GENOMIC RELATIONSHIPS IN THE *LACHENALIA ORCHIOIDES* GROUP

André Minnaar

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Supervisor: Prof J. J. Spies
Co-supervisor: Mrs R. Kleynhans

To my family:
My Parents and two sisters, Nadia & Natalie

You believed in me, when I didn't
You prayed for me, when I didn't
You encouraged me,
when I felt like quitting.
You lifted up my spirit, when I let it down
Your love gave me strength to see this through.

With love…

Faith:

Something every
post- graduate student
should have
when starting
any research-project.

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List of abbreviations

A	Adenine
ARC-Roodeplaat	Agricultural Research Council – Roodeplaat Vegetable and Ornamental Plant Institute
bp	base pair
cat	Catalogue
CI	Consistency index
cm	centimetre
CO_2	Carbon dioxide
cpDNA	Chloroplast DNA
CTAB	Hexadecyltrimethylamonium bromide
˚C	Degrees centigrade
dH_2O	Distilled water
DNA	Deoxyribonucleic acid
dNTP	Deoxynucleotide triphosphate
EDTA	Ethylene diamintetra acetic acid
Ethanol	Ethyl alcohol
Fig.	Figure
G	Guanine
g.	Gravitational Force
g	Gram
HCl	Hydrochloric acid
HI	Homoplasy index
i.e.	it est (that is)
ITS	Internal Transcribed Spacer Region
Kb	Kilobase
M	Molar
$MgCl_2$	Magnesium chloride
Mg	Miligram
ml	Mililiter
mm	Milimetre
mM	Milimolar

min.	Minute
m/v	Mass per volume
n	Gametic chromosome number
2n	Somatic chromosome number
NaCl	Sodium chloride
PAUP	Phylogenetic analysis using parsimony
PCR	Polymerase chain reaction
ρmol	pico moles
rbcL	Ribulose-1,5-biphosphate carboxylase large subunit
RC	Rescaled consistency index
RI	Retention index
RNA	Ribonucleic acid
s	Second
SNL	Signal to noise
TAE	Tris–acetic acid EDTA
Taq	*Thermus aquaticus*
TBR	Tree bisection–reconnection
T	Thymine
Tris	2–amino–2–(hydroxymethyl)–1,3–propanediol
UFS	University of the Free State
UV	Ultraviolet light
V	Volt
v/v	Volume per volume
%	Percentage
µg	Micrograms
µl	Microlitre
µM	Micro moles

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1. Introduction

Plants form the primary source of life through the process of photosynthesis. Additionally plants provide us with food, clothes, housing, medicine, ornamentals and many other uses. South Africa excels with its kaleidoscope of colour provided by these magnificent organisms. The flora of South Africa includes almost 10% of the worlds known flowering plants. Tourists flock to South Africa to enjoy the splendour and beauty of our Flora (Arnold and De Wet, 1993).

In an attempt to produce new and better ornamentals, breeding-programmes were developed. The Roodeplaat Vegetable and Ornamental Plant Institute of the ARC (ARC-Roodeplaat) developed an economically viable breeding-programme in South Africa, for the genus *Lachenalia.* This genus varies morphologically and it contains species of considerable character and beauty (Crosby, 1986). According to Duncan (1988) the Indigenous Bulb Growers Association of South Africa (IBSA) determined *Lachenalia* to be the second most popular genus in the world, other than *Gladiolus*, in 1985.

1.1. *Lachenalia*: The Genus

Lachenalia belongs to the order Asparagales. This order was first recognised and described by Huber (1969). Dahlgren *et al.* (1985) suggested that this order is a monophyletic group based on fruit and seed characters. The order Asparagales includes approximately 31 families of which Hyacinthaceae, Alliaceae and Amaryllidaceae are considered to be the closely related families (Dahlgren *et al.* 1982, Dahlgren *et al.* 1985). *Lachenalia* is a member of the Hyacinthaceae.

This family commonly known as the hyacinth family, consists of at least 70 genera and 1 000 species (Pfosser & Speta, 1999). Hyacinthaceae are well distributed through Africa, across most of Europe and central Asia to India and in Andean South America (Speta, 1998). Morphologically, it is described as perennial, usually deciduous herbs, containing steroidal saponins, which form a characteristically slimy sap (Manning *et al.*, 2002).

Morphological comparisons in some genera of this family have not been useful to resolve relationships between such genera. Although Hyacinthaceae is a family of

great karyological diversity, difficulty in the generic circumscription of the family still occurs. Molecular analysis of chloroplast DNA (*rbcL* and trn_{L-F}-sequences) has proven to be extremely informative (Fay & Chase, 1996; Pfosser & Speta, 1999; Fay *et al.*, 2000). Trn_{L-F} sequences provide strong support for the interfamilial classification, which divides this family into four sub-families: Oziroëoideae, Urgineoideae, Ornithogaloideae and Hyacinthoideae as described by Pfosser and Speta (1999). Except for the North American chlorogaloid genera, this family is now well established as a monophyletic lineage within the order Asparagales (Fay & Chase, 1996; Pfosser & Speta, 1999; Fay *et al.;* 2000, Manning & Van der Merwe, 2002).

The recorded history of *Lachenalia* dates back as far as 1685, to a painting of *L. hirta* (Thunb.) Thunb. (Duncan, 1988). Later more *Lachenalia* species were painted, i.e. *L. orchioides* (L.) Ait.*, L. glaucina* Jacq. and *L. contaminata* Ait. The famous painting of *L. hirta* was published in 1692 and it was described as "*Hyacinthus Africanus orchioides serpentarius, folio singularis, undato. piliscilliaribus fimbriato, floribus ex aureo punicatibus"*. Thunberg renamed the species as *Lachenalia hirta* in 1794 (Duncan, 1988)

Joseph Franz Jacquin described a new genus, *Lachenalia*, which he named after Werner de Lachenal, a professor of Botany in Basel, Switzerland. Jacquin's paper was not published in 1780, due to the collapse of the journal "*Acta Helvetica*", but it was later (1787) published in a revived journal, "*Nova Acta Helvetica*". Murray unknowingly published a short description of the genus in 1784 in "*Linnaeus Systema Vegetabilium*". The correct citation for the genus is thus *Lachenalia* Jacq. f. *ex*. Murray (Duncan, 1988).

Lachenalia is commonly known as the 'Cape Cowslip' (Crosby, 1986) and it is endemic to South Africa. It is a small bulbous geophyte and is closely related to *Polyxena* Kunth. The genus contains more than a hundred species (Arnold and De Wet, 1993). *Lachenalia* is essentially a genus of the winter rainfall regions of southern Africa, but some species do occur in summer rainfall regions (Duncan, 1988). Most of the species prefer sun, whereas others prosper in shady parts. The different species occur in a wide range of different habitats and they show great variation in plant height, leaf size, and number of flowers per inflorescence,

inflorescence type, flower colour, size and flowering period (Duncan 1988).

The leaves in the genus usually occur in pairs, but there are several species with a single leaf, like *L. anguinea* Sweet, *L. unifolia* Jacq. and *L. hirta.* Some species, such as *L. contaminata* and *L. orthopetala* Jacq. may contain as many as eight leaves. The leaves can also differ in width, length and shape. Some species have smooth leaves and some have hairy leaves. Leaves can have spots or stripes depending on the species. Some species growing in the sun will have purple spots on the leaves and no spots when growing in the shade (Duncan, 1988).

The flowers of the genus are arranged in a spike on a fleshy stem. The attachment, size, shape and colour of the flowers of *Lachenalia* differs (Duncan, 1988). The tubular or bell-shaped flowers have colours ranging from shades of red, green, blue, purple, yellow and white (Hancke & Liebenberg, 1990).

1.1.1 Endangered species

Quite a few of the *Lachenalia* species are described to be endangered due to the lack of comprehensive distribution knowledge (Duncan, 1988). This makes it very difficult to determine the conservation status of many of the species (Duncan, 1988). Most of the species regarded as endangered, is known from a single locality like *L. macgregoriorum* Barker*, L. margaretae* Barker*, L. matthewsii* Barker and *L. viridiflora* Barker*. Lachenalia matthewsii* was believed to be extinct for several decades, but it was rediscovered in the late eighties (Duncan, 1988).

Lachenalia purpureo-caerulea Jacq.*, L. polyphylla* Bak.*, L. arbuthnotiae* Barker*, L. muirii* Barker*, L. buchubergensis* Dinter*, L. klinghardtiana* Dinter*, L. namibiensis* Barker*, L. nordenstamii* Barker and *L. nutants* Duncan are only a few examples of species that have been reduced in numbers due to agricultural activities, mining as well as urban development. This puts these species in a vulnerable position (Duncan, 1988; Golding, 2002).

According to Duncan (1988), *L. pearsonii* (Glover) Barker have not been seen for quite a number of years and its position is described to be uncertain. Golding (2002), however, described this species to be known from a very limited number of specimens and therefore it has been considered as data deficient. Other species

such as *L. sargeantii* Barker has not been recorded since 1971. Although this genus is still growing with new species being discovered regularly an increasing number of species are in need of conservation (Duncan 1988).

1.1.2 Division of genus

According to Crosby (1986) *Lachenalia* can be described as delimitative due to the variability of the genus. Due to its variability, the genus had been reviewed and divided into subgenera or groups at least four times (Table 1).

The first division was made by Baker (1897) who based the work on floral morphology and a few cytogenetic similarities that exist within each subgenus. *Lachenalia* then consisted of only 42 species:

- ***Eulachenalia*** with basic chromosome number of x = 7 (Spies *et al.,* 2002)*:* The species in this subgenus are characterised by having a very symmetrical perianth, tubular in shape about four times as long as broad, the mouth rather open, the stamens included and the flowers arranged in racemes.

- ***Coelanthus*** with x = 7 (Spies *et al.,* 2002): This subgenus has a ventricose perianth and a spike of erect or partially erect flowers. The only representative for this group is *L. reflexa* Thunb.

- ***Orchiops*** with x = 7, 8 & 10 (Spies *et al*., 2002): Having a tubular perianth, shorter than that of Eulachenalia, identifies *Orchiops.* The stamens remain included or almost so. The flowers are borne in dense spikes and racemes, and are patent or erect.

- ***Chloriza*** with basic chromosome numbers of 7, 8, 10, 11 & 13 (Spies *et al*., 2002): In this subgenus the perianth is almost as broad as long, campanulate in shape and the stamens are generally exerted.

- ***Brachyscypha*** with x = 7 (Spies *et al*., 2002): Here the perianth is cylindrical and the segments nearly uniform. The inflorescence is capitate.

The chromosome studies made by Moffett (1936) and Crosby (1986) confirmed that

the division made by Baker needed revision due to poor cytogenetic similarities amongst the five subgenera.

