THE “LIP PRINT”

Is this a lip print?
Is the size, shape and location of this print consistent with a lip print on a drinking glass?

For the sake of greater clarity Folien 1 has been modified to show the “lip” print only. The print itself was not modified.
For this to be a lip print left on a drinking glass, the white line needs to be the top edge (rim) of the glass. However, as it has been conclusively proved in the section on the lines, the white line could not be a representation of the rim of a perfectly round drinking glass. This white line resembles something closer to a parabolic curve and it needs to be a circular curve to have been lifted off a round glass. On this point alone it is impossible for this to be a lip print on a drinking glass. But we’ll investigate and see if it is a lip print altogether.

Please study our section on the LINES of Folien 1 in the “EXPLANATION OF THE LINES ON FOLIEN 1” on the enclosed CD. This explains in great detail why the top line (and bottom line) could not have been produced by a conical and round drinking glass’ edges. Although it creates that general impression, the top white curved line in this image (Folien 1) does not represent the top rim of a drinking glass.
Two world renowned experts have conflicting views on this. They put the lip print on either side of their own selected right thumb print. One to the left and one to the right. As we will gather through our investigation, none is right. Mr Wertheim places the lip at the more unlikely side of the thumb. Tests will show over and over again that with normal handling of a glass while drinking from it, the lip print will sit more in line and even slightly more to the right of the right thumb print. Mr Zeelenberg, that is not a thumb print to start off with, sorry. IF it was, just for the sake of the argument, one would also then need to ask why not two lip prints (he reckons both these are thumb prints of the same thumb)? Where is the second set of right prints? Thus two touches (ten possible prints) with the right hand but still no other right fingers’ prints anywhere on Folien 1? – prints that could be lifted with a second lift? Why would they not have recorded just as clearly as the left prints? Why would a lifter then just leave them?
Give or take 5 mm, this image of the accused’s mouth is more or less on scale. Exact scale is not that important, it can be established that adult males have a total oral width (TOW) of about 45-60 mm. The accused’s TOW can be any size in this range, we simply want to demonstrate the principle of what could be expected in terms of the size and shape of a lip print on a drinking glass. Later we will do some practical tests and see in real life what happens to a lip when it touches a drinking glass during drinking action. Throughout we will conclusively show that the print on Folien 1 is too flat to be a lip print of any kind on any surface.

Red line: Normal action would leave about a 40 mm print
Yellow line: Glass rim will have to go from mouth edge to mouth edge – and therefore deep into mouth to produce a 50 mm print
What happens when a drinking glass touches the lower lip and pout?

(TOW measurements random, only to illustrate principle)

In principle the total oral width will lose about 30% in the print because the glass rests only on a part of the lip and the glass curves away from the lip.

Glass rests slightly on pout

Total oral width 60 mm

Print’s size 40 mm

whole lower lip

VIEW FROM “ABOVE”
Put the glass in a bit deeper

If you press the glass deeper in over the lip, the print’s width will slightly increase but the shape will become even more bulb-like and in ratio wider.

Thus, the width and depth of the print will both slightly increase but it stays in aspect ratio. As we will establish, this aspect ratio would be more or less 0.45. Thus the depth is always more or less half of the width, doesn’t matter how deep you put the glass in your mouth.
Width/Depth ratio comparisons

We have looked at tens of glass prints on the internet and also looked at our own prints, and looked at the width/depth aspect ratio where the depth is divided by the width. Please see this aspect ratio to the top left of each image. (E.g. if a print's width is 50 and the depth 25, it gives a 0.5 ratio.) In simple terms it means the print is half as deep as it is wide.

Note that because we work with ratios the scale in each photo is not important. The aspect ratio of each photo was not changed.

The print stops here and that means the end of that “lip” and therefore it can be considered to be the top end line of the print. Thus the depth measurement is taken from that line downwards and not from the rim.

In order to compensate for the curve we added 5 mm to width (determined to be accurate enough)
40/77 = 0.51

Lift by qualified independent fingerprint expert

19/77 = 0.24
In order to compensate for the curve we added 5 mm to width (determined to be accurate enough)

\[
\frac{47}{101} = 0.43
\]

\[
\frac{55}{112} = 0.47
\]

\[
\frac{19}{77} = 0.24
\]
This clearly shows statistically that the “lip” print on Folien 1 print is too flat to be consistent with a lip print. A lip print on a drinking glass will have a width/depth ratio of about 0.4 to 0.5. And not 0.24 like the print on Folien 1.
Let’s get **inside** the glass for a better view on the lip touch

Broken part of 85 mm high 75 mm dmtr tumbler

85 mm high 75 mm dmtr tumbler
TOW about 45-50 mm

Cover lower lip COMPLETELY with Aluminium powder
Put broken part of glass on lip just as you would a normal glass when taking a sip. No excessive pressure. Just resting on pout.
Even if you put glass deeper over lip in to get wider width, the ratio of 0.45 stays more or less the same.

