

# TAXON

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Electronic Supplement to

## **Morphology, phylogeny, and taxonomy of *Microthlaspi* (Brassicaceae: Coluteocarpeae) and related genera**

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***Taxon* 65: 79–98**

**Table S1.** Summary of flow cytometric analyses and chromosome count.

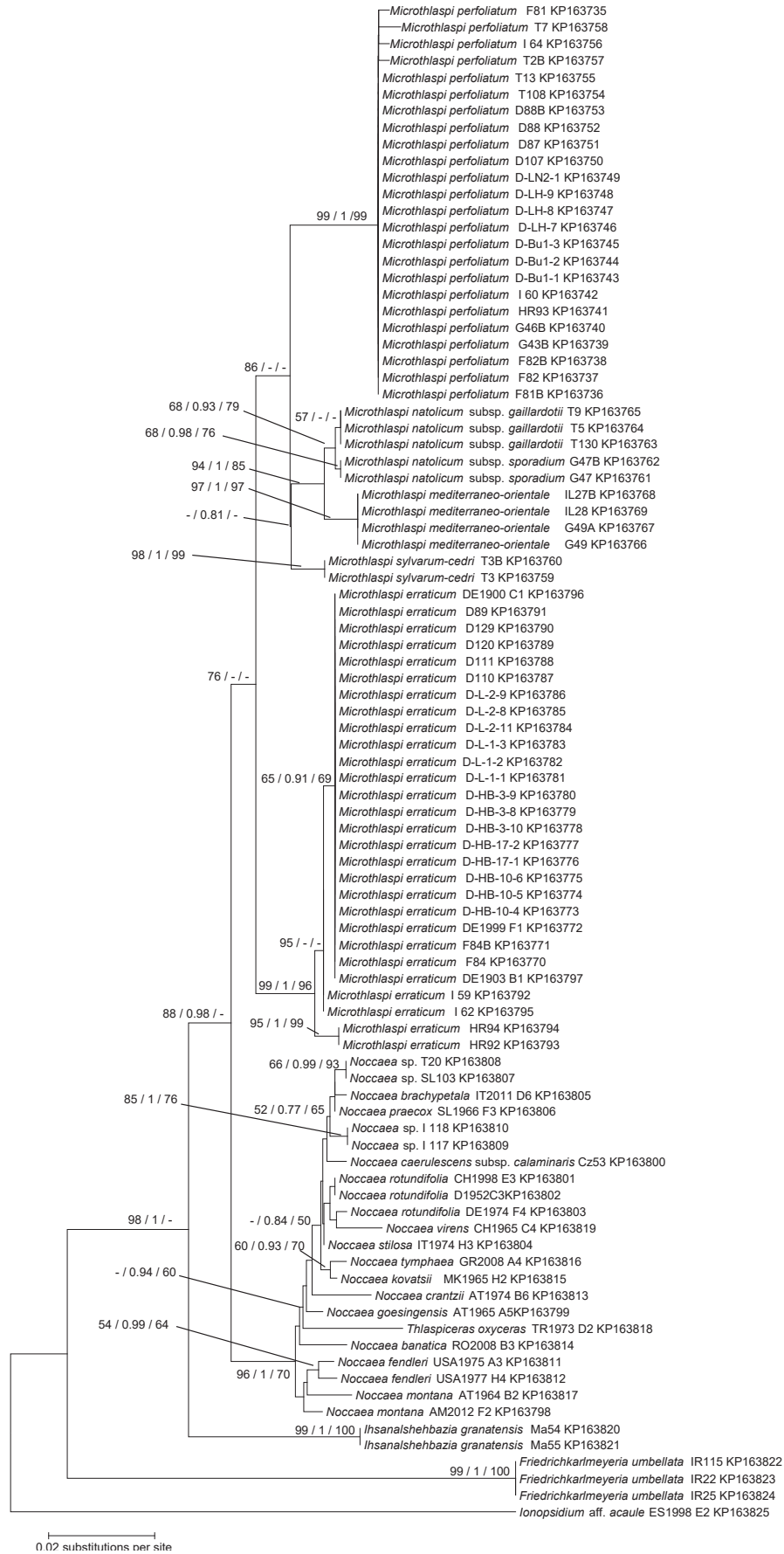
|  | Coefficient of variation (CV)<br>(mean $\pm$ s.d.) | Ratio of sample/<br>standard fluorescence<br>(mean $\pm$ s.d.) | <i>n</i> | Chromosome<br>count (CC)<br>( <i>2n</i> ) | DNA<br>ploidy | DNA ploidy<br>determination | DNA contents of<br><i>2n</i> nucleus (2C) | Estimated genome<br>size (Mb) | GC<br>content (%) |
|--|--|--|----------|---|---------------|-----------------------------|---|-------------------------------|-------------------|
| <i>Ihsanalshehbazia granatensis</i><br>(Boiss. & Reut.) Tahir Ali & Thines | 3.25 $\pm$ 0.820                                   | 0.121 $\pm$ 0.0005   | 02       | –   | 2x            | Lit. review                 | 0.35                                      | 339                           | 39.14             |
| <i>Friedrichkarmeyeria umbellata</i><br>(Steven ex DC.) Tahir Ali & Thines | 2.75 $\pm$ 0.216                                   | 0.146 $\pm$ 0.0023   | 03       | –   | 2x            | Lit. review                 | 0.44                                      | 427                           | 39.72             |
| <i>Microthlaspi erraticum</i> (Jord.) Tahir Ali & Thines                   | 2.22 $\pm$ 0.275                                   | 0.147 $\pm$ 0.0035   | 11       | 14  | 2x            | CC                          | 0.43                                      | 422                           | 40.06             |
| <i>M. mediterraneo-orientale</i> Tahir Ali & Thines                        | 2.05 $\pm$ 0.060                                   | 0.223 $\pm$ 0.0033   | 03       | –   | 2x            | CC regression               | 0.69                                      | 677                           | 40.90             |
| <i>M. natolicum</i> subsp. <i>gaillardotii</i> F.K.Mey.                    | 1.55 $\pm$ 0.245                                   | 0.292 $\pm$ 0.0009   | 03       | 14  | 2x            | CC                          | 0.90                                      | 883                           | 39.14             |
| <i>M. natolicum</i> subsp. <i>sporadium</i> F.K.Mey.                       | 1.64 $\pm$ 0.169                                   | 0.296 $\pm$ 0.0035   | 02       | –   | –             | –                           | –   | –                             | –                 |
| <i>M. perfoliatum</i> (L.) F.K.Mey. s.str.                                 | 1.35 $\pm$ 0.321                                   | 0.438 $\pm$ 0.0116   | 15       | 42  | 6x            | CC                          | 1.33                                      | 1,296                         | 39.97             |
| <i>M. sylvorum-cedri</i> Tahir Ali & Thines                                | 1.59 $\pm$ 0.070                                   | 0.362 $\pm$ 0.0014   | 02       | –   | –             | –                           | 1.07                                      | 1,044                         | 36.62             |
| <i>Noccaea</i> sp.   | 2.14 $\pm$ 0.798                                   | 0.188 $\pm$ 0.0076   | 05       | –   | 2x            | Lit. review                 | 1.16                                      | 1,135                         | 40.02             |