Crosby (1986) re-divided the genus into five provisional groups based on phenotypical appearance and biological relationships obtained from chromosome studies and hybridisation experiments:

- ***Lachenalia aloides* group** with a basic chromosome number of x = 7. The ploidy levels in this group, ranges from 2x (diploid) to 8x (octaploid). This group consist of seven species: *L. algoensis* Schonl., *L. aloides* (L.f.) Engl., *L. bulbifera* (Cyrillo) Engl., *L. glaucina, L. reflexa*, *and L. rubida* Jacq., *L. viridiflora*.

  Chromosome numbers for members of the *L. aloides* group determined at ARC-Roodeplaat supports the division of Crosby (1986). Hancke (1991) studied the meiosis of hybrids between *L. aloides* (2n=14), and the following species: *L. reflexa* (2n=14), *L. orchioides* (2n=14) and *L. viridiflora* (2n=14).

  The meiosis of all three hybrids gave seven bivalents during metaphase I. The only exception was the *L. reflexa x L. aloides* hybrid, where, in addition to the bivalents, occasional univalents were found. These monovalents were B-chromosomes. Thus the meiotic data of the hybrids also agrees with the division of Crosby the exception being *L. orchioides.* Since the publication of Crosby's paper, *L. glaucina* has been identified as a variety of *L. orchioides* (Duncan 1988). Crosby (1986) placed *L. orchioides* var. *glaucina* (=*L. glaucina*) in the *L. aloides* group and *L. orchioides* in the *L. orchioides* group.

- ***Lachenalia orchioides* group** with x = 7 and ploidy levels ranging from 2x (diploid) to 8x (octaploid). Six species forms part of this group: *L. arbuthnotiae*, *L. elegans* W.F. Barker, *L. longibracteata* Phillips, *L. mutabilis* Sweet, *L. orchioides*, *L. rosea* Andrews

  Further investigation should be done to determine the validity of this group. Crosby separated the two groups, *L. aloides* group and *L. orchioides* group, because he had difficulty in obtaining hybrids between members of the two groups. Should *L. orchioides*, for example, be placed in the *L. aloides* group,

then all the species left in the *L. orchioides* group have much smaller flowers then the members of the *L. aloides* group. Crosby himself did not have any living *L. orchioides* plants to study and he placed it in the *L. orchioides* group according to the phenotypic relationships to other species in the group. There are a number of species that are very similar to *L. orchioides*. One of these is, *L. pallida* Ait., which has a somatic chromosome number of 2n=16. *Lachenalia orchioides* accessions studied at ARC-Roodeplaat, however, have larger flowers than most of the members of the *L. orchioides* group (Hancke *et al*., 1993 & 1994). *L. orchioides* readily hybridises with *L. aloides, L. orchioides* var. *glaucina* and *L. viridiflora* (Hancke 1987, 1988 & 1991). According to the placing of *L. orchioides* var. *glaucina*, the phenotypic data and the meiotic data of Hancke (1991), *L. orchioides* most probably belongs to the *L. aloides* group.

Hybrids between members of the *L. aloides* group and the *L. orchioides* group have successfully been produced at ARC-Roodeplaat between *L. bulbifera* and *L. mutabilis* by cutting the style of *L. bulbifera*. Hybrids between *L. mutabilis* and *L. aloides* have also been produced, more than once, at ARC-Roodeplaat. Hancke (1991) also illustrates that the latter hybrids have a normal meiosis with a high degree of bivalents.

These two groups (*L.aloides* group and *L. orchioides* group) appear to be very similar, but there are quite a few differences between the groups, for example, the size of the inflorescence, the fertility of the hybrids made within the groups, the colour range within the groups and much more. There could easily be organographic and incompatibility problems.

- ***Lachenalia unicolor* group** with x = 7, 8 & 11. The ploidy level of this group has been restricted to diploids and occasional tetraploids. This is the largest of the five groups with fifteen species: *L. bachmanii* Bak., *L. campanulata* Bak., *L. contaminata, L. framesii* W.F. Barker, *L. liliflora* Jacq., *L. namaquensis* Schltr. ex W.F. Barker, *L. orthopetala, L. ovatifolia* Jacq., *L. pallida, L. pustulata* Jacq., *L. roodeae* Phillips, *L. unicolor* Jacq., *L. verticillata* W.F. Barker, *L. violacea* Jacq., *L. zeyheri* Bak.

Most of the species in this group have a basic chromosome number of x = 8, with the exception of *L.* violacea with x = 7 and *L. zeyheri* with x = 11 (Spies *et al*., 2002). A number of hybrids have been produced between members within this group at ARC-Roodeplaat (Hancke 1992, Hancke *et al*., 1993 & 1994). This data seems to strengthen the existence of this group. However, *L. violacea* presents a problem. Crosby placed it in this group because he found the chromosome number to be 2n=16. A chromosome number of 2n=14 have, however, been found on three other occasions. Further investigation is needed to classify this species.

- ***Lachenalia unifolia* group** with x = 11, 12 or 13. This group consist of five species: *L. anguinea*, *L. comptonii* W.F. Barker, *L. juncifolia* Bak., *L. mediana* Jacq., *L. unifolia*.

  Neither of the species in this group has been used in hybrid production at ARC-Roodeplaat and further investigation is needed before commenting on this group.

- ***Lachenalia pusilla* group** with x=7. This is the smallest of the five groups with only one species: *L. pusilla* Jacq.

  This division is supported by studies done at ARC-Roodeplaat, as the karyotype of this species is markedly different from the x=7 of the *L. aloides* and *L. orchioides* groups.

According to Crosby (1986) there are still approximately 64 species that have not yet been grouped.

Duncan (1988) suggested that the genus need taxonomical revision, because of the newly discovered species and the variation within the species. Duncan (1988) divided this species into two main groups:

- **Group 1:** Stamens included or just protruding beyond the tip of the perianth.
  - Subgroup 1a: Inflorescence spicate
  - Subgroup 1b: Inflorescence spicate or subspicate

- ◊ Subgroup 1c: Inflorescence spicate, subspicate or racemose
- ◊ Subgroup 1d: Inflorescence subspicate
- ◊ Subgroup 1e: Inflorescence subspicate or racemose
- ◊ Subgroup 1f: Inflorescence racemose

❖ **Group 2:** Stamens shortly exerted to well exerted beyond the tip of the perianth.

- ◊ Subgroup 2a: Inflorescence spicate
- ◊ Subgroup 2b: Inflorescence subspicate
- ◊ Subgroup 2c: Inflorescence subspicate or racemose
- ◊ Subgroup 2d: Inflorescence racemose

If the chromosome studies made by Moffett (1936) and Crosby (1986) are taken into account, the divisions as made by Baker (1897) and Duncan (1988) are not the best. The review as proposed by Crosby (1986) seems to be more acceptable, because it have a better illustration of closely related species in the specific groups. This classification is further supported by a preliminary investigation of the genus, which includes cytogenetics and molecular experiments (cpDNA sequencing) (Spies *et al*., 2002).

Duncan (2002) once again revised the genus and this time he divided the genus into five main groups based on taxonomy and morphology. Some of the species that occur in one group, share karyological similarities and most of the species that Crosby (1986) described as ungrouped, are included in Duncan's new groups.

❖ **Groups of *Lachenalia*:**

◊ **Group 1:**

- Leaves 3 to many, oblong or linear to subterete; flowers pedicellate, white or brownish blue, tepals subequal and similar, anthers usually exserted.

- Leaves 1 – 2

◊ **Group 2:**

- Flowers, at least the lowermost, sessile or subsessile with pedicels to 1 mm long, exceptionally longer but then bracts conspicuously developed or leave with star-shape hairs, and anthers included
- Flowers pedicellate with pedicels at least 2 mm long or if sessile then anthers are more or less exserted.

◊ **Group 3:**

- Flowers (15-) 20 – 35 mm long, either suberect or nodding; anthers included or shortly exserted.
- Flowers 5 – 18 mm long

◊ **Group 4:**

- Anthers well exserted stamens more than 2 mm longer than the tepals.

◊ **Group 5:**

- Anthers included or shortly exserted stamens to 2 mm longer than the tepals.

Table 1: Some *Lachenalia* species and their divisions as made by Baker (1897), Crosby (1986), Duncan (1988) and Duncan (Manning *et al.,* 2002), respectively.

Species	**Baker (1897)**	**Crosby (1986)**	**Duncan (1988)**	**Duncan (Manning *et al.*, 2002)**
L. algoensis	Only known	*L. aloides*	1d	3

	since 1910	group		
L. aloides	Eulachenalia	*L. aloides* group	1f	3
L. ameliae	Only known since 1983	Not yet grouped	1a	2
L. arbuthnotiae *	Only known since 1984	*L. orchioides* group	1a	2
L. bachmanii	Chloriza	*L. uniclor* group	1d	5
L. bolusii	Only known since 1979	Not yet grouped	1f	5
L. buchubergensis	Only known since 1932	Not yet grouped	1b	None
L. bulbifera	Eulachenalia	*L. aloides* group	1f	3
L. carnosa	Chloriza	*L. unicolor* group	1a	None
L. comptonii	Only known since 1930	*L. unifolia* group	2b	4
L. congesta	Only known since 1978	Not yet grouped	1a	2
L. contaminata	Chloriza	*L. unicolor* group	1b	1
L. elegans *	Only known since 1933	*L. orchioides* group	1a	2

*L. fistulosa**	Orchiops	Not yet grouped	1a	2
L. framesii	Only known since 1930	*L. unicolor* group	1a	None
L. giessii	Only known since 1983	Not yet grouped	1f	None
L. gillettii	Only known since 1933	Not yet grouped	2c	4
L. haarlemensis	Only known since 1932	Not yet grouped	2c	4
L. juncifolia	Chloriza	*L.unifolia* group	2d	4
L. klinghardtiana	Only known since 1920	Not yet grouped	2c	None
L. liliflora	Orchiops	*L. unicolor* group	1e	5
L. longibracteata	Only known since 1931	*L. orchioides* group	1b	2/5
L. margaretae	Only known since 1979	Not yet grouped	1e	5
L. marginata	Only known since 1979	Not yet grouped	1a	2
L. mediana	Chloriza	*L. unifolia* group	1e	5
L. multifolia	Only known	Not yet	2d	1

	since 1978	grouped		
*L. mutabilis**	Orchiops	*L. orchioides* group	1a	2
L. namaquensis	Only known since 1978	*L. unicolor* group	1a	none
*L. orchioides**	Orchiops	*L. orchioides* group	1a	2
L. orthopetala	Orchiops	*L. unicolor* group	1e	1
L. pallida	Chloriza	*L. unicolor* group	1e	5
L. peersii	Only known since 1978	Not yet grouped	1f	5
L. pusilla	Brachyscypha	*L. pusilla* group	2c	1
L. pustulata	Chloriza	*L. unicolor* group	2d	5
L. reflexa	Coelanthus	*L. aloides* group	1d	3
L. rosea	Chloriza	*L. orchioides* group	1f	5
L. rubida	Eulachenalia	*L. aloides* group	1e	3
L. sargeantii	Only known since 1978	Not yet grouped	1f	3

L. stayneri	Only known since 1979	Not yet grouped	2d	4
L. unicolor	Chloriza	*L. unicolor* group	2d	4
L. unifolia	Chloriza	*L. unifolia* group	1f	5
L. ventricosa	Only known since 1979	Not yet grouped	2a	4
L. viridiflora	Only known since 1972	*L. aloides* group	1e	3
L. zebrina	Only known since 1983	Not yet grouped	2d	4
L. zeyheri	Chloriza	*L. unicolor* group	1e	5

*Indicates species used in this study

1.1.3 The species used in this study

The species used in this study were selected, because of various reasons. Firstly because of the different basic chromosome numbers that occurred in the group; the inclusion of *L. mutabilis* in the *L. orchioides* group were questioned. In order to clarify this other species from the *L. orchioides* group were selected to determine the genomic relationships in this group and also to prove that *L. mutabilis* is part of the group. Secondly because Crosby (1986) did not divide *L. fistulosa* into a group and some evidence indicates that it might be part of the *L. orchioides* group.

