Bike Milk® Lubrication Location & Reservoir Effect

INTRODUCTION

The bushingless bicycle chain used by almost all riders was patented by Guy Dupoyet in 1978 and assigned to Compagnie des Transmissions Mecaniques Sedis. This resulted in SEDIS chains dominating the cycling world in the 1980's because they shifted more smoothly and were both lighter and stronger than competitor chains. To assist with promotion and development the Peugeot-Esso-Michelin pro team used the SEDIS bushingless chains in the 1978 Tour de France.

FIG. 15

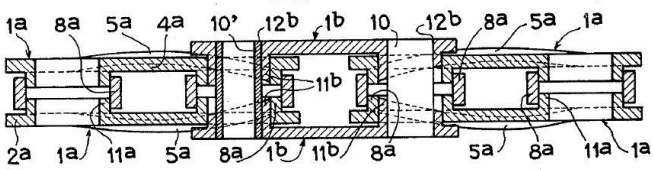
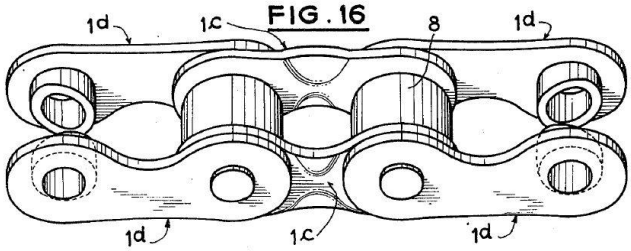
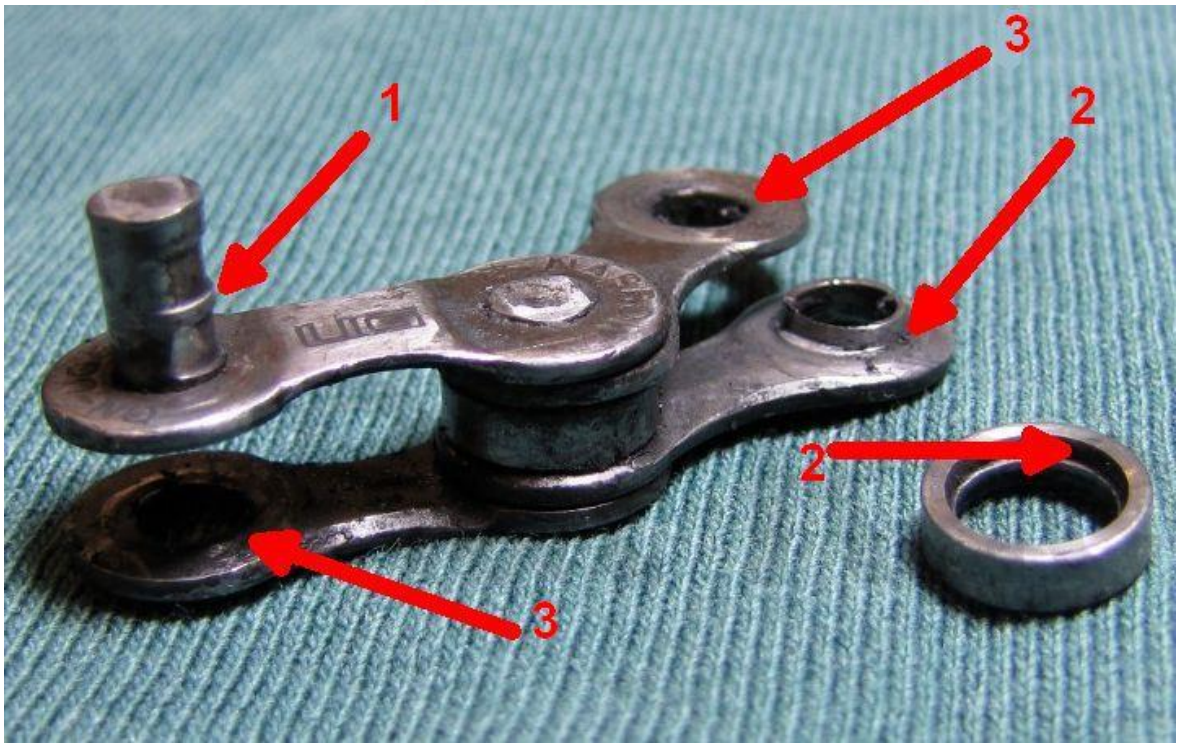


FIG. 16



In the US patent Dupoyet used the following descriptions for the most important parts of his invention: 1^c inner plates; 1^d outer plates; 8 roller; 10 spacer members (solid or hollow pins); 11 cylindrical spigots. The pins are riveted through the outer plates at point 12^b and do not rotate at that point. Not much has changed in the basic design although some chains are now narrower to match the increased number of cogs on the cassette.

