Fall 2021

The Classification of Basket Neural Cells in the Mammalian Neocortex

Sreya Pudi

The Classification of Basket Neural Cells in the Mammalian Neocortex

By

Sreya Pudi

Submitted in Partial Fulfillment
of the Requirements for
Graduation with Honors from the
South Carolina Honors College

December, 2021

Approved:

Deanna Smith
Director of Thesis

Sofia Lizarraga
Second Reader

Steve Lynn, Dean
For South Carolina Honors College

TABLE OF CONTENTS

ABSTRACT

Basket neuronal cells of the mammalian neocortex have been classically categorized into two or more groups. Originally, it was thought that the large and small types are the naturally occurring groups that emerge from reasons that relate to neurobiological function and anatomical position. Later, a study based on anatomical and physiological features of these neurons introduced a third type, the net basket cell which is intermediate in size as compared to the large and small types. In this study, multivariate analysis was used to test the hypothesis that the large and small types are morphologically distinct groups. The results of this study do not support the hypothesis that large and small neuronal basket cells can be distinguishable on the premise of morphological differences, and therefore also reject the hypothesis that basket cells are a subclass of neurons with morphology distinct from large and small basket cells. Further testing involved the identification of individual large and small basket neurons and whether it is possible to categorize them by individual morphological features

INTRODUCTION & THESIS STATEMENT

Cerebral Cortex

The cerebral cortex of the mammalian brain is the outermost layer of tissue in the cerebrum. The cerebral cortex consists of six distinct layers of nerve cells and is covered by the meninges, or layers of tissue which protect it and hold it in place Cechetto and Weishaupt, 2017). The cerebral cortex is often referred to as gray matter due to its characteristic appearance, as cells in this area lack myelin sheaths for insulation, unlike the white-colored regions of the brain (Cechetto and Weishaupt, 2017). The cerebral cortex is a highly developed structure, which in humans, contains between 14 billion to 16 billion neurons (Cechetto and Weishaupt, 2017). Even though the cerebral cortex has a cross section length of a few millimeters, it is roughly estimated to encompass half the total brain mass weight (Cechetto and Weishaupt, 2017). Its external surface is organized into an involute and intricate structure. The convolution of the surface of the cerebral cortex resulted from the volume of the cortex region increasing during evolution (Cechetto and Weishaupt, 2017). The elevated portions of the cerebral cortex are referred to as the gyri, while the grooves are referred to as sulci (Cechetto and Weishaupt, 2017). The many convolutions of the cerebral cortex allows for a larger surface area for neurons, allowing for large amounts of information to be processed (Cechetto and Weishaupt, 2017). The cortex is categorized into four different lobes through persistent gyri and sulci markings: the frontal, parietal, temporal, and occipital, each of which was named after its respective cranial bone (Cechetto and Weishaupt, 2017).

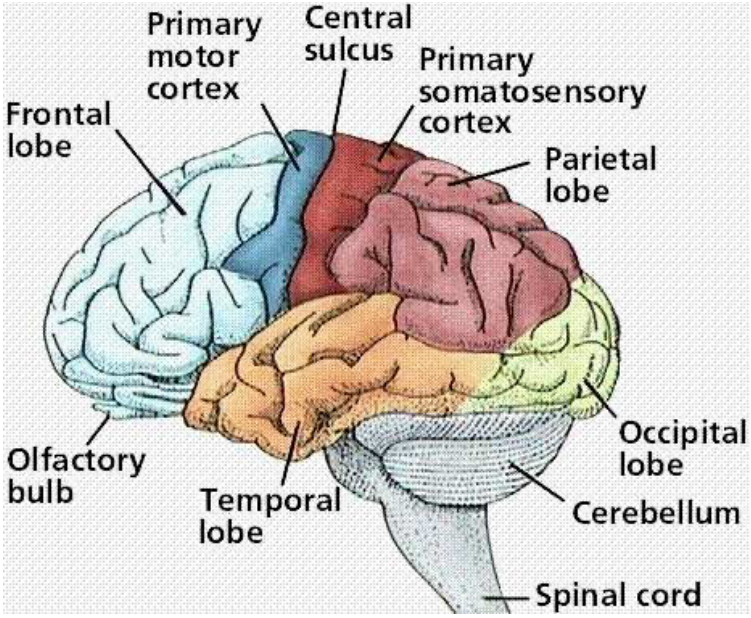

Figure A above illustrates different regions of the cerebral cortex (retrieved from Zippo, 2011).

The frontal lobe is responsible for higher cognitive functions, such as decision making, conscious thought, and problem-solving (Cechetto and Weishaupt, 2017). The frontal lobes are the largest part of the cerebral cortex and located at the front region of the cerebral cortex as the name implies (Cechetto and Weishaupt, 2017). It also contains Broca's Area, which is responsible for language processing (Cechetto and Weishaupt, 2017). The occipital lobes are located at the rear of the brain, and receive sensory information from the retinas (Cechetto and Weishaupt, 2017). The occipital lobes are responsible for the encoding of the sensory information, as well as object recognitions and depth perception (Cechetto and Weishaupt, 2017). The parietal lobes are located above the temporal lobes, and between the frontal and occipital lobes (Cechetto and Weishaupt, 2017). It plays a major role in the processing of sensory information such as touch, pressure, and temperature. The parietal lobes also are involved in movement coordination through spatial awareness (Cechetto and Weishaupt, 2017). The temporal lobes are the second largest part of the cerebral cortex; the left and right temporal lobes are associated with different functions (Cechetto and Weishaupt, 2017). The left temporal lobe is responsible for language comprehension, speech and learning (Cechetto and Weishaupt, 2017). The right temporal lobe is responsible for recognizing information, and determining facial expressions (Cechetto and

Weishaupt, 2017). Both are important for the processing of auditory information, and memory. While the cerebrum itself is made up of both white and gray matter and comprises of cell bodies and nerve fibers, the cerebral cortex comprises of cell bodies and dendrite (Cechetto and Weishaupt, 2017). The functionality of the cerebrum targets voluntary muscular movements, while the cerebral cortex plays a major role in consciousness (Cechetto and Weishaupt, 2017).

The cerebral cortex comprises three sections, each section divided based on horizontal positioning in terms of layers (Cechetto and Weishaupt, 2017). It is roughly approximated that 10% of the cerebral cortex is the allocortex, while the other 90% is the neocortex (Cechetto and Weishaupt, 2017). The allocortex being the phylogenetically oldest part of the cerebral cortex. The allocortex, also known as the heterogenetic cortex, is morphologically distinct from other parts of the cerebral cortex as it has never developed into a six-layered structure (Morris, 2006).

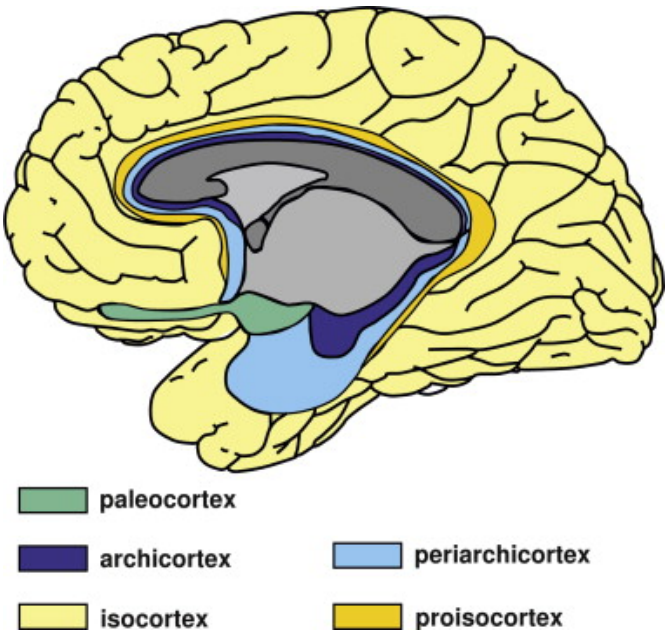

Figure B above illustrates different regions of the cerebral cortex (retrieved from Mai and Paxinos, 2012).

The allocortex itself can be divided into three categories, the paleocortex, archicortex, and periallocortex (Morris, 2006). The paleocortex is a narrow, primitive cortical tissue that comprises three layers of neuronal cell bodies or laminae (Morris, 2006). The three major regions of the paleocortex are the olfactory tubercle, olfactory bulb, and the preform cortex (Morris, 2006). The paleocortex is roughly estimated to be less than 1% of the cerebral cortex surface area (Morris, 2006). It consists of the olfactory tubercle, olfactory bulb,

piriform cortex, anterior olfactory nucleus, anterior commissure or precommissure and the uncus and plays a major role in processing scent and sensory responsiveness (Morris, 2006). The archicortex is a cortical tissue with four layers of neuronal cell bodies (Morris, 2006). The archicortex consists of the dentate gyrus and hippocampus; it is most extensive in the olfactory cortex and hippocampus regions (Morris, 2006). Both regions play a role in sensation and processing of scent and memory formation (Morris, 2006). The archicortex is believed to be one of the first tissue types to form in the primitive nervous system (Morris, 2006). The periallocortex is a transitional region between the allocortex and neocortex and has two partitions; the peripaleocortex which forms at the borders between the neocortex and paleocortex, and the periarchicortex which forms at the borders between the neocortex and the archicortex (Morris, 2006).

Neocortex

The neocortex, also known as the homogenetic cortex, is morphologically distinct from the allocortex and the neocortex comprises six horizontal layers, while the allocortex has three (Morris, 2006). The neocortex has a single sheet of gray matter and covers the majority of the cerebral cortex, while the allocortex only covers the boundaries of the cerebral cortex (Morris, 2006). The neocortex is the newest part of the cerebral cortex phylogenetically, while the allocortex is primitive (Morris, 2006). The neocortex is primarily associated with conscious thought and action while behavior and emotions are associated with the allocortex (Morris, 2006).

The neocortex is the largest part of the cerebral cortex and a cortical part of the limbic system which is the part of the brain involved in behavioral and emotional responses such as feeding, reproduction, and sympathetic and parasympathetic responses (Morris, 2006). The

neocortex consists of grey matter that surrounds the deeper white matter of the cerebrum. The neocortex accounts for roughly 76% of the volume of the brain; it is a hallmark of mammalian brains and is analogous to the dorsal cortex in reptiles (Morris, 2006). The neocortex is found only in mammals; however the neocortex does vary between mammals (Morris, 2006). Rodents and small mammals typically have a smooth neocortex, without the sulci and gyri found in the neocortex regions of large mammals and primates (Morris, 2006). The gyri and sulci folding allow for a great surface area and the processing of high volumes of information (Morris, 2006). The neocortex plays a role in the following functions: language, consciousness, sensory perception, spatial reasoning, motor command, episodic memory, semantic memory, social and emotional processing, sleep, memory, and learning processes (Morris, 2006). The functions of the neocortex depend on its structure as the neocortex is divided horizontally and vertically. The neocortex is divided into six layers or laminae vertically (Morris, 2006). The cortex is also divided horizontally into columns which exhibit certain physiological properties. The majority of the cortical areas have one or more topographic maps (Morris, 2006). The cortical columns are functionally divergent and each area performs specific functions (Morris, 2006). The neocortex was derived from the dorsal telencephalon in the rostral area of the forebrain, and its cortical columns are subdivided into regions demarcated by the frontal, parietal, occipital, and temporal cranial bones (Morris, 2006). For example, the neocortex plays a role in the formation of semantic memories, or memories that people forget with age (Morris, 2006). Semantic memories are one of the main functions of the temporal lobe, so the neocortex cortical column in the temporal lobe region will play a role in semantic memory processing (Morris, 2006).

Layers of the Neocortex

The neocortex can be subdivided into two horizontal regions, the proisocortex and the true cortex, which itself can be divided into six laminae (Ramachandran, 2002). The proisocortex is a transitional layer between the periallocortex and the true isocortex (Ramachandran, 2002). The proisocortex is located in the cingulate cortex, which is part of the limbic system (Ramachandran, 2002). The true isocortex consists of the six laminae that are separated by cell type and neuronal connections; the laminae are named by their respective roman numerals in order from their proximity to the cortex surface (Ramachandran, 2002). Around 80% percent of the neurons in the neocortex are excitatory while the remaining 20% are inhibitory (Ramachandran, 2002). While excitatory neurons release neurotransmitters that promote the postsynaptic neuron to generate an action potential, inhibitory neurons release neurotransmitters that inhibit the postsynaptic neuron's likelihood of generating an action potential (Ramachandran, 2002). The six laminae of the true isocortex can be characterized by varying neuronal shapes, density, sizes, and organization of nerve fibers (Ramachandran, 2002).

For example, layer IV is smaller than the others in terms of cross section length, and does not have a primary motor cortex. Neurons in various layers connect vertically to form small microcircuits, or columns (Ramachandran, 2002). The cognitive functions of the neocortex are heavily reliant on the convergence of two distinct courses of information: a ‘bottom-up’ stream which transmits signals from the environment and a ‘top-down’ stream which transmits internally generated information derived from experience (Ramachandran, 2002). Despite the many regions of the neocortex displaying structural similarity, specific functions are circumscribed to particular regions on the premise of cytoarchitecture, input and output

connectivity, proportion of cell types, modular structure, and micro-circuitry (Ramachandran, 2002).

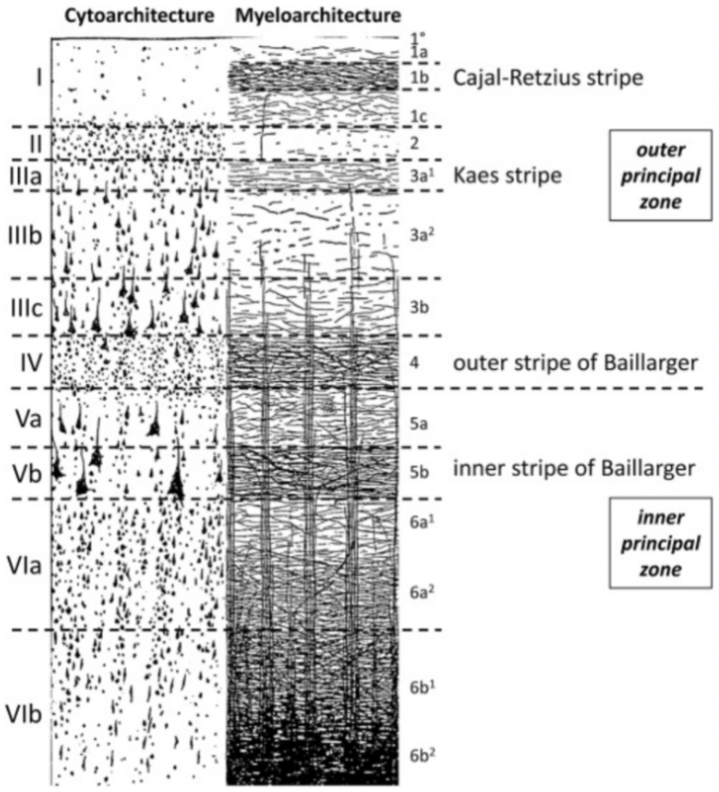

Image C above shows the six layers of the neocortex (retrieved from Palomero-Gallagher and Ziles, 2019).

The layers of the neocortex from I to VI are respectively also known as the molecular or plexiform layer, external granular layer, external pyramidal layer, internal granular layer, internal pyramidal layer, and the fusiform or multiform layer (Ramachandran, 2002). The molecular layer or layer I is the most superficial layer (Ramachandran, 2002). This layer is characterized by a dearth of cellular components, and is represented by a small number of horizontal cells of Cajal-Retzius (Ramachandran, 2002). The main portion of layer I is involved with the processes of the neurons in the lower layers (Ramachandran, 2002). Most of the dendrites in layer I originate from pyramidal and fusiform cells (Ramachandran, 2002). The axons in layer I are the ending fibers of the afferent thalamocortical tract that stems from the thalamic nuclei (Ramachandran, 2002). The external granular layer or layer II consists primarily of stellate cells, which give it its distinct granular appearance; small pyramidal cells can be found in this layer as well

(Ramachandran, 2002). Cells in layer II send their dendrites to other layers of the cortex, in particular layer I (Ramachandran, 2002). Their axons reach into the lower layers and even the cortex, and are involved in intracortical synapsing (Ramachandran, 2002). The axons of this layer are lengthy and can form the association fibers that travel through the white matter to the other parts of the central nervous system, such as the spine (Ramachandran, 2002). The external pyramidal layer or layer III consists primarily of pyramidal cells (Ramachandran, 2002). The superficial pyramidal cells in layer III are smaller than those in the layers below (Ramachandran, 2002). The apical dendrites of the pyramidal cells have a superficial reach into layer I (Ramachandran, 2002). The basal processes conjoin with the subcortical white matter and then loop back again to the cortex as they function as both association and commissural corticocortical fibers (Ramachandran, 2002). The internal granular layer or layer IV is the primary input cortical station and plays an important role receiving stimuli, and has more extensive development within the sensory regions of the cerebral cortex (Ramachandran, 2002). Layer IV predominantly consists of stellate cells, and a smaller portion of pyramidal cells (Ramachandran, 2002). The axons of stellate cells remain in the cortex and undergo local synapsing (Ramachandran, 2002). The axons of the pyramidal cells synapse in lower regions of the cortex and even conjoin with the white matter fibers below the cortex (Ramachandran, 2002). The stellate cells of layer IV are key in the development of specific sensory cortical areas; these areas receive fibers from primarily the thalamus (Ramachandran, 2002). These fibers extend horizontally through layer IV and are often myelinated giving them a white color juxtaposed with the gray matter; the white-colored region is also known as the outerstripe of Baillarger or the stripe of Gennari (Ramachandran, 2002). The internal pyramidal layer or layer V primarily consists of medium-sized and large-sized pyramidal cells and acts as the source of output or

corticofugal fibers (Ramachandran, 2002). Layer V is most prominent in the motor cortex and its fibers are involved in the regulation of motor activity (Ramachandran, 2002). The multiform layer or layer VI is the deepest region of the cortex and is located above the subcortical white matter (Ramachandran, 2002). Layer VI predominantly consists of fusiform cells, pyramidal cells, and interneurons (Ramachandran, 2002). The axons of the fusiform and pyramidal cells of layer VI interact with the cortical fibers that travel to the thalamus (Ramachandran, 2002).

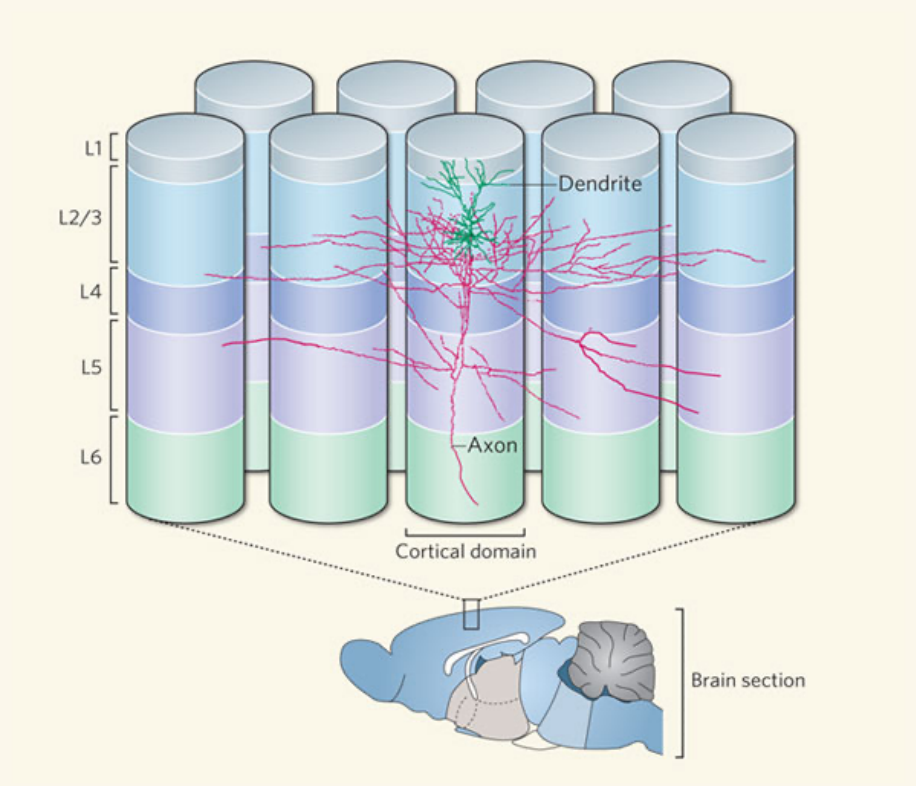

Image D above illustrates the layers and cortical columns in the neocortex (retrieved from Feldmeyer, 2010).

The cortical columns of the neocortex each consist of supragranular and infragranular subdivisions (Ramachandran, 2002). The supragranular part is made up of the most superficial layers of the true isocortex from layers I to III (Ramachandran, 2002). The supragranular part is responsible for projecting and receiving connections to other columns (Ramachandran, 2002). Layer III is important in communication with bordering cortical columns, and layer II mediates communication with distant cortical columns (Ramachandran, 2002). The infragranular part consists of layers V to VI, and is

responsible for the reception of input from the supragranular parts of bordering columns; it also transmits outputs to the thalamus (Ramachandran, 2002). Layer IV is neither categorized as supragranular or infragranular; it acts more like a border between these two parts (Ramachandran, 2002). Functionally, layer IV is important in the reception of input from the thalamus, and plays a role in sending signals to other parts of the cortical column (Ramachandran, 2002). Essentially layers I to IV function as input stations that receive corticopetal fibers, while layer V to VI act as output stations which give rise to corticofugal projection fibers (Ramachandran, 2002). Due to the differences in both functionality and morphology between the layers of the true isocortex, different regions of the cerebral cortex may not have all 6 layers completely developed (Ramachandran, 2002). It is important to note that in different mammals, certain layers of the neocortex may not be present at all (Ramachandran, 2002). The rat neocortex, however, shares many similarities with the human neocortex and can be useful for modeling purposes as all 6 layers are present (Ramachandran, 2002).

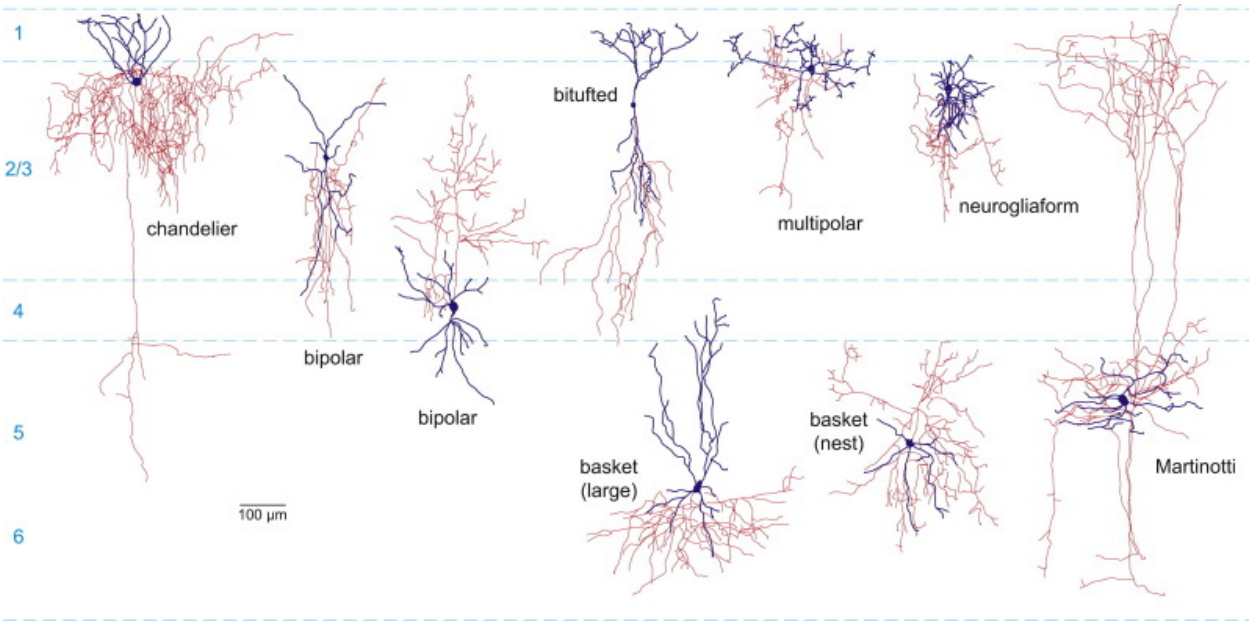

Image E above shows various neuron morphologies such as chandelier, bipolar, bitufted, large and nest basket, multipolar, neurogliaform, and Martinotti (retrieved from Watson, et al., 2012).