1.1.3.1 ***Lachenalia arbuthnotiae*** Barker

Lachenalia arbuthnotiae, which miss W. F. Barker (1984) named after Miss I Arbuthnot, has been known since 1931. It has been cultivated in England since 1961 (Crosby, 1986). This once very common species is endemic to the Cape flats, but is

now restricted to isolated remnants of the fynbos in this area (Duncan, 1988). Miss Barker regarded *Lachenalia arbuthnotiae* as an intermediate between *L. orchioides* and *L. fistulosa* (Crosby, 1986). This species usually have one or two lanceolate leaves, which may be plain green or maroon or green with spots on the upper surface. The inflorescence is arranged in a spike of bright yellow, oblong shaped flowers (Duncan, 1988). Duncan (1988) described this sweetly scented species as one of the most desirable species and he regards it to be very well suited for both pot and garden culture. *L. arbuthnotiae* is one of the species that produces long-lasting cut flowers with a height that varies between 180 – 400 mm. This species can be seen in bloom during August to October. Some bulbs in this species tend to remain dormant in some seasons (Duncan, 1988).

Very little chromosomal studies have been done on this species and only diploids (2n = 14) have been reported (Crosby, 1986; Johnson & Brandham 1997, Kleynhans, 1997).

1.1.3.2 *Lachenalia elegans* Barker

Duncan (1988) described this species as one with the most elegant inflorescence. This species can be found most commonly in the Nieuwoudtville district and its range extends south to the Cederberg and the West Karoo. *L. elegans* is a morphological variable species with four known varieties (Duncan, 1988):

Lachenalia elegans* var. *elegans

The height of this variety, with one or two lanceolate leaves (plain or spotted), ranges between 180 – 240 mm and it blooms in October. The inflorescence of this variety consists of numerous oblong-ureolate, sub-erect flowers. It is restricted to the Nieuwoudtville district (Duncan, 1988).

Lachenalia elegans* var. *flava

Flava refers to the yellow flowers of this attractive variety from the Elandskloof- and Karoopoort district. The bulbs of this variety produce one lanceolate to ovate-lanceolate leaf with dark green blotches and a crisp maroon margin. The inflorescence consists of spreading urceolate flowers (Duncan, 1988).

Lachenalia elegans* var*. membranacea

Duncan (1988) described this variety to be one with one or two ovate-lanceolate glaucous or bright green leaves (usually spotted) and the inflorescence consists of spreading urceolate flowers. The height ranges between 150 – 200 mm and it blooms in August to September. This variety is suitable for both pot and garden culture and it commonly occurs from Nieuwoudtville to Clanwilliam (Duncan, 1988).

Lachenalia elegans* var*. suaveolens

According to Duncan (1988) this variety consists of one or two lanceolate to ovate-lanceolate leaves (plain or spotted) with an inflorescence containing urceolate, scented, spreading flowers. The distribution area of this variety ranges from Nieuwoudtville to Clanwilliam (Duncan, 1988).

Several chromosome studies have been reported for this species. Ornduff and Watters (1978) reported the only diploid (2n = 14) that has ever been observed. Barker (1933) observed a tetraploid (2n = 28) during her studies and this was confirmed by other chromosomal studies (Moffet, 1936; Ornduff & Watters, 1978; Crosby, 1986). De Wet (1957) reported a rare octaploid (2n = 56). The first hexaploid in the species, 2n = 6x = 42, were reported by Johnson & Brandham (1997).

1.1.3.3 *Lachenalia fistulosa* Bak

Lachenalia fistulosa refers to the hollow formed by surrounding perianth segments. According to Duncan (1988) this species was previously known as *L. convallariodora* Stapf. It contains two lorate leaves (plain or heavily spotted) with a slender penduncle, which bears a spike of oblong-campanulate flowers. This heavily fragrant species, with a height of 80 – 300 mm, blooms during September – October and it occurs in the Piquetberg, Tulbach and Worcester district as well as the Cape Peninsula and as far east as Caledon. Duncan (1988) suggested that this species should be grown for its heavy sweet scent.

Ornduff & Watters (1978) reported diploids (2n = 14) and tetraploids (2n = 28), for this species. The reports of the diploid number of 2n = 14 were confirmed by later chromosome studies (Johnson & Brandham, 1997).

1.1.3.4 *Lachenalia mutabilis* Sweet

Mutabilis refers to the changing colour of the inflorescence. This species commonly occurs in the Clanwilliam district, throughout Namaqualand as far as Piquetberg, Langebaan on the west coast, inland as far as Worcester and south to Riviersonderend (Duncan, 1988). Crosby (1986) described this species to be one of the most commonly grown of the small-flowered *Lachenalias*. This species normally produces one lanceolate; often erect leaf (plain or faintly spotted) that can be occasionally banded with maroon on the clasping base. The inflorescence consists of a dense spike of oblong urceolate flowers (Duncan, 1988).

Baker (1897) formerly described the species as a variety of *L. orchioides*, but this was rejected by a colour-plate obtained by Hutchinson in 1936 (Crosby, 1986). Duncan (1988) described this species to be very desirable and extremely variable. Colour illustrations are to be found in Rice and Compton (1951), Mason (1972) and Le Roux & Schelpe (1981).

This species is usually diploid with 2n = 14 as reported by De Wet (1957) and confirmed by Johnson & Brandham (1997), Kleynhans (1997) and Spies *et al.* (2000). Several other chromosome reports have been made: 2n = 10 (Ornduff & Watters, 1978) confirmed by Johnson & Brandham (1997), 2n = 12, 24 (Spies *et al.*, 2000), 2n = 56 (De Wet, 1957). Spies *et al.* (2000) suggested three hypotheses to more or less determine the origin of the basic chromosome numbers (x = 5, 6, 7). The first being that x = 5 is the original basic chromosome number and that misidentification of B-chromosomes are responsible for the higher numbers. This hypothesis was rejected, because normal meiosis was observed for higher basic numbers. The second suggested the original basic chromosome number to be x = 7 and that dysploidy led to the formation of lower numbers. This hypothesis was also rejected because of the lack of evidence of longer chromosomes (formed through Robertsonian translocations) or any other abnormalities during meiotic studies. The third hypothesis suggested that an aneuploid series occurred in the species and until otherwise proven through more meiotic studies and *in situ* hybridisation to help determine the mode of chromosome evolution, this will be the hypothesis to be accepted.

1.1.3.5 *Lachenalia orchioides* (L.) Ait.

This species with the orchid-like scented flowers, are very variable and it has two different varieties (Duncan, 1988).

Lachenalia orchioides* var*. orchioides

This variety, commonly known as the 'groen viooltjie' or wild hyacinth, occurs on flats and mountain slopes from Clanwillian to Cape Peninsula, inland as far as Worcester and eastwards to Swellendam (Duncan, 1988). *Lachenalia orchioides* var*. orchioides,* with a height-range of 80 – 400 mm, was previously known as *L. glaucina* Jacq var *pallida* Lindl. The bulbs of this variety produce one to two lanceolate or lorate leaves (plain or spotted) with an inflorescence that carries sweetly scented, oblong-cylindrical flowers (Duncan, 1988). The flowers fade to a dull red as they mature and Duncan (1988) recommended this variety for both pot and garden culture.

Lachenalia orchioides* var. *glaucina Jacq

This variety was previously known as *L. glaucina* and it is commonly known as the 'blou viooltjie'. *Lachenalia orchioides* var. *glaucina* differs from the *Lachenalia orchioides* var. *orchioides* variety in its flower colour being shades of blue and it is not strongly scented (Duncan, 1988). The small-flowered form of this variety exists and it occurs on the slopes below Devil's Peak, while it is commonly restricted to the eastern slopes of Table Mountain. Duncan (1988) described this variety to be one of the most desirable members of the genus.

Variable chromosome numbers have been reported for this species. Early reports showed a somatic chromosome number of 2n = 16 (Moffett, 1936; De Wet, 1957) as well as an aneuploid of 2n = 17 (Moffett, 1936). *L. orchioides* var *glaucina* has a somatic number of 2n = 18 (Riley, 1962) as well as a polyploidy with 2n = 24 and 2n = 28 (Moffett, 1936; De Wet, 1957). Hancke & Liebenberg (1990) suggested that the somatic chromosome number for *L. orchioides* and *L. orchioides* var *glaucina* should be 2n = 14, which confirmed the report of Ornduff & Watters (1978). The higher numbers (2n = 16) might have occurred because of B-chromosomes or misidentification of the plants involved. Another report of 2n = 28 were made by

Ornduff & Watters (1978) and Johnson & Brandham (1997). Through thorough meiotic studies Hancke & Liebenberg (1990) find the basic chromosome number of this species to be x = 7.

1.1.4 Breeding of *Lachenalia*

Breeding and cultivation of this genus commenced in Europe nearly two centuries ago (Duncan, 1988). According to Barker most species of *Lachenalia* form hybrids very easily (natural hybridisation). Crosby (1978), however, eliminated this fact by saying that if this was the case, deliberate (natural) hybridisation would be expected and *Lachenalia* as a genus did not develop that fast, because natural hybridisation can lead to a new species and it is a way to broaden the ranges of a specific genus. Due to the lack of a taxonomic key for all species, it is however possible that new species, that might have occurred from natural hybridisation were misidentified. According to Duncan (1988) new species are being added to the genus frequently and the number of species more than doubled since Baker's monograph in 1897.

Rev. J. Nelson (1878) raised the first authenticated hybrid (Moore 1905), almost a century after the first introduction of the genus to Europe. This hybrid was obtained through seed and the seedling first flowered three years after germination. *L. luteola* Jessop was the female parent and the male parent was *L. aurea*. This hybrid can no longer be considered an interspecific hybrid, because the parental plants are varieties of *L. aloides* (Crosby 1978). Rev Nelson also raised the first genuine interspecific hybrid between *L. aloides* var. *aurea* and *L. reflexa* (Moore 1891; Baker 1897; Moore 1905). Ten years later a certain Rev. Theodore H. March grew several interspecific hybrids (Moore 1905).

