrs Chamberlain genuinely believed that a dingo had taken Azaria, I do not have any difficulty in accepting that she also believed that the small cuts and holes had been caused by the claws of a dingo walking across the blanket.

I have dealt at some length with the evidence as to the existence of marks on the space blanket because of its importance on the question of Mrs Chamberlain's credit. As I have already observed, her evidence at the trial on this matter was bereft of any corroboration. The failure to call witnesses who could have corroborated her evidence must have caused the jury seriously to doubt her veracity.

On the whole of the evidence before me I am satisfied that there were some marks on the space blanket and that Mrs Murchison and members of her family believed that the marks may have been caused by a dingo. In these circumstances if the matter of the space blanket is considered separately from the other evidence there is no reason to treat it as reflecting adversely on Mrs Chamberlain's credit. Moreover, the existence of the marks is at least consistent with Mrs Chamberlain's assertion that

she saw a dingo at the entrance to the tent when she returned from the barbecue area.

Tracksuit pants

The question whether Mrs Chamberlain's tracksuit pants were splattered with blood is of some importance. If there were numerous spots of blood on both legs of the pants below the knee that would be a circumstance which, in the absence of an explanation, would afford strong support for the Crown's allegation that Mrs Chamberlain was wearing the pants when she murdered Azaria.

The pants are made of dark blue material with green triangular insets on both the inside and outside of each leg. Each inset measures about 12.5 cm along the hem of the garment and the apex of the triangle is some 37 cm from the base. The insets are a very prominent part of the trousers, occupying a fair proportion of the garment below the knee.

The Crown alleges that Ms Chamberlain, having left the barbecue area dressed in a floral dress to take Azaria to the tent, pulled on these tracksuit pants over her clothes, murdered the child and that blood fell onto or was splattered upon the pants after she cut Azaria's throat. She is then alleged to have removed the pants before returning to the barbecue.

There seem to be four possible versions of the facts concerning the tracksuit pants: -

- (a) they were splattered with Azaria's blood at or about the time her throat was cut by Mrs Chamberlain;

- (b) there were no blood stains on the pants;
- (c) the pants were lying on the floor of the tent when a dingo took Azaria and spots of Azaria's blood fell onto the trousers in consequence of injuries inflicted upon her by the dingo;
- (d) the pants became spotted with blood when Mrs Chamberlain who was wearing them later in the evening crawled into the tent after Azaria had been taken by a dingo and the pants came in contact with articles in the tent which were blood stained, thus causing blood stains to be transferred to the pants.

After Mrs Chamberlain returned to Mount Isa she gave the pants to a friend, Mrs Jennifer Ransom, with the request that she have them dry cleaned. The pants were not scientifically examined for the presence of blood before they were cleaned. At the trial Mrs Ransom gave evidence that Mrs Chamberlain gave her the pants, stating that there were marks on them and requesting her to point the marks out to the dry cleaners. Mrs Ransom said that Mrs Chamberlain did not state that the pants were blood stained. She was unable to recall exactly the word used by Mrs Chamberlain to describe the marks but she did not think that Mrs Chamberlain ever used the word "blood". Although Mrs Ransom said at the trial that she thought the marks were blood, she also said that the nature of the marks was not discussed with Mrs Chamberlain at all.

However it appears that in a telephone conversation with Constable Boag on 20 November 1981 Mrs Ransom told him that the tracksuit had blood on it. She also told him that Mrs Chamberlain had said that the tracksuit had blood on it

and requested her to tell the dry cleaners of that fact. In a written statement made by her on 6 December 1981 Mrs Ransom said:

"I don't remember Lindy telling me that the stains on the track suit were blood, but I got the impression that she thought they were blood."

At the trial the Crown sought to treat Mrs Ransom as a hostile witness for the purpose of cross-examining her on the statement she made to Constable Boag. The trial judge declined to rule that she was a hostile witness and accordingly her conversation with Constable Boag did not go into evidence.

In her evidence to the Commission Mrs Ransom maintained that at no stage did Mrs Chamberlain say there was blood on the tracksuit pants. She explained her statement to Constable Boag by saying that she was "babbling on" to him, that it was just a quick conversation and that she had "suspected it was blood because of blood found on other items". She also said that she had seen blood on a parka and sleeping bag, and had been told that there was blood on Mrs Chamberlain's running shoes.

I am not persuaded that Mrs Chamberlain told Mrs Ransom that there was blood on the tracksuit pants. I think it is not unlikely that because Mrs Ransom correctly understood that there was blood on other articles brought back to Mount Isa she assumed that the spots on the tracksuit pants were blood stains.

The tracksuit pants were taken for dry cleaning to Western Dry Cleaners where Mrs Joan Hansell was employed. Her duties were to identify marks on garments and to ensure that they were removed in the dry cleaning process. She

was experienced in the removal of blood stains from clothing and said that she thought at the time that the marks on the tracksuit pants were blood stains. They were treated with a cleaning agent used by dry cleaners for the purpose of removing such stains. She agreed that Mrs Ransom did not tell her that the marks on the pants were blood stains.

I do not think that Mrs Hansell's evidence establishes that there was blood on the pants. The evidence establishes that the cleaning fluid which she used to remove the stains would also have removed stains caused by substances other than blood. Mrs Hansell agreed that the marks on the pants were resistant to the treatment normally found effective for the removal of blood stains. Although that treatment, comprising the application of the cleaning fluid and then putting "the garment through the white-spirit machine, usually removed blood stains two weeks old on the first application, these stains were not completely removed even after this process had been gone through twice and they had to be further treated with ammonia for complete removal.

According to Dr Andrew Scott stains caused by other substances can be confused with blood. He expressed the opinion that even experienced persons such as Mrs Hansell and forensic biologists would not be able positively to identify blood by visual inspection.

I think it is inherently improbable that the marks on the pants were caused by blood which flowed from Azaria if and when her throat was cut by her mother. It is possible, but unlikely, that the child's blood could have fallen only on the blue section of the pants and not on the green insets to cause the staining described by Mrs Hansell. In my opinion, it would have been an unlikely coincidence for the blood to have stained only the blue section of the pants. The Crown submitted that Mrs Chamberlain donned the

pants so as to avoid getting blood on her dress when she murdered Azaria. The presence of such blood would have made unbelievable her claim that a dingo was involved. In these circumstances, it would have been astonishing for her to have been so rash as to wear them in the presence of others, including a policeman in a lighted motel room, which she did later in the evening after Azaria disappeared.

Further, it is remarkable that if there were blood stains on the pants they were not observed by numerous people who saw her wearing them on the Sunday night. Again, it would have been astonishing conduct on her part to have sent the pants to be dry cleaned if there were incriminating blood stains on them.

It should be added that Mrs Chamberlain was not slow to bring to the attention of the police the fact that there were stains, which she believed to be blood, on her track shoes and on articles which were in the tent when Azaria disappeared. It would have been inconsistent conduct on her part to have hidden from the police the fact that there were blood stains on her pants if indeed there were any such stains.

I think it is unlikely that if the stains on the pants were blood stains they got there in either of the ways indicated in paragraphs (c) and (d) above. There was not sufficient blood in the tent for enough of it to have been transferred to the pants so as to cause the amount of staining on them. Further, assuming a dingo did take Azaria and shook her bleeding body in the tent, it is improbable that blood would have fallen from the body in such a fashion as to cause the pattern of staining on the pants which I have described.

It is true that when she was questioned about the marks on the pants Mrs Chamberlain made statements that are open to the construction that she believed them to be blood stains. But I do not think it appears from these statements that she ever stated positively that the marks were blood stains. She may well have assented to a suggestion put to her that the pants were blood stained. However, I am satisfied that any such assent would have been based upon an erroneous assumption that because other articles in the tent were found to be blood stained, the pants were similarly stained. Her statement made, long after the event, that the stains may have been caused by the spillage of food or drink was relied upon by counsel for the prosecution as demonstrating that her evidence as to the nature of the stains was not worthy of credence. I do not think this criticism carries much-weight since it was not unreasonable for her to have suggested, albeit belatedly, an alternative cause of the stains. Further, the possibility of blackcurrant juice having caused part of the staining on her running shoes was mentioned by her to the police at the first opportunity, on 1 October 1980, and it seems not unreasonable on her part to infer that there was staining of a similar kind on the tracksuit pants.

I am far from satisfied that the tracksuit pants were blood stained. Indeed, on the whole of the evidence, I am of the view that the marks on the tracksuit pants were not blood stains.

Evidence of Aidan Chamberlain

Aidan was aged 6 years and 10 months at the time of Azaria's disappearance. It has never been suggested that he was responsible for his sister's death and there is not the

semblance of a case upon which any such suggestion could be based.

It is almost certain that Aidan would have observed his mother's conduct in the tent after she took him and Azaria to it after leaving the barbecue area. Unless he fell asleep almost instantaneously after entering the tent he would have seen his mother leave the tent carrying the baby and subsequently return without her, if she took the child away and killed her. Moreover, it is improbable that Mrs Chamberlain could have strewn the cot blankets and other articles around the tent without being observed by her son. Accordingly, except for the unreliability inevitably attaching to the evidence of a child of such tender years, what Aidan has to say about the events surrounding his sister's disappearance-is of considerable importance.

The danger in placing any weight upon his evidence is manifest. It arises from at least three considerations. First, Aidan's age of itself requires his evidence to be treated with the greatest reserve. Secondly, the passage of time since August 1980 must inevitably have affected his recollection of events which occurred more than six years before he gave evidence. Thirdly, the risk that his mind would have been affected by statements made to him by his parents cannot be discounted.

It is important to weigh Aidan's evidence against his statements and actions immediately following upon Azaria's disappearance. Mrs Lowe said that very soon after the alarm was raised he said to her, "That dog's got baby *in* its tummy." Later the same evening he told Mrs West that a dingo had taken the baby. Since Aidan has never said that he saw a dingo at the tent, his statements that a dog had taken the baby must have been based upon his mother's assertion of that fact. However, I think it is of

significance that he accepted his mother's statement without any dissent. If his mother had taken Azaria from the tent to the car and later returned without her, it might have been expected that he would say that the baby was in the car and not in the dog's "tummy". It is possible, of course, that he did not know that his mother took Azaria to the car (if, indeed, she did) but this would have been unlikely since the car was but a few feet from the tent.

It is against the background of Aidan's statements and conduct on 17 and 18 August that the written statement made by him on 1 October 1980 must be assessed. Part of that statement was in the following terms:

"After I finished my tea I said that I wanted to go to bed and mummy said that she would take me and bubby up to bed. I went up to the tent with mummy and bubby and I said to mummy is that all the tea that I get. Mummy said that I could have some more tea. While we were in the tent mummy put bubby down in the cot and then I went to the car with mummy and she got some bake (sic) beans and then I followed her down to the BBQ area. When we got to the BBQ area mummy opened the tin of bake (sic) beans and daddy said: "Is that bubby crying and mummy said I don't think so. Mummy went back to the tent and said: the dingo has got my baby. Mummy shouted has anybody got a torch" and daddy went around and asked if anybody has got a torch. When mummy saw the dingo come out of the tent I was behind her but I didn't see the dingo come out of the tent."

Apart from some minor discrepancies, this statement is corroborative of his mother's account of what happened. More importantly, it is entirely consistent with what he said immediately after the alarm was raised. For this latter reason I think that his written statement of 1 October is entitled to more weight than would otherwise attach to it.

At the time of making that statement Aidan was one day short of his seventh birthday. The statement was taken from him by Detective Sergeant John Scott. Senior Constable Graham and Mrs Chamberlain were also present at the interview. It is apparent from Scott's evidence that he was well aware of the risk that Aidan might have been coached by his parents before being interviewed. Scott said that he thought Aidan's answers to his questions were spontaneous and that Aidan gave him his own account of events as he remembered them. He said that Aidan did refer to his mother on some occasions before answering questions, but the references were made on matters of no great consequence. He said that Aidan appeared to understand the questions put to him. Little or no notice was given to Aidan or his parents that the police wished to interview the child.

It is reasonably plain from Scott's evidence that he formed the opinion that Aidan's answers were based on his recollection of the events of 17 August and were not given at the dictation of his parents. Mrs Chamberlain did not intervene during Scott's questioning of Aidan and did not suggest answers to him. Scott said if he had believed that Mrs Chamberlain's presence at the interview was influencing the child's answers he would have suspended the interview. At the time of the interview Scott was not only an experienced police officer, but was also the father of a young child.

Constable Graham said that Aidan appeared to have what he described as "a very vivid recollection" of the matters upon which he was questioned. I think it is a reasonable inference from Scott and Graham's evidence that they were both of the opinion that Aidan had not been coached by his parents.

I do not think I can safely place reliance upon the evidence given by Aidan before the Commission in 1986. Mr James Thomson, a retirprimary scho0l principal, expressed the opinion, based on considerable experience of working with children that a child aged 12 years would be likely to remember in detail and with clarity traumatic events which had taken place five years earlier. I do not doubt Aidan's veracity but the risk that his mind might have been affected by hearing and reading accounts of the events of the night of 17 August is so great that it would be dangerous to rely upon his oral evidence given in 1986, let alone found any conclusion upon it.

Professor Brent Waters, Professor of Child and Adolescent Psychiatry at the University of New South Wales, expressed the opinion¹¹ that a child aged 6 years and 10 months could be expected to have good powers of recall for events which had occurred six weeks previously. However, he thought it was extremely unlikely that such a child would have the capacity to form a totally independent recollection of the events of August 17, 1980 six weeks thereafter. This opinion was expressed without the benefit of interviewing Aidan and it appears that Professor waters was not given any history of the statements made by Aidan on the night of Azaria's disappearance.

Making due allowance for althe caveats to which I have already referred, I have come to the conclusion that the statement made by Aidan on 1 October 1980 should be accorded some weight. Several considerations lead me to this conclusion. First, when Scott interrogated Aidan on 1 October, a period of only six weeks had elapsed since Azaria's disappearance. Secondly, the expert evidence establishes that a child of Aidan's age would have had good powers of recall of events which had occurred six weeks previously. Thirdly, Aidan and his parents were given

minimal, if any, warning that he was to be interrogated. Fourthly, Scott was an experienced police officer and formed the opinion that Aidan's answers were not the result of prompting by his mother. Fifthly, I find it difficult to accept that a seven year old child could be so well coached in his answers that an experienced police officer would be unable during the course of an interview exceeding one hour in duration to satisfy himself that the child had no independent recollection of the events of which he was speaking. Finally, I think it is probable that, if Mrs Chamberlain took Azaria to the car and returned alone, Aidan would have noticed this and would not have assented to his mother's statement that a dingo had taken the child. It is unlikely that he would have told Mrs Lowe that the "dog's got baby in its tummy.". Thus an important part of the statement made by him on 1 October is consistent with what he said at a time when there would have been no real opportunity for his mind to have been affected by statements made to him by his parents.

The Crown submits that Aidan would have been tired on the night of 17 August and that for that and other reasons he would not have been able to independently recollect the events of that night six weeks later. It was also submitted that the fact that Aidan gave his statement spontaneously, clearly, confidently and without hesitation (as appears to have been the case) indicates that he was repeating an acquired version of the facts rather than relying upon his memory. Any force in this submission is substantially diminished by the considerations to which I have referred. The Crown also pointed to some respects in which Aidan's evidence differs from his mother's. For instance, his mother said he did not accompany her to the car whereas he said he did. This is an important difference and I do not overlook it. Whether it is occasioned by the

imperfections of memory commonly experienced by children and adults alike or by some other cause is impossible to say.

In the result I think the statements made by Aidan at the time Azaria disappeared and the contents of his written statement of 1 October are not without significance. It would be dangerous to afford great weight to them, but they should not be disregarded. They must be taken into account together with all the other evidence in determining whether there is a doubt as to his parents' guilt.

New evidence of Mr Lowe

Mr Gregory Lowe was present with his wife Sally Lowe at the barbecue when Mrs Chamberlain returned to the tent with Azaria and Aidan. He was in his wife's company when she claimed to have heard Azaria cry but he himself did not hear any cry. In his evidence before the Commission Mr Lowe said, for the first time, that after Mrs Chamberlain left the barbecue area he saw her return to the tent and enter it with Azaria, and later emerge without the baby and go to the car with Aidan. He said he could remember Mrs Chamberlain putting her arm around Aidan's shoulder. He said that he had not recognized the significance of this evidence until after the second inquest. He claimed that he had not told anybody that he had seen Mrs Chamberlain go to the car without Azaria for fear of being accused of fabricating evidence. He said he believed such an accusation might have an affect on his wife's credibility.

After the second inquest he sought legal advice from the Australian Legal Aid Office in Hobart on the question whether, at that late stage, it would be in order for him to volunteer evidence which he had not previously disclosed.

A reading of Mr Lowe's evidence at the trial discloses that he was given adequate opportunity to include in his evidence a statement that he had seen Mrs Chamberlain go to the car without Azaria. I am satisfied that the Australian Legal Aid Office did not give Mr Lowe any advice before the trial that could have led him to believe that it would be unwise for him to disclose that he could give additional evidence.

Mr Lowe's evidence is in conflict with Mrs Chamberlain's evidence that she went to the car alone. She was quite definite that she left Aidan in the tent when she went to the car to obtain something for Aidan to eat. However, it should be pointed out that when Aidan made a written statement to the police at Mount Isa on 1 October 1980 he said he went to the car with her. I am inclined to think that Mr Lowe, perhaps subconsciously, was anxious to give what support he could to his wife's evidence. I do not think I can safely rely upon his evidence that he saw Mrs Chamberlain go to the car without Azaria.

Mrs Lowe's evidence

I have referred in Chapter 4 to Mrs Lowe's evidence at the trial that she heard Azaria give what she described as "quite a serious cry" after Mrs Chamberlain returned to the barbecue. Mrs Lowe was called as a Crown witness at the trial and hence the prosecutor was unable to cross-examine her. Her evidence to the Commission was thoroughly tested under cross-examination. She admitted that when interviewed on 4 October 1980 she described the cry she heard as "a short faint cry". At the first inquest she variously described it as "a faint cry" and as "not a faint cry and it was not a sharp scream of pain, but it was certainly enough to make anyone wary". When asked at the

inquest to reconcile these two descriptions she said: "Why I said faint here was the fact that it was not a piercing. I have heard my own daughter scream in loud pain - you know, it was not a sharp piercing cry". When interviewed in September 1981 she described the cry as "fairly loud fairly strong". At the second inquest she said it was "a serious cry, something I'd be concerned about".

I think Mrs Lowe is an honest witness but that she is prone to exaggeration and embellishment. The discrepancies in her various descriptions of the cry which she claims to have heard do not inspire confidence in the reliability of her evidence. However, I accept that she is convinced that she heard a baby cry.

Mrs Lowe's reference to the cry forms only a small part of her evidence. Most of her evidence is not in dispute. Since she was an eyewitness of some events of critical importance and gave a comprehensive account of them in a statement she made to the police on 4 October 1980 it is appropriate to refer to what she then said. In the following quotation I have retained the spelling in the original document.

"On about the 2nd of August 1980, my husband Gregory and ■ and our 18 month old daughter left Tasmania for a touring holiday in the Alice Springs area, with our base being with my husband's sister in Alice Springs.

On the 17th of Aug. 1980 we left Alice Springs and travelled to Ayers Rock by road and arrived at the Ayers Rock Tent Campsite at about 4.30 pm.

We set up our tent next to a barbacue and then drove around the rock and visited tourists spots close to the Rock.

We returned to our camp at about 6.30pm - 7pm which was dusk.

We then prepared our evening meal on the barbacue and were eating it when a man came to an adjacent barbacue and began cooking. We began a conversation with the man, and he introduced himself to us as Mike Chamberlain. He had his son, Aiden aged about 6 yrs with him. About ten or fifteen minutes later, a woman with a very small baby joined Mike and he introduced her as his wife Lindy Chamberlain and she informed us that her baby's name was Azaria.

We stood talking for quite a long time, and Lindy was nursing the baby for the whole of the time, and was rocking the baby in her arms trying to get it to sleep.

Sometime around 8pm, Lindy said that the baby was asleep and she went to her tent which was about 10 metres away from both our tent and the barbacue.