**Table S2.** Summary of various vegetative, floral and fruit traits measured. Maximum (Max.), minimum (Min.), median, standard deviation (STDEV), and standard error mean values (SEM)

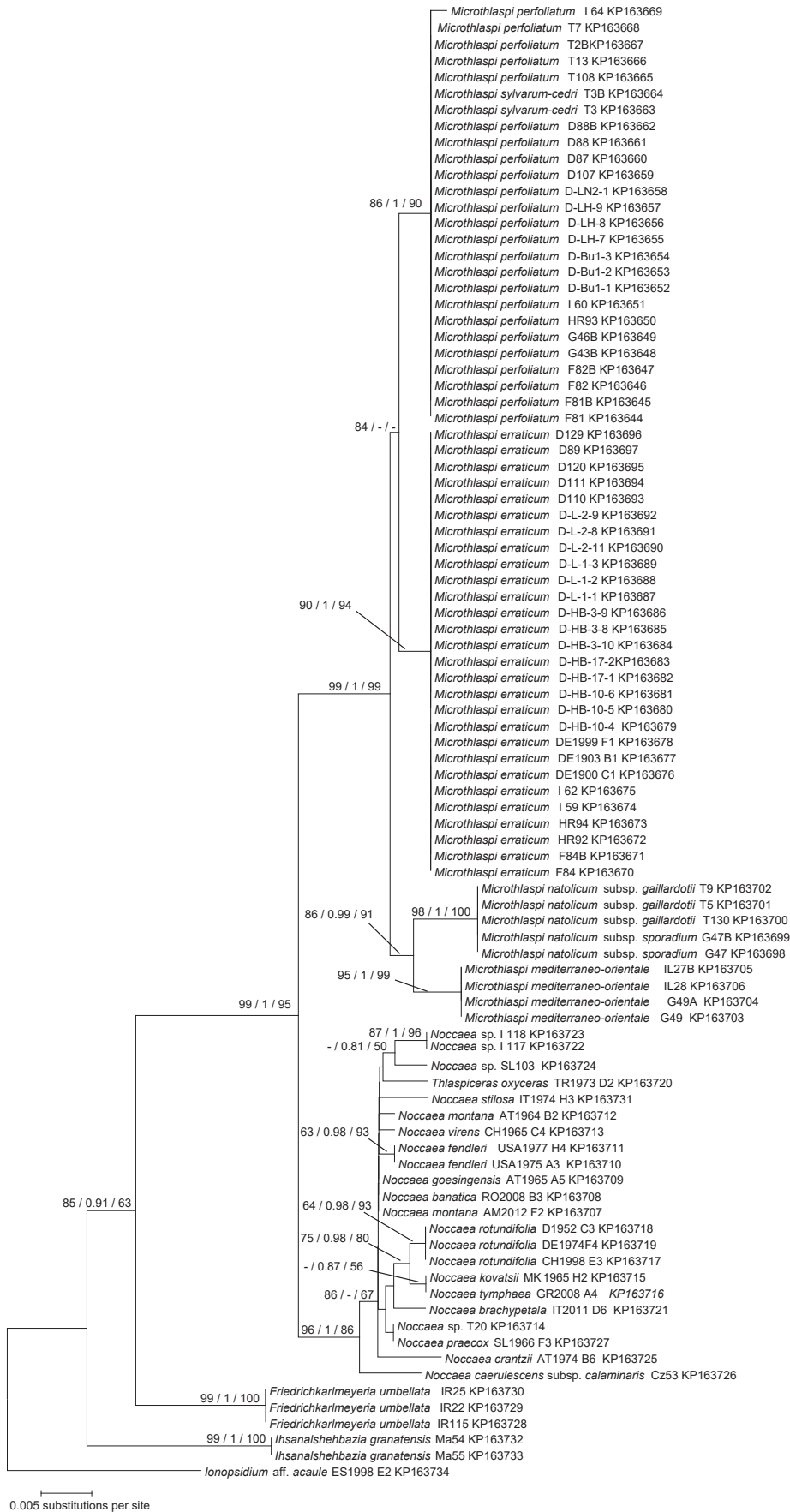
| Morphological characteristic                | <i>Ihsanalshehbazia granatensis</i><br>(Boiss. & Reut.) Tahir Ali & Thines |      |        |        |       |    | <i>Friedrichkarmeyeria umbellata</i><br>(Steven ex DC.) Tahir Ali & Thines |       |        |        |       |    | <i>Microthlaspi mediterraneo-orientale</i><br>Tahir Ali & Thines |       |        |        |       |    | <i>M. natolicum</i> subsp. <i>gaillardotii</i><br>F.K.Mey. |       |        |        |      |    |
|---|--|------|--------|--------|-------|----|--|-------|--------|--------|-------|----|--|-------|--------|--------|-------|----|--|-------|--------|--------|------|----|
|   | Max.   | Min. | Median | STDEV± | SEM   | N  | Max.   | Min.  | Median | STDEV± | SEM   | N  | Max.   | Min.  | Median | STDEV± | SEM   | N  | Max.   | Min.  | Median | STDEV± | SEM  | N  |
| <b>Rosette Leaf</b>                         |  |      |        |        |       |    |  |       |        |        |       |    |  |       |        |        |       |    |  |       |        |        |      |    |
| Length of lamina (mm)                       | 22.83  | 9.91 | 13.18  | 3.54±  | 1.02  | 12 | 13.2   | 5.14  | 7.87   | 2.35±  | 0.55  | 18 | 14.29  | 3.04  | 7.02   | 3.71±  | 0.85  | 19 | 12.19  | 6.86  | 10.35  | 1.79±  | 0.40 | 13 |
| Width of lamina (mm)                        | 12.25  | 5.63 | 8.70   | 2.04±  | 0.59  | 12 | 15.2   | 4.91  | 9.77   | 3.11±  | 0.73  | 18 | 11.65  | 2.44  | 6.65   | 3.02±  | 0.69  | 19 | 14.28  | 7.13  | 11.26  | 2.26±  | 0.51 | 13 |
| Length of petiole                           | 16.79  | 6.91 | 11.75  | 2.90±  | 0.84  | 12 | 11.4   | 4.02  | 6.49   | 2.39±  | 0.56  | 18 | 7.16   | 1.84  | 4.01   | 1.76±  | 0.40  | 19 | 14.12  | 4.59  | 8.09   | 2.60±  | 0.58 | 13 |