Other hybrids were made by Sprenger between *L. reflexa* and *L. aloides* var. *quadricolor*, which was obtained after pollen was stored in a dry bottle for 1 – 2 months. The name of the hybrid was *L. comesii* (Crosby, 1978). This specific hybrid differs from *L. nelsoni* (by Rev. J. Nelson) by the outer segments being longer than the inner segments. Crosby's (1978) own hybrids between *L. aloides* and *L. reflexa* inherited the long tube of the latter parent. Hybrids between *L. aloides* and *L. bulbifera* were an attempted effort at the end of the 19th century. *L. pearsonii* was the hybrid that resulted from one of the latter crossings. This hybrid appears to be

merely a form of *L. aloides* close to *L. nelsonii*. It seems that hybrids made between *L. aloides* and *L. bulbifera* are selves of *L. aloides* after the failure of an attempted cross (Crosby 1978).

The exceptional variation in the genus *Lachenalia* led to the start of a breeding-programme in which the genus was developed into an ideal pot plant (Coertze & Hancke, 1987). This includes plants with attractive leaves, bigger flowers, more flowers per inflorescence, variation in the shape and orientation of the flower on the inflorescence, more than one inflorescence per plant, a greater colour variety and a longer flowering period. ARC–Roodeplaat successfully developed *Lachenalia* cultivars that are of economical importance to South Africa. Twenty-five cultivars have been registered (Kleynhans, 1997).

Factors of importance in the breeding programme are flower size, genetic variation within the genus, as well as polyploidy (Lubbinge, 1980). Polyploidy leads to gene duplication and greater genetic diversity upon which selection can act. It is frequent and of evolutionary importance in plants (Judd *et al.*, 1999). The first crosses made at ARC-Roodeplaat concentrated on the combination of inflorescence with large but few flowers with inflorescence with small but many flowers (Lubbinge, 1980). The 25 known cultivars originated from these crosses.

One of the problems experienced in the breeding work, is the fact that some species flowered much later than others. This problem was solved by storing pollen in refrigerators and by temperature treatments, which induced the bulbs to flower earlier. This made divergent varieties possible (Bramley 1970).

The study of isolation barriers like flower size; polyploidy, reciprocal combinations, incompatibility, flowering time of the species in South Africa, poor crossibility between species and genetic differences can no longer be ignored in the breeding-programme (Kleynhans, 1997; Kleynhans & Hancke 2002). The importance of studying the genetic diversity of this genus has increased. This information is needed to develop advanced breeding strategies in order to develop new cultivars. The breeding programme has thus changed from a simple programme (one of making crosses) to a demanding multidisciplinary programme.

The amazingly huge variety (morphologically, taxonomically, cytogenetically) of the

genus can easily lead to more cultivation possibilities. This might introduce more and new hybrids or species to the commercial market. This variation in the genus as well as within species, however often make the classification of the genus very difficult. Cytogenetic investigation of the genus could not clarify the classification as made by several authors. It might be possible that molecular techniques can help solve the relationships of the species within the genus. Chloroplast DNA sequencing has been successfully used to infer phylogenetic relationships in other genera as discussed in section 1.3.1.2.1

1.2. Cytogenetics

Cytogenetics has a central role in phylogenetic studies of plants and animals, because similar chromosome numbers may indicate close relationships within genera, species and families (Judd *et al.*, 1999). Chromosome studies have been used successfully in assessing relationships between individuals, populations and species (Harding *et al.,* 1991).

According to Burger (1995), the cytogenetic characters that can be of use in phylogenetic studies, are: basic chromosome numbers, ploidy levels, chromosome size and genomic constitution. Spies *et al.* (1991) described cytogenetics to be an important element in the evaluation of relationships and the determination of phylogenetic studies.

Chromosome numbers can be determined through mitotic, as well as meiotic studies. Most chromosome studies done were by means of meiosis, because it contains more information about relationships of genomes (Stebbins, 1971).

Different chromosome numbers as well as different basic chromosome numbers have been reported for more than fifty *Lachenalia* species (Barker, 1933; Moffett, 1936; De Wet, 1957; Riley, 1962; Mogford, 1978; Ornduff & Watters, 1978; Nordenstam, 1982; Crosby, 1986; Hancke & Liebenberg, 1990; Hancke 1991; Johnson & Brandham, 1997; Kleynhans, 1997; Hancke & Liebenberg, 1998; Kleynhans & Spies, 1999; Spies *et al.*, 2000). The somatic chromosome numbers include 10, 12, 14, 15, 16, 17, 18, 20, 21, 22, 24, 26, 28, 29, 30, 32, 40, 42, 44, 49 and 56. The gametic numbers vary from n = 5, 7, 8, 9 to 11, 12, 14, 16, 18, 18, 20,

21, 22 and 28. When Crosby (1986) reviewed the genus, chromosome studies [made by Moffett (1936) and Crosby (1986)] led to the division of the genus into five provisional groups. Basic chromosome numbers were used as one of the criteria in the delimitation of the groups (Spies *et al.*, 2002).

Chromosome counts and morphology have been phylogenetically useful at species-level, but high order taxa remain problematic (Speta, 1979). Because of the diversity in chromosome numbers in the genus *Lachenalia* and even within species, it is very difficult to do a phylogenetic study based on cytogenetics only.

Cytological data often provide clues to the true relationship of taxonomic units (De Wet, 1957), but in most situations cytological evidence are not enough to resolve the mode of evolution. The variability among and within species complicates the determination of the mode of evolution and therefore more studies of molecular nature needs to be done in order to shed more light on the evolutionary pathways of plants. Molecular studies in combination with cytogenetics may provide enough information to do a thorough phylogenetic study on this genus.

1.3. Molecular systematics

Evolution is the source of diversity. “Molecular genetics and biochemistry are becoming increasingly important as tools for understanding evolution. Molecular systematics can be seen as the most visible sub-discipline in systematics” (Brown, 1989). Molecular studies can resolve relationships within groups of plants, especially at lower taxonomical levels (Gielly & Taberlet, 1996).

In most organisms, the primary genetic material is a double stranded polymeric molecule named DNA in the form of a double helix as founded by Watson & Crick in 1953 (Brown, 1989). It is also known as the unique fingerprint for every different organism. DNA molecules carry the hereditary information of all living organisms, with the exception of some viruses.

In order for any molecule to qualify as the base in any study concerning the evolution of an organism:

- It has to be stable, as genetic information may need to function in a living organism for up to 100 years or more,

- It must be able to replicate, to permit dissemination of genetic information as new cells are formed during growth and development

- And there should be the potential for limited alteration to the genetic material (mutation), to enable evolutionary pressures to exert their affect.

The DNA molecule fulfils all these criteria (Nicholl, 1994). DNA thus provides an important source of characters for phylogeny reconstruction in plants (Baldwin, 1992).

Phylogeny is not just an indication of the evolutionary path of organisms, but it can also determine the relationships between organisms down to species-level. It is one of the areas of molecular evolution that have generated much interest in the last decade, mainly because in many cases phylogenetic relationships are difficult to access any other way (Li & Graur*,* 1991). Only moderately slow evolving DNA sequences have been widely used in plant phylogenetics (Hamby & Zimmer, 1988 & 1992).

1.3.1 DNA Sequences

The ability to determine the sequence of bases in DNA is a central part of modern molecular biology, and provides what might be considered as the ultimate structural information. DNA sequencing provides the means for direct comparison of DNA variation and therefore it can be acknowledged as the major source of comparative molecular data (Olmstead & Palmer, 1994). Sequencing has been done as far back as 1951, but the first breakthrough came in the mid 1970's with modern DNA sequencing techniques (Maxam & Gilbert, 1977; Sanger *et al.* 1977). Sequence analysis was developed in the late 1970's (Nicholl, 1994). DNA sequencing became affordable and easy to use for phylogenetic studies at all levels (Doyle, 1993).

The changes in DNA nucleotides, which occur in time, can be seen as the basic process in the evolution of DNA sequences. These changes are used in molecular evolutionary studies both for estimating the rate of evolution and for reconstructing the evolutionary history of organisms (Li & Graur*,* 1991). Certain problems may occur with sequencing, the first being to obtain the sequence, and the second in making certain critical decisions in the alignment of the sequence that cannot be

determined by the alignment programmes (Crawford, 2000).

The three most popular genomes used in molecular systematics today are: The chloroplast genome, the mitochondrial genome and the nuclear genome (Harding *et al.*, 1991; Doyle, 1993).

Although a lot of sequencing has been done in the family Hyacinthaceae, very little have been done in the genus *Lachenalia.* This genus is very variable (morphologically as well as cytogenetically) and because of this, difficulty has been experienced in determining the mode of evolution in the genus. In this study, trn_{L-F} sequences together with cytogenetics will be used to resolve a part of the evolution of this complicated genus.

1.3.1.1 The mitochondrial genome

The mitochondrial genome is circular just like the chloroplast genome and it rearranges itself quite frequently (Judd *et al.*, 1999). In plants, this genome is extremely variable in organization and size, although perhaps not in function (Gottlieb & Jain, 1988). Size variation of the mitochondrial genome (200 – 2500kbp) is much greater than that of the chloroplast genome, but it is only a fiftieth the range of a plant nuclear genome (Gottlieb & Jain, 1988; Judd, 1999).

Mitochondrial cytogenetics proves to be a lot like nuclear cytogenetics in many respects (Gottlieb & Jain, 1988). Plasmids occur in the mitochondrial genome, and it can be seen as yet another source of variability, while recombination occurs with high frequency – within and between molecules (Gottlieb & Jain, 1988). Mammalian mitochondrial genes evolve more rapidly then the mitochondrial genes of plants. These genes, like chloroplast genes, are transmitted strictly uniparental (maternal) (Gottlieb & Jain, 1988; Judd *et al.*, 1999). Mitochondrial genomes accumulate sequences transferred from both the chloroplast- and nuclear genomes and therefore it contains various repeated sequences (Doyle, 1993).

Plant systematists and evolutionists prefer not to use mitochondrial DNA to compare plants to one another. Rearrangements occur so frequently within the same cell, that it makes the mitochondrial genome unreliable for phylogenetic inferences (Gottlieb & Jain, 1988; Palmer, 1992; Doyle, 1993). According to Palmer (1992) some of the

mitochondrial genes have the potential in phylogenetic studies, which involves distant relationships.

1.3.1.2 The chloroplast genome

The chloroplast genome (plastome) is a prokaryotic, circular, double-stranded DNA genome. The circularity of chloroplast DNA was first reported in 1971. The first physical map of chloroplast DNA was constructed for maize in 1976 (Bredbook & Bogorad) and the first chloroplast gene was cloned in 1977 (Bredbook *et al.,* 1977).