5 mm added for curve

25/55 = 0.45

As deep as can go, rim touches mouth corners

5 mm added for curve

30/65 = 0.46
These photo’s are not on exact scale and one is a photo and one a lift, but the difference in shape is clear.

If you doubt this result, PLEASE repeat this test yourself. This lift, illustrating this shape, will be confirmed over and over again.

It might be a bit bigger or a bit smaller, but the width/depth ratio will stay between 0.4 and 0.5.
Not even a lip on a flat surface would produce such a flat print as the F1 print.

Even on a flat surface the aspect ratio will be around 0.45. It is all in the pout!

The so-called lip print on F1 is not a lip print at all. Neither a lip print on a drinking glass nor on a flat surface.
What type of lip print does the accused have? If it is a lip print.

Using Suzuki and Tsuchihashi’s (1970) classification of lip prints

Type 1: Vertical grooves across the lip

Type 1': Partial length grooves of Type 1

Type II: Branched grooves

Type III: Intersecting grooves

Type IV: Recticular grooves

Type V: Other patterns

Can you see ANY grooves in this print on Folien 1?

NO MATCH FOUND!
The history of the “lip print” theory

Mr Daan Bekker didn’t say a word about the “lip print”. Supt Dixon and Mr Wertheim did absolutely nothing to prove that it is a lip print. They just said it looked like a lip print (“consistent with”). The only expert trying to explain why it is a “lip print”, was Mr Zeelenberg, who on 16 Aug 2007 admitted on the stand that he is not a lip print expert. However, Mr Zeelenberg had an odd explanation for the sloped nature of the lip print. And an explanation for about everything else too.

But what was especially interesting was Mr Zeelenberg’s explanation for the absence of creases in the print. He said that the lip was put on a condensed glass. But on the photos in his report (below) it is clear that condensation would not go that far up, unless the glass was filled up to the brim. Impossible? Surely not. But how would you approach and handle such a glass when you are planning to drink with a sloped lip as well? Try it.

It would have spilled and it would have had a devastating effect on e.g. the dried drops marks, dissolving them, and possibly other prints as well. There is no indication that there was ever widespread wetness or damp or condensation on the substrate that Folien 1 was lifted from.

Photos of two condensed glasses from Mr Zeelenberg’s own report (Slide 58 Part 2)
Why would this print NOT have any grooves or wrinkles?

Mr Wertheim reckons it is because the lip was “excessively wet”. Wet lip, dry surface.

Mr Zeelenberg said condensation obliterated the creases. Wet surface, dry lip.

Which one is it now?

**Question to Mr Wertheim:** Under what circumstances would your lip be so “excessively wet” before you take a sip? It is reasonable to assume that you put the glass on and over the lip and that the water runs over your lower teeth into your mouth. The water does not run back underneath the glass and between the glass and the lip.

**Question to Mr Zeelenberg:** So if we understand correctly. Condensation ruined the creases of the lip print but not that of for example the right thumb print? Why was for example the right thumb print, only centimeters away, not ruined?

This part of the glass would also only have had condensation if the glass was filled to the brim. Condensation does not occur above the water line (thus above where the water touches the glass surface). If you fill the glass to the rim, imagine the spillage if you then drink with a 10 degree sloped lip? Any case, doing one or both would be highly unlikely and irregular behaviour.
Why this print was made by LATEX and not by human skin (such as by a lip)

As we convincingly show, the print was made by latex and not by human skin. As we have already shown, it is not a lip print. It failed being consistent with a lip print in terms of size, shape, texture and position. We will now look at the possibility of either the right index finger as the source of the print. We show that the contact source was wet latex and not human skin (lip) during the dusting process.

“Wet latex” simply means a non-porous glove with a thin layer of some sort of fluid on it (e.g. water or sweat). This does not mean the whole glove was wet or that it was dripping wet. We suspect only a part of the glove, notably around the right index finger, got e.g. sweat on.
Texture?

Results after damp latex prints were made on a DVD sleeve, as well as a lip print on glass plate. Compared with Folien 1.
Use same coloured water and one glass plate (with piece of plastic sleeve pasted on) to compare prints.
**Question:** If you look at only the texture of the prints, which one resembles the Folien 1 print in the middle the best?
How did the glove get wet?

The day of the murder had a mean humidity of 87%. A factor that neither Mr Wertheim or Mr Zeelenberg considered to use in forming their drop theories.

At the time of dusting it would have been warm already. It was summer and the humidex high. Sweat would have been a factor at the time. It would have been in the vicinity. Sweat is normally especially prevalent under gloves, and subconsciously touching on the wrist area (such as pushing a a watch strap) could get fluid (sweat) on a glove.

