

# CoCoDat users manual

# 1. Introduction

CoCoDat (*Collation of Cortical Data*) is a relational database designed and implemented in Microsoft Access© to facilitate the collation, organization and selection of quantitative experimental data for biophysically realistic neuronal models. It provides a framework for entering detailed information extracted from the published literature in a manner ensuring the integrity of the data by strictly anchoring uninterpreted experimental data to the anatomical information provided on the recording site it was obtained from, as well as detailed records of the experimental procedures employed and detailed bibliographic references and publishing information.

The records are organized in the four major groups *Literature*, *Experimental Methods*, *Mapping of Recording Site* and *Experimental Findings*. The latter is further subdivided into the six data categories *Morphology*, *FiringProperties*, *IonicCurrents*, *IonicConductances*, *SynapticCurrents* and *Connectivity*. In this manual a brief description of how to enter and retrieve data in the different categories using a GUI based on custom made graphical forms will be given.

For a detailed description of the database structure and search procedures please refer to:

D.-Johnsen, J., Maier, J., Stephan, K.E., Kötter, R.: "CoCoDat: Collation of Cortical Data on Neurons and Microcircuitry. Systematic Storage and Retrieval of Experimental Data for Biophysically Realistic Modeling". In: Kötter, R. (ed.), NEUROSCIENCE DATABASES - A Practical Guide, pp.109-120, Kluwer Academic Publishers, 2003.

D.-Johnsen, J., Stephan, K., Maier, J., Luhmann, H., Kötter, R.: "Guiding the modeller: Organizing and selecting experimental data for single cell models using the CoCoDat database. Neurocomputing (In press).

## 2. Entering data in CoCoDat

The CoCoDat contains data in 4 different groups, each consisting of several tables with different types of information. Graphical forms allow the user to enter data into one or more tables in a group and can also be used to simply browse the data already contained in the database. Each form consists of a *Main* form and one or more *Sub*-forms, distinguished by a graphical border and a separate heading. In the following the style of heading indicates a **MainForm** or a *SubForm*.

Two general principles build the foundation of successful data collation in the CoCoDat framework:

- Familiarize yourself with the *entire* publication before entering data of any kind
- *Always* enter data exactly the way they appear in the publication

To follow the first principle read through the entire publication and make sure to have a good understanding of the individual details. Misunderstanding information in the publication leads to erroneous data collation which results in a corrupted database.

The second principle is imperative to the concept of CoCoDat: Only uninterpreted data entered exactly as given by the authors in the original publication should be entered in the database. This ensures transparency (a user can always check the data against the original publication) and minimizes the risk of data-corruption. *Comment*-fields in most tables allows the data-collator to add personal

comments, derived results and other information in a manner that makes it obvious that this is *not* original information.

Since Microsoft Access does not allow the use of subscript or superscript in table fields, the following convention has been adopted: Superscript is entered as normal text following the previous or following word (ie. Ca<sup>2+</sup> = Ca2+). Subscript is entered as normal text in parentheses (ie. I<sub>Na,P</sub> = I(Na,P)).

All forms for entering and browsing data are reached from the central *SwitchBoard*, which is automatically opened when opening the database file.

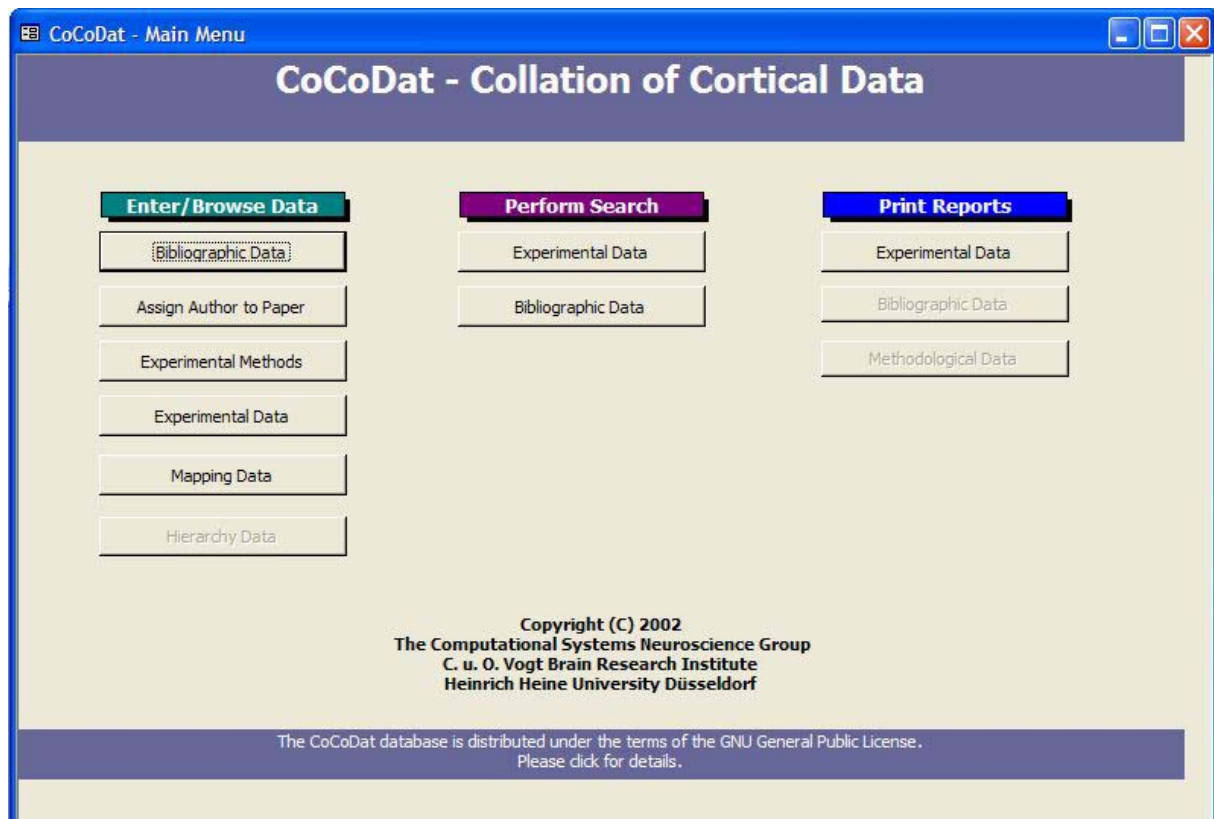


Fig. 1: The CoCoDat *SwitchBoard*.

## 2.1 *Entering bibliographic data*

All data in the CoCoDat database are ultimately linked to information on the original publication they were extracted from. To enter bibliographic data on a publication click "Literature Data" under the heading "Enter/Browse Data" on the CoCoDat *SwitchBoard*.

Fig. 2: The *Literature* form.

## Literature:

This is the main form giving access to bibliographic data. To simply browse already entered information use the navigational arrows at the bottom of the form. To enter a new record click the ">\*" symbol on the navigation bar in order to open an empty form.

- **Literature\_ID:** Each publication in CoCoDat is assigned a *LiteratureID* which is combined from the initials of all authors last names and the year of publication: The combination "Anderson, Brown and Daley (1996)" results in the ID "ABD96". In case of more publications with same combination of initials and publication year subsequent "a,b,c..." is added to the ID similar to the use in reference lists. This *LiteratureID* is used a reference when further information from the publication is entered in other data categories.
- **Title:** Title of the publication.
- **Year:** Year of publication.

- **Journ./Chapter/Book:** Enter J (journal article), C (contributed bookchapter), B (book) depending on the type of publication.
- **Abstract:** Abstract of the publication if available (can be copied from a reference manager or MEDLINE).
- **Morphology, FiringProperties, IonicCurrents, IonicConductances, SynapticCurrents, Connectivity:** A "y" (yes) indicates that the publication contains information in this datacategory, a "n" that no information is present.
- **PhysicalCopy:** Can be ticked to signify whether or not a physical copy of the article has been filed.
- **Comments:** Any additional information or comments the data collator wishes to provide on content etc.
- **dbCollator:** Initials of the person collating the data from the publication.

**Authors:** The collator must check whether the last name and initial of all authors exist in the subform *Authors* (navigate by using the arrows), otherwise these must be added by clicking the ">\*" button.

- **LastName:** The full last name of the author.
- **Initials\_FirstName:** Initials of first and middle name(s).

Depending on the type of publication further bibliographic data must be entered in one of the following three subforms:

*Literature\_JournalArticles:* This subform contains publishing information on publications appearing as journal articles.

- **ID\_Literature:** The literature ID is automatically filled in from the main form.
- **Journal:** The journal where the article was published can either be selected from the drop down menu or typed in manually.
- **Volume:** The journal volume.
- **Pages:** The pages of the publication must be entered with the full numbers, ie. 1154-1165, and not in a shortened form.