Despite the market domination of the invention SEDIS struggled as a business and were bought by Mannesman in 1987, rebranded as SACHS in about 1991 and then in 1997 the bicycle parts division of SACHS was sold to SRAM. Shimano adopted the Dupoyet design as soon as the patents expired.

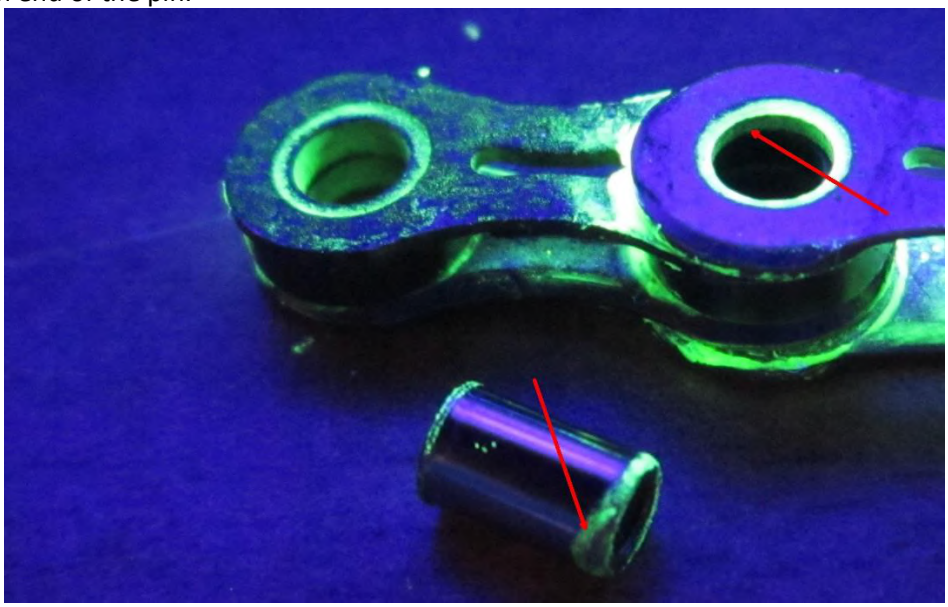


It is well understood that the three areas area where most chain wear occurs are **1)** between the outside of pins and the inside of the spigots, **2)** between the outside of the spigots and the rollers, **3)** between the outer plates and the inner plates. These are the areas which require most effective lubrication.

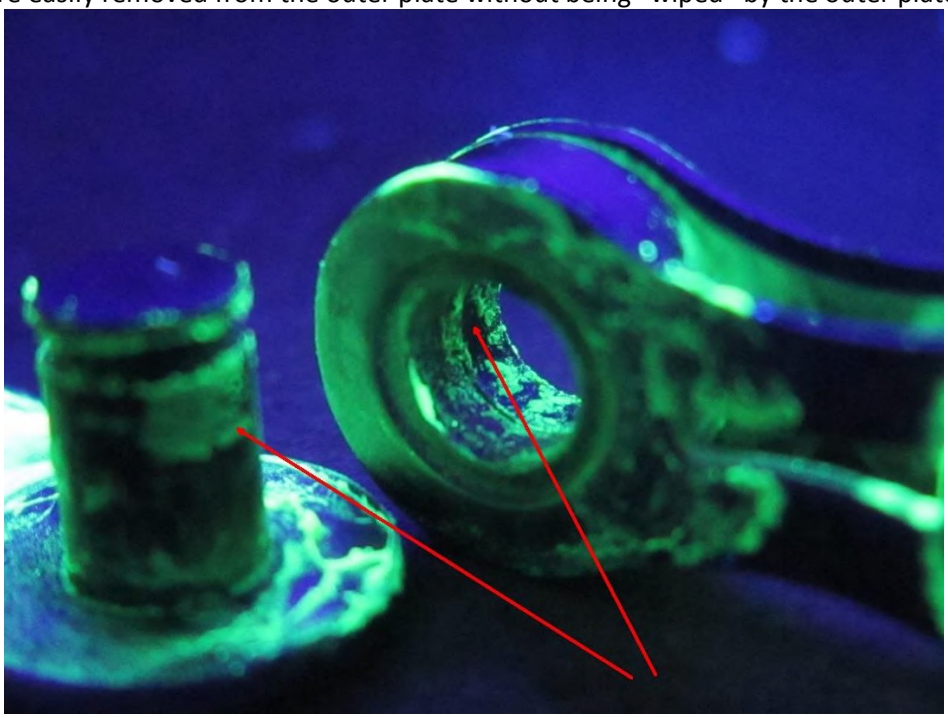
Ride Mechanic dry lubricant **Bike Milk** can easily penetrate and fill the gaps between the rollers, pins, spigots and plates. The carrier solvent then evaporates over time and leaves a thin and tenacious protective film of dry lubricant coating in the 3 areas where it is required. Investigations by **Ride Mechanic** have shown that after thorough chain conditioning each spigot/plate/roller link is coated with 10mg of dry lubricant. To demonstrate the performance in more graphic detail, **Bike Milk** was formulated with a highly fluorescent dye which can be energised under a UV light to become visible. **Bike Milk** was then applied onto a clean, fully degreased and dry Ultegra 10 speed CN6701 chain as per label directions (apply-leave, apply-leave, wipe). With the UV active dye it was very easy to identify where the lubricant film locates and bonds. **Note:** this example was not wiped down and excess unnecessary film residue is evident on surface. The excess was wiped off for other photos.