Chamberlains tent entrance faced the barbacue area and I saw Lindy walk towards the tent with the baby and I think their son Aiden was with them.

A short time later, which I believe was only a matter of minutes, she and Aiden returned to the barbacue and she began to open a can of beans to give to Aiden.

At this time, which was about 8.15 pm, I heard a short faint cry from the direction of the Chamberlain tent.

Either Mike or Aiden passed some remark about that noise being the baby, and Lindy went immediately to the tent and as she walked towards it, she yelled, "That dogs got my baby" and then went into the tent for a matter of seconds. She then backed out of the tent, stood up and yelled to us and others in the area to chase the dog and help her.

Mike and my husband then ran off in the direction that Lindy said the dog had gone. ■ then asked another camper to get the Police.

I then comforted Lindy who was distraught and with her son Aiden got into the Chamberlains tent. As soon as I went to get in, ■ noticed blood on the floor of the tent and ■ noticed that a small cane crib at the rear of the tent, had a blanket hanging from it.

I recognized this blanket as the one which the baby had earlier been wrapped in while in her mothers arms at the barbacue area. ■ then saw another child asleep in a sleeping bag on the right and his sleeping bag had a few spots of fresh blood on it.

There was ulood in different places within the tent and I gained the impression that the baby would be dead.

I then searched the area close to the tent, and then shortly after the Police arrived.

On my husband's return from searching about 9.50 pm, we decided to leave immediately and packed our tent into our vehicle. We then left the area and stayed the night in a nearby motel.

We had nothing more to do with the Chamberlains again, although we did return to the campsite and spent a short while searching before we left the area. for good."

Mrs Lowe's reliability as a witness was strongly attacked by the Crown. It was submitted, with some justification, that in some important respects her evidence had changed over the years and that she was biased in favour of Mrs Chamberlain. Certainly she exhibited in the witness box a conviction that Mrs Chamberlain was innocent. However this is readily understandable if she is convinced that she heard Azaria cry after her mother returned to the barbecue. If Azaria did indeed cry at that time her mother must be innocent of her murder.

Mrs Lowe has been consistent in her evidence that Mrs Chamberlain was absent from the barbecue for only a brief period. Her statement of 4 October, in which she described the period of Mrs Chamberlain's absence as "only a matter of minutes", was made at a time when her memory of the relevant events would have been fairly fresh. In a statement made on 19 September 1981 she said: "The minimum would have been six minutes and not more than a quarter of

an hour." At the trial she fixed the period as being "5-10 minutes".

This estimate was supported by her husband's evidence at the trial. He fixed the period at between eight and ten minutes. Not unnaturally neither Mr nor Mrs Lowe could make any more accurate estimate when they gave evidence to the Commission. In the circumstances, it seems reasonable to accept the estimate Mrs Lowe gave at the trial.

I did not understand the Crown to assert that Mrs Lowe gave deliberately untruthful evidence. I would, in any event, reject any such suggestion. The question remains, however, whether she is mistaken in her belief that she heard Azaria cry." Whether she is so mistaken is a question which can only be addressed in the light of the whole of the evidence before the Commission. It is, of course, important to bear in mind that it is for the Crown to establish that Mrs. Lowe was mistaken, and not for the Chamberlains to establish that she was not.

Evidence was given to the Commission by Mrs Gail Dawson, who was not called as a witness at the trial. Mrs Dawson was camped with her husband some little distance to the north of the Chamberlains' tent. She said that either on the night of 16 or 17 August she heard a baby cry. She described what she heard as a "fairly short cry". She said she was sure it was a baby's cry, not the cry of a small child. She heard the cry shortly after dozing off to sleep, which she did at about 10 p.m. on 16 August and about 7.45 p.m. the following night. There is evidence that Azaria cried on the night of 16 August because she was hungry but her crying on that occasion could not be described as a "fairly short cry".

Mrs Dawson said that on 16 August there were three or four tents erected between the Chamberlains' tent and her tent. Most of the campers in these tents left the area on 17 August and by the evening of that day only one of these tents remained. She said this circumstance led her to believe that she would have been more likely to have heard a cry coming from the vicinity of the Chamberlains' tent on the night of 17 August than on the preceding night. However, she did not hear Mrs Chamberlain cry out that a dingo had taken her baby and this might be an indication that she was sound asleep at that time and that she heard the baby's cry on the previous night.

Mrs Dawson was unaware of the alarm which was sounded after Azaria's disappearance and did not become aware of the tragedy until the following night. She and her family left the camping area on the morning of 18 August and did not learn of Azaria's disappearance until they heard a report of it when they reached Alice Springs. When they heard the news they called at Alice Springs Police Station. They first went to the police station at about 8 p.m. on 18 August. The police were then busy and asked the Dawsons to leave their names and address and to come back the following day. However, it would appear that shortly after they left the police station the police must have formed the view that it was urgent that they be interviewed because a police patrol van was sent to the place where they were camped at about midnight and Mrs Dawson was then taken to the police station to be interviewed. Mr Dawson stayed at their camp site to mind their three small children and went to the police station at about 10 a.m. the following morning.

According to Mrs Dawson, she told a police officer that she heard a baby cry while she was at Ayers Rock but that she was unable to state definitely on which night she

heard it. She also reported to the police officer that one of their children had been molested by a savage dog in the camping area. Mrs Dawson said that she made a written statement to the police. Mr Dawson said he also gave a written statement but any such statements appear to have been lost.

Both Mr and Mrs Dawson made written statements on 20 September 1981. These statements were taken at the Geelong Police Station. Mrs Dawson made no mention in her statement of having heard a baby cry. However, this omission may have **bo**cexplicable by reason of her inability to state positively that she heard the cry on the night of 17 August.

I think Mrs Dawson is a reliable witness. I did not understand her credit, as distinct from her memory, to be attacked. She did not appear to be unduly sympathetic to the Chamberlains and, indeed, some of her evidence as to her observations of the Chamberlains' conduct during the day of 17 August is mildly critical of them. Her inability to fix the night of 17 August as the time when she heard a baby's cry deprives her evidence of the weight which otherwise might have attached to it. However, her evidence is at least consistent with Mrs Lowe's evidence that she heard a baby cry shortly after Mrs Chamberlain returned to the barbecue and affords some marginal support for Mrs Lowe's evidence that a small baby was heard to cry shortly after Mrs Chamberlain returned to the barbecue.

The blankets in the bassinet

According to Mrs Chamberlain when Azaria was put to bed in her bassinet there were two small purple blankets over her. Mrs Hansell of Western Dry Cleaners, Mount Isa

confirmed Mrs Chamberlain's evidence that these blankets were dry cleaned just before the Chamberlains went to Central Australia. According to Mr Allwood, an entomologist, dry cleaning might be expected to eradicate any moths in the blankets. Both Mrs Hansell and Mrs Chamberlain said that there were no cuts or tears in the blankets when they were dry cleaned.

Mr and Mrs Chamberlain claimed at the trial that there was, in effect, dingo teeth damage to one of the blankets after the baby disappeared. At the first inquest Mrs Chamberlain said there were three rips in one blanket and also a very small mark that had been made by moths. Professor Chaikin however said at the trial that the marks he saw on the blanket, in September 1981, were made by clothes moth larvae, which were then still alive in the form of pupae. It was not realized at the trial that any damage from those moths must have occurred after the blankets were taken into police custody on 18 August 1980. The moth larvae were extracted by Dr Scott on 29 September 1981. According to Mr Allwood, since the moth has a total life cycle of 3-8 months and since the larvae were alive when extracted, the infestation observed by Professor Chaikin must have occurred at the outside five months before 6 October 1981 but more likely within one month before that date.

At the trial, Mrs Chamberlain was accused of lying when she attributed the damage on the blanket to dingo bites, since it was suggested that she must have known that it was moth damage. This accusation would have lost its sting if it had been appreciated that the damage caused by the moths that Professor Chaikin saw could not have been on the blanket when Mrs Chamberlain last saw it before it was taken into police custody.

(Constable Morris took possession of the blankets on 18 August 1980 because there were blood spots on them. At the first inquest he said the blankets "had what appeared to be several marks on them ... They were like tears, with a couple of blood spots splattered on them". He said the marks were pointed out to him at the time, that they were about a quarter of an inch long and agreed that the most accurate description he could give of them was that they appeared to be "just cuts in the blanket". He was not asked any questions on this matter at the trial, but in his evidence to the Commission he described the damage as "cuts or whatever".

Mrs Lowe gave a vague description at the trial of having seen a torn blanket lying out of the bassinet on the night the baby disappeared.

Inspector Gilroy saw the blankets on 18 August. At the Commission he said he could remember seeing a blanket with "quite a few little punctures, cut - tiny cut - like punctures in it".

Hilary Tabrett, a ranger at Ayers Rock, was shown the blanket by Inspector Gilroy and she said that she saw two marks, "one which was clearly a puncture mark where material had been severed and another mark which looked like the material was almost severed". There was blood staining around both marks.

At the first inquest Mr Ken Brown said that he had observed three marks on one blanket and that they appeared to have been "produced by some blade". He expressed the opinion that they were not consistent with having been produced by teeth. At the trial the Crown relied on Professor Chaikin and did not lead this evidence. However the defence raised it in cross-examination in order to show

that Mr Brown was prepared to express such an opinion without having made a microscopic examination of the blanket.

The first inquest was held long before the moth damage seen by Professor Chaikin could have occurred. It would therefore appear that there was some damage to one blanket before it suffered any moth damage while it was in police custody.

The parts of the blanket which were described by the witnesses as being damaged were not preserved. They may have been used up or lost in the course of examinations of the blankets for blood stains. In these circumstances it is difficult to ascertain with any certainty the exact nature of the damage to the blanket. It is possible, of course, that the damage that was observed on 18 August was deliberately caused by Mrs Chamberlain on the preceding night.

Dingo activity at Ayers Rock

I have referred in Chapter 4 to the evidence on this subject at the trial. The Commission received a great deal of further evidence concerning dingo behaviour both in the Ayers Rock area and generally around Australia. Broadly, there were three types of evidence. First, there were accounts of particular dingo activity in the Ayers Rock area. This evidence came from rangers, other residents of the area and visitors. Secondly, there was evidence from persons experienced in the behaviour of dingoes, including Dr Alan Newsome and Dr Lawrence Corbett, research scientists with the CSIRO, Mr Leslie Harris, President of the Dingo Foundation of Australia, Mrs Berenice Walters, President of the Australian Native Dog Training Society of New South

Wales and Mr Roland Breckwoldt, an author who has made a considerable study of dingoes. The third type of evidence was of an anecdotal nature, relating to incidents observed and, in particular, attacks by dingoes or dingo hybrids upon children or adults. Much of this evidence was received in the form of statements or copies of published articles.

It was common ground between the experts that, under normal circumstances in the wild, dingoes exhibit a considerable wariness or fear of man. However, there was evidence at the trial and much more evidence before the Commission to the effect that the dingoes in the Ayers Rock area were atypical in this respect. They were frequently seen at close quarters at various places around the Rock, particularly in the camping area. They often stood and were photographed in the camping area near people and motor vehicles. They were given food by residents, motel staff, bus drivers and visitors. There were dingoes who were regularly seen going from one particular place to another for hand-outs of food. A number of witnesses had experience of dingoes entering tents and annexes to caravans, apparently in search of food and, on occasions seizing and carrying off food or other objects such as shoes. It was the view of Mr Roff, the chief ranger, that the conduct of dingoes in the area could not be assessed by reference to what was typical of dingoes. He considered that dingoes in the area had been conditioned by human feeding and encouragement.

Much further evidence was received on the question of the propensity of dingoes to attack human beings, particularly children. ■ conclude that in places other than the Ayers Rock arer, such attacks by dingoes or dingo hybrids are not common but have occurred from time to time. Evidence of a fatal attack upon a baby was given by Mr Lionel Perron. Mr Perron had worked as an engineer on

survey work in the Great Sandy Desert in South Australia in 1961. On an occasion when his party was camped near a group of nomadic aborigines a baby from the group, about twelve months old, was carried off by a semi-domesticated dingo. Mr Perron's party recovered the partly eaten remains of the baby.

There were a number of attacks upon children in the Ayers Rock area in the months preceding Azaria's disappearance. There was evidence of some of these at the trial, but more evidence about them and other attacks was given before the Commission. On 23 June 1980 a three year old girl was seized around the head and neck by a dingo and, apparently, dragged out of a c r and some little distance along the ground before her father confronted the dingo. Mrs Roberta Elston, who was the resident nurse at the Rock, treated two or three children for bites by dingoes or dogs in the period of about three weeks prior to Azaria's disappearance. On the day preceding the disappearance, there were three incidents involving dingoes. On a walk around the Rock, Mr Ronald Bellingham was snapped at by a dingo. It seized the cardigan of his daughter, aged 14, and the pants of his son aged 10. In the camping area, a dingo seized the elbow of Catherine West aged 12, although it caused no injury. In the camping area, after dusk, a 9 year old boy was bitten by a dingo or dog who stood over him on the ground. After each of these incidents, the dingo or dog was slow to move off and exhibited little or no fear of man.

After a number of attacks on children by dingoes in June 1980, Mr Roff became worried and expressed his concern to his superiors that a subsequent incident could be more serious. He arranged for notices to be posted in the toilet blocks in the camping area, in the visitors' centre, motels and store which gave a warning to the effect that dingoes

were wild animals and should not be fed. Early in August 1980, Mr Roff was still concerned that, if no action were taken to control the dingoes, a more serious attack could occur and, after discussions with the other rangers, on 6 August he requested the issue of rifle ammunition for this purpose. For various reasons, the ammunition had not been made available by 17 August.

The evidence does not enable me to conclude whether the posting of the warning notices had been effective in dissuading people from feeding dingoes. However, it would not be unreasonable to see a connection between the likely effect of such notices in reducing the hand-outs of food to the dingo population and the evidence of aggressive behaviour on the part of dingoes shortly before Azaria disappeared. The dingo whelping season in the area was around the month of July and the presence of small dingo pups might also be seen as adding to the pressure to obtain food.

The opinions of the various witnesses experienced in the behaviour of dingoes were sought upon a number of questions. One of such questions was whether, in August 1980, it was within the bounds of reasonable possibility that a dingo might attack a human baby and carry it away for consumption as food. The Crown relied heavily upon the evidence of Dr Corbett, a research scientist with very considerable experience in the observation of dingoes in the wild. In his view, it was possible, but highly unlikely that a dingo would do this. I have no reason to doubt that this is a fair assessment of the likely conduct of normal dingoes in the wild. However Dr Corbett's experience of the dingoes at Ayers Rock was limited. Dr Newsome's view was that it was reasonably possible. The view of Mr Roff and the other rangers at the Rock was that, not only was it possible, but they had been concerned that something of the

kind might happen. In view of the evidence of the particular circumstances at Ayers Rock, I conclude that it was reasonably possible that a dingo would seize a baby in order to carry it off for consumption as food and that, if necessary, it would enter a tent to do so.

Another question which arose was as to the ability of a dingo to carry the weight of Azaria's body, approximately 9-1/2 lbs., over the distance of some 5 km between the camping area and the place where the clothing was found. While Mrs Walters had some doubt about this, the other experts were in agreement that a dingo would be capable of doing this, particularly where its purpose was to carry food to pups in its den. There was, of course, a dingo den approximately 30 metres from where the clothing was found and a week after the discovery a lactating bitch was shot in the vicinity. At the trial, Mr Harris gave evidence that a dingo would have carried the baby with its head erect and with the baby held clear of the ground. Before the Commission, the weight of expert opinion was that, while a dingo could carry a 9-1/2 lb load over 5 km, it would on occasions put the load down and probably drag it. I accept that, if Azaria were taken by a dingo, it is likely that she was placed down on the sand from time to time and also dragged while touching the sand for part of the journey to the place where the clothes were found. The evidence before the Commission on this aspect is more supportive of the tracking evidence, referred to in Chapter 14, than it was at the trial.

Another question upon which the experts gave evidence was whether a dingo carrying the baby would have been likely to drop her when Mrs Chamberlain saw it and cried out, if she did. The Crown relied upon the evidence of Dr Corbett that, from his experience, he would have expected a dingo in this situation to drop the baby. In his

experience, . dingoes in the wild, if interrupted by a human being when carrying substantial prey, will drop the prey and move off if the person comes within 100 metres. However, in view of the evidence of the behaviour of dingoes in the Ayers Rock area and, in particular, their slowness to move off when attacks on children were interrupted, doubts arise about the application of Dr Corbett's experience to the Ayers Rock situation. His experience is to be compared with that of Mr Jack Love, who camped near Ayers Rock in 1971. According to him, a dingo jumped on a camp table, removed the lid of an Esky and, when interrupted, seized a large leg of pork from the Esky, jumped off the table and made off with it. Mr Love gave chase but was unsuccessful in stopping the dingo, which continued to run easily while carrying its load. The leg of pork was about 10" wide and 18" long and weighed about 11 lbs. I conclude that, if a dingo took Azaria, it might well not have dropped her when Mrs Chamberlain cried out or when Mr Chamberlain and Mr Lowe pursued it.

I have already considered in Chapter 9 certain evidence in relation to the ways in which dingoes seize and kill prey. In Chapter 11 I have considered the abilities of dingoes in connection with the question of the removal of the clothing from Azaria's body.

Evidence of the kind discussed above does not, of course, form a basis for firm conclusions about what any particular dingo might do. On questions of animal behaviour, reasoning from generally observed conduct to a particular incident is precarious. However, it seems fair to conclude that, having regard to the particular circumstances at Ayers Rock in August 1980, the entry of a dingo into a tent and the seizure and carrying away of a baby for consumption some 5 km away was within the bounds of reasonable possibility.

The Ding Theory

The Commission heard evidence in respect of an allegation made outside the Commission that a dingo known as Ding was responsible for taking Azaria from the Chamberlains' tent. The allegation is the subject of a book written by Mr P. Ward. Mr D. McNicol apparently assisted Mr Ward in the compilation of the book. An application for leave to appear at the Commission was made by counsel for Mr Ward and Mr McNicol. That application was refused for the reasons which appear in Chapter 1 of this report.

In substance, the Ding allegation appears to be that Ding took Azaria's body on the night of 17 August to the premises then occupied by Mr Cawood, and that some women there took the body from Ding and disposed of it. A further part of the allegation is that Azaria's clothes were taken from her body and placed in the position where they were found on 24 August, that cuts were made in her clothing to simulate dingo damage, and that the clothes were placed near a dingo den so as to make it appear that dingoes had consumed the body.

At a very early stage of the Commission's hearings ■ indicated to Mr Ward and Mr McNicol and their counsel that if they had any evidence which might support the veracity of the Ding story they should furnish it to counsel assisting the Commission. They did furnish certain material, but it did not support the allegation in the story.

Ding was well known in the Ayers Rock area prior to June 1980. He was a regular visitor to the motels and to some of the houses, including the house occupied by Mr Cawood. A number of residents, including Mr Cawood, fed Ding. On 23 June 1980 Ding attacked Amanda Cranwell, a

three year old child who had been left by her parents in the front seat of their car at the camping area. She was found lying on the ground with a dingo standing over her. Apparently she had been dragged out of the car onto the ground. She was not badly injured.

The incident was reported to Mr Cawood and he told the Cranwells that he thought the culprit was Ding. He also told them that he would shoot Ding. The following day he informed them that he had, in fact, shot the animal.

The Ding story was investigated by Inspector Charlwood in 1983. He formed the view that it had no foundation. The evidence before the Commission affords no support for the story. Mr Cawood said that he shot Ding on the night of 23 June 1980, and Mrs Cawood confirmed that this was so. Cawood's contemporary diary contains an entry recording the shooting of Ding, as does a written report he made to Mr Roff, the chief ranger. Other documents which pre-date 17 August also refer to the shooting, but do not mention Ding by name. A number of witnesses gave evidence that they did not see Ding after 23 June.

On the evidence before the Commission, I am left in no doubt that Ding was destroyed on 23 June 1980. In these circumstances, no useful purpose would be served by referring to the extremely tenuous material which seems to be relied upon by proponents of the Ding story. It is sufficient to say that it does not make out even the semblance of a case that Mr or Mrs Cawood or any persons who may have been at their home on the night of Azaria's disappearance took any part in disposing of her body or placing her clothes where they were found.

