

Editing notes:

- Temporarily, terms deleted from the human account (Swanson, 2014, Appendix 4) have been stricken through; terms added to the human account are noted as [new] and other notes are also bracketed for now. Potential abbreviations are highlighted in yellow.
- Add 3 white layers of SC?

TABLE D

Rat CNS White Matter Tracts (topographic histological grouping)

This hierarchical Nomenclature Table and its companion (Table C) provide sets of *standard terms* for describing the *gray matter regions* (Swanson & Bota, 2010) and *white matter tracts* (Bell & Bell, 1826) of the adult rat *central nervous system* (Carus, 1814) (CNS) when viewed with appropriate histological methods. There are multiple ways to group *gray matter regions* (Swanson & Bota, 2010) and *white matter tracts* (Bell & Bell, 1826). Tables C and D are adapted directly from Appendices 3 and 4, respectively of Swanson (2014). Thus, a strictly topographic approach is followed, using the broad topographic divisions of Table A for the highest levels of the hierarchy. By definition this approach is done without regard to function.

This Nomenclature Table deals with the most confusing aspect of *central nervous system* (Carus, 1814) descriptive anatomy: *tracts* (Willis, 1664), connections, projections, and pathways. These terms are defined clearly in the Foundational Model of Connectivity (Swanson & Bota, 2010; see especially their Fig. 5). Briefly, *white matter tracts* (Bell & Bell, 1826) are defined macrodivisions of *white matter* (Meckel, 1817), connection and projection are synonyms and describe an axonal relationship from one *gray matter region* (Swanson & Bota, 2010) to another *gray matter region* (Swanson & Bota, 2010) that takes a route through one or more sequential *white matter tracts* (Bell & Bell, 1826), and a pathway is the part of a connection revealed in a particular experimental pathway tracing experiment.

There is no systematic, widely accepted account of all *white matter tracts* (Bell & Bell, 1826) in any mammalian species, although Appendix 4 in Swanson (2014) is a recent attempt. Nomenclature Table D presented here is minimally necessary to describe the topography of *white matter tracts* (Bell & Bell, 1826) followed by *central nervous system* (Carus, 1814) connections and their overall circuitry—the routes taken by projections and pathways.

The guiding principles of the scheme presented here are twofold: a topological interpretation of *central nervous system* (Carus, 1814) development (Table B; Fig. 2B, lower part in Swanson, 2014), and the basic longitudinal-transverse organization of *nervous systems* (Monro, 1783) in evolution and comparative anatomy (Figs. 1, 2 in Swanson, 2014). The general longitudinal-transverse organization of human *central nervous system white matter tracts* (>1840) has been emphasized at least since the work of Reil (1809b) and Gall & Spurzheim (1810), and has been documented more recently for *nervous system* (Monro, 1817) organization in all bilaterally symmetric animals (for example, Reisinger, 1925, 1972).

In practice, *central nervous system white matter tracts* (>1840) in this Table are divided into 4 types: longitudinal, transverse, intrinsic, and central root. They are discussed in Chapter 3 (see Fig. 16 in Swanson, 2014).

Nervous system [rat] (Monro, 1783)

Systems architecture (Swanson & Bota, 2010; also see Fig. 15 here, right side)

White matter tracts (Bell & Bell, 1826)

Cerebrospinal axis (Meckel, 1817) or Central nervous system (Carus, 1814)

Central root

Spinal tract of trigeminal nerve (>1840) **sptV**

Gracile fascicle (Müller, 1834) **grf**

Cuneate fascicle (Müller, 1834) **cuf**

Longitudinal

Medial longitudinal fascicle (>1840) **mlf**

Tectospinal tract (>1840) **tst**

Medial reticulospinal tract (>1840) **mrst**

Corticospinal tract (>1840) **cst**

Medial forebrain bundle (Edinger, 1893) **mfb**

Lateral vestibulospinal tract (>1840) **lvsp**

Spinothalamic tract (>1840) **stt**

Ventral spinocerebellar tract (>1840) **vsct**

Rubrospinal tract (>1840) **rust**

Lateral reticulospinal tract (>1840) **lrst**

Dorsal spinocerebellar tract (>1840) **dsct**

Brain (Smith Papyrus, c1700 BC)