*Literature\_BookChapters:* This subform contains publishing information on publications appearing as contributed chapters in an edited volume.

- **ID\_Literature:** The literature ID is automatically filled in from the main form.
- **Pages:** The pages of the publication must be entered with the full numbers, ie. 1154-1165, and not in a shortened form.

- **Editors:** The editors of the book.
- **Title\_Book:** The title of the book.
- **Publisher:** Name of the publisher.
- **Place:** Location of the publisher.

*Literature\_Books:* This subform contains publishing information on books.

- **ID\_Literature:** The literature ID is automatically filled in from the main form.
- **Publisher:** Name of the publisher.
- **Place:** Location of the publisher.

*[NB! Advanced users: The predefined list of journal names that appears as a drop-down menu in the subform Literature\_JournalArticles can be edited to add more abbreviations. From the main Microsoft Access (heading "CoCoDatRel1000: Database") window go to "Tables" and open the table "Literature\_Abbreviations\_Journals" and simply add the desired abbreviations to the list.]*

#### **Literature\_LinkTable:**

To establish links between individual authors and a publication click "Assign author to paper" under the heading "Enter/Browse Data" on the CoCoDat *SwitchBoard*.

The screenshot shows a software window titled "Literature\_LinkTable". At the top, there are standard window controls (minimize, maximize, close). Below the title bar, there are four input fields: "ID\_Literature" containing "ASC93a", "LastName\_Author" containing "Alzheimer", "Initials\_FirstName\_Author" containing "C", and "Position" containing "1". To the right of these fields is a button labeled "Add Link". Below the input fields are two tables. The left table, titled "Literature", has a single column "ID" and lists several entries: AJ96, ASC93a (selected), ASC93b, B00b, BGC00, BSC93, BSC94, BSSC94, CG90, FG96, FGPSWA, and FSPRA98. The right table, titled "Literature\_Authors", has two columns: "LastName" and "Initials\_FirstName". It lists authors: Alzheimer (selected), Avanzini, Avery, Beierlein, Bekkers, Blakemore, Brown, Connors, Crill, Egger, Feldmeyer, and Fleiderish. At the bottom of each table are record navigation controls. The "Literature" table shows "Record: 3 of 106". The "Literature\_Authors" table shows "Record: 1 of 43".

Fig. 3: The *LinkTable* form.

By selecting a Literature\_ID in the column "Literature" (left), an author in the column "Literature\_Authors" (right) and clicking the button "Add Link" produces a pop-up dialog where the position of the author (first, second, third etc.) must be entered numerically. This information is used for searching the database for content based on authorship (see later).

## 2.2 *Entering methodological data*

To enable comparison and evaluation of quantitative experimental in the CoCoDat database, detailed records of the experimental methodology from a given publication is entered. It is recommended to organize a list of the different manipulations combined for a given measurement on paper before entering these in the database. Often the exact combinations can only be found by inspecting legends to figures containing experimental data, whereas the methods section of a paper more often than not contains separate descriptions of eg. stimulation and recording methods, pharmacological manipulations etc., but not how these were combined in the individual measurements.

To enter methodological data from a publication click "Experimental Methods" under the heading "Enter/Browse Data" on the CoCoDat *SwitchBoard* (Fig. 1).

The screenshot shows a web-based form titled "Methods : Electrophysiology". At the top, there are fields for "ID" (BGC00), "Title" (A network of electrically coupled interneurons drives synchronized inhibition in neocortex.), and "Year" (2000). Below this is a subform titled "Methods\_Electrophysiology" with fields for "ID" (-1195798297), "ID\_Literature" (BGC00), "dbCollator" (JDJ), "Preparation" (Acute Slice), "Solution" (Standard), "Recording\_Method" (Whole-cell Iclamp), "Stimulation\_Method" (Extracellular tetanic stim.), "Species" (Rat), "Temperature(°C)" (32), "Reference\_Text" (pp.909-910), and "Reference\_Figures" (-). To the right of this subform is a "Component\_Concentration" section with fields for "Component" and "Component\_Concentr" (both empty), and a record navigation bar showing "Record: 1 of 1". Below that is an "Animals" section with fields for "Animal\_Strain" (Sprague-Dawley), "Animal\_Age" (P14-P21), "Animal\_Sex" (-), "Animal\_Weight" (-), and a record navigation bar showing "Record: 1 of 1". The "Slice Orientation" section has a "SliceOrientation" field (Thalamocortical) and a record navigation bar showing "Record: 1 of 4". At the very bottom of the form is a global record navigation bar showing "Record: 5 of 37".

Fig. 4: The *Methods\_Electrophysiology* form.

### Methods\_Electrophysiology:

Selecting the proper publication one or more records can be entered in the *Methods\_Electrophysiology* subform. The user can navigate between several records using the second navigation bar from the bottom. Clicking the ">\*" symbol will open a blank record.

- **ID:** The numerical ID of the methods record is generated automatically.
- **ID\_Literature:** The Literature\_ID is automatically referenced from the parent publication.
- **Preparation:** The experimental preparation recorded from (ie. slice, dissociated neurons etc.). Entries can either be selected from the drop-down menu or entered manually.

- **Solution:** The bathing solution in the experiment. Entries can either be selected from the drop-down menu or entered manually. If new combinations of ion channel blocking solutions are entered the format to be followed is "Na/Ca Block" (Sodium and calcium channel block). Standard refers to a standard ACSF solution.
- **Recording\_Method:** The method employed for recording the experimental data. Entries can either be selected from the drop-down menu or entered manually.
- **Stimulation\_Method:** The stimulation method used in the experiment. Entries can either be selected from the drop-down menu or entered manually.
- **Species:** The animal species. Entries can either be selected from the drop-down menu or entered manually.
- **Temperature(°C):** The temperature at recording time.
- **Reference\_Text:** Reference to the pages in the publication containing the methodological information entered. Multiple pages are entered as "pp.111-114" or a comma-separated list "p. 111, 115, 120".
- **Reference\_Figures:** The names of figures containing information on the entered experimental methods. Multiple figures are entered as a list separated by commas, eg. "Fig. 1, 2, 3".
- **Comments:** This field allows the dbCollator to enter personal comments on the experimental methods. It can also be used to point to content of figures, equations or other data which are difficult to enter into either pre-defined fields or as straight quotes.
- **dbCollator:** Intials of the database collator.

*Animals:* This subform must be filled with any additional information on the animals used in the experiments.

- **Animal\_Strain:** The strain of animals used (eg. Wistar rats)
- **Animal\_Age:** The age or age range of the animals used.
- **Animal\_Sex:** The sex of the animals used.
- **Animal\_Weight:** The weight or weight range of the animals used.

*Slice\_Orientation:* If the recordings were done in slices the following must be filled out.

- **SliceOrientation:** The plane of the slice (sagittal, coronal etc.).

*Component\_Concentration*: In cases where a bathing solution different from standard ACSF was used, the deviations of added or changed components must be entered. To enter information on more than one component click the ">\*" button to produce an empty record.

- **Component**: The name of the component deviating from standard ACSF.
- **Component\_Concentration**: The concentration of the component.

[NB! Advanced users: The predefined lists appearing as a drop-down menus for the fields *Preparation*, *Solution*, *Recording\_Method*, *Stimulation\_Method* and *Species* can be edited to add more choices. From the main Microsoft Access (heading "CoCoDatRel1000: Database") window go to "Tables" and open the tables *Methods\_Electrophysiology\_Preparations*, *Methods\_Electrophysiology\_SolutionType*, *Methods\_Electrophysiology\_RecMethod*, *Methods\_Electrophysiology\_StimMethod* or *Methods\_Electrophysiology\_Species* and simply add the desired entries to the correct list.]

### 2.3 Entering experimental data

CoCoDat is designed for organizing experimental findings in the six categories *Morphology*, *FiringProperties*, *IonicCurrents*, *IonicConductances*, *SynapticCurrents* and *Connectivity*. In all cases the data are linked to records of the methods used for obtaining them and the site from which they were recorded, designated on four levels of description: *BrainRegion*, *Layer*, *Neuron* and *NeuronCompartment*.

To enter experimental data from a publication click "Experimental Data" under the heading "Enter/Browse Data" on the CoCoDat *SwitchBoard* (Fig. 1).

#### **MC\_Supra\_Findings:**

This is the top-level form for entering and browsing experimental data. It organizes several nested subforms for entering the *RecordingSite* and the associated data in the six experimental categories, as well as a summarized display of the experimental methods data entered for a given publication.

- **ID**: The *Literature\_ID* of the original publication. The user can navigate between the different publications in the database by using the navigation bar at the bottom of the form.
- **Title**: The title of the publication.
- **Year**: The year of publication.