The size of the chloroplast genome varies in a range of 120 – 160kbp (Palmer, 1985; Sugiura, 1992; Doyle, 1993). *Codium fragile* has the smallest cpDNA (85kbp) known and *Chlamydomonas moewusii* has the largest (292kbp). Chloroplasts might be similar to prokaryotic genomes, but they differ in the number of cpDNA genes that are interrupted by introns. It is usually uniparently inherited (mostly maternal in angiosperms) (Gottlieb & Jain, 1988; Judd *et al*., 1999) and therefore recombination, transposition and importation are very rare in the chloroplast genome. An average chloroplast genome contains about 120kbp of unique sequences – enough to code for at least 120 genes if it can be assumed that an average gene contains about 1kbp (Sugiura, 1992).

Chloroplast sequencing is a powerful tool for making phylogenetic inferences (Gottlieb & Jain, 1988). These intracellular organelles contain the entire machinery necessary for photosynthesis and it also participate in the biosynthesis of amino acids, nucleotides, lipids and starch (Sugiura, 1992). It evolves very slowly and is described as an evolutionary stable molecule (Doyle, 1993; Judd, 1999); therefore the nucleotide sequence evolution of this genome is relatively conservative (Gottlieb & Jain, 1988). The genome is composed of single-stranded sequences, which makes it suitable for broad analysis (Doyle, 1993). Plant chloroplast genes are experimentally tractable, because it evolves so slowly.

The conservative chloroplast genome makes it very suitable for studies of plant phylogeny (Clegg *et al.,* 1991). The use of cpDNA variation in molecular studies has become quite popular in the past few years and the great evolutionary and phylogenetic value of cpDNA analysis has now been documented at several taxonomic levels (Soltis*, et al*., 1992, Potter *et al.*, 2002, Sinclair *et al.*, 2002).

Plastid sequences can be used to improve the overall assessments along the spine of topology in combination with nuclear ribosomal DNA internal transcribed spacer region (Pridgeon *et al.*, 2001). The relatively slow rate of evolution of the chloroplast genome, frequently limits its use at taxonomic levels, particularly among closely related and recently diverged taxa (Alnouche & Bayer, 1997).

1.3.1.2.1. trn_{L-F} region

The trn_{L-F} region consists of an intron, a short exon and an intergenic spacer (Taberlet *et al.,* 1991). These non-coding regions are characterised by higher nucleotide substitution than coding regions in some taxa (Taberlet *et al.,* 1991; Soltis & Soltis, 1998; Sun *et al.,* 2001). The trnL (UAA) intron and the intergenic spacer between the trnL (UAA) 3' exon and the trnF (GAA) gene (Fig. 1.1) seem to be well suited for inferring plant phylogenies between closely related taxa (Gielly & Taberlet, 1994). The compounds of the trn_{L-F} region are usually combined, because they are nearly all non-coding (Meerow *et al.,* 1999). These non-coding regions display the highest frequency of mutations (Palmer *et al.,* 1988; Clegg *et al.,* 1991). By amplification and direct sequencing of the non-coding regions the resolution of cpDNA can be increased for both evolutionary studies and identifying of intraspesific genetic markers (Taberlet *et al.,* 1991). McDade and Moody (1999) as well as Van der Bank *et al.* (2002) suggested that trn_{L-F} could be useful for addressing phylogenetic questions among, but not within genera.

The trn_{L-F} region has become increasingly popular for inferring phylogenetic relationships in the angiosperms, and it has been employed at a variety of taxonomic levels (Gielly & Taberlet, 1996; Persson, 2001). The average size of the trn_{L-F} intron of the Family Hyacinthaceae is between 515 and 592 bp and for the trn_{L-F} intergenic spacer it varies between 342 and 408 bp (Pfosser & Speta, 1999). The size for the total region ranges between 857 and 1000 bp. It can easily be amplified in most taxa, because of its size (Taberlet *et al.,* 1991). According to Fay *et al.* (2000) as well as Sun *et al.* (2001), the high degree of length variation can make it difficult to align across taxonomic categories.

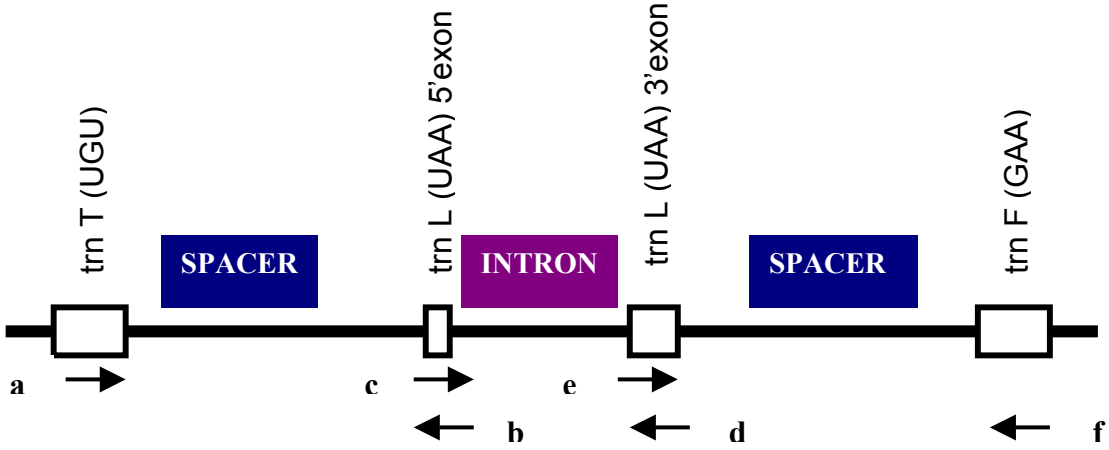

Figure 1.1: Positions and directions of universal primers used to amplify three non-coding regions of cpDNA. Tips of the arrows indicate the 3' ends of the primers.

Maternal lineages can easily be determined by trn_{L-F} sequencing data in some taxa (Hodkinson *et al.,* 2002) and it can improve resolution in certain groups together with other chloroplast DNA sequences (Nyffeler, 2002). Trn_{L-F} sequences can be use to resolve aspects of taxonomy, phylogeny and biogeography (Sun *et al.*, 2001).

Trn_{L-F} sequences have previously been used in combined datasets, not only with other chloroplast DNA sequences, **rbcL** (All recent references are listed in Appendix L), ***ndhF*** (All recent references are listed in Appendix L), ***matK*** (All recent references are listed in Appendix L), but also with nuclear DNA sequences, ***ITS*** (All recent references are listed in Appendix L). Asmussen *et al.* (2002) got better support with a combination of trn_{L-F} and *rps 16* intron to resolve the tribe Areceae as a non-monophyletic group. The combined analysis of trn_{L-F} and *rbcL* provided good support for the monophylly of *Amaryllidaceae* and it also indicated that *Agapanthaceae* is a sister family (Meerow *et al.,* 1999).

Sequences of the trn_{L-F} region have also been used in phylogenetic studies of *Helleborus (Ranunculaceae)* (Kila, 1995; Sun *et* al., 2001), *Gentiana* L. (Gielly & Taberlet, 1996; Chassot *et* al., 2001), *Crassulaceae* (Kim *et al.,* 1996; Mes *et al.,* 1996; Mes *et al.,* 1997), *Proteaceae* (Maguire *et al.,* 1997; Mast & Givnish, 2002),

Paeoniaceae (Sang *et al.,* 1997), *Plumbaginaceae* (Lledo *et* al., 1998), *Amaryllidaceae* (Meerow *et* al., 1999), *Asphodelaceae* (Chase *et al.,* 2000), *Rhamnaceae* (Richardson *et* al., 2001), *Polygalaceae* (Persson, 2001), *Rosaceae* (Potter *et* al., 2002), *Aegialitis* (Lledo *et* al., 2001), *Pleurothallidinae* (Pridgeon *et* al., 2001), *Lepidium* (Mummenhoff *et* al., 2001), *Gesnerioideae* (Zimmer *et* al., 2002), *Cactaceae* (Nyffeler, 2002), *Chloranthus* (Khong *et* al., 2002), *Osmorhiza* (Yoo *et* al., 2002), *Capparaceae & Brassicaceae* (Hall *et* al., 2002), *Condamineeae-Rondeletreae-Sipaneeae* complex (Rova *et al.,* 2002), *Cranichideae* (Salazar *et al.,* 2003), *Hypochaeris* (Samuel *et al.,* 2003), *Epithemateae* (Mayer *et al*., 2003), *Chisocheton* and *Guarea* (Fukuda *et al.,* 2003), *Fagaceae* (Fujii *et al.,* 2002), *Bifrenaria* complex (Koehler *et al.,* 2002), *Crinum* (Meerow *et al.,* 2003). The use of trn_{L-F} sequencing in *Thymelaeaceae* (Van der Bank *et al.,* 2002) supported the division of this family into four subfamilies as proposed by Heywood (1993) and Cronquist (1981).

Although the trn_{L-F} region evolves relatively slowly, it exhibits more variation than *rbc*L (Taberlet *et al*., 1991; Lledo *et* al., 2001) and therefore it can be used to resolve relationships amongst closely related species. Coding genes is a valuable tool for assessing phylogenetic relationships at interfamilial level, while the use of non-coding genes can be very effective at lower taxonomic levels (Zurawski *et al.,* 1984; Doebley *et al.,* 1990; Wilson *et al.,* 1996; Jansen *et al.,* 1991; Bousquet *et al.,* 1992; Van der Bank *et al.,* 2002). The trn_{L-F} region was sequenced to evaluate the generic relationship within the family Hyacinthaceae (Pfosser Speta, 1999).

1.4. Aim

The aim of this study is to determine the genomic relationship within the *Lachenalia orhioides* group (as described by Crosby, 1986), through a combination of cytogenetics and molecular systematics (DNA sequencing of the trn_{L-F} region).

2.1 Materials

Bulbs of different species of the *Lachenalia orchioides* group (Crosby, 1986), *L. orchioides* var. *glaucina* (*Lachenalia aloides* group) and *L. fistulosa (*still ungrouped) from the ARC-Roodeplaat were planted in a greenhouse at the University of the Free State in Bloemfontein. Originally the species were collected in the veldt or obtained from seeds. The herbarium voucher specimens and their geographical distribution are listed in Table 2.1. The outgroups used in this study, represent each of the other groups in the genus *Lachenalia* as described by Crosby (1986): *L. aloides* (*L aloides* group), *L. pusilla* (*L. pusilla* group), *L. unifolia* (*L. unifolia* group) and *L. unicolor* (*L. unicolor* group). *Massonia depressa* representing another genus within the family Hyacinthaceae was used as fifth outgroup. Boundaries of the trn_{L-F} region as well as the trn_{L-F} intron were determined by comparison with known sequences of other *Lachenalia* species as obtained from GENBANK (Appendix K).

Table 2.1: The geographical distribution and voucher numbers of species used to complete this study.

