



# BIONUMERICS Tutorial:

## Creating an MLVA typing scheme

### 1 Preparing the database

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1. Create a new database, install the *MLVA plugin* and create an MLVA scheme as described in the tutorial: "Setup of an MLVA scheme".
2. Import and pre-process the VNTR sequencer sample trace files as described in the tutorial "Importing and processing VNTR capillary electrophoresis data".
3. Calculate and assign VNTR copy numbers for the imported data based on the steps described in the tutorial "Calculating and assigning VNTR copy numbers".

### 2 Setting up an MLVA typing

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1. Click somewhere in the *Database entries* panel to make it the active panel and select **Edit** > **Select all (Ctrl+A)** to select the 20 entries in the database.
2. In the *Main* window, select **MLVA** > **MLVA management window...** (  ) to call the *MLVA management* window.
3. Select **Edit** > **Typing schemas** > **Add typing schema...** to call the *Add typing schema* dialog box.
4. Specify a **Name**, e.g. **My Typing Scheme**, select all (or a subset of) VNTRs using the **Ctrl-** and **Shift-** keys (see Figure 1) and press < **OK** >.

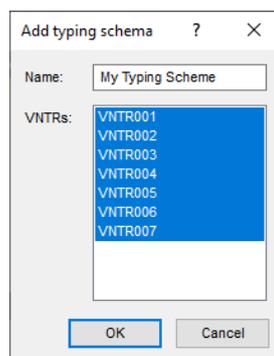
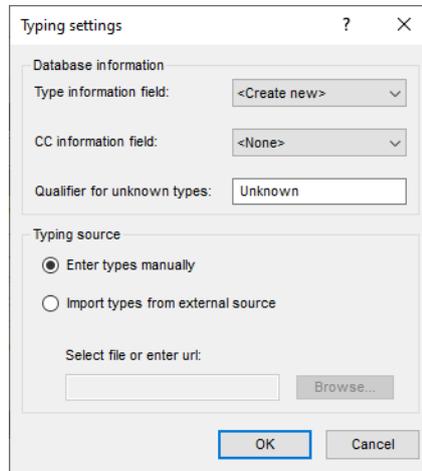


Figure 1: Add a typing scheme.

The MLVA typing scheme is created in the database but no actual typing information is available yet.

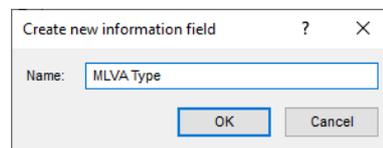
5. Select **File** > **Typing...** (E?) to call the *Select typing* dialog box and press <**Edit**>.



**Figure 2:** MLVA typing settings.

In this tutorial we will let BIONUMERICS assign types based on the copy numbers linked to the selected entries in our database.

6. Leave all settings at their default for this exercise and press <**OK**>.
7. Specify a name (e.g. **MLVA Type**) for the new information field that will hold the MLVA type for each entry (see Figure 3) and press <**OK**>.



**Figure 3:** New information field for the storage of the MLVA type.

BIONUMERICS will ask "Do you want to scan the selected entries for types?".

8. Press <**Yes**>.

The new types detected in the selected entries are listed in the *Update* dialog box (see Figure 4). In our database, 8 new types are detected.

9. Press <**OK**> to add the types to the MLVA typing schema.

The *Typing management* window opens, providing an overview of the types that are currently present in the MLVA typing schema, and the corresponding copy numbers for each of the VNTRs that are included in the typing schema.

10. Close the *Typing management* window and *MLVA management* window.

### 3 Assigning types

1. In the *Main* window make sure all entries are selected in the *Database entries* panel.

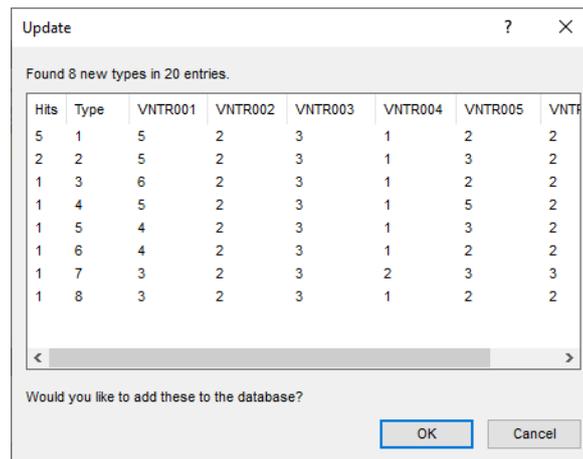


Figure 4: New MLVA types.