The screenshot shows the top portion of the 'MC\_Supra\_Findings' form. It is divided into several sections:

- Main Form Fields:**
  - ID:** ASC93a
  - Title:** Postnatal development of a persistent Na<sup>+</sup> current in pyramidal neurons from rat sensorimotor cortex
  - Year:** 1993
- RecordingSite Section:**
  - ID:** 481039627
  - ID\_Literature:** ASC93a
  - ID\_BrainRegion:** GM-Ctx\_SeM
  - ID\_Layer:** GM-L\_Gen
  - ID\_NeuronType:** GM-C\_Pyr
  - ID\_NeuronCompartment:** GM-Comp\_Gen
- Methods\_Electrophysiology Section:**
  - ID:** -1020917390
  - ID\_Literature:** ASC93a
  - Preparation:** Dissociated Neurons
  - Solution:** K/Ca Block
  - Recording\_Method:** Whole-cell patch
  - Stimulation\_Method:** Depolarizing voltage steps
  - Species:** Rat
- Navigation:** A record navigation bar at the bottom of the 'Methods\_Electrophysiology' section shows 'Record: 1 of 1'.
- Category Buttons:** A vertical stack of buttons on the right side of the 'RecordingSite' section: Morphology, Firing Properties, Ionic Currents, Conductances, Synaptic Currents, and Connectivity.

Fig. 5: The top of the *MC\_Supra\_Findings* form.

*Methods\_Electrophysiology:* This subform displays the entered methodological information for the chosen publication. The correct numerical methods ID must be entered along with the experimental data in the six categories (see later). All fields are automatically filled with the previously entered information. The user can navigate between different records of methodology from a given publication by using the navigation bar at the bottom of the subform.

- **ID:** The numerical ID of the method.
- **ID\_Literature:** The *Literature\_ID* of the parent publication.
- **Preparation:** The experimental preparation.
- **Solution:** The type of bathing solution.
- **Recording\_Method:** The experimental recording method employed.
- **Stimulation\_Method:** The experimental method of stimulation employed.
- **Species:** The species used in the experiment.

*Recording\_Site:* Each record of experimental data in CoCoDat is linked to a *RecordingSite* anatomically characterizing the location of the recording on four levels of description: *BrainRegion*, *Layer*, *Neuron* and *NeuronCompartment*. The *RecordingSite* thus combines four *BrainSites* (one for each level of description) and the *Literature\_ID* to a unique combination which is given a unique *Neuron\_ID*. When entering information on the *RecordingSite* the exact description from the original publication must be used. In case information is missing on one or more levels of description the *BrainSite* "general" is chosen at the given level of description.

The six buttons in the frame on the right lets the user jump directly to the desired data category after entering the data on the *RecordingSite*.

- **ID:** Numerical ID for the *RecordingSite* automatically assigned.
- **ID\_Literature:** The ID of the chosen publication.
- **ID\_BrainRegion:** The *BrainSite* designating the brain area or region of the *RecordingSite*. When choosing the appropriate entry in the drop-down menu the concatenated *BrainSite* is shown in the left column while the right column contains the full name. If the brain region or area is not specified in the publication choose "GM-Ctx\_Gen".
- **ID\_Layer:** The *BrainSite* designating layer of the *RecordingSite*. When choosing the appropriate entry in the drop-down menu the concatenated *BrainSite* is shown in the left column while the right column contains the full name. If the layer is not specified in the publication choose "GM-L\_Gen".
- **ID\_Neuron:** The *BrainSite* designating the neuronal celltype of the *RecordingSite*. When choosing the appropriate entry in the drop-down menu the concatenated *BrainSite* is shown in the left column while the right column contains the full name. If the neuronal celltype is not specified in the publication choose "GM-C\_Gen".
- **ID\_NeuronCompartment:** The *BrainSite* designating the cellular compartment of the *RecordingSite*. When choosing the appropriate entry in the drop-down menu the concatenated *BrainSite* is shown in the left column while the right column contains the full name. If the cellular compartment is not specified in the publication choose "GM-Comp\_Gen".

**IMPORTANT:** If the correct *BrainSite* for describing a given *RecordingSite* is not available in the drop-down menus it must first be created and entered into the CoCoDat mapping hierarchy. Please refer to section 2.4 of this manual for instructions.

*RecordingSite\_Details:* This subform contains the six subforms for the various experimental data categories of CoCoDat. Before entering data into any of the six subforms select and copy the correct numerical methods ID from the *Methods\_Electrophysiology* subform above. Regardless of the data category, all data must be entered exactly as given in the original publication including standard deviations etc. Likewise if a quantitative measure is given as an approximate value this must be entered (eg. a reversal potential of "about -60 mV" is entered exactly as written). All values must be entered with the correct dimension (eg. mV, pA etc.).

RecordingSite_Morphology	
ID_RecordingSite	1004375359
ID_Methods_Electrophysiology	1003935176
Feature_name	Cell identification
Feature_value	-
Reconstruction	<input checked="" type="checkbox"/>
Citations	"Experiments were carried out o 52 cells, all of which had the morphology of pyramidal neuron (see Fig. 1A) with a large dendrit
Reference_figures	Fig. 1
Reference_text	p.1532
Comments	-
Reconstruction_method	Hoffman modulation optics anc
Record:	<input type="button" value="I"/> <input type="button" value="◀"/> <input type="text" value="1"/> <input type="button" value="▶"/> <input type="button" value="▶"/> <input type="button" value="▶*"/> of 1
Record:	<input type="button" value="I"/> <input type="button" value="◀"/> <input type="text" value="1"/> <input type="button" value="▶"/> <input type="button" value="▶"/> <input type="button" value="▶*"/> of 1

Fig. 6: The *RecordingSite\_Morphology* subform.

*RecordingSite\_Morphology*: This subform is used for entering details on neuronal morphology ranging from counts of dendrites, branchpoint and spines to width of axonal arborization, length of apical dendrite, somatic surface area etc. As the morphological features possible to report are extremely diverse no features are predefined. Instead the user enters the name of a feature and the associated numerical value in each individual case. Multiple records from the same publication can be entered using the navigation bar at the bottom of the subform.

- **ID\_RecordingSite:** The ID of the *RecordingSite* is filled in automatically.
- **ID\_Methods\_Electrophysiology:** The ID of the correct methodological record must be selected from the *Methods\_Eletrophysiology* subform and either copied and pasted or typed in manually.
- **Feature\_name:** The morphological feature described (eg. number of dendrites, width of axonal arbor etc.).
- **Feature\_value:** The associated numerical value.

- **Reconstruction:** Tick if the described neuron was reconstructed.
- **Citations:** Straight quotes from the publication, which provide additional information (quantitative or qualitative) or serve to further clarify the experimental data. Each quote must be entered in separate quotation marks with indication of the page number(s) in the original publication.
- **Reference\_Figures:** The names of figures containing information on the entered experimental data. Multiple figures are entered as a list separated by commas, eg. "Fig. 1, 2, 3".
- **Reference\_Text:** Reference to the pages in the publication containing the experimental information entered. Multiple pages are entered as "pp.111-114" or a comma-separated list "p. 111, 115, 120".
- **Comments:** This field allows the dbCollator to enter personal comments on the experimental data. It can also be used to point to content of figures, equations or other data which are difficult to enter into either pre-defined fields or as straight quotes.
- **Reconstruction\_Method:** The method used for neuronal reconstruction if ticked above.

**RecordingSite\_FiringProperties**

ID_RecordingSite	1004375359
ID_Methods_Electrophysiology	1003935176
Pattern_Type	.
Citations	"Before capacitive charging currents and series resistance were compensated, hyperpolarizing voltage steps of 10 ms duration and 10-30 mV amplitude from a holding potential of -60 mV were employed to calculate input resistance and
Reference_figures	Fig. 1
Reference_text	p.1532
Comments	Specific membrane resistance = 51.9+6.8 KOhm-cm <sup>2</sup> , cell capacitance = 17.5+1.2pF (range 7.0-29.8 pF). Capacitance related to truncated cells (acutely dissociated neurons).

V_rest		AP_duration	
Record: [I] [L] [1] [R] [I]		Record: [I] [L] [1] [R] [I]	
R_input	3.5+0.4 GOhm	R_intracellular	
Record: [I] [L] [1] [R] [I]		Record: [I] [L] [1] [R] [I]	
Tau_membrane			
Record: [I] [L] [1] [R] [I] [*]	of 1		

Fig. 7: The *RecordingSite\_FiringProperties* subform.

*RecordingSite \_FiringProperties*: This subform is used for entering all information regarding the neuronal response characteristics and passive electrophysiological characteristics. Multiple records from the same publication can be entered using the navigation bar at the bottom of the subform.