Cells of the Neocortex

The neurons of the neocortex can be divided into three main categories: Cajal-Retzius neurons, principal neurons, and interneurons (Watson et al., 2012). The developmentally early Cajal-Retzius neurons are contained within layer I, though their axons reach to layer II. These neurons are primarily involved in developmental processes, and 97% of them die in later stages of development (Watson et al., 2012). The localization of Cajal-Retzius neurons in adults is uneven, and they tend to centralize around the primary motor and sensory regions(Watson et al., 2012). Cajal-Retzius neurons are involved in the reception of synapses from Martinotti neurons, fibers and interneurons in layer I, and can form excitatory synapses with pyramidal neurons (Watson et al., 2012).

Principal neurons or excitatory neurons send their axons and collaterals across the cortex and to other regions of the central nervous systems (Watson et al., 2012). Excitatory neurons can be distinguished through their neurotransmitters, glutamate or aspartate. Excitatory synapses can be distinguished by their round vesicles and asymmetric appearance due to their thick postsynaptic density (Watson et al., 2012). Principal neurons make up between 62% to 85% of all neocortical neurons, and are profuse in all layers except for layer I (Watson et al., 2012). Principal neurons send the axons down through inferior layers to the white cortical matter (Watson et al., 2012). These axons are involved in excitatory synapses, through the use of either glutamate or aspartate neurotransmitters (Watson et al., 2012). The dendritic field makes up 90% to 95% of the input station of principal neurons. The principal neurons include pyramidal cells, polymorphic cells in layer VI, small spiny stellate cells in layer IV (Watson et al., 2012).

Pyramidal cells account for 75% of the cellular density of the cortex, and function as the primary output neurons of the cerebral cortex (Watson et al., 2012). Pyramidal cells vary in size,

and are characterized by one apical dendrite that moves towards the surface of the cortex, several basal dendrites, and one long axon which leaves the cortex and reaches into the subcortical white brain mass (Watson et al., 2012). Fusiform cells or polymorphic cells are found in the deepest cortical layer, and with dendrite projection towards the cortical surface (Watson et al., 2012). Spiny stellate cells closely resemble pyramidal cells, however, they can be distinguished by the loss of their apical dendrites as they undergo maturation (Watson et al., 2012). They have a similar electrophysiological function to the pyramidal cells in layers II and III; however, they are constrained within layer IV of primary sensory regions (Watson et al., 2012). Overall, the cortex is primarily composed of mainly principal neurons (Watson et al., 2012). In every layer sans layer I, principal cells far outnumber interneurons (Watson et al., 2012).

Interneurons can be found in all layers of the neocortex, and even make up 90% of cell density in layer I (Watson et al., 2012). The term interneuron is used to describe neurons lacking spines or neurons with short axons (Watson et al., 2012). Interneurons are inhibitory neurons that can be distinguished by the use of γ-aminobutyric acid (GABA) neurotransmitters (Watson et al., 2012). Interneurons typically participate in local circuits and rarely project their axons across long distances, unlike pyramidal cells (Watson et al., 2012). Inhibitory synapses are characterized by their flattened vesicles and symmetric densities (Watson et al., 2012). Interneurons as a class encompasses a great diversity of morphologies, and electrophysiological properties which allow in input to generate a wide range of responses (Watson et al., 2012). Interneurons include stellate cells, chandelier cells, Martinotti cells, neurogliaform cells, bipolar cells, bitufted cells, and basket cells (Watson et al., 2012).

Stellate cells are typically small and their dendrites project in all directions locally, resembling a star (Watson et al., 2012). They are located in all layers except for layer I. Their

processes occur in local circuits and their project locally in the cortex, and mediate the activity of other cortical neurons (Watson et al., 2012). They are considered spiny or aspiny depending on whether their dendrites have small cytoplasmic ridges, referred to as dendritic spines (Watson et al., 2012). Aspiny cells release GABA, which is the most powerful inhibitory neurotransmitter in the central nervous system, while spiny cells release glutamate, an excitatory neurotransmitter. Chandelier cells are a major short-axon interneuron found in layers II and III (Watson et al., 2012). Chandelier cells form highly specialized synapses with the axons of pyramidal cells in layers II and III by wrapping them in synaptic cartridges (Watson et al., 2012).

The cells of Martinotti can be distinguished by their multipolarity, and are localized in the layer VI (Watson et al., 2012). The axons and dendrites of Martinotti cells move upwards towards the surface of the cortex (Watson et al., 2012). Neurogliaform cells occur in all layers but are primarily found in layer I (Watson et al., 2012). The axons and dendrite of neurogliaform cells overlap, as their dendrites function as input stations for signals from layers II, III, and V, while their axons inhibit local dendrites (Watson et al., 2012). In the neocortex, neurogliaform cells are distinguishable by their expression of actin binding protein α-actinin-2 and slow spiking times (Watson et al., 2012). Bipolar and bitufted cells are both interneurons distinguishable by their different dendritic orientation (Watson et al., 2012). Bipolar cells are characterized by two principal dendrites, one ascending and one descending, which branch away from the cell body (Watson et al., 2012). Bipolar cells display heterogeneous transmitter use as they use both vasoactive intestinal polypeptide (VIP), as an excitatory transmitter, while others use GABA for inhibition (Watson et al., 2012). They are typically found in layers II, III and VI. Bitufted cells can be distinguished by tufts of dendrites extending from two opposite poles of the cell body,

which are involved in corticocortical and thalamocortical synapses reception. They are typically found in layers II, III and IV (Watson et al., 2012).

Basket Cells

Basket cells are the most typical subtype of GABAergic interneuron; they are characterized by being generally large-bodied and are located in layers II, III, and VI of the neocortex (Wang et al., 2002). Basket cells can be further divided into the nest and small subtypes and typically have four to ten dendrites that extend through the neocortex. Basket cells play an important role due to their effects on pyramidal neurons, which are multipolar neurons found in the cerebral cortex (Wang et al., 2002). Basket cells can result in myelinated axons which form termination clusters for pyramidal cell regulation (Wang et al., 2002). Basket cells are GABAergic interneurons that detect excitatory inputs from parallel fibers, or the axonal parts of Purkinje cells (Wang et al., 2002). Parallel fibers can be excited so that the neurotransmitter glutamate is released, stimulating other cells (Wang et al., 2002). Basket cell axons form inhibitory synapses with Purkinje cells, along with stellate cells (Wang et al., 2002). Basket cell synapses are considered to play a major role in the regulation of action potentials in pyramidal cells (Wang et al., 2002). Basket cells derive their name from their proclivity to form ‘baskets’ of axonal branches in the extracellular matrices of target cells, oftentimes, pyramidal cells (Wang et al., 2002).

Basket cells can be further divided into small, large, and nest basket cells as basket cells include a diverse range of interneurons of varying morphological, anatomical, and electrophysiological properties. Nest basket cells (NBS) are anatomically different from small and large basket cells (SBC and LBC respectively) (Zeng and Sanes, 2017). NBCs have dendritic arbors and axonal plexuses of lower densities. NBC also shows a diverse range of mRNA expression patterns for proteins such as calbindin, calretinin, somatostatin, cholecystokinin and

vasoactive intestinal peptides amongst others (Zeng and Sanes, 2017). SBCs are not known to express the patterns for many proteins that NBCs do such as NPY. Certain types of NBC can form GABAergic synapses with pyramidal cells. NBCs are found mainly in layers II, and III. SBCs and LBCs are known to have specific axonal arborization patterns and are called classical basket neuronal subtypes (Zeng and Sanes, 2017). They are both aspiny multipolar neurons (Zeng and Sanes, 2017). SBCs have shorter, curvier axonal plexuses while LBCs have longer straight horizontal axonal plexuses (Zeng and Sanes, 2017).

The neurons of the mammalian rat neocortex are highly variable in their morphological characteristics (Ramon y Cajal 1899; Masland, 2004; Ling et al., 2012). Principal component analysis (PCA) is a statistical test that can be utilized to reduce a large set or variable to a smaller set that still accurately represents the data overall (Costa et al., 2010). It involves the translation of uncorrelated or correlated variables into a smaller set of uncorrelated variables which are known as principal components (Costa et al., 2010). These components are supposed to represent the variability of the data (Costa et al., 2010). PCA is a useful dimension-reduction procedure that allows for the variability underlying a potentially large data set, in this case, it can be used to study the morphological characteristics of rat neurons (Typlt et al., 2012; Ascoli 2006).

Thesis Statement

This experiment aims to understand whether the differences in individual morphologies between large and small basket cells are significant enough such that they can be divided and classified on this premise, ignoring the electrophysiological differences between large, nest, and small basket cells. This study also seeks to understand the role and significance of including a nest basket cell subclass when focusing on morphological differences as prior research has indicated that nest basket cells can be distinguished from small and large basket cells due to their

simpler dendritic arbors and the intermediate density of their axonal plexus (Wang et al., 2002). The alternative hypothesis states that large and small neuronal basket cells can be distinguishable solely on the premise of morphological differences; therefore, basket cells are a subclass of neurons with morphology distinct from large and small basket cells. The null hypothesis states that large and small basket cells cannot be distinguished solely on the premise of morphological differences, and therefore basket cells cannot be a distinct morphological subclass.

APPROACH OR METHODOLOGY

NeuroMorpho.Org

NeuroMorpho.Org (Ascoli 2006; July 2019) was utilized as the source of morphological data on basket cells in the rat neocortex. NeuroMorpho.Org was accessed by its web-based interface and the use of the first step in an informatics pipeline which consisted of shell-based scripts and the command line software curl. For example, the command line used for this experiment was [basket cell & neocortex & rat]. NeuroMorpho.Org was the selected source of data as it offers digitally reconstructed neurons from peer-reviewed studies (Ascoli 2006; July 2019). Previous research has been conducted similarly, using NeuroMorpho.Org to obtain data (Costa et al., 2010). Using NeuroMorpho.Org's web-based interface, allows for access to documented, peer-reviewed, digitally reconstructed samples detailing the morphological and physiological aspects of neurons. Figures 2.0 and 3.0 display information about the rats from which these neurons were derived, whether the basket cells were grown in-vivo or in-vito, and the stain used for imaging. The two stains used for staining in all of the studies which were used to generate data were either neurobiotin or biocytin.

Neurobiotin

Neurobiotin is an amino derivative of biotin that can be utilized in the intracellular labelling of cells, especially neutrons (Yu and Svoboda, 2018). It is useful for visualizing neural structure and morphology and locating gap junctions (Yu and Svoboda, 2018). Neurobiotin can be used in many different preparations including in vivo, whole mounts, slice preparations, or cultured cells (Yu and Svoboda, 2018). It is also versatile in delivery, as it can be delivered through intracellular electrodes, microinjection, cut-loading, or scrape-loading. Neurobiotin can be detected using avidin or streptavidin systems through chromogenic or fluorescence visualization methods (Yu and Svoboda, 2018). Some advantages that neurobiotin has over biocytin include that it is more soluble, undergoes efficient iontophoresis, longer lasting in the cell, non-toxic, and can be fixed with formalin (Yu and Svoboda, 2018).

Biocytin

Biocytin is often used as a substrate to study various cellular and tissue-level uptake mechanisms, and it is also used to label neurons including medium spiny neurons, and optic nerves (Yu and Svoboda, 2018). Biotin is derived from lysine and biotin, and can be hydrolyzed by biotinidase. It is considered to be a cell-impermeant, fixable, fluorescent polar tracer; polar tracers are commonly used to study cell to cell interactions and cell to liposome fusion, membrane permeability, gap junctions, and pinocytosis (Yu and Svoboda, 2018). It is water-soluble and can be delivered inside cells through whole-cell patch clamping, iontophoresis, and osmotic lysis of pinocytic vesicles (Yu and Svoboda, 2018).

Neurolucida

Neurolucida is a microscopy and digital imaging system that allows for neuron tracing, reconstruction, quantitative neuron analysis, and 3-dimensional brain mapping (Halavi et al., 2012). Neurolucida is capable of 500 quantitative morphological analysis from histological

specimens including dendrites, axons, nodes, synapses, spines, length, width, volume of dendrites and axons, the area and volume of somas and the complexity and extension of neurons (Halavi et al., 2012). Figure A shows an example of digitally reconstructed image of a rat basket cell derived from Neurolucida.dat software (Halavi et al., 2012).

Sampling and Measurements

There was a great deal of variation regarding whether the basket cells were maintained in-vivo or in-vito, along with gender and age variation in the rat specimens from which the basket cells were derived. A sample size of 304 rat neurons was used, as a relatively larger sample size will allow for better principal component analysis. Through Neuromorpho.Org, it was possible to create a table detailing the following components for each rat neuron studied: surface, volume, fractal dimension, width, height, depth, diameter, euclidean distance, path distance, branch order, contraction, fragmentation, partition symmetry, average Rall's ratio, bifurcation amplitude local, bifurcation amplitude remote, somatic surface, stems, bifurcations, branches, length, and most importantly the recorded cell type.

The term 'surface' refers to the total surface area of the neuron inμm^2. The 'somatic surface area' term accounts only for the surface area of the cell body. Volume refers to the volume of the neuron in μm^3(Ramachandran, 2002). Fractal dimension and fragmentation refer to the prevalence of fractal branching behavior in the neuron networks (Ramachandran, 2002). Width, height, and depth refer to measurements of the entire neuron in references to 3-dimensional plane, and are measured in μm; they are measured along the x-axis, y-axis, and z-axis respectively (Ramachandran, 2002). While length encompasses the length of each compartment of the neuron (Ramachandran, 2002). Diameter refers to the diameter of the cell soma in μm. Euclidean distance is a metric for comparing neuronal tree shapes in

μm(Ramachandran, 2002). The path distance encompasses the distance from dendrite to axon terminal, and is measured inμm(Ramachandran, 2002). Branch order accounts for dendritic arborization (Ramachandran, 2002). The term contraction accounts for the somatosensory nerve cells triggering muscle cell contractions through a neuromuscular junction site (Ramachandran, 2002). The term 'partition symmetry' refers to the symmetry in the neural grid-cell activity, and compares the symmetry of the processes in terms of the number of tips on the left bifurcation to the right bifurcation (Ramachandran, 2002). Rall's ratio accounts for the proportion of the diameter of the larger bifurcation and the smaller bifurcation (Ramachandran, 2002). The term 'bifurcation amplitude local' refers to the local angle formed right at the vertex of the branches as the two branches extend out of the bifurcation (Ramachandran, 2002). The term 'bifurcation amplitude remote' refers to the angle between two branches between the ends of two growing segments at a current bifurcation or terminal end (Ramachandran, 2002). The term 'stems' refers to the number of stems attached to the soma, 'bifurcations' refers to the number of bifurcation of the neuron, and 'branches' refers to the number of bifurcation of stems that have bifurcations (Ramachandran, 2002).

Principal Component Analysis

Table 1.0 illustrates an example of how tables can be constructed from the data generated from NeuroMorpho.Org, the data in these tables will be used for statistical analysis. The principal component analysis (PCA) will be based on a correlation matrix since the morphological data is measured by different units across variables. Minitab statistical software (version 14; Wild 2005) will be used for further data arrangement, grouping by a field, and statistical testing. A Scree plot will be used as a diagnostic tool to show the data variability that is captured by each of the principal components and to assess the optimal choice of components for exploring the neuronal

data set. A Scree plot essentially displays how much variation a principal component reflects, so data variability can be observed if there are distinguishable patterns for each cell type on the scree plot. The scree plot will show how each cell type (basket interneurons, descending basket interneurons, horizontal basket neurons, large basket neurons, small basket neurons, and nest basket neurons) varies morphologically. The first and second principal components (PC1 and PC2) reflect the features of morphology that show the greatest diversity of data (Costa et al., 2010). Observing the significance and degree of morphological diversity between basket cells is crucial to understanding whether basket cells can be distinguished based on individual morphology features (Costa et al., 2010). Minitab statistical software (version 14; Wild 2005) will be necessary to arrange data and conduct principal component analysis as it allows for the grouping of cell types and understanding variability of data within cell types for various principal analysis components such as surface area, volume, width, height, depth, somatic surface area, number of bifurcations, number of branches, and length.

Further Statistical Analysis

A student unpaired two-sample t-test was used to determine the significance of overall mean differences between large, small, and nest basket cells found in all layers on the premises of surface area (in micrometers) and number of branches.

The large, small and nest basket cells were also sorted by the layer of neocortex they were derived from and compared on the basis of surface area (in micrometers) and number of branches. The null hypothesis for each t-tests was:

H0: $\mu 1 = \mu 2$ (the two population means are equal)

The alternative hypothesis for the six different t-tests was:

H1: $\mu 1 \neq \mu 2$ (the two population means are not equal)

The alpha-value used 0.05, so if the p-value was greater than alpha, we fail to reject the null hypothesis.

Table 1.0 a sample table of data from 16 neurons from NeuroMorpho.Org. The PCA used 304 neurons in total.

Neuron name	Type	Surface Area	Volume	Width	Height	Depth	Soma Surface	N-bif	N-branch	Length
C280998A-I4	S	4668	598	184	415	130	652	64	132	3947
RP110105-L5-1-2-IDG	N	4875	749	567	571	69	629	88	181	6695
C280206C	S	5253	644	157	422	126	508	73	152	5233
VD100714C-IDA	N	5326	1202	392	372	204	1937	88	181	6377
RP110114-L5-1-IDG	L	5498	1188	483	622	402	1049	80	163	6477
C290998A	S	5587	1146	293	305	113	1241	24	57	3206
MTC121100B-IDH	S	6071	1035	442	489	50	747	105	221	7548
MTC121100B-IDI	L	6517	961	993	512	44	524	82	172	8571
C010306N	S	6517	989	327	202	127	428	56	116	3877
MTC100100-6-IDA	L	6600	1014	177	355	74	557	53	109	5542
MTC070301A-IDA	N	6789	838	195	343	97	499	112	232	9918
RP101228-L5-3-IDC	L	6800	1657	682	534	368	908	58	122	6921
RP110125-L5-1-IDA	L	6801	569	209	554	174	492	113	236	10105
RP110120-L5-4-IDB	S	7039	1140	302	427	433	931	144	294	10402
MTC300301B-IDA	L	7178	846	603	430	94	1054	213	433	13806
C270801-I3	L	7202	510	416	499	235	440	44	89	8135

Figure 1.0 above illustrates an image of a rat basket cell on NeuroMorpho.Org that was constructed through Neurolucida.dat software; it represents a visual model of Neuron NMO_35830 (retrieved from Turko et al., 2019).

Details about selected neuron	
NeuroMorpho.Org ID :	NMO_35830
Neuron Name :	TF29-PV-basket-cell
Archive Name :	Klausberger
Species Name :	rat
Strain :	Sprague-Dawley
Structural Domains :	Dendrites, Soma, Axon
Physical Integrity :	Dendrites Complete, Axon Moderate
Morphological Attributes :	Diameter, 3D, Angles
Min Age :	3.0 months
Max Age :	3.0 months
Gender :	Male
Min Weight :	300 grams
Max Weight :	500 grams
Development :	adult
Primary Brain Region :	hippocampus
Secondary Brain Region :	CA1
Tertiary Brain Region :	pyramidal layer, posterior
Primary Cell Class :	interneuron
Secondary Cell Class :	basket
Tertiary Cell Class :	Parvalbumin (PV)-positive, ErbB4-positive, Somatostatin (SOM)-negative, Neuropeptide Y (NPY)-negative, Cholecystokinin (CCK)-negative

Figure 2.0 above illustrates how information about neuron classification and information about the rat that the neuron is derived from is presented in NeuroMorpho.Org (retrieved from Turko et al., 2019).

Original Format :	Neurolucida.dat
Experiment Protocol :	in vivo
Experimental Condition :	Control
Staining Method :	Neurobiotin
Slicing Direction :	horizontal
Slice Thickness :	70 µm
Tissue Shrinkage :	Reported (no values given) Corrected (no values given)
Objective Type :	oil
Magnification :	100**x**
Reconstruction Method :	Neurolucida
Date of Deposition :	2014-01-13
Date of Upload :	2016-03-04
Persistence Vector :	TF29-PV-basket-cell.pvec
Note :	Max Age is unknown, displaying same value as in Min Age

Figure 3.0 above illustrates how information about neuron magnification and mapping is presented in NeuroMorpho.Org (retrieved from Turko et al., 2019).

Measurements	
Soma Surface :	2214.19 μm^2
Number of Stems :	4
Number of Bifurcations :	263
Number of Branches :	530
Overall Width :	590.2 µm
Overall Height :	654.75 µm
Overall Depth :	613.71 µm
Average Diameter :	0.72 µm
Total Length :	18076.2 µm
Total Surface :	42357.3 μm^2
Total Volume :	10322.9 μm^3
Max Euclidean Distance :	742.59 µm
Max Path Distance :	1547.18 µm
Max Branch Order :	38
Average Contraction :	0.85
Total Fragmentation :	6693
Partition Asymmetry :	0.58
Average Rall's Ratio :	1.79
Average Bifurcation Angle Local :	88.79°
Average Bifurcation Angle Remote :	83.46°
Fractal Dimension :	1.05

Figure 4.0 above illustrates how information about neuron morphology is presented in NeuroMorpho.Org (retrieved from Turko et al., 2019).

RESULTS

Table 2.0 below displays the following data values for all 304 rat basket cells: surface, volume, fractal dimension, width, height, depth, diameter, euclidean distance, and max path distance. This table is continued in the Appendix.

Basket cell name	Surface	Volume	Fractal Dimension	Width	Height	Depth	Diameter	Euclidean Distance	Max Path Distance
C010306C	7579.83	1533.22	1.04789	233.089	448.971	95.89	0.526872	365.232	722.071
C010306G	9162.81	1646.65	1.06343	270.782	189.571	96.3	0.572736	275.971	394.385
C010306N	6516.91	988.795	1.04652	326.772	202.119	126.61	0.524641	266.284	657.749
C010398B-I4	25467	3117.46	1.04	955.12	1115.42	259.82	0.41	807.95	1217.48
C010600A2	15609.3	1897.66	1.03	336.51	321.13	231.33	0.39	427.14	625.66
C010600B1	42711.1	5654.74	1.04	466.63	691.87	317.07	0.37	477.72	1266.01
C010600B2	28924.8	3831.27	1.06	480.27	832.38	619.17	0.39	598.57	1147.81
C010600C1	8980.65	918.23	1.04	344.18	385.3	153.16	0.37	329.68	716.85
C010700A	15604.3	1103.56	1.03	472.95	463.72	240.58	0.28	563.51	889.11
C011098A-I3	10038.9	1434.02	1.03	277.18	363.01	142.34	0.41	277.37	503.25
C020200-16	24137.7	2471.77	1.04	398.27	401.56	167.55	0.36	582.58	1017.66
C030502A	9913.64	1457.32	1.03512	412.245	375.064	50.84	0.481158	411.862	512.488
C031097B-I4	16400.2	4308.46	1.07	598.28	319.63	212.12	0.27	497.61	855.89
C040600A2	19224.7	1891.62	1.04	399.36	525.5	453.49	0.36	489.87	1000.27
C040600B1	17256.4	1874.39	1.03	365.28	348.03	259.95	0.36	396.46	744.15
C040600B3	22841.6	2382.14	1.03	286.34	512.94	161.49	0.36	402.4	718.56
C050301A1	34773.2	10208.2	1.02497	808.869	905.79	81.31	0.92549	703.582	2003.23
C050398B-I4	18208.09	2738.41	1.05	337.74	459.31	200.09	0.41	628.08	930.82
C050600B1	21322.2	2532.04	1.04	669.63	727.19	211.73	0.36	582.22	906.78
C060106F	9482.92	1875.26	1.04645	879.4	650.981	366.8	0.227121	933.443	1146.14
C060600A2	26062.2	2389.04	1.03	435.27	642.72	249.47	0.33	613.23	817.9
C060600A3	17315.59	1876.04	1.03	198.09	615.82	432.08	0.37	524.4	689.43
C060998B-I1	14865.1	1448.71	1.03	487.01	317.57	274.74	0.34	404.3	670.73
C070600A2	19993.59	2861.82	1.03	560.16	644.67	307.51	0.41	512.72	788.53
C070600A4	8033.67	874.59	1.06	267.41	358.7	153.41	0.38	231.97	716.61
C080300B2	19298.5	2108.31	1.03	473.88	527.17	246.43	0.36	634.13	927.17
C080301B1	24241.8	3861.01	1.05494	487.779	471.672	178.71	0.518634	541.988	817.908
C080998A	20524.7	3484.41	1.04	834.22	453.93	203.01	0.4	590.88	981.09
C090997A-I3	17479.7	3611.95	1.05	362.09	289.42	91.52	0.43	318.45	494.95
C110300A1	18539	2192.61	1.07	404.13	520.2	232.26	0.38	430.47	915.23
C120398A-I4	29850.2	7381.08	1.06	420.55	495.22	388.96	0.6	758.65	1121.4
C130301B	8166.91	825.897	1.04209	354.737	758.878	135.56	0.356601	500.25	796.478
C130897B-I1	12495.7	2437.25	1.05	263.35	445.15	193.34	0.57	443.2	644.95
C130897B-I4	8188.43	1721.19	1.06	341.48	346.45	120.96	0.57	372.49	662.57
C140300B-I2	13519	1536.13	1.03	348.05	756.93	83.96	0.38	783.43	1254.76
C140300B-I3	9849.33	1595.24	1.02	393.22	531.95	139.94	0.39	488.82	645.5
C140898A-I1	14197	2457.65	1.06	483.03	529.14	314.89	0.41	622.82	919.34
C140898A-I3	26881.6	4581.97	1.06	461.14	489.01	430.67	0.43	496.16	1341.52
C170500A-I4	16172	1390.97	1.05	198.19	224.51	312.74	0.31	291.55	587.68
C170897A-I1	17652.9	2805.62	1.05	355.99	402.45	156.35	0.46	313.48	559.42
C170898A-I1AXON	15638.6	1272.13	1.05232	432.121	283.151	203.81	0.305991	381.895	628.153
C170998D-I4	14246.6	1955.41	1.04	278.91	266.55	198.44	0.4	299.17	488.38
C180298A-I4	20432.59	2325.17	1.04	450.29	559.62	263.98	0.38	430	638.34
C181000A-I3	22683.1	2279.71	1.03	359.84	588.37	276.31	0.33	465.94	759.2
C190199A-I4	12590.8	1959.36	1.02	362.09	577.03	162.91	0.38	450.95	616.49
C200897C-I1	22219.8	2602.63	1.04	408.65	540.59	239	0.4	438.46	760.6
C220798A-I	14759.5	1511.04	1.04	391.88	589.47	216.04	0.33	436.45	1081.9
C230300D1	17370.4	2003.88	1.04	604.83	695.23	271.08	0.36	642.73	904.36
C230998C-I2	27578.2	4330.53	1.03	531.89	974.6	293.08	0.42	877.05	1008.49
C231001B1	13038.8	2063.93	1.1335	225.619	509.11	70.47	0.498051	528.382	824.596
C240298B-I2	19139.3	4575.08	1.05	271.81	268.3	319.68	0.59	499.8	628.35
C240298B-I4	24907.2	3103.35	1.05	506.7	626.71	235.33	0.41	453.37	758.7

Table 3.0 below displays the following data values for all 304 rat basket cells: max branch order, contraction, fragmentation, partition asymmetry, average Rall's ratio, average bifurcation angal local, soma surface, number of stems, and number of bifurcations. This table is continued in the Appendix.