It may well be the fact that there were dog or dingo tracks leading to Cawood's house on the night of

17 August, but there would have been nothing unusual about that. It may also be the fact that some persons may have been seen in the grounds of the Cawood residence on that night. Indeed, there appears to be no dispute that Mr Elston did hold a conversation with some women outside the Cawood house on that night, and that a dingo was seen by Mrs Beasy in the Cawoods' backyard after the child disappeared. Perhaps the sighting of this dingo explains the origin of the Ding story. The fact that neither Mr ward nor Mr McNicol was able to provide the Commission with any evidence which might support the story confirms my opinion that it has no foundation.

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Mr and Mrs Chamberlain[#] gave evidence to the Commission, as they did at the trial and the two inquests which preceded it. At the trial the Crown launched a vigorous attack on Mrs Chamberlain's credit. A similar, but rather less sustained, attack was made on Mr Chamberlain's veracity.

In the case of the Chamberlains I thought it proper to make an exception to the rule that I applied to all other witnesses requiring that their evidence be led by counsel assisting me. Accordingly, their evidence was led by their own counsel and they were cross-examined both by counsel for the Crown and by counsel assisting me. Except in minor respects they did not depart from the evidence they gave at the trial.

I have referred in Chapter 4 to some of the most relevant statements made by Mrs Chamberlain to Mr Haby, Mrs Whittaker, Mr Roff and Constable Morris on the night of 17 August and to Inspector Gilroy on the following day. When she was interviewed at Mount Isa on 30 September 1980

she gave a detailed account of what she claimed had happened. The substance of her account appears in Chapter 4, as do some of the most relevant passages from her evidence at the trial.

When interviewed by the police on 1 October 1980 Mr Chamberlain gave the following account of what he claimed had happened:

"On or about 8.15 or 8.20 we all saw what we considered a rather mangy forlorn specimen of a dingo, lurking just outside the barbeque enclosure. It appeared to be looking for food. It went into the shadows and then without any warning came back into the light of the barbeque area next to the gas bottles and pounced with frightening agility on a small, █ guess you'd call it a field mouse which we had sighted a few minutes earlier: This had been seen by the Tasmanian people as well as ourselves. My wife who had been nursing bubby then took her to the tent to lay her down to rest. I prepared some food for her while she was putting bubby down as she had not eaten much prior, to this. She returned to have something to eat and as she was eating I think I thought I heard a faint cry from the tent. I think my words were, "Is that Azaria crying? My wife said she would check it out and as she was proceeding back and into the tent her voice startled me when she cried out in horror, "The dingos (sic) got my baby." █ was stunned and raced with the other man madly towards and into the tent to see if this was so. That is if the baby was missing. The sequence of events following this for some minutes is a little unclear. █ was in a severe state of trauma. I felt useless. █ raced for my torch █ think, and it would not go. █ think that I ran into the bush madly hoping that in the darkness █ might see either the dog or Azaria. I remember feeling very angry and frustrated because normally I pride myself with having very effective lighting and also because my keys were not in my pocket █ could not switch the ignition of my car on in order to use the 100 watt search light that was in my glove box. My Tasmanian friend who had somewhere got hold of a torch had raced out into the bush in front of me and searched feverishly. I cannot remember much at the time for a few moments except

that I came back to the tent in the hope that our eyes were playing tricks on us. In other words that the dog might have left Azaria somewhere in an unlit corner under a rug, or bag, perhaps. But not so. The moment of truth that she really was gone hit me and realising now that I could do nothing alone cried out, I'm not sure if it was in my conscience or out aloud, 'Oh God help me,' it was probably a silent cry and raced along the southerly section of the road to elert (sic) any other campers that I could see to if they had a torch get out and start searching. I was led toward a tent on the end of the road where I had heard Christian music. I raced unceremoniously to the tent door and said two things. A dingo has got our baby. If you have a torch please come out and search. If you haven't please pray."

Mr Chamberlain has given varying descriptions of the cry he claims to have heard. In the statement just quoted he described tlte cry as a "faint cry... Some time later, he described it in his diary notes as "an insignificant short cry". At the trial he said: "It was an urgent cry, not loud. It cut off. It almost seemed as if the baby \<Tas beiP.g <}11P.P.7.erL " To Inspector Gilroy he described it as "a short, sharp cry". To Inspector Charlwood he said that "It almost seemed to me a cry of someone being squeezed, almost out of breath ... it sounded to me as a pretty important cry". At the Commission he described it as "a significant cry". There are some slight differences in these descriptions, but they are of no great consequence.

It is not possible to do justice to the Crown case without referring to some of the unsatisfactory features of Mrs Chamberlain's evidence. According to the Crown, a fatal flaw in her story is that she does not claim ever to have seen Azaria in the mouth of the dingo which is supposed to have taken her. She says she could see the dingo shaking its head, but apparently saw nothing in its mouth. She gave conflicting accounts of the state of the lighting. She

claimed that she could see inside the tent from the barbecue area yet she said the light was such as to prevent her seeing what was in the dingo's mouth. Her explanation of this, i.e. that the dingo's mouth would have been obscured by the post-and-rail fence, is unconvincing. She gave varying accounts of the direction taken by the dingo after she frightened it away. Unless there were two dingoes at or near the tent (a matter to which I shall presently refer) her ability to describe in minute detail the appearance of the dingo's face and ears is very difficult to reconcile with her inability to see the child in the dingo's mouth. Her evidence as to when she first called out that she had seen the dingo conflicts with Mr and Mrs Lowe's evidence. Her statement that she believed the dingo had the baby when she first saw it is not easily reconcilable with another statement she made that she "dived straight for the tent, to see what had made the baby cry". She claimed to have seen the dingo run off into the area behind the car and it might be thought that she would have assumed that the dingo had carried the child off. The Crown contends that since, on her own story, she only saw the dingo at the entrance to the tent and did not see the baby in its mouth, she could not have known that the dingo had taken the baby when she cried out that it had taken her.

These are all powerful considerations. However, it is not difficult to find explanations consistent with her innocence for many of the problems raised by her evidence. The Crown submitted that it was unbelievable that Mrs Chamberlain could have had such a clear view of the alleged dingo as to be able to describe its face and head with great precision, and yet be unable to see Azaria in its mouth. This is a very powerful submission if the assumption be made that there was only one dingo at or near the tent at the time. It is rendered even more powerful by the circumstance that the child was clad in white clothing. But the

submission loses its weight if it be accepted that two dogs or dingoes might have been at or near the tent. On the evidence, I do not think this possibility can be ruled out. I have referred elsewhere to the frequency with which dingoes were sighted in and around the camping area in August 1980. According to Constable Morris there were about 100 camp dogs or dingoes in the Ayers Rock area in August 1980. Mr Roff said that, at that time, up to 25 dingoes frequented the camping area. Because of his great experience at Ayers Rock, he was the person best able to form an opinion about the likelihood of two dingoes being in the camping area at the same time. It is significant that when he first met Mrs Chamberlain at the tent and was told by her that she had not seen Azaria in the dingo's mouth, it immediately occurred to him that there may have been two dingoes involved. As he said in evidence: "I then accepted in my mind that there could of course have been two dogs. I must say that was a thought that came to me straight away."

At the time of Azaria's disappearance the Wests were in their tent which was pitched next to the Chamberlains' tent. Mr West said that after he had his dinner on the night of 17th, "I heard a dog growl... A little while later we heard a noise outside and my wife went outside and investigated and she came back and said, 'Something terrible has happened'." About 15 minutes before the alarm was raised Mr Haby took a photograph of a dingo which came up to the door of his Kombi van. The van was parked next to the Chamberlains' tent and about 15-20 yards to the south of it. The dingo walked off in the direction of the Chamberlains' tent.

In the light of all the evidence it does not seem inherently improbable that there could have been two dingoes at or in the vicinity of the tent. It cannot be assumed

that the animal that Mr West heard growl was the same as the one Mr Haby photographed. If there were two dingoes, Mrs Chamberlain may have seen only one animal which did not have Azaria in its mouth, and failed to see the other which did. Her evidence at the trial would appear to be consistent with her having seen two dingoes, or only one dingo on two separate occasions only a few seconds apart. It must be kept in mind that Mrs Chamberlain did not carry any onus of proving that she saw a dingo, or that there may have been a second dingo which she did not see. It was for the Crown to prove beyond reasonable doubt that a dingo did not take Azaria.

As I have observed elsewhere the Crown relied at the trial on Mr Harris' evidence that the head of a dingo is likely to be in a raised position if it is carrying prey. However, his evidence is now contradicted by much other expert evidence, which I prefer to accept. Thus there is no substance in the argument that Azaria's body would have been clearly visible if it had been in a dingo's mouth because the dingo's head would have been raised.

It is possible that there are other explanations for the unsatisfactory features of Mrs Chamberlain's evidence. As Gibbs C.J. and Mason J. said at 153 C.L.R. 521 at 564:

"Of course, if Mrs Chamberlain were innocent, the events of the evening of 17 August must have been shatteringly traumatic, and likely to cause a deep and persistent emotional disturbance which might have affected her memory of the events of that night and of matters connected with it. Moreover, if she were innocent, it is possible that she might embroider her story when faced with the threat of unjust conviction."

There are other matters which must be referred to on the question of Mrs Chamberlain's credit. The Crown

submitted at the trial, and to me, that her claim to have seen paw and claw marks on the space blanket was spurious. It is asserted that she gave false evidence about the space blanket in an effort to gain acceptability for her story that she had seen a dingo at the tent. I have dealt with the matter of the space blanket in Chapter 14. As I there point out, the evidence before the Commission on this matter is much more favourable to Mrs Chamberlain than it was at the trial. ■ need do no more than repeat that ■ am persuaded that there were some marks on the space blanket and that Mrs Murchison and members of her family believed that those marks may have been caused by a dingo. I do not think the evidence concerning the space blanket of itself reflects adversely on Mrs Chamberlain's credit.

The Crown also submitted at the trial and to me that Mrs Chamberlain was lying when she claimed that the damage to the blanket which had been over Azaria in the bassinet may have been caused by the dingo. As appears from what I have written in Chapter 14 the evidence before me on this matter is much more favourable to Mrs Chamberlain than it was at the trial.

The Crown claimed that some statements made for the first time by Mrs Chamberlain in her evidence before the Commission demonstrate a willingness on her part to make untrue statements in support of her claim of innocence. For instance, she told the Commission that Azaria's singlet was one size too big for her, whereas she had not previously claimed this to be the case. Again, before the Commission she said that she thought that Azaria had been asleep for only about ten minutes before she took her back to the tent to bed her down for the night. At all times previously she had stated that the child had been asleep for one-half or three-quarters of an hour. Yet again, before the Commission she stated for the first time that Aidan

accompanied her from the tent towards the car when she went to obtain extra food for him. She had previously said that he stayed in the tent. I do not think any of these matters are of great importance. If any of her more recent statements are incorrect, and they may well be, their inaccuracy could be due to frailty or confusion of memory or a desire to obtain redress for an unjust conviction.

It is proper to have regard to a number of other matters in assessing the reliability of her evidence. She, like her husband, was of excellent character and had shown herself to be a normal, loving and responsible parent. She was in good physical and mental health. There is not a trace of evidence to suggest that she has ever suffered from any form of mental illness, including post-natal depression. She had never manifested any symptoms to suggest that she might be violent towards one of her children. There is the strongest evidence, which I accept, that she welcomed Azaria's birth and was delighted to have a daughter. Not long before Azaria die⁹ she purchased clothes on lay-by for her. Azaria's birth was normal, and apart from some minor infantile disorders her short life was unattended by any problems. There is no evidence to suggest that Mrs Chamberlain had any motive to kill Azaria. On the contrary, there is compelling evidence that she had no such motive.

None of the numerous witnesses who saw Mrs Chamberlain during the day or evening of 17 August prior to Azaria's disappearance observed any sign of stress or ill temper about her. Apart from an occasion when, shortly after the family arrived at the camping area on 16 August, Azaria cried apparently because she was hungry, there is no evidence that she cried thereafter or was proving troublesome on that day.

Azaria cried for a short time during the next day but the crying was described by Mrs McCombe as a normal baby's cry and she did not think the child was distressed. She said Mrs Chamberlain was caring for the baby in the way a normal mother would and did not appear to be distressed or tired herself. Not long before she returned to the barbecue with Aidan, Mrs Chamberlain was seen by a number of people, including Mrs Willmott, Mr and Mrs Lowe and Mr and Mrs West, and none of them observed anything unusual about her conduct or her attitude to Azaria.

I have referred elsewhere to Mrs Chamberlain taking one of Azaria's garments from the car in the presence of Mr and Mrs Demaine and their dog. This incident seems inconsistent with any desire on her part to prevent people seeing inside the car.

It is true that Mrs Chamberlain might not have displayed as much grief as others may have shown in the same situation, but there is much evidence that she was visibly distressed after Azaria's disappearance. Her grief was thought to be genuine by Mr and Mrs West, Mr and Mrs Lowe and Mr and Mrs Whittaker. All these people were total strangers to the Chamberlains. She seems to have shared her husband's ready acceptance that she would not see her child again. She did little searching on the dunes, but there is nothing surprising about that having regard to her need to be close to the other children.

Some of Mrs Chamberlain's actions when she returned to Mount Isa were extraordinary if she had murdered Azaria in the manner alleged by the Crown. For example, if she had killed the child it was foolhardy of her to volunteer the statement that she had washed blood off her track shoes.

A minor matter relevant to Mrs Chamberlain's credit is the finding of the matinee jacket. She had at all

times maintained that Azaria was wearing the jacket when she disappeared and its discovery proved this to be the case.

In considering Mr Chamberlain's evidence it is necessary to refer to a few matters which form a background against which the reliability of his evidence must be assessed.

First, it is beyond question that he was not only a man of excellent character but also a good father who was devoted to his children. He was well educated.

Secondly, on the most crucial part of his evidence, namely, that he heard Azaria cry after his wife returned to the barbecue, he is corroborated by Mrs Lowe. I say this is the most crucial part "of his evidence because, if it is correct, his wife must be innocent.

Thirdly, it is highly improbable that he knew before the alarm was raised that his wife had already killed Azaria (if that was the case). According to Mrs Lowe's statement made on 4 October 1980, Mrs Chamberlain had very little, if any, opportunity to tell her husband she had killed Azaria (if she had) before the baby's cry was allegedly heard. Mrs Lowe said: ... "she (Mrs Chamberlain) and Aiden returned to the barbacue and she began to open a can of beans to give to Aiden. At this time, which was about 8.15 p.m., ■ heard a short faint cry from the direction of Chamberlains' tent". Her statement to the police on 19 September 1981 includes the following:

"Q.77. Now can you tell me what happened as Mrs Chamberlain and Aiden reached the barbeque area.

A. As got (sic) to the area ■ heard a baby cry."

No doubt the word "they" was intended to precede the word

"got". I have said elsewhere that I regard Mrs Lowe as an honest witness and there is no reason to conclude that her estimate of the time lapse between Mrs Chamberlain's return to the barbecue and the raising of the alarm was badly astray. Even if it was, and a period of a few minutes elapsed, it is straining credulity to believe that Mrs Chamberlain could have broken the news of Azaria's murder to her husband in those few minutes without Mr or Mrs Lowe noticing that something was amiss. They were at the barbecue the whole of the time. It is almost beyond belief that in such a short time, and in the virtual presence of others, Mrs Chamberlain could tell her husband the shattering news that she had killed Azaria and explain to him that she was intending to account for her death by saying that a dingo had taken her, and that he could formulate a plan to support her story by saying he thought he had heard the baby cry. I shall refer later to the remarkable coincidence that Mrs Lowe also thought she heard the baby cry.

Fourthly, the opportunity which his wife had of conversing with him in private and telling him that she had killed Azaria was virtually non-existent in the first fifteen minutes after the alarm was raised and extremely limited in the half hour or so thereafter. During that relatively short period the opportunities they had for private conversation were extremely limited, if they existed at all.

Finally, at no stage after Azaria disappeared did Mr Chamberlain exhibit any concern about leaving his other two children alone in his wife's care and custody. ■ shall refer later to the significance of some of these matters.

With the exception of his statement that he heard the baby cry, there is not much conflict in the evidence as

to Mr Chamberlain's conduct on the night of Azaria's disappearance and thereafter. It is the inferences which should be drawn from that conduct which are in dispute. The Crown submitted, both at the trial and before me, that it could safely be inferred from his conduct after Azaria's disappearance that he knew his wife had killed Azaria and that there had not been any dingo involvement in her death. The Crown relied upon a number of matters to justify the drawing of this inference. These included his alleged failure to make an urgent and sustained search of the sand dunes to find Azaria's body, his failure to use the headlights of his vehicle to assist in the search, his premature acceptance of the fact that Azaria's body would not be found alive, his failure on 18 August to enquire as to the progress of the search, his failure to exhibit great grief, his willingness to talk to the media and his decision to leave Ayers Rock on the morning of 19 August. In addition the Crown alleged that many statements he made when giving his various accounts of what had happened were inconsistent and exaggerated.

There is considerable force in some, but not all, of the Crown's criticisms of Mr Chamberlain. I can see no reason to doubt his explanation for not using the headlights of his car to assist in the search. He said, in effect, that in the agony of the moments immediately following the raising of the alarm he was unable to find the keys to his car. I think it is almost certain that, at that time, he could not have been aware that his wife had killed Azaria, if indeed she had. Hence no inference adverse to him can be drawn from his conduct at that time.

Nor do I think that any inference adverse to him can safely be drawn from the limited part he took in the search in the hours after Azaria's disappearance. He did, in fact, assist in the initial search. Within a relatively

short time there were up to 300 people searching on the dune. His decision not to continue searching and to stay at the barbecue area to comfort his wife can hardly be regarded as incriminating, even if others might have acted differently. In any event, it appears that on a couple of occasions during the night he did assist, albeit briefly, in the search. It is true that although the search continued until 3 a.m. on 18 August, he and his wife decided to leave the camping area at about midnight and go to the Uluru Motel. However, their decision was taken on the advice of others and seems not unreasonable.

Nor do I think there is much weight in the submission that his failure to enquire as to the progress of the search on 18 August is an indication that he knew Azaria had not been taken by a dingo. At the time, Ayers Rock was a very small community and he could have acted on the basis that it was unnecessary for him to enquire as to the progress of the search because the police would certainly make contact with him if they had anything to report. Most parents would have acted differently, but I do not think it would be safe to draw any inference adverse to him from this.

Further, it was not the fact that he did not exhibit grief. There is evidence that he did appear to be distressed after Azaria disappeared, although not as much as might have been expected. He explained any apparent lack of distress on his part by reference to the comfort which his religious faith gave him, and to his desire to give what he regarded as a good witness to that faith. Whatever had been the cause of Azaria's disappearance, Mr Chamberlain must have been grief stricken by her loss. If he failed to exhibit as much grief as might have been expected, that cannot be taken as any evidence that he knew his wife had killed the child.

However, by any standards, some of Mr Chamberlain's conduct on 18 August was unusual. His willingness to be interviewed by the media and to talk about the tragedy was extraordinary. He explained this willingness by saying that he wanted to alert the public to the danger to tourists posed by dingoes at Ayers Rock. Perhaps the most extraordinary aspect of his conduct was the request he made of Constable Morris that he be permitted to photograph the jaws of a dingo which had been shot by the police. Strange though this request was, it was not of itself incriminating. The request, like some of his other conduct, was equally extraordinary whether Azaria was murdered or taken by a dingo.

To my mind, the most suspicious aspect of Mr Chamberlain's conduct was the statement he made so soon after Azaria's disappearance that she would not be found alive. There is some uncertainty in the evidence as to when he first expressed this opinion, but it seems to have been about half an hour after Azaria disappeared. In his defence, it has to be said that very soon after the search commenced and before he said that he did not think Azaria would be found alive, he was told by Mr Lowe that he was pessimistic about the likely outcome of the search. Lowe said at the trial: "Mike and I had been searching for about 10 minutes, and I told him if we find the baby, it's not going to be any joy for him, and he agreed ...". Counsel also submitted on his behalf that the prospect of viewing Azaria's savaged corpse was so horrific to Mr Chamberlain that he could not face it and that he set up a psychological barrier, as it were, by convincing himself that her body would never be found. Whether or not he did so is impossible to say.

