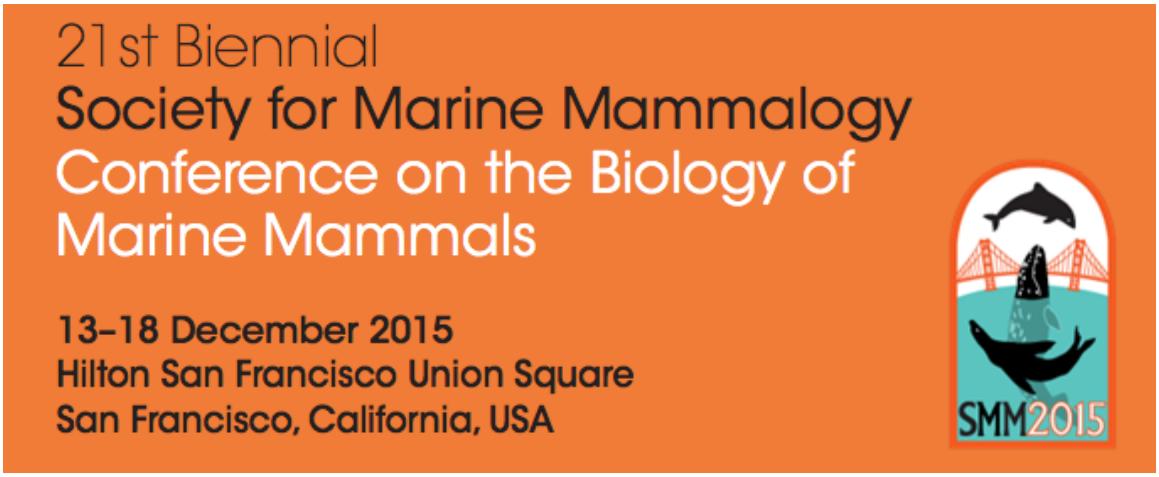

2015. Strobel, S. M., Reichmuth, C., Batac, F., and Miller, M. The sense of active touch in sea otters. *21st Biennial Conference on Marine Mammals,* San Francisco, United States, 13 December – 18 December. (Presentation abstract).

The sense of active touch in sea otters

Sea otters (*Enhydra lutris*) consume a variety of cryptic benthic invertebrates in conditions that are often turbid or poorly lit, and individuals tend to specialize on particular prey items even when other food types are available. Foraging theory predicts that, in food-limited environments, minute differences in search and handling time can drive such prey specialization. However, the proximate mechanisms (*i.e.*, sensory and cognitive abilities) that enable sea otters to identify and select potential prey items are virtually unknown. While their underwater behavior has not been described, sea otters are assumed to rely on an enhanced sense of touch to forage in patches with complex topographic features. To explore this possibility, we used a structure-function approach to investigate the cutaneous mechanoreceptors and corresponding tactile performance of sea otter forepaws. Using histological methods and tissues from naturally deceased individuals, we identified and described three types of receptors found in other mammals. Merkel ending complexes (MEC) were distributed within the basal layer of the epidermis, Meissner corpuscles (MC) were distributed in dermal papillary ridges as solitary units, and Pacinian corpuscles (PC) were distributed in both the deep dermis and hypodermis of the forepaw as solitary units and in clusters of three to four. PCs exhibited typical mammalian onion-like structure, but were significantly larger (0.9-1.2 mm) than those of cats, raccoons, elephants and some primates. These anatomical results complement ongoing behavioral studies with captive individuals allowed to forage in artificial prey fields using all of their senses, or trained to discriminate fine-scale differences in surface texture using only haptic abilities. Our findings provide general insight into underwater foraging, and specifically, how sea otters manipulate hard-shelled invertebrate prey and tools using dexterous forepaws.