Figure 1. Han Lab.
(Moving left to right) Claire Hanson, Taylor Niehoff, Liang Han, Yanyan Xing, Henry Hilley, Haley Steele, Olivia Olson, Rossie Nho, and Katy Lawson.

Figure 2. Haley Steele (middle), a 4th year graduate student, Yanyan Xing (right), a postdoctoral fellow, and Henry Hilley (left), a research technician in Han lab, are investigating the mechanisms of glabrous skin itch.

Summary:
Pruritus is a devastating chronic itch condition known to significantly impact patient quality of life. It is one of the most common symptoms of skin disease and, therefore, also one of the most common reasons for visiting a dermatologist. Pruritus has proven particularly difficult to treat as it arises from a broad range of etiologies including systemic diseases and side effects of medications. Almost all previous itch research has focused on itch arising from the hairy skin. However, many dermatological conditions, such as plantar and palmar psoriasis, Tinea capitis, dyshidrosis and cholestasis induce glabrous (non-hairy) skin itch that occurs on the palms of hands and soles of feet and is considered particularly disabling. We recently discovered that hairy and glabrous skin itch are mediated by distinct neural circuits (Figure 3). Our investigation revealed the unique morphology of itch-sensing axonal arborization in the skin (Figure 4&5) and identified the neuronal populations mediating glabrous skin itch. This study provides novel insights into the topographical organization of the somatosensory system and sheds light on future therapeutic advances aimed towards alleviating chronic itch within both glabrous and hairy skin.

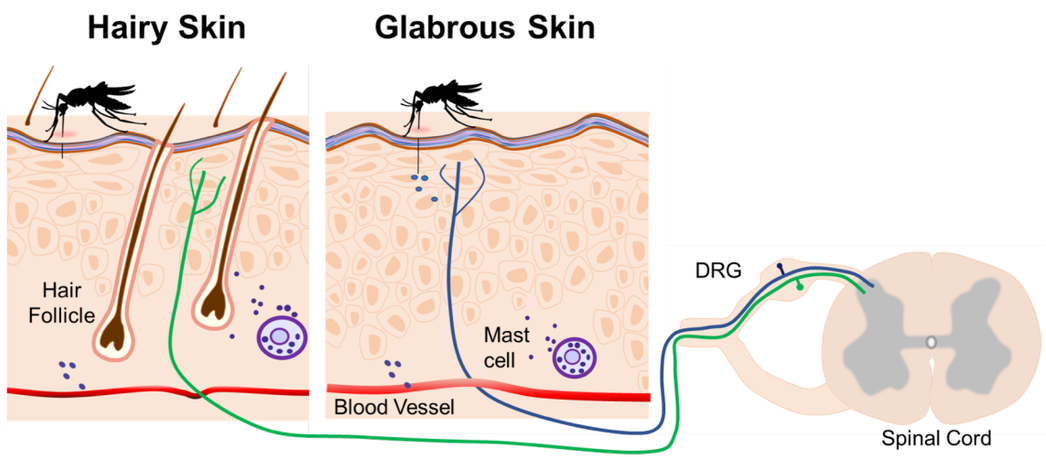

Figure 3. Distinct neural circuits mediating hairy and glabrous skin itch.

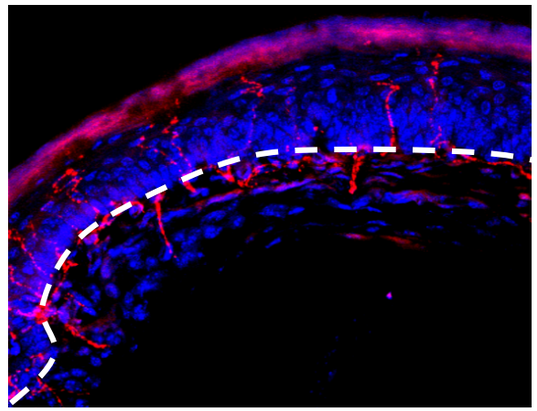

Figure 5. Fluorescent labeled itch-sensing nerves in the mouse glabrous skin.

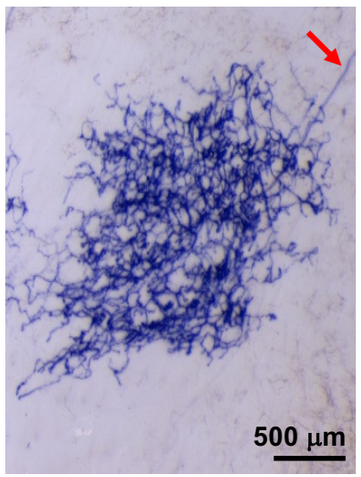

Figure 4. Itch-sensing axonal arborization in the skin. One itch-sensing axon (1-2 μm diameter, indicated by red arrow) projects to the skin surface and generates extensive branching to form an millimeter scale axonal arborization subserving its function.