Voucher number	**Locality/ Hybrid combinations (Parental accessions)**
L. arbuthnotiae	
Spies 8054	**WESTERN CAPE.**–3418 (Simonstown): Steenbras river mouth (-BB)
Spies 8055	**Unknown**. Grown from commercial seeds.
Spies 7711	Paula Spies*
L. elegans	
Spies 8018, 8019	**NORTHERN CAPE.**–3119 (Calvinia): Nieuwoudtville (-AC)
Spies 8014	**NORTHERN CAPE.**–3119 (Calvinia): On top of Vanrhyns Pass (-AC)
Spies 8020, 8021	**NORTHERN CAPE.**–3119 (Calvinia): Vanrhyns Pass (Look out point) (-AC)
Spies 8015, 8016	**WESTERN CAPE.**–3118 (Vanrhynsdorp): On top of Gifberg (-BC)

Spies 8022, 8023	**WESTERN CAPE.**–3218 (Clanwilliam): near Clanwilliam (-BB)
Spies 8024, 8025, 8026, 8027	**WESTERN CAPE.**–3319 (Worcester): Karoopoort, Ceres (-AD)
Spies 8017	**Unknown**. Grown from commercial seeds.
Spies 7734, 7735, 7736, 7737	Paula Spies*
***L. elegans* hybrids**	
Spies 8033, 8034, 8035, 8036, 8037	*Spies 8014* **(28)** x Unknown
L. fistulosa	
Spies 8056, 8063	**WESTERN CAPE.**–3418 (Simonstown): Hout Bay (-AB)
Spies 8057	**WESTERN CAPE.**–3418 (Cape Town): Dassenberg (-BC)
Spies 8058	**WESTERN CAPE.**–3419 (Caledon): Caledon (-AB)
Spies 8060	**WESTERN CAPE.**–3419 (Caledon): Riviersonderend (-BB)
Spies 8058, 8059, 8061, 8062, 8064, 8065	**Unknown**. Grown from commercial seeds.
L. mutabilis	
Spies 6750	**NORTHERN CAPE.**–3017 (Hondeklipbaai): near Hondeklipbaai (-AD)
Spies 8001	**NORTHERN CAPE.**–3017 (Hondeklipbaai): Along road to Soebatsfontein (-BA)
Spies 8000, 8007, 8008	**NORTHERN CAPE.**–3017 (Hondeklipbaai): Along road to Leliefontein (-BB)
Spies 6746	**NORTHERN CAPE.**–3119 (Calvinia): On top of Vanrhyns Pass (-AC)
Spies 6757, 6758, 6759, 6760, 6761	**NORTHERN CAPE.**–3119 (Calvinia): Along road to Oorlogskloof (-AC)
Spies 8002	**WESTERN CAPE.**–3118 (Vanrhynsdorp): Nuwerus (-AB)

Spies 6744, 6748, 6753	**WESTERN CAPE.**–3118 (Vanrhynsdorp): near Vanrhynsdorp (-DA)
Spies 6762, 6763, 6764, 6765, 6766	**WESTERN CAPE.**–3118 (Vanrhynsdorp): south from Bulshoekdam (-DD)
Spies 6774, 6775	**WESTERN CAPE.**–3218 (Clanwilliam): Clanwilliam Nature Reserve (-AB)
Spies 6751	**WESTERN CAPE.**–3218 (Clanwilliam): near Elandsbaai (-AD)
Spies 6747, 6767, 6768, 6769, 6770, 6773, 6776, 6777, 6778	**WESTERN CAPE.**–3218 (Clanwilliam): near Clanwilliam (-BB)
Spies 6779, 6780, 6781	**WESTERN CAPE.**–3218 (Clanwilliam): near Sandberg (-BC)
Spies 8009, 8010, 8011, 8012, 8013	**WESTERN CAPE.**–3219 (Wuppertal): near Citrusdal (-CA)
Spies 6745, 6784, 8004, 8005, 8006	**WESTERN CAPE.**–3318 (Cape Town): Langebaan Nature Reserve (-AA)
Spies 6752	**WESTERN CAPE.**–3318 (Cape Town): near Porterville (-BB)
Spies 6749, 6754, 6755, 6756, 6771, 6772, 6782, 6783	**Unknown**. Grown from commercial seed.
L. mutabilis hybrids	
Spies 8028, 8032	*Spies 6747* **(14)** x *Spies 6744* **(12)**
Spies 8038, 8039, 8040, 8041, 8042, 8047	*Spies 6749* **(14)** x *Spies 6747* **(14)**
Spies 8029, 8030, 8031,	*Spies 6747* **(14)** x *Spies 6746* **(12)**
Spies 8043, 8044, 8045, 8046, 8048	*Spies 6749* **(14)** x *Spies 6746* **(12)**
Spies 8049, 8050, 8051, 8052, 8053	*Spies 6749* **(14)** x Unknown
L. orchioides (short flowered)	

Spies 8071	**WESTERN CAPE.**–3319 (Worcester): near Tulbach (-AC)
Spies 8068, 8069	**WESTERN CAPE.**–3319 (Worcester): Along the road to Ceres (-CB)
Spies 8075	**WESTERN CAPE.**–3319 (Worcester): At the beginning of Du Toitskloof
Spies 8073, 8079, 8080	**WESTERN CAPE.**–3319 (Worcester): Goudini Spa (-CB)
Spies 8072, 8074, 8082, 8083	**WESTERN CAPE.**–3319 (Worcester): Rawsonville (-CB)
Spies 8070, 8076, 8077, 8078, 8081	**Unknown**. Grown from commercial seeds.
L. orchioides (long flowered)	
Spies 8086	**WESTERN CAPE.**–3218 (Clanwilliam): Pakhuis Pass (-BB)
Spies 8085	**WESTERN CAPE.**–3318 (Cape Town): Helshoogte (-DD)
Spies 8084	**WESTERN CAPE.**–3318 (Cape Town): Stellenbosch (-DD)
Spies 8089, 8090, 8092, 8093, 8095	**WESTERN CAPE.**–3318 (Cape Town): 4km from Klapmuts' four way stop to Paarl (-DD)
Spies 8098, 8099	**WESTERN CAPE.**–3319 (Worcester): Ceres Peak (-AD)
Spies 8091	**WESTERN CAPE.**–3319 (Worcester): Du Toitskloof (-CA)
Spies 8100, 8101	**WESTERN CAPE.**–3319 (Worcester): Brandvleidam (-CB)
Spies 8094, 8097	**WESTERN CAPE.** –3421 (Riversdale): Kanonkop between Still Bay en Mossel Bay (-BD)
Spies 8087, 8088, 8096	**Unknown**. Grown from commercial seeds.
L. orchioides	
Spies 7802, 7806	Paula Spies*
L. orchioides* var. *glaucina	

Spies 8066	**WESTERN CAPE.**–3318 (Cape Town): Kirstenbosch (-AA)
Spies 8067	**Unknown**. Grown from commercial seeds.
L. rosea	
Spies 7827	Paula Spies*
***L. aloides* (outgroup)**	
Spies 7698	Paula Spies*
***L. pusilla* (outgroup)**	
Spies 7820	Paula Spies*
***L. unifolia* (outgroup)**	
Spies 7850	Paula Spies*
***L. unicolor* (outgroup)**	
Spies 7846	Paula Spies*
Massonia depressa	
Spies 7870	Paula Spies*

*Only the sequences of these accessions were obtained from Paula Spies (also indicated in cladograms in Chapter 4 and the appendices attached).

2.1.1 Chemicals

Thermus aquaticus (Taq) Super Therm DNA polymerase with a 10x buffer (Southern Cross Biotechnology, catalogue number: JMR 801) was used in the optimisation of DNA amplification conditions reactions as well as in the DNA amplification reactions. Both the Sequencing – as well as the kit used for DNA amplification was ABI™ Prism products from Applied Biosystems. The primers used in this study, were made by Whitehead Scientific, Cape Town.

All other chemicals used, were of analytical grade.

2.2 Methods

2.2.1 Maintenance of bulbs

The bulbs were stored at 25°C during their dormant period. As soon as the root primordia at the base of the bulb became visible, the bulbs were planted according to size in pots with a mixture of potting soil (⅔) and sand (⅓) in a greenhouse at the University of the Free State, Bloemfontein. Watering started late in February and

stopped during September. The bulbs were watered twice weekly and pests and disease control was applied if necessary.

2.2.2 Cytogenetics

2.2.2.1 Mitotic Analysis

Mitotic divisions were obtained from slides prepared from root tip squashes. When the root primordia started to show, the bulbs were placed on a hydro gel medium (Deco gel™, obtained from florists). The medium was kept moist and the bulbs were left on the gel at room temperature for 24 – 48 hours.

Actively growing root tips were cut off at a length of more or less 10 – 15 mm and placed in pre-cooled water at 4°C for 24 hours. The water functioned as a mitotic arrester (to break spindle cords of the chromosomes to ensure well spread chromosomes). The root tips were fixed in Carnoy's fixative (6 ethanol: 3 chloroform: 1 acetic acid: v/v) (Carnoy 1886) for 24 – 36 hours. The root tips were then stored in 70% (v/v) ethanol until further use for mitotic squashes.

For the microscope analysis, the root tips were hydrolysed in 1N hydrochloric acid (HCl) at 60°C for 7 minutes and stained in the dark at 4°C with leuco-basic fuchsin for two hours. Leuco-basic fuchsin was prepared by dissolving 1 g basic fuchsin in 200 ml boiling distilled water. The solution was cooled to 50ºC and filtered. 30 ml N HCl was added to the filtrate. Potassium bisulphide ($K_2S_2O_5$) (3 g) was added. The solution was kept in the dark for 24 hours, where after 0.5 g decolourising carbon was added. The solution was shaken for a minute, filtered through coarse filter paper and stored in the dark at 4ºC (Darlington and LaCour, 1976). The leuco-basic fuchsin was replaced by either 70% (v/v) ethanol for storage or 30% (v/v) ethanol just before squashing.

The root tips were squashed on a microscope slide in 1% aceto-orceien (m/v) [2.2 g orcein in 100 ml glacial acetic acid] (Darlington and La Cour, 1976) and left to stain for 20 minutes. During this 20-minute waiting period, the cover slips were treated with Mayr's albumin (25 ml albumin, 25 ml glycerine and 0.5 g sodium salicilate) (Darlington & La Cour, 1976).

The slide was scanned for mitotic divisions and if well spread chromosomes were observed, the cover slip was floated off in 45% (v/v) acetic acid. The cover slip, now containing the squashed material, was dehydrated in an alcohol series of 70% (v/v), 80% (v/v) and 100% (v/v) ethanol. Slides were permanently mounted in Euparol and left to harden on a warm plate.

A Nikon Microscope was used to study the slides. Chromosomes of at least twenty cells per plant were counted. Photos were taken with a Nikon 995 Coolpix Digital camera.

2.2.2.2 Meiotic Analysis

Young inflorescences were collected at the first signs of emerging between leaves at ground level before ten o'clock in the morning. The bulb was cut half to remove the inflorescence and fixing it in Carnoy's (1886) fixative (see section 2.2.2.1). After 24 – 36 hours the fixative were replaced by 70% (v/v) ethanol for storage.