Central root

Brachium of superior colliculus (>1840) **bsc**

Midbrain tract of trigeminal nerve (>1840) **mtV**

Longitudinal

Striatotegmental fascicle (>1840) **stg** [new; bidirectional]

Pallidotegmental fascicle (>1840) **ptf** [new; bidirectional]

Medial lemniscus (>1840) **ml**

Mammillotegmental tract (Kölliker, 1896) **mtg**

Nigrothalamic tract (>1840) **ntt** [new]

Central tegmental tract (Bechterew, 1889) **ctt**

Dorsal longitudinal fascicle (Schütz, 1891) **dlf**

Ventrolateral fascicle (>1840) **vlf**

Habenulo-interpeduncular tract (>1840) **hit**

Cerebellar peduncles (Ridley, 1695) **cbp**

Superior cerebellar peduncle (Procháska, 1800) **scp**

Forebrain (Goette, 1873)

- Transverse and longitudinal
 - Fornix (Vesalius, 1543a) **fxs**
- Longitudinal
 - Internal capsule (Burdach, 1822) **int**
 - Thalamic radiations (Reil, 1809b) **tra**
 - Postcommissural fornix (Loo, 1931) **pof**
 - Terminal stria (Wenzel & Wenzel, 1812) **st**

Endbrain (Kuhlenbeck, 1927)

- Transverse
 - Precommissural fornix (Loo, 1931) **prf**
- Longitudinal
 - Lateral septal arcuate fibers (>1840) **lsa**
 - Endbrain terminal stria (>1840) **ste**
 - Peduncular loop (Gratiolet, 1857) **pdl**

Cerebral nuclei (Swanson, 2000a)

- Intrinsic
 - ~~Medial medullary lamina (>1840)~~
 - ~~Lateral medullary lamina (>1840)~~
- Transverse
 - Terminal stria commissure (>1840) **stc**
- Longitudinal
 - ~~Anterior limb of internal capsule (>1840)~~
 - Cerebral nuclei corticospinal tract (>1840) **cstc**
 - ~~Genu of internal capsule (>1840)~~
 - Diagonal band (Broca, 1879) **db**
 - Septal postcommissural fornix (>1840) **pofs**
 - Cerebral nuclei part of thalamic radiations (>1840) **ctra** [new, in ant. limb of humans]
 - Cerebral nuclei part of striatotegmental fascicle (>1840) **stgc** [new; bidirectional]
 - Cerebral nuclei part of pallidotegmental fascicle (>1840) **ptfc** [new; bidirectional]

Cerebral cortex (>1840)

- Central root
 - Olfactory nerve layer of main olfactory bulb (>1840) **MOBnl**
- Intrinsic
 - Lateral olfactory tract (>1840) **lot**
 - ~~Superficial medullary lamina of subiculum (Dejerine & Dejerine-Klumpke, 1895)~~
- Transverse

Cerebral cortex white matter (>1840) **cwm**

- Anterior commissure (Lieutaud, 1742) **ac**
 - Olfactory limb of anterior commissure (>1840) **aco**
 - Temporal limb of anterior commissure (>1840) **act**
- Corpus callosum (Galen, c177) **cc**
 - Rostrum of corpus callosum (Reil, 1809b) **ccr**
 - Genu of corpus callosum (Reil, 1809b) **ccg**
 - Body of corpus callosum (Arnold, 1838a) **ccb**
 - Splenium of corpus callosum (Burdach, 1822) **ccs**
- Radiation of corpus callosum (>1840) **ccra**
 - Frontal forceps (>1840) **frf**
 - ~~Tapetum (Reil, 1809b)~~
 - Occipital forceps (>1840) **ocf**
- Fimbria (Honegger, 1890) **fi**
 - Longitudinal striae (>1840) **los**
 - ~~Medial longitudinal stria (>1840) losm~~
 - ~~Lateral longitudinal stria (Arnold, 1838a) losl~~
 - Alveus (Burdach, 1822) **alv**
 - Dorsal fornix (Sprague & Meyer, 1950) **df**
 - Hippocampal commissures (Johnston, 1913) **hc**
 - Ventral hippocampal commissure (Craigie, 1925) **vhc**
 - Intermediate hippocampal commissure (>1840) **ihc**
 - Dorsal hippocampal commissure (Craigie, 1925) **dhc**
- Association fibers of cerebral cortex (>1840) **assn**
 - ~~Arcuate fibers (Arnold, 1838b)~~
 - ~~Uncinate fascicle (Reil, 1809b)~~
 - ~~Inferior longitudinal fascicle (Burdach, 1822)~~
 - ~~External capsule (Burdach, 1822)~~
 - ~~Superior longitudinal fascicle (>1840)~~
 - Cingulum (Burdach, 1822) **cing**
 - Perforant path (>1840) **per**
 - ~~Optic radiation (>1840)~~
 - ~~Auditory radiation (>1840)~~