Basket cell name	Max Branch Order	Contrac -tion	Fragme- ntation	Partition Asymmetry	Average Rall's Ratio	Average Bifurcat -ion Angle Local	Soma Surface	Number of stems	Number of bifurcat -ions
C010306C	9	0.849574	2078	0.463973	1.73133	79.5796	652.243	5	42
C010306G	11	0.8115	3034	0.42596	1.80435	82.963	728.417	6	66
C010306N	11	0.864124	1562	0.536009	1.8073	83.9205	428.091	4	56
C010398B-I4	23	0.86	4261	0.58	1.81	81.47	936.389	8	188
C010600A2	14	0.89	3120	0.52	1.87	78.26	685.111	7	148
C010600B1	26	0.86	9436	0.51	1.91	83.31	904.866	8	356
C010600B2	17	0.8	4794	0.55	1.86	81.62	853.696	7	161
C010600C1	21	0.88	2238	0.55	1.91	84.12	250.017	4	130
C010700A	16	0.86	3565	0.57	1.97	81.17	566.435	1	134
C011098A-I3	15	0.86	1613	0.51	1.8	86.58	1173.15	10	99
C020200-16	17	0.86	5181	0.51	1.87	80.74	819.505	14	207
C030502A	12	0.861638	2443	0.53222	1.88943	91.7224	908.286	10	56
C031097B-I4	20	0.82	5419	0.59	1.8	79.38	1286.85	4	292
C040600A2	17	0.85	3871	0.46	1.84	80.47	809.585	9	146
C040600B1	17	0.87	3403	0.52	1.94	83.99	735.415	10	168
C040600B3	16	0.86	5542	0.52	1.9	79.6	782.084	9	197
C050301A1	10	0.877295	4687	0.503269	1.82216	80.6665	6877.03	8	62
C050398B-I4	20	0.83	3844	0.57	1.78	76.82	1474.03	6	143
C050600B1	24	0.87	4626	0.55	1.89	80.43	534.775	7	266
C060106F	16	0.851253	5680	0.545095	2.04369	85.7257	726.489	6	102
C060600A2	16	0.88	5377	0.5	1.93	77.06	642.155	8	238
C060600A3	18	0.86	3058	0.57	1.87	73.98	668.562	4	152
C060998B-I1	18	0.89	2676	0.55	1.83	76.57	1219.72	7	200
C070600A2	19	0.88	3927	0.52	1.8	79.49	737.339	8	188
C070600A4	19	0.81	2262	0.58	1.93	92.65	421.058	6	94
C080300B2	16	0.87	4069	0.49	1.9	77.89	1315.11	6	147
C080301B1	13	0.813894	4765	0.508131	1.89285	92.4632	679.845	5	93
C080998A	19	0.85	3217	0.51	1.9	81.97	1362.71	4	145
C090997A-I3	25	0.9	3642	0.54	1.75	81.5	2058.07	7	292
C110300A1	14	0.79	5163	0.51	1.94	85.22	665.632	3	168
C120398A-I4	23	0.84	4076	0.55	1.75	78.24	2158.65	5	222
C130301B	12	0.845382	1977	0.67999	1.85155	85.1341	499.08	5	54
C130897B-I1	11	0.84	2012	0.49	1.81	85.28	936.013	9	71
C130897B-I4	14	0.84	1431	0.58	1.45	85.57	1438.59	5	52
C140300B-I2	19	0.88	2574	0.58	1.83	76.76	1171.3	8	124
C140300B-I3	11	0.89	1417	0.41	1.78	77.75	891.016	5	79
C140898A-I1	14	0.8	1980	0.55	1.87	78.92	1452.61	4	109
C140898A-I3	25	0.83	3986	0.56	1.71	77.06	1523.3	7	200
C170500A-I4	26	0.86	3887	0.6	1.9	83.37	1125.65	5	276
C170897A-I1	16	0.85	2461	0.5	1.84	80.6	834.69	8	134
C170898A-I1AXON	20	0.870879	3487	0.567143	1.86765	81.1479	1122.13	1	251
C170998D-I4	15	0.84	2689	0.5	1.74	80.06	764.146	9	127
C180298A-I4	16	0.86	3537	0.51	1.91	81.24	1068.83	4	203
C181000A-I3	18	0.83	6802	0.56	1.96	84.03	1385.18	7	216
C190199A-I4	17	0.92	2059	0.53	1.89	76.7	1361.66	10	121
C200897C-I1	18	0.85	3863	0.57	1.87	79.23	1010.88	11	194
C220798A-I	29	0.87	2312	0.6	1.83	81.67	1087.45	4	149
C230300D1	15	0.87	3835	0.56	1.87	82.12	1061.31	8	121
C230998C-I2	23	0.88	4666	0.59	1.74	75.51	1456.26	12	174
C231001B1	10	0.683697	4828	0.485609	1.73395	92.5501	1328.12	13	63
C240298B-I2	16	0.85	2654	0.54	1.69	83.37	1246.6	5	154
C240298B-I4	22	0.87	4210	0.57	1.89	79.68	1013.24	6	278

Table 4.0 below displays the following data values for all 304 rat basket cells: number of branches, average bifurcation angle remote, length, cell type, as well as categories that do not pertain to morphology but are displayed for identification purposes such as neuron ID, region, and layer. This table is continued in the Appendix.

Basket cell name	Number of branches	Average Bifurcat-ion Angle Remote	Length	Cell type	Neuron ID	Region	Layer
C010306C	89	73.9164	4222.21	Small basket intern	36779	somatosensory	layer 1
C010306G	138	80.4545	4795.72	Small basket intern	36784	somatosensory	layer 1
C010306N	116	89.2384	3876.6	Small basket intern	36785	somatosensory	layer 1
C010398B-I4	384	74.25	21166.6	Large basket intern	240	somatosensory	layer 4
C010600A2	303	69.38	14487.2	Nest basket interne	243	somatosensory	layer 4
C010600B1	720	68.06	38659.6	Large basket intern	244	somatosensory	layer 4
C010600B2	329	79.47	25547.4	Large basket intern	245	somatosensory	layer 4
C010600C1	264	76.61	8456.12	Small basket intern	246	somatosensory	layer 2-3
C010700A	269	73	17646.2	Nest basket interne	247	somatosensory	layer 4
C011098A-I3	208	80.59	8199.23	Small basket intern	248	somatosensory	layer 2-3
C020200-16	428	69.94	22742.1	Nest basket interne	250	somatosensory	layer 2-3
C030502A	122	75.2154	6358.49	Nest basket interne	37425	somatosensory	layer 2-3
C031097B-I4	588	75.95	21366	Small basket intern	260	somatosensory	layer 4
C040600A2	301	82.36	18947	Nest basket interne	262	somatosensory	layer 2-3
C040600B1	346	70.78	16621.09	Nest basket interne	263	somatosensory	layer 4
C040600B3	403	63.1	21683.7	Nest basket interne	265	somatosensory	layer 2-3
C050301A1	132	81.2805	13757.1	Nest basket interne	37427	somatosensory	layer 5
C050398B-I4	292	73.74	15579.3	Large basket intern	269	somatosensory	layer 2-3
C050600B1	539	74.32	19773.9	Large basket intern	272	somatosensory	layer 2-3
C060106F	210	84.9164	12339.8	Horizontal basket i	36783	somatosensory	layer 1
C060600A2	484	63.21	26995.7	Large basket intern	281	somatosensory	layer 4
C060600A3	308	67.42	16536.2	Nest basket interne	282	somatosensory	layer 4
C060998B-I1	407	71.98	14173.3	Small basket intern	283	somatosensory	layer 4
C070600A2	384	68.66	17094.9	Nest basket interne	287	somatosensory	layer 4
C070600A4	194	91.15	7202.98	Small basket intern	288	somatosensory	layer 2-3
C080300B2	300	62.54	18300.7	Nest basket interne	290	somatosensory	layer 2-3
C080301B1	191	71.5268	15374.2	Nest basket interne	36879	somatosensory	layer 5
C080998A	294	75.01	17105.3	Large basket intern	293	somatosensory	layer 5
C090997A-I3	591	73.37	12818.9	Small basket intern	295	somatosensory	layer 4
C110300A1	339	79.07	16343.7	Small basket intern	298	somatosensory	layer 2-3
C120398A-I4	449	76.76	19495.09	Large basket intern	299	somatosensory	layer 4
C130301B	113	64.0875	7204.84	Large basket intern	37437	somatosensory	layer 5
C130897B-I1	151	83.16	8135.61	Large basket intern	307	somatosensory	layer 4
C130897B-I4	109	75.98	4923.7	Large basket intern	308	somatosensory	layer 4
C140300B-I2	256	72.98	12305.8	Large basket intern	310	somatosensory	layer 2-3
C140300B-I3	163	68.91	8399.06	Large basket intern	311	somatosensory	layer 2-3
C140898A-I1	222	73.31	11266.9	Small basket intern	315	somatosensory	layer 4
C140898A-I3	407	77.26	20799.9	Small basket intern	316	somatosensory	layer 4
C170500A-I4	557	73.12	16716.8	Small basket intern	323	somatosensory	layer 2-3
C170897A-I1	276	71.68	13287.3	Nest basket interne	327	somatosensory	layer 4
C170898A-I1AXON	503	76.001	16595.3	Small basket intern	37441	somatosensory	layer 4
C170998D-I4	263	77.15	12144.2	Nest basket interne	331	somatosensory	layer 2-3
C180298A-I4	410	67.53	17093.3	Small basket intern	332	somatosensory	layer 2-3
C181000A-I3	439	69.25	22075.8	Nest basket interne	336	somatosensory	layer 4
C190199A-I4	252	64.27	10574.4	Nest basket interne	338	somatosensory	layer 2-3
C200897C-I1	399	72.07	18251.09	Nest basket interne	347	somatosensory	layer 4
C220798A-I	302	73.68	13821.9	Large basket intern	364	somatosensory	layer 4
C230300D1	250	66.34	16219.6	Large basket intern	366	somatosensory	layer 2-3
C230998C-I2	360	67.54	23388.3	Large basket intern	372	somatosensory	layer 4
C231001B1	139	83.2655	7899.99	Large basket intern	37447	somatosensory	layer 2-3
C240298B-I2	313	74.36	10612.4	Small basket intern	381	somatosensory	layer 4
C240298B-I4	562	70.5	19811.9	Large basket intern	382	somatosensory	layer 4

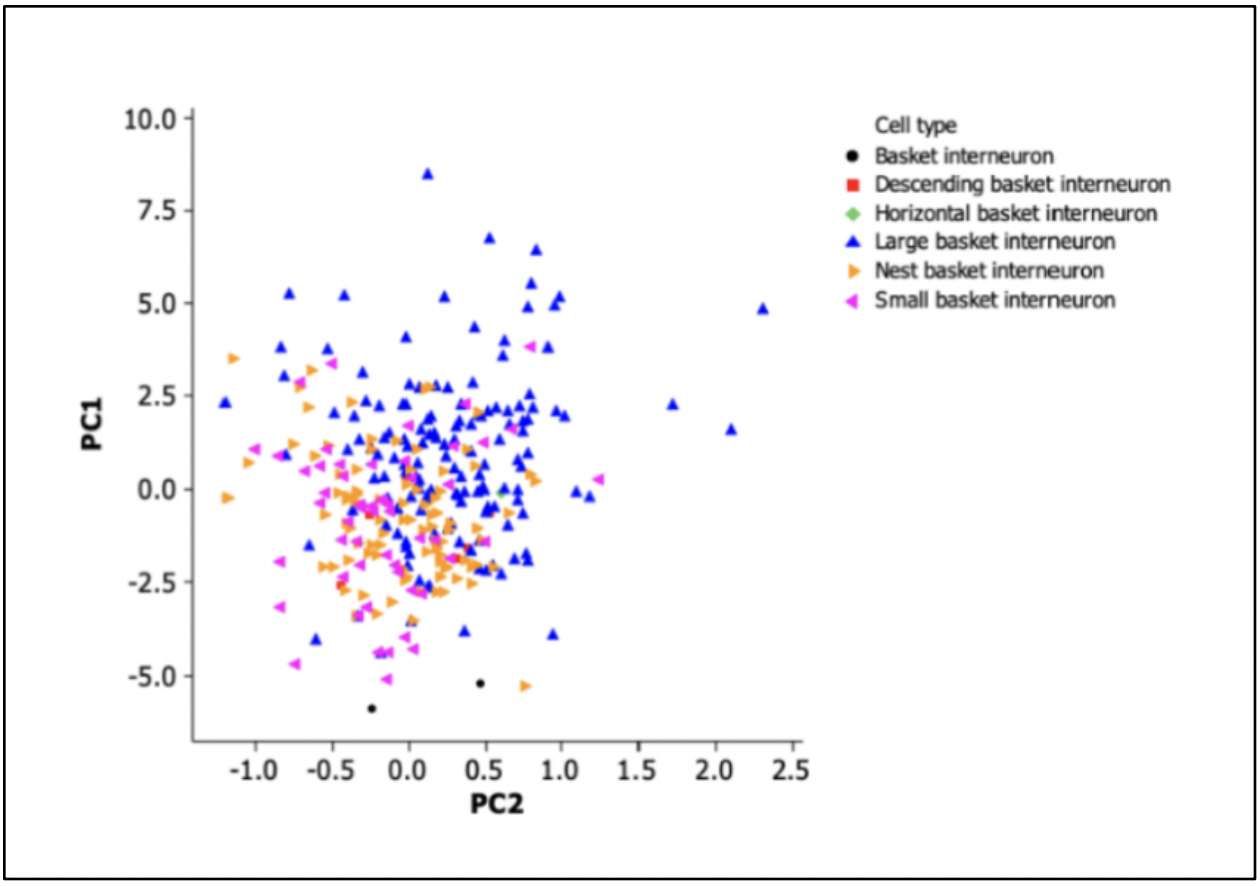

Figure 5.0 is a principal component analysis plot of basket cell neuronal morphologies in the somatosensory region of rat neocortex.

Layer Non-Specific T-Test

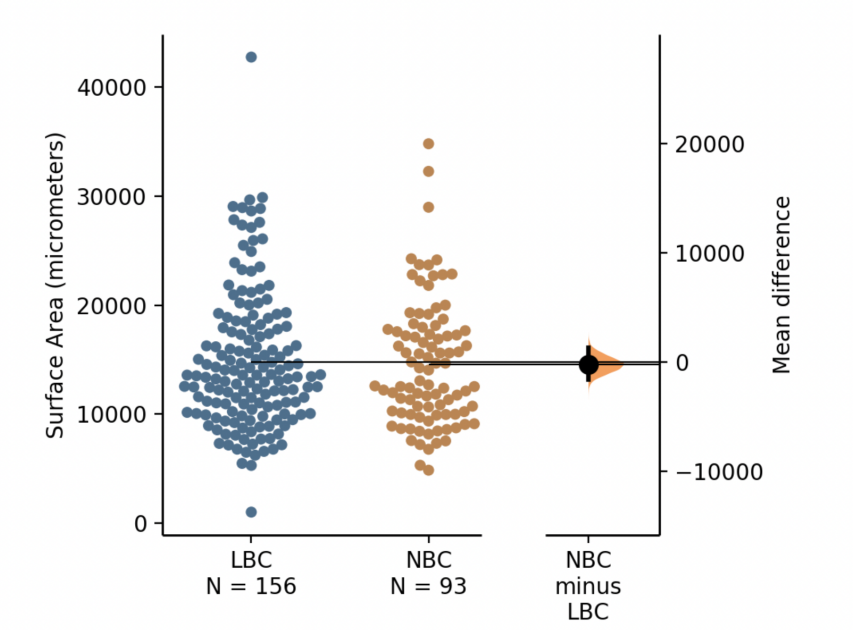

Figure 6.0 shows a Gardner-Altman estimation plot where large basket cell (LBC) and nest basket cell (NBC) surface area values are compared.

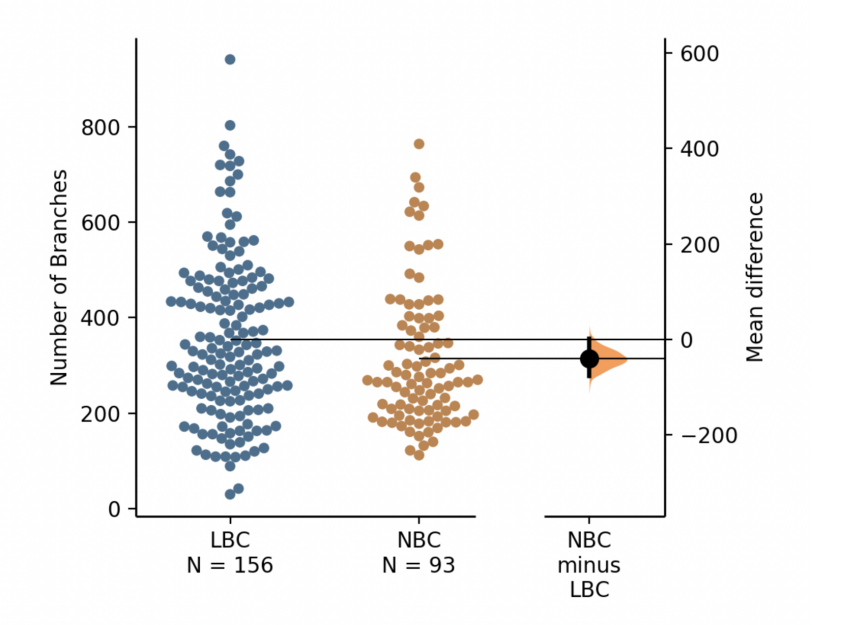

Figure 7.0 shows a Gardner-Altman estimation plot where large basket cell (LBC) and nest basket cell (NBC) branching number values are compared.

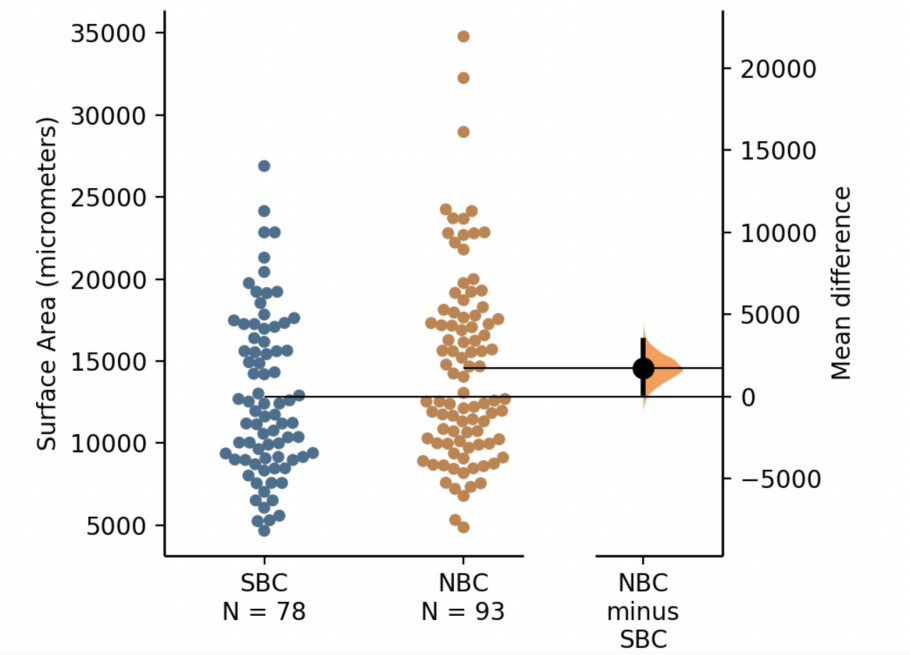

Figure 8.0 shows a Gardner-Altman estimation plot where small basket cell (SBC) and nest basket cell (NBC) surface area values are compared.

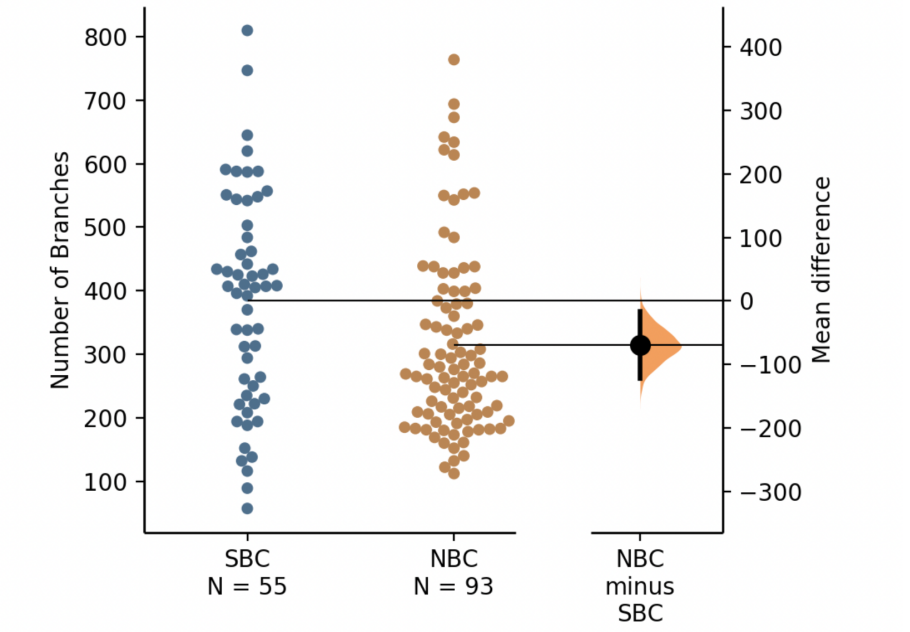

Figure 9.0 shows a Gardner-Altman estimation plot where small basket cell (SBC) and nest basket cell (NBC) branching number values are compared.