The anthers of individual flowers were removed from the inflorescence and squashed in 2% (m/v) aceto-carmine (0.5 g carmine boiled for 5 minutes in 45 ml glacial acetic acid and 55 ml distilled water and filtered when cooled) (Darlington and LaCour, 1976). To enhance the contrast between the cytoplasm and the chromosomes, a drop of ferri-acetate was added right before the squash was to be made. The slides were scanned for meiotic divisions. As soon as phases were observed, the slide was made permanent by using the liquid CO_2-freeze method (Bowen, 1956), followed by dehydration in alcohol. The slides were then mounted in Euparol.

The slides were analysed and photographed with the same method as describe in section **2.2.2.1** for the same number of cells per plant.

2.2.3 Molecular Studies

Leaves of different specimens were collected in the greenhouse and stored in a saturated solution of CTAB and Sodium Chloride for 6 months before DNA extraction. Preserved material gave better results than fresh material.

2.2.3.1 DNA Extraction

DNA was extracted according to the method of Rogstad (1992) with a few modifications. Firstly 0.5 g leaf material was ground with a 2 mg of sand, purified by acid. All extractions were carried out in eppendorf tubes. The ground material was incubated at 65°C for 1 hour in 500 µl of extraction buffer (1% (m/v) CTAB, 50 mM Tris – HCl (pH 8), 10 mM EDTA (pH 8), 0.7 M NaCl), to which 1% (m/v) ß-mercapto-ethanol was added. After one hour, an equal amount of chloroform: iso-amylalcohol (24:1) was added and the contents were mixed thoroughly. The mixture was now centrifuged at 3000g for 5 minutes. The supernatant was transferred into a clean tube and 500 µl of absolute ethanol at -20°C were added in order for the DNA to precipitate. After 1 hour in the refrigerator, the mixture was centrifuge at 7000g for 10 minutes. The supernatant was removed and the DNA pellet was washed with 70% (v/v) ethanol/ammonium acetate solution. After drying the DNA pellet, 20 µl of distilled water were added to dissolve the DNA. A 1% agarose gel (50 ml 1 X TAE, 0.5 g agarose, 2.5 µl ETBr) with a 1 x TAE buffer (40 mM Tris–acetate, 1 mM EDTA, pH 8) was used for electrophoresis at 100 V for 20 minutes. The agarose gel was intercalated with ethidium-bromide in order to make the DNA bands visible under ultra-violet light.

2.2.3.2 Optimisation of DNA amplification conditions

After DNA extraction, the DNA concentration was determined by means of a spectrophotometer. Amplification conditions were optimised through the method of Taguchi (Cobb & Clarkson, 1994). The three variables used in this study, were: primers *c* and *d* (50 pmol/µl mixture containing both primers), 25 mM magnesium chloride ($MgCl_2$) and DNA template. Three different concentrations of each variable were used (Table 2.2). Other components (5 x Buffer [10 x buffer (500 µl); gelatine (1 mg); dNTP's (10 µl of each); triton X-100 (5 µl) (dNTP's are included in buffer)], *Thermus aquaticus* (Taq) Super Therm DNA polymerase and water) were kept constant (Table 2.2). Primer *c* was used as the forward primer and primer *d* as the reverse primer (Taberlet *et al.*, 1991). The reactions were incubated at 4°C for 30 minutes and then placed in the Genius Thermo Cycler using the following cycles: 25 x (94°C for 3 minutes; 40 cycles of 94°C for 30 seconds, 50°C for 30 seconds, 72°C for 90 seconds) and then cooled to 4°C for 3½ hours. The PCR products were

loaded onto a 1% (m/v) agarose gel and visualized with ethidium bromide under UV light and photographed.

The fragments were scored according to the intensity of the fragment, with 1 being the lowest score (no fragment visible) and five the highest (brightest fragment). The product yield (intensity of fragment) for each reaction is used to estimate the effects that the individual components have on the amplification products (Cobb & Clarkson, 1994).

Yield can be calculated by signal to noise ratio's (Taguchi & Wu 1980; Taguchi 1986):
SNL = –10 log (1/n Σ 1/y²),
Where: **SNL** = signal to noise, **y** = yield per amplification reaction (score given for each reaction), **n** = number of levels (different concentrations).

The highest SNL value represents the optimal condition for the variables for further use during this study. The volumes for DNA (PCR – template), $MgCl_2$ and primer for optimum reaction performance were 1 µl, 1 µl and 1 µl respectively.

Table 2.2: Taguchi optimisation. **A**, **B** and **C** represents the volumes of the three variables. This is to indicate the different component combinations. The volumes (µl) for the different components, is added in brackets.

Reaction number	**5 x Buffer & Taq. polimerase**	**$MgCl_2$**	**Primers**	**DNA**	**H_2O (dilute reaction to 10µl)**
1	(2.1)	**A** (0.3)	**A** (0.2)	**A** (0.5)	6.9 µl
2	(2.1)	**A** (0.3)	**B** (0.5)	**B** (1.0)	6.1 µl
3	(2.1)	**A** (0.3)	**C** (1.0)	**C** (1.5)	5.1 µl
4	(2.1)	**B** (0.5)	**A** (0.2)	**C** (1.5)	5.8 µl
5	(2.1)	**B** (0.5)	**B** (0.5)	**A** (0.5)	6.4 µl
6	(2.1)	**B** (0.5)	**C** (1.0)	**B** (1.0)	5.4 µl
7	(2.1)	**C** (1.0)	**A** (0.2)	**B** (1.0)	5.7 µl

8	(2.1)	**C** (1.0)	**B** (0.5)	**C** (1.5)	4.9 µl
9	(2.1)	**C** (1.0)	**C** (1.0)	**A** (0.5)	5.4 µl

2.2.3.3 DNA amplification

After optimising the reaction conditions, DNA amplification reactions were done, using the optimal values as calculated in section **2.2.3.2.** Two primers were used to set up the reactions:

Primer c: Sequence: 5'- CGA AAT CGG TAG ACG CTA CG- 3'

Primer f: Sequence: 5'- ATT TGA ACT GGT GAC ACG AG- 3'

A DNA amplification reaction consists of:

DNA (PCR – template)	1 µl
$MgCl_2$	1 µl
Primer mixture (c and f)	1 µl
Taq polymerase	0.1 µl
5x Buffer	2 µl
Water	5.5 µl
Total Volume	**10 µl**

The reactions were made up, left in the refrigerator for half an hour and then placed in the Perkin Elmer thermo cycler for 3½ hours. The cycles used for the DNA amplification were: 25 cycles: 25 x (94°C for 3 minutes; 40 cycles of 94°C for 30 seconds, 50°C for 30 seconds, 72°C for 90 seconds and then cooled to 4°C for 30 min). The amplification products were separated on a 1% agarose gel as described in section **2.2.3.2.** The successful reactions were then used for sequencing the trn_{L-F} region of the gene.

2.2.3.4 Sequencing (trn_{L-F} region):

An ABI prism® BigDye™ Terminator cycle sequencing kit was used. The nested primers (Pfosser & Speta, 1999) used for these reactions, were:

PS1: Sequence: 5'- CTA CGG ACT TAA TTG GAT TGA GC-3'

PS2: Sequence: 5'- GGG GAT AGA GGG ACT TGA AC-3'

PS3: Sequence: 5'- GGT TCA AGT CCC TCT ATC CC-3'

PS4: Sequence: 5'- AGG ATT TTC AGT CCT CTG CTC-3'

A sequencing reaction consisted of:

Primers (PS1 – PS4)	3.2 µl [1 pm/µl]
Pre-mix (in kit)	2 µl
Buffer (in kit)	3 µl
DNA (PCR template)	6 µl
Water	5.8 µl
Total Volume	**20 µl**

The reactions were placed in the Perkin Elmer Thermo cycler for 25 cycles of 94°C for 30 seconds, 50°C for 15 seconds and 60°C for 4 minutes.

After amplification, the contents were transferred to a 1.5 ml eppendorf tube and the following were added: 16 µl of deionised water and 64 µl of 100% (v/v) ethanol. The DNA was than precipitated for 15 minutes at room temperature. The mixture was centrifuged for 20 minutes at 10 000g. The supernatant was removed by means of a vacuum. The DNA pellet was washed by adding 250 µl of 70% (v/v) ethanol. Again the mixture was centrifuged for 10 minutes at 10 000g. After the supernatant was discharged, the pellets were left to dry for 5 – 7 minutes. The dried pellets were stored at 4°C.

Before loading a gel the DNA was denaturated by adding 4 µl of formamide loading buffer (contains a dye) to the pellet and heating it to 100°C for 5 minutes. Approximately 2 µl of the samples were loaded on the poly-acrylamide gel and separated for 4 to 6 hours.

2.2.3.5 Sequencing analysis

2.2.3.5.1 Sequencing alignment.

The sequences for each of the different primer combinations per specimen, was aligned on the Apple Macintosh computer by using Auto Assembler (Applied Biosystems, 1999).

The sequences of each specimen, using the consensus product from the Apple Macintosh, were aligned by means of Clustal G (Thompson *et al.,* 1997). Further alignment was done manually. Before the phylogenetic analysis could start, the data was then taken to Gap coder, missing parameter (Young & Healy, 2003) to convert it into a data matrix.

2.2.3.5.2 Phylogenetic analysis

The data matrix was analysed with the computer program, *Phylogenetic analysis using parsimony* (PAUP) version 4.1 (Swofford, 1998).

This program determines the maximum parsimony through the minimum length cladogram. Parsimonious cladograms are cladograms that minimize the amount of evolutionary changes needed to explain the available data under pre-specified set of constraints upon permissible character changes (Swofford, 1998). A general *HEURISTIC* search with branch swapping was done and it was follow up with a *HEURISTIC* search with tree bisection–reconnection *(TBR*) branch swapping and MULPARS (Swofford, 1998), to find the most parsimonious cladogram. If more than one equally parsimonious cladogram was obtained, the *STRICT CONSENSUS* option was selected.

BOOTSTRAP and *JACKKNIFE* tests from 200 replications using the *HEURISTIC* option was used to test the heuristic cladogram (Felsenstein, 1985; Lanyon, 1985; Siddall, 1995).

Decay values CI and RI were determined. The CI-value (consistency index – indicating homoplasy) divides the minimum number of changes of characters on a cladogram by the actual number of changes. The RI-value (retention index – representing the number of synapomorphies, retained in the cladogram) corrects the actual distribution of character states in the data matrix subtracting both the minimum changes and actual changes from the maximum changes possible (Farris 1989a, b).

3.1 Introduction

Cytogenetics is a combination of cytology and genetics (Swanson *et al*., 1967; Singh, 1993), which include the study of chromosome numbers (mitosis & meiosis), -behaviour, and -morphology. This information eases the classification of species (Stebbins, 1971) and according to Raven (1975), cytogenetics play an important role in the evaluation of phylogenetics in angiosperms. Similar chromosome numbers may indicate close relationships (Judd *et al.*, 1999). Cytogenetics can also be used to identify hybridisation in species (Grant, 1981).