- **ID\_RecordingSite**: The ID of the *RecordingSite* is filled in automatically.
- **ID\_Methods\_Electrophysiology**: The ID of the correct methodological record must be selected from the *Methods\_Electrophysiology* subform and either copied and pasted or typed in manually.
- **Pattern\_Type**: The type of firing pattern recorded, entered as abbreviation (eg. intrinsic burster = IB, regular spiking = RS, low threshold spiking = LTS, regular spiking, adapting = RS(AD)).
- **Citations**: Straight quotes from the publication, which provide additional information (quantitative or qualitative) or serve to further clarify the experimental data. Each quote must be entered in separate quotation marks with indication of the page number(s) in the original publication.
- **Reference\_Figures**: The names of figures containing information on the entered experimental data. Multiple figures are entered as a list separated by commas, eg. "Fig. 1, 2, 3".
- **Reference\_Text**: Reference to the pages in the publication containing the experimental information entered. Multiple pages are entered as "pp.111-114" or a comma-separated list "p. 111, 115, 120".
- **Comments**: This field allows the dbCollator to enter personal comments on the experimental data. It can also be used to point to content of figures, equations or other data which are difficult to enter into either pre-defined fields or as straight quotes.
- **V\_rest**: The resting membrane potential.
- **R\_input**: The input resistance.
- **Tau\_membrane**: The membrane time-constant.
- **AP\_duration**: The actionpotential duration.
- **R\_intracellular**: The intracellular or axial resistance.

RecordingSite_IonicCurrents	
ID_RecordingSite	35614620
ID_Methods_Electrophysiology	-20718951
Current_name	I(Na)
Charge_carrier	Na+ ▾
Peak_conductance	109+39 pS/μm <sup>2</sup>
Peak_current	-
E_rev	-
V_threshold	-55 mV
V_half_activation	-30.6+2.8 mV
V_peak	-
Citations	-
Reference_figures	Table 1-2;Figs. 6-9
Reference_text	-
Comments	Kinetic parameters fitted; biexponential decay; ratio of slow to fast component of Na-current
Record:	<input type="button" value="⏪"/> <input type="button" value="⏩"/> <input type="text" value="1"/> <input type="button" value="▶"/> <input type="button" value="▶▶"/> <input type="button" value="▶*"/> of 2

Fig. 8: The *RecordingSite\_IonicCurrents* subform.

*RecordingSite\_IonicCurrents*: This subform is used to enter data on non-synaptic ionic currents. Multiple records from the same publication can be entered using the navigation bar at the bottom of the subform.

- **ID\_RecordingSite**: The ID of the *RecordingSite* is filled in automatically.
- **ID\_Methods\_Electrophysiology**: The ID of the correct methodological record must be selected from the *Methods\_Electrophysiology* subform and either copied and pasted or typed in manually.
- **Current\_name**: The name of the current (ie. I(NaP), I(KCa) etc.).
- **Charge\_carrier**: The ionic charge-carrier of the current (ie. Ca<sup>2+</sup>, Na<sup>+</sup> etc.)
- **Peak\_conductance**: Conductance at the point of peak-activation.

- **Peak\_current:** Current at the point of peak-activation.
- **E\_rev:** Reversal potential.
- **V\_threshold:** Membrane potential threshold for activation.
- **V\_half\_activation:** Membrane potential at the point of half-activation.
- **V\_peak:** Membrane potential at the point of peak-activation.
- **Citations:** Straight quotes from the publication, which provide additional information (quantitative or qualitative) or serve to further clarify the experimental data. Each quote must be entered in separate quotation marks with indication of the page number(s) in the original publication.
- **Reference\_Figures:** The names of figures containing information on the entered experimental data. Multiple figures are entered as a list separated by commas, eg. "Fig. 1, 2, 3".
- **Reference\_Text:** Reference to the pages in the publication containing the experimental information entered. Multiple pages are entered as "pp.111-114" or a comma-separated list "p. 111, 115, 120".
- **Comments:** This field allows the dbCollator to enter personal comments on the experimental data. It can also be used to point to content of figures, equations or other data which are difficult to enter into either pre-defined fields or as straight quotes.

RecordingSite_IonicConductances	
ID_RecordingSite	998919415
ID_Methods_Electrophysiology	998918972
Conductance_name	BK
Charge_carrier	K+ ▾
Peak_conductance	181.6+3.9 pS
V_threshold	-
V_half_activation	-
V_peak	-
Citations	"Three hundred ninety-six slow-gating ("slow") and 9 fast-gating ("fast") BK channels were observed in 218 inside-out
Reference_figures	Fig. 1(A,B), 2(A,B), 3
Reference_text	pp.4195-4196
Comments	Data on timeconstants, open-probabilities and calcium-dependency in text and figures.


Record:  1 of 1

Fig. 9: The *RecordingSite\_IonicConductances* subform.

*RecordingSite\_IonicConductances*: This subform is used to record information non-synaptic ionic conductances, - particularly in the case of single channels studied in patch-clamp experiments. Multiple records from the same publication can be entered using the navigation bar at the bottom of the subform.

- **ID\_RecordingSite**: The ID of the *RecordingSite* is filled in automatically.
- **ID\_Methods\_Electrophysiology**: The ID of the correct methodological record must be selected from the *Methods\_Electrophysiology* subform and either copied and pasted or typed in manually.
- **Conductance\_name**: The name of the conductance (ie. CaP, CaT etc.).
- **Charge\_carrier**: The ionic charge-carrier of the current (ie. Ca<sup>2+</sup>, Na<sup>+</sup> etc.).
- **Peak\_conductance**: Conductance at the point of peak-activation or single channel conductance.

- **V\_threshold:** Membrane potential threshold for activation.
- **V\_half\_activation:** Membrane potential at the point of half-activation.
- **V\_peak:** Membrane potential at the point of peak-activation.
- **Citations:** Straight quotes from the publication, which provide additional information (quantitative or qualitative) or serve to further clarify the experimental data. Each quote must be entered in separate quotation marks with indication of the page number(s) in the original publication.
- **Reference\_Figures:** The names of figures containing information on the entered experimental data. Multiple figures are entered as a list separated by commas, eg. "Fig. 1, 2, 3".
- **Reference\_Text:** Reference to the pages in the publication containing the experimental information entered. Multiple pages are entered as "pp.111-114" or a comma-separated list "p. 111, 115, 120".
- **Comments:** This field allows the dbCollator to enter personal comments on the experimental data. It can also be used to point to content of figures, equations or other data which are difficult to enter into either pre-defined fields or as straight quotes.

RecordingSite_SynapticCurrents	
ID_RecordingSite	990651240
ID_Methods_Electrophysiology	663618204
Synapse_type	mGluR1a
Peak_conductance	-
Peak_current	-
Peak_potential	18.4 mV
E_rev	-
Latency:	-
Citations	"In the presence of tetrodotoxin (TTX; 2 $\mu$ M) to block spikes, ACPD depolarized LTS cells by an average of 18.4 mV (n = 9)." p.906-907
Reference_figures	-
Reference_text	pp.906-907
Comments	-

Record: ⏪ ⏴  ⏵ ⏩ ⏭ of 2

Fig. 10: The *RecordingSite\_SynapticCurrents* subform.

*RecordingSite\_SynapticCurrents*: This subform is used to enter data on synaptically activated currents. Multiple records from the same publication can be entered using the navigation bar at the bottom of the subform.

- **ID\_RecordingSite:** The ID of the *RecordingSite* is filled in automatically.
- **ID\_Methods\_Electrophysiology:** The ID of the correct methodological record must be selected from the *Methods\_Electrophysiology* subform and either copied and pasted or typed in manually.
- **Synapse\_Type:** The type of the synapse as detailed in the publication (ie. NMDA, AMPA, mGLUR etc.).
- **Peak\_conductance:** Conductance at peak-activation.

- **Peak\_current:** Current at peak activation.
- **E\_rev:** Reversal potential.
- **Latency:** Response latency following stimulation in the given experimental setting.
- **Citations:** Straight quotes from the publication, which provide additional information (quantitative or qualitative) or serve to further clarify the experimental data. Each quote must be entered in separate quotation marks with indication of the page number(s) in the original publication.
- **Reference\_Figures:** The names of figures containing information on the entered experimental data. Multiple figures are entered as a list separated by commas, eg. "Fig. 1, 2, 3".
- **Reference\_Text:** Reference to the pages in the publication containing the experimental information entered. Multiple pages are entered as "pp.111-114" or a comma-separated list "p. 111, 115, 120".
- **Comments:** This field allows the dbCollator to enter personal comments on the experimental data. It can also be used to point to content of figures, equations or other data which are difficult to enter into either pre-defined fields or as straight quotes.