There is much in the evidence to justify a conclusion that Mr Chamberlain has a tendency to describe

events in theatrical language. I think he also enjoys having an audience. These characteristics (which are exemplified in some of the language used in his statement I have quoted above) may account for some of the embellishments and exaggerations in his evidence. It is these exaggerations and embellishments which give some of his evidence a ring of unreality. In one of his interviews with the media he said that the great quantity of blood discovered in the tent led him to conclude that Azaria's death must have been swift. This statement was patently ridiculous and could not have deceived any person who saw inside the tent. The Crown relies upon it as showing that Mr Chamberlain is a liar but I think the statement does no more than reflect his proclivity for hyperbole.

The Crown submitted that if Mr Chamberlain had heard the cry as he alleged, he would have run immediately to the tent. His failure to do so was said to show that he did not hear the alleged cry. I do not find this submission convincing. As I have pointed out, there is no reason to suppose that he knew Azaria was dead at that time. Hence, his failure to run to the tent cannot be attributed, as the Crown alleges, to his knowledge that Azaria had not been taken by a dingo. In any case, his wife was closer to the tent than he was and his decision to allow his wife to go to the tent first in response to the cry can hardly be regarded as incriminating. Of course, by the time his wife cried out that the dingo had the baby she was much closer to the tent than he. The evidence seems to suggest that he hurried to the tent immediately after he heard his wife cry out.

I return now to consider some of the background matters to which I referred earlier. The corroboration which Mrs Lowe gives to the most crucial part of Mr Chamberlain's evidence cannot be dismissed lightly. Of course, Mrs Lowe may be mistaken in what she believes she

heard. However, she says not only that she heard a cry, but that either Mr Chamberlain or Aidan also said that he had heard it. It is almost certain that Mr Chamberlain was unaware, at that time, that his daughter was dead. If Mrs Lowe was mistaken when she thought she heard a cry, it was a remarkable coincidence that Mr Chamberlain or Aidan said he also heard the same cry. Of course, Mrs Lowe may be mistaken not only in thinking that she heard a cry, but also in thinking that Mr Chamberlain or Aidan said he heard the same cry. But it would seem less likely that she made two mistakes rather than one.

I would be much less inclined to attribute significance to this coincidence if it had appeared only from evidence given by Mrs Lowe at the trial or to the Commission. I have referred in Chapter 14 to the way in which, at the trial, she embellished her original description of the cry which she says she heard. By the time of the trial Mrs Lowe had become strongly committed to Mrs Chamberlain's cause, but that is unlikely to have been the case when she made the written statement to the police on 4 October 1980. At that time Mrs Lowe had not had any contact with the Chamberlains since about 9.50 p.m. on 17 August, when she and her family left the camping area. Before that time the Chamberlains and the Lowes were total strangers.

Further mention should also be made of Mr Chamberlain's willingness to leave Aidan and Reagan alone with his wife after the tragedy. Had his wife told him the horrific news that she had killed their daughter, one would think that he would have concluded either that she was a murderess or that she had suddenly been overtaken by some form of severe mental illness. It is possible that, out of loyalty and a desire to protect her, he might have done everything in his power to give credence to his wife's

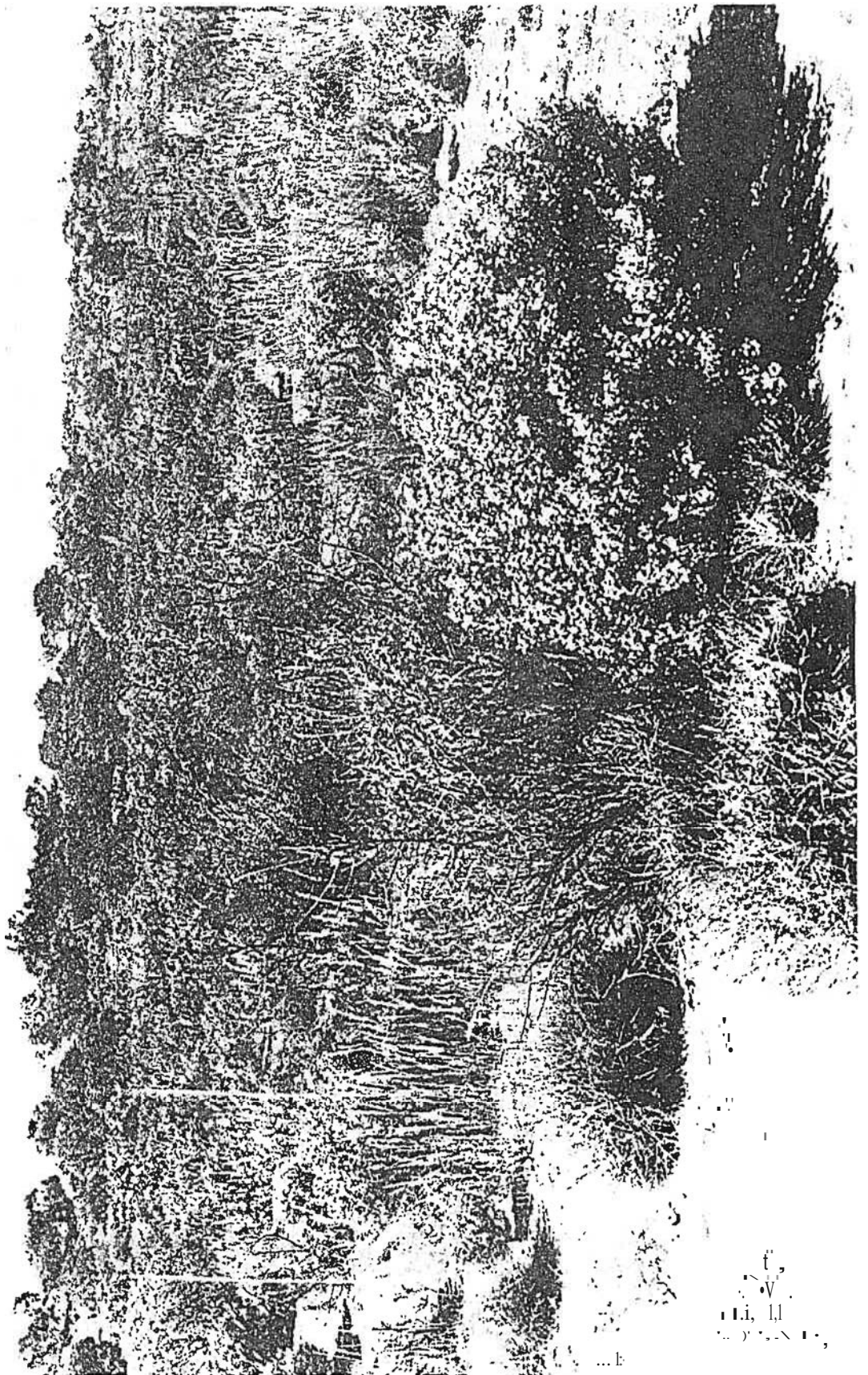
story. However, if he knew she had killed Azaria he surely would have been apprehensive of the boys' welfare if they were left alone with her. Yet, according to Ms Prell, on the morning of 18 August he left his wife alone with the boys in their room at the Uluru Motel on at least one occasion, and probably two. Of course, it might be said that he believed she would not harm one of the other children for fear of immediate discovery. But that is hardly a satisfactory explanation. He would have had no reason to be confident that there would not be a recurrence of the same murderous or deranged conduct.

Mention must also be made of Mr Chamberlain's willingness to furnish the police with any information requested of him. He drew their attention to the fact that they had taken possession of the wrong camera bag when they searched his house at Cooranbong in September 1981. It was he who gave the police the camera bag which he had taken to Ayers Rock. This was extraordinary conduct on his part if the bag had been used as a repository for Azaria's body.

There is one further matter affecting Mr Chamberlain's credit which should be mentioned. It was part of the Crown case that he or his wife buried Azaria's body on the sand dune to the east of their tent. Of course, he denied this. At the trial, it did not emerge clearly, if it emerged at all, that Azaria's body was probably not buried until at least two and a half to three hours after her death, if indeed it was buried. The consequence of this is that, if Mr or Mrs Chamberlain buried the body on the sand dune, they probably could not have done it until about 10.30 to 11 p.m. at the earliest. This circumstance raises a not inconsiderable difficulty for the Crown in its claim that Mr Chamberlain falsely denied that Azaria had been buried on the dune. On the Crown case, by the time Azaria's body was buried it had remained undiscovered in the car for

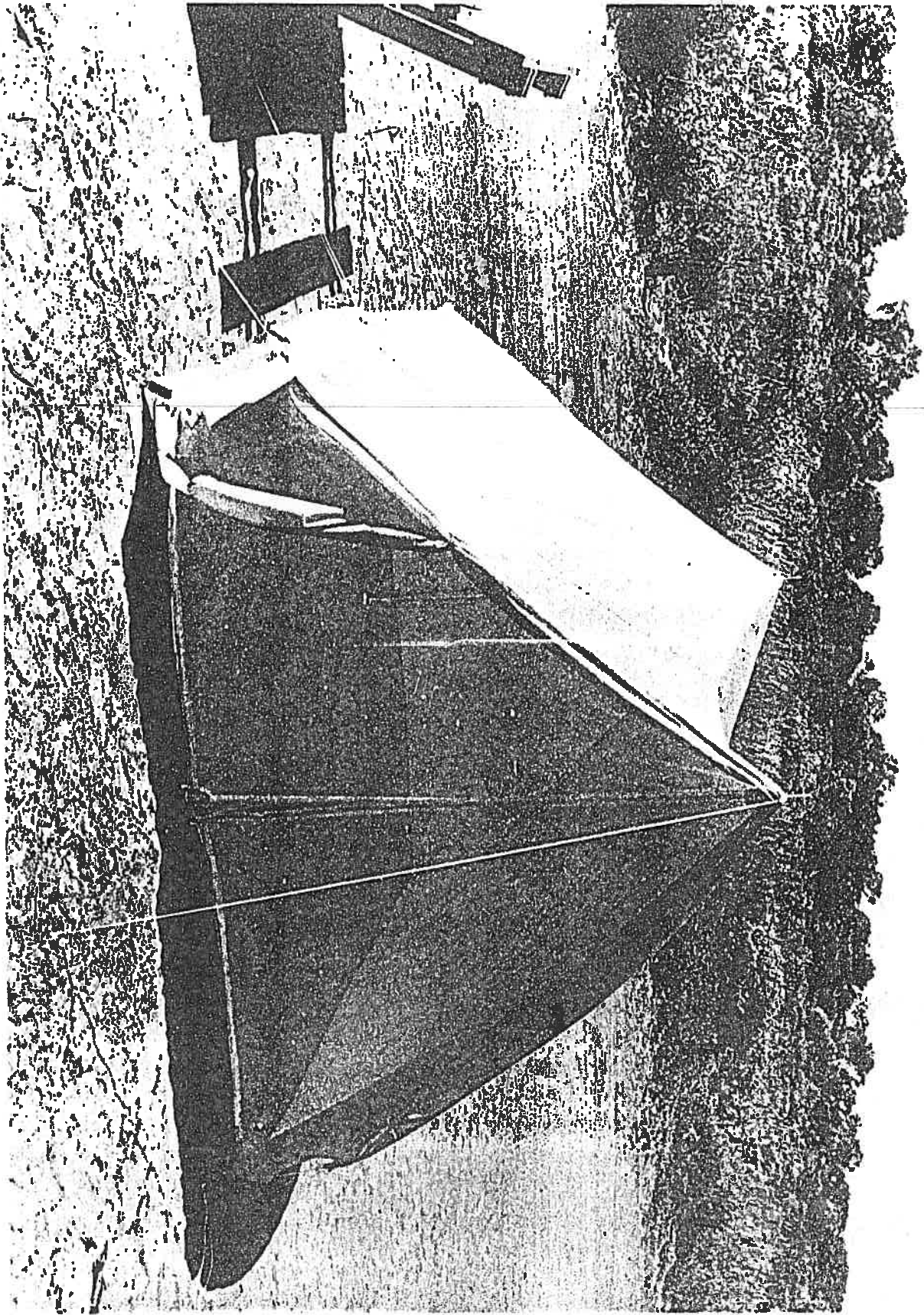
at least two and a half to three hours. By 11 p.m. Mr Chamberlain had a reasonable excuse for taking his distressed wife and children to the safe haven of a motel, where he would have a better opportunity of disposing of the body than if he remained at the camp site. The camping area was alive with activity, and no doubt he and his wife were the cynosure of all eyes. Why he would run the enormous risk of taking the body out of the car and burying it on the nearby sand dune is not apparent. No one saw him or his wife acting suspiciously at the time. It is to be remembered that there were up to 300 people searching the dune. Moreover, if the body were buried and disinterred later in the night, it seems probable the disinterment would have occurred after midnight. It seems improbable that if he had succeeded in burying the body before midnight without being detected, he would have returned to the grave very soon thereafter, disinterred the body, and carried it back to the car. At midnight the Chamberlains went to the Uluru Motel, some 2 or 3 km from the dune. If he had returned to the sand dune by car after midnight it is almost certain that he would have been observed since the search continued until 3 a.m. If he had returned by foot, he still ran the risk of being seen carrying the baby's dead body back to the motel.

Quite apart from the risks involved, the difficulty in finding an unmarked grave on a dark night on a sand dune well covered with vegetation would have been not inconsiderable, unless the grave were quite close to the road. The vegetation on the dune immediately behind the Chamberlains' tent is shown in the photographs identified as "Sand dune to the east of Chamberlains' tent" and "Chamberlains' tent with sand dune in background" which are reproduced. The difficulties inherent in this part of the Crown's case are very considerable indeed. Compared to them the difficulties the defence has in explaining the Chamberlains' conduct, although of a different kind, are minor.



Sand dune to the east of Chamberlains' tent.

Chamberlains' tent with sand dune in background.



Counsel for the Crown submitted that, since the accounts given by the Chamberlains at the trial and to the Commission of what happened at the time of Azaria's disappearance do not vary significantly, I can derive considerable assistance from the comments made on their evidence by some of the judges who decided the appeals to the High Court. However, their Honours' task in deciding the appeal was much different from mine. Quite apart from seeing the Chamberlains in the witness box, there is so much more evidence before the Commission on the general question as to the Chamberlain's guilt and the particular question as to whether a dingo might have been involved in Azaria's disappearance, that the help that can be derived from the judgments is limited. As appears from what I have already written, I share many of the difficulties felt by their Honours in accepting the Chamberlains' evidence but in the light of the evidence before the Commission, those difficulties are not nearly as great as they were at the trial. For instance, the tracking evidence before the Commission is more favourable to the Chamberlains than it was at the trial. So is the evidence on the question whether the damage to Azaria's clothes could have been caused by a dingo and the further question whether the vegetable matter found on her clothes was more consistent with dingo involvement than not. I mention these matters merely by way of illustration - there are many others. While they do nothing of themselves to explain any unsatisfactory features about the Chamberlains' evidence, they do afford more support for the general story of dingo involvement.

Before leaving the question of the Chamberlains' credit, I should make reference to evidence before the Commission of rumours which circulated from time to time about the Chamberlains. All the rumours were thoroughly investigated and evidence in respect of many of them was

given to the Commissiu. The rumours included that Mrs Chamberlain had ill-treated Azaria, that Azaria's name meant "sacrifice in the wilderness", that Mrs Chamberlain dressed Azaria in a sinister black dress, that Mr Chamberlain kept a child's coffin at his home for the purpose of housing her body, that Mrs Chamberlain did not properly feed Azaria shortly after her birth, that the teachings of the Seventh Day Adventist Church countenance child sacrifice, that the Chamberlains' family bible was found to be open at a passage where reference is made to a woman murdering her son, and that a photograph published on the cover of the "Woman's Day" showing a baby supported by Mrs Chamberlain on Ayers Rock was not of Azaria but an older child. It is sufficient to say that all the rumours, and many others, were found to be baseless. It would be inappropriate to dignify them by further discussion. I should add that the trial judge, who conducted every aspect of the trial with scrupulous fairness, was at great pains to direct the members of the jury to put from their minds any gossip or media reports which might have come to their attention.

The Crown case against the Chamberlains depended upon circumstantial evidence and a major component of this evidence was scientific in nature. In essence, the Crown case was that Mrs Chamberlain murdered Azaria in the car by cutting her throat. The defence asserted that Azaria had been taken by a dingo, an event for which there was no known precedent. It was therefore a novel case.

Since the child's body has never been found it was necessary to examine her clothing and other articles in order to ascertain the possibility of dingo involvement. The Crown sought to prove that a dingo did not kill the child. It sought to prove the presence of blood in the car and to disprove dingo involvement by calling evidence from experts in a number of disciplines.

The Northern Territory Police Department did not have any extensive scientific expertise or equipment. Its practice was to rely upon services made available to it upon request by the South Australian Forensic Science Centre.

The Commission enlisted the services of the Victorian State Forensic Science Laboratory. This laboratory had not been involved in previous work on the Chamberlain case. Prior to the setting up of the Commission the Northern Territory Government had requested it to take possession of the matinee jacket before it was examined by experts on behalf of the Crown and the Chamberlains. I decided that it was appropriate that it should be requested to undertake a number of assignments at the request of the Commission.

Most of the work done by the Victorian State Forensic Science Laboratory was done by Mr Anthony Raymond. He examined and tested the car, the matinee jacket and the clothing. He also supervised experiments with dingoes to obtain "cuts" in clothing damaged by them. He made arrangements to ensure that his work and tests could be observed by experts nominated by the parties. No doubt as a result of this there was little dispute as to his findings. Mr Raymond was assisted by Mr Peter Ross and Sergeant Henry Huggins. Likewise, the opinions they expressed in evidence were not seriously challenged. I am greatly indebted to the Victorian State Forensic Science Laboratory and its officers for their assistance.

In criminal cases, where the standard of proof is proof beyond reasonable doubt, it is highly desirable that complex scientific evidence called by the prosecution should be so carefully prepared and expressed that the necessity for the defence to challenge it is reduced as much as possible. This was especially the case at the Chamberlain trial because of the complexity and novelty of so many scientific questions which arose for the jury's consideration.

At the time of the Chamberlain case, it was the practice of the N.S.W. Health Commission not to preserve plates on which blood tests had been done or photographs of them or samples of blood for testing by experts on behalf of the accused. The undesirable consequences of this practice, which has since been changed, are obvious. The former practice placed Mrs Kuhl in a difficult position because of her inability to refer to the plates which she made in the course of her experiments. Her notes, memory and credibility assumed an importance which they would not have had if the plates, or photographs of them, had been preserved.

Mrs Kuhl was called upon to perform an extremely difficult task in a scientific area where controversy between experts was, to say the least, likely. Yet, it appears that her laboratory had not laid down any criteria for determining whether a particular result was sufficiently certain to be used as a basis for giving evidence. At the Commission Mr Martin, who was called at the request of the Crown, said that some of the P-st results, especially in respect of the scissors found in the car, were so uncertain that they should not have been relied upon.

Mr Martin thought that in the field of immuno-chemical reaction testing certain criteria had to be adopted to ensure that only reasonably certain results were relied upon in a criminal case. The absence of such criteria in the Chamberlain investigation produced a risk of injustice to the accused and aggravated the difficulty of the task which confronted Mrs Kuhl.

It will often be the case that experts will disagree on matters concerning which there is little prior experience. However, in the present case a number of opinions given in evidence at the trial have been shown to

be plainly erroneous. Some of them were extremely adverse to the Chamberlains and it is unfortunate that they should have been given in evidence at a murder trial. It is appropriate to discuss some of them in the hope that lessons may be learned which may prevent similar errors being made in the future. These and other errors were the cause of lengthy and expensive evidence, both at the trial and before the Commission.