Interbrain (Baer, 1837)

- Central Root
 - Optic tract (Vicq d' Azyr, 1784) **opt**
- Transverse
 - Medullary stria (Wenzel & Wenzel, 1812) **sm**

Mammillothalamic tract (Kölliker, 1896) **mtt**

Longitudinal

~~Posterior limb of internal capsule (1840)~~

~~Sublentiform part of internal capsule (>1840)~~

~~Retrolentiform part of internal capsule (>1840)~~

Interbrain corticospinal tract (>1840) **csti**

Interbrain nigrothalamic tract **ntti** (>1840) [new]

Interbrain superior cerebellar peduncle (>1840) **scpi** [new]

Hypothalamus (Kuhlenbeck, 1927)

Central Root

Optic chiasm (Galen, c173) **och**

Medial retinohypothalamic tract (>1840) **mrht**

Hypothalamic optic tract (>1840) **oph**

Lateral retinohypothalamic tract (>1840) **lrht**

Inferior fascicle of accessory optic system (Hayhow et al., 1960) **iao**

Intrinsic

Periventricular bundle of hypothalamus (>1840) **pvbh**

Hypothalamohypophysial tract (>1840) **hht**

Principal mammillary tract (Kölliker, 1896) **pm**

Transverse

Hypothalamic medullary stria (>1840) **smh**

Hypothalamic mammillothalamic tract (>1840) **mtth**

Longitudinal

Supraoptic decussations (>1840) **sup**

Hypothalamic mammillotegmental tract (>1840) **mtgh**

Supramammillary decussation (>1840) **smd**

Hypothalamic terminal stria (>1840) **sth**

Hypothalamic medial forebrain bundle (>1840) **mfbh**

Hypothalamic postcommissural fornix (>1840) **pofh**

Medial corticohypothalamic tract (Gurdjian, 1927) **mct**

Hypothalamic striatotegmental fascicle (>1840) **stgh** [new, bidirectional]

Hypothalamic pallidotegmental fascicle (>1840) **ptfh** [new; bidirectional]

Thalamus (His, 1893a)

Central Root

Thalamic optic tract (>1840) **optt**

Thalamic brachium of superior colliculus (>1840) **bsct**

Intrinsic

Periventricular bundle of thalamus (>1840) **pvbt**

Internal medullary lamina (>1840) **im**

Middle commissure (>1840) **mc**

External medullary lamina (>1840) **em** [don't put on flatmap]

Zonal layer of thalamus (Burdach, 1822)

Transverse

Epithalamic medullary stria (>1840) **sme**

Habenular commissure (>1840) **hbc**

Epithalamic branch of pallidotegmental fascicle (>1840) **ptfe** [new]

Thalamic branch of pallidotegmental fascicle (>1840) **ptt** [new]

Thalamic mammillothalamic tract (>1840) **mtt**

Longitudinal

~~Inferior thalamic radiation peduncular loop (>1840)~~

Subiculothalamic tract (Swanson et al., 1987) **sbt**

Thalamic part of thalamic radiations (>1840) **tra** [new, in post. limb of humans]

Thalamic spinothalamic tract (>1840) **stt**

Thalamic medial lemniscus (>1840) **mlt**

Thalamic habenulo-interpeduncular tract (>1840) **hitt**

Midbrain (Baer, 1837)

Transverse

nigrotectal tract (**nte**) [new]

Tegmentum (Swanson, 2000b)

Central Root

Oculomotor nerve central root (>1840) **IIIc**

Oculomotor nerve central rootlets (>1840) **IIIcr** [don't need on flatmap]