RecordingSite_Connectivity	
ID_RecordingSite	990651240
ID_Methods_Electrophysiology	976116286
BrainRegion_Target	GM-Ctx_B
Layer_Target	GM-L4_IsoCtx
NeuronType_Target	GM-C_FS
NeuronCompartment_Target	GM-Comp_Gen
Citations	"LTS cells...made frequent inhibitory synaptic connections with RS and FS cells,...".p.904
Reference_figures	-
Reference_text	p.904
Comments	-

Record: 1 of 3

Fig. 11: The *RecordingSite\_Connectivity* subform.

*RecordingSite\_Connectivity*: This subform is used to record information on connectivity in as much detail as it is given in the original publication. The originally entered *RecordingSite* is always taken as the source of the projection. Multiple records from the same publication can be entered using the navigation bar at the bottom of the subform.

- **ID\_RecordingSite:** The ID of the *RecordingSite* is filled in automatically.
- **ID\_Methods\_Electrophysiology:** The ID of the correct methodological record must be selected from the *Methods\_Electrophysiology* subform and either copied and pasted or typed in manually.
- **BrainRegion\_Target:** The *BrainSite* designating the target *BrainRegion*.
- **Layer\_Target:** The *BrainSite* designating the target *Layer*.
- **Neuron\_Target:** The *BrainSite* designating the target *Neuron*.
- **NeuronCompartment\_Target:** The *BrainSite* designating the target *NeuronCompartment*.

- **Citations:** Straight quotes from the publication, which provide additional information (quantitative or qualitative) or serve to further clarify the experimental data. Each quote must be entered in separate quotation marks with indication of the page number(s) in the original publication.
- **Reference\_Figures:** The names of figures containing information on the entered experimental data. Multiple figures are entered as a list separated by commas, eg. "Fig. 1, 2, 3".
- **Reference\_Text:** Reference to the pages in the publication containing the experimental information entered. Multiple pages are entered as "pp.111-114" or a comma-separated list "p. 111, 115, 120".
- **Comments:** This field allows the dbCollator to enter personal comments on the experimental data. It can also be used to point to content of figures, equations or other data which are difficult to enter into either pre-defined fields or as straight quotes.

*[NB! Advanced users: The predefined list appearing as a drop-down menus for the fields Charge\_carrier can be edited to add more choices. From the main Microsoft Access (heading "CoCoDatRel1000: Database") window go to "Tables" and open the table Neurons\_ChargeCarrier and simply add the desired entries to the list.]*

## *2.4 Entering Mapping Data*

In the CoCoDat database mapping data are used to associate specific experimental results with the exact anatomical site they were recorded from. This is done by specifying a *RecordingSite* consisting of the *Literature\_ID* and and a 4 *BrainSites* designating the *BrainRegion*, *Layer*, *NeuronType* and *NeuronCompartment* where the recording took place. In cases where the *BrainSite(s)* necessary to describe the *RecordingSite* in question are not already entered in the database, the user will have to add it before experimental data can be entered. Each *BrainSite* consists of a *BrainMap* designation and an acronym as shorthand for the full name and has an associated *BrainSite\_Type*.

The screenshot shows a software window titled "Mapping : BasicData". It contains three subforms stacked vertically:

- BrainMaps\_BrainSiteAcronyms:** Fields include Acronym (Amygdala), FullName (amygdala), and dbCollator (JDJ). Record navigation shows "1 of 72".
- BrainMaps\_BrainSites\_BrainSiteTypes:** Field includes Site\_Type (Area\_AlloCtx\_2D). Record navigation shows "1 of 18".
- BrainMaps\_BrainSites:** Fields include ID (GM-Axon), ID BrainSite\_Acronyms (Axon), ID\_BrainMap (GM), Site\_Type (Neuron\_Compartment\_3D), and dbCollator (JDJ). Record navigation shows "1 of 39".

Fig. 12: The *Mapping : BasicData* form with 3 subforms.

### Mapping : BasicData:

This form contains the three subforms necessary to enter new mapping data into the CoCoDat database.

- **ID:** The ID of the *BrainMap* used. CoCoDat uses a non-delineated *General Map* ("GM") to organize the *BrainSites* on the four levels of description. This practice is based on the fact that the electrophysiological literature rarely delineates the exact sites as it is done in tract-tracing studies, since precise definitions or techniques for unambiguously determining their properties are not available. As an example, cell types and their properties are currently not defined in a principled manner but described according to heuristic criteria, e.g. IB (intrinsically bursting) vs. RS (regular spiking) pyramidal cells, irrespective of precise definitions. Therefore our *BrainSites* should be seen as prototypes, described by a generally accepted nomenclature on each of the four levels of description, and they are therefore also organized in a prototypical *General Map*.

*BrainMaps\_BrainSiteAcronyms:* Each description of an anatomical structure is assigned a shorthand acronym with an associated full description, eg. Pyramidal has the acronym "Pyr", somatosensory the acronym "SS". Clicking the ">\*" symbol will open a blank record.

- **Acronym:** The chosen acronym, - in some cases identical with the full name. In case of a cortical *BrainRegion* the acronym must start with "Ctx\_", in case of a *Layer* with "L\_", and in

case of a *NeuronType* with "C\_". If the acronym is combined from several words or abbreviations these are separated by underscores.

- **FullName:** The full name and or description of the anatomical structure.
- **DbCollator:** The initials of the database collator entering the acronym.

*BrainMaps\_BrainSites\_BrainSiteTypes:* This subform allows the user to define new *BrainSiteTypes* if the exist ones are not available to describe a given type of anatomical structure. Clicking the ">\*" symbol will open a blank record.

- **Site\_Type:** The type of anatomical structure. Please follow the style of an already existing *SiteType* closest to the one you want to enter.

*BrainMaps\_BrainSites:* This subform allows the user to the actual new *BrainSites* on the four levels of description. Clicking the ">\*" symbol will open a blank record.

- **ID:** The final ID of the new *BrainSite* must be entered manually and consists of the ID of the *BrainMap* (here always "GM") and the *BrainSite.Acronym* separated by a hyphen ("-").
- **ID\_BrainSiteAcronyms:** Here the correct acronym is selected from the list of available *BrainSiteAcronyms*.
- **ID\_BrainMap:** The ID of the *BrainMap* (here always "GM").
- **Site\_Type:** Here the correct *BrainSiteType* is selected from the list of site types.
- **dbCollator:** The initials of the dabase collator adding the new *BrainSite*.

## 2.5 Entering Hierarchy Data

New *BrainSites* must eventually be entered in their relevant hierarchies or they will not be included among results returned from querying the CoCoMac database. Instructions on how to enter the hierarchical data will be given in an updated version of this manual as soon as the feature is available. The missing hieararchy entries are however no hindrance for entering information using new *BrainSites* into the database.