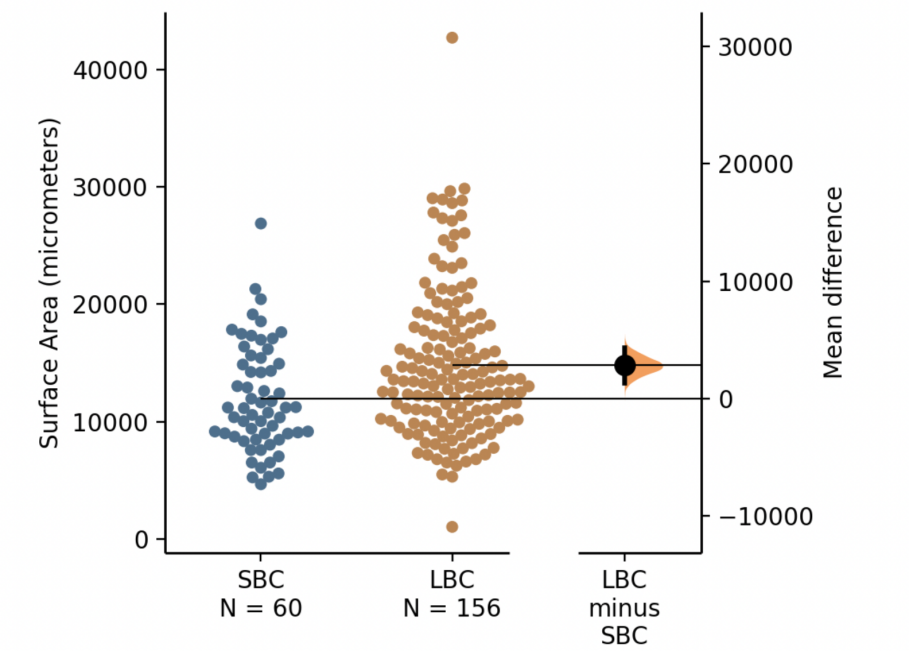

Figure 10.0 shows a Gardner-Altman estimation plot where large basket cell (LBC) and small basket cell (SBC) surface area values are compared.

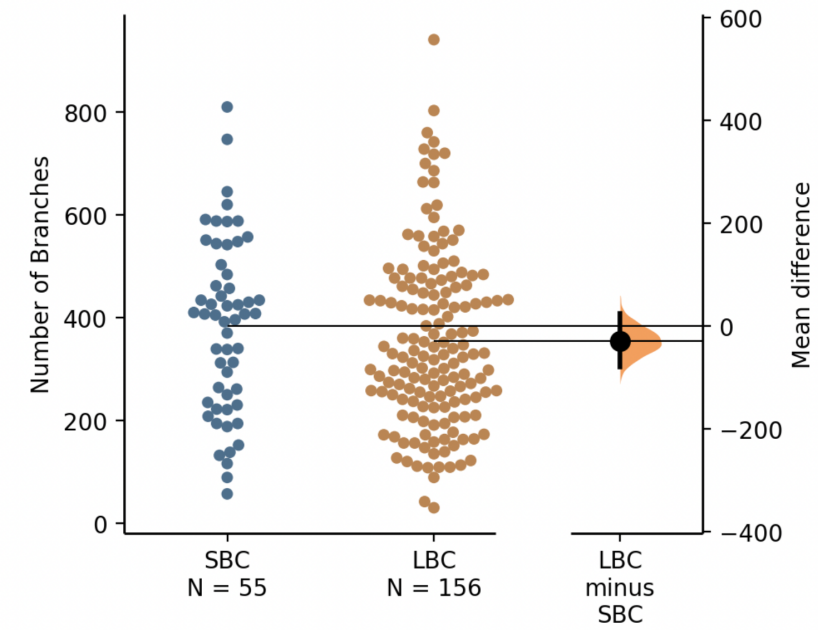

Figure 11.0 shows a Gardner-Altman estimation plot where large basket cell (LBC) and small basket cell (SBC) branching number values are compared.

Table 5.0 shows the p-values generated by the t-tests for layer non-specific mean comparisons of surface area and branching number for large, small, and nest basket cells.

Groups	Surface Area p-values	Number of Branches p-values	Significant mean Surface Area difference	Significant mean branching number difference
LBC and NBC	0.7750143438	0.0572012144	No	No
SBC and NBC	0.321482413	0.0883272269	No	No
LBC and SBC	0.2152807429	0.2712629174	No	No

Layer-Specific T-test

Table 6.0 shows the p-values generated by the t-tests for layer-specific mean comparisons of surface area and branching number for large, small, and nest basket cells.

Layer	Groups	Surface Area p-values	Number of Branches p-values	Significant mean Surface Area difference	Significant mean branching number difference
I	LBC and NBC	0.2323553955	0.9930202987	Yes	Yes
	SBC and NBC	0.4948291317	0.2089999467	Yes	Yes
	LBC and SBC	0.8017746715	0.1008147994	Yes	Yes
II-III	LBC and NBC	0.2581706053	0.001195976457	Yes	No
	SBC and NBC	0.2653821136	0.007716370702	Yes	No
	LBC and SBC	0.8558407021	0.8464214674	Yes	Yes
IV	LBC and NBC	0.002648540695	0.5707029322	No	Yes

	SBC and NBC	0.1660818132	0.08967445706	Yes	Yes
	LBC and SBC	0.2388712385	0.2283500412	Yes	Yes
V	LBC and NBC	0.8648609192	0.4216683287	Yes	Yes
	SBC and NBC	0.4291776453	0.03900392951	Yes	No
	LBC and SBC	0.5139364311	0.2558920436	Yes	Yes
VI	LBC and NBC	0.508273701	0.4180239034	Yes	Yes
	SBC and NBC	0.6268375994	0.859828145	Yes	Yes
	LBC and SBC	0.6687172832	0.6834570095	Yes	Yes

Layer I

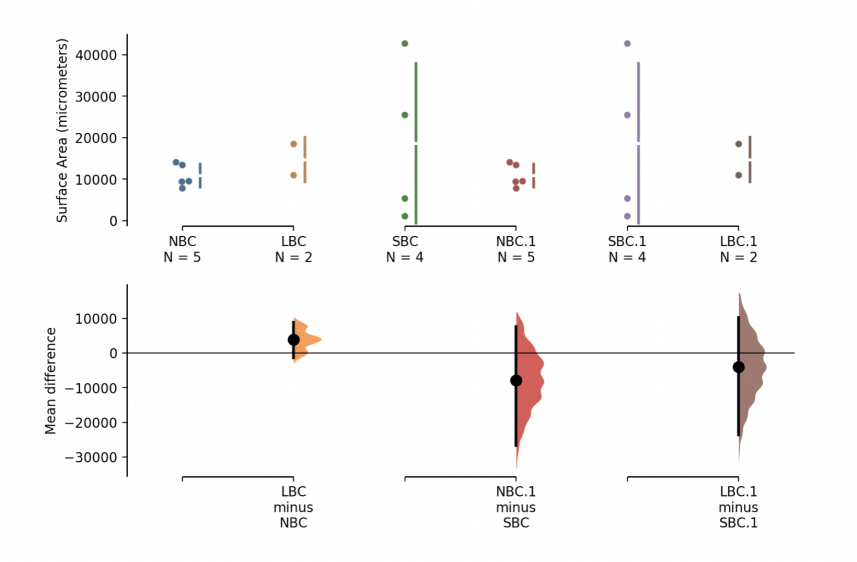

Figure 12.0 shows a Cumming estimation plot where layer I large, nest, and small basket cells surface area values are compared.

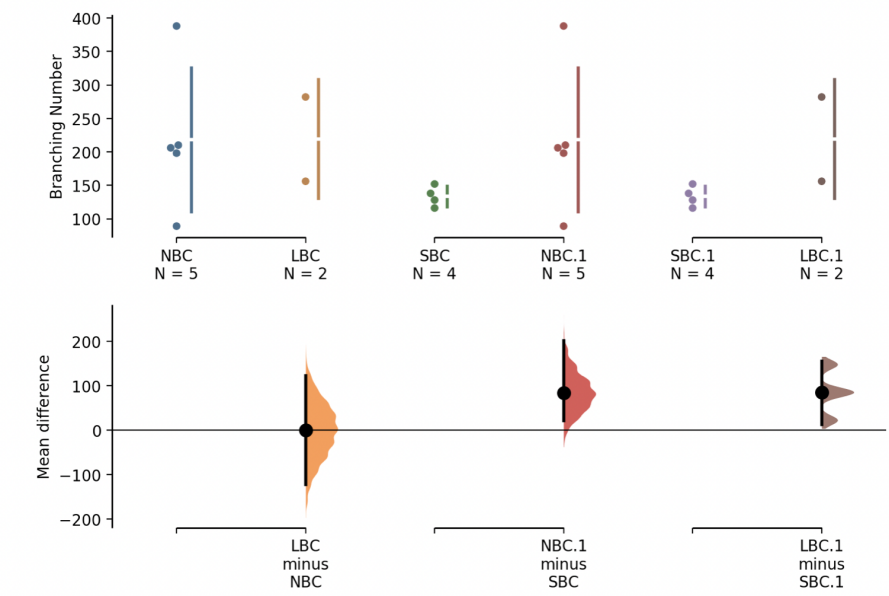

Figure 13.0 shows a Cumming estimation plot where layer I large, nest, and small basket cells branching number values are compared.

Layer II-III

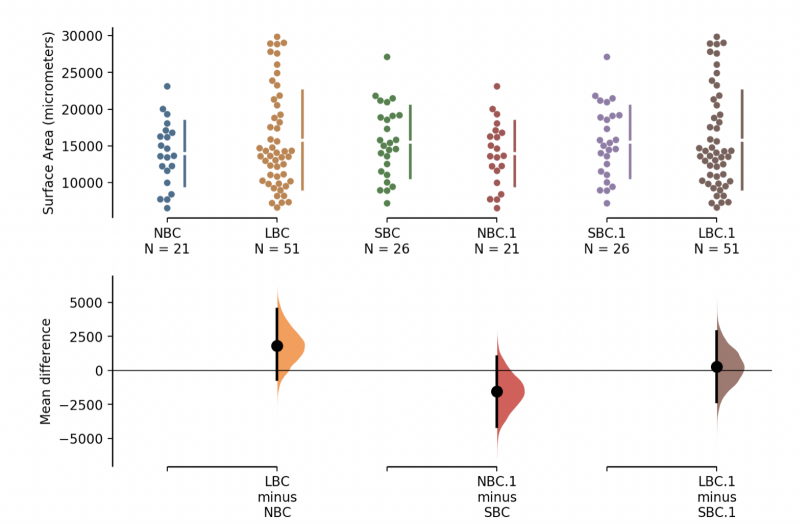

Figure 14.0 shows a Cumming estimation plot in which layers II-III large, nest, and small basket cells surface area values are compared.

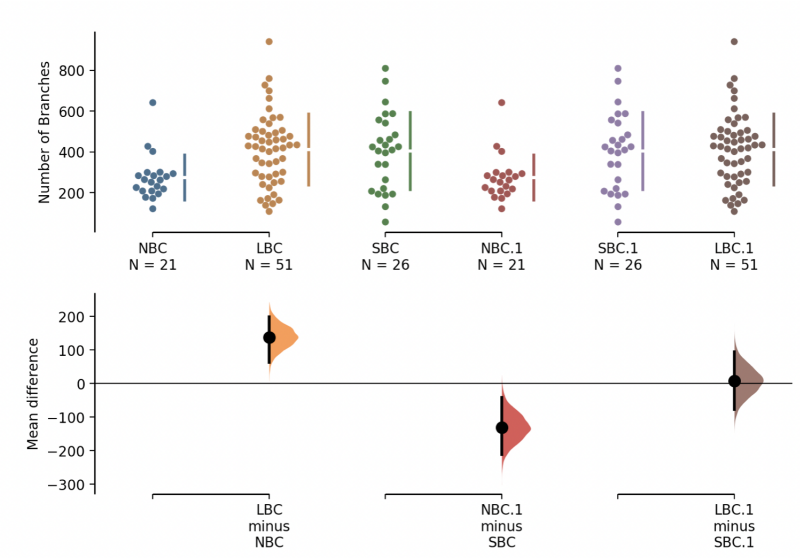

Figure 15.0 shows a Cumming estimation plot in which layers II-III large, nest, and small basket cells branching number values are compared.

Layer IV

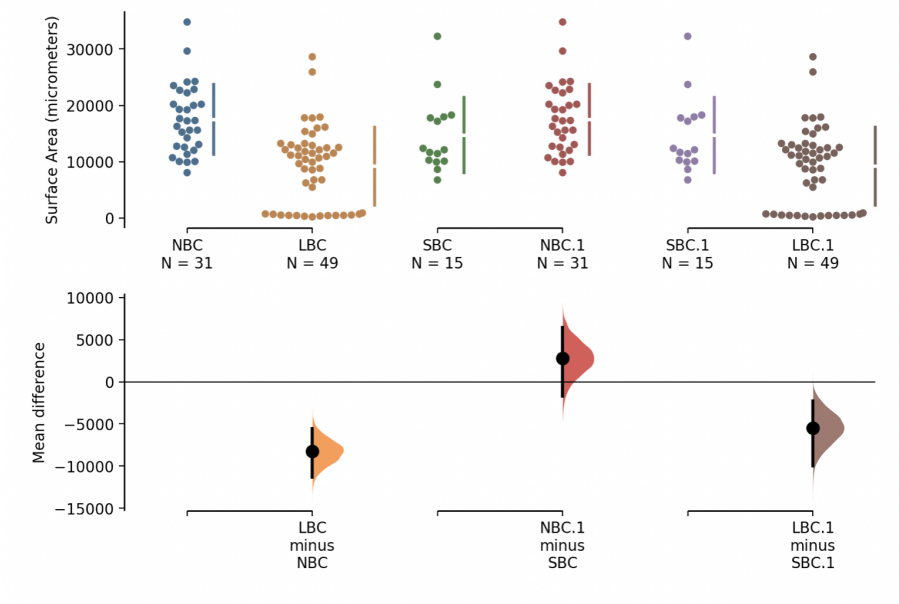

Figure 16.0 shows a Cumming estimation plot where layer IV large, nest, and small basket cells surface area values are compared.

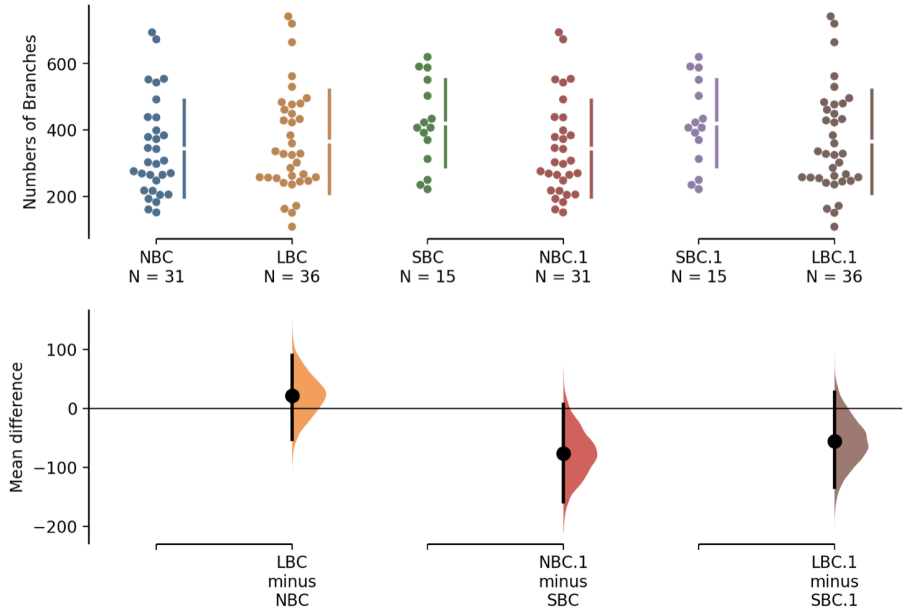

Figure 17.0 shows a Cumming estimation plot where layer IV large, nest, and small basket cells branching number values are compared.

Layer V

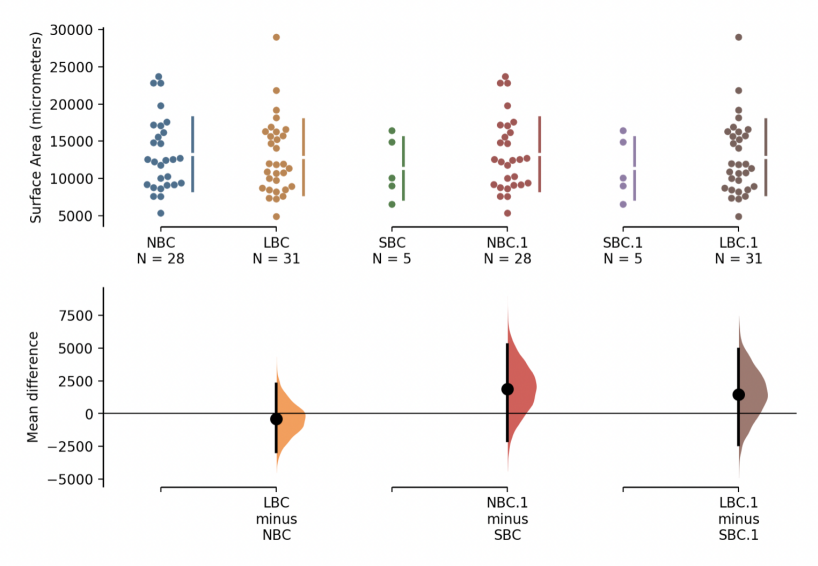

Figure 18.0 shows a Cumming estimation plot where layer V large, nest, and small basket cells surface area values are compared.

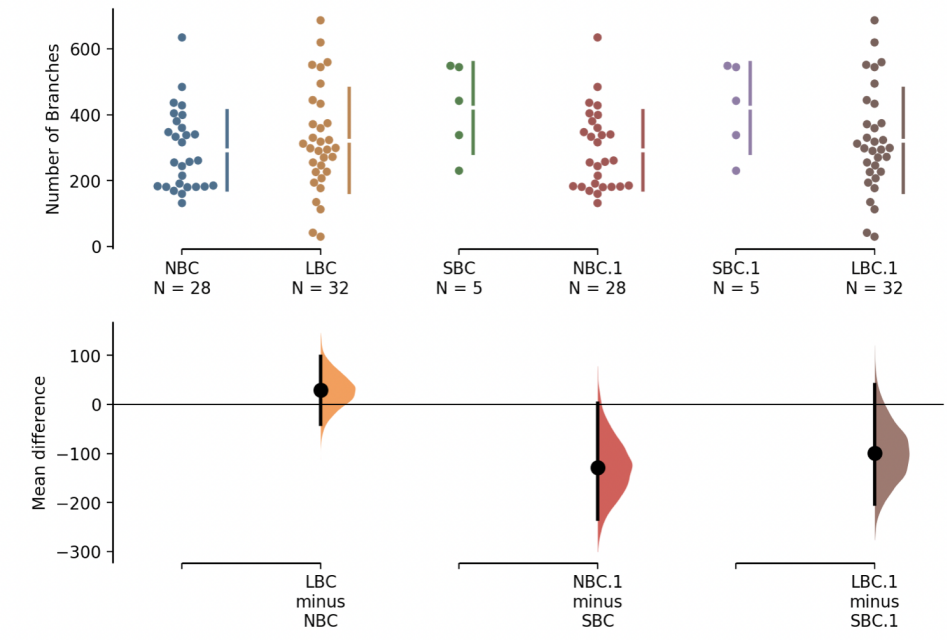

Figure 19.0 shows a Cumming estimation plot where layer V large, nest, and small basket cells branching number values are compared.

Layer VI

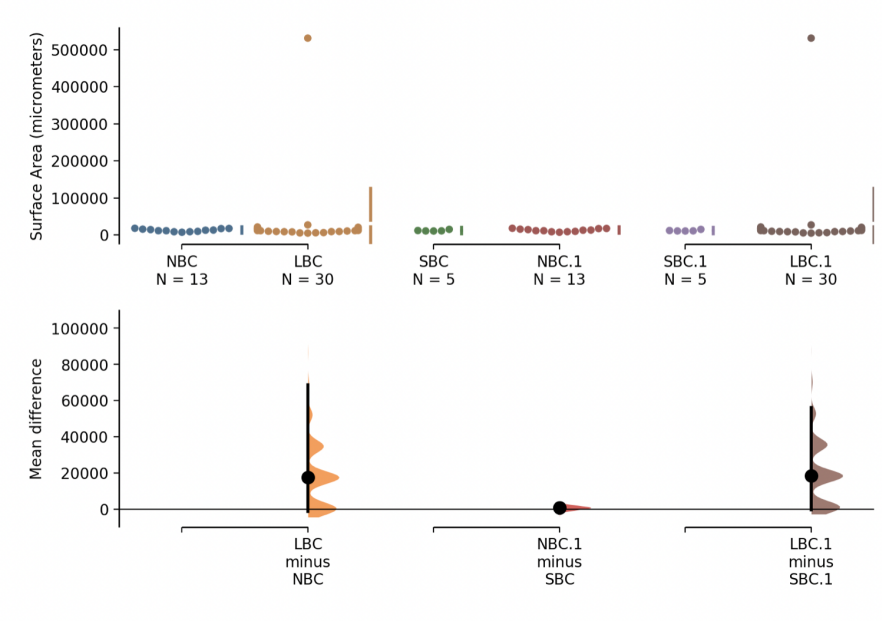

Figure 20.0 shows a Cumming estimation plot where layer V large, nest, and small basket cells surface area values are compared.

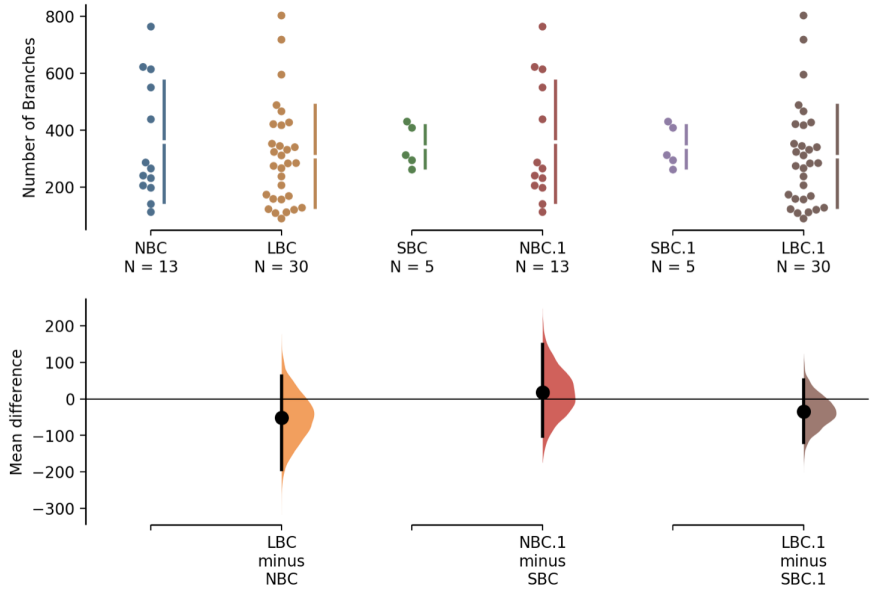

Figure 21.0 shows a Cumming estimation plot where layer V large, nest, and small basket cells branching number values are compared.

DISCUSSION

This study tested the hypothesis that the classical basket neuronal cell types, large and small, are distinct. The nest basket cell also has been identified, but these are intermediate in size, so any rejection of the above hypothesis will lead to a conclusion that the nest basket cell is also not a valid category of morphological cell type.

Figure 5.0 shows the multivariate statistical test to verify that large and small basket cells are distinct groups. This test used analysis to summarize the neuronal anatomical features by their principal components. These components are uncorrelated and calculated by a linear model assumption. This result allows one to plot the components as representative of the multitude of morphological feature values and interpret whether the large and small basket cells form clusters in the plot. This is a qualitative part of this kind of analysis.

The large and small basket cells do not cluster in Figure 1 (blue and orange triangle symbols). These cell types overlap in the figure plot as expected from non-distinct groups. Therefore, the hypothesis is rejected that the large and small types are distinct according to morphology as originally proposed.

Tables 2.0-4.0 shows further details of the basket neurons as shown in the figure. This is a subset of the data to illustrate and contrast the large and small types. They were selected by similarity in surface area. It is clearly shown in the table that the small and large types do not have distinct surface area sizes. For example, the small basket neurons with names C280998A-I4 and RP110120-L5-4-IDB show surface area in millimeters of 4668 and 7039, respectively. Therefore, no large basket neurons should show a surface in between these values, otherwise, the grouping would not be distinct and provide any prediction for basket cell type according to the surface area. The surface area is measured by the total area surrounding the neuron and its

processes. However, several large basket cells defy this pattern such as neurons named RP110114-L5-1-IDG and MTC121100B-IDI (surface area in millimeters of 5498 and 6517, respectively).