| Area of lamina (mm <sup>2</sup> )           | 260.9  | 69.9 | 116.17 | 57.43± | 16.58 | 12 | 181  | 25.24 | 72.45  | 49.89± | 11.76 | 18 | 166  | 7.52  | 44.44  | 49.34± | 11.32 | 19 | 167.5  | 60.32 | 125.0  | 37.23± | 8.32 | 13 |
| Length of lamina / width of lamina          | 2.20   | 1    | 1.57   | 0.35±  | 0.10  | 12 | 1.18   | 0.66  | 0.85   | 0.13±  | 0.03  | 18 | 1.43   | 0.80  | 1.15   | 0.16±  | 0.04  | 19 | 1.20   | 0.69  | 0.87   | 0.17±  | 0.04 | 13 |
| Length of lamina / length of petiole        | 1.63   | 0.9  | 1.38   | 0.25±  | 0.07  | 12 | 1.71   | 0.51  | 1.33   | 0.34±  | 0.08  | 18 | 3.58   | 0.88  | 1.71   | 0.70±  | 0.16  | 19 | 1.95   | 0.49  | 1.26   | 0.44±  | 0.10 | 13 |
| <b>Flower</b>                               |  |      |        |        |       |    |  |       |        |        |       |    |  |       |        |        |       |    |  |       |        |        |      |    |
| Length of larger petals (mm)                | 2.59   | 1.82 | 2.22   | 0.22±  | 0.04  | 24 | 3.69   | 2.67  | 3.08   | 0.27±  | 0.04  | 36 | 2.73   | 1.97  | 2.58   | 0.24±  | 0.04  | 38 | 6.97   | 3.70  | 4.92   | 0.84±  | 0.16 | 26 |
| Length of smaller petals (mm)               | 2.45   | 1.59 | 1.96   | 0.26±  | 0.05  | 24 | 3.22   | 2.08  | 2.70   | 0.26±  | 0.04  | 36 | 2.64   | 1.86  | 2.50   | 0.29±  | 0.05  | 38 | 4.93   | 2.79  | 4.02   | 0.57±  | 0.11 | 26 |
| Length of larger / length of smaller petals | 1.35   | 1.02 | 1.09   | 0.10±  | 0.02  | 24 | 1.28   | 1.02  | 1.13   | 0.06±  | 0.01  | 36 | 1.33   | 1.01  | 1.06   | 0.07±  | 0.01  | 38 | 1.67   | 1.08  | 1.25   | 0.14±  | 0.03 | 26 |
| <b>Fruit</b>                                |  |      |        |        |       |    |  |       |        |        |       |    |  |       |        |        |       |    |  |       |        |        |      |    |
| Length (mm)                                 | 9.72   | 7.35 | 8.71   | 0.73±  | 0.21  | 12 | 6.65   | 3.99  | 5.90   | 0.75±  | 0.18  | 18 | 10.88  | 4.28  | 6.1    | 1.52±  | 0.35  | 19 | 8.22   | 3.51  | 6.56   | 1.72±  | 0.39 | 13 |