## 3. Searching and Visualizing Experimental Data

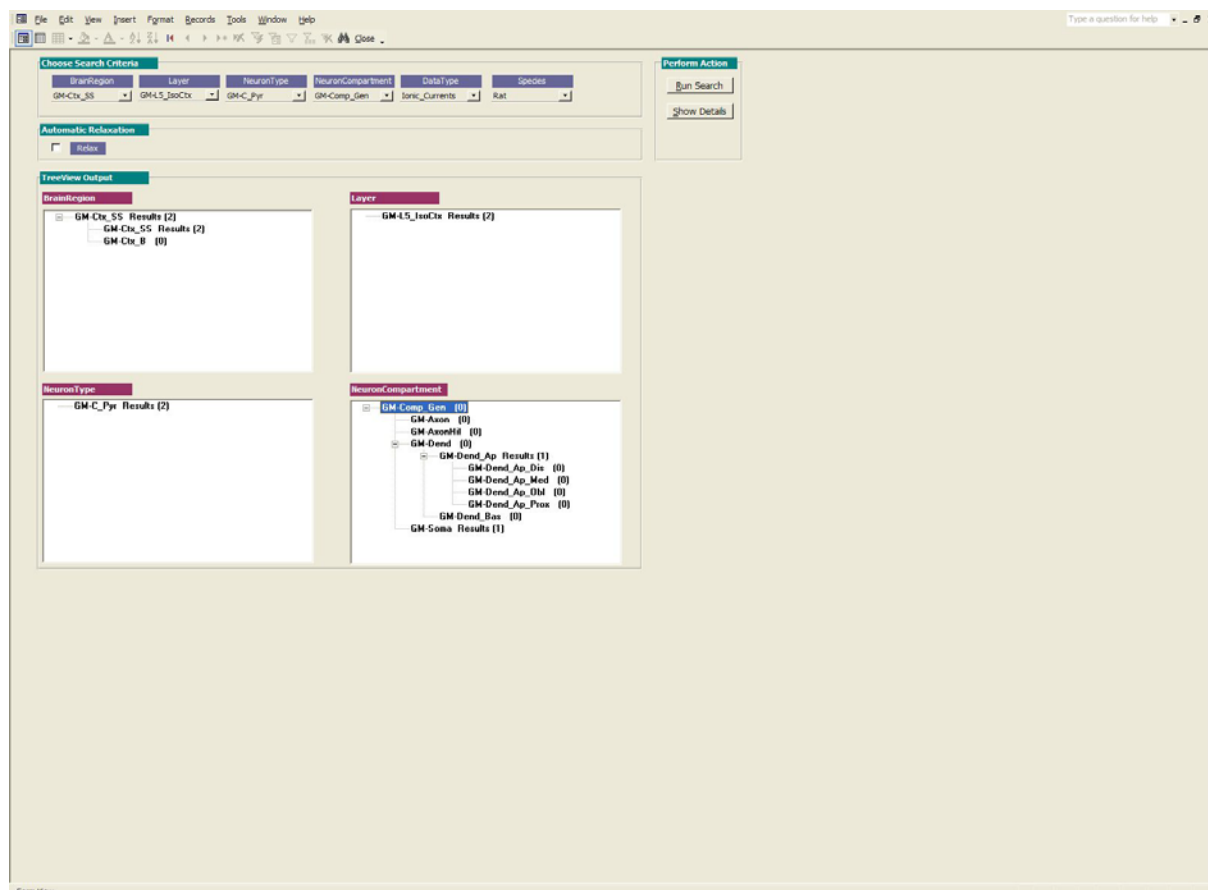


Fig. 13: The CoCoDat *SearchBoard*.

### 3.1 Purpose

The searchboard gives you the opportunity to perform a combinatorial search on the database using the level of description as a compound input vector. It is organized in several areas giving in the upper frames the input fields for the level-of-description vector and the possibility to choose and define the automatic relaxation. The lower frame shows four distinct output fields to display the search results in a hierarchically manner using four different tree-views. The perform-action frame in the upper right area of the form enables you to start the search-process and after retrieving some results to display them on the detail-form.

### 3.2 Choose search criteria

The first step in using the searchboard is to define the components of the search vector. The appropriate fields are in the frame “Choose Search Criteria” on top of the form.

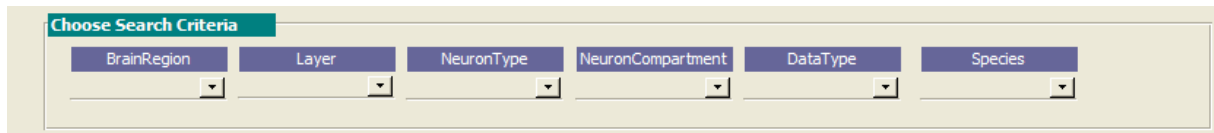


Fig. 14: The combo-boxes for choosing the search vector components.

To define the components of the search vector you have to select each criterion within the level-of-description combo boxes BrainRegion, Layer, NeuronType and NeuronCompartment. In addition you must choose a data category from the DataType combo box to get a complete search string. If you are interested in search results concerning only a specific animal species then choose it from the Species box in order to restrict the results respectively.

*Please note: Each field in the level-of-description vector must contain a value; otherwise the system gives you an error message.*

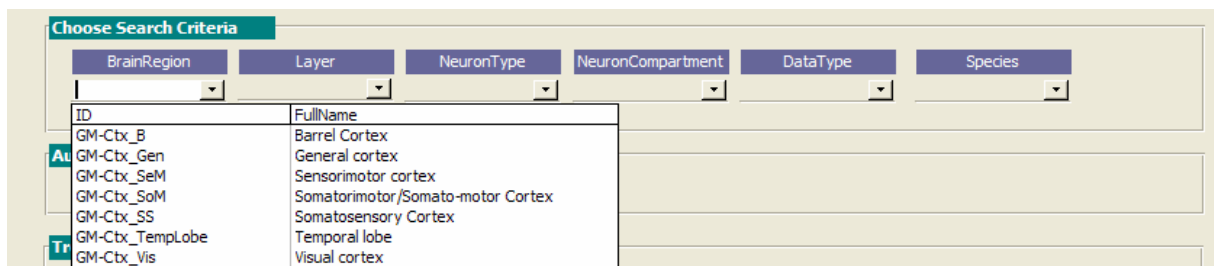


Fig. 15: BrainSites are chosen from lists showing their ID and FullName.

Each of the input fields is implemented as a combo-box so that you can select the appropriate values in the drop-down list according to the field. These lists are filled automatically with values that are in the tables and therefore make sense in the context of the database.

### 3.3 Automatic relaxation

In order to give an easier access to the hierarchical input of the search routine we implemented a functionality called “automatic relaxation”.

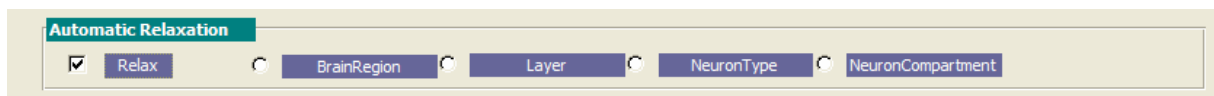


Fig 16: If automatic relaxation is selected, the dimension for the relaxation must be specified.

If the tick-box beneath “Relax” is clicked, the four options of the possible relaxation dimensions are shown immediately. One of these fields can then be marked as the chosen dimension for the automatic relaxation. The option for the automatic relaxation can be used in all cases where it is not known on which level of detail the search-vector returns a result. If the automatic relaxation is set on, then the system searches automatically from the chosen entry point of the selected search criterion upwards to the first level where results are found. The other three search criteria that are not set to be automatically relaxed (and in the current version there can only be one) are fixed to the selected values. During the search and relaxation process the user is informed about the level of the current relaxation state. After the process terminates the level where the first results are found is displayed in the according combo-box of the search criterion which was chosen for relaxation. The purpose of this mechanism is to provide the user with an automated search when a scan of the possible levels is to be performed.

### 3.4 TreeView output

The found results according to the selected search vector (by hand or by the automatic relaxation) are presented in the form of four tree-views. For each criterion (dimension of the vector) the results are displayed in their hierarchical position and with the number of results for each level.