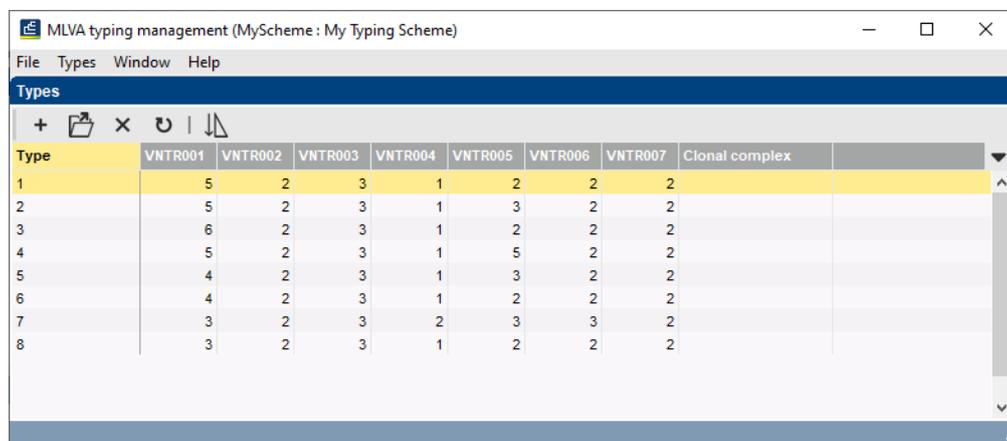


Figure 5: The Typing management window.

2. Select **MLVA > Perform MLVA typing...** (🔍) in the *Main* window. This action opens the *Perform typing* dialog box (see Figure 6).

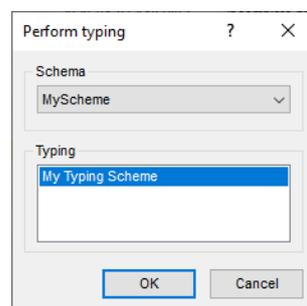


Figure 6: Perform MLVA typing.

3. In this database, only one MLVA scheme and associated MLVA typing scheme is available, so press <OK> to start the typing.

BIONUMERICs will determine the MLVA types and will add these to the entry information field that was specified for the typing information (in this exercise: **MLVA Type**) (see Figure 7). The text "Incomplete profile" will be filled in when copy numbers are not available for all VNTRs as defined

in the MLVA typing schema. For new profiles, i.e. VNTR copy number combinations that are not in the database yet, the text "Unknown" is filled in.

The screenshot displays the 'MLVA database - BioNumerics' application window. The central 'Database entries' table is the primary focus, listing various profiles with their keys, modification dates, and MLVA types. The table has 14 columns: 'Key', 'Modified date', 'MLVA Type', and 13 numbered columns representing VNTR loci (1-13). Each cell in the loci columns contains a green dot, indicating the presence of a specific VNTR profile. The 'MLVA Type' column contains values such as 'Incomplete profile' and 'Fixed'. The 'Experiment types' panel on the left lists 13 different MLVA schemes, including 'MyScheme\_vala', 'MyScheme\_frags', and various 'MLVAMP' schemes. The 'Comparisons' panel on the right is currently empty. The status bar at the bottom indicates '13 experiments' and the file path 'C:\Users\Public\Documents\BioNumerics\Data\BIO\MLVA database'.

Key	Modified date	MLVA Type	1	2	3	4	5	6	7	8	9	10	11	12	13
✓ N2006-0003	2020-04-07 14:59:02	Incomplete profile	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0004	2020-04-07 14:59:02	Incomplete profile	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0021	2020-04-07 14:59:02	2	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0022	2020-04-07 14:59:02	4	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0040	2020-04-07 14:59:02	7	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0063	2020-04-07 14:59:02	1	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0082	2020-04-07 14:59:02	1	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0099	2020-04-07 14:59:02	Incomplete profile	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0112	2020-04-07 14:59:02	Incomplete profile	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0123	2020-04-07 14:59:02	6	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0152	2020-04-07 14:59:02	1	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0170	2020-04-07 14:59:02	8	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0172	2020-04-07 14:59:02	1	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0179	2020-04-07 14:59:02	Incomplete profile	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0185	2020-04-07 14:59:02	Incomplete profile	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0196	2020-04-07 14:59:02	1	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0208	2020-04-07 14:59:02	3	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0231	2020-04-07 14:59:02	Incomplete profile	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0232	2020-04-07 14:59:02	2	*	*	*	*	*	*	*	*	*	*	*	*	*
✓ N2006-0233	2020-04-07 14:59:02	5	*	*	*	*	*	*	*	*	*	*	*	*	*

Figure 7: The *Main* window after MLVA typing.