| Width (mm)                                  | 6.03   | 4.43 | 5.32   | 0.49±  | 0.14  | 12 | 4.96   | 2.89  | 4.27   | 0.53±  | 0.13  | 18 | 11.28  | 4.61  | 6.19   | 1.59±  | 0.36  | 19 | 7.71   | 3.82  | 6.36   | 1.21±  | 0.27 | 13 |
| Angle at apex (degree)                      | 69.18  | 43.7 | 61.48  | 7.78±  | 2.25  | 12 | 134  | 103   | 118.91 | 8.47±  | 2.00  | 18 | 132.9  | 94.11 | 114.45 | 11.07± | 2.54  | 19 | 107.5  | 58.45 | 89.7   | 13.86± | 3.10 | 13 |
| Length of stalk (mm)                        | 3.03   | 2.41 | 2.82   | 0.23±  | 0.07  | 12 | 4.74   | 2.03  | 2.91   | 0.68±  | 0.16  | 18 | 6  | 2.04  | 3.9    | 0.92±  | 0.21  | 19 | 9.31   | 4.56  | 5.66   | 1.26±  | 0.28 | 13 |
| Length of style (mm)                        | 0.45   | 0.11 | 0.23   | 0.11±  | 0.03  | 12 | 0.51   | 0.25  | 0.38   | 0.08±  | 0.02  | 18 | 0.58   | 0.14  | 0.33   | 0.12±  | 0.03  | 19 | 0.99   | 0.45  | 0.78   | 0.20±  | 0.05 | 13 |
| Basal angle (degree)                        | 115.9  | 95.1 | 106.96 | 6.01±  | 1.73  | 12 | 81.8   | 58.3  | 67.80  | 6.07±  | 1.43  | 18 | 138.5  | 100.2 | 124.92 | 9.23±  | 2.12  | 19 | 139.6  | 102   | 115.78 | 1.29±  | 2.97 | 13 |
| Apex angle / basal angle                    | 0.70   | 0.38 | 0.57   | 0.09±  | 0.03  | 12 | 2.13   | 1.38  | 1.75   | 0.19±  | 0.05  | 18 | 1.14   | 0.73  | 0.93   | 0.12±  | 0.03  | 19 | 0.98   | 0.47  | 0.84   | 0.17±  | 0.03 | 13 |
| Length / stalk length                       | 3.47   | 2.9  | 3.17   | 0.17±  | 0.05  | 12 | 3.26   | 1.3   | 1.92   | 0.48±  | 0.11  | 18 | 2.29   | 1.16  | 1.60   | 0.30±  | 0.07  | 19 | 1.48   | 0.76  | 0.97   | 0.22±  | 0.05 | 13 |
| Area of fruit (mm <sup>2</sup> )            | 57.71  | 32.6 | 45.39  | 7.62±  | 2.2   | 12 | 29   | 11.5  | 25.89  | 5.18±  | 1.22  | 18 | 122.7  | 20.59 | 38.69  | 23.14± | 5.31  | 19 | 60.89  | 14.55 | 39.56  | 16.53± | 3.70 | 13 |
| Length / Width                              | 1.85   | 1.49 | 1.66   | 0.09±  | 0.03  | 12 | 1.66   | 1.11  | 1.42   | 0.15±  | 0.03  | 18 | 1.01   | 0.83  | 0.91   | 0.06±  | 0.01  | 19 | 1.22   | 0.72  | 0.99   | 0.15±  | 0.03 | 13 |