Pretectal brachium of superior colliculus (>1840) **bscp**

Superior fascicle of accessory optic system (Hayhow et al., 1960) **sao**

Transverse peduncular tract (Gudden, 1870) **tpt**

Trochlear nerve central root (>1840) **IVc**

Trochlear nerve decussation (>1840) **IVd**

Tegmental segment of midbrain tract of trigeminal nerve (>1840) **mtVt**

Transverse

Posterior commissure (Winslow, 1733) **pc**

Tegmental habenulo-interpeduncular tract (>1840) **hittg**

tegmental nigrotectal tract (>1840) **ntetg** [new]

Longitudinal

Tegmental medial longitudinal fascicle (>1840) **mlft**

Tegmental tectospinal tract (>1840) **tstt** [transverse & longitudinal segments, **tstt/tsttl**]

Dorsal tegmental decussation (>1840) **dtd**

Tegmental medial lemniscus (>1840) **mltg**
 Cerebral peduncle (Tarin, 1753) **cp**
 Tegmental medial forebrain bundle (>1840) **mfbt**
 Tegmental striatotegmental fascicle (>1840) **stgt** [new; bidirectional]
 Tegmental pallidotegmental fascicle (>1840) **ptftg** [new; bidirectional]
 Tegmental nigrothalamic tract (>1840) **nttt** [new]
 Mammillary peduncle (>1840) **mp**
 Tegmental mammillotegmental tract (>1840) **mtgt**
 Tegmental central tegmental tract (>1840) **cttt**
 Tegmental dorsal longitudinal fascicle (>1840) **dlft**
 Tegmental ventrolateral fascicle (>1840) **vltf** [show components on flatmap]
 Tegmental spinothalamic tract (>1840) **stttg**
 Tegmental rubrospinal tract (>1840) **rustt**
 Tegmental superior cerebellar peduncle (>1840) **scpt**
 Superior cerebellar peduncle decussation (>1840) **scpd**
 Brachium of inferior colliculus (>1840) **bic**

Tectum (Baer, 1837)

 Transverse

 Superior colliculus commissure (>1840) **csc**
 Tectal nigrotectal tract (>1840) **ntet** [new]
 Inferior colliculus commissure (>1840) **cic**

Pons (Haller, 1747)

 Central Root

 Abducens nerve central root (>1840) **VIc**
 Abducens nerve central rootlets (>1840) **VIcr** [don't need for flatmap]
 Trigeminal nerve central motor root (>1840) **moVc**
 Pontine segment of midbrain tract of trigeminal nerve (>1840) **mtVp**
 Trigeminal nerve central sensory root (>1840) **sVc**
 Pontine segment of spinal tract of trigeminal nerve (>1840) **sptVp**

 Transverse

 Middle cerebellar peduncle (Rolando, 1819) **mcp**
 Transverse pontine fibers (>1840) **tpf**

 Longitudinal

 Pontine medial longitudinal fascicle (>1840) **mlfp** [with mfl decussation, **mlfd** in med]
 Pontine tectospinal tract (>1840) **tstp**
 Pontine medial reticulospinal tract (>1840) **mrstp**
 Pontine medial lemniscus (>1840) **mlp**
 Lateral lemniscus (Bechterew, 1885b) **ll**

Longitudinal pontine fibers (Arnold, 1838b) **lpf**
Pontine medial forebrain bundle (>1840) **mfbp**
Pontine central tegmental tract (>1840) **cttp**
Pontine dorsal longitudinal fascicle (>1840) **dlfp**
Pontine ventrolateral fascicle (>1840) **vlfp** [show components on flatmap]
 Pontine spinothalamic tract (>1840) **sttp**
 Pontine ventral spinocerebellar tract (>1840) **vsctp**
 Pontine rubrospinal tract (>1840) **rustp**
Pontine superior cerebellar peduncle (>1840) **scpp**

Cerebellum (Aristotle)

Transverse

Cerebellar commissure (>1840) **cbc**

Longitudinal

Arbor vitae (Winslow, 1733) **arb**

Floccular peduncle (Burdach, 1822) **flp** [probably not relevant for rat]

Medulla (Winslow, 1733)