The evidence as to the alleged arterial blood spray under the dash of the car may have had a considerable impact on the jury. Mrs Chamberlain was challenged to provide an explanation for it and was unable to do so. The Crown's evidence was that the arterial blood spray contained foetal haemoglobin. If the jury accepted that evidence, they must have regarded it as compelling evidence of Mrs Chamberlain's guilt. I have already stated my conclusion that the spray pattern was made up of sound deadening material which was sprayed on the metal plate during the course of manufacture of the car.

As appears from what I have already written, there is doubt whether Constable Scott properly applied the ortho-tolodine test to the underdash area. Scott was a biologist who examined the samples from this area immuno-chemically and failed to identify blood. The Crown now claims that he lacked the expertise to do these tests. Dr Jones examined samples under a microscope which was not sufficiently powerful to disclose (as the Victorian State Forensic Science Laboratory's microscope did later) that there was duco paint sprayed over the top of the alleged blood. Mrs Kuhl was not sent the plate on which the spray appeared, but only a few small samples scraped from it. In any event, she did not have readily available to her the services of an analytical chemist to identify the bituminous compound in the samples, and they were not examined by such

a chemist. She found the presence of foetal blood in the samples, not that the samples were all blood.

Dr Jones gave evidence at the trial that if it was blood under the dash, it was an arterial spray. Dr Cameron gave similar evidence. Mrs Kuhl simply gave evidence of having examined the sample which she said contained blood, but she did not say it was entirely blood. Apparently the various experts did not consult together to decide precisely what was established by the results of the tests. Before the Commission, no witness would take responsibility for what was put to the jury. The error appears to have been the result of lack of expertise by some experts, lack of proper equipment and lack of consultation between all the experts involved in this important part of the Crown case.

The discussion earlier in this report of the ortho-tolidine test shows that there must be considerable doubt whether the jury properly appreciated the difference between this test, a screening test to indicate the possible presence of blood, and other tests which prove that blood is in fact present. Based on the evidence called at the trial that a skilled operator would not mistake positive ortho-tolodine reactions for blood if they were caused by other substances, the jury may well have regarded it as an almost conclusive test for blood rather than a preliminary or screening test. Yet no expert who gave evidence to the Commission thought that the ortho-tolidine test by itself can prove the existence of blood. All denied that it can. If there had been consultation between the biologists called at the trial, agreement might have been reached on a description of the test's capabilities so that the risk of the jury being misled would have been eliminated.

I have referred elsewhere to Professor Cameron's evidence as to the alleged hand print on Azaria's jumpsuit

and to my conclusion that much of what he thought was blood was sand impregnated into the jumpsuit. This error occurred because he made assumptions as to the blood stains examined by Dr Scott but did not verify those assumptions.

Mrs Chamberlain was asked by Sergeant Charlwood to furnish a print of her hand on the basis that it might exonerate or incriminate her. She declined to do so until she obtained legal advice. The same request was made of her in open Court by counsel assisting the Coroner at the second inquest. She declined to do so on legal advice. Fortunately this matter was not pursued at the trial, since it appears that there is no reliable test for comparing Mrs Chamberlain's hand print against the alleged hand prints on the jumpsuit. Professor Cameron himself told the Commission that he had never suggested that there was such a test. This seems to indicate a lack of communication between the police, Professor Cameron and the Crown lawyers at the second inquest.

As discussed in Chapter 14, it was claimed by the Crown at the trial that Mrs Chamberlain had lied because she had described marks on the purple blanket as having been made by a dingo's teeth when she must have known they were made by moths. It now appears that what Professor Chaikin correctly described as moth damage could not have been the damage originally described by Mrs Chamberlain. Thus his evidence did not provide any basis for the accusation of lying made against her. The accusation probably would not have been made if there had been consultation between Professor Chaikin, the textile expert, and Mr Kuchel, the entomologist.

I have also referred to the erroneous assumption made by Professor Chaikin that dingoes cannot cut fabric with their teeth and produce tufts. This assumption was not

based upon any research work, or any scientific writing. He gave it as the strongest reason for his belief that the jumpsuit severances had been made by human hand and not by a dingo. Professor Chaikin's evidence on this point was of great importance, even though he had another reason for saying the severances were not made by a dingo.

At the trial, hairs found on the jumpsuit and singlet, and in the tent, were identified as probably cat hairs, whereas they were in fact dog hairs. Dr Harding, who made the original identification, did not contest Mr Brunner's later identification (made after the trial) of the hairs as dog hairs. Dr Harding was at pains at the trial to concede the possibility that the hairs might be dingo hairs. Nevertheless, as the case went to the jury the evidence was that the hairs were probably cat hairs. The alleged absence of dog or dingo hairs was relied upon as disproving the dingo story. In fact the presence of dog hairs on the clothing and in the tent tended to support it. This error was caused, as Dr Harding freely conceded, by the fact that he did not possess Mr Brunner's expertise in the special field of animal hair identification. No doubt had he or the Crown been aware of Mr Brunner's expertise, advantage would have been taken of it. Comparisons between various human hairs and between various animal hairs have been conducted for years, and there was nothing incompetent about Dr Harding's methods. It happened that further progress had been made in the field by Mr Brunner, and Dr Harding was not aware of this.

Individual forensic science centres such as those in Melbourne and Adelaide cannot be expected to have a full range of experts in every field of forensic science. They will frequently need to consult outside experts. As I shall mention later, a central forensic science institute would assist in meeting this need.

A great deal of time was occupied by the Commission in taking scientific evidence. Efforts to narrow the areas of dispute between the experts and to shorten the evidence were only partly successful. In fairness, it must be said that some of the most important issues arose in areas where there had been little or no scientific research and disagreement was likely because of the novelty of the problems which had to be addressed.

I have not conducted an inquiry into the giving of scientific evidence or into the standards which should be observed by witnesses. However, it became clear during the course of the Commission that mistakes had been made, and that most of these mistakes were avoidable. Some of the expert witnesses, particularly Professor Ferris, volunteered suggestions as to how such mistakes could be avoided in the future. It would not be appropriate for me to make specific suggestions for changes in this area of forensic science. However: **it** is appropriate that I should draw attention to the desirability of steps being taken at government level to deal with the sort of problems which arise when proof of an accused person's guilt or innocence may depend upon scientific investigation and evidence.

Forensic science evidence has been the subject of a number of reports in recent years. In April 1974 a committee of enquiry reported to the Attorney-General of Australia recommending the setting up by the Commonwealth of a Forensic Science Institute. Such a national institute was suggested at a symposium on Law and Justice in the Australian Capital Territory in 1973.

In March 1982 a task force inquired into certain aspects of forensic science services for police and reported to the Australian Police Ministers' Council. It found that forensic science facilities for support of police in

Australia were fragmented and lacked co-ordination and potential for significant research and development. It also found that facilities were generally limited by lack of liaison, that information exchange was not co-ordinated, and that there was no long term plan for national development and improvement. It again recommended the establishment of a National Institute of Forensic Science.

A forensic scientist may be under considerable pressure from the police to produce quick results. This was well illustrated before the Commission by evidence of numerous telephone conversations between police officers in which they expressed their anxiety to obtain the results of Mrs Kuhl's testing, and their hope that it would support the Crown case. There is no reason to criticize the police for enthusiasm, but it is essential that the forensic scientist be free from pressure to produce results, except after adequate testing procedures have been observed. Dr Baxter expressed the firm opinion that a forensic science centre should be autonomous and so structured that it is not subject to external pressure. He is obviously correct in his opinion.

Professors Schreiber and Nairn suggested that there should be closer links between forensic science centres and universities and other appropriate institutions so as to ensure that the former have the advantage of the research conducted by the latter. I agree with this suggestion, but how close the link should be was not explored in evidence before the Commission.

In the Chamberlain case, the Health Commission's staff might have derived great assistance from the experience and knowledge of other experts, had it been available to them. The complex and difficult nature of the work Mrs Kuhl was required to undertake made it highly

desirable that she had as much research and other assistance as was available.

The laying down of appropriate standards in matters of forensic science would not be easy. The evidence I have heard discloses differences of opinion between various experts as to what standards should be adopted. For example, in the testing of blood scientists disagreed as to the merits and reliability of the crossover electrophoresis test as compared with the Ouchterlony test. If the former is unreliable, as some witnesses suggested, it is unfortunate that it is the standard final test in some laboratories, when others regard it as a preliminary test only. This is the type of problem which the suggested National Forensic Science Institute could address and, it is to be hoped, resolve," so as to establish a uniform and reliable practice throughout Australia.

Such an Institute might also be a centre for the exchange of information, and the location of reliable experts in unusual fields of expertise. Thus Dr Harding could have been informed about Mr Brunner's work if such an institute had kept an up-to-date register of relevant research work done in Australia and overseas. Such an Institute, had it existed before the Chamberlain tragedy, might have been of great assistance to Mrs Kuhl in carrying out her difficult work.

Furthermore, the existence of such an Institute would hopefully reduce the need to retain experts from overseas. The fact that some of the Crown's experts who gave evidence at the trial resided overseas may have contributed to the lack of consultation between them and other experts in the matter of the alleged hand prints on the jumpsuit, and also in the matter of the alleged underdash arterial spray.

There is no reason to believe that it should normally be necessary to consult overseas experts. If the need arises, it would be better for it to be done through a National Forensic Science Institute, rather than for the Crown and the defence to scour the world to find experts to support their cases. Experts from England, Germany, Sweden, Japan, Canada and the U.S.A. gave evidence to the Commission. If a National Forensic Science Institute lessened the expenditure of public money in calling such evidence, there would be sound economic reasons for its existence.

The Commission is the second inquiry in recent years arising out of doubts as to scientific evidence. The other was the Splatt inquiry conducted into the conviction of Edward Charles Splatt for murder in South Australia. The report of the Royal Commission, Mr Carl Shannon, Q.C. (formerly a judge of the N.S.W. District Court) was made in 1984, some two years after the Chamberlain trial. As a result of his report some changes were made to forensic science procedures in South Australia. The fact that two such inquiries have now been held points up the desirability of further consideration of the proposal to set up a national institute.

Juries may attach great weight to the opinions of experts on matters outside the competence of the layman to understand. It is essential that everything possible be done to ensure that opinions expressed by experts, especially Crown experts, be soundly based and correct. In many cases, the opinions expressed by the Crown's experts are accepted by the defence. If they are not accepted, the resources of an accused person may well not suffice to enable him to challenge them. The risk of an injustice occurring would be diminished if an accused person, in

common with the Crown, had access to a National Forensic Science Institute and its staff of experts.

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The two strands in the Crown Case

I shall now draw together some of the more important matters dealt with in earlier chapters and state my conclusions upon them. In doing so, some repetition will be unavoidable.

There were two broad strands in the Crown's case against the Chamberlains. The first was comprised of the evidence from which the jury were invited to conclude that during her short absence from the barbecue Mrs Chamberlain took Azaria to the front passenger seat of the car and cut her throat. In this part of its case the Crown alleged that after the murder Azaria's body was initially secreted in the car and later the same evening buried in the sand on the nearby dune. It was further alleged that the Chamberlains or one of them subsequently disinterred the body, removed the clothing and placed it where it was found, having first cut it so as to simulate dingo damage. The jury were invited to find that Azaria's blood was not shed in the

tent, but was transferred there on Mrs Chamberlain's person or clothing after the murder.

The second strand in the Crown's case was comprised of the evidence from which the jury were invited to conclude that a dingo did not take the baby. It was alleged that Mrs Chamberlain's story of having seen a dingo at the tent was a fabrication. This part of the case depended upon the proposition that if the jury were satisfied beyond reasonable doubt that a dingo did not take Azaria, they were entitled to accept the only other explanation for her disappearance, which was that she had been murdered by her mother.

The new evidence, whether in relation to the first or second strand came for the most part from witnesses with high scientific qualifications. Most of them have not been identified with the Chamberlains' cause. There is no reason to suppose that their judgment has been affected by preconceptions as to the Chamberlains' innocence or guilt.

Although it is convenient to consider the two strands in the case separately, much of the evidence is relevant to both strands. Of course the jury had to consider the evidence in its entirety when reaching their verdict.

The first strand - effect of new evidence

As to the first strand, ■ invited counsel for the Crown to indicate a place, other than the front seat of the car, at which the murder might have occurred. He was unable to suggest an alternative location but submitted that it was not incumbent upon the Crown to specify and prove the particular place where Azaria was killed. ■ agree, but the trial was conducted upon the basis that the child was

murdered in the car. That this was so is abundantly clear from the Crown Prosecutor's address to the jury, reference to which is made in Chapter 5. In these circumstances, it would be unrealistic to think that the jury might have concluded that Azaria was not murdered in the car, but at some other unspecified place.

The effect of the new evidence on the first strand in the Crown's case is to leave it in considerable disarray. The new scientific evidence casts serious doubt on the reliability of all the findings of blood in the car. The evidence leads me to conclude that if there were any blood in the car, it was present only in small quantities in the area of the hinge on the passenger's seat and beneath. It has not been established that any such blood was Azaria's. The blood shed by Mr Chchan could well have been the source of any blood stains in that area. The finding most damaging to Mrs Chamberlain was that of the alleged blood spray, such as might have come from a severed artery, on the metal plate under the dash. There is compelling evidence that the spray was made up of a sound deadening compound and contained no blood at all.

The new evidence casts similar doubt on the reliability of the evidence at the trial that there was baby's blood on some of the contents of the car. At the trial Mrs Kuhl gave evidence that there were indications of baby's blood on the scissors found in the console of the car. It was virtually conceded before me that Mrs Kuhl's tests did not confirm the presence of blood of any kind on the scissors. Indeed, on the evidence, it would be impossible to find that the scissors were even in the car when it was at Ayers Rock. The evidence at the trial was that there was also baby's blood on a towel, a chamois and its container found in the car and on the camera bag which had been in the car. ■ am satisfied that the presence of

baby's blood or of any blood on these articles has not been established.

As the case went to the jury, they would have been entitled to find that there was a significant quantity of blood in the car when it was examined in 1981. However, there was general agreement between the expert witnesses who gave evidence to the Commission that only a very small quantity of blood was found in the car, if any was found.

Taken in its entirety, the evidence falls far short of proving that there was any blood in the car for which there was not an innocent explanation. It is plain that great reliance was placed by the Crown on the findings of blood. The real dispute in this part of the case at the trial was whether the Blood came from a baby. The question whether there was any blood in the car went almost by default.

The doubt cast by the new scientific evidence on the findings of blood is made greater by evidence from Senior Constable Graham, who was not called at the trial. His failure to observe any sign of blood in the car, notwithstanding a thorough inspection of it, lends additional weight to the defence case on this issue.

It is true, as Brennan J. observed (153 C.L.R. at p.596) that the jury may have rejected the scientific evidence led by the Crown to prove the allegation that the blood found in the car came from Azaria, and yet found the Chamberlains guilty on the other evidence and on the impression they formed of them in the witness box. Nevertheless, as his Honour said, if the jury were indeed satisfied that the blood in the car was Azaria's, the guilt of the Chamberlains was "virtually demonstrated". If the jury did conclude that the Chamberlains' guilt was virtually

demonstrated by the scientific evidence, that conclusion, without more, would have destroyed any chance Mrs Chamberlain had of giving a favourable impression to the jury. consequently, any difficulty the Crown may have had in proving beyond reasonable doubt that a dingo did not take the baby was greatly diminished, if not entirely overcome.

The doubt cast upon the findings of blood in the car is of more general importance than might first appear. It is beyond dispute that Azaria's blood was found on some of the articles in the tent. The Crown relied on this fact in two ways. First, it claimed that more blood was found in the car than was found in the tent. Secondly, it claimed that the blood found in the tent was transferred from the car to the tent on Mrs Chamberlain's person or clothing. The new evidence shows⁷ that it cannot be safely concluded that more blood was found in the car than was found in the tent. Moreover, the Crown's inability to prove that there was any of Azaria's blood in the car leaves the hypothesis that the blood found in the tent was transferred from the car without any factual foundation.

In the light of the new evidence, the opinion expressed by Professor Cameron at the trial that the pattern of blood staining on the jumpsuit was consistent only with a cut throat cannot be safely adopted, nor can it be concluded from the pattern of blood staining on the clothing that Azaria's throat was cut with a blade. Further, Professor Cameron's evidence that there was an imprint of a hand in blood on the back of the jumpsuit has been weakened, if not totally destroyed, by new evidence that a great deal of what he thought was blnnn on the back of the jumpsuit was, in fact, red sand.

There are other respects in which the first strand of the Crown's case is weakened by the new scientific

evidence. The evidence at the trial led Gibbs C.J. and Mason J. to say (153 CLR at p.567) that it could be inferred with certainty that Azaria's clothing had been buried. No doubt this statement was based to a large extent on the evidence of Professor Cameron. The new evidence before the Commission discloses that Dr Andrew Scott, the first Crown expert to examine the jumpsuit, did not see any indication that the clothes had been buried. He was not asked about the question of burial at the trial. As I conclude elsewhere, although Azaria's clothing may have been buried, the quantity and distribution of sand on it might well have been the result of it being dragged through sand.

Further, the evidence at the trial justified the Crown in putting to the jury that the characteristics of most of the soil in the jumpsuit could only be matched in soil found in certain places, that one of those places was under bushes on the dune to the east of the Chamberlains' tent, and that this was the most likely place of origin of the soil. This evidence supported the Crown's allegation that the Chamberlains buried the child somewhere on the sand dune. Before the Commission it became much clearer that a reasonable match of the soil found in the jumpsuit can be found in soil under bushes which are widespread in the sand dune country and under desert oak trees which grow both in the dune country and on the plains at scattered points throughout the Ayers Rock region. Moreover, the new evidence concerning plant fragments on the clothing is consistent with the clothed body of the baby being dragged through low vegetation of kinds which grew in the dune country and on the plains between the camping area and the Rock. In the light of the new evidence, it is difficult to conceive how Azaria's clothing could have collected the quantity and variety of plant material found upon it if it had been merely taken from the car, buried, disinterred and later placed near the base of the Rock. It is more

consistent with the new plant and soil evidence that Azaria's clothed body was carried and dragged by an animal from the camp site to near the base of the Rock, rather than that it was buried on the dune and later carried there.

The matters to which I have referred are sufficient to demonstrate the considerable disarray in which the first strand in the Crown's case is left as a result of the new evidence.

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The second strand - effect of new evidence

I turn now to consider the second strand in the Crown's case, namely, that a dingo did not take Azaria. While the new evidence is not as destructive of this part of the Crown case, it greatly diminishes its strength. I shall refer briefly to some of the new evidence which produces this result.

Mr Roff's evidence at the trial of having seen the tracks of a dingo carrying a load which may have been Azaria's body is corroborated by Mr Minyintiri. He did not give evidence at the trial but there is no question of his evidence being recent invention.

The Crown's expert has conceded that the hairs found in the tent and on the jumpsuit which were said at the trial to be probably cat hairs were either dingo or dog hairs. Dog hairs are indistinguishable from dingo hairs. The Chamberlains had not owned a dog for some years prior to August 1980.

The evidence given at the trial by Mrs Chamberlain that she saw marks on the space blanket is now supported by plausible new evidence. It is impossible to say whether the

marks she claimed to have seen were made by a dingo. However, having regard to all the evidence there is only the most insecure basis for the accusation made by the Crown at the trial that her claim to have seen the marks was made only for the purpose of supporting a false story that a dingo took Azaria.

The new evidence negates some of the most cogent evidence relied upon by the Crown at the trial to support its claim that the damage to the purple blanket which had covered Azaria in the bassinet was caused by moths. Mrs Chamberlain's claim that the damage to the blanket was caused by a dingo is more credible as a result of the new evidence.

The quantity and distribution of blood in the tent has been shown to be at least as consistent with the dingo hypothesis as it is with murder.

As I have observed in dealing with the first strand of the Crown's case it is more consistent with the new plant and soil evidence that Azaria's clothed body was carried and dragged from the camp site to near the base of the Rock rather than that it was buried on the dune, disinterred, and later carried there.

At the trial there was no evidence from a textile expert disputing Professor Chaikin's view that the jumpsuit was cut, probably with fairly sharp scissors, and that the severances on the clothing were not caused by a dingo. Professor Chaikin conceded that the opinion he expressed at the trial that dingoes do not produce tufts when they sever fabric with their teeth was erroneous. The professor had said at the trial that the presence of such tufts on Azaria's jumpsuit was "the strongest evidence" that it had been cut. From the great volume of new expert evidence as

to the possible causes of the damage to Azaria's clothing it cannot be concluded beyond reasonable doubt that the damage to it was caused by scissors or a knife, or that it was not caused by the teeth of a canid.

There is no reason to doubt that when Azaria disappeared she was wearing the matinee jacket discovered in 1986. The jacket would have covered much of the jumpsuit worn by the child. The failure to detect dingo saliva on the jumpsuit is made more explicable than it was at the trial.

There was more evidence before the Commission than was before the jury as to the ability of a dingo to remove Azaria from her clothing without causing more damage to it than was found. Although it would have been very difficult for a dingo to achieve this, it cannot be concluded that it was impossible for it to have done so.

The dingo experts disagree as to whether the arrangement of the clothing when discovered was inconsistent with dingo involvement. While Mr Roff did not consider the appearance of the clothing was inconsistent with dingo activity, Dr Corbett and Dr Newsome were of the view that it would have been more scattered if a dingo had removed Azaria from it.

Are there doubts as to the Chamberlains' guilt?

I must now answer the question whether, in the light of all the evidence, there are doubts as to the Chamberlains' guilt. In my opinion this question must be answered in the affirmative. I do not think any jury could properly convict them on the evidence as it now appears.

I have referred in earlier chapters to the evidence at the trial and to the significant new evidence that is before the Commission. It is apparent from what I have already written in this chapter that the effect of the new evidence is to greatly weaken the case presented against the Chamberlains at the trial.

The jury must have disbelieved Mrs Chamberlain's story about the dingo. No doubt, in concluding that her story was a fabrication they had regard to all the evidence in the case, as they were entitled to do. Some of the most damaging of that evidence has been shown to be either wrong or highly suspect. Other important parts of it have been shown to be open to serious question. The effect on her credit of her inability to explain the presence of blood in the car and how the allged spray of blood came to be on the plate under the dash cannot be known with certainty, but was probably disastrous. If the jury accepted the Crown's evidence on those matters and on the alleged imprint of a hand in blood on the jumpsuit it must have regarded her story as unbelievable and not worthy of consideration.

I have referred elsewhere to the unsatisfactory features in Mrs Chamberlain's account of having seen a dingo at the tent and ■ do not underestimate their importance. It can fairly be said that there are inconsistencies and improbabilities in her story and in the various versions she has given of it. However, as I point out in Chapter 15, there are possible explanations for many of the apparently unsatisfactory features of her evidence.

On the other hand, the obstacles to the acceptance of the Crown's case are both numerous and formidable. Almost every facet of its case is beset by serious difficulties. Some of these must now be mentioned.

The Crown is unable to suggest a motive or explanation for the alleged murder. The undisputed evidence is that Mrs Chamberlain was an exemplary mother and was delighted at Azaria's birth. She did not suffer from any form of mental illness nor had she ever been violent to any of her children. She had spent the day with her family on 17 August and had not exhibited any sign of abnormal behaviour or of irritation with Azaria. She was not stressed when she took Azaria to the tent for her expressed purpose of putting her to bed.

If Mrs Chamberlain left the barbecue with the intention of killing Azaria it is astonishing that she took Aidan with her. It would have been easy for her to have left him at the barbecue with his father. Having taken Aidan with her, it is even more astonishing that she should have murdered Azaria, on the Crown case, a few feet from where he was awaiting her return to the tent. It was a great coincidence that Mrs Lowe not only thought she heard Azaria cry, but also thought she heard Mr Chamberlain or Aidan say that he had heard the same cry. It is surprising that Mrs Chamberlain did not attempt to bolster her story by saying that she also heard the cry.

If Mrs Chamberlain did not intend to murder Azaria when she left the barbecue, it is difficult to understand why, for no apparent reason, she should have formed that intention almost immediately after she left it. There is nothing in the evidence which could account for the formation of such a sudden intention.

It seems improbable that Mrs Chamberlain, having murdered Azaria in the car or elsewhere, would have returned to the tent with so much blood on her person or clothing that some of it dripped on to the articles upon which it was found in the tent. Unless she did, there is no

explanation, except the dingo story, for the blood found in the tent. Such conduct on her part seems inconsistent with her donning the tracksuit pants (as the Crown alleges) so as to avoid tell-tale signs of blood.

It is extraordinary that the persons present at the barbecue area at the time of and immediately after Azaria's disappearance accepted Mrs Chamberlain's story and noticed nothing about her appearance or conduct suggesting that she had suddenly killed her daughter, and nothing about Mr Chamberlain's conduct suggesting that he knew that she had done so. She must have been a consummate actress if, having killed her daughter, she was able to appear calm and unconcerned when she returned to the barbecue a few minutes after the murder.

The short period during which Mrs Chamberlain was absent from the barbecue made it only barely possible that she could have committed the crime alleged against her. On the Crown case, in the 5-10 minutes she was proved to have been absent from the barbecue she must have

returned to the tent;
done whatever was necessary to ensure that
Aidan did not follow her;
donned her tracksuit pants;
taken Azaria to the car;
possessed herself of a murder weapon;
cut Azaria's throat;
allowed sufficient time for Azaria to die;
secreted the body;
done at least some cleaning-up of blood in the
car;
removed her tracksuit pants;
obtained a can of baked beans for Aidan;
returned to the tent;

entered the tent and done whatever was necessary for several articles in it to be spotted with blood;
collected Aidan; and
returneU tv the barbecue.

The length of time which, on the Crown case, must have elapsed between Azaria's throat being cut and her death is of some importance. It seems probable that if Mrs Chamberlain murdered the child she would not have returned to the tent before she was satisfied the child was dead. If both Azaria's carotid arteries were severed it probably would have taken about 2-3 minutes for her to have died. The minimum time would have been half a minute. It would have taken much longer; up to 20 minutes, for her to have died if her jugular vein, and not her carotid arteries, were severed. The blood staining on the jumpsuit indicates, according to all the experts, an absence of arterial bleeding.

Young though he was, it is very difficult to accept that Aidan did not notice that his mother took Azaria away from the tent and returned without her and did not comment on that fact when his sister was found to be missing.

It was indeed fortuitous that a dog or dingo should have been heard to growl and a dingo should have been seen not far from the tent very shortly before Azaria disappeared, and that on the night of 17 August a rianid's tracks should have been found hard up against the tent.

It is surprising that, if Mrs Chamberlain had blood on her clothing, nobody noticed it in the hours after Azaria's disappearance. If Azaria's body was left in the car after the alleged murder, it was foolhardy for Mrs

Chamberlain, in the presence of the Demaines and their dog, to open the car door and give the dog the scent of Azaria's clothing. The risks involved in the Chamberlains burying and disinterring Azaria when there were so many people who might have observed them were enormous. It is difficult to explain how the variety of plant material found on Azaria's clothing could have got there if she had been murdered. It seems improbable that, the murder having been so cleverly accomplished and concealed, the clothing would have been so left as to invite suspicion.

If Mrs Chamberlain told her husband that she had killed Azaria, it was extraordinary conduct on his part to leave his two sons, the younger of whom was aged only 3 years, in her sole custody on 18 August.

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Mr and Mrs Chamberlain's conduct at Ayers Rock on 18 August was strange whether or not Azaria had been murdered. Their conduct upon their return to Mount Isa is inexplicable if she had murdered Azaria. For instance, it is almost incredible that she should have told people there was blood on her shoes if she had murdered her daughter. Further, it was bravado of a high order for Mr Chamberlain to tell the police at Cooranbong that they had taken possession of the wrong camera bag if Azaria's body had been secreted in the one which he then produced.

The Crown has no direct evidence of the Chamberlains' guilt to overcome the cumulative effect of all these formidable obstacles. Even so, their guilt would be established if, in spite of so many considerations pointing to their innocence, the conclusion was reached that it had been proved beyond reasonable doubt that a dingo did not take the baby. In the light of all the evidence before the Commission, I am of the opinion that such a conclusion cannot be reached.

I shall state in summary form the effect of the evidence that leads me to hold this opinion. In doing so, it will be necessary to recapitulate some of the matters to which I have already referred in order to give a complete picture of the material (save for the Chamberlains' own testimony) which is directly relevant to this part of the Crown's case. It is also necessary to keep in mind that, under ordinary circumstances, it would be highly unlikely that a dingo would enter a tent, take a baby from it, carry it several kilometres to a den and there consume the body leaving the clothing in a position similar to that in which Azaria's clothing was found. But the question of Mrs Chamberlain's guilt or innocence is to be determined on the evidence and against the background of the circumstances as they existed at Ayers Rock in August 1980. It is not to be determined on the basis of preconceptions as to the likelihood of unusual animal behaviour.

Before August 1980 dingoes in the Ayers Rock area frequented the camping area. At that time there were many dingoes in the area, some 18-25 of which were known to visit the camping area. A number of attacks were made by dingoes on children in the months preceding Azaria's disappearance. In none of these did any child suffer serious injury.

About twenty minutes before Azaria disappeared Mr Haby saw and photographed a dingo which walked towards the Chamberlains' tent. A few minutes before the alarm was raised the Wests heard a dog growl.

On the night of 17 August dog tracks were observed on the southern side of and very close to the Chamberlains' tent. The same night Mr Roff and Mr Minyintiri, both experienced trackers and familiar with dingo behaviour, saw tracks of a dog carrying a load which they believed to be Azaria. It was within the bounds of reasonable possibility

that a dingo might have attacked a baby and carried it away for consumption as food. A dingo would have been capable of carrying Azaria's body to the place where the clothing was found. If a dingo had taken Azaria it is likely that, on occasions, it would have put the load down and dragged it.

Hairs, which were either dog or dingo hairs, were found in the tent and on Azaria's jumpsuit. The Chamberlains had not owned a dog for some years prior to August 1980.

The quantity and distribution of the sand found on Azaria's clothing might have been the result of it being dragged through sand. The sand could have come from many places in the Ayers Rock region. The sand and plant fragments on the clothing are consistent with Azaria's body being carried and dragged by a dingo from the tent to the place where it was found. It is unlikely that, if the clothing had been taken from the Chamberlains' car, buried, disinterred, and later placed where it was found it would have collected the quantity and variety of plant material found upon it.

It would have been very difficult for a dingo to have removed Azaria from her clothing without causing more damage than was observed on it. However, it would have been possible for it to have done so. Mr Roff, the chief ranger at Ayers Rock and a man of great experience, thought that the arrangement of the clothing when discovered was consistent with dingo activity. Other dingo experts disagreed. I think it is likely that a dingo would have left the clothing more scattered, but it might not have done so.

The blood found in the tent was at least as consistent with dingo involvement in Azaria's disappearance as it was with her murder in the car. The pattern of blood staining on the clothing does not establish that the child's throat was cut with a blade.

The absence of saliva on Azaria's jumpsuit which was not conclusively proved at the trial is made more explicable by the finding of the matinee jacket which would have partially covered it. The fact that no debris from the baby's body was found on the jumpsuit is also made more explicable by the finding of the jacket.

There is a great conflict of expert opinion as to whether the damage to the clothing could have been caused by a dingo. It has not been shown beyond reasonable doubt that it could not have been. There were marks on plastic fragments of the nappy similar to marks made by a dingo on another nappy used for testing purposes. However, there was no blood on the nappy.

There was a dingo's den about thirty metres from the place where the clothing was found. There is no evidence that the existence of the den was known to the Chamberlains or, for that matter, to anybody else and in fact it was unknown to the chief ranger and his deputy.

It is impossible in the above summary to capture the whole effect of the voluminous evidence given on the matters which bear upon the dingo hypothesis but, taken in its entirety, it falls far short of proving that Azaria was not taken by a dingo. Indeed, the evidence affords considerable support for the view that a dingo may have taken her. To examine the evidence to see whether it has been proved that a dingo took Azaria would be to make the

fundamental error of reversing the onus of proof and requiring Mrs Chamberlain to prove her innocence.

I am far from being persuaded that Mrs Chamberlain's account of having seen a dingo near the tent was false or that Mr Chamberlain falsely denied that he knew his wife had murdered his daughter. That is not to say that I accept that all their evidence is accurate. Some of it plainly is not, since parts of it are inconsistent with other parts. But if a dingo took her child, the events of the night of 17 August must have been emotionally devastating to Mrs Chamberlain. Her ability to give a reliable account of the tragedy may have been badly affected by her distress. The inconsistencies in her evidence may have been caused by her confusion of mind. Where her evidence conflicts with the Lowes' account of what she said and did in the few seconds after she commenced to run back to the tent, it may be the Lowes' recollection, not hers, that is at fault. The belief that people might unjustly accuse her of making up the dingo story might have led her, even subconsciously, to embellish her account of what happened, and this may explain some of its improbabilities. Her failure to see Azaria in the dingo's mouth is explicable if, as is quite possible, there were two dingoes, not one. These considerations afford at least as convincing an explanation for the apparently unsatisfactory parts of her evidence as does the Crown's claim that she was lying to conceal her part in the alleged murder. Having seen Mr and Mrs Chamberlain in the witness box, I am not convinced that either of them was lying.

In reaching the conclusion that there is a reasonable doubt as to the Chamberlains' guilt I have found it unnecessary to consider the possibility of human intervention (other than by the Chamberlains) in the time between Azaria's disappearance and the finding of her

clothes. It is difficult, but not impossible, to imagine circumstances in which such intervention could have occurred. It is not inconceivable that an owner of a domestic dog intervened to cover-up its involvement in the tragedy or that some tourist, acting irrationally, interfered with the clothes before they were later discovered by others. There is not the slightest evidence to support either of these hypotheses but the possibility of human intervention is another factor which must be taken into account in considering whether the evidence establishes the Chamberlains' guilt beyond reasonable doubt. It was so recognized in some of the judgments given on the appeal to the High Court.

Conclusion

I am conscious of the fact that the Chamberlains' convictions were upheld in the High Court. On the evidence as it appeared at the trial, two of the five members of the Court thought that the convictions were unsafe. I am confident that the appeal would have succeeded if the evidence had been as it now appears.

The question may well be asked how it came about that the evidence at the trial differed in such important respects from the evidence before the Commission. I am unable to state with certainty why this was so. However, with the benefit of hindsight it can be seen that some experts who gave evidence at the trial were over-confident of their ability to form reliable opinions on matters that lay on the outer margins of their fields of expertise. Some of their opinions were based on unreliable or inadequate data. It was not until more research work had been done after the trial that some of these opinions were found to be of doubtful validity or wrong. Other evidence was given at

the trial by experts who did not have the experience, facilities or resources necessary to enable them to express reliable opinions on some of the novel and complex scientific issues which arose for consideration. It was necessary for much more research to be done on these matters to determine whether the opinions expressed at the trial were open to doubt.

The failure of the defence to put in issue some of the scientific opinions expressed at the trial may have been due, in part, to lack of access to the necessary expert witnesses. However, this does not account for the failure to call Dr Lincoln, who was in a position to dispute Mr Culliford's opinion that blood was present in some of the samples taken from the car. Again, with the benefit of hindsight, it is unfortunate that the defence did not become aware of the chemical composition of the spray found on the metal plate removed from under the dash of a Torana car similar to the one owned by the Chamberlains. If this had been ascertained, it seems likely that the defence would have been alerted to the possibility that all the findings of blood relied upon by the Crown might be suspect. On a less technical and less important matter it is surprising that the Demaines' evidence was not called at the trial, although both the prosecution and the defence appear to have been aware that it was available to be called.

Counsel for the Chamberlains' submitted to me that the manner in which the Northern Territory Police conducted the investigation into Azaria's disappearance prejudiced their trial. I am not persuaded that it did. The great difficulties for the defence arose out of the scientific evidence, and the police cannot be held responsible for the deficiencies in it.

It follows from what I have written that there are serious doubts and questions as to the Chamberlains' guilt and as to the evidence in the trial leading to their conviction. In my opinion, if the evidence before the Commission had been given at the trial, the trial judge would have been obliged to direct the jury to acquit the Chamberlains on the ground that the evidence could not justify their conviction.

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APPENDIX A

COMMISSION OF INQUIRY

(CHAMBERLAIN CONVICTIONS) ACT 1986

and APPOINTMENT OF COMMISSIONER

NORTHERN TERRITORY OF AUSTRALIA

COMMISSION OF INQUIRY (CHAMBERLAIN
CONVICTIONS) ACT 1986

 No. 1 of 1986

TABLE OF PROVISIONS

Section

1. Short title
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8. Penalty for refusing to be sworn or to give evidence
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12. Rights of witness
13. Statements made by witness not admissible in evidence against him
14. Power of Commission in relation to documents and other things
15. Examination of witnesses by counsel, &c.
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28. Regulations



NORTHERN TERRITORY OF AUSTRALIA

No. 1 of 1986

AN ACT

To provide for a Commission of Inquiry in
 relation to certain criminal convictions

[Assented to 1 April 1986]

WHEREAS:

1. On 29 October 1982, in the Supreme Court of the Northern Territory -
 - (a) Alice Lynne Chamberlain was convicted on a charge of murdering her daughter Azaria at Ayers Rock on 17 August 1980; and
 - (b) Michael Leigh Chamberlain was convicted of being an accessory after the fact to that murder.
2. Doubts or questions have arisen as to their guilt or as to evidence in the trial leading to their conviction.

BE it enacted by the Legislative Assembly of the Northern Territory of Australia, with the assent as provided by the *Northern Territory (Self-Government) Act 1978* of the Commonwealth, as follows:

1. SHORT TITLE

This Act may be cited as the *Commission of Inquiry (Chamberlain Convictions) Act 1986*.

2. DEFINITIONS

In this Act, unless the contrary intention appears -

"Commission" means the Commission of Inquiry established pursuant to this Act;

Commission of Inquiry (Chamberlain Convictions)

"Commissioner" means the Commissioner appointed under section 3;

"document" includes a book, register or other record of information, however compiled, recorded or stored;

"reasonable excuse", in relation to an act or omission by a witness or a person summoned as a witness before the Commission, means an excuse which would excuse an act or omission of a similar nature by a witness or a person summoned as a witness before the Supreme Court.

3. ESTABLISHMENT OF COMMISSION

(1) There shall be a Commission of Inquiry having the purpose specified in section 4.

(2) The Commission shall be constituted by a judge or former judge of the Supreme Court or the Federal Court or of the Supreme Court of a State or another Territory of the Commonwealth, appointed by the Attorney-General as the Commissioner.

(3) The Attorney-General may make an appointment for the purposes of subsection (2).

4. INQUIRY AND REPORT

(1) The Commission shall, as it thinks fit, but subject to this Act, examine all persons who and all documents and things which, in the opinion of the Commissioner, are likely to be able to give or provide material information on the matters set forth in the recitals to this Act, and shall report to the Administrator on the conclusions to be drawn from the evidence and "material information received by it.

(2) In determining the nature and the scope of the inquiry the Commission shall be guided by the meaning given to like terms in subsection 475(1) of the Crimes Act 1900 of the State of New South Wales.

(3) Subject to section 12, proceedings of the Commission shall be in public but the Commissioner may exclude any person for reasons he thinks fit.

(4) The Attorney-General shall cause a copy of a report under subsection (1) to be laid before the Legislative Assembly within 6 sitting days of the Legislative Assembly after the report is received by the Administrator.

Commission of Inquirg (Chamberlain Convictions)

5. COMMISSION HAY SIT AT ANY PLACE

The Commission may sit at any place in Australia and, with the consent of the Attorney-General, elsewhere.

6. POWER TO SUMMON WITNESSES AND TAKE EVIDENCE

(1) The Commissioner may summon a person to appear at a hearing before the Commission to give evidence and to produce such documents or other things (if any) as are referred to in the summons.

(2) The Commissioner may require a person appearing at the hearing .to produce a document or other thing.

(3) The Commission may, at a hearing, take evidence on oath or affirmation and for that purpose -

(a) the Commissioner may require a person appearing at the hearing to give evidence either to take an oath or to make an affirmation in a form approved by the Commissioner; and

(b) the Commissioner, or a person so authorized in writing by the Commissioner, may administer an oath or affirmation to a person so appearing at the hearing.

7. FAILURE OF WITNESSES TO ATTEND OR PRODUCE DOCUMENTS

(1) A person served, as prescribed, with a summons to appear as. a witness at a hearing before the Commission who, witho t r so ahle excuse -

(a) fails to attend as required by the summons; or

(b) fails to attend from day to day unless excused, or released from further attendance, by the Commissioner,

is guilty of a regulatory offence.

Penalty: \$1,000 or imprisonment for 6 months.

(2) A person appearing as a witness at a hearing before the Commission who, without reasonable excuse, refuses or fails to produce a document or other thing that he was required to produce by a summons under this Act served on him as prescribed or that he was required by the Commissioner to produce, is guilty of a regulatory offence.

Penalty: \$1,000 or imprisonment for 6 months.

Commission of Inquiry (Chamberlain Convictions)

(3) It is a defence to a prosecution for an offence against subsection (2) constituted by a refusal or failure to produce a document or other thing to the Commission if it is proved that the document or other thing was not relevant to the matters into which the Commission was inquiring.

8. PENALTY FOR REFUSING TO BE SWORN OR TO GIVE EVIDENCE

A person appearing as a witness before the Commission who refuses to be sworn or to make an affirmation or to answer a question relevant to the inquiry put to him by the Commissioner is guilty of a regulatory offence.

Penalty: \$1,000 or imprisonment for 6 months.

9. SELF-INCRIMINATION

(1) It is not a reasonable excuse for the purposes of section 7(2) for a person to refuse or fail to produce a document or other thing that he was required to produce at a hearing before the Commission that the production of the document or other thing might tend to incriminate him.

(2) A person is not entitled to refuse or fail to answer a question that he is required to answer by the Commissioner on the ground that the answer to the question might tend to incriminate him.

10. ARREST OF WITNESS FAILING TO APPEAR

(1) If a person served with a summons to attend the Commission as a witness fails to attend the Commission in answer to the summons, the Commissioner may, on proof by statutory declaration of the service of the summons, issue a warrant for his apprehension.

(2) A warrant issued under subsection (1) shall authorize the apprehension of the witness and his being brought before the Commission, and his detention in custody for that purpose, until he is released by order of the Commissioner.

(3) A warrant issued under subsection (1) may be executed by a member of the Police Force or a member of the Australian Federal Police or the Police Force of a State or another Territory of the Commonwealth, or by a person to whom it is addressed, and the member or person executing it shall have power to break and enter any premises, vessel, aircraft or vehicle for the purpose of executing it.

(4) The apprehension of a witness under this section shall not relieve him from any liability incurred by him by reason of his non-compliance with the summons.

Commission of Inquiry (Chamberlain Convictions)

11. ACTS OR OMISSIONS ON DIFFERENT DAYS TO CONSTITUTE SEPARATE OFFENCES

Where a person has on any day done or omitted to do something, and his act or omission amounts to an offence against section 8, and does or omits to do the same thing at a hearing before the Commission held on some other day, each such act or omission shall be a separate offence.

12. RIGHTS OF WITNESS

(1) Nothing in this Act shall make it compulsory for a witness at a hearing before the Commission to disclose to the Commission a secret process of manufacture.

(2) If a witness at a hearing before the Commission requests that his evidence relating to a particular subject be taken in private on the ground that the evidence relates to the profits or financial position of a person, and that the taking of the evidence in public would be unfairly prejudicial to the interests of that person, the Commission may, if the Commissioner thinks fit, take that evidence in private, and no person who is not expressly authorized by the Commissioner to be present shall be present during the taking of that evidence.

(3) The Commissioner may direct that -

- (a) any evidence given before the Commission;
- (b) the contents of a document, or a description of a thing, produced before, or delivered to, the Commission; or
- (c) any information that might enable a person who has given evidence at a hearing before the Commission to be identified,

shall not be published, or shall not be published except in such manner, until the Commission specifies.

(4) A person who contravenes or fails to comply with a direction given under subsection (3) is guilty of a regulatory offence.

Penalty: \$2,000 or imprisonment for 12 months.

13. STATEMENTS MADE BY WITNESS NOT ADMISSIBLE IN EVIDENCE AGAINST HIM

A statement or disclosure made by a witness in the course of giving evidence at a hearing before the Commission is not (except in proceedings for an offence against this Act) admissible in evidence against that witness in any civil or criminal proceedings.

Commission of Inquiry (Chamberlain Convictions)

11L. POWER OF COMMISSION IN RELATION TO DOCUMENTS AND OTHER THINGS

The Commissioner or a person who is authorized by the Commissioner for that purpose,, may -

- (a) inspect a document or other thing produced before, or delivered to, the Commission or Commissioner;
- (b) retain the document or other thing for so long as is reasonably necessary for the purposes of the inquiry; and
- (c) in the case of a document produced before, or delivered to, the Commission or Commissioner - make copies of matter contained in the document, being matter that is relevant to a matter into which the Commission is inquiring.

15. EXAMINATION OF WITNESSES BY COUNSEL, &c.

A legal practitioner appointed by the Attorney-General to assist the Commission, a person authorized by the Commission to appear before it, or a legal practitioner authorized by the Commission to appear before it for the purpose of representing a person, may, so far as the Commissioner thinks proper, examine or cross-examine a witness on a matter which the Commissioner considers relevant to the inquiry, and a witness so examined or cross-examined shall have the same protection, and be subject to the same liabilities, as if examined by the Commissioner.

16. WITNESS TO BE PAID EXPENSES

(1) A witness appearing at a hearing before the Commission shall be paid a reasonable amount for the expenses of his attendance in accordance with the prescribed scale.

(2) In the absence of a prescribed scale, the Commissioner may authorize the payment of such amount as he thinks reasonable.

17. FALSE OR MISLEADING EVIDENCE

(1) A person who, at a hearing before the Commission, knowingly gives false or misleading evidence about a matter, being a matter that is material to the inquiry, is guilty of a crime.

Penalty: \$20,000 or imprisonment for 5 years.

(2) Notwithstanding that an offence against subsection (1) is a crime, the court of summary jurisdiction may hear and determine proceedings in respect of such an offence if it is satisfied that it is proper to do so and the defendant and the prosecutor consent.

Commission of Inquiry (Chamberlain Convictions)

(3) **Where**, in accordance with subsection (2), the court of summary jurisdiction convicts a person of an offence against subsection (1), the penalty that the court may impose is a fine of \$2,000 or imprisonment for 12 months.

18. BRIBERY OF WITNESS

A person who -

- (a) gives, confers, or procures, or promises or offers to give or confer, or to procure or attempt to procure, property or a benefit of any kind to, on, or for, a person, on an agreement or understanding that a person called or to be called as a witness at a hearing before the Commission shall give false testimony or withhold true testimony;
- (b) attempts by any means to induce a person called or to be called as a witness at a hearing before the Commission to give false testimony or to withhold true testimony; or
- (c) asks, receives or obtains, or agrees or attempts to receive or obtain property or a benefit of any kind for himself, or any other person, on an agreement or understanding that a person shall, as a witness at a hearing before the Commission, give false testimony or withhold true testimony,

is guilty of a crime.

Penalty: Imprisonment for 5 years.

19. FRAUD ON WITNESS

A person who practises fraud or deceit, or knowingly makes or exhibits a false statement, representation, token, or writing, to a person called or to be called as a witness at a hearing before the Commission with intent to affect the testimony of that person as a witness, is guilty of a crime.

Penalty: Imprisonment for 2 years.

20. DESTROYING DOCUMENTS OR OTHER THINGS

A person who, knowing or having reasonable grounds to believe that a document or other thing is or may be required in evidence at a hearing before the Commission, wilfully-

- (a) conceals, mutilates or destroys the document or other thing;
- (b) renders the document or other thing incapable of identification; or

Commission of Inquiry (Chamberlain Convictions)

(c) in the case of a document, renders it illegible or indecipherable,

is guilty of a crime.

Penalty: \$10,000 or imprisonment for 2 years.

21. PREVENTING WITNESS FROM ATTENDING

A person who wilfully prevents or wilfully endeavours to prevent a person who has been summoned to attend as a witness at a hearing before the Commission from attending as a witness or from producing anything in evidence pursuant to the summons to attend, is guilty of an offence.

Penalty: Imprisonment for 12 months.

22. INJURY TO WITNESS

A person who uses, causes, inflicts, or procures any violence, punishment, damage, loss or disadvantage to a person for or on account of his having appeared as a witness at a hearing before the Commission, or for or on account of any evidence given by him before the Commission, is guilty of a crime.

Penalty: \$1,000 or imprisonment for 12 months.

23. DISMISSAL BY EMPLOYERS OF WITNESS

(1) An employer who dismisses an employee from his employment, or prejudices an employee in his employment, for or on account of the employee having appeared as a witness at a hearing before the Commission, or for or on account of the employee having given evidence before the Commission, is guilty of a regulatory offence.

Penalty: \$1,000 or imprisonment for 12 months.

(2) In a proceeding for an offence against subsection (1), it shall lie on the employer to prove that an employee shown to have been dismissed or prejudiced in his employment was so dismissed or prejudiced for some reason other than the reasons mentioned in subsection (1).

24. CONTEMPT OF COMMISSION

(1) A person who -

(a) wilfully insults or disturbs;

(b) interrupts the proceedings of;

(c) uses insulting language towards;

(d) by writing or speech uses words false and defamatory of; or

(e) is in any manner guilty of a wilful contempt of,

Commission of Inquirg (Chamberlain Convictions)

the Commission, is guilty of an offence.

Penalty: \$200 or imprisonment for 3 months.

(2) The Commissioner shall, in relation to an offence against subsection (1) committed in the face of the Commission, have all the powers of a Judge of the Supreme Court sitting in open court in relation to a contempt committed in the face of the court, except that any punishment inflicted shall not exceed the punishment provided by subsection (1).

25. INCIDENTAL POWERS

In addition to any other powers it or he may have under this or any other Act or under a law of the Commonwealth or a State or another Territory of the Commonwealth, the Commission and the Commissioner have, respectively, in relation to a hearing conducted or to be conducted for the purposes of this Act, except to the extent that the MRttPr is specifically provided for under this Act, all the powers of the Supreme Court and a Judge of the Supreme Court in that Court's criminal jurisdiction, including the power to order the disposal of documents or other things produced before, or delivered to, the Commission or the Commissioner.

26. PROTECTION TO COMMISSIONER, &c.

(1) The Commissioner shall, in the exercise of his powers and performance of his functions as Commissioner, have the same protection and immunity as a Judge of the Supreme Court.

(2) Every witness summoned to attend or appearing at a hearing before the Commission shall have the same protection and shall, in addition to the penalties provided by this Act, be subject to the same liabilities in any civil or criminal proceeding, as a witness in a case tried in the Supreme Court.

(3) A legal practitioner assisting the Commission or appearing on behalf of a person at a hearing before the Commission has the same protection and immunity as a barrister has in appearing for a party in proceedings in the Supreme Court.

27. COMMISSION MAY HAVE CONCURRENT FUNCTIONS AND POWERS UNDER COMMONWEALTH ROYAL COMMISSION

If with the consent of the Attorney-General, a function or power is conferred on the Commission or the Commissioner by the Governor-General, the Commission or the Commissioner may perform that function or exercise that power in conjunction with the performance or exercise by it or him, as the case may be, of a function or power under this Act.

Commission of Inquiry (Chamberlain Convictions)

28. REGULATIONS

The Administrator may make regulations, not inconsistent with this Act, prescribing matters -

- (a) required or permitted by this Act to be prescribed; or
 - (b) necessary or convenient to be prescribed for carrying out or giving effect to this Act.
-
-

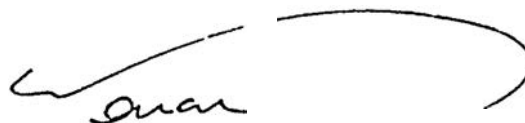
NORTH TERRITORY OF AUSTRALIA

Commission of Inquiry (Chamberlain Convictions) Act

APPOINTMENT OF COMMISSIONER

I, MARSHALL BRUCE PERRON, the Attorney-General, in pursuance of section **3(2)** and **(3)** of the *Commission of Inquiry (Chamberlain Convictions) Act*, appoint The Honourable Mr Justice Trevor Rees McInerney, a judge of the Federal Court, as the Commissioner who shall constitute the Commission.

Dated this first day of April 1986.



Attorney-General

APPENDIX B LETTERS PATENT



COMMONWEALTH OF AUSTRALIA

ELIZABETH THE SECOND, **by** the Grace of God Queen of Australia and Her other Realms and Territories, Head of the Commonwealth:

THE HONOURABLE TREVOR REES MORLING

GREETING:

WHEREAS -

- (a) on 29 October 1982, in the Supreme Court of the Northern Territory -
 - (i) Alice Lynne Chamberlain was convicted on a charge of murdering her daughter Azaria at Ayers Rock on 17 August 1980; and

ENTERED ON RECORD by me, in Register of Patents No. 21
this 2nd day of April 1986

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[Signature]
of the Federal Extradition Court

(ii) Micrraei teigh Chamberlain was convicted of being an accessory after the fact to that murder; and

(b) doubts or questions have arisen as to their guilt or as to evidence in the trial leading to their conviction:

NOW THEREFORE We do, by these Our Letters Patent issued in our name by our Governor-General of the Commonwealth of Australia on the advice of the Federal Executive Council and pursuant to the Royal Commissions Act 1902 and every other enabling power, appoint you to be a Commissioner to inquire into the following matters, namely, the matters set forth in paragraph (b) of the preamble to these Our Letters Patent:

AND We direct that, in determining the nature and the scope of your inquiry in accordance with these Our Letters Patent, you be guided by the meaning given to like terms in sub-section 475(1) of the Crimes Act, 1900 of the State of New South Wales:

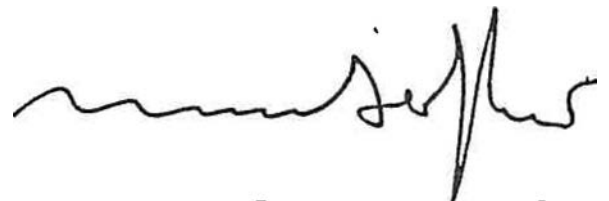
AND We declare that you are authorised to conduct your inquiry into the matters mentioned aforesaid under these Our Letters Patent in combination with the inquiry that you have been directed or authorised to make pursuant to the appointment by the Attorney-General of the Northern Territory under section 3 of the Commission of Inquiry (Chamberlain Convictions) Act 1986 of that Territory constituting you to be the Commission of Inquiry established under sub-section 3(1) of that Act:



AND We require you as expeditiously as possible to make your inquiry and to furnish to Our Governor-General of the Commonwealth of Australia a report on the conclusions to be drawn from the evidence and other material information received by you.


WITNESS His Excellency the Right Honourable Sir Ninian Martin Stephen, a member of Her Majesty's Most Honourable Privy Council, Knight of the Order of Australia, Knight Grand Cross of The Most Distinguished Order of Saint Michael and Saint George, Knight Grand Cross of The Royal Victorian Order, Knight Commander of The Most Excellent Order of the British Empire and Governor-General of the Commonwealth of Australia.

Dated 2 April 1986



Governor-General

By His Excellency's Command,



Attorney-General
for and on behalf of
Prime Minister

The advertisement was in the following terms:

"ROYAL COMMISSION OF INQUIRY INTO
CHAMBERLAIN CONVICTIONS

The Legislative Assembly of the Northern Territory of Australia, with the assent of the Commonwealth as provided by the Northern Territory (Self-Government) Act 1978 and pursuant to the provisions of the Commission of Inquiry (Chamberlain Convictions) Act 1986, and the Governor-General of the Commonwealth of Australia, by issue of Letters Patent, have established a Commission of Inquiry to inquire into doubts or questions as to -

1. The guilt of Alice Lynne Chamberlain who was convicted on a charge of murdering her daughter Azaria on 17 August, 1980.
2. The guilt of Michael Leigh Chamberlain who was convicted of being an accessory after the fact to that murder.
3. Evidence in the trial leading to those convictions on 29 October, 1982, in the Supreme Court of the Northern Territory.

The Commission of Inquiry will be constituted by the Honourable Mr. Justice Trevor Rees Morling.

NOTICE IS HEREBY GIVEN that the Inquiry will commence at Darwin on 8 May, 1986, at 10.00 a.m. to receive applications for leave to appear, to fix a date for the subsequent hearing and to deal with matters of procedure. Any person who considers that he or she has information which may assist the Inquiry should contact:-

The Secretary,
Chamberlain Commission of Inquiry,
G.P.O. Box 7091,
SYDNEY N.S.W. 2001 or

G.P.O. Box 4752,
DARWIN N.T. 5794

Telephone: (02) 234 4608
(089) 894385

JOHN FLYNN
Secretary to the Inquiry."

The advertisement appeared on 17 April 1986 in the following newspapers, with the exception of the Centralian Advocate and the N.T. News where it appeared on 18 April and 23 April respectively:-

The Sydney Morning Herald
The Daily Telegraph (Sydney)
The Age (Vic)
The Advertiser (S.A.)
The Courier Mail (Qld)
The West Australian
The Perth Daily News
The Australian
The Financial Review
The N.T. News
The Centralian Advocate (Alice Springs)
The Mercury (Tas)

Subsequent advertisements were placed in the Launceston Examiner.

APPENDIX D TOPICS AND WITNESSES

1

Some of the more important topics in respect of which evidence was given and the witnesses in relation thereto. Where a witness gave evidence on more than one topic his or her name has been included under several headings. For the sake of completeness the names of some persons whose written statements were tendered in evidence are included. The names of Mr and Mrs Chamberlain are not included.

{a) Mrs Chamberlain's mental health and her treatment of and attitude to her children

Dr Irene Milne
Shirley Bischoff
Suzanne Langen
Jennifer Bell
Noel Dawson
Insp. Robert Gray
Judith West
Breese Rickards
Lloyd Evans

Avis Murchison
Kathleen Bamberry
Jennifer Ransom
Jennifer Da Silva
Gail Dawson
Dr Eric Milne
Lorraine Balke
Marilyn Nolan

(b) Events preceding Azaria's disappearance at Ayers Rock

Noel Dawson	Gail Dawson
James McCombe	Lynette McCombe
Judith West	Catherine West
Graham Balke	Lorraine Balke
Gweneth Eccles	Jack Eccles
Florence Wilkin	Prof. John Beveridge

(c) The events of the night of 17 August 1980

Lynette Beasy	Andrew Demaine
Bernadette Demaine	Roberta Elston (nee Downs)
Edwin Haby	Gregory Lowe
Sally Lowe	James McCombe
Margaret Morris	Canst. James Noble
Judith West	William West
Alice Whittaker	Rosalie Whittaker
Vernon Whittaker	Richard Willmott
Sue Willmott	Canst. Francis Morris

(d) The search for dog or dingo tracks

Impana Collins	Daisy Walkabout
Nui Minyintiri	Nipper Winmarti
Barbara Tjikadu	Marlene Cousens
Derek Roff	Canst. Francis Morris
Edwin Haby	John Beasy
Lynette Beasy	Ian Cawood
Valerie Cawood	Debbie Connor (nee Cawood)
Peter Elston	Insp. Michael Gilroy
John Lincoln	Ian Marshall
James McCombe	Dr Robert Morrison
Canst. James Noble	Berenice Walters
Eric Foster	Susan Foster
Sally Thompson	William Ferguson
Joseph Bass	

(e) Capacity of dingoes to carry a child aged 9-1/2 weeks

Roland Breckwoldt	Dr Lawrence Corbett
Janelle Graham	Leslie Harris
Jack Love	Dr Robert Morrison
Dr Peter Murray	Dr Alan Newsome
Derek Roff	Berenice Walters
Ian cawood	

(f) Presence of dingoes at Ayers Rock at and shortly before the time of Azaria's disappearance. Prevalence of dingo attacks on children and dingo activity at Ayers Rock in August 1980.