1) BETWEEN THE OUTSIDE OF THE PINS AND INSIDE OF SPIGOTS

Lubrication coating in this area was difficult to show in this investigation as it is impossible to photograph the area without removing the pin by chain breaker and the pin is forced through the outer plate. This extrusion squeezes the film off the outside of the pin and the pin comes out "wiped" clean. **Bike Milk** film can be seen on the inside surface of the outer link rivet contact point and at each end of the pin.

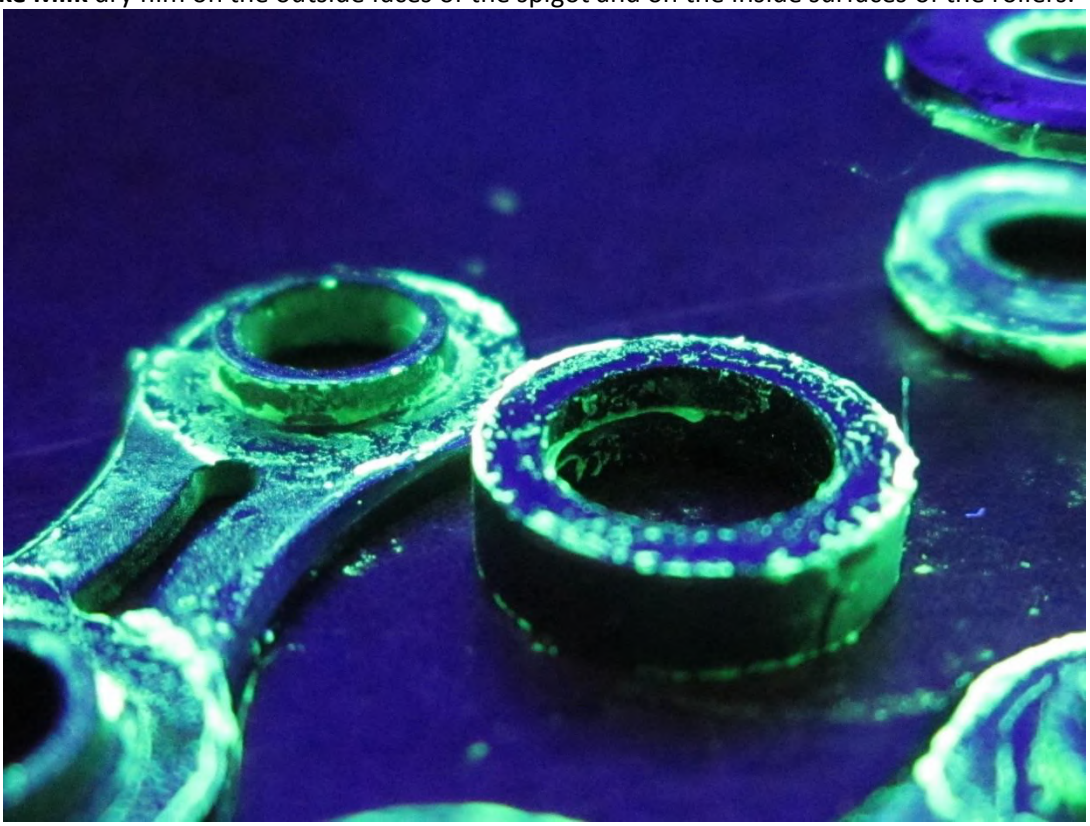


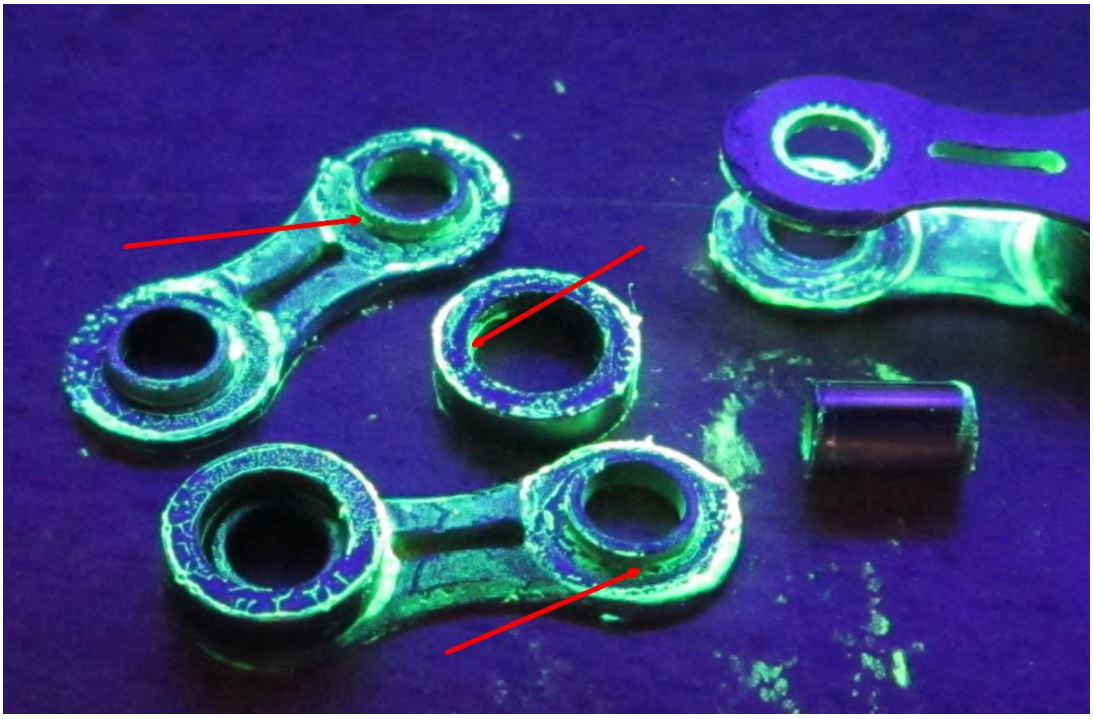