Central Root

Medullary segment of spinal tract of trigeminal nerve (>1840) **sptVm**

Facial nerve central root (>1840) **VIIc**

Intermediate nerve central root (>1840) **iVIIc** [2 parts: gustatory, parasympathetic]

Cochlear nerve central root (>1840) **cVIIIc**

Vestibular nerve central root (>1840) **vVIIIc**

Glossopharyngeal nerve central root (>1840) **IXc**

Glossopharyngeal nerve central rootlets (>1840) **IXcr** [not needed for flatmap]

Vagus nerve central root (>1840) **Xnc**

Vagus nerve central rootlets (>1840) **Xcr** [not needed for flatmap]

Hypoglossal nerve central root (>1840) **XIIc**

Hypoglossal nerve central rootlets (>1840) **XIIcr** [not needed for flatmap]

Medullary gracile fascicle (>1840) **grfm**

Medullary cuneate fascicle (>1840) **cufm**

Transverse

Trapezoid body (Treviranus, 1820) **tb**

Internal arcuate fibers (>1840) **iaf**

Medial lemniscus decussation (>1840) **mld**

Longitudinal

Medullary medial longitudinal fascicle (>1840) **mlfm**

Medullary tectospinal tract (>1840) **tstm**

Medullary medial reticulospinal tract (>1840) **mrstm**

Medullary medial lemniscus (>1840) **mlm**
Pyramid (Willis, 1664) **py**
 Pyramidal decussation (Reil, 1809c) **pyd**
Medullary medial forebrain bundle (>1840) **mfbm**
Medullary central tegmental tract (>1840) **cttm**
 Amiculum of olive (>1840) **ami**
Medullary lateral vestibulospinal tract (>1840) **lvstm**
Medullary ventrolateral fascicle (>1840) **vlfm** [indicate parts on flatmap]
 Medullary spinothalamic tract (>1840) **sttm**
 Medullary ventral spinocerebellar tract (>1840) **vsctm**
 Medullary rubrospinal tract (>1840) **rustm**
 Medullary lateral reticulospinal tract (>1840) **lrstm**
 Medullary dorsal spinocerebellar tract (>1840) **dsctm**
Inferior cerebellar peduncle (Günther, 1786) **icp**
 Ventral external arcuate fibers (>1840) **vea** [probably not important for rat]
 Olivocerebellar tract (>1840) **oct**
 Medullary striae (Scarpa, 1788) **mes** [not relevant for rat]

Spinal cord (Galen, c162-c166)

Central Root

Ventral root central part (>1840) **vrct**
 Ventral rootlets central part (>1840) **vrtr** [dont need for flatmap]
 Spinal root of accessory nerve central part **sXIc**
Spinal segment of spinal tract of trigeminal nerve (>1840) **sptVs**
Dorsal root central part (1840) **drtc**
Spinal gracile fascicle (>1840) **grfs**
Spinal cuneate fascicle (>1840) **cufs**

Transverse

Ventral white commissure (>1840) **vc**

Longitudinal

Funiculi of spinal cord (Burdach, 1822) **fun** [not used in flatmap]
 Ventral funiculus (>1840) **vfun** [not used in flatmap]
 Ventral intersegmental tract (>1840) **vit**
 Spinal medial longitudinal fascicle (>1840) **mlfs**
 Spinal tectospinal tract (>1840) **tsts**
 Uncrossed corticospinal tract (>1840) **cstu**
 Spinal lateral vestibulospinal tract (>1840) **lvsts**
 Spinal medial reticulospinal tract (>1840) **mrsts**
 Ventral spinothalamic tract (>1840) **vsct**

Lateral funiculus (Burdach, 1822) **lfun** [not used in flatmap]
Lateral intersegmental tract (>1840) **lit**
Lateral spinothalamic tract (>1840) **lsct**
Spinal ventral spinocerebellar tract (>1840) **vscts**
Spinal lateral reticulospinal tract (>1840) **lsrts**
Spinal rubrospinal tract (>1840) **rusts**
Crossed corticospinal tract (>1840) **cstc**
Spinal medial forebrain bundle (>1840) **mfbs**
Spinal dorsal spinocerebellar tract (>1840) **dscts**
Dorsolateral tract (>1840) **dl**
Dorsal funiculus (>1840) **dfun** [not used in flatmap]
Dorsal intersegmental tract (>1840) **dit**