The results of the layer non-specific t-tests, the quantitative part of the analysis, show that the results of this study do not support the hypothesis that large and small neuronal basket cells can be distinguishable on the premise of morphological differences, and therefore also rejects the hypothesis that basket cells are a subclass of neurons with morphology distinct from large and small basket cells. However the results of the layer-specific t-test analysis shows that there is significant mean difference between the large, nest, and small basket cell surface area and branching number mean values with the exception of branching number differences between all groups in layer II-III, and branching number differences between small and nest basket cells in layer V. The layer-specific t-test results indicate that further research is needed to properly classify basket cells and identify the correct morphological parameters needed to distinguish cell type as there were varying numbers of large, nest, and basket cells in each of the layers, which could cause a skewing of the data.

While the physiological features may be informative in creating groups of basket cells, the original method of morphological analysis is not robust at the population level of neurons, but instead produces artificial instances of distinctiveness when analyzing small populations of basket cells (citation to that paper). Repeated use of tests in their manner, such as 2-sample z-tests, is not robust at the population level because of sampling error in the neuron morphologies (knowledge from Table 2.0). The database indicator of basket cell type is very likely from individual studies that have not been compared to one another. In fact, in this large scale study, it

is apparent that the basket cell type definition is not consistently applied in these past studies. The conclusion is that the basket cell classification scheme is not yet robust to use in the future.

The major criteria for classifying the basket cell neuron include the dendritic branching structure and axon length (Wang et al., 2002). They function as an inhibitor in the local neural circuit of the neocortex of the rat. Therefore, they are expected to have short axons, such as in the somatosensory multilayered region and function within one of the layers. Given the result that the axon length is not informative in basket cell type, then generally these interneurons are from a single type and function similarly.

The physiology markers may show differences in these basket cell types, but in that case, a correlation would have to exist between these markers and identifiable morphological features, such as the original definition by axon length which was not available in the database (Raman y Cajal 1899, 1911). However, the height and length measurements of the neuron are not consistent with the current scheme either. And even in this case a classification scheme would have to be robust enough and include many morphological parameters to explain both the cell type and also proposed function (Wang et al., 2002). This function would theoretically show a difference between the large and small types if the classification scheme is formulated consistently and valid for the known data sets.

BIBLIOGRAPHY

1) Andres-Barquin PJ. 2001. Ramón y Cajal: a century after the publication of his masterpiece. Endeavour. 25: 13-17.

2) Ascoli GA. 2006. Mobilizing the base of neuroscience data: the case of neuronal morphologies. Nature Review Neuroscience 7: 318-324.

3) Brown KM, Gillette TA, Ascoli GA. 2008. Quantifying neuronal size: summing up trees and splitting the branch difference. Seminars in Cell & Developmental Biology 19: 485-493.

4) Cechetto, D. F., & Weishaupt, N. (2017). *The cerebral cortex in neurodegenerative and neuropsychiatric disorders: Experimental approaches to clinical issues*. Elsevier/Academic Press.

5) Costa Lda F, Zawadzki K, Miazaki M, Viana MP, Taraskin SN. 2010. Unveiling the neuromorphological space. Frontiers in Computational Neuroscience 4: 150.

6) DeFelipe J. 2015. The anatomical problem posed by brain complexity and size: a potential solution. Frontiers in Neuroanatomy 9: 104.

7) Donohue DE., Ascoli GA. 2011. Automated reconstruction of neuronal morphology: an overview. Brain Research Reviews 67: 94-102.

8) Feldmeyer, Dirk. (2010). Neuroscience: Signals far and away. Nature. 464. 1134-6. 10.1038/4641134a.

9) Feng L, Zhao T, Kim J. 2015. neuTube 1.0: A New Design for Efficient Neuron Reconstruction Software Based on the SWC Format. eNeuro 2: 1-10.

10) Halavi M, Hamilton KA, Parekh R, Ascoli GA. 2012. Digital reconstructions of neuronal morphology: three decades of research trends. Frontiers in Neuroscience 6: 49.

11) Holt CE, Martin KC, Schuman EM. 2019. Local translation in neurons: visualization and function. Nature Structural & Molecular Biology 26: 557-566.

12) Jarvis S, Nikolic K, Schultz SR (2018) Neuronal gain modulability is determined by dendritic morphology: A computational optogenetic study. PLoS Comput Biol 14(3): e1006027. https://doi.org/10.1371/journal.pcbi.1006027

13) Ling C, Hendrickson ML, Kalil RE (2012) Morphology, Classification, and Distribution of the Projection Neurons in the Dorsal Lateral Geniculate Nucleus of the Rat. PLoS ONE 7(11): e49161. https://doi.org/10.1371/journal.pone.0049161

Mai, J. K., & Paxinos, G. (2012). The Human Nervous System. Elsevier Academic Press.

14) Manis PB, Kasten MR, Xie R (2019) Classification of neurons in the adult mouse cochlear nucleus: Linear discriminant analysis. PLoS ONE 14(10): e0223137. https://doi.org/10.1371/journal.pone.0223137

15) Manis PB, Spirou GA, Wright DD, Paydar S, Ryvgo DK. Physiology and morphology of complex spiking neurons in the guinea pig dorsal cochlear nucleus. J Comp Neurol. 1994;348: 261–276. pmid:7814691

16) Masland RH. 2004. Neuronal cell types. Current Biology 14: R497-500.

17) Meijering E. 2010. Neuron tracing in perspective. Cytometry Part A. 77: 693-704.

18) Morris, R. (2006). *Cognitive systems: Information processing meets brain science*. Elsevier.

19) Rakic P. 1988. Specification of cerebral cortical areas. Science 241: 170-176.

20) Palomero-Gallagher, N., & Zilles, K. (2019). Cortical layers: Cyto-, myelo-, receptor- and synaptic architecture in human cortical areas. *NeuroImage*, *197*, 716–741. https://doi.org/10.1016/j.neuroimage.2017.08.035

21) Ramachandran, V. S. (2002). *Encyclopedia of the human brain*. Academic Press.

22) Ramon y Cajal S. 1899. Textura del Sistema Nervioso del Hombre y de los Vertebrados trans (Nicolas Moya, Madrid).

23) Ramon y Cajal S. 1911. Histologie du système nerveux de l'homme et des vertebras (Paris: Maloine).

24) Rees CL, Moradi K, Ascoli GA. 2017. Weighing the Evidence in Peters' Rule: Does Neuronal Morphology Predict Connectivity? Trends in Neuroscience 40: 63-71.

25) Scorcioni R, Polavaram S, Ascoli GA. 2008. L-Measure: a web-accessible tool for the analysis, comparison and search of digital reconstructions of neuronal morphologies. Nature Protocols 3: 866-876.

26) Turko, P., Groberman, K., Browa, F., Cobb, S., & Vida, I. (2019). Differential Dependence of GABAergic and Glutamatergic Neurons on Glia for the Establishment of Synaptic Transmission. Cerebral cortex (New York, N.Y.: 1991), 29(3), 1230-1243.

27) Typlt M, Englitz B, Sonntag M, Dehmel S, Kopp-Scheinpflug C, Ruebsamen R (2012) Multidimensional Characterization and Differentiation of Neurons in the Anteroventral Cochlear Nucleus. PLoS ONE 7(1): e29965. https://doi.org/10.1371/journal.pone.0029965

28) Wang Y, Gupta A, Toledo-Rodriguez M, Wu CZ, Markram H. 2002. Anatomical, physiological, molecular and circuit properties of nest basket cells in the developing somatosensory cortex. Cerebral Cortex 12: 395-410.

29) Watson, C., Paxinos, G., & Puelles, L. (2012). The mouse nervous system. Elsevier. Retrieved November 8, 2021, from https://www.sciencedirect.com/book/9780123694973/the-mouse-nervous-system.

30) Wild DJ. 2005. MINITAB Release 14. Journal of Chemical Information and Modeling 45: 212.

31) Yu, J., & Svoboda, K. (2018). Biocytin/Neurobiotin staining followed by immunostaining V1. *Protocols.io*. https://doi.org/10.17504/protocols.io.wa4fagw

32) Zeng H, Sanes JR. 2017. Neuronal cell-type classification: challenges, opportunities and the path forward. Nature Reviews in Neuroscience 18: 530-546.

33) Zippo, Antonio. (2011). Neuronal Ensemble Modeling and Analysis with Variable Order Markov Models Contents.

APPENDIX

Table 2.0 Continued

Basket cell name	Surface	Volume	Fractal Dimension	Width	Height	Depth	Diameter	Euclidean Distance	Max Path Distance
C240998A-I3	17086.7	1687.26	1.04	301.39	493.53	450.79	0.33	435.31	716.89
C250300C2-ax	10726.3	775.02	1.03	505.87	839.43	198.2	0.28	682.89	762.52
C250500A-I4	12163.6	1864.06	1.04	408.72	701.29	177.28	0.43	754.54	934.16
C260897C-I1	23239.3	3654.27	1.07	242.05	645.76	257.27	0.41	537.89	761.23
C270106A	18477	2887.91	1.05074	333.31	698.052	275.88	0.346628	456.299	1395.15
C270106C	10935.3	1349.69	1.06124	705.82	458.97	156.02	0.352333	665.628	1089.07
C270106G	7769.84	1265.95	1.05505	389.062	290.487	191.97	0.265396	318.898	708.143
C270801-I3	7201.95	510.45	1.03	415.65	499.07	235.27	0.28	572.24	899.49
C271097A-I4	29027.9	4820.05	1.05	637.16	921.71	153.66	0.43	847.3	1154.93
C280206C	5253.02	643.694	1.06775	157.351	421.508	126.12	0.307325	404.245	587.247
C280998A-I2	11335	1742.03	1.03	477.92	695.76	249.48	0.43	585.25	788.04
C280998A-I4	4668.21	598.15	1.05	184.23	415.32	130.19	0.41	336.62	392.65
C280999A-I4	13065.4	2514.52	1.02667	392.794	499.619	246.23	0.515268	436.317	694.348
C281197A-I2	23878.5	2909.43	1.05	741.83	725.4	241.91	0.4	678.13	997.88
C281197A-I4	23700.7	3208.84	1.05	696.68	544.05	137.88	0.44	678.55	954.81
C281199A-IN	14064.4	1892.7	1.03	445.37	615.24	109.78	0.44	740.53	786.55
C290500B-I2	17184.2	3016.18	1.04	352.12	381.45	300.5	0.42	392.63	678.65
C290998A	5586.89	1145.53	1.05702	292.807	305.001	112.6	0.568831	297.512	417.8
C290999C-I4	32243.7	3673.2	1.04	614.66	537.69	351.63	0.36	467.4	1237.56
C300106A	12906.6	1933.03	1.04127	186.858	342.763	107.47	0.446516	229.454	448.331
C300301B1	530996	2205520	1.04	576.85	383.07	159.36	12.08	439.17	685.2
C300898C-I3	12128.2	1620.31	1.05	263.01	258.95	238.39	0.42	304.27	526.91
C300997B-I4	18290.7	2553.05	1.05	373.71	342.06	622.52	0.38	570.65	833.32
C310106C	17541.9	2648.3	1.02677	536.562	717.519	228.92	0.517423	597.832	863.231
C310897A-I2	28842.7	4453.97	1.04	890.84	360.8	316.7	0.46	711.57	1063.88
d030100ka	1035.76	68.6744	1.04741	173.67	330.481	39.5	0.194054	293.805	373.877
d250501me	5311.88	977.197	1.04377	232.631	615.22	44.99	0.465577	360.578	446.252
MTC010301B-IDE	12390.2	2188.84	1.03906	373.556	473.559	203.11	0.407511	453.573	883.118
MTC020502F-IDB	10122.6	1236.86	1.03576	436.97	673.299	101.39	0.25529	494.199	841.887
MTC021101A-IDA	27812.4	4494.43	1.03203	730.21	694.379	199.97	0.2545	786.402	1135.04
MTC030800C-IDA	14257.5	1023.6	1.03917	392.97	566.52	73.48	0.198953	475.299	1221.03
MTC031100A-IDA	17774.9	2402.61	1.03906	431.778	315.677	137.29	0.251281	429.982	881.838
MTC031100A-IDC	11457.2	1708.82	1.03352	520.362	336.89	288.98	0.296997	614.441	790.394
MTC031100A-IDD	8650.97	895.033	1.02851	445.551	374.32	82.98	0.232785	438.302	792.047
MTC040800A-IDB	9006.29	1340.69	1.06074	302.834	511.101	101.22	0.296471	418.575	832.42
MTC040800B-IDA	8953.9	1061.84	1.04862	381.085	376.719	60.42	0.325966	341.347	1124.74
MTC050301A-IDA	21834.4	2577.44	1.02047	443.809	663.55	75.66	0.244829	559.071	839.348
MTC050301A-IDC	10819.1	1865.73	1.03111	676.053	453.088	95.75	0.328118	617.841	739.123
MTC050600A-IDA	11675.5	1291.62	1.04741	569.226	531.221	83.12	0.218006	497.456	980.51
MTC050600A-IDB	15879	2271.17	1.04095	343.636	824.36	83.49	0.208953	730.143	1116.43
MTC050600B-IDA	11118.7	812.4	1.02498	794	790.17	77.65	0.19974	594.51	809.058
MTC050800A-IDA	9973.54	1523.06	1.03957	327.23	547.5	73.28	0.326654	407.685	864.316
MTC050800A-IDE	14307.6	1858.08	1.04072	481.479	671.583	73.6	0.262157	548.962	1429.45
MTC050800B-IDB	15603.1	1447.85	1.05225	361.361	678.06	128.16	0.205316	701.885	1165.31
MTC060800A-IDC	9812.26	1499.63	1.02241	640.401	608.999	102	0.331467	687.2	806.505
MTC060800A-IDF	10293.5	1862.16	1.03598	333.219	568.24	73.98	0.360368	438.174	993.726
MTC060800B-IDA	10240	496.766	1.04226	917.932	314.062	78.84	0.161294	889.375	1118.42
MTC060800C-IDA	7330.53	859.529	1.06652	591.391	930.784	194.95	0.20436	1127.14	1463.32
MTC060800C-IDB	14322.6	2904.3	1.03423	433.159	992.15	113.4	0.40692	885.54	995.494
MTC060800D-IDA	17960.1	2391.71	1.08475	268.809	346.738	78.35	0.24328	320.222	637.198
MTC061100A-IDE	11038.4	1665.57	1.04502	449.441	406.857	158.89	0.284886	726.494	975.868
MTC061100B-IDA	10172.2	1601.18	1.04928	741.522	708.432	138.64	0.275679	759.775	1354.46
MTC070301A-IDA	6789.44	837.943	1.03404	195.156	342.949	96.75	0.252879	395.256	730.584
MTC070301C-IDA	12951.8	1407.67	1.03137	317.224	734.858	83.37	0.229386	568.072	1363.39
MTC080301C-IDA	9230.87	1499.38	1.02746	911.271	327.272	59.84	0.313428	576.514	977.027
MTC080800A-IDD	13445.9	1612.84	1.03576	776.276	283.041	222.33	0.231904	635.126	913.107

Basket cell name	Surface	Volume	Fractal Dimension	Width	Height	Depth	Diameter	Euclidean Distance	Max Path Distance
MTC080800C-IDC	18798.3	4021.7	1.0321	653.671	730.381	126.83	0.414174	776.553	1045.2
MTC090800B-IDB	19234.4	2505.93	1.05271	535.889	416.36	110.31	0.201118	519.884	1183.29
MTC100100-6-IDA	6600.08	1014.31	1.05578	176.662	354.99	73.57	0.390812	336.053	621.517
MTC100100-6-IDB	7265.06	1007.93	1.06458	373.966	534.475	79.01	0.340104	675.659	1085.99
MTC100300A-IDB	9720.37	649.66	1.04034	367.722	458.15	71.1	0.179543	404.711	633.741
MTC100300D-IDA	9078.03	633.756	1.07852	277.983	225.379	73.16	0.128069	229.524	557.98
MTC110300B-B1-2-NBC-	12320.7	1046.91	1.05632	543.139	490.649	261.24	0.196749	567.341	902.823
MTC110300B-B1-2-NBC-	13621.2	966.154	1.04465	375.264	718.166	157.83	0.167584	673.941	1063.02
MTC110301B-IDA	18127.9	3726.33	1.02091	536.11	964.279	126.46	0.357751	810.199	907.471
MTC120501B-IDA	14677.8	1975.47	1.045	442.138	610.456	131.54	0.235271	566.722	703.358
MTC120501B-IDB	9502.81	1713.24	1.02962	287.292	432.029	91.8	0.278734	453.219	687.547
MTC121100B-IDB	12404.6	1587.85	1.04214	866.893	666.327	175.35	0.249474	668.25	953.964
MTC121100B-IDG	13579.8	2695.27	1.0592	263.279	555.87	85.04	0.237062	678.127	819.371
MTC121100B-IDH	6071.26	1035.47	1.0509	441.936	488.901	50.25	0.234583	718.612	1068.59
MTC121100B-IDI	6516.78	961.37	1.04856	993.352	511.719	43.95	0.23615	989.854	1178.24
MTC130201A-IDA	8397.52	680.581	1.03187	425.058	688.439	200.61	0.130166	720.99	1095.78
MTC130301A-IDA	11599.8	2490.2	1.03558	792.698	418.441	134.18	0.40448	570.561	803.185
MTC130800A-IDA	14617.4	1606.48	1.06868	726.232	624.034	159.07	0.207216	951.913	1377.92
MTC130800C-IDA	13642.7	907.353	1.05102	456.344	669.102	103.73	0.17384	730.246	1123.52
MTC130800D-IDA	20007.1	1638.16	1.07236	561.97	824.32	160.93	0.209479	733.226	1168.81
MTC140201B-IDB	7685.55	624.808	1.04192	406.56	522.231	117.56	0.122099	489.015	680.854
MTC141001A-IDA	11236.9	1501.1	1.03516	349.562	405.31	183.53	0.241171	305.856	571.892
MTC141001A-IDB	15033	1952.06	1.0285	309.213	499.971	150.68	0.255794	395.31	944.571
MTC141200A-IDA	9966.34	1332.39	1.02601	840.07	666.559	124.44	0.279768	706.456	940.417
MTC151001B-IDB	11627.1	1815.75	1.03436	274.11	295.771	110.08	0.265921	368.801	637.638
MTC151100A-IDA	19305.9	2301.72	1.03954	568.053	883.885	98.12	0.22752	766.707	1070.83
MTC151200B-IDA	12221.3	1693.34	1.03872	468.952	693.342	143.92	0.267849	719.048	869.236
MTC151200C-IDA	13583.2	2473.65	1.04093	777.129	716.38	108.27	0.365462	606.511	965.992
MTC151200D-IDA	13423.6	1445.13	1.0322	546.92	878.68	180.5	0.247891	797.858	1003.03
MTC161001A-IDA	16781.4	1988.99	1.03252	448.369	598.21	198.52	0.251193	1068.87	1337.96
MTC170501A-IDA	12252.9	1717.78	1.03292	435.359	733.043	102.07	0.244929	1036.17	1379.97
MTC180800A-IDB	11953.1	1341	1.03416	261.964	297.712	80.86	0.254115	337.856	655.352
MTC180800A-IDC	17103.7	2371.61	1.04203	489.963	734.187	74.41	0.257849	921.02	1323.5
MTC180800C-IDA	21302	2544.68	1.02808	486.814	519.593	162.48	0.215706	550.67	942.226
MTC190800A-IDA	16172.4	1979.56	1.03338	748.213	455.615	83.76	0.236045	629.063	887.982
MTC190800B-IDB	16260.9	1688.65	1.02963	580.34	474.692	129.01	0.211781	648.666	1046.44
MTC190800C-IDD	18048.8	2624.57	1.02803	580.905	627.729	259.5	0.28391	628.784	856.863
MTC210301B-IDA	7725.56	1167.03	1.03619	564.028	600.346	114.9	0.258654	610.804	878.882
MTC210401C-IDA	23103.1	1529.6	1.03895	939.506	1348.66	421.12	0.189598	1250.65	1802.93
MTC211200B-IDA	9643.45	1334.66	1.0317	568.757	1100.14	118.92	0.289486	1022.42	1471.46
MTC211200C-IDA	8897.01	1924.43	1.03357	498.402	590.501	58.3	0.311072	447.035	557.172
MTC231001A-IDA	8686.69	1303.47	1.04395	359.749	396.53	275.83	0.274146	412.789	913.864
MTC231001A-IDB	14442.6	1907.79	1.02926	355.486	608.84	192.75	0.226434	590.685	1016.04
MTC231100A-IDA	19075.8	2052.02	1.04749	568.415	461.579	139.66	0.224331	566.333	760.496
MTC250300A-IDD	12521.9	1042.9	1.03593	481.37	297.428	151.08	0.164303	483.581	858.078
MTC250402A-IDA	8721.63	616.923	1.03449	364.35	978.487	59.67	0.188324	911.906	1129.93
MTC251001A-IDB	16884.4	2595.38	1.03072	492.298	448.6	210.57	0.273013	476.072	703.494
MTC260800B-IDA	8912.69	1134.2	1.04203	333.605	368.357	46.33	0.250142	398.83	577.225
MTC260800D-IDA	21462.9	2351.21	1.04031	416.808	594.606	113.09	0.197824	700.977	1142.21
MTC261001B-IDD	18545.7	3463.67	1.0286	549.751	736.501	145.93	0.25703	889.756	966.433
MTC270202A-IDA	15013.7	1584.64	1.03236	401.418	629.019	236.9	0.213114	446.868	685.394
MTC280600A-IDA	11201.5	1052.28	1.04972	430.197	833.165	79.16	0.209764	1192.38	1354.23
MTC280600A-IDB	14001.8	1812.66	1.05433	349.462	891.038	72.5	0.245737	969.901	1193.17
MTC280600C-IDA	14320.2	2383.72	1.06832	219.14	1047.77	57.1	0.24607	1094.79	1569.92
MTC291001C-IDA	8945.37	1024.05	1.04053	610.278	358.065	94.55	0.221606	415.325	601.209
MTC300301B-IDA	7178.26	845.968	1.04996	602.599	429.56	93.69	0.164217	459.87	618.425