Investigating a master link does not give a perfect indication of what happens inside the standard pins/spigots of a chain as it is a much looser linkage. However, it does provide a useful indication of **Bike Milk** penetration to the innermost chain cavities. The benefit to using a master link is that it can be more easily removed from the outer plate without being "wiped" by the outer plate.



2) BETWEEN THE OUTSIDE OF THE SPIGOTS AND THE ROLLERS

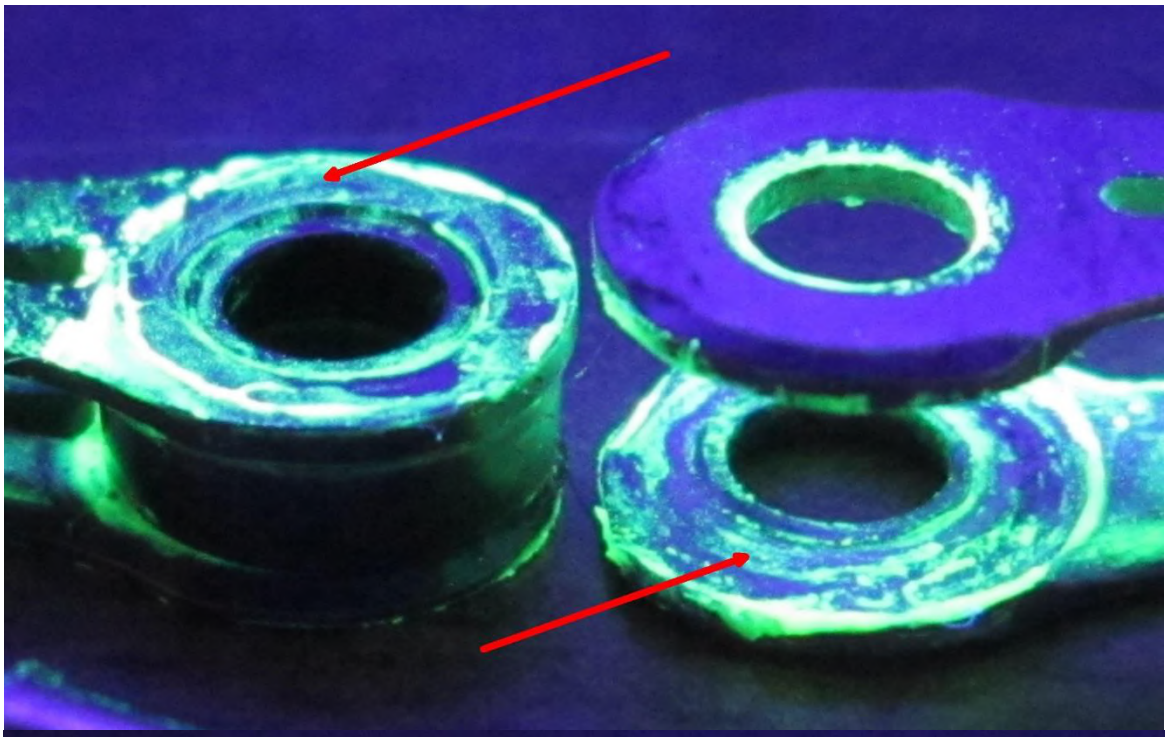
This area of the chain can be quite easily seen when it is separated. There is a very thorough coating of **Bike Milk** dry film on the outside faces of the spigot and on the inside surfaces of the rollers.

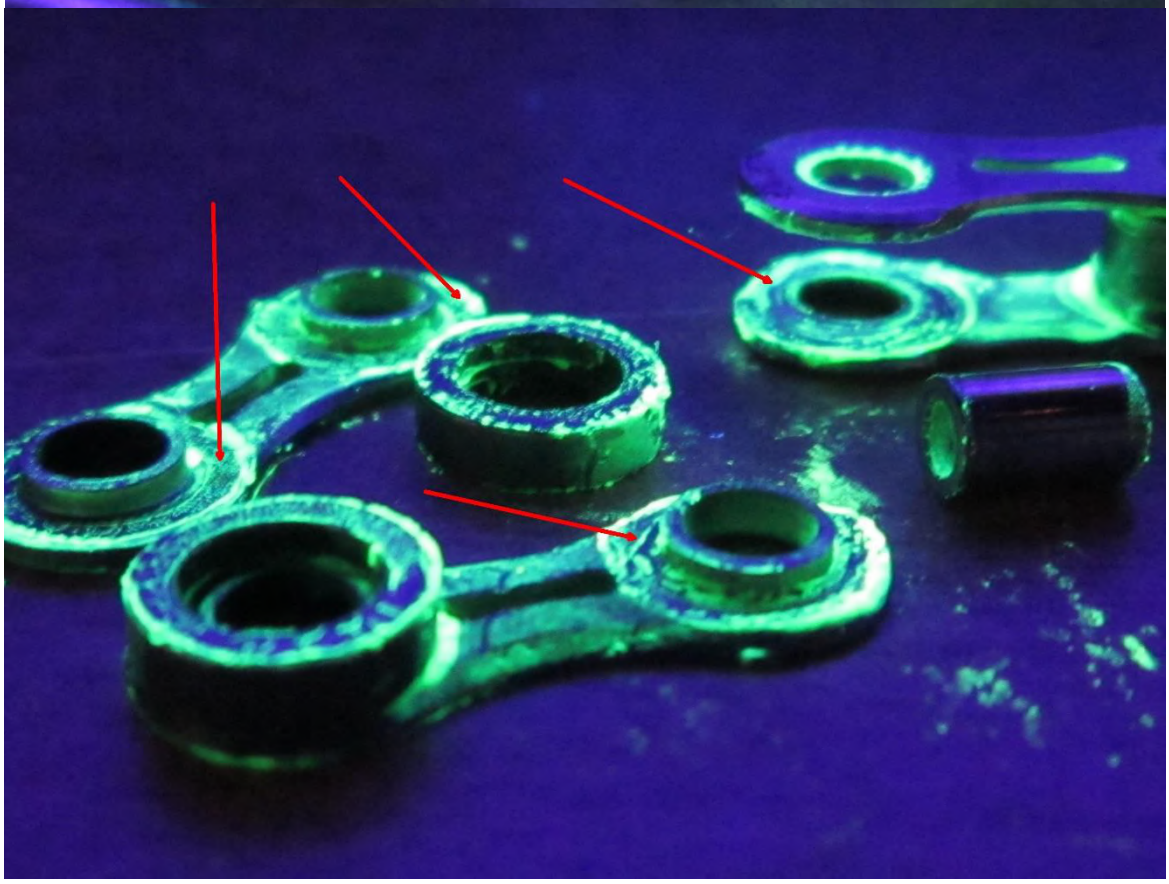




3) BETWEEN THE OUTER PLATES AND INNER PLATES

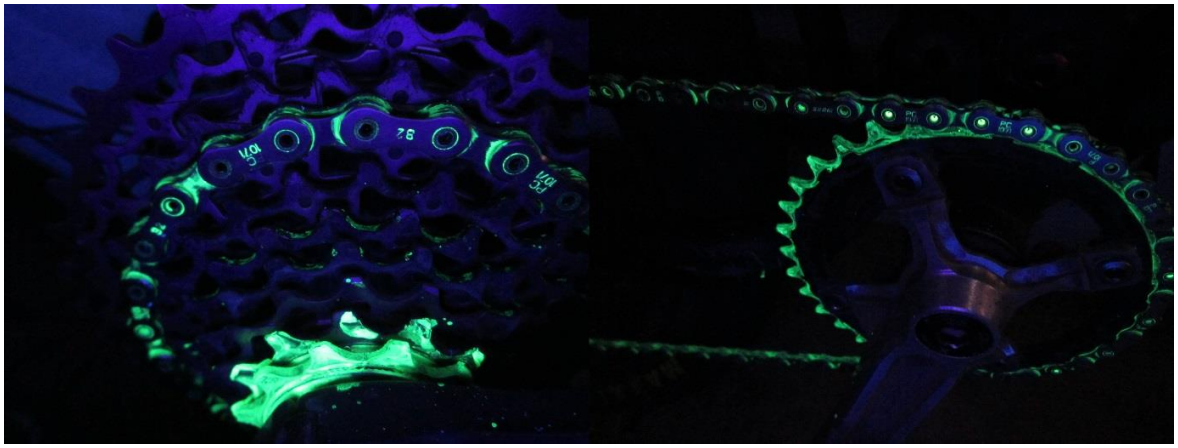
This area of the chain can be quite easily seen when it is separated. There is a thorough coating of **Bike Milk** on the inside faces of the outer links and the outside faces of the inner links.

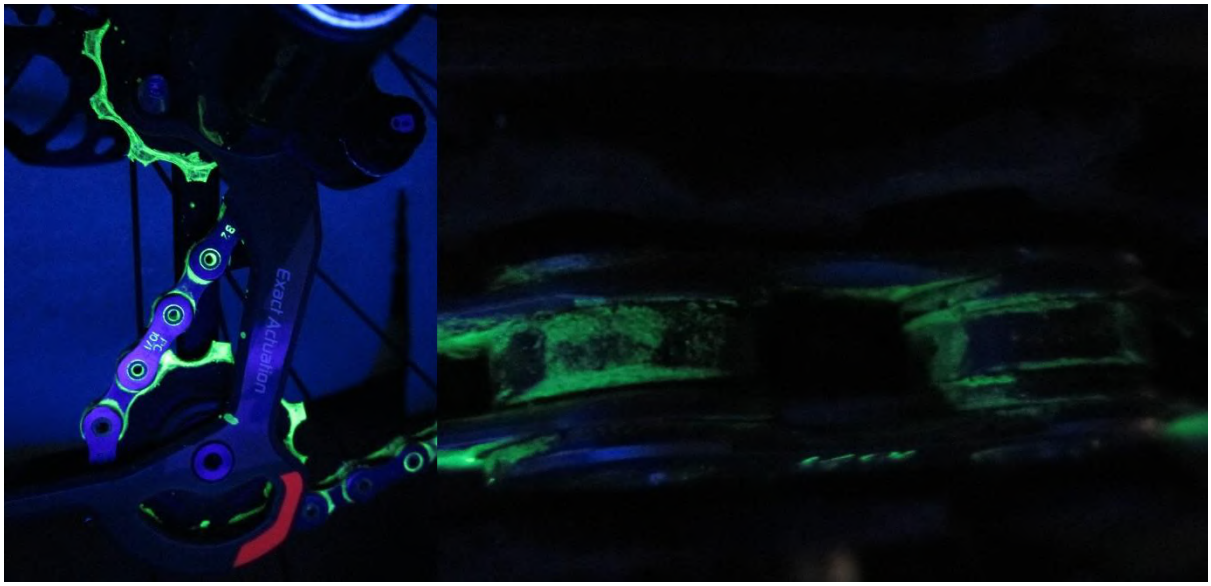




4) APPLICATION TO DRIVETRAIN ON BIKE

The fluorescent **Bike Milk** was applied to a fully degreased and dry 10sp PC1071 MTB chain on the bike, as per label instructions. The conditioning involved: 1) apply **Bike Milk** to chain until wet while rotating cranks backwards, 2) continue rotating chain for 30 seconds to allow lubricant to penetrate links, 3) leave to evaporate 1 hour; 4) apply **Bike Milk** to chain until wet while rotating cranks backwards; 5) continue rotating chain backwards for 30s to allow lubricant to penetrate links, 6) leave to evaporate and form film for 2 hours. 7) The outside of the chain was wiped thoroughly with cloth to remove excess film. When this initial drivetrain conditioning was completed, the drivetrain was photographed to show location of Bike Milk. This was immediately prior to riding. A 2 minute video of the correct application method is on Ride Mechanic website, under YouTube tab.



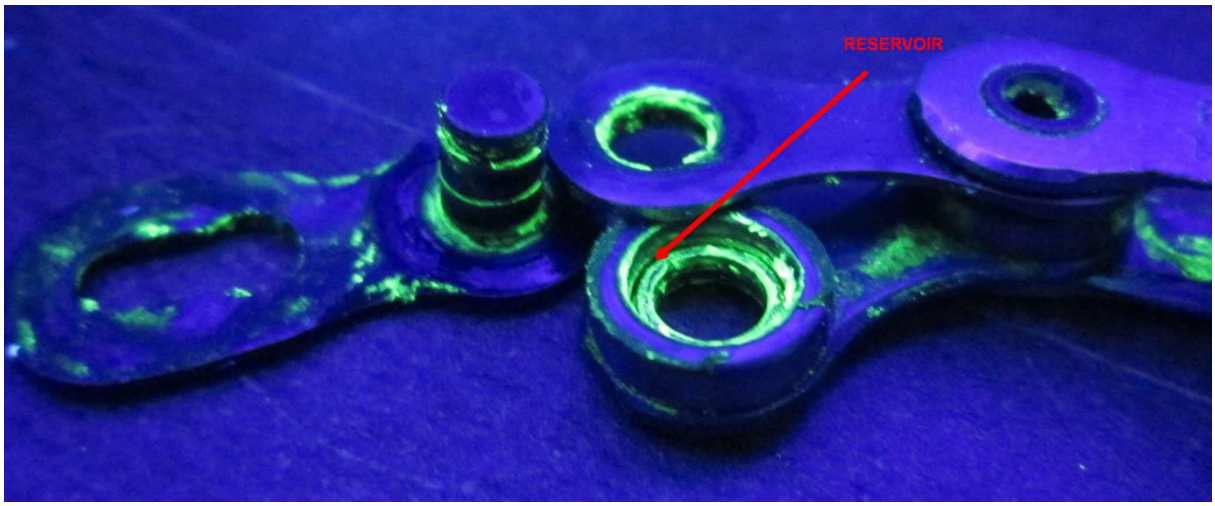


5) LUBRICANT LOCATION AFTER RIDING

The test bike with fluorescent **Bike Milk** was ridden cross country on fire trail and single track for 2 hours in dry and dusty conditions with ambient temperature of about 25°C. The 1x10 drivetrain ran smooth and quiet for the duration of the ride. Riders will recognise the typical dirt coverage on the bike which reflects common MTB riding conditions.

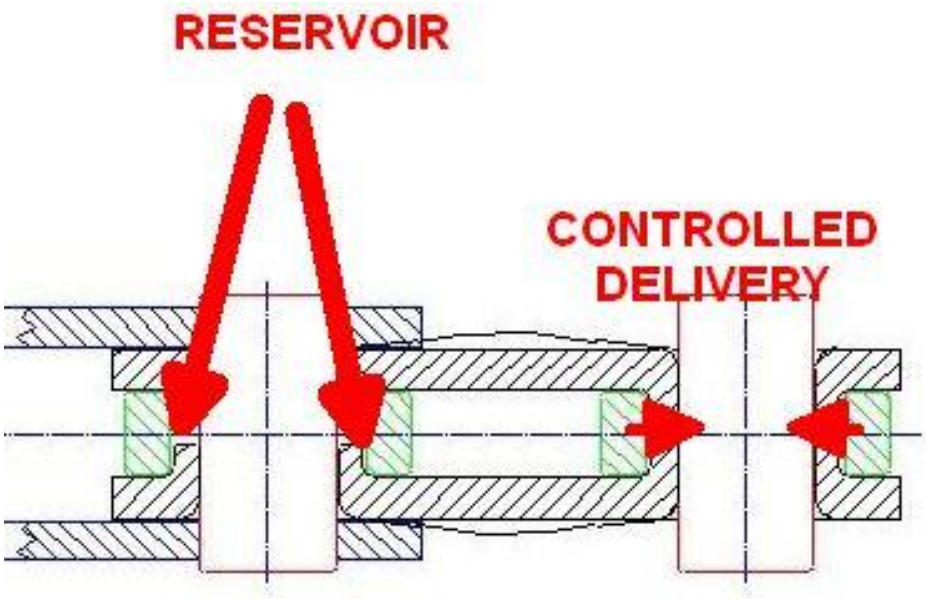
A close-up of the cassette (above right) shows the characteristic clean and dry state of the drivetrain which **Bike Milk** users are accustomed to. The chain was then removed from the bike **after the ride** and closer examination under UV light showed where the **Bike Milk** film was located.

