The nerve bundle in an elephant's trunk found to be one of the largest known structures of its type

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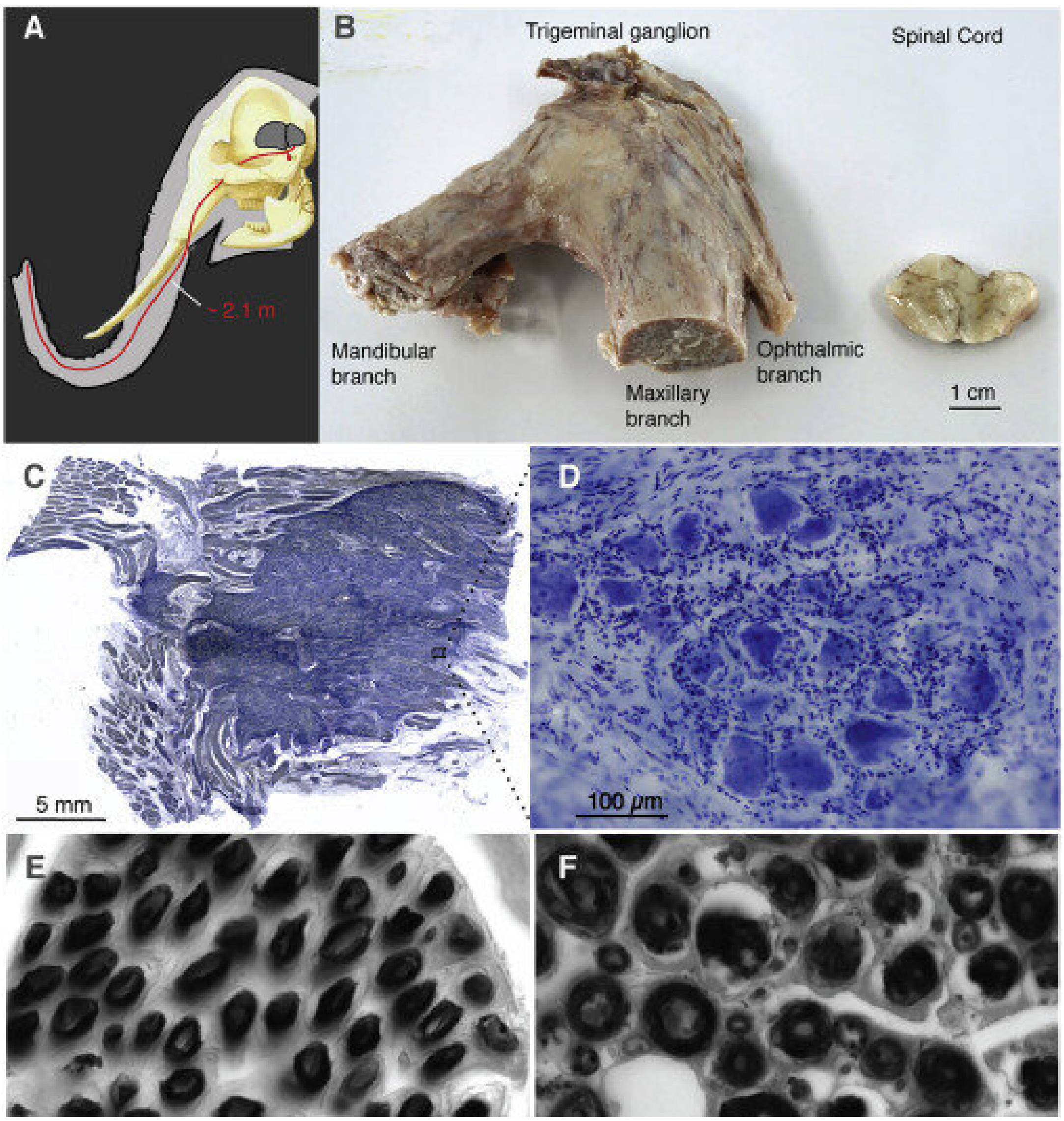

Figure 1. The elephant trigeminal ganglion and infraorbital nerve axons (A)

Schematic of an elephant head with the brain in dark gray and a schematic of a trunk sensory neuron (in red). The neuron's cell body (red circular dot) is situated below the brain in the trigeminal ganglion. (B) Left: the trigeminal ganglion of an adult female Asian elephant (Burma). The ganglion's main sensory branches are labeled and the maxillary branch connects via the infraorbital nerve to the trunk. The trigeminal nerve connecting to the brain stem leaves the ganglion dorsally (opposite from the sensory branches) and has been clipped here. Right: spinal cord of Burma. Note that the maxillary branch is thicker than a hemi-cord, i.e., connections to the trunk are more substantive than the nerve tracts connecting the brain to the body. (C) A thin (60 μm) Nissl-stained section through the center of the trigeminal ganglion of an Asian baby elephant. Note the alternation of fiber bundles (peripheral) and cells (deep blue, more central). (D) A higher magnification view of trigeminal ganglion cells. Neuronal cells (large deep blue somata) are surrounded by satellite cells (small round somata). In the upper right corner Schwann cell nuclei (small, deep blue, elongated) can be seen. (E) A cross-section through the infraorbital nerve of an Asian baby elephant stained with osmium tetroxide to reveal myelin sheets. (F) Same as in (E) but in this case the infraorbital nerve of an adult Asian elephant (Burma) was stained. Note the slightly larger axon diameters in the adult elephant. Credit: DOI: 10.1016/j.cub.2021.12.051

A team of researchers working at the Bernstein Center for Computational Neuroscience in Berlin, has found that the nerve bundle in an elephant's trunk is one of the largest known structures of its type. In their paper published in the journal *Current Biology*, the group describes their dissection and study of multiple elephant heads and what they learned about the nerve network in the trunk.

An elephant's trunk is agile and is used for many purposes. From sucking water from a lake, to grabbing twigs off of trees to blowing dirt over its body to stop flies from biting, the trunk is a true multi-tasking proboscis. In this new effort, the researchers have found that the trunk is also far more sensitive than has been thought.

Noting that a lot of work has been done to learn more about known sensitive animal parts, such as human fingertips, dog noses, and rodent whiskers, the team wondered about elephant trunks—a body part that has not received nearly as much study.

To learn more about the elephant trunk, the researchers obtained eight elephant heads, three Asian and five African. All had died from natural causes or were put down due to severe health problems. They note that dissecting an elephant's head is rare due to the huge size. The researchers had to first obtain special tools and machinery to conduct their work.

One of the major focus areas was the trigeminal ganglion, which is a network of nerves in the trunk and parts of the face—elephants have two of them. The team found that each weighed approximately 50 grams. They also found that each was made up of approximately 400,000 nerves, which is far more than was expected. The number was only slightly lower than for the optic nerve. They also found the main nerve in the trunk was triple the thickness of the optic nerve, which suggests that huge amounts of information are carried back and forth.

The researchers suggest their findings indicate that the elephant trunk may be one of the most sensitive body parts in the animal kingdom.

More information: Leopold Purkart et al, Trigeminal ganglion and sensory nerves suggest tactile specialization of elephants, *Current Biology* (2022). DOI: 10.1016/j.cub.2021.12.051