Basket cell name	Surface	Volume	Fractal Dimension	Width	Height	Depth	Diameter	Euclidean Distance	Max Path Distance
MTC300402A-IDB	11516.6	2100.01	1.04106	331.56	599.1	47.05	0.353903	512.746	634.841
MTC300600C-IDA	11974.3	1833.98	1.05634	450.02	369.089	112.16	0.250208	380.375	739.631
OG060523B1-2-IDA	19162	3514.48	1.02641	1028.6	969.201	138.46	0.218599	1197.24	1343.01
OG060523B2-CH7-MC-H	21801.1	3742.09	1.04464	1011.45	1008.49	137.41	0.35378	1136.43	1316.43
OG060622A1-CH1-BC-N	9422.9	1664.99	1.06117	413.773	437.42	172.72	0.407665	320.626	640.753
OG060810A8-011807-CH	15813	2311.53	1.0495	782.74	569.909	217.52	0.295419	738.196	1041.44
OG060822A1-2-IDB	14561.8	2516.01	1.03708	801.642	896.043	182.67	0.284225	728.92	1114.84
OG060826C1-4-IDB	15202.7	4404.78	1.03275	397.198	639.069	226.75	0.588095	608.74	774.284
OG060826C1-4-IDC	18868.5	5382.73	1.03488	690.279	498.289	271.6	0.317518	577.198	856.951
OG060828B1-5-IDD	17302.2	2986.37	1.02878	745.416	1111.52	276.68	0.266864	988.94	1287.46
OG060828C2-061205-CH	10024.8	1414.03	1.04126	484.781	811.794	333.32	0.182635	874.321	1031.47
OG060829A1-4-IDB	27106	3515.02	1.04351	514.722	769.214	272.48	0.374216	660.684	898.061
OG060829A1-4-IDE	16571.9	1997.78	1.0366	531.423	614.434	255.11	0.226358	565.361	754.008
OG060901A1-4-IDA	15400.8	4481.43	1.03881	610.639	827.312	198.73	0.411983	569.269	874.916
OG060901A3-061218-CH	11040.8	1904.06	1.04474	482.821	829.728	443.34	0.252488	527.389	819.898
OG060904A1-3-IDC	15774	2188.31	1.0315	846.827	555.821	208.74	0.261325	650.402	1092.39
OG060906A1-4-IDE	11913.3	2211.36	1.04781	443.1	644.747	183.18	0.288592	481.782	793.273
OG060907A2-070120-CH	28958.4	4612.16	1.03396	679.44	447.229	254.79	0.258974	471.171	714.435
OG060907B1-3-IDC	13582.6	2959.72	1.03511	558.471	814.318	90.27	0.291704	754.395	863.349
OG060921A3-CH5-BC-H	21795.4	1672.8	1.05537	476.741	605.38	121.75	0.25954	477.662	691.356
OG060921A-4-IDB	21163.5	4832.65	1.03991	1449.21	988.404	164.98	0.372756	1252.97	1596.6
OG060922A1-4-IDA	15710.9	3184.97	1.02939	413.646	719.301	132.23	0.308694	506.419	725.995
OG061012B-IDB	10664.7	1602.43	1.03801	709.23	558.07	83.44	0.280872	655.444	899.538
OG061106A1-IDA	8473.06	2242.38	1.04473	341.447	469.424	26.56	0.318958	434.073	569.071
OG061123A1-4-IDB	11331.9	2385.06	1.02707	442.971	679.063	156.78	0.230312	560.581	884.259
OG061123A1-4-IDE	20943.3	3801.26	1.02444	650.25	1405.33	181.43	0.213145	1287.88	1542.99
OG061123B1-3-IDB	27328	8124.14	1.04485	794.729	1254.43	138.03	0.320687	989.426	1233.95
OG061201A1-8-IDE	17792.2	3003.61	1.04312	800.182	721.07	109.99	0.25691	623.854	787.025
OG061201A6-CH5-BC-H	17924.9	3507.71	1.03507	847.36	706.119	168.19	0.277959	626.347	892.782
RP100426-1-IDA	19155.7	2012.87	1.03807	526.94	645.4	77.63	0.205958	550.394	697.239
RP100426-2-IDB	14047.1	2704.98	1.04182	475.909	565.59	154.51	0.341862	413.112	909.87
RP100427-123-IDB	7339.3	746.405	1.02462	468.313	404.12	134.73	0.222803	495.258	642.838
RP100427-123-IDH	11835.6	1610.73	1.03092	467.67	562.95	75.45	0.215762	430.998	746.306
RP100427-123-IDP	8740.29	2332.77	1.03349	410.826	420.19	296.97	0.419824	359.09	661.639
RP100427-123-IDQ	9976.43	2098.74	1.03916	308.81	421.809	169.18	0.416025	371.066	465.059
RP100428-12-IDK	10358.5	2757.97	1.0493	598.094	397.945	167.44	0.3033	516.372	876.884
RP100428-12-IDL	8180.68	1604.59	1.04668	423.665	582.076	82.15	0.283041	471.367	671.766
RP100428-3-IDB	12901.6	4515.44	1.04875	423.383	952.009	210.97	0.498138	657.939	1083.24
RP101020-1-E1-5-INT-ID	15378.3	4999.3	1.04947	1318.29	935.761	224.53	0.379781	1170.11	1642.74
RP101026-1-INT-IDC	7591.91	1791.89	1.04315	323.373	440	273.79	0.300149	384.59	635.155
RP101228-L5-3-IDB	9940.09	1698.99	1.0364	697.522	577.27	191.78	0.224633	607.736	910.691
RP101228-L5-3-IDC	6799.72	1657.07	1.05034	681.763	534.059	367.56	0.334061	578.265	858.462
RP101229-L5-1-IDD	16279.2	3295.46	1.06243	520.347	575.09	117.99	0.242645	499.106	879.327
RP110105-L5-1-2-IDG	4874.76	748.748	1.02976	566.606	570.674	68.86	0.316326	449.487	616.619
RP110107-L5-1-IDB	17620.9	3441.79	1.04867	458.272	824.788	192.79	0.365321	608.933	903.437
RP110107-L5-1-IDC	8441.92	1852.13	1.04124	543.106	490.828	199.86	0.337761	519.963	797.759
RP110110-L5-3-IDA	15424.7	2988.05	1.04205	457.75	281.269	217.79	0.276577	328.262	633.789
RP110111-L5-3-IDA	15633.8	2314.76	1.04038	548.607	592.855	247.29	0.246577	456.683	686.498
RP110112-L5-3-IDB	13024.9	2462.16	1.04772	494.965	724.269	133.81	0.272401	517.255	1273.47
RP110112-L5-3-IDD	7223.38	1035.71	1.03834	334.93	702.57	115.92	0.316845	479.911	675.237
RP110113-L5-1-IDA	8469.1	1688.34	1.02798	358.344	341.39	207.52	0.449729	345.904	545.046
RP110113-L5-1-IDC	14677.3	2593.23	1.03037	571.302	347.167	170.42	0.344749	403.35	735.227
RP110113-L5-3-IDA	14938.7	3909.08	1.02488	174.021	1004.46	819.83	0.235302	835.413	1289.97
RP110114-L5-1-IDG	5497.64	1187.93	1.04337	483.361	622.079	402.36	0.357504	648.266	1034.67
RP110119-L5-1-IDB	16241.5	2444.5	1.03805	295.712	716.97	718.29	0.266855	646.159	1114.69
RP110119-L5-2-IDC	9403.56	1173.17	1.05089	439.342	365.405	357.41	0.24102	419.109	708.363

Basket cell name	Surface	Volume	Fractal Dimension	Width	Height	Depth	Diameter	Euclidean Distance	Max Path Distance
RP110119-L5-2-IDD	10738.6	2121.84	1.04275	241.28	685.196	327.46	0.263459	512.126	803.103
RP110120-L5-2-IDH	13232.7	1438.9	1.02348	1030.47	548.75	252.54	0.186955	927.2	1567.93
RP110120-L5-3-IDA	17325.1	5390.97	1.04065	329.155	508.881	551.22	0.414739	528.884	737.312
RP110120-L5-3-IDD	10865.5	3404.73	1.04438	432.075	637.332	203.27	0.42163	476.558	757.531
RP110120-L5-3-IDF	13011.6	3364.29	1.04215	343.845	858.606	211.67	0.362355	754.187	979.153
RP110120-L5-4-IDB	7039.19	1139.5	1.02772	302.13	427.372	432.54	0.202751	455.829	674.744
RP110121-L5-1-IDC	18712.3	4231.56	1.03357	519.375	483.555	173.85	0.318935	433.608	627.394
RP110121-L5-2-IDA	22792.9	3577.39	1.03343	454.022	397.119	251.41	0.270944	544.15	838.891
RP110121-L5-2-IDB	17559.1	2867.14	1.03095	506.149	469.157	180.55	0.290116	487.09	741.653
RP110121-L5-2-IDF	12532.8	2364.61	1.02996	406.889	571.061	654.41	0.346223	552.248	796.207
RP110125-L5-1-IDA	6801.28	569.205	1.06178	209.176	553.73	174.01	0.215063	390.523	788.67
RP110125-L5-1-IDC	11198	2281.05	1.07073	206.326	532.395	149.36	0.382826	659.246	729.992
RP110125-L5-1-IDD	12110.1	1078.78	1.05094	749.44	809.385	682.24	0.17562	1102.98	1328.49
RP110125-L5-2-IDE	16148.3	3490.76	1.07176	391.011	538.007	129.81	0.301779	365.398	599.473
RP110125-L5-2-IDH	17162.1	3796.75	1.0757	541.05	403.82	143.58	0.250014	415.516	883.57
RP110127-L5-1-IDC	14674.6	3043.5	1.03975	503.119	785.859	626.93	0.316078	738.308	1239.86
RP110127-L5-3-IDI	12483.3	2373.43	1.05452	989.276	1011.29	294.45	0.198021	860.599	1795.66
RP110131-L5-1-IDA	10240.3	1631.37	1.04167	426.032	406.726	118.38	0.269842	406.735	606.323
RP110131-L5-1-IDD	8602.66	1681.48	1.03931	389.762	489.735	122.43	0.345522	351.025	507.518
RP110131-L5-2-IDB	17063	2602.75	1.03668	764.44	808.306	128.86	0.192676	646.795	969.867
RP110201-L5-2-IDA	12551.2	1572.35	1.0441	626.297	621.715	269.32	0.268853	837.352	1269.51
RP110201-L5-2-IDB	14787.2	2015.34	1.04166	595.127	469.431	246.84	0.266984	482.127	1014.18
RP110202-L5-2-IDA	11752.6	1789.54	1.05167	631.151	785.109	136.9	0.202666	850.794	1274.43
RP110202-L5-2-IDB	10678.6	1257.73	1.06992	700.185	647.119	144.94	0.18898	612.291	933.319
RP110203-L5-2-IDA	25916.4	3833	1.03846	508.403	1004.1	710.89	0.225676	1146.04	1732.51
RP110204-L5-1-IDA	17837.7	3286.11	1.04044	554.86	544.519	195.12	0.323623	401.118	669.829
RP110207-L5-1-IDA	9668.04	723.834	1.0397	794.931	592.934	136.98	0.170911	659.171	926.885
RP110207-L5-1-IDC	10435.5	1568.38	1.06222	667.909	356.674	167.45	0.259043	501.827	1019.85
RP110207-L5-2-IDA	22783.6	3401.6	1.06775	367.442	654.783	139.62	0.2333	506.93	760.821
RP110207-L5-2-IDB	16146.8	3409.05	1.06989	389.116	450.097	171.96	0.282001	339.752	692.567
RP110208-L5-2-IDA	8755.65	936.456	1.05547	462.242	380.021	137.18	0.191004	345.774	605.747
RP110419-C1-IDA	11835.8	1641.87	1.03399	719.86	705.122	83.71	0.363809	570.374	1091.11
RP110420-C1-IDA	15540.6	2196.77	1.05402	494.791	310.909	190.14	0.28067	406.547	970.825
RP110427-C2-IDA	12416.3	2673.31	1.05743	416.671	508.601	337.33	0.332313	488.215	684.8
RP110427-C2-IDB	12451.5	2019.82	1.03904	620.308	1062.93	239.9	0.196694	843.425	1155.37
RP110506_C1+2_IDA	9373.1	2050.31	1.03289	528.19	336.331	231.75	0.344117	469.754	621.764
RP110506_C1+2_IDB	7559.81	1302.57	1.03742	399.454	646.972	93.49	0.3064	460.596	614.125
RP110710-C3-IDA	12138.4	1841.8	1.03648	781.608	561.079	192.9	0.245501	497.989	843.675
RP110711_C1+2_IDA	12694.3	2645.73	1.03704	656.25	494.081	154.07	0.387488	596.497	881.442
RP110711-C3-IDA	12534.9	2556.23	1.03261	247.851	675.92	224.26	0.321672	522.047	874.459
RP120507-P-1-IDA	11152	2765.36	1.03024	241.211	275.544	119.13	0.405938	263.604	395.912
RP120516-P-1-IDA	17755.1	3396.05	1.03911	253.016	754.12	538.13	0.264625	1236.89	1486.43
RP120607-P-1-2-IDE	9996.16	2532.19	1.03751	558.267	709.747	162.55	0.420793	648.307	762.093
RP120802-P-1-IDA	13250.1	2574.82	1.03449	965.018	893.572	132.28	0.327694	778.409	1275.73
RP120803-P-1-IDD	8836.43	1342.57	1.05672	205.524	582.55	173.52	0.267576	602.471	717.799
RP120914-P-1-IDA	19750.2	3632.32	1.03252	400.81	676.548	421.24	0.292076	698.82	958.873
RP120919-P-2-IDA	12611.9	2637.22	1.04316	338.946	261.499	124.41	0.320383	320.93	604.046
SM100427A1-6-IDH	14231.2	2985.79	1.07397	275.912	575.975	129.39	0.273074	485.493	737.989
SM100506A1-4-IDD	8334.54	1352.69	1.06768	586.743	794.541	129.18	0.270321	1054.26	1384.87
SM100513A1-3-IDC	14052.5	1905.47	1.05092	399.672	495.23	416.08	0.259606	640.583	974.004
SM110120C1-2-INT-IDC	28615.3	4196.36	1.03728	550.887	1444.23	217.18	0.240106	1340.25	1627.07
SM110125A1-3-IDC	15982	3351.85	1.03369	472.697	464.566	396.36	0.21959	628.737	943.864
SM110127A1-3-INT-IDD	8463.68	1146.2	1.04309	329.209	366.573	86.76	0.214283	569.199	694.326
SM110127B1-3-INT-IDD	16972.3	1858.18	1.03871	383.762	352.474	249.65	0.201331	386.84	1040.21
SM110128A1-2-INT-IDB	14932.8	2109.08	1.03421	553.371	289.51	169.92	0.242184	464.634	681.23
SM120429-2PHOTON-A1	13386.2	2399.93	1.03724	504.316	812.841	280.36	0.291099	640.908	878.159

Basket cell name	Surface	Volume	Fractal Dimension	Width	Height	Depth	Diameter	Euclidean Distance	Max Path Distance
SM120509A1-2-2PHOTO	9372.85	1399.84	1.04558	565.955	597.084	291.3	0.286563	536.767	835.535
TKB050507A1-CH1-BC-I	9067.23	1557.28	1.03659	425.575	582.841	306.64	0.250341	543.942	592.132
TKB050507A1-CH5-BC-I	10951.5	2318.77	1.03564	803.52	515.79	304.92	0.344906	703.949	1012.52
TKB051205A4-CH7-BC-I	12213.5	668.551	1.02861	522.565	751.438	230.97	0.138856	637.561	1031.01
TKB060118B1-CH6-BC-I	6249.43	807.039	1.02833	799.156	446.343	122.04	0.313927	594.998	891.45
TKB060126A2-CH3-BC-N	10572.1	1042.72	1.04984	338.746	773.071	192.6	0.194108	595.833	1388.87
TKB060127A1-CH1-BC-N	11512.1	1379.53	1.04489	913.235	1349.54	205.68	0.230545	1357.46	1520.11
TKB060508A2-CH5-BC-I	23669.6	3192.16	1.04204	678.515	508.217	153	0.513256	465.287	825.08
TKB060530A2-CH5-BC-N	11195	2331.28	1.04	745.092	629.503	149.43	0.347771	831.355	914.417
TKB060531A2-CH7-BC-I	8569.47	1466.34	1.03759	536.364	536.203	187.81	0.355383	416.573	776.669
TKB061009A2-CH7-BC-N	11545.6	1553.82	1.04138	406.638	579.979	133.36	0.481924	458.142	582.762
TKB061020A1-CH5-BC-I	11091.4	1745.18	1.03769	1071.03	1311.99	305.49	0.246354	1115.26	1673.3
TKB061020B1-CH1-BC-I	16283.7	1744.9	1.03646	909.481	839.365	404.35	0.223106	804.202	1589.55
TKB061101A2-CH2-BC-I	23500.9	2706.89	1.04013	784.405	1063.54	447.6	0.292879	1108.66	1484.24
TKB070208B3-CH2-BC-N	8081.01	1137.46	1.02325	491.8	1723.13	167.35	0.149715	1595.53	1830.96
TKB070809A2-CH3-BC-N	29634.4	3142.9	1.03585	595.772	1217.96	226.11	0.378042	1083.58	1331.68
TKB071119A2-CH8-BC-N	12761	3237.55	1.07446	526.584	422.457	160.18	0.608143	519.555	698.661
VD100621-IDB	9129.45	2213.96	1.04323	265.479	326.133	77.16	0.376491	256.887	459.715
VD100714B-IDA	10377.9	2554.58	1.03164	293.44	573.73	103.16	0.528797	407.886	603.851
VD100714C-IDA	5325.71	1202.23	1.06055	392.486	371.994	203.57	0.322686	304.619	447.726
VD100715C-IDA	15255.5	4100.86	1.04612	692.58	713.269	212.82	0.272005	562.897	874.412
VD100726A-IDC	10769	1545.86	1.05733	295.425	318.027	91.22	0.239309	265.941	462.13
VD101020B-IDB	11740.4	1034.54	1.03865	389.579	305.262	153.54	0.178347	283.223	711.937
VD110112A-INT-IDA	10063.4	2072.8	1.04531	552.237	796.595	217.66	0.329238	641.823	1131.34
VD110112B-INT-IDA	20190.6	2397.76	1.03787	484.301	1529.87	252.11	0.271874	1229.85	1413.51
VD110112-INT-A-IDA	10063.4	2072.8	1.04531	552.237	796.595	217.66	0.329238	641.823	1131.34
VD110112-INT-B-IDA	20190.6	2397.76	1.03787	484.301	1529.87	252.11	0.271874	1229.85	1413.51
VD110120-INT-B-IDB	12028.3	631.991	1.01682	271.534	664.506	482.64	0.162106	847.578	1058.63

Table 3.0

Basket cell name	Max Branch Order	Contrac -tion	Fragme- ntation	Partition Asymmetry	Average Rall's Ratio	Average Bifurcat -ion Angle Local	Soma Surface	Number of stems	Number of bifurcat -ions
C240998A-I3	17	0.87	3492	0.56	1.86	82.77	1216.38	8	213
C250300C2-ax	18	0.89	1670	0.56	1.92	74.66	0.950332	1	104
C250500A-I4	12	0.85	3097	0.52	1.82	84.29	873.852	9	91
C260897C-I1	19	0.79	3863	0.58	1.89	84.91	1192.51	6	181
C270106A	17	0.848938	5569	0.4501	2.09335	87.709	733.618	4	139
C270106C	12	0.828621	4243	0.561749	1.83944	79.1926	506.19	8	74
C270106G	19	0.85676	2843	0.467492	2.11279	82.031	824.474	6	100
C270801-I3	13	0.86	1469	0.54	1.95	78.89	440.257	1	44
C271097A-I4	19	0.85	4529	0.6	1.89	80.52	1055.89	5	236
C280206C	12	0.822476	2254	0.499009	1.65352	86.8006	507.622	6	73
C280998A-I2	13	0.88	1937	0.48	1.73	84.32	1133.16	8	85
C280998A-I4	12	0.85	1078	0.52	1.83	91.83	651.622	4	64
C280999A-I4	15	0.919211	1942	0.548054	1.68834	81.9078	1246.53	9	105
C281197A-I2	14	0.85	3820	0.5	1.85	80.08	1253	8	160
C281197A-I4	16	0.85	4114	0.54	1.79	75.56	1589.3	9	182
C281199A-IN	15	0.89	2334	0.47	1.69	74.59	1029.1	8	136
C290500B-I2	14	0.86	3384	0.51	1.88	82.41	1606.3	10	137
C290998A	7	0.84087	830	0.486538	1.61373	82.2638	1241.26	9	24
C290999C-I4	11	0.81	4072	0.47	1.86	83.58	1040.62	46	146
C300106A	14	0.867756	4199	0.464052	1.98734	86.9059	718.139	10	120
C300301B1	18	0.82	20119	0.48	2.33	84.39	883.625	8	213
C300898C-I3	14	0.83	1963	0.52	1.74	80.29	953.555	9	93
C300997B-I4	16	0.85	3679	0.52	1.78	77.79	928.76	6	146
C310106C	12	0.906926	3457	0.528151	1.88035	74.9675	487.106	6	83
C310897A-I2	19	0.86	3927	0.56	1.77	75.03	1856.45	9	210
d030100ka	5	0.832228	559	0.22381	1.73772	77.7779	224.853	2	14
d250501me	5	0.868749	979	0.396926	1.36722	98.665	1334.84	2	20
MTC010301B-IDE	14	0.850781	7130	0.55312	1.7324	85.7575	1114.79	5	128
MTC020502F-IDB	19	0.863529	6699	0.586603	1.7584	83.4589	825.888	8	109
MTC021101A-IDA	22	0.88942	25564	0.515152	1.88727	84.8862	1018.61	9	397
MTC030800C-IDA	22	0.875364	9859	0.53662	1.90567	88.407	489.871	4	246
MTC031100A-IDA	33	0.873	13647	0.51788	1.93985	88.8504	1241.62	10	316
MTC031100A-IDC	20	0.873179	8348	0.577178	1.85971	85.5529	1272.63	10	142
MTC031100A-IDD	21	0.893355	7351	0.546416	1.88365	83.8765	860.222	8	136
MTC040800A-IDB	11	0.828845	4786	0.516573	1.86729	87.8131	755.177	4	92
MTC040800B-IDA	27	0.82928	4663	0.614742	1.88595	93.6086	677.519	9	123
MTC050301A-IDA	18	0.91973	16794	0.523054	1.87867	78.3831	750.591	6	329
MTC050301A-IDC	16	0.885504	7200	0.540328	1.89966	82.7011	558.071	5	177
MTC050600A-IDA	21	0.843315	8265	0.592542	1.88058	82.49	586.369	6	155
MTC050600A-IDB	23	0.839799	14023	0.579651	1.92176	83.1567	1037.95	9	226
MTC050600B-IDA	16	0.879389	13256	0.54548	1.89957	77.3665	570.731	6	128
MTC050800A-IDA	18	0.867427	4229	0.485221	1.68996	81.8841	518.425	5	100
MTC050800A-IDE	31	0.859407	6703	0.576721	1.87866	85.2755	889.4	6	205
MTC050800B-IDB	23	0.841718	10224	0.612042	1.86796	89.8493	538.497	6	214
MTC060800A-IDC	13	0.905455	5714	0.544827	1.73182	84.1517	1280.23	7	100
MTC060800A-IDF	16	0.878778	6359	0.503187	1.78066	85.5021	849.266	6	121
MTC060800B-IDA	26	0.817713	20063	0.569886	1.81611	80.6754	661.498	9	209
MTC060800C-IDA	27	0.737608	12994	0.66098	2.07187	94.8546	379.193	9	144
MTC060800C-IDB	14	0.869325	9374	0.549135	1.74038	84.3323	867.789	5	111
MTC060800D-IDA	18	0.682049	26570	0.514821	1.77094	95.4186	530.428	10	272
MTC061100A-IDE	22	0.848246	9280	0.594024	1.80496	89.934	1243.83	8	135
MTC061100B-IDA	12	0.846875	8047	0.525748	1.79148	87.5139	896.255	7	109
MTC070301A-IDA	18	0.873318	5720	0.540038	1.84809	88.7458	499.471	8	112
MTC070301C-IDA	25	0.868885	14092	0.539135	1.92702	88.2856	904.9	7	213
MTC080301C-IDA	16	0.899268	6255	0.605503	1.87688	80.284	817.986	7	130
MTC080800A-IDD	27	0.873014	13033	0.59829	1.88824	83.7577	720.374	7	228