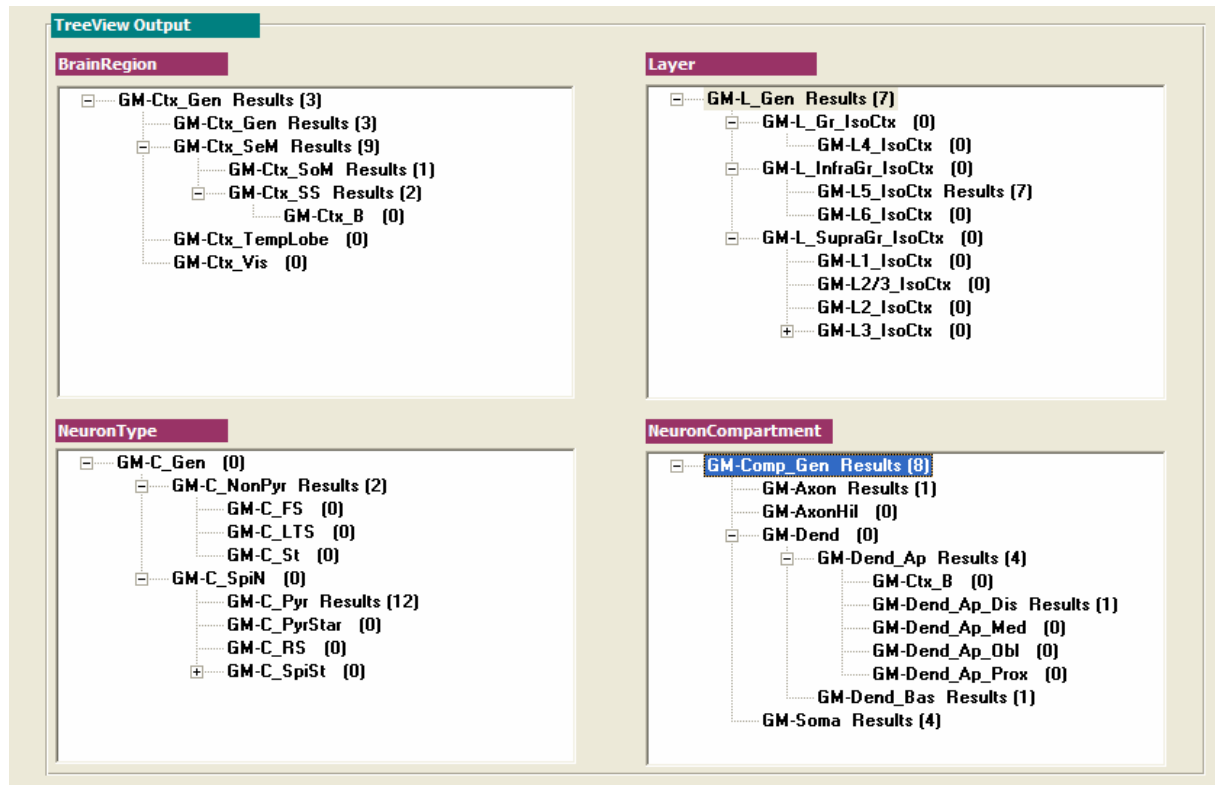
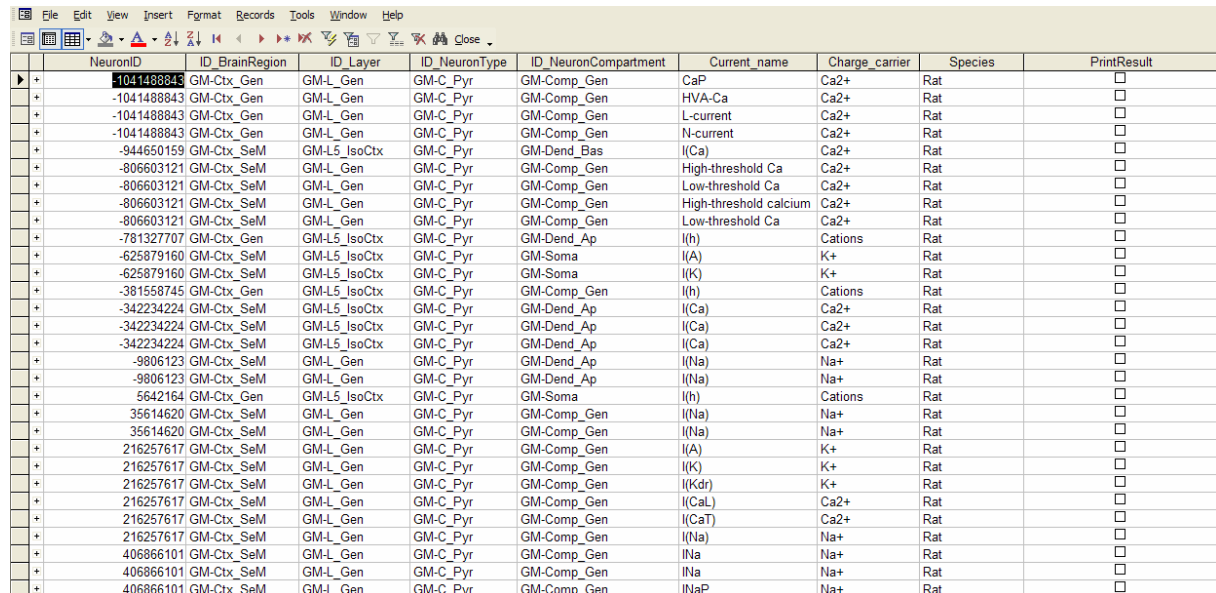


Fig. 17: The 4 tree-view panels with the *BrainSite* hierarchies expanded.

All trees are shown in a collapsed version, so you have to use the plus sign in front of each node to expand the hierarchy levels. In the example above all four trees are expanded in all levels. By doing so it is possible to get a quick overview of the location of the results according to their position in the hierarchy.

## Show Details

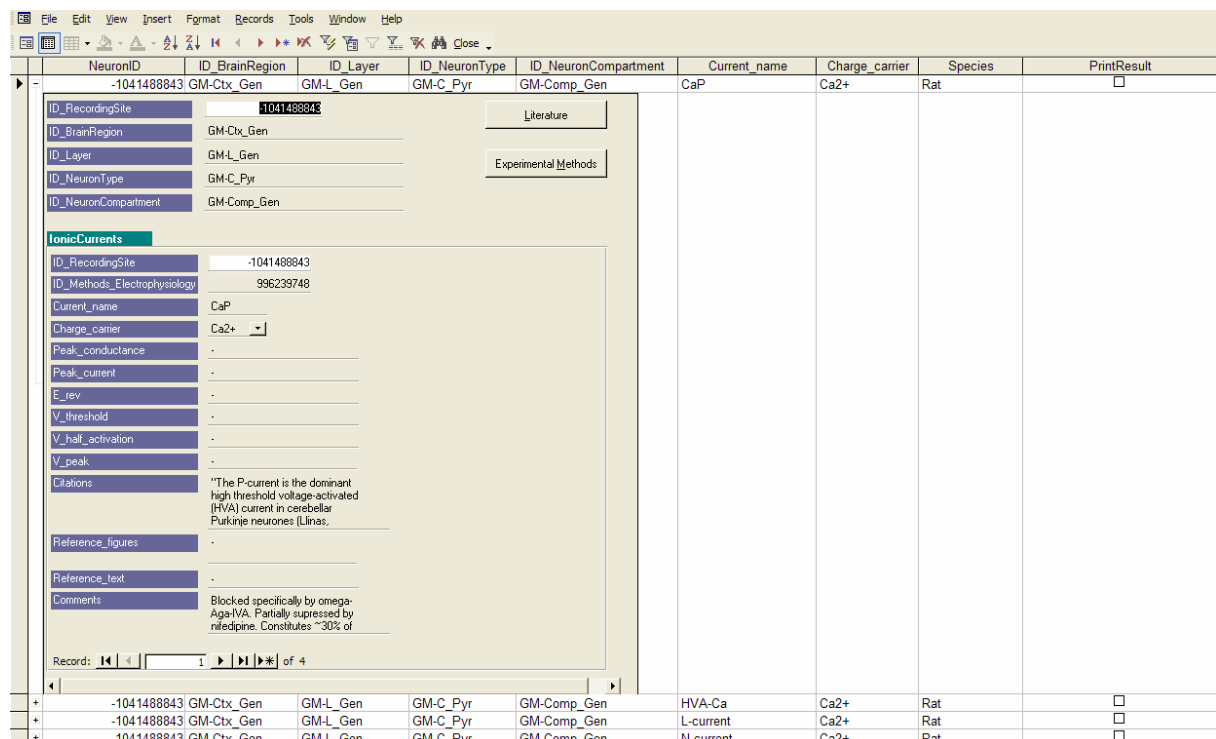
If you click on the button “Show details” the subform for the detailed view on the results is shown. According to the data type that was selected in the search criteria different details will be displayed in the list of the result set.



NeuronID	ID_BrainRegion	ID_Layer	ID_NeuronType	ID_NeuronCompartment	Current_name	Charge_carrier	Species	PrintResult
+1041488843	GM-Ctx_Gen	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	CaP	Ca2+	Rat	<input type="checkbox"/>
+1041488843	GM-Ctx_Gen	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	HVA-Ca	Ca2+	Rat	<input type="checkbox"/>
+1041488843	GM-Ctx_Gen	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	L-current	Ca2+	Rat	<input type="checkbox"/>
+1041488843	GM-Ctx_Gen	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	N-current	Ca2+	Rat	<input type="checkbox"/>
+944650159	GM-Ctx_SeM	GM-L5_IsoCtx	GM-C_Pyr	GM-Dend_Bas	I(Ca)	Ca2+	Rat	<input type="checkbox"/>
+806603121	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	High-threshold Ca	Ca2+	Rat	<input type="checkbox"/>
+806603121	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	Low-threshold Ca	Ca2+	Rat	<input type="checkbox"/>
+806603121	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	High-threshold calcium	Ca2+	Rat	<input type="checkbox"/>
+806603121	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	Low-threshold Ca	Ca2+	Rat	<input type="checkbox"/>
+781327707	GM-Ctx_Gen	GM-L5_IsoCtx	GM-C_Pyr	GM-Dend_Ap	I(h)	Cations	Rat	<input type="checkbox"/>
+625879160	GM-Ctx_SeM	GM-L5_IsoCtx	GM-C_Pyr	GM-Soma	I(A)	K+	Rat	<input type="checkbox"/>
+625879160	GM-Ctx_SeM	GM-L5_IsoCtx	GM-C_Pyr	GM-Soma	I(K)	K+	Rat	<input type="checkbox"/>
+381558745	GM-Ctx_Gen	GM-L5_IsoCtx	GM-C_Pyr	GM-Comp_Gen	I(h)	Cations	Rat	<input type="checkbox"/>
+342234224	GM-Ctx_SeM	GM-L5_IsoCtx	GM-C_Pyr	GM-Dend_Ap	I(Ca)	Ca2+	Rat	<input type="checkbox"/>
+342234224	GM-Ctx_SeM	GM-L5_IsoCtx	GM-C_Pyr	GM-Dend_Ap	I(Ca)	Ca2+	Rat	<input type="checkbox"/>
+342234224	GM-Ctx_SeM	GM-L5_IsoCtx	GM-C_Pyr	GM-Dend_Ap	I(Ca)	Ca2+	Rat	<input type="checkbox"/>
+9806123	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Dend_Ap	I(Na)	Na+	Rat	<input type="checkbox"/>
+9806123	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Dend_Ap	I(Na)	Na+	Rat	<input type="checkbox"/>
+5642164	GM-Ctx_Gen	GM-L5_IsoCtx	GM-C_Pyr	GM-Soma	I(h)	Cations	Rat	<input type="checkbox"/>
+35614620	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	I(Na)	Na+	Rat	<input type="checkbox"/>
+35614620	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	I(Na)	Na+	Rat	<input type="checkbox"/>
+216257617	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	I(A)	K+	Rat	<input type="checkbox"/>
+216257617	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	I(K)	K+	Rat	<input type="checkbox"/>
+216257617	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	I(Kdr)	K+	Rat	<input type="checkbox"/>
+216257617	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	I(CaL)	Ca2+	Rat	<input type="checkbox"/>
+216257617	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	I(CaT)	Ca2+	Rat	<input type="checkbox"/>
+216257617	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	I(Na)	Na+	Rat	<input type="checkbox"/>
+406866101	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	Ia	Na+	Rat	<input type="checkbox"/>
+406866101	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	Ia	Na+	Rat	<input type="checkbox"/>
+406866101	GM-Ctx_SeM	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	IaP	Na+	Rat	<input type="checkbox"/>

Fig. 18: The *SummaryForm* displays an overview of the returned information.

The plus sign at the beginning of each line gives you the possibility to expand the result and see the full entry in the original form. With the buttons “Literature” and “Experimental Methods” you can navigate from this point directly to the according data for each result.



NeuronID	ID_BrainRegion	ID_Layer	ID_NeuronType	ID_NeuronCompartment	Current_name	Charge_carrier	Species	PrintResult
+1041488843	GM-Ctx_Gen	GM-L_Gen	GM-C_Pyr	GM-Comp_Gen	CaP	Ca2+	Rat	<input type="checkbox"/>

**ID\_RecordingSite** Literature

**ID\_BrainRegion** GM-Ctx\_Gen

**ID\_Layer** GM-L\_Gen Experimental Methods

**ID\_NeuronType** GM-C\_Pyr

**ID\_NeuronCompartment** GM-Comp\_Gen

---

**IonicCurrents**

**ID\_RecordingSite** -1041488843

**ID\_Methods\_Electrophysiology** 996239748

**Current\_name** CaP

**Charge\_carrier** Ca2+

**Peak\_conductance** -

**Peak\_current** -

**E\_rev** -

**V\_threshold** -

**V\_half\_activation** -

**V\_peak** -

**Citations** "The P-current is the dominant high threshold voltage-activated (HVA) current in cerebellar Purkinje neurones (Llinas).

**Reference\_figures** -

**Reference\_text** -

**Comments** Blocked specifically by omega-Aga-IVA. Partially suppressed by nifedipine. Constitutes ~30% of

Record: 1 of 4

Fig. 19: Single records can be expanded using the "+" sign next to the *NeuronID*.

If you wish to get a print out of some (or all) results, then click on the box “PrintResult” in each line that displays a result you want to have printed out.

## 4. Reports

The marked results (see above) can be printed out in the form of predefined reports. After searching and marking the results you have to choose the option “Experimental Data” in the category “Print Results” on the CoCoDat – Main Switchboard. The system will then show the window “Report Selector” where the report for the appropriate data type of the found results can be started.

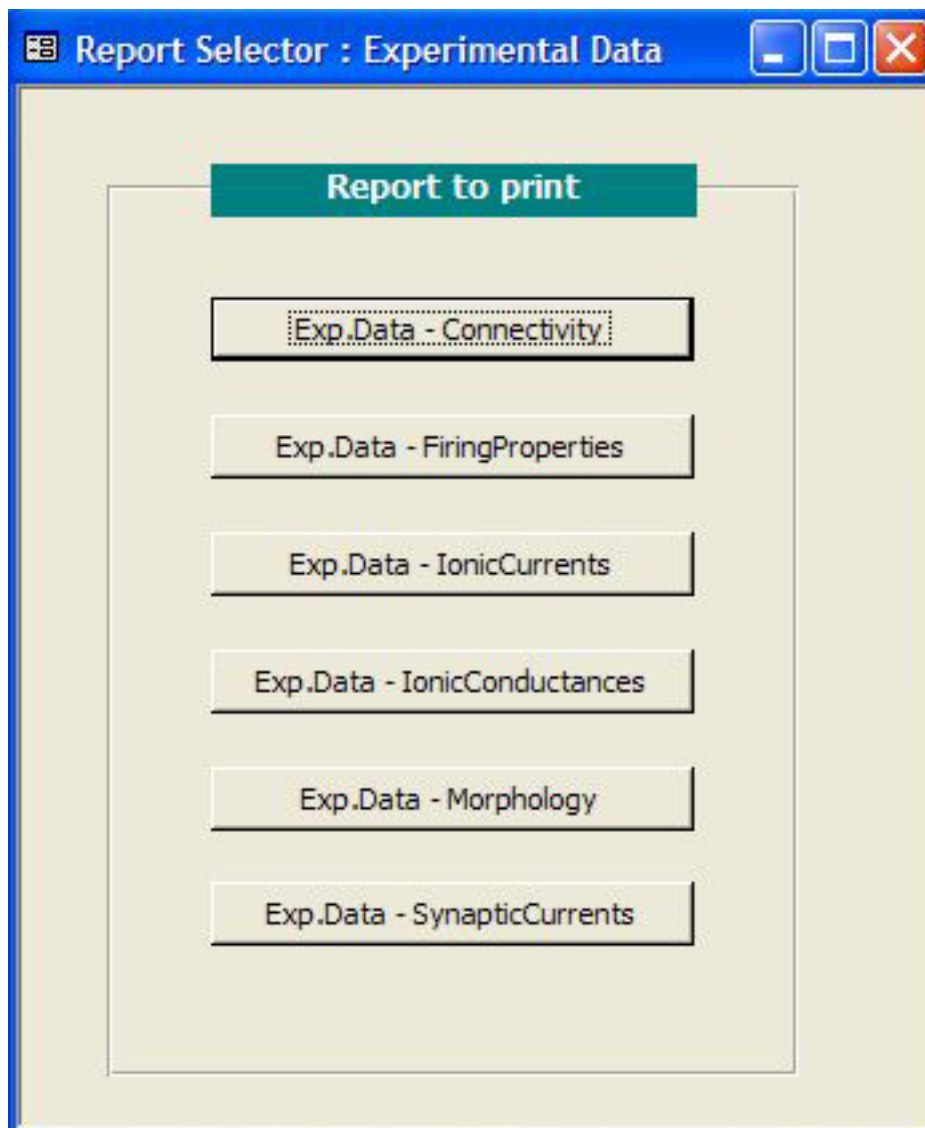


Fig 20: The pop-up *ReportSelector* lets the user specify which data category to report from.

Each report gives you a predefined output of all data items that are in the database according to the found and selected results, specified by the data type. The next figure shows an example of a report (first page with the header) for selected results and the data type “IonicConductances”.

## Experimental Data - IonicConductances

<b>NeuronID</b>	<input type="text" value="-1208544038"/>	<b>Conductance_name</b>	BK
<b>ID_Literature</b>	KHP96a	<b>Charge_carrier</b>	K+
<b>ID_Methods_Electrophysiology</b>	976026094	<b>Peak_conductance</b>	-
		<b>V_threshold</b>	-
<b>ID_BrainRegion</b>	GM-Ctx_SS	<b>V_half_activation</b>	-
<b>ID_Layer</b>	GM-L_InfraGr_Is	<b>V_peak</b>	-
<b>ID_NeuronType</b>	GM-C_Pyr	<b>Reference_text</b>	p.194
<b>ID_NeuronCompartment</b>	GM-Comp_Gen	<b>Reference_figures</b>	Fig.10

### Citations

"When perfused over five outside-out patches, 30 and 100 nM only partially inhibited, and 1  $\mu$ M ChTX completely blocked BK channel openings in the same patches (Fig. 10A). Thirty and 100 nM ChTX reduced P(0) of BK channels to 82.5 $\pm$ 3.1% and 51.6 $\pm$ 3.2% of control values (n = 5), respectively."p.194

### Comments

-

Fig. 21: A sample *Report* from the *RecordingSites\_IonicConductances* category.