Imagine drops hanging from your eyebrows while you are working. Do you think that any of these actions would be impossible? Before you say no, remember we do these actions subconsciously without thinking about them as you would do now.

Obviously there are many other places where sweat could have been picked up, arms, hair, etc. These are the most probable places one could expect sweat. And surely not impossible. A (long) drinking glass with fluid in was also on the scene and was also handled in that time.
Aspect ratio / shape

Left little finger

Right index finger

Ratio: 12/49 = 0.24

Ratio: 14/57 = 0.24

Exactly the same aspect ratio as Folien 1

This means they have the same width/depth proportion: meaning they have very much the same shape

19/77 = 0.24
Size of little finger print fits print on F1 exactly, about 50 mm from side to side
There are many ways to clip a DVD between your fingers, so the possibilities are endless, but it is very likely to get a similar downward slope (of about 10 degrees) – generally matching the slope of the print on F1.
Although not exactly, there is a good resemblance in shape. The shape can depend on how tight the glove sat on the finger, the size anatomy of the specific finger.
Let us ask again, why and under what circumstances will a lip print stop here in the middle of nowhere? Why?

**End of print**

**IF a lip print is sloped and forced to end, it will look like this:**

End of the lip facing upwards not sideways downwards like on F1

Note general bulb-like shape of lip print with aspect ratio of about 0.4.

No problem if it is a finger
Position

This “lip” print sits on the more unlikely side of the right thumb print

Under normal handling considerations the lip print should have been about here in relation to right thumb

No problem if it is a finger – it can sit anywhere
Let’s recap

<table>
<thead>
<tr>
<th>Wet lip print on drinking glass</th>
<th>Damp latex gloved finger on DVD sleeve (e.g. pinky)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Texture</td>
<td>too dense and smooth</td>
</tr>
<tr>
<td>Aspect ratio</td>
<td>too flat</td>
</tr>
<tr>
<td>Shape</td>
<td>too flat</td>
</tr>
<tr>
<td>Size</td>
<td>too flat</td>
</tr>
<tr>
<td>Slope</td>
<td>should not slope</td>
</tr>
<tr>
<td>End of print</td>
<td>should not end way before rim</td>
</tr>
<tr>
<td>Position</td>
<td>wrong place</td>
</tr>
<tr>
<td></td>
<td>flaked and pimpled, very consistent</td>
</tr>
<tr>
<td></td>
<td>100% same aspect ratio</td>
</tr>
<tr>
<td></td>
<td>very consistent</td>
</tr>
<tr>
<td></td>
<td>very consistent</td>
</tr>
<tr>
<td></td>
<td>slope possible</td>
</tr>
<tr>
<td></td>
<td>end of print natural</td>
</tr>
<tr>
<td></td>
<td>print can be any place</td>
</tr>
</tbody>
</table>

Which one is the more plausible possibility?

A duster wipes his **sweaty brow** with his fingers and subsequently **clamps** a DVD cover between two of his **gloved fingers** while handing the cover to a colleague (or receiving it from someone). The print dries quickly and gets dusted and lifted with the other prints.

A person drinks with an **excessively wet lip** from a glass leaving a **sloped print** AND on the **wrong side of the thumb** AND with the **print stopping suddenly**? Or drinks from filled-to-the-brim glass with a sloped lip?

Just to answer a question: Why didn’t the print smudge with dusting? As test would confirm, a wet glove print dries extremely quickly. In the summer (even nights) it will only take a minute or so to dry completely. If so long.
CONCLUSION

The issue around the so-called “lip print” is very alarming. It represents to a great extent how Mr Wertheim and Mr Zeelenberg went about business in this case. At the very least it tells us about the dangers of making assumptions. Admittedly the print gives a general idea of a lip. But does it really represent a lip on a drinking glass? Mr Wertheim felt that it looked to him like a lip print on the basis of its size, shape and position. Please note: It looked to him like a lip print. He then assumed it to be a lip print. He never ever ventured to test this observation. He did not compare it with either a known lip print (on a drinking glass) or with any other lip print on a drinking glass. He did not compare the shape and size of this print with any other known data on lip prints. He ascribed the position of the lip print to a very unlikely location (to the left of the right thumb print) as if that would be a normal position. He blatantly denies that the print is skew – “parallel to the edge of the glass”. He doesn’t say anything about the fact that the “lip” just stops in the middle of nowhere. And then he argues – on top of all of this – that the lip was “excessively wet”, hence no creases in it. And he does not tell us under what circumstances a person would have such a wet lip.

Mr Zeelenberg goes a bit further, but only sets out to refute other claims. In a presentation of 208 pages, he never looks at a lip print on a drinking glass. Never. He looks at a few on flat surfaces. He never compares the print on F1 with a known or any other lip print on a drinking glass in terms of size and shape. Never. He never tested the latex glove possibility. Even if it was just a possibility. He makes the highly contested statement that lip prints will generally be sloped (because “the glass touches the nose when you drink and then your hand doesn’t fully compensate for it”, something in that line). He ascribes the print’s position – as being a lip print – to a print that he claims to be a right thumb print. He does not prove in any way that this print is indeed a right thumb print. He does not offer any evidence that it is a right thumb print.

Mr Wertheim and Mr Zeelenberg contradict each other on various points. They have the lip print on opposing sides of their selected thumb. Mr Wertheim denies that the print is sloped 10 degrees. He says it is “parallel to the edge of the glass”. Mr Zeelenberg says it’s normal for lip prints to be sloped. Mr Wertheim said the lip was wet and the surface dry. Hence no creases in the print. Mr Zeelenberg said it was a dry lip on a condensed surface. And that in an area which would not condense, as it is above the water line of a normally filled up glass.

Both these experts did not hunt the truth. They wanted to put the glass theory forward at all cost. And for that they needed a lip. Desperately. They wanted it so desperately that they probably started believing that it is a lip print. Ignoring fact and science. Brushing over other plausible claims. Trampling ACE-V and industry standards and regulations.

We have convincingly shown that with respect to size, shape, texture, position, etc., that the print was most possibly caused by a latex glove on a DVD sleeve and not by a human lip on a drinking glass.

See reviews on next page.
Let us look at the views and reviews of some real lip experts on the “lip print”:

Dr Noor Hazfalinda Hamzah (Expertise: Clinical Forensic) from the University of Kebangsaan in Malaysia, wrote this to us after studying our Lip Report:

Based on the pictures, I can safely conclude that the print does not suggest a lip print. After seeing many lip prints before, the creases which usually present in a lip print are absent. Even if it is believed to be a lip print with any disease or any incident that change the skin of the lips, the angle of the lip print left on the glass is not usual, and after reviewing your research, my opinion is that it is not a lip print.

Mr Sarun Arunkumar, Co-Author of the Paper: ‘Personal Identification from Lip-Print Features using a Statistical Model’*:

It’ll always be a pleasure for us to help in investigation cases as this. Our paper mainly focuses on extraction of certain features that a lip print contains, we’ll check to see if at all these features exists (in the image sent by you). Moreover we’ll try to loop in other professors in the world who work in this field. We’ll get back to you as soon as come up with some positive outcome.

And then some time later:

We tried certain algorithms on the lip print provided by you ... but couldn’t end up getting a substantial result. We would certainly forward your case to a professor in Poland as early as possible.

*This paper presents a novel approach towards identification of human beings from the statistical analysis of their lip prints. Lip features are extracted by studying the spatial orientations of the grooves present in lip prints of individuals using standard edge detection techniques. Horizontal, vertical and diagonal groove features are analysed using connected-component analysis to generate the region-specific edge datasets. Comparison between test and reference sample datasets against a threshold value to define a match yield satisfactory results.

Assoc. Prof. Dr. Balwant Rai, BDS, MS (Forensic Odontology), JBR Medicare, India; KSI, USA:

Evidences from images:
1. Creases are absent
2. Creases are usually present in different diseases and disorders, which are absent

So, it is not lip print (1).

I did an analysis of images in Adobe Photoshop by using a technique (2). I did not find any features related to lip prints while comparing with databases.

My opinion, it is not a lip print, as per scientific evidences.
Assoc. Professor (Dr.) Balwant Rai is the founder of curriculum aeronautical (2006) and space Dentistry and JBR group association of space and aeronautical dentistry (2006). He is Program Director and Associate Professor of Aeronautic Dentistry at KSI. He is working as Researcher, VU, Amsterdam. He is also a consultant and adviser of different companies. He is also the President and Founder of the JBR Institute of Health Education Research and Technology. Dr Rai has more than 100 published articles in international and national journals, has written seven books, and is Editor-in-Chief of four international journals. He is also founder of the BR formula and BR regression equation used in forensic technology.

His current work involves the effect of micro-gravity on the oral cavity, human physiology and psychology and non-invasive biomarkers, including the elaboration of technologies to prevent the adverse effects of microgravity on the human physiology including oral cavity. His biography has been published in Who's Who in Health and Medicine and Who's Who in the World, USA. He is invited Editor of Mars Quarterly. He is an invited reviewer to NRF, South Africa, reviewer of more than 10 different journals, and has seven pending patents. He is an invited reviewer of many national and international indexed journals. He was selected as part of Crew 78, Crew on the Mars Desert Research Station [MDRS] as Health and Safety Officer and appointed as Commander for 100 B and Commander 114 crew on MDRS.

He is principal investigator cum researcher on a project entitled “simulated micro-gravity and human factors including oral cavity: non invasive technology”. Dr Rai is working with different space related research projects and has been an invited judge for different space related programs.