Basket cell name	Max Branch Order	Contrac -tion	Fragme- ntation	Partition Asymmetry	Average Rall's Ratio	Average Bifurcat -ion Angle Local	Soma Surface	Number of stems	Number of bifurcat -ions
MTC080800C-IDC	21	0.879585	10865	0.572414	1.75186	84.0054	993.132	6	165
MTC090800B-IDB	22	0.745775	31289	0.553124	1.84591	93.6297	735.228	9	232
MTC100100-6-IDA	11	0.724503	4210	0.497239	1.7124	86.207	557.494	3	53
MTC100100-6-IDB	13	0.765218	4789	0.584461	1.75495	84.5579	377.898	5	71
MTC100300A-IDB	16	0.892521	4312	0.528412	1.95401	81.972	865.186	4	244
MTC100300D-IDA	23	0.838771	7958	0.494518	1.91301	78.4608	952.91	10	400
MTC110300B-B1-2-NBC-I	25	0.857299	5776	0.522185	1.93107	83.2548	1192.1	8	281
MTC110300B-B1-2-NBC-I	23	0.872599	6609	0.518664	1.94252	82.5606	872.808	8	302
MTC110301B-IDA	16	0.923435	9833	0.564241	1.82821	72.6519	1228.99	12	196
MTC120501B-IDA	17	0.820528	18564	0.50388	2.39091	84.4109	613.332	5	209
MTC120501B-IDB	24	0.871896	9332	0.547883	1.93144	80.5781	827.982	9	146
MTC121100B-IDB	18	0.851718	11450	0.630443	1.87615	89.2238	805.548	8	227
MTC121100B-IDG	24	0.823905	14770	0.544497	1.84063	89.1786	910.984	6	221
MTC121100B-IDH	17	0.819756	7128	0.562748	1.7152	87.89	746.708	11	105
MTC121100B-IDI	19	0.825531	7438	0.599705	1.59631	80.599	523.873	8	82
MTC130201A-IDA	21	0.907454	5898	0.604106	1.91515	81.9302	857.428	8	261
MTC130301A-IDA	15	0.882263	6920	0.546395	1.80094	89.7172	525.966	7	124
MTC130800A-IDA	18	0.747647	21109	0.559436	1.85835	88.6317	683.916	7	168
MTC130800C-IDA	23	0.805878	24659	0.526213	1.89429	82.8492	552.76	7	224
MTC130800D-IDA	23	0.75531	29220	0.519106	1.86879	91.993	614.831	8	367
MTC140201B-IDB	18	0.881906	5892	0.460857	1.93429	80.9212	1066.98	11	245
MTC141001A-IDA	24	0.884009	8839	0.611557	1.90986	88.7259	798.86	8	209
MTC141001A-IDB	25	0.892968	10723	0.597257	1.90243	85.5518	882.258	7	226
MTC141200A-IDA	19	0.898253	6649	0.593874	1.86797	79.9594	930.764	9	116
MTC151001B-IDB	19	0.879254	8904	0.554017	1.89558	85.6086	886.495	9	208
MTC151100A-IDA	27	0.824509	26005	0.567181	1.83979	83.2007	856.895	5	329
MTC151200B-IDA	17	0.849224	10876	0.515599	1.91306	89.7181	781.267	5	205
MTC151200C-IDA	10	0.830775	7927	0.459764	1.69275	94.6938	1020.81	4	80
MTC151200D-IDA	15	0.88868	10378	0.524936	1.81454	78.608	700.192	5	121
MTC161001A-IDA	16	0.88094	12127	0.537939	1.83535	84.6651	891.973	8	206
MTC170501A-IDA	28	0.870135	12262	0.601975	1.87116	85.9249	1248.34	10	179
MTC180800A-IDB	22	0.881817	10596	0.512701	1.92171	84.2867	874.083	7	319
MTC180800A-IDC	35	0.78641	24956	0.540205	1.55868	86.0205	933.396	11	212
MTC180800C-IDA	29	0.874431	33676	0.542267	1.88783	83.3957	927.924	11	270
MTC190800A-IDA	18	0.81286	27856	0.508009	1.88145	84.7969	882.074	10	236
MTC190800B-IDB	22	0.830919	26615	0.475285	1.87839	80.136	882.348	8	211
MTC190800C-IDD	14	0.888181	13550	0.479253	1.83187	88.1314	1200.86	9	172
MTC210301B-IDA	18	0.845195	3180	0.532957	1.88429	88.8215	1069.48	4	95
MTC210401C-IDA	20	0.86125	8005	0.521817	1.97225	86.1369	1089.01	6	250
MTC211200B-IDA	20	0.819639	8436	0.586321	1.73141	96.6297	808.256	4	95
MTC211200C-IDA	15	0.862672	6793	0.547344	2.06743	84.3409	1365.57	7	119
MTC231001A-IDA	13	0.834677	6811	0.560557	1.79086	93.8516	962.038	5	102
MTC231001A-IDB	24	0.884728	13426	0.59224	1.90841	82.6916	963.857	8	197
MTC231100A-IDA	20	0.795818	29437	0.535201	1.90757	84.73	1038.86	10	359
MTC250300A-IDD	30	0.900174	6038	0.525718	1.91651	78.2488	1096.36	6	347
MTC250402A-IDA	19	0.874689	9254	0.572969	1.92186	85.633	558.308	11	223
MTC251001A-IDB	15	0.872808	13454	0.491851	1.85575	89.3337	712.534	6	216
MTC260800B-IDA	15	0.793896	15994	0.524602	1.80288	85.7238	712.752	9	128
MTC260800D-IDA	30	0.761672	45920	0.557516	1.94236	83.7493	794.237	8	376
MTC261001B-IDD	22	0.889648	15881	0.533164	1.89703	85.5927	1161.77	8	275
MTC270202A-IDA	20	0.869546	16896	0.578901	1.91957	85.8267	851.441	10	235
MTC280600A-IDA	45	0.868474	7898	0.57285	1.77532	81.5092	1028.2	6	291
MTC280600A-IDB	19	0.85524	8105	0.573257	1.92447	83.9471	1201.3	6	244
MTC280600C-IDA	27	0.733223	17152	0.604641	1.88078	90.9686	610.228	8	238
MTC291001C-IDA	14	0.85311	10122	0.56944	1.91124	91.1352	703.267	6	132
MTC300301B-IDA	18	0.872768	3225	0.478252	1.91862	88.9911	1054.43	7	213

Basket cell name	Max Branch Order	Contrac -tion	Fragme- ntation	Partition Asymmetry	Average Rall's Ratio	Average Bifurcat -ion Angle Local	Soma Surface	Number of stems	Number of bifurcat -ions
MTC300402A-IDB	12	0.874526	7559	0.55668	1.81145	89.26	1039.56	11	115
MTC300600C-IDA	15	0.825896	6524	0.559288	1.76728	92.2405	810.27	7	129
OG060523B1-2-IDA	33	0.846173	27235	0.576416	1.83527	84.2037	1218.77	4	242
OG060523B2-CH7-MC-H-	27	0.8616	12587	0.517641	1.78115	85.1741	1342.24	5	163
OG060622A1-CH1-BC-N-	14	0.788384	4382	0.659651	1.78538	84.4194	916.041	10	55
OG060810A8-011807-CH5	19	0.821092	6761	0.550944	1.82291	89.0795	613.37	7	138
OG060822A1-2-IDB	23	0.855703	13130	0.555504	1.83552	82.5466	1236.16	5	153
OG060826C1-4-IDB	10	0.849543	5932	0.35965	1.50078	82.9322	1395.74	4	68
OG060826C1-4-IDC	13	0.835148	16226	0.462929	1.81653	81.8444	1144.16	8	138
OG060828B1-5-IDD	20	0.908675	6578	0.527449	2.16963	70.5203	2363.74	11	274
OG060828C2-061205-CH1	23	0.850626	9291	0.570219	2.13982	82.4661	1917.79	7	205
OG060829A1-4-IDB	16	0.825275	16811	0.560018	2.71227	82.3903	1201.4	10	217
OG060829A1-4-IDE	21	0.829568	15630	0.537425	1.86033	72.2952	1123.92	6	216
OG060901A1-4-IDA	19	0.855968	9417	0.558186	1.7441	80.5429	1780.73	6	169
OG060901A3-061218-CH7	18	0.84891	9945	0.537338	1.7601	88.7226	1980.07	6	167
OG060904A1-3-IDC	24	0.906505	5706	0.544915	1.87028	71.9654	1867.25	9	271
OG060906A1-4-IDE	18	0.8324	9586	0.569088	1.84613	84.6627	1286.04	4	141
OG060907A2-070120-CH-	15	0.842393	38150	0.492982	1.92398	84.3197	933.012	6	379
OG060907B1-3-IDC	21	0.89556	6824	0.486051	1.82885	79.5748	913.159	10	171
OG060921A3-CH5-BC-H-	18	0.834802	16136	0.479945	1.85679	87.9539	484.289	10	302
OG060921A-4-IDB	37	0.874548	16662	0.604355	1.91191	90.1147	1349.78	5	295
OG060922A1-4-IDA	18	0.895797	11591	0.513977	1.8788	84.5121	1526.66	10	270
OG061012B-IDB	11	0.878212	5297	0.488676	1.70705	83.9372	781.45	6	117
OG061106A1-IDA	12	0.882392	3733	0.474979	1.7187	82.0734	782.268	4	113
OG061123A1-4-IDB	11	0.82701	13160	0.533997	1.77703	84.0032	1331.8	5	89
OG061123A1-4-IDE	31	0.847505	25740	0.574957	1.88327	79.1553	1194.88	7	306
OG061123B1-3-IDB	13	0.848608	11462	0.503726	1.72329	85.2125	1593.81	3	184
OG061201A1-8-IDE	19	0.872891	11221	0.54219	1.84056	82.0877	909.539	7	210
OG061201A6-CH5-BC-H-	18	0.874753	15052	0.559134	1.85369	89.3269	890.251	7	207
RP100426-1-IDA	21	0.887844	14085	0.544712	1.92548	82.4766	654.77	8	313
RP100426-2-IDB	19	0.847251	9907	0.507112	1.79355	87.1578	1471.88	10	137
RP100427-123-IDB	12	0.808056	12900	0.453805	1.77206	88.7921	449.492	9	104
RP100427-123-IDH	17	0.819335	18539	0.540207	1.77724	88.1875	705.096	6	177
RP100427-123-IDP	12	0.821324	5744	0.566559	1.03352	88.3697	1134.22	5	53
RP100427-123-IDQ	8	0.822397	6936	0.442797	0.769751	92.554	946.852	6	53
RP100428-12-IDK	18	0.841855	5531	0.570137	1.71098	86.7443	834.328	5	128
RP100428-12-IDL	21	0.866167	3722	0.596256	1.87025	81.2741	994.859	7	129
RP100428-3-IDB	23	0.890517	2368	0.662469	1.92988	90.7518	1679.25	4	121
RP101020-1-E1-5-INT-IDE	12	0.76775	13222	0.447718	2.04033	80.9435	1260.15	7	64
RP101026-1-INT-IDC	17	0.835381	4441	0.628396	1.79551	81.5463	932.356	6	77
RP101228-L5-3-IDB	22	0.840025	13418	0.536566	1.66368	84.3901	1661.31	12	130
RP101228-L5-3-IDC	14	0.818019	5508	0.492799	1.71725	89.6647	907.948	6	58
RP101229-L5-1-IDD	17	0.825258	11508	0.526956	2.19545	86.7668	1381.24	8	238
RP110105-L5-1-2-IDG	18	0.891384	3506	0.560649	1.83731	84.8313	628.672	5	88
RP110107-L5-1-IDB	20	0.831539	14634	0.540211	1.73235	91.863	1137.75	4	219
RP110107-L5-1-IDC	18	0.843176	6073	0.533179	1.78815	87.8114	863.147	6	88
RP110110-L5-3-IDA	23	0.853506	12317	0.59054	1.87726	81.3311	1379.07	6	271
RP110111-L5-3-IDA	17	0.866442	16028	0.530079	1.87855	81.2226	1422.3	6	273
RP110112-L5-3-IDB	14	0.825756	12022	0.541314	1.80831	82.6008	751.471	2	195
RP110112-L5-3-IDD	13	0.901366	1496	0.552741	1.82301	85.8097	1720.86	5	94
RP110113-L5-1-IDA	16	0.871457	4539	0.608769	1.70679	85.5808	670.245	9	87
RP110113-L5-1-IDC	14	0.868904	8945	0.453957	1.79015	85.3598	1078.28	6	132
RP110113-L5-3-IDA	24	0.847735	17990	0.568895	1.74305	84.7385	1570.76	3	161
RP110114-L5-1-IDG	12	0.85326	3413	0.583362	1.80405	88.4345	1048.66	3	80
RP110119-L5-1-IDB	16	0.856706	12237	0.541738	1.84633	84.3125	1308.8	7	170
RP110119-L5-2-IDC	14	0.811482	10522	0.539138	1.82216	94.4786	727.471	8	152

Basket cell name	Max Branch Order	Contrac -tion	Fragme- ntation	Partition Asymmetry	Average Rall's Ratio	Average Bifurcat -ion Angle Local	Soma Surface	Number of stems	Number of bifurcat -ions
RP110119-L5-2-IDD	14	0.85093	9491	0.583449	1.87286	84.6844	1142.1	7	124
RP110120-L5-2-IDH	27	0.847297	23994	0.579064	1.85285	83.7587	928.446	8	243
RP110120-L5-3-IDA	20	0.858509	9262	0.464035	1.81432	88.0539	1569.15	8	165
RP110120-L5-3-IDD	19	0.848917	6392	0.522139	1.7278	91.722	1658.94	7	129
RP110120-L5-3-IDF	25	0.855183	7602	0.541625	1.8338	87.1088	1846.18	8	133
RP110120-L5-4-IDB	16	0.83648	11078	0.575765	1.92636	89.9847	931.278	6	144
RP110121-L5-1-IDC	16	0.875964	13544	0.47746	1.84615	87.9229	1513.28	8	186
RP110121-L5-2-IDA	29	0.861051	22095	0.520961	1.87499	84.0333	2294.18	8	343
RP110121-L5-2-IDB	18	0.868562	15917	0.510611	1.9416	84.5654	1576.82	9	267
RP110121-L5-2-IDF	11	0.874646	7676	0.437406	1.81952	85.8736	1220.65	5	100
RP110125-L5-1-IDA	12	0.763373	10261	0.479875	1.58844	82.3816	491.605	10	113
RP110125-L5-1-IDC	35	0.799917	7647	0.610682	1.83879	88.1997	751.404	4	202
RP110125-L5-1-IDD	16	0.782801	24497	0.590895	1.83836	88.4221	641.891	6	156
RP110125-L5-2-IDE	14	0.752026	14917	0.495866	1.83169	89.3969	1061.68	12	143
RP110125-L5-2-IDH	18	0.754494	17759	0.539692	1.7429	88.3652	846.363	5	197
RP110127-L5-1-IDC	20	0.837497	8728	0.549968	1.78719	90.9045	1976.02	5	82
RP110127-L5-3-IDI	47	0.799256	17533	0.704071	1.89724	91.958	954.434	4	270
RP110131-L5-1-IDA	12	0.811803	10921	0.462964	2.06301	88.4498	849.766	10	104
RP110131-L5-1-IDD	13	0.838261	6882	0.454375	1.77427	86.322	1043.65	8	72
RP110131-L5-2-IDB	16	0.843112	26094	0.494843	1.89849	80.5648	1935.92	6	215
RP110201-L5-2-IDA	20	0.831722	10099	0.618293	1.76412	83.8186	696.616	5	147
RP110201-L5-2-IDB	20	0.813346	13665	0.618405	1.78608	87.8877	1076.42	7	163
RP110202-L5-2-IDA	14	0.782148	18373	0.55012	1.71937	87.4089	1813.87	7	89
RP110202-L5-2-IDB	23	0.760039	17238	0.561785	1.89924	88.5044	1130.35	6	184
RP110203-L5-2-IDA	28	0.865935	25679	0.570885	1.91524	83.7392	1737.86	6	340
RP110204-L5-1-IDA	19	0.865035	13748	0.502231	1.90928	85.4659	1223.39	8	268
RP110207-L5-1-IDA	18	0.814697	17963	0.570744	1.94376	89.4306	1167.2	9	157
RP110207-L5-1-IDC	28	0.780025	10595	0.595044	1.83564	92.2438	661.48	4	163
RP110207-L5-2-IDA	24	0.768592	28444	0.564979	1.76662	86.6082	1041.22	9	332
RP110207-L5-2-IDB	19	0.761325	16051	0.54282	1.88349	86.3997	809.231	7	168
RP110208-L5-2-IDA	14	0.790436	14052	0.52522	1.84625	89.1132	812.837	7	125
RP110419-C1-IDA	14	0.889136	2208	0.508557	2.06408	73.6656	825.716	7	85
RP110420-C1-IDA	27	0.817389	5893	0.497729	1.84661	89.8206	1215.18	8	210
RP110427-C2-IDA	17	0.831051	7844	0.53241	1.86294	91.7441	1184.15	6	167
RP110427-C2-IDB	17	0.870404	10591	0.56196	1.92219	86.646	5845.46	8	141
RP110506_C1+2_IDA	12	0.882019	5584	0.502072	1.84973	93.3305	1001.86	7	104
RP110506_C1+2_IDB	12	0.869582	5055	0.5099	1.79208	93.5881	956.364	6	87
RP110710-C3-IDA	18	0.86987	9326	0.515194	1.91564	89.8316	1104.82	6	153
RP110711_C1+2_IDA	14	0.834555	7055	0.499103	1.76339	91.015	1087.13	4	101
RP110711-C3-IDA	13	0.879556	7637	0.504857	1.75921	78.5244	1195.44	8	118
RP120507-P-1-IDA	14	0.888968	6016	0.524283	1.77316	84.8131	1354.69	8	166
RP120516-P-1-IDA	15	0.849718	14023	0.506217	1.82484	87.8152	1327.93	5	171
RP120607-P-1-2-IDE	12	0.857564	5647	0.534815	1.65838	91.7952	2081.35	7	77
RP120802-P-1-IDA	14	0.853622	9066	0.524775	1.53564	89.4212	1015.41	4	111
RP120803-P-1-IDD	23	0.811507	7974	0.590985	1.87498	91.5188	877.765	3	127
RP120914-P-1-IDA	17	0.871053	12950	0.51699	1.82631	83.1963	1125.17	9	185
RP120919-P-2-IDA	18	0.83496	10556	0.52035	1.70264	89.1448	1805.15	10	180
SM100427A1-6-IDH	25	0.848203	6916	0.552512	1.88611	81.9922	751.067	7	290
SM100506A1-4-IDD	36	0.818328	7092	0.570007	1.84037	86.2891	644.376	8	194
SM100513A1-3-IDC	20	0.831983	11252	0.542539	1.85888	88.5215	790.826	10	189
SM110120C1-2-INT-IDC	28	0.867689	33015	0.511879	1.91608	79.1371	1342.74	11	465
SM110125A1-3-IDC	29	0.848667	21330	0.618442	1.87737	82.2107	1368.06	6	281
SM110127A1-3-INT-IDD	25	0.877373	6956	0.548077	1.91637	82.5751	705.473	13	196
SM110127B1-3-INT-IDD	29	0.845544	22180	0.542311	1.87034	85.7618	941.831	13	367
SM110128A1-2-INT-IDB	21	0.854906	18165	0.527897	1.87754	83.9327	976.541	12	265
SM120429-2PHOTON-A1-	17	0.82945	10503	0.578175	1.77556	89.4348	1177.73	6	96

Basket cell name	Max Branch Order	Contrac -tion	Fragme- ntation	Partition Asymmetry	Average Rall's Ratio	Average Bifurcat -ion Angle Local	Soma Surface	Number of stems	Number of bifurcat -ions
SM120509A1-2-2PHOTON	12	0.842124	7399	0.543697	1.7776	86.8182	602.313	6	102
TKB050507A1-CH1-BC-B	10	0.883337	3223	0.465406	1.69114	73.6688	944.338	5	96
TKB050507A1-CH5-BC-B	13	0.870079	3078	0.562058	1.75356	72.9262	794.783	8	74
TKB051205A4-CH7-BC-B	20	0.866158	13897	0.529352	1.94188	76.6465	802.737	2	310
TKB060118B1-CH6-BC-B	13	0.847581	3886	0.512996	1.63254	77.8498	1112.54	6	51
TKB060126A2-CH3-BC-N	34	0.829541	10972	0.596393	2.24868	87.871	686.38	4	213
TKB060127A1-CH1-BC-N	18	0.828182	11807	0.537041	1.63148	87.1157	1332.55	5	116
TKB060508A2-CH5-BC-H	14	0.833419	5068	0.507766	1.95211	83.4103	652.264	7	112
TKB060530A2-CH5-BC-N	13	0.837792	6868	0.592031	1.98343	83.6071	909.201	6	76
TKB060531A2-CH7-BC-B	15	0.852592	4860	0.615099	1.56942	88.2664	660.748	7	83
TKB061009A2-CH7-BC-N	14	0.896719	4205	0.547918	1.88327	80.2225	776.568	6	100
TKB061020A1-CH5-BC-B	20	0.850215	6978	0.553394	1.39789	82.1057	1546.36	6	81
TKB061020B1-CH1-BC-B	13	0.810737	10112	0.552619	1.85943	80.3784	1079.63	7	158
TKB061101A2-CH2-BC-H	21	0.871156	12992	0.522199	1.89314	86.1182	982.046	8	229
TKB070208B3-CH2-BC-N	23	0.905553	9103	0.6273	1.88707	66.9061	1058.96	6	130
TKB070809A2-CH3-BC-N	31	0.883614	14618	0.577176	1.92246	77.8287	1015.86	6	356
TKB071119A2-CH8-BC-N	12	0.758604	3570	0.496827	1.41776	93.4095	1652.47	13	57
VD100621-IDB	17	0.835868	5079	0.53265	1.8206	76.057	1130.11	11	81
VD100714B-IDA	16	0.880053	5077	0.483558	1.71521	82.5757	1130.39	7	114
VD100714C-IDA	15	0.836284	2334	0.634474	1.88973	100.067	1937.48	5	88
VD100715C-IDA	16	0.825555	10448	0.540598	1.96724	85.5821	957.131	6	140
VD100726A-IDC	17	0.813288	12028	0.45634	1.85552	94.0655	1086.68	11	206
VD101020B-IDB	26	0.797751	20671	0.510634	1.93606	87.269	556.296	8	306
VD110112A-INT-IDA	18	0.830689	7497	0.578853	1.85229	89.6831	773.23	4	127
VD110112B-INT-IDA	15	0.859006	15384	0.528571	1.80906	80.6309	603.581	7	235
VD110112-INT-A-IDA	18	0.830689	7497	0.578853	1.85229	89.6831	773.23	4	127
VD110112-INT-B-IDA	15	0.859006	15384	0.528571	1.80906	80.6309	603.581	7	235
VD110120-INT-B-IDB	19	0.854742	26614	0.581016	1.91986	84.8931	574.923	10	250

Table 4.0

Basket cell name	Number of branches	Average Bifurcat-ion Angle Remote	Length	Cell type	Neuron ID	Region	Layer
C240998A-I3	434	72.83	16606.9	Small basket interr	388	somatosensory	layer 2-3
C250300C2-ax	209	69.35	11994	Nest basket interne	391	somatosensory	layer 2-3
C250500A-I4	191	71.94	9779.19	Large basket interr	392	somatosensory	layer 2-3
C260897C-I1	368	75.89	18070.09	Large basket interr	400	somatosensory	layer 2-3
C270106A	282	85.4863	17779.2	Descending basket	36780	somatosensory	layer 1
C270106C	156	85.1032	10081.5	Descending basket	36781	somatosensory	layer 1
C270106G	206	83.3395	9331.23	Descending basket	36782	somatosensory	layer 1
C270801-I3	89	66.27	8135.05	Large basket interr	407	somatosensory	layer 6
C271097A-I4	477	72.38	22149.4	Large basket interr	411	somatosensory	layer 4
C280206C	152	85.1975	5232.73	Small basket interr	36786	somatosensory	layer 1
C280998A-I2	178	73.29	9721.36	Nest basket interne	419	somatosensory	layer 2-3
C280998A-I4	132	81.96	3946.61	Small basket interr	420	somatosensory	layer 2-3
C280999A-I4	219	72.7148	9184.23	Nest basket interne	36972	somatosensory	layer 2-3
C281197A-I2	328	69.41	19805	Large basket interr	422	somatosensory	layer 4
C281197A-I4	373	62.33	18404.4	Nest basket interne	423	somatosensory	layer 4
C281199A-IN	280	68.79	12492	Large basket interr	424	somatosensory	layer 2-3
C290500B-I2	284	67.59	13598.3	Nest basket interne	425	somatosensory	layer 2-3
C290998A	57	81.5753	3206.09	Small basket interr	37448	somatosensory	layer 2-3
C290999C-I4	338	77.2	30854.8	Nest basket interne	429	somatosensory	layer 5
C300106A	250	79.8424	8928.31	Small basket interr	37838	somatosensory	layer 4
C300301B1	434	75.14	14668.6	Small basket interr	430	somatosensory	layer 4
C300898C-I3	195	84.63	9937.28	Nest basket interne	434	somatosensory	layer 2-3
C300997B-I4	298	69.96	15955.3	Nest basket interne	438	somatosensory	layer 4
C310106C	172	67.1268	10692.1	Large basket interr	37839	somatosensory	layer 4
C310897A-I2	429	70.47	21490.1	Large basket interr	440	somatosensory	layer 4
d030100ka	30	69.9283	1789.01	interneuron basket	62981	somatosensory	layer 5
d250501me	42	64.8759	3674.51	interneuron basket	62982	somatosensory	layer 5
MTC010301B-IDE	261	79.8129	12916.2	Nest basket interne	37245	somatosensory	layer 5
MTC020502F-IDB	226	75.8239	13934.7	Nest basket interne	37777	somatosensory	layer 2-3
MTC021101A-IDA	803	62.2222	37313.8	Large basket interr	37365	somatosensory	layer 6
MTC030800C-IDA	496	72.435	24264.3	Large basket interr	37846	somatosensory	layer 4
MTC031100A-IDA	642	68.3391	25779.4	Nest basket interne	37708	somatosensory	layer 2-3
MTC031100A-IDC	294	67.0794	14090.4	Nest basket interne	37709	somatosensory	layer 2-3
MTC031100A-IDD	280	62.6069	13088.9	Nest basket interne	37710	somatosensory	layer 2-3
MTC040800A-IDB	188	75.6493	10069.4	Small basket interr	37788	somatosensory	layer 2-3
MTC040800B-IDA	255	89.8708	10539.6	Large basket interr	37843	somatosensory	layer 4
MTC050301A-IDA	664	60.0025	34697.2	Large basket interr	37343	somatosensory	layer 4
MTC050301A-IDC	359	64.4757	13695.3	Large basket interr	37345	somatosensory	layer 5
MTC050600A-IDA	316	76.5975	19195.8	Nest basket interne	37238	somatosensory	layer 5
MTC050600A-IDB	461	74.9081	23157.4	Large basket interr	37237	somatosensory	layer 4
MTC050600B-IDA	262	61.9768	18358	Large basket interr	37510	somatosensory	layer 4
MTC050800A-IDA	205	71.3465	10604	Nest basket interne	37789	somatosensory	layer 4
MTC050800A-IDE	416	80.4146	19480.8	Large basket interr	37790	somatosensory	layer 2-3
MTC050800B-IDB	434	75.1434	22965.9	Large basket interr	37849	somatosensory	layer 2-3
MTC060800A-IDC	207	68.3062	12115.2	Large basket interr	37321	somatosensory	layer 5
MTC060800A-IDF	248	72.4466	10809.5	Nest basket interne	37323	somatosensory	layer 4
MTC060800B-IDA	427	64.3484	20035.9	Large basket interr	37737	somatosensory	layer 2-3
MTC060800C-IDA	297	71.4325	10692.2	Large basket interr	37738	somatosensory	layer 2-3
MTC060800C-IDB	227	67.9214	14324.5	Large basket interr	37666	somatosensory	layer 5
MTC060800D-IDA	554	74.8406	22425.2	Nest basket interne	37667	somatosensory	layer 4
MTC061100A-IDE	278	71.3818	12916.4	Large basket interr	37705	somatosensory	layer 2-3
MTC061100B-IDA	225	69.465	12679.1	Large basket interr	37706	somatosensory	layer 2-3
MTC070301A-IDA	232	77.8093	9917.55	Nest basket interne	37728	somatosensory	layer 2-3
MTC070301C-IDA	433	72.321	20080.5	Large basket interr	37347	somatosensory	layer 4
MTC080301C-IDA	267	61.0029	12614.9	Large basket interr	37246	somatosensory	layer 4
MTC080800A-IDD	463	70.4999	19774.3	Large basket interr	37687	somatosensory	layer 2-3

Basket cell name	Number of branches	Average Bifurcat-ion Angle Remote	Length	Cell type	Neuron ID	Region	Layer
MTC080800C-IDC	336	70.9543	18590.3	Large basket intern	37325	somatosensory	layer 4
MTC090800B-IDB	473	68.275	28867.6	Large basket intern	37755	somatosensory	layer 2-3
MTC100100-6-IDA	109	81.4353	5542.16	Large basket intern	37723	somatosensory	layer 2-3
MTC100100-6-IDB	147	73.8673	7876.36	Large basket intern	37752	somatosensory	layer 2-3
MTC100300A-IDB	492	71.0705	20014.2	Nest basket interne	37578	somatosensory	layer 4
MTC100300D-IDA	810	65.9345	24351.6	Small basket intern	37727	somatosensory	layer 2-3
MTC110300B-B1-2-NBC-	570	73.0828	21847.8	Large basket intern	37713	somatosensory	layer 2-3
MTC110300B-B1-2-NBC-	612	71.9894	28529	Large basket intern	37714	somatosensory	layer 2-3
MTC110301B-IDA	404	56.1141	21188.3	Nest basket interne	37349	somatosensory	layer 5
MTC120501B-IDA	423	71.6156	20399.5	Large basket intern	37386	somatosensory	layer 4
MTC120501B-IDB	301	63.6839	11373.8	Large basket intern	37746	somatosensory	layer 2-3
MTC121100B-IDB	462	79.0045	17709.5	Small basket intern	37688	somatosensory	layer 2-3
MTC121100B-IDG	448	74.4185	17325.9	Large basket intern	37778	somatosensory	layer 2-3
MTC121100B-IDH	221	72.8176	7547.74	Small basket intern	37779	somatosensory	layer 2-3
MTC121100B-IDI	172	68.0117	8571.26	Large basket intern	37780	somatosensory	layer 2-3
MTC130201A-IDA	530	67.1589	23323	Large basket intern	37580	somatosensory	layer 4
MTC130301A-IDA	255	75.7452	12749.2	Large basket intern	37350	somatosensory	layer 5
MTC130800A-IDA	343	63.8759	21849.2	Large basket intern	37767	somatosensory	layer 2-3
MTC130800C-IDA	455	64.3176	24825.1	Large basket intern	37768	somatosensory	layer 2-3
MTC130800D-IDA	742	72.7398	31271	Large basket intern	37671	somatosensory	layer 4
MTC140201B-IDB	501	68.6221	21188.8	Large basket intern	37743	somatosensory	layer 2-3
MTC141001A-IDA	426	78.5145	16065.5	Small basket intern	37850	somatosensory	layer 2-3
MTC141001A-IDB	459	74.7493	21521.5	Large basket intern	37851	somatosensory	layer 2-3
MTC141200A-IDA	241	59.4988	13125.6	Large basket intern	37327	somatosensory	layer 4
MTC151001B-IDB	425	75.3705	15366.7	Small basket intern	37852	somatosensory	layer 2-3
MTC151100A-IDA	663	66.6705	29286.4	Large basket intern	37844	somatosensory	layer 2-3
MTC151200B-IDA	415	74.0231	15986.4	Large basket intern	37697	somatosensory	layer 2-3
MTC151200C-IDA	164	72.778	14177.6	Large basket intern	37696	somatosensory	layer 2-3
MTC151200D-IDA	247	59.9	20340	Large basket intern	37320	somatosensory	layer 4
MTC161001A-IDA	420	67.319	24133.1	Large basket intern	37853	somatosensory	layer 2-3
MTC170501A-IDA	368	67.0474	16948.5	Large basket intern	37758	somatosensory	layer 2-3
MTC180800A-IDB	645	70.802	18076.6	Small basket intern	37689	somatosensory	layer 2-3
MTC180800A-IDC	435	65.8224	21794.6	Large basket intern	37791	somatosensory	layer 2-3
MTC180800C-IDA	551	70.5685	31524.8	Small basket intern	37792	somatosensory	layer 4
MTC190800A-IDA	482	63.1587	22964.9	Large basket intern	37756	somatosensory	layer 2-3
MTC190800B-IDB	430	59.9667	25822.7	Large basket intern	37769	somatosensory	layer 2-3
MTC190800C-IDD	353	72.3732	24272.7	Large basket intern	37702	somatosensory	layer 2-3
MTC210301B-IDA	194	73.808	10767.4	Large basket intern	37795	somatosensory	layer 5
MTC210401C-IDA	506	76.0577	39868.5	Large basket intern	37797	somatosensory	layer 2-3
MTC211200B-IDA	194	81.3914	12482.8	Small basket intern	37772	somatosensory	layer 2-3
MTC211200C-IDA	245	67.2947	10481.3	Large basket intern	37841	somatosensory	layer 4
MTC231001A-IDA	209	81.2147	10480.7	Nest basket interne	37856	somatosensory	layer 2-3
MTC231001A-IDB	402	68.4694	20758.9	Large basket intern	37857	somatosensory	layer 2-3
MTC231100A-IDA	728	67.0554	27954.5	Large basket intern	37782	somatosensory	layer 2-3
MTC250300A-IDD	700	66.4513	26611.3	Large basket intern	37718	somatosensory	layer 2-3
MTC250402A-IDA	457	79.3987	15781.4	Small basket intern	37740	somatosensory	layer 2-3
MTC251001A-IDB	438	73.5455	22301.5	Nest basket interne	37858	somatosensory	layer 4
MTC260800B-IDA	265	69.1835	11885.7	Nest basket interne	37670	somatosensory	layer 4
MTC260800D-IDA	760	66.9263	33148.4	Large basket intern	37757	somatosensory	layer 2-3
MTC261001B-IDD	558	68.0427	25173.9	Large basket intern	37860	somatosensory	layer 2-3
MTC270202A-IDA	480	73.2639	23152.1	Large basket intern	37861	somatosensory	layer 4
MTC280600A-IDA	588	68.7274	18131.8	Small basket intern	37862	somatosensory	layer 2-3
MTC280600A-IDB	494	71.298	18420.8	Large basket intern	37863	somatosensory	layer 2-3
MTC280600C-IDA	484	80.4613	16664.8	Small basket intern	37773	somatosensory	layer 2-3
MTC291001C-IDA	270	70.7709	13508.7	Large basket intern	37864	somatosensory	layer 5
MTC300301B-IDA	433	75.1601	13806.2	Large basket intern	37798	somatosensory	layer 5

Basket cell name	Number of branches	Average Bifurcat-ion Angle Remote	Length	Cell type	Neuron ID	Region	Layer
MTC300402A-IDB	241	73.4284	12829.5	Large basket interr	37742	somatosensory	layer 2-3
MTC300600C-IDA	265	77.2184	13562.5	Nest basket interne	37799	somatosensory	layer 2-3
OG060523B1-2-IDA	488	72.6153	26766.9	Large basket interr	37139	somatosensory	layer 6
OG060523B2-CH7-MC-H-	331	73.4328	20396.4	Large basket interr	37223	somatosensory	layer 6
OG060622A1-CH1-BC-N-	120	67.9388	6654.83	Large basket interr	37115	somatosensory	layer 6
OG060810A8-011807-CH	283	75.1511	15391.5	Large basket interr	37163	somatosensory	layer 6
OG060822A1-2-IDB	311	74.9372	18170.9	Large basket interr	37164	somatosensory	layer 6
OG060826C1-4-IDB	140	71.0222	9826.28	Nest basket interne	37116	somatosensory	layer 6
OG060826C1-4-IDC	284	71.1037	17489.8	Large basket interr	37165	somatosensory	layer 6
OG060828B1-5-IDD	559	63.0108	25872.7	Large basket interr	37166	somatosensory	layer 5
OG060828C2-061205-CH1	417	81.5865	17916.9	Large basket interr	37167	somatosensory	layer 6
OG060829A1-4-IDB	444	76.1164	23916.4	Large basket interr	37168	somatosensory	layer 5
OG060829A1-4-IDE	438	74.2164	24359.6	Nest basket interne	37014	somatosensory	layer 6
OG060901A1-4-IDA	344	70.8915	14458.1	Large basket interr	37213	somatosensory	layer 6
OG060901A3-061218-CH	340	71.6142	13633.8	Large basket interr	37169	somatosensory	layer 6
OG060904A1-3-IDC	551	68.4913	25434.5	Large basket interr	37170	somatosensory	layer 5
OG060906A1-4-IDE	286	81.2132	13510.2	Nest basket interne	37108	somatosensory	layer 6
OG060907A2-070120-CH-	764	73.2534	35458.6	Nest basket interne	37117	somatosensory	layer 6
OG060907B1-3-IDC	352	66.7601	14888.1	Large basket interr	37140	somatosensory	layer 6
OG060921A3-CH5-BC-H-	614	70.5082	26638.2	Nest basket interne	37118	somatosensory	layer 6
OG060921A-4-IDB	595	79.4918	22539.6	Large basket interr	37141	somatosensory	layer 6
OG060922A1-4-IDA	550	67.9882	18882.1	Nest basket interne	37015	somatosensory	layer 6
OG061012B-IDB	240	71.9448	12765.7	Nest basket interne	37016	somatosensory	layer 6
OG061106A1-IDA	230	71.0238	8558.28	Small basket interr	37172	somatosensory	layer 5
OG061123A1-4-IDB	183	71.1814	15378.7	Nest basket interne	37017	somatosensory	layer 5
OG061123A1-4-IDE	619	65.4296	31012.9	Large basket interr	37173	somatosensory	layer 5
OG061123B1-3-IDB	371	73.9255	28445	Large basket interr	37174	somatosensory	layer 5
OG061201A1-8-IDE	427	70.9081	24185.6	Large basket interr	37142	somatosensory	layer 6
OG061201A6-CH5-BC-H-	421	71.1821	23602.4	Large basket interr	37225	somatosensory	layer 6
RP100426-1-IDA	634	66.188	29822.1	Nest basket interne	37120	somatosensory	layer 5
RP100426-2-IDB	284	72.1662	13755.5	Nest basket interne	37392	somatosensory	layer 2-3
RP100427-123-IDB	217	72.3822	10039.6	Nest basket interne	37109	somatosensory	layer 4
RP100427-123-IDH	360	71.6158	15879	Nest basket interne	37121	somatosensory	layer 5
RP100427-123-IDP	111	77.7656	6084.04	Large basket interr	36993	somatosensory	layer 6
RP100427-123-IDQ	112	82.612	7293.94	Nest basket interne	37112	somatosensory	layer 6
RP100428-12-IDK	261	85.6967	9004.68	Small basket interr	37471	somatosensory	layer 6
RP100428-12-IDL	265	78.9853	9434.16	Nest basket interne	37472	somatosensory	layer 4
RP100428-3-IDB	246	90.0781	9801.25	Large basket interr	37569	somatosensory	layer 5
RP101020-1-E1-5-INT-IDI	135	65.6067	13656	Large basket interr	37122	somatosensory	layer 5
RP101026-1-INT-IDC	160	76.683	7306.97	Nest basket interne	37123	somatosensory	layer 5
RP101228-L5-3-IDB	272	70.1893	13805.5	Large basket interr	37199	somatosensory	layer 5
RP101228-L5-3-IDC	122	71.753	6921.22	Large basket interr	37533	somatosensory	layer 6
RP101229-L5-1-IDD	484	69.7715	21164.6	Nest basket interne	37025	somatosensory	layer 5
RP110105-L5-1-2-IDG	181	74.983	6695.11	Nest basket interne	37373	somatosensory	layer 5
RP110107-L5-1-IDB	442	81.9391	17592.8	Small basket interr	37368	somatosensory	layer 5
RP110107-L5-1-IDC	182	84.5772	9283.99	Nest basket interne	37111	somatosensory	layer 5
RP110110-L5-3-IDA	548	71.0979	19624.4	Small basket interr	37375	somatosensory	layer 5
RP110111-L5-3-IDA	552	67.0373	22563	Nest basket interne	37376	somatosensory	layer 4
RP110112-L5-3-IDB	392	77.3398	16883.2	Small basket interr	36976	somatosensory	layer 4
RP110112-L5-3-IDD	193	86.2041	8531.16	Nest basket interne	37508	somatosensory	layer 4
RP110113-L5-1-IDA	183	81.4142	8715.23	Nest basket interne	37094	somatosensory	layer 4
RP110113-L5-1-IDC	270	73.064	16608.2	Nest basket interne	37800	somatosensory	layer 4
RP110113-L5-3-IDA	325	68.3108	18317.7	Large basket interr	37180	somatosensory	layer 4
RP110114-L5-1-IDG	163	76.6813	6476.55	Large basket interr	36981	somatosensory	layer 4
RP110119-L5-1-IDB	347	65.321	21115.5	Nest basket interne	37802	somatosensory	layer 5
RP110119-L5-2-IDC	312	78.0826	11854.9	Small basket interr	37295	somatosensory	layer 6

Basket cell name	Number of branches	Average Bifurcat-ion Angle Remote	Length	Cell type	Neuron ID	Region	Layer
RP110119-L5-2-IDD	255	70.5781	13212.3	Nest basket interne	37418	somatosensory	layer 5
RP110120-L5-2-IDH	494	67.8991	22105.9	Large basket interr	37182	somatosensory	layer 5
RP110120-L5-3-IDA	338	71.0816	13869.7	Small basket interr	37805	somatosensory	layer 5
RP110120-L5-3-IDD	265	71.7744	10856.5	Nest basket interne	37098	somatosensory	layer 6
RP110120-L5-3-IDF	274	64.9618	12135	Large basket interr	37845	somatosensory	layer 6
RP110120-L5-4-IDB	294	78.0825	10402.1	Small basket interr	37183	somatosensory	layer 6
RP110121-L5-1-IDC	380	71.3259	22029.6	Nest basket interne	37394	somatosensory	layer 5
RP110121-L5-2-IDA	694	72.236	31004.2	Nest basket interne	37126	somatosensory	layer 4
RP110121-L5-2-IDB	543	74.956	24011.2	Nest basket interne	37027	somatosensory	layer 4
RP110121-L5-2-IDF	205	75.6218	16018.9	Nest basket interne	37097	somatosensory	layer 6
RP110125-L5-1-IDA	236	70.9274	10105.1	Large basket interr	37304	somatosensory	layer 4
RP110125-L5-1-IDC	408	85.7211	10420.7	Small basket interr	37146	somatosensory	layer 6
RP110125-L5-1-IDD	318	80.2253	21284.1	Large basket interr	37305	somatosensory	layer 5
RP110125-L5-2-IDE	298	72.6541	16504.5	Large basket interr	37504	somatosensory	layer 5
RP110125-L5-2-IDH	399	73.1269	20403.7	Nest basket interne	37505	somatosensory	layer 5
RP110127-L5-1-IDC	169	70.8033	15896.2	Nest basket interne	37809	somatosensory	layer 5
RP110127-L5-3-IDI	544	86.1796	21825.9	Large basket interr	37149	somatosensory	layer 5
RP110131-L5-1-IDA	218	76.1407	13288.7	Nest basket interne	37299	somatosensory	layer 4
RP110131-L5-1-IDD	152	72.5956	8681.07	Nest basket interne	37383	somatosensory	layer 4
RP110131-L5-2-IDB	436	57.4169	28318.8	Nest basket interne	37318	somatosensory	layer 5
RP110201-L5-2-IDA	299	67.8116	16883	Large basket interr	37151	somatosensory	layer 5
RP110201-L5-2-IDB	333	66.1836	19109.2	Nest basket interne	36984	somatosensory	layer 5
RP110202-L5-2-IDA	185	67.3054	17373.5	Nest basket interne	37627	somatosensory	layer 5
RP110202-L5-2-IDB	374	72.233	16901.2	Large basket interr	37628	somatosensory	layer 5
RP110203-L5-2-IDA	686	61.647	37250.4	Large basket interr	37602	somatosensory	layer 5
RP110204-L5-1-IDA	544	76.0786	19899.7	Small basket interr	37603	somatosensory	layer 5
RP110207-L5-1-IDA	323	67.4248	17291.7	Large basket interr	37630	somatosensory	layer 5
RP110207-L5-1-IDC	330	74.6702	12739.5	Large basket interr	37342	somatosensory	layer 5
RP110207-L5-2-IDA	673	67.9511	31969.3	Nest basket interne	37310	somatosensory	layer 4
RP110207-L5-2-IDB	343	69.5386	18352.7	Nest basket interne	37311	somatosensory	layer 4
RP110208-L5-2-IDA	257	69.8298	13993.2	Nest basket interne	37631	somatosensory	layer 5
RP110419-C1-IDA	177	59.7608	10864.7	Large basket interr	37485	somatosensory	layer 5
RP110420-C1-IDA	428	83.2903	20192.2	Nest basket interne	37486	somatosensory	layer 5
RP110427-C2-IDA	340	78.1536	14358.7	Nest basket interne	36985	somatosensory	layer 5
RP110427-C2-IDB	290	65.9957	19649	Large basket interr	37813	somatosensory	layer 5
RP110506_C1+2_IDA	215	77.6501	10363.5	Nest basket interne	37604	somatosensory	layer 5
RP110506_C1+2_IDB	180	77.6913	8352.31	Nest basket interne	37605	somatosensory	layer 5
RP110710-C3-IDA	312	68.9807	17498.9	Large basket interr	37606	somatosensory	layer 5
RP110711_C1+2_IDA	206	78.7465	11670.7	Nest basket interne	37298	somatosensory	layer 4
RP110711-C3-IDA	244	70.23	14392	Nest basket interne	37816	somatosensory	layer 5
RP120507-P-1-IDA	340	75.7339	11884.2	Small basket interr	37733	somatosensory	layer 2-3
RP120516-P-1-IDA	347	77.5368	24148.7	Large basket interr	37736	somatosensory	layer 2-3
RP120607-P-1-2-IDE	161	79.2641	8369.97	Nest basket interne	37877	somatosensory	layer 4
RP120802-P-1-IDA	226	73.357	13517.9	Large basket interr	37384	somatosensory	layer 5
RP120803-P-1-IDD	257	76.3629	10927.1	Large basket interr	37597	somatosensory	layer 4
RP120914-P-1-IDA	379	75.1522	26539.3	Nest basket interne	37598	somatosensory	layer 4
RP120919-P-2-IDA	370	67.9741	12757.1	Small basket interr	37416	somatosensory	layer 4
SM100427A1-6-IDH	587	76.0247	15501.5	Small basket interr	37474	somatosensory	layer 2-3
SM100506A1-4-IDD	396	77.7722	10583.5	Small basket interr	37477	somatosensory	layer 2-3
SM100513A1-3-IDC	388	70.9309	17527.7	Descending basket	37607	somatosensory	layer 1
SM110120C1-2-INT-IDC	941	64.7824	40851.9	Large basket interr	37518	somatosensory	layer 2-3
SM110125A1-3-IDC	568	67.9011	21252.2	Large basket interr	37529	somatosensory	layer 2-3
SM110127A1-3-INT-IDD	405	71.8899	12618.4	Small basket interr	37520	somatosensory	layer 2-3
SM110127B1-3-INT-IDD	747	72.1223	25401.8	Small basket interr	37532	somatosensory	layer 2-3
SM110128A1-2-INT-IDB	542	65.6422	18955.2	Small basket interr	37530	somatosensory	layer 2-3
SM120429-2PHOTON-A1	198	76.9197	15001.5	Descending basket	37511	somatosensory	layer 1

Basket cell name	Number of branches	Average Bifurcat-ion Angle Remote	Length	Cell type	Neuron ID	Region	Layer
SM120509A1-2-2PHOTOI	210	73.5887	11015.7	Descending basket	37608	somatosensory	layer 1
TKB050507A1-CH1-BC-E	197	67.9312	11821	Nest basket interne	36966	somatosensory	layer 6
TKB050507A1-CH5-BC-E	156	65.9746	12129.5	Large basket interr	37186	somatosensory	layer 6
TKB051205A4-CH7-BC-E	622	73.9978	29758.7	Nest basket interne	36967	somatosensory	layer 6
TKB060118B1-CH6-BC-B	108	66.6891	7224.77	Large basket interr	37128	somatosensory	layer 6
TKB060126A2-CH3-BC-N	430	87.0058	16953.7	Small basket interr	37187	somatosensory	layer 6
TKB060127A1-CH1-BC-N	237	67.3652	17090	Large basket interr	37188	somatosensory	layer 6
TKB060508A2-CH5-BC-H	231	67.986	15228.5	Nest basket interne	37131	somatosensory	layer 6
TKB060530A2-CH5-BC-N	158	65.0619	10650.3	Large basket interr	37191	somatosensory	layer 6
TKB060531A2-CH7-BC-E	173	76.5453	8050.62	Large basket interr	37132	somatosensory	layer 6
TKB061009A2-CH7-BC-N	206	73.1536	7497.04	Large basket interr	37134	somatosensory	layer 6
TKB061020A1-CH5-BC-E	168	73.4377	15135.3	Large basket interr	37192	somatosensory	layer 6
TKB061020B1-CH1-BC-E	323	74.2107	23173.8	Large basket interr	37193	somatosensory	layer 6
TKB061101A2-CH2-BC-H	466	70.4847	25331.8	Large basket interr	37195	somatosensory	layer 6
TKB070208B3-CH2-BC-N	266	52.4851	19892.5	Large basket interr	37196	somatosensory	layer 6
TKB070809A2-CH3-BC-N	718	72.2361	24628.3	Large basket interr	37197	somatosensory	layer 6
TKB071119A2-CH8-BC-N	127	72.54	6077.02	Large basket interr	37137	somatosensory	layer 6
VD100621-IDB	173	71.3783	7509.82	Nest basket interne	37479	somatosensory	layer 2-3
VD100714B-IDA	235	73.8217	9698.54	Small basket interr	37565	somatosensory	layer 4
VD100714C-IDA	181	88.7718	6377.42	Nest basket interne	37552	somatosensory	layer 5
VD100715C-IDA	286	71.7482	17348.1	Large basket interr	37553	somatosensory	layer 4
VD100726A-IDC	423	79.0043	13937.3	Small basket interr	37555	somatosensory	layer 4
VD101020B-IDB	620	78.7407	20450.9	Small basket interr	37556	somatosensory	layer 4
VD110112A-INT-IDA	258	83.2182	11512.5	Large basket interr	37557	somatosensory	layer 4
VD110112B-INT-IDA	477	67.3071	29011.5	Large basket interr	37558	somatosensory	layer 2-3
VD110112-INT-A-IDA	258	83.2182	11512.5	Large basket interr	37381	somatosensory	layer 4
VD110112-INT-B-IDA	477	67.3071	29011.5	Large basket interr	37382	somatosensory	layer 2-3
VD110120-INT-B-IDB	510	69.8748	23334.9	Large basket interr	37198	somatosensory	layer 2-3