After the ride, the pins of the PowerLock master link were coated in a film of **Bike Milk**. The film is most concentrated in the middle of the pin where the cylindrical spigots of the inner plates join and leave a small gap. Considering this inspection was made after a 2h ride in dry conditions, there is a surprisingly large "reservoir" of **Bike Milk** film located in between the roller and the spigots.



6) THE RESERVOIR EFEFCT

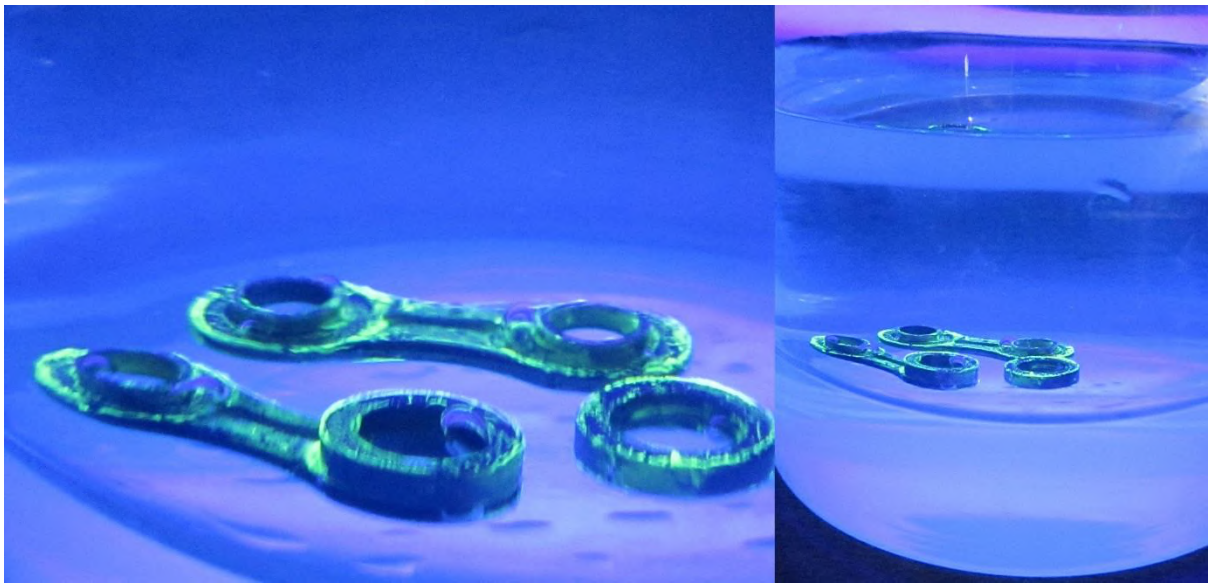
This is perhaps the best explanation for the longevity of the **Bike Milk** film as a lubricant for bushingless bike chains. As the chain rotates and the roller meshes with the teeth of the sprockets it forces lubricant from the reservoir through the narrow gap between the spigots and onto the pin. This *in-situ* supply from the reservoir is delivered to the pin over time during the motion of the chain.



After a MTB ride in dry dusty conditions, and despite there being negligible lubricant coating on the surface of the chain or drivetrain, the inner surfaces of the chain remain well lubricated and the drivetrain performance is maintained.

7) WATER RESISTANT COATING

The consistency of the **Bike Milk** film is smooth, tacky and it is a dry finish so it does not attract and retain dust. This has been proven by many successful and experienced riders in endurance events. It is often presumed that a “dry” lube will not remain on a chain surface in wet conditions. As a continuation of this investigation the treated chain links were immersed in water for three hours and the **Bike Milk** dry film remains in place where it is required and does not dissolve or disperse.



8) CONCLUSIONS

When a clean, degreased and dry 10sp bushingless chain is well conditioned with **Bike Milk** it is lubricated and protected in the key areas it is required, **1)** between the outside of pins and the inside of the spigots, **2)** between the outside of the spigots and the rollers, **3)** between the outer plates and the inner plates. The outside of a **Bike Milk** conditioned drivetrain appears very clean and dry as shown in the photos of drivetrains below immediately after winning MTB (left) and road (right) races, and in the photograph in **Section 5**. The lubricant stays inside the chain where it is needed, even in wet conditions, and fills the cavities preventing the ingress of further contaminants. The surprising longevity of **Bike Milk** performance in a variety of riding conditions may be explained by the **RESERVOIR EFFECT** where a film of Bike Milk is retained between the rollers and the spigots then delivered to the pin while riding. Regular cleaning and lubrication of a chain with **Bike Milk** will assist with drivetrain performance and protection.