Sensory receptors

What decides whether certain sense receptors get developed? Indiscriminate variations of the sense receptor structures and mechanisms are formed by natural selection to meet the informational needs required and are adequate for our survival. All forms of life must interact with their surroundings, extracting information and performing some form of energy exchange. Even the amoeba, the one celled protozoa can receive information without specialized receptors. Most of its external surface is responsive to gravity, light, heat, and pressure.

In multi-celled organisms--animals--demands of interacting with the environment led to the evolution of receptor cells and units. In response to stimulation there is a shared function of generating neural activity. A clumping together of receptor units form sense organs of distinct arrangements and function that are susceptible to countless forms of energy changes within the environment of an organism; examples of which relate to the eyes which are customized to receive and react neutrally to electromagnetic or radiant energy, the taste buds that react to chemical molecules in the mouth, the inner ear which receives airborne vibrations, the surface of the skin which responds to thermal changes as well as to mechanical deformations. Also note that mechanical energy rightly applied as pressure influences vision and hearing.

Specialized sense receptors developed over time to perform “survival tasks” for each species through discriminatory responses to other specific forms of energy, which delivers information to the species about its surroundings. The development of sense receptors is dependent upon their environment and what is necessary for their survival, (e.g., a human will have different sensory receptors than a dog, a snake will have different sensory receptors than a wolf, a turtle will have different sensory receptors than a hawk, and a cat will have different sensory receptors than a bat).

To further elaborate I expound upon the bat with its highly developed and specialized auditory anatomy. It is most active at night and lives within an environment that is quite dark that would render photoreceptor mechanisms almost useless. Their sensory structures and behaviors are unique, suited to motion in lightless environments. Their auditory structures, extended range of sound reception and emission allows them to navigate and avoid objects in the dark as they locate and catch prey. Echolocation, also known as bio sonar, is used by several types of animals whereby they emit "calls" into the environment and listen for the echoes that return from objects near them. Animals that utilize echolocation include some mammals and a few birds but most notably the Microchiroptera bats[i] and odontocetes,[ii] shrews, two cave dwelling bird groups, dolphins, and have more recently included humans. Studies are being conducted that revolve around teaching the blind to see by directing "calls" or energy signatures out into one's environment and, by doing so, they can detect just how close they are to an object.

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i The Microbats which establishes the suborder Microchiroptera within the order of Chiroptera (bats) or insectivorous bats; Wikipedia The Free Encyclopedia

ii Toothed whales and dolphins; Wikipedia The Free Encyclopedia