3.1. 1 Cytogenetics of *Lachenalia*

Although the family Hyacinthaceae proved to be kariologically variable (Speta, 1998), the chromosome numbers remained relatively constant at genus level, irrespective of the genus size (*Scilla sensu stricto:* x = 9, *Muscari:* x = 9, *Bellevalia*: x = 4, *Albuca*: x = 9). The occurrence of dysploidy in some genera of this family, however, led to the variation in chromosome numbers (*Prospera*: x = 4, 5, 6, 7; *Bernardia*: x = 8, 9; *Hyacinthella*: x = 9, 10, 11, 12; *Stellaroides*: x = 2, 3, 4, 5, 6, 7, 8, 9; *Schnarfia*: x = 9, 10) (Pfosser & Speta, 1999).

Lachenalia as part of this family has a complexity of chromosome numbers (Barker, 1933; Moffett, 1936; De Wet, 1957; Riley, 1962; Mogford, 1978; Ornduff & Watters, 1978; Nordenstam, 1982; Crosby, 1986; Hancke & Liebenberg, 1990; Hancke 1991; Johnson & Brandham, 1997; Kleynhans, 1997; Hancke & Liebenberg, 1998; Kleynhans & Spies, 1999; Spies *et al.*, 2000) due to different basic chromosome numbers, various ploidy levels (Crosby 1986) and the presence of B-chromosomes (Hancke & Liebenberg 1990). These chromosome numbers differ within each of the five provisional groups as suggested by Crosby (1986) as well as within some species (Kleynhans, 1997).

Chromosome numbers of more than fifty species have been reported (Spies *et al.,* 2002). The somatic chromosome numbers include 10, 12, 14, 15, 16, 17, 18, 20, 21, 22, 24, 26, 28, 29, 30, 32, 40, 42, 44, 49 and 56. The gametic numbers vary from n = 5, 7, 8, 9 to 11, 12, 14, 16, 18, 20, 21, 22 and 28 and the basic chromosome numbers include x = 5, 6, 7, 8, 9, 11, 12 and 13 with 7 and 8 being the most frequent (Barker, 1933; Moffett, 1936; De Wet, 1957; Riley, 1962; Mogford, 1978; Ornduff &

Watters, 1978; Nordenstam, 1982; Crosby, 1986; Hancke & Liebenberg, 1990; Hancke 1991; Johnson & Brandham, 1997; Kleynhans, 1997; Hancke & Liebenberg, 1998; Kleynhans & Spies, 1999; Spies *et al.*, 2000 & 2002). The study of these chromosome numbers can contribute enormously to the taxonomic grouping of the *Lachenalia* species.

The aim of this study is to determine whether any other chromosome numbers as well as polyploidy are present in the *Lachenalia* orchioides group (Crosby, 1986) in order to evaluate the phylogenetic relationships of the species within this group.

3.2 Results and Discussion

3.2.1 Results

This cytogenetic study included 135 specimens, representing four of the six species in the *Lachenalia orchioides* group as defined by Crosby (1986), 10 specimens representing an ungrouped species, *L. fistulosa* [not described by Crosby (1986)] as well as 5 intraspecific hybrids of *L. elegans* and 21 intraspecific hybrids of *L. mutabilis*.

3.2.1.1 ***Lachenalia arbuthnotiae*** Barker

The somatic chromosome numbers (Fig. 3.1 A) obtained from the specimens of *L. arbuthnotiae,* showed no variation and it also confirmed previous reports (Table 3.1) of somatic chromosome numbers (2n = 14; Crosby, 1986) in this species. The specimens studied, were obtained from different localities. Only two specimens were used during this study, and therefore it was not possible to determine whether chromosome numbers could be correlated with its distribution area. The gametic chromosome numbers obtained from meiotic studies in the species also confirmed previous reports (Table 3.1) of a diploid somatic chromosome number (2n = 2x = 14, n = 7).

..\Figures\Fig. 3.1.pdf

Table 3.1 Published chromosome numbers and chromosome numbers of different accessions of the *Lachenalia* species studied, including hybrids of some of the species. Gametic chromosome numbers (n) indicate meiotic studies and somatic chromosome (2n) numbers indicate mitotic studies.

Species/ Hybrid combinations (Parental species)	**n**	**2n**	**References or accessions used in this study**
***Lachenalia orchioides* group**			
L. arbuthnotiae		14	Crosby (1986), Johnson & Brandham (1997)
	7	14	*Spies 8054, 8055*
L. elegans		14	Crosby (1986), Johnson & Brandham (1997)
		28	Moffett (1936), Crosby (1986), Johnson & Brandham (1997)
	14	28	*Spies 8014, 8015, 8016, 8018, 8020, 8021, 8022, 8023, 8025, 8026, 8027, 8033* (hybrid), *8034* (hybrid), *8035* (hybrid), *8036* (hybrid), *8037* (hybrid)
		42	Johnson & Brandham (1997)
	21	42	*Spies 8017, 8019, 8024*
		56	De Wet (1957)
	7		Ornduff & Watters (1978)
L. mutabilis		10	De Wet (1957), Johnson & Brandham (1997)
		12	Spies *et al.* (2000)
	6	12	*Spies 6744, 6746, 6751, 6774, 6771, 6772, 6775, 6779, 6780, 6781, 8001, 8006, 8007, 8008, 8029* (hybrid), *8030* (hybrid), *8031* (hybrid), *8043* (hybrid), *8044* (hybrid), *8045* (hybrid), *8046*

			(hybrid), *8048* (hybrid)
		14	De Wet (1957), Crosby (1986), Hancke & Liebenberg (1990), Hancke (1991), Johnson & Brandham (1997), Kleynhans (1997), Spies *et al.* (2000)
	7	14	*Spies 6745, 6747, 6748, 6749, 6752, 6753, 6754, 6755, 6756, 6757, 6758, 6759, 6760, 6761, 6767, 6768, 6769, 6770, 6773, 6776, 6777, 6778, 6782, 6783, 6784, 8000, 8002, 8004, 8005, 8009, 8010, 8011, 8012, 8013, 8028* (hybrid), *8032* (hybrid), *8038* (hybrid), *8039* (hybrid), *8040* (hybrid), *8041* (hybrid), *8042* (hybrid), *8047* (hybrid), *8049* (hybrid), *8050* (hybrid), *8051* (hybrid), *8052* (hybrid), *8053* (hybrid)
		24	Spies *et al.* (2000)
	12	24	*Spies 6750*
		56	De Wet (1957)
	5		Ornduff & Watters (1978)
	6		Spies *et al.* (2000)
	7		Spies *et al.* (2000)
L. orchioides		14	Hancke & Liebenberg (1990)
Long-flowered specimens	7	14	*Spies 8084, 8085, 8086, 8087, 8088, 8089, 8090, 8091, 8092, 8093, 8094, 8095, 8096, 8097, 8098, 8099, 8100, 8101*
Short-flowered specimens	7	14	*Spies 8068, 8069, 8070, 8071, 8072, 8073, 8074, 8075, 8076, 8077, 8078, 8079, 8080, 8081, 8082, 8083*
		16	De Wet (1957), Moffett (1936)
		17	Moffett (1936)
		18	Riley (1962)

		28	Moffett (1936), De Wet (1957), Ornduff & Watters (1978), Johnson & Brandham (1997)
		29	Johnson & Brandham (1997)
	7		Ornduff & Watters (1978)
Ungrouped			
L. fistulosa		14	Ornduff & Watters (1978), Johnson& Brandham (1997)
	7	14	*Spies 8056, 8057, 8058, 8059, 8060, 8061, 8062, 8063, 8064, 8065*
		28	Ornduff & Watters (1978)

3.2.1.2 *Lachenalia elegans* Barker

Chromosome numbers obtained from the 14 *L. elegans* specimens confirmed previous reports (Table 3.1) of 2n = 4x = 28 (Fig 3.1 C, E, I). Although diploids and octaploids were reported before, none were observed during this study. Hexaploids [(2n = 6x = 42) Fig 3.1 B, F), Table 3.1] confirmed a report by Johnson & Brandham (1997). The specimens studied were obtained from at least 5 different localities. Most of the tetraploid specimens (2n = 4x = 28) were found in the northern parts of their distributional area (Fig 3.2). More hexaploid specimens (2n = 6x = 42) need to be studied in order to correlate the chromosome numbers of the species to their distributional area. The meiotic studies confirmed the chromosome numbers as obtained in this study.

The hybrids obtained from the *L. elegans* specimens, showed no variety in chromosome numbers. The hybrids all had a somatic chromosome number of 2n = 4x = 28 (Fig 3.1 D). Only one of the parental accessions (*Spies 8014*) of the hybrids is known.

3.2.1.3 *Lachenalia fistulosa* Bak

The chromosome numbers [(2n = 14) Fig 3.1 G] obtained from the 10 specimens of *L. fistulosa,* showed no variation and it also confirmed previous studies (Table 3.1). Although several tetraploids had been reported, none were observed during this study. The gametic chromosome numbers [(n = 7) Fig 3.1 H) also confirmed that there was no variation in the chromosome numbers of this species. The specimens were obtained from different localities.

3.2.1.4 *Lachenalia mutabilis* Sweet

The chromosome numbers obtained from the *L. mutabilis* specimens*,* ranged from 2n = 12 (Fig. 3.3 B, F, G), 14 (Fig. 3.3 H) and 24. The specimens were obtained from different localities. This study confirmed previous reports (Table 3.1). Although an octaploid, 2n = 56 (De Wet, 1957) were reported, none were observed during this study. Gametic chromosome numbers of n = 6 (Fig. 3.4 A – B, D – E, G – H), 7(Fig. 3.4 F, L), 12 (Fig. 3.4 J), were observed. These numbers as well as the somatic chromosome numbers confirmed earlier studies (Table 3.1). The intraspecific hybrids that were obtained from some of the specimens also had a variety in somatic chromosome numbers, 2n = 12 (Fig. 3.3D – E), 14(Fig. 3.3 A, C) as well as gametic chromosome numbers, n = 6 (Fig. 3.4 C, I), n = 7 (Fig. 3.4 K – L).

Theoretically, when a plant with 2n = 14 has been crossed with a plant with 2n = 12, the offspring would all be sterile plants with 2n = 13. In these hybrids however: A female plant with 2n = 14 were hybridised with a male plant with 2n = 12. The offspring, turned out to be 2n = 14. This can still be explained by self-fertilization of the female plant, but when the same cross were made some of the offspring had a somatic chromosome number of 2n = 12. Separation of chromosomes during meiosis might be able to explain this, but no chromosomal abnormalities were observed during this study and therefore specimens need to be studied.

The chromosome numbers of this species can be correlated with their distributional area. Specimens with a basic chromosome number of x = 6 were mostly found in the northern and western parts of the geographical distribution area, whilst the

specimens with the basic chromosome number of x = 7 were found in the southern parts of the geographical distribution area (Fig 3.2).

3.2.1.5 *Lachenalia orchioides* (L.) Ait. (Short flower form)

The chromosome numbers obtained from the 16 specimens of *L. orchioides* (short flower form), showed no variