



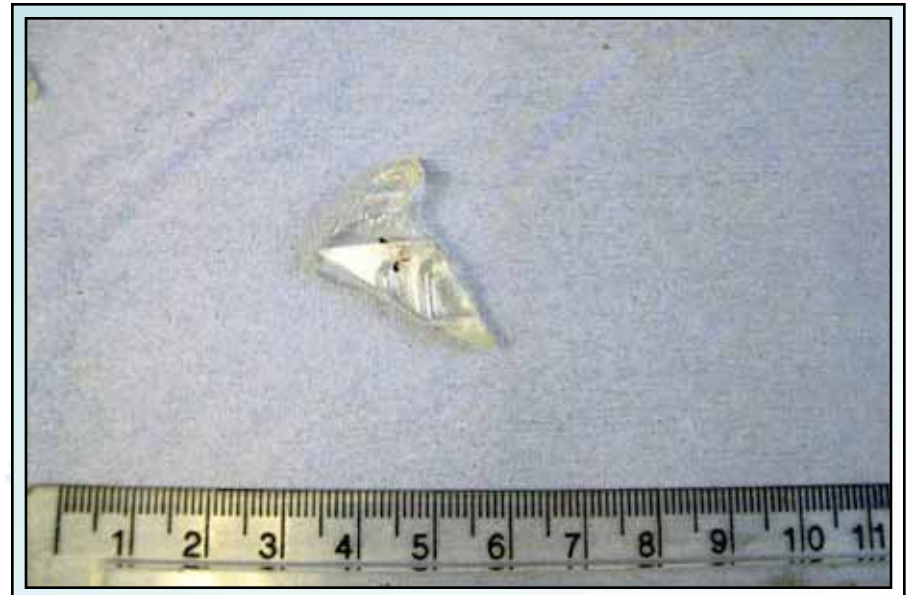
## The Interpretation of Glass Evidence within a 'Select' Population

An Incident of an Assault with a Broken Bottle in a Prison

Tom Geddes

• pioneering • innovative • responsive • accurate • reliable

# Recovered bottle glass



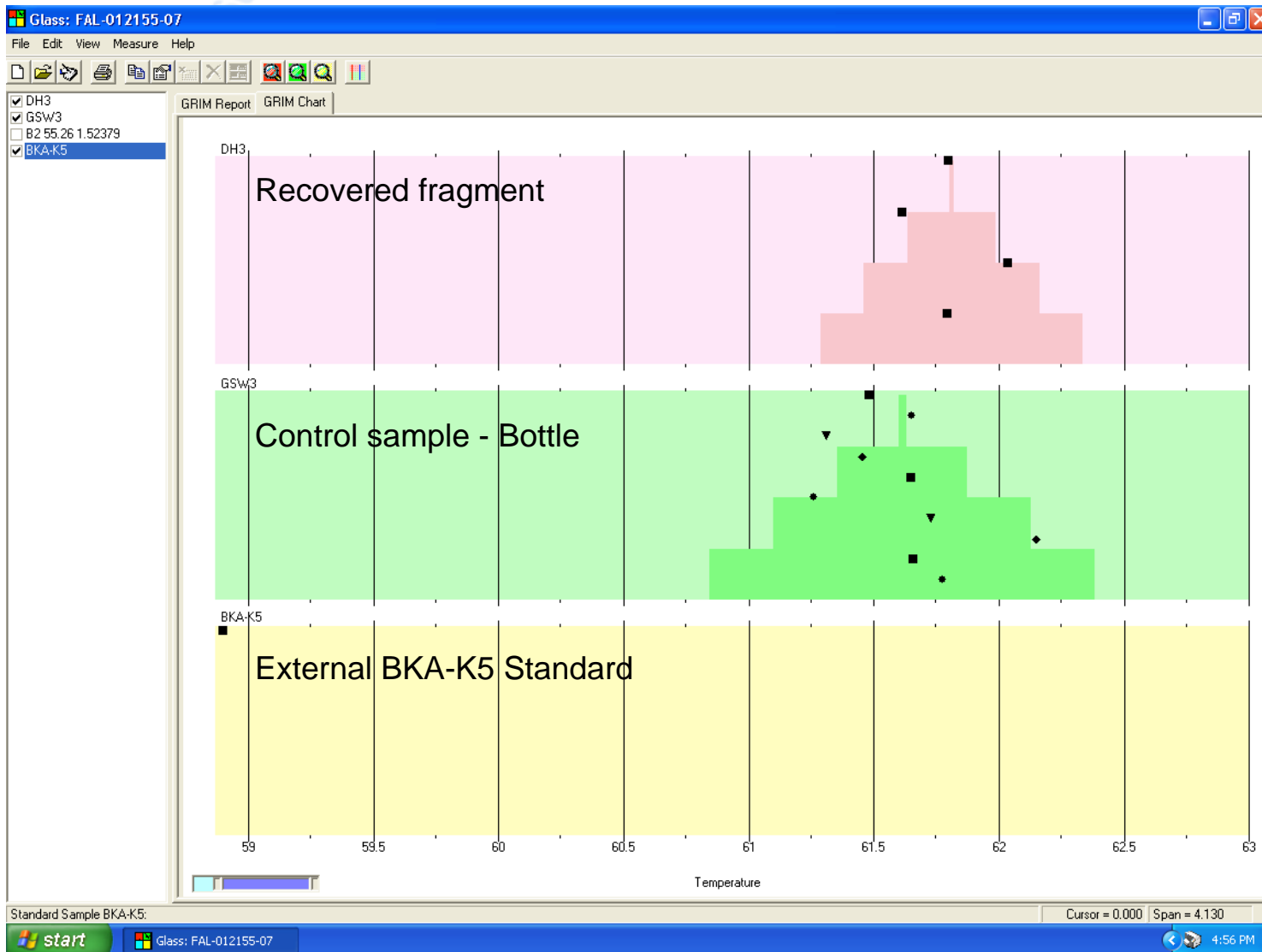
# Encona Hot Pepper Sauce



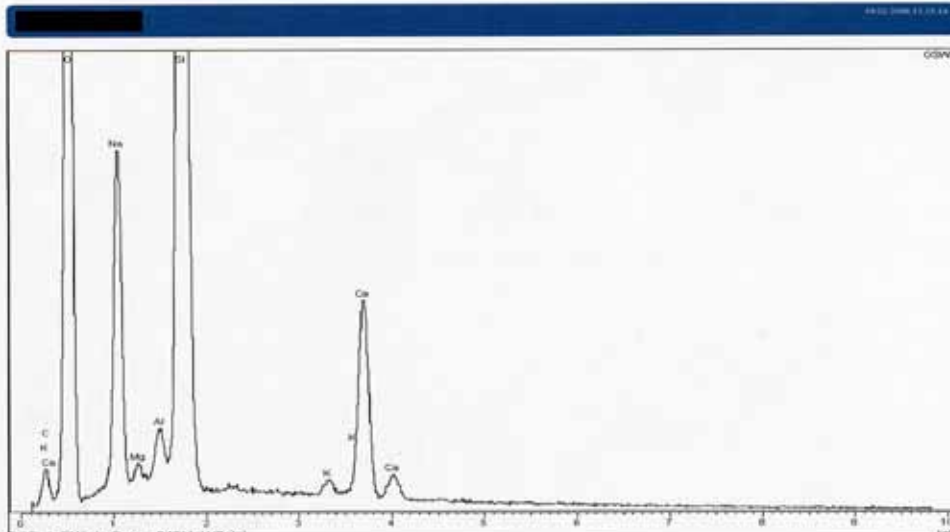
# Refractive index measurement



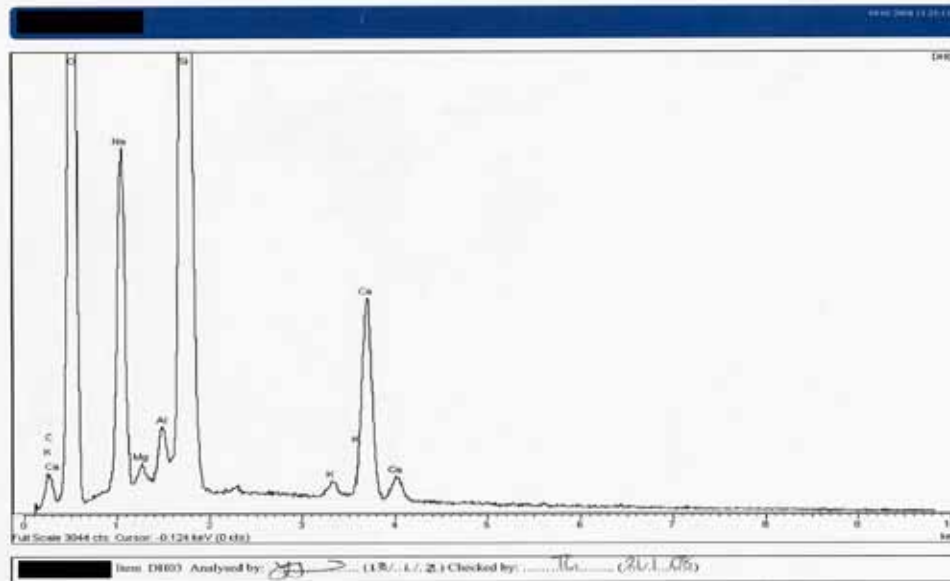
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# SEM/MPA Analysis



Control sample - bottle



Recovered fragment

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# Source Level Propositions

- The matching glass fragment originated from the broken bottle
- The matching glass fragment did not originate from the broken bottle. The fragment originated from some other, unrelated source.

# Activity Level Propositions

- Mr X smashed the bottle.
- Mr X did not smash the bottle

# Evidential scale

<b>LR</b>	<b>Verbal scale</b>
1	Inconclusive
2-10	Limited scientific support
10-100	Moderate scientific support
100-1,000	Moderately strong scientific support
1,000-10,000	Strong scientific support
10,000+	Very strong scientific support



## Source level calculation

$$LR = \frac{(G-1)!}{G!} \frac{1}{f}$$

G = Number of groups of glass

f = frequency of occurrence of matching glass.

# Prison Shop Inventory



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Prison Shop Product Range

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PL No.	Description	Price	PL No.	Description	Price
3230	Gentryck Mackerel in Tom. 125g	£0.71	3546	Go Ahead F.Fruit You Break 70g	£0.35
3232	Gentryck Mackerel in Oil 125g	£0.71	3548	Hub Nuts 300g	£0.75
3234	Princes Sardines in Tom. 120g	£0.51	3557	Taxi Spk	£1.09
3236	Princes Sardines in Oil 120g	£0.49	3563	Highland Shortbread 2x100g	£0.89
3238	Princes Pink Salmon 105g	£0.75	3564	Euro Shop. Jaffa Cakes 300g	£0.89
3240	DB Pilgrims in Tom. Sauce 425g	£0.80	3565	E.S. Choc Chip Cookies 150g	£0.59
3252	Princes Fruit Cocktail 411g	£0.70	3566	E.S. Digestive Biscuits 400g	£0.45
3264	Princes Peach Slices in Juice 415g	£0.77	GROCERIES		
3260	Prin.Pineapple Slices in Juice 227g	£0.58	3601	Kellogg's Cornflakes 500g	£1.73
3290	Princes Sweetcorn 340g	£0.51	3604	Kel. Crunchy Nut C.Flakes 375g	£1.90
3308	Heinz Baked Beans 415g	£0.55	3612	Kellogg's Special K - 375g	£2.35
3309	H.S. Baked Beans 420g	£0.37	3616	Nestle Pick-a-pack Cereal Spk	£1.18
3311	Euro Shop. Baked Beans 420g	£0.25	3617	Nestle Cheerios 375g	£1.59
3318	Natco Oats 400g	£0.90	3619	Wheaties 12's	£1.90
3334	Princes Chopped Ham/Pork 170g	£0.65	3622	Shredded Wheat 12's	£1.55
3340	Ship Corned Beef 340g	£0.95	3631	Alpen 750g	£2.95
3342	Robens Corned Beef 340g	£1.92	3634	MFlave Superfast Oats 500g	£0.47
3362	Robens Chicken Luncheon 200g	£1.40	3637	Reade Bkx 250g	£0.98
3368	Princes Hot Dogs 400g	£0.70	3639	Outac Simple Variety Pack	£1.55
GROCERIES			GROCERIES		
3400	Bake Cake	£1.08	3660	C&B Cup Soup Tomato 4pk	£0.68
3418	Chocolate Muffins 3 pk	£0.90	3652	C&B Cup Soup Chicken 4pk	£0.68
3422	Fernhouse Loaf Cakes	£1.13	3667	H.S. Pickled Onions 220g	£0.79
3424	Plepacks (Apricot) 4 Pack	£0.95	3679	C&B Branston Pickle 360g	£1.06
3426	Puri - Spicy 8's	£1.29	3683	Patok Cash Pickle 385g	£1.82
3427	Garlic Pittas Spk	£0.61	3682	Natco Mango Chutney 340g	£1.39
3428	Plain Chapatis 8's	£1.29	3696	Natco Mixed Pickle 300g	£1.49
3429	Spicy Chapatis 4's	£1.29	3700	Natco Chili Pickle 300g	£1.39
3430	Screen Matt Loaf	£0.63	GROCERIES		
3433	Ryvita Crispbread 200g	£0.64	3701	Robertson Strawberry Jam 227g	£0.89
3436	H.S. Cream Crackers 200g	£0.32	3705	Stute Diabetic Jam 400g	£1.68
3448	Jetsica Bun	£1.18	3713	Robertsons Lemon Curd 205g	£1.11
GROCERIES			3725	H.S. Pure Clear Honey 454g	£2.79
3474	Tate & Lyle Sugar 1kg	£0.50	3732	Heinz Tomato Ketchup 400g	£1.34
3482	Sweetest Sweeteners 1000s	£1.00	3736	H.S. Brown Sauce 490g	£0.85
GROCERIES			3740	H.S. Salad Cream 440g	£0.79
3500	Crawfords Bourbon Creams 150g	£0.45	3744	H.S. Mayonnaise 500ml	£1.46
3503	Crawfords Custard Creams 150g	£0.45	3746	Hellmans Mayos 200g	£1.12
3506	Crawfords Choc Digestives 500g	£1.00	3754	H.S. Mint Sauce 186g	£0.52
3509	Crawfords Jam Rings 120g	£0.49	3781	L&P Worcester Sauce 150ml	£1.08
3512	Crawfords Fig Rolls 150g	£0.59	3812	* Encona Hot Pepper Sauce 142ml	£0.89
3518	H.S. Ginger Nuts 300g	£0.65	GROCERIES		
3521	H.S. Coconut Rings 300g	£0.59	3650	Sewadee Chick Choc Noodles 85g	£0.29
3524	H.S. Fruit Shortcake 200g	£0.55	3653	Sewadee Beef Cas. Noodles 85g	£0.29
3526	H.S. Choc Chip Cookies 200g	£0.59	3656	Sewadee Curry Noodles 85g	£0.29
3531	Orange Milk Choc Digestives 300g	£1.09	3662	Sewadee Spicy Tom. Noodles 85g	£0.29
3533	McVities Rich Tea 300g	£0.75	3665	Sewadee Prawn Noodles 85g	£0.29
3536	McVities Digestives 400g	£0.82	3666	Ko-Lee Noodles - Choc Melo - 85g	£0.35
3538	McVities Jaffa Cakes	£0.96	3667	Munch & Crunch - Hot & Spicy - 85g	£0.35

Robertson Strawberry Jam 227g	£0.89
Stute Diabetic Jam 430g	£1.68
Robertsons Lemon Curd 326g	£1.20
H.S Pure Clear Honey 454g	£2.79
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H.S Mint Sauce 186g	£0.52
L&P Worcester Sauce 150ml	£1.08
Encona Hot Pepper Sauce 142ml	£0.89

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# Activity Level Propositions

- Mr X was in close proximity when the bottle smashed.
- Mr X was not in close proximity when the bottle smashed.

# Activity Level Propositions

- Mr X smashed the bottle.
- Mr X did not smash the bottle

## Activity level calculation

$$LR = \frac{(G-1)!}{G!} \frac{P_{G-1}}{P_G} \frac{T}{f \cdot S}$$

G = Number of groups of glass.

P = Probability of the presence of a particular number of groups of glass.

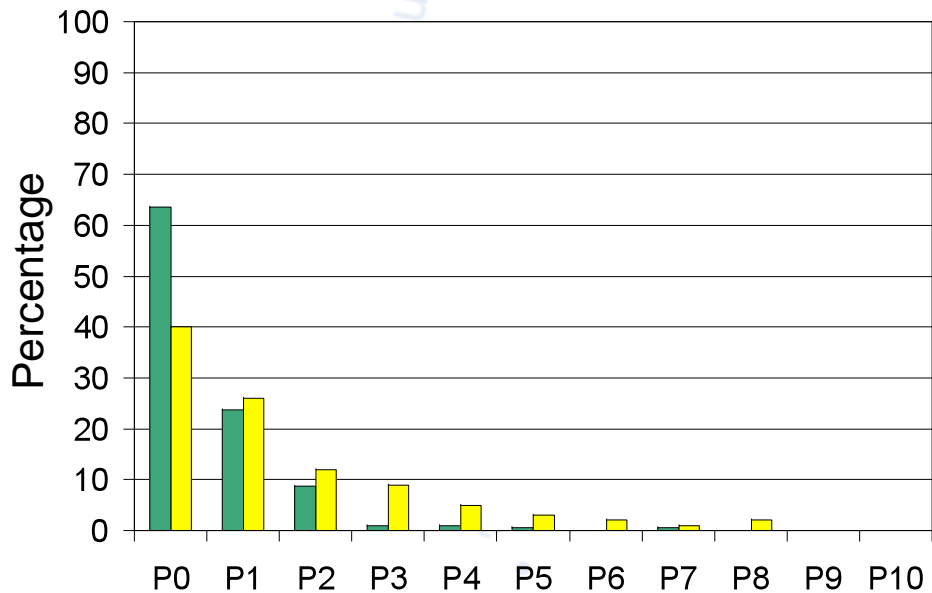
S = Probability of finding a group fragments of this size.

T = Probability of transfer, persistence and recovery  
of the group of glass fragments.

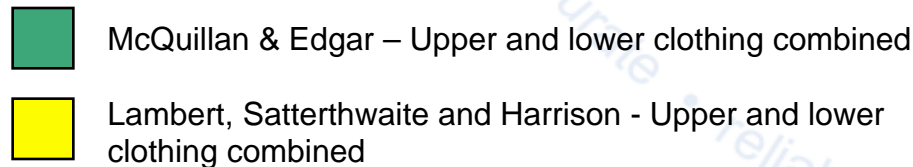
f = Frequency of occurrence of matching glass.

# Population Surveys

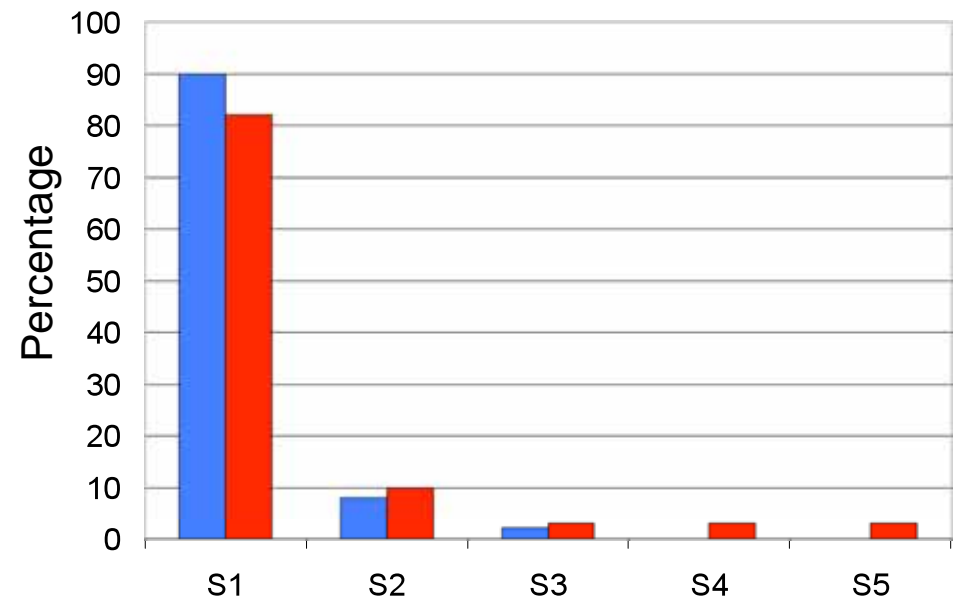
Number of groups of glass per individual



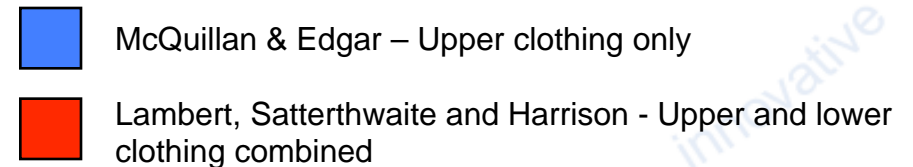
Number of groups found



Distribution of the size of groups of fragments



Number of fragments per group



SA Coulson, AB Gummer, CM Triggs and JS Buckleton. Glass on clothing and shoes of members of the general population and people suspected of breaking crimes. *Science & Justice*; 2001;41;39-48

## Activity level calculation

$$LR = \frac{(G-1)!}{G!} \frac{P_{G-1}}{P_G} \frac{T}{f \cdot S}$$

G = Number of groups of glass.

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T = Probability of transfer, persistence and recovery  
of the group of glass fragments.

f = frequency of occurrence of matching glass.

# Transfer and Persistence



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## Conclusion

*“In my opinion, my findings provide some support for the proposition that the glass fragment originated from the broken bottle. However, I am unable to quantify my findings.”*

# Acknowledgments



- *Dr Tina Lovelock*
- *Rachel Hewetson*
- *LGC Forensics Marks and Trace Team*

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