

Abstract Submitted
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Tracing lipids and their association with keratin in the adhesive gecko setae by NMR Spectroscopy DHARAMDEEP JAIN, ALYSSA.Y. STARK, PETER.H. NIEWIAROWSKI, TOSHIKAZU MIYOSHI, ALI DHINOJWALA, University of Akron — Numerous examples exist in nature where the coexistence of lipids and keratin is prominent. Examples include cell membranes, epidermis, avian feathers, wool, insect cuticle and the adhesive hairy features known as “setae” on the gecko toe. Until recently the setae were only considered to be composed of keratinous material. Given the prevalence of lipid-keratin associations in nature however, it is perhaps not surprising that phospholipids were found in the setae, and interestingly, in the form of a footprint after a gecko moves along a surface. However, the organization and the molecular-level behavior of lipids and keratin in the setae is still not known. Here, we demonstrate the use of NMR spectroscopy to detect lipids and understand their association with keratin in the molts termed as “sheds” from the toe pad and the non-adhesive regions of the epidermal skin. Our results show a distribution of similar lipids in both the skin and toe shed but with different dynamics at a molecular level. The study can help us understand the system better both biologically and for the design of better synthetics, but our findings may also have a larger impact on the recurring observations of lipids in many popular biomaterials and biological systems.

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