Table S2. Continued.

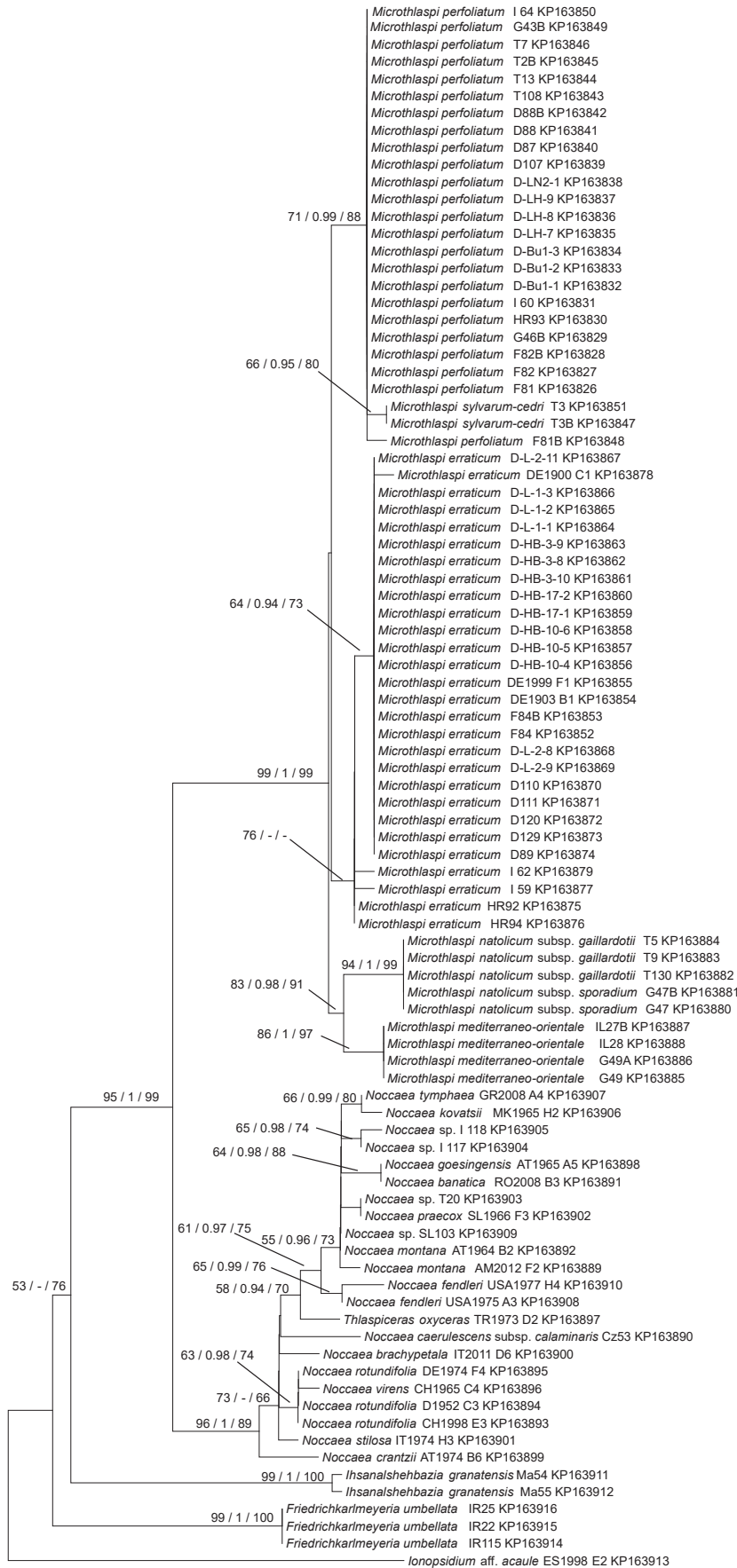
| Morphological characteristic                | <i>M. natolicum</i> subsp. <i>sporadium</i><br>F.K.Mey. |       |        |         |       |    | <i>M. sylvarum-cedri</i><br>Tahir Ali & Thines |       |        |        |      |    | <i>M. erraticum</i><br>Tahir Ali & Thines |       |        |        |       |    | <i>M. perfoliatum</i><br>(L.) F.K.Mey. |       |        |        |       |    |
|---|---|-------|--------|---------|-------|----|--|-------|--------|--------|------|----|---|-------|--------|--------|-------|----|--|-------|--------|--------|-------|----|
|   | Max.  | Min.  | Median | STDEV±  | SEM   | N  | Max.   | Min.  | Median | STDEV± | SEM  | N  | Max.                                      | Min.  | Median | STDEV± | SEM   | N  | Max.                                   | Min.  | Median | STDEV± | SEM   | N  |
| <b>Rosette Leaf</b>                         |   |       |        |         |       |    |  |       |        |        |      |    |   |       |        |        |       |    |  |       |        |        |       |    |
| Length of lamina (mm)                       | 17.03   | 4.89  | 8.29   | 5.43±   | 1.21  | 14 | 8.77   | 5.9   | 7.19   | 1.97±  | 0.20 | 17 | 16.88                                     | 2.87  | 5.91   | 3.46±  | 0.72  | 23 | 19.09                                  | 4.57  | 7.84   | 3.74±  | 0.72  | 27 |
| Width of lamina (mm)                        | 20.42   | 5.93  | 7.18   | 6.20±   | 1.39  | 14 | 12.17  | 6.54  | 8.43   | 2.65±  | 0.42 | 17 | 11.67                                     | 3.68  | 5.44   | 2.50±  | 0.52  | 23 | 17.97                                  | 5.34  | 8.04   | 3.52±  | 0.68  | 27 |
| Length of petiole                           | 18.76   | 5.83  | 6.5    | 4.61±   | 1.03  | 14 | 23.13  | 5.74  | 10.32  | 5.11±  | 1.09 | 17 | 14.9                                      | 2.12  | 5.59   | 2.94±  | 0.61  | 23 | 24.52                                  | 4.68  | 10.11  | 5.04±  | 0.97  | 27 |
| Area of lamina (mm <sup>2</sup> )           | 324.1   | 29    | 60.32  | 135.95± | 30.40 | 14 | 105.8  | 41.33 | 63.98  | 86.07± | 4.78 | 17 | 196.9                                     | 10.56 | 33.07  | 49.80± | 10.38 | 23 | 317.9                                  | 24.40 | 61.55  | 84.78± | 16.32 | 27 |
| Length of lamina / width of lamina          | 0.97  | 0.77  | 0.82   | 0.07±   | 0.02  | 14 | 0.97   | 0.65  | 0.86   | 0.27±  | 0.02 | 17 | 1.47                                      | 0.68  | 1.11   | 0.21±  | 0.04  | 23 | 1.20                                   | 0.86  | 0.99   | 0.09±  | 0.02  | 27 |
| Length of lamina / length of petiole        | 1.47  | 0.76  | 0.91   | 0.29±   | 0.06  | 14 | 1.03   | 0.34  | 0.69   | 0.35±  | 0.05 | 17 | 2.54                                      | 0.46  | 1.21   | 0.48±  | 0.10  | 23 | 2.26                                   | 0.41  | 0.87   | 0.42±  | 0.08  | 27 |
| <b>Flower</b>                               |   |       |        |         |       |    |  |       |        |        |      |    |   |       |        |        |       |    |  |       |        |        |       |    |
| Length of larger petals (mm)                | 5.84  | 3.23  | 4.56   | 1.03±   | 0.27  | 14 | 3.11   | 1.73  | 2.29   | 0.32±  | 0.06 | 34 | 3.72                                      | 2.53  | 2.97   | 0.23±  | 0.03  | 46 | 3.67                                   | 2.30  | 3.04   | 0.35±  | 0.05  | 54 |
| Length of smaller petals (mm)               | 4.84  | 2.69  | 3.46   | 0.72±   | 0.19  | 14 | 2.94   | 1.51  | 2.14   | 0.33±  | 0.06 | 34 | 3.43                                      | 2.40  | 2.75   | 0.23±  | 0.03  | 46 | 3.39                                   | 2.26  | 2.75   | 0.32±  | 0.04  | 54 |