Janelle Graham	Eric Foster Ian
Jane Foster	Cawood Phyllis
Maxwell Cranwell	Cranwell Richard
Rohan Dalgleish	Dare
Andrew Demaine•	Bernadette Demaine
Gail Dawson	Noel Dawson
Derek Roff	Hilary Tabrett
Catherine West	Lytle Dickinson
Ronald Bellingham	John Cormack
Elizabeth Fisher	Lorraine Hunter
Erica Letsch	Judith West
Roberta Elston	Sue Willmott
Peggy Chapman	

(g) The behaviour of the Chamberlains on 18 and 19 August 1980

Pastor Matthew Cozens	Norma Cozens
Geoffrey de Luca	Gregory Reid
Lytle Dickinson	Roberta Elston
Alice Whit.t.aker	Vernon Whittaker
Elizabeth Prell	Allan Barber
Sue Willmott	William Ferguson
Sally Thompson	

(h) The Chamberlains' conduct after leaving Ayers Rock

Const. Peter Buzzard	Jennifer Ransom
Pastor Matthew Cozens	Norma Cozens
Neroline Goss	

(i) Finding of Azaria's clothes at Ayers Rock

Wallace Goodwin	Const. Francis Morris
Ian Cawood	Derek Roff

(j) Statements made by Mr and Mrs Chamberlain

Insp. Michael Gilroy	John Lincoln
Insp. Graeme Charlwood	Canst. Peter Buzzard
Pastor Matthew Cozens	Geoffrey de Luca
Elizabeth Hickson	Det. Sgt. Mark Plumb

(k) Aidan Chamberlain's evidence

Det. Sgt. John Scott	Prof. Brent Waters
Aidan Chamberlain	,James Thomson
Const. Barry Graham	

(l) Vegetable material and soil found in Azaria's clothing

Dr Barry Collins	Dr Gregory Leach
David Torlach	Rex Kuchel
Dr Peter Latz	Clyde Dunlop

(m) The cause of the damage to Azaria's clothes

Allan Allwood	Prof. Randall Bresee
Prof. James Cameron	Prof. Malcolm Chaikin
Kenneth Chapman	Leslie Smith
Sgt. Frank Cocks	Prof. Ronald Fearnhead
Dr Ross Griffith	Prof. Gosta Gustafson
Arthur Hawken	Dr Barry Haschke
Dr Hector Orams	Dr William Pelton
Michael Raymond	Dr Vivian Robinson
Dr Gordon Sanson	Dr Andrew Scott
Bernard Sims	Kenneth Brown
Darryl Cummins	Raymond Ruddick
Noel Emselle	Robert Jobson

(n) The finding of foetal or any blood in Chamberlains' car

Roberta Elston	Dr Siegfried Baudner
Dr Simon Baxter	Prof. Barry Boettcher
Dr William Brighton	Findlay Cornell
Bryan Culliford	Elton Evans
Ross Evans	Leo Freney
Const. Barry Graham	Floyd Hart
Snr Sgt. Henry Huggins	Dr Anthony Jones
Joy Kuhl	Prof. Simon Leach
Patrick Legge	Keyth Lenehan
Dr Patrick Lincoln	Peter Martin
Snr Const. James Metcalfe	Prof. Richard Nairn
Prof. Orjan Ouchterlony	Det. Sgt. Mark Plumb
Michael Raymond	Peter Ross
Maxwell Scott	Ben Silk
Leslie Smith	Rowan Tew
stuart Tipple	Dr John Ziegler
Alexander Murchison	Jennifer Jones
Webber Roberts	Arnold Russell
James Fowler	

(o) Blood in tent and contents, including clothing

Merva Beaman	Peter Martin
Prof. James Ferris	Joan Hansell
James Gothard	Joy Kuhl
John Lincoln	Sally Lowe
Elizabeth Prell	Michael Raymond
Dr Andrew Scott	Hilary Tabrett
Judith West	Avis Murchison
Jennifer Ransom	Myra Fogarty
Lytle Dickinson	Norma Cozens
Insp. Michael Gilroy	Prof. James Cameron

(p) Animal hairs on articles in tent and damage to blankets in tent

Michael Raymond	Kenneth Brown
Hans Brunner	Prof. Malcolm Chaikin
Insp. Michael Gilroy	Dr Harry Harding
Sgt. Gottlieb Svikart	Myra Fogarty

(q) Nature and extent of blood loss from head injuries

Prof. Keith Bradley	Prof. James Cameron
Roland Breckwoldt	Dr Lawrence Corbett
Prof James Ferris	Dr Anthony Jones
Prof. Vernon Plueckhahn	Dr William Rose
Derek Roff	Michael Raymond
Dr Graeme Snodgrass	Vivien Moxon

(r) Stains on Mrs Chamberlain's tracksuit pants and the sleeping bag

Joan Hansell	Jennifer Ransom
Merva Beaman	Jennifer Bell

(s) Marks on the space blanket

Avis Murchison Insp.	Sgt. Irvine Brown
Robert Gray	Felicity Koentges
Alexander Murchison	Dr Paul Hopwood

(t) Religious beliefs of Seventh Day Adventists

Pastor Matthew Cozens	Jennifer Ransom
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(u) The finding of the matinee jacket

John Beasy	Jennifer Da Silva
Snr. Const.	Chief Insp.
James Metcalfe	Terence O'Brien
Sgt. Michael Van Heythuysen	

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Expert witnesses who gave oral evidence or whose written statements were tendered in evidence.

ALLWOOD, Allan John - Entomologist; Regional Director of the Department of Primary Production in Darwin.

BAUDNER, Siegfried -Production Manager, Behringwerke (Germany); Head of the Plasma Protein Research Laboratory.

BAXTER, Simon John Consultant Biologist; formerly Senior Forensic Biologist at Health Commission of N.S.W.

BEVERIDGE, John Paediatrician at Prince of Wales Children's Hospital, Sydney.

BOETTCHER, Barry -Professor of Biology in Department of Biological Sciences at University of Newcastle.

BRADLEY, Keith Campbell Neuro-surgeon; Emeritus Professor of Anatomy at University of Melbourne.

BRECKWOLDT, Ronald Dingo expert.

BRESEE, Randall Richard - Associate Professor:
Textiles - Kansas State University, U.S.A.

BRIGHTON, William Harold - Medical Practitioner;
formerly Pathologist - Health Commission of
N.S.W.

BROWN, Kenneth Aylesbury - Odontologist; Senior
lecturer in Forensic Odontology at University
of Adelaide.

BRUNNER, Hans - Senior Technical Officer employed at
the Keith Turnbull Research Institute,
Department of Conservation & Lands, Frankston,
Victoria.

CAMERON, James Malcolm - Pathologist, Professor in
Forensic Medicine at University of London at
London Hospital Medical College, U.K.

CHAIKIN, Malcolm - Professor of Textile Technology and
Pro Vice-Chancellor of University of N.S.W.

CHAPMAN, Kenneth John - Laboratory Supervisor at
Avondale College, Cooranbong; formerly Chief
Analyst at Sanitarium Health Food Company
laboratories.

COCKS, Frank Barry - Sergeant 1st Grade (Central
Police Headquarters, South Australia)
(retired). Expert in the study of tool marks
on material.

COLLINS, Barry - Geologist employed by Forensic
Science Centre, South Australia.

CORBETT, Lawrence Keith - Dingo expert. Senior
research scientist with the CSIRO.

CORNELL, Findlay Norman Consultant Clinical
Biochemist.

CULLIFORD, Bryan John - Forensic Biologist. Deputy
Director of the Metropolitan Police
Laboratory, London, U.K.

CUMMINS, Darryl Michael - Fabric Development Manager
employed by Bonds Coats Patens Ltd.

FEARNHEAD, Ronald William - Professor of Oral Anatomy,
Tsurumi University School of Dental Medicine,
Tokyo.

FERRIS, James Alexander Professor of Forensic Pathology at University of British Columbia, Canada.

FRENEY, Leo Charles Forensic Scientist; Forensic Science Department of Queensland State Health Laboratory.

GOTHARD, James Anthony Senior Analytical Chemist with the N.S.W. Health Commission, Division of Analytical Laboratories.

GRIFFITH, Ross Ernest Head of Department of Textile Technology, School of Fibre Science & Technology, University of N.S.W.

GUSTAFSON, Gosta Odontologist; Emeritus Professor in Oral Pathology, University of Lund, Sweden.

HARDING, Harry William Forensic Biologist at Adelaide Forensic Science Division.

HARRIS, Leslie Collin Dingo expert.

HORTON, Laurence Francis Formerly Head of the Forensic Laboratory of N.S.W. Department of Health.

HOSCHKE, Barry c man Assistant Chief of the Division of Textile Physics at CSIRO.

HUGGINS, Henry Gregory Senior Sergeant, Victorian Police Force. Officer-in-charge of Crime Scene Section of the Victorian state Forensic Science Laboratory.

JONES, Anthony Neal Forensic Pathologist.

KUCHEL, Rex Harold Consultant Botanist with the Technical Services Laboratory, Central Police Station, Adelaide.

KUHL, Joy Laraine Forensic Biologist employed by the Northern Territory Government in Darwin; formerly employed in the Division of Forensic Medicine at the N.S.W. Department of Health.

LEACH, Gregory John Botanist employed by the Conservation Commission of the Northern Territory.

LEACH, Simon Joshua Emeritus Professor of Biochemistry at University of Melbourne, Faculty of Medicine.

LEGGE, Patrick Technical officer with the Health
Commission of N.S.W.

LINCOLN, Patrick John - Senior lecturer in Blood Group
Serology at the Department of Haematology at
London Hospital Medical College, U.K.

MARTIN, Peter David - Deputy Director, Head of Biology
Division of the Metropolitan Police
Laboratory, London, U.K.

MILNE, Irene Medical Practitioner and gynaecologist.

MORRISON, Robert Gwydir Wildlife expert.

MURRAY, Peter Faye Curator of Anthropology of the
Northern Territory Museum.

NAIRN, Richard Charles Emeritus Professor of
Pathology and Immunology at Monash University
Medical School.

NEWSOME, Alan Eric • - Dingo expert. Senior principal
research scientist with CSIRO.

CRAMS, Hector Josiah Reader in Dental Medicine and
Surgery at University of Melbourne.

OUCHTERLONY, Orjan Emeritus Professor of
Bacteriology at Medical Faculty of university
of Goteborg, Sweden.

PELTON, William Robert Head of Home Economics,
Faculty of Food & Environmental Sciences,
Hawkesbury College of Advanced Education,
N.S.W.

PLUECKHAHN, Vernon Douglas Director of Pathology at
Geelong Hospital, Victoria.

RAYMOND, Michael Anthony - Biology Division Manager of
the State Forensic Science Laboratory,
Victoria.

ROBINSON, Vivian Noel Microscopist.

ROFF, Arthur Derek Formerly Senior Ranger at Uluru
National Park, Ayers Rock.

ROSE, William Mcintosh Physician and Pathologist.

ROSS, Peter - Analytical Chemist employed at Victorian
State Forensic Science Laboratory.

RUDDICK, Raymond Frederick Medical Photography
expert, London Hospital Medical College, U.K.

RUSSELL, Arnold Brian - Consulting analytical chemist;
Senior medico-legal chemist at the Coroner's
Court in Melbourne.

SANSON, Gordon Drummond Lecturer, Department of
Zoology, Monash University.

SCOTT, Andrew Charles Chief Forensic Biologist in
the Forensic Science Division, Adelaide.

SCOTT, Maxwell Ian Formerly Forensic Biologist with
Northern Territory Police Force.

SILK, Ben - Electrical fitter operator employed by the
N.S.W. Department of Health, Division of
Forensic Medicine.

SIMS, Bernard Grant - Forensic Odontologist; Honorary
Senior Lecturer in Forensic Odontology,
University of London, U.K.

SMITH, Leslie Norman Scientist employed by the
Sanitarium Health Food Company.

TORLACH, David Angus Agricultural Scientist,
Conservation Commission of the Northern
Territory, Land Conservation Unit.

WALTERS, Berenice Jean Dingo expert.

WATERS, Brent - Professor and Head of Department of
Child & Adolescent Psychiatry at Prince of
Wales Children's Hospital, Sydney.

ZIEGLER, John Bernard - Senior Lecturer in Paediatrics
at University of N.S.W.

ABO grouping. A system of grouping of bloods by reference to certain antigens in red blood cells. There are four main groups - A, B, AB & O. Two methods of grouping were attempted by Mrs Kuhl, the absorption/elution method, and the Lattes method.

Antibody. A protein produced in a vertebrate animal when a certain kind of substance (an antigen), which is normally foreign to its body fluids, gains access to them. The antibody combines chemically with the antigen. Antibodies tend to be highly specific, in that they combine only with antigens of a particular kind.

Antigen. A large molecule, usually a protein or carbohydrate. The specificity of its reaction is due to the structure of certain small areas (antigenic determinants or epitopes) on the surface of the molecule. These active areas evoke antibodies carrying matching structures (combining sites) that in

turn combine only with the specific active areas - a "lock and key" arrangement. When antibody meets antigen the effect is to agglutinate or precipitate the antigen.

Anti-serum. A substance produced in the blood of an animal (relevantly here, rabbits) comprising antibodies, in response to the injection of a serum, such as a pure haemoglobin. The anti-serum is then taken from the blood of the animal, purified and used to detect the presence of its antigen, namely the particular haemoglobin.

Cross-over (or counter-current) electrophoresis. A method of testing what antigens are present in a sample by exposure to specific anti-sera. A layer of gel is applied to a plate and a series of holes, in groups of two, are cut into the gel to form wells. In one of the holes in each group is placed the sample to be tested, in solution, and in the other is placed an anti-serum. A DC current is applied across the plate, causing the particles to migrate or to be carried from each well, towards either the anode or the cathode. Where the particles meet between two wells, if they constitute antigen and anti-body, a precipitin band should be formed.

Denaturation. A modification, by physical or chemical action, of the biological structure of an organic substance, especially a protein, with an alteration of some of its properties.

Electrophoresis. The migration of charged particles or ions through a gel or solution under an electric field.

Enzyme. A protein which catalyses reactions with a high degree of specificity and efficiency. Enzymes are present in all living organisms. They are classified into divisions based on the type of reaction catalysed and have the suffix "ase". e.g. phosphoglucomutase (PGM) .

Epitope. An antigenic determinant, or small area on the surface of an antigen molecule by which the antigen combines with its antibody.

Foetal haemoglobin. One of the principal types of haemoglobin found in human blood. At birth, approximately 50-80% of a baby's haemoglobin is of the foetal type. Over the next six months of life, the proportion rapidly declines and the proportion of adult haemoglobin increases so that, from about six months of age onwards, a child will have less than 1% foetal haemoglobin. The only exceptions to this are people with certain extremely rare blood diseases.

Haem. An iron-porphyrin compound which forms part of haemoglobin.

Haemochromogen test. A test for the presence of the haem molecule in haemoglobin. The sample is placed on a slide with the reagent, the slide is warmed and, over a period of a few minutes, pink crystals of pyridine haemochromogen are formed which are visible under a microscope.

Haemoglobin. Red respiratory pigment occurring mainly in red blood cells of vertebrates; a conjugated protein consisting of the iron-porphyrin compound haem, combined with the basic protein globin. Many haemoglobins are known, differing in molecular weight

and in other properties. Each animal species has a different haemoglobin. Within human blood there will be various haemoglobins, including HbA (adult haemoglobin), hbF (foetal haemoglobin) and others called HbC and HbS.

Haptoglobin. A protein occurring in the serum of the blood. If blood cells break down, haptoglobin molecules will attach themselves to the loose haemoglobins and allow them to be removed from the body.

Haptoglobin Plate. Haptoglobin can be shown to be present in a tested sample using polyacrylamide gradient gel electrophoresis, where it may appear as a separate band or bands upon a "haptoglobin plate". On such a plate, types of haptoglobin can be separated, allowing the typing or grouping of particular blood - into haptoglobin type 1 (or 1-1), type 2 (or 2-2) or type 2-1, depending upon the position of bands on the plate.

Hemastix. A presumptive or screening test for blood using tetramethylbenzidine in conjunction with cumene hydroperoxide to effect a colour change to green-blue in the presence of blood (and some other substances). It takes the form of small cardboard-like strips which can easily be rubbed upon or dipped in material suspected of carrying blood.

Iso-electric focusing (IEF). A method whereby various proteins in a sample are separated according to their iso-electric points, i.e. the pH at which each protein has no net charge and therefore will not migrate in an electric field. A stable pH gradient is established in a gel on a plate and, under the

influence of an electric field, the proteins in the sample will move so as to line up in bands at their iso-electric points. Such bands are made visible by fixing and dyeing chemicals.

Kastle-Meyer (K-M) test. A screening or presumptive test for the presence of blood relying on the oxidation by hydrogen peroxide of reduced phenolphthalein in the presence of blood (and some other substances). The presence of trace blood is signalled by a pink colour. As in the ortho-tolidine test, the K-M reagents rely on the peroxidase-like activity of the haem molecule.

Ortho-tolidine test. A screening or presumptive test for the presence of blood. Normally a dry filter paper is rubbed on the substance or surface to be tested, a drop of the reagent ortho-tolidine (dimethylbenzidine) is then added to the paper and the paper is observed for any colour development. If there is no colour development at this stage, a drop of hydrogen peroxide solution is added to the same spot on the paper and it is again observed for colour development. The presence of blood, and some other substances, is indicated by a bright blue colour which develops very quickly after the application of the hydrogen peroxide solution. The test depends upon the peroxidase-like activity, as a catalyst, of the haem molecule occurring in red blood cells.

Ouchterlony (or immuno-diffusion) test. Another method of testing what antigens are present in a sample by exposure to anti-sera. A layer of gel is applied to a plate and a series of holes are cut into the gel to form wells. Normally a central well is made, surrounded, at the same distance, by a number of other wells. The sample in solution is exposed to various

anti-sera in the adjacent wells. No use of electricity is involved. The plate is allowed to rest in a humid chamber for a period, usually 24 hours, while particles disburse from the wells through the gel. Where antigen meets antibody, a visible precipitin band should be formed.

Phosphoglucosmutase (PGM). A category of enzymes used extensively in grouping blood. Such enzymes are found in all living things and in many other cells apart from blood. Formerly, the only method for detection of the different types of PGM1 was starch gel electrophoresis, which permitted PG 1 to be divided into three types, i.e. PGM1, PGM2-1 and PGM2. These showed up as bands at three different places upon a starch gel plate. More recently, the use of iso-electric focusing has permitted ten types of PGM1 to be identified, showing up as bands at ten different positions on an iso-electric plate. In the 1 region there are the further sub-types 1+, 1+1-, 1-, within the 2-1 region there are the sub-types 2+1+, 2+1-, 2-1+, 2-1-; and in the 2 region the sub-types 2+, 2+2- and 2-.

(Polyacrylamide gradient gel electrophoresis. A method of separating out different substances in a sample depending upon their variations in molecular size. Two glass plates are taped together with a polyacrylamide gradient gel sandwiched in between. The gel acts as a molecular sieve. The samples are introduced at the top with a micro-syringe. The whole plate is suspended in a tank, and electric current is applied and the samples travel down through the gel. Where the molecules reach the size in the sieve that traps them, they remain at that level, and, after staining, show up as a band on the plate. When blood

is so tested, haemoglobins appear at the bottom of the plate and, if different haemoglobins are present, they may appear as separate bands. Haptoglobin appears at a higher level.

Precipitin tests. Tests which depend upon the precipitation of a band where antigen meets antibody, involving the use of an anti-serum to the substance sought to be detected. The ouchterlony, the cross-over electrophoresis and the tube precipitin tests are examples.

Prozone Effect. An effect which prevents a visible precipitate forming, although antigen and antibody are present. It occurs where the antigen is present in an excessive concentration compared to that of the antibody and this prevents the lattice comprising the two types of molecule from forming so as to produce a visible precipitate.

Tube precipitin test. An old test in which an anti-serum is placed in a tube and the sample to be tested is then layered very carefully with the micro-syringe over the anti-serum, so that there is no mixing between them. Where the antigens to the antibodies in the anti-serum are present in the sample, in appropriate conditions one sees a white precipitation line at the interface.