| Length of larger / length of smaller petals | 1.38  | 1.08  | 1.22   | 0.08±   | 0.02  | 14 | 1.52   | 1.00  | 1.07   | 0.09±  | 0.02 | 34 | 1.21                                      | 1.00  | 1.05   | 0.06±  | 0.01  | 46 | 1.26                                   | 1.01  | 1.08   | 0.06±  | 0.01  | 54 |
| <b>Fruit</b>                                |   |       |        |         |       |    |  |       |        |        |      |    |   |       |        |        |       |    |  |       |        |        |       |    |
| Length (mm)                                 | 8.21  | 5.54  | 6.68   | 1.04±   | 0.23  | 14 | 6.83   | 3.69  | 5.8    | 1.70±  | 0.24 | 17 | 7.7                                       | 3.27  | 5.47   | 0.89±  | 0.19  | 23 | 8.09                                   | 4.14  | 6.07   | 0.84±  | 0.16  | 27 |
| Width (mm)                                  | 10.64   | 6.15  | 6.72   | 1.66±   | 0.37  | 14 | 5.63   | 2.89  | 4.72   | 1.46±  | 0.20 | 17 | 6.37                                      | 3.02  | 4.42   | 0.96±  | 0.20  | 23 | 7.82                                   | 4.11  | 5.56   | 0.84±  | 0.16  | 27 |
| Angle at apex (degree)                      | 119.9   | 43.34 | 58.45  | 30.84±  | 6.90  | 14 | 46.67  | 28.49 | 41.76  | 18.53± | 2.99 | 17 | 93.16                                     | 59.99 | 79.9   | 9.59±  | 2.00  | 23 | 117.1                                  | 66.29 | 98.79  | 18.27± | 3.52  | 27 |
| Length of stalk (mm)                        | 5.17  | 3.12  | 5.03   | 0.73±   | 0.16  | 14 | 4.81   | 2.38  | 3.7    | 1.19±  | 0.18 | 17 | 5.25                                      | 2.22  | 3.16   | 0.89±  | 0.19  | 23 | 4.97                                   | 1.4   | 3.13   | 0.84±  | 0.16  | 27 |
| Length of style (mm)                        | 0.77  | 0.2   | 0.61   | 0.22±   | 0.05  | 14 | 0.39   | 0.1   | 0.22   | 0.14±  | 0.02 | 17 | 0.72                                      | 0.21  | 0.42   | 0.13±  | 0.03  | 23 | 0.68                                   | 0.13  | 0.35   | 0.14±  | 0.03  | 27 |
| Basal angle (degree)                        | 155.8   | 128.4 | 128.4  | 9.60±   | 2.15  | 14 | 127.3  | 79.3  | 103.64 | 33.60± | 4.08 | 17 | 117.1                                     | 77.55 | 88.79  | 10.89± | 2.27  | 23 | 137.7                                  | 95.95 | 108.29 | 10.05± | 1.93  | 27 |
| Apex angle / basal angle                    | 0.91  | 0.28  | 0.47   | 0.24±   | 0.05  | 14 | 0.81   | 0.24  | 0.48   | 0.24±  | 0.04 | 17 | 1.13                                      | 0.62  | 0.90   | 0.15±  | 0.03  | 23 | 1.07                                   | 0.32  | 0.68   | 0.17±  | 0.03  | 27 |
| Length / stalk length                       | 1.78  | 1.26  | 1.47   | 0.16±   | 0.04  | 14 | 2.69   | 1.19  | 1.52   | 0.55±  | 0.08 | 17 | 2.67                                      | 1.04  | 1.68   | 0.47±  | 0.10  | 23 | 4.18                                   | 1.38  | 1.93   | 0.57±  | 0.11  | 27 |
| Area of fruit (mm <sup>2</sup> )            | 87.35   | 34.07 | 47.96  | 19.76±  | 4.42  | 14 | 37.5   | 10.66 | 24.74  | 21.27± | 1.89 | 17 | 48.36                                     | 9.88  | 24.95  | 8.14±  | 1.70  | 23 | 59.38                                  | 19.98 | 36.63  | 9.13±  | 1.76  | 27 |
| Length / Width                              | 0.93  | 0.77  | 0.90   | 0.06±   | 0.01  | 14 | 1.52   | 0.87  | 1.18   | 0.39±  | 0.04 | 17 | 1.60                                      | 0.77  | 1.22   | 0.21±  | 0.04  | 23 | 1.29                                   | 0.71  | 1.09   | 0.14±  | 0.03  | 27 |



**Fig. S1.** Phylogenetic tree (minimum evolution) based on ITS sequences, with support values in minimum evolution ( $\geq 50\%$ ), Bayesian inference ( $\geq 0.8$ ), and maximum likelihood ( $\geq 50\%$ ) at first, second and third position on the branches, respectively. A dash (-) denotes lacking significant support for a conflicting or congruent topology.



**Fig. S2.** Phylogenetic tree (minimum evolution) based on *matK* sequences, with support values in minimum evolution ( $\geq 50\%$ ), Bayesian inference ( $\geq 0.8$ ), and maximum likelihood ( $\geq 50\%$ ) at first, second and third position on the branches, respectively. A dash (-) denotes lacking significant support for a conflicting or congruent topology.



**Fig. S3.** Phylogenetic tree (minimum evolution) based on *trnL-F* sequences, with support values in minimum evolution ( $\geq 50\%$ ), Bayesian inference ( $\geq 0.8$ ), and maximum likelihood ( $\geq 50\%$ ) at first, second and third position on the branches, respectively. A dash (-) denotes lacking significant support for a conflicting or congruent topology.

■ **APPENDIX S1.**  
**DETAILED DESCRIPTIONS FOR THE TYPES**  
**OF THE TWO NEW GENERA AND TWO NEW**  
**SPECIES INTRODUCED IN THIS STUDY**

***Friedrichkarmeyeria umbellata***

The detailed description for *Friedrichkarmeyeria umbellata* from Meyer (2003) is given here in a partly simplified translation, with some additional observations (underlined) made in this study.

Plant annual, glabrous, bluish green. Root simple and thin. Lower leaves rosette-like or with a greater or lesser distance to each other. From these the simple inflorescence arises. Further (up to 14) inflorescence-bearing branches arising from the leaf axils of the lower leaves, rarely giving rise to up to two further inflorescence-bearing branches, arising from the lower leaves of the branch. Leaves herbaceous, slightly thickened. Stems ascending to erect, often with a slightly reddish tint, branched only at the base, 2–20 cm. Each raceme bearing 6–48 flowers, almost umbellate during flowering, later extending to 0.5–10 cm in length. Lower leaves close to each other or more distant, alternating, spatulate, the roundish to ovate lamina with coarse teeth, the lowermost dents often slightly bending upwards. Lamina clearly separate from the narrowly winged petiole, lamina about the same length as the petiole, leaves 4–40 mm long, 2–15 mm wide. Stem leaves mostly 6–8, alternate, sessile, only the lowermost rarely with a short stalk, oval to almost triangular, serrate, often half-perfoliate, 4–9 mm long, 2–11 mm wide. Sepals bluish-green, often with a bluish-red tint, with white margins, ovate, 1.2–1.7 mm long, 0.5–0.8 mm wide. Petals white, spatulate, tapering towards the nail, which makes up for about a third (0.8–0.9 mm) of the petal length, 1.9–2.5 (2.0–3.7 in culture) mm long, 0.6–0.9 (1.0–1.7 in culture) mm wide. Anthers 1.3–1.5 mm (central anthers) and 1.1–1.5 mm (lateral anthers) long. Filaments 0.1 mm wide, often thickened at the base. Anthers pale yellow, broadly ovate, with a prominent tip of the connective, 0.2–0.25 × 0.2 mm. Style 0.1–0.2 (0.2–0.5 in culture) mm long, 0.2 mm wide. Nectaries very small, at the sides of the lateral anthers, hardly prominent. Fruit heart-shaped, mostly with a convex margin in the lower half, tapering into the fruit stalk, fruit winged, outer rim formed by a prominent vein, into which pronounced parallel radial veins are inserting, which are only seen on the wing (Fig. 6). Fruit with a wide, net-like, inconspicuous venation, which is inconspicuous. Angle between the wings wide, sometimes almost straight (180 degrees). Fruit 4.5–6 (3.9–6.6 in culture) mm long, 3.5–4.5 (2.8–4.9 in culture) mm wide. Fruit stalks 1.5–6 mm long, inclined to almost horizontal. Septum cells often in slightly bent rows of spindle-like cells, 8–24 × 30–38 μm, cell walls 2 μm in thickness. Septum seam reaching until the lower third. Seeds 4–6 per fruit compartment, ovate, pale orange to yellow, 1.2 × 0.85 mm. Seed coat with domed brightly hyaline cells in the epidermis, 16–33 × 25–40 μm, with a small central tooth-like structure. Subepidermal cells rectangular to square, yellowish, 6–12 × 6–17 μm. Inner integument orange.

***Ihsanalshehbazia granatensis***

The detailed description for *Ihsanalshehbazia granatensis* from Meyer (2003) is given here in a partly simplified translation, with some additional observations (underlined) made in this study.

Plants annual, glabrous, bluish green. Root simple, thin. Stem with basal rosette-like leaves, from which the simple inflorescence arises. Additional (up to 9) inflorescence-bearing branches often arising from the leaf axils of the lower leaves. Leaves herbaceous, somewhat thickened. Stems ascending to erect, mostly 3–16 cm, sometimes with a slightly reddish tint. Each raceme bearing (4–)6–44 flowers, (0.3–)0.5–6.5 cm long when fruiting. Lower leaves rosulate, alternate, spatulate, roundish, ovate to lanceolate, lamina tapering into the petiole (in smaller basal leaves lamina more clearly separated from the petiole), lamina shorter or of about the same length as the petiole, margins entire, leaves glossy, 6–33 mm long, 3–11 (5.63–12.25 in culture) mm wide. Stem leaves 2–5, alternate, sessile, ovate to broadly ovate, often almost roundish, with entire margins, broadly perfoliate, greyish blue–green in colour, 3–16 mm long, 2–12 mm wide. Sepals green, often with a reddish tint, with white margins, ovate, 1.1–1.6 mm long, 0.5–0.9 mm wide. Petals white, spatulate, 1.5–1.95 (1.59–2.59 in culture) mm long, often tapering into the 0.6–0.8 mm long nail. Filaments 0.1 mm wide. Anthers pale yellow, broadly ovate, with a small more or less conspicuous connective tip, 0.15–0.2 × 0.18–0.2 mm. Style 0.1–0.15 mm (0.1–0.4 mm in culture) mm long, 0.15 mm wide, stigma sometimes almost sitting. Nectaries small, at the sides of the lateral anthers, slightly dome-like. Fruit ovate to oval, with narrow wings with a pronounced outer vein, otherwise with inconspicuous nervature (Fig. 5C). Angle between the wings at the apex acute, wings sometimes overlapping above the apex. Fruits 3–6 (7.3–9.7 in culture) mm long, 2.5–5 (4.4–5) mm wide. Fruit stalks 1.5–7 mm long, slightly bent upwards in a bow. Septum cells in short, bent, spindle-like rows, strongly undulate, 10–24(–45) × 30–70 μm, cell walls 2–3 μm thick. Septum seam only in the upper quarter. Four seeds per fruit compartment. Seeds ovate, yellow to pale orange, 1.3–1.6 × 0.9–1.1 mm. Seed coat epidermis consisting of almost square cells, with a dome on the outer side of the brightly hyaline cells of the epidermis, in the centre with a thick glass-like inclusion, partly giving rise to mucus, 13–26 × 22–29 μm. Subepidermal cells almost square to upright rectangular, yellowish, 10–15 × 4–14 μm. Inner integument brown. Endosperm with small spherites.

***Microthlaspi mediterraneo-orientale***

Plants annual, glabrous, bluish-green. Root simple, thin. Stem with lower leaves close to each other, from this the simple inflorescence arises. Additional inflorescence-bearing branches (up to 8) arising from the leaf axils of the lower leaves. Leaves herbaceous and slightly thickened. Stems ascending to erect 6–18 cm. Racemes bearing 4–18 flowers, 0.5–4 cm long when fruiting. Rosette leaves close to each other, alternating, spatulate, petiolate, petiole shorter than the lamina, margins entire, leaves waxy, 4.9–21 mm long, 2.4–11.7 mm wide



(Fig. 7B). Stem leaves 2–4, alternate, sessile, lanceolate, with entire margins, broadly perfoliate, 3–12 mm long, 2–6 mm wide. Sepals light green, with white margins, ovate. Petals white, spatulate, 1.8–2.7 mm long, slightly zygomorphic or of equal size (Fig. 7A). Anthers pale yellow, broadly ovate, with a small but conspicuous connective tip. Style 0.14–0.58 mm long. Fruit base mostly forming an obtuse angle to roundish, fruit with pronounced wings (Fig. 7C). Fruits 4.2–10.9 mm long, 4.6–11.3 mm wide. Fruit stalks 2–6 mm long. Two seeds per fruit compartment. Seeds ovate, yellow to pale orange in colour.

### ***Microthlaspi sylvarum-cedri***

Plants annual, glabrous, bluish green. Root simple, thin. Stem with lower leaves close to each other, from this the simple inflorescence arises. Additional inflorescence-bearing branches arising from the leaf axils of the lower leaves. Leaves herbaceous and slightly thickened. Stems ascending to erect 6–14 cm. Racemes bearing 4–20 flowers, 3–10.5 cm long when fruiting. Rosette leaves close to each other, alternating,

spatulate, petiolate, petiole longer than the lamina, margins entire, 11.6–31.8 mm long, 6.5–12.2 mm wide (Fig. 10B). Stem leaves 2–10, alternating, sessile, hastate, slightly dentate along the margin, often perfoliate, pale-green, 2–10 mm long, 1–4 mm wide. Sepals light green, with white margins, ovate. Petals white, 1.5–3.1 mm long, slightly zygomorphic to equally long, indistinctly spatulate, only gradually tapering from the apex to the base. Anthers pale yellow, broadly ovate, with a small but conspicuous connective tip. Style 0.1–0.3 mm long. Fruit with a roundish base, ovoid to ovate to roundish, with narrow wings tapering towards the base. Angle between the wings at the apex acute (Fig. 10C). Fruits 3.6–6.8 mm long, 4.6–11.3 mm wide. Fruit stalks 2.9–5.6 mm long. Two seeds per fruit compartment. Seeds ovate, yellow to light orange.

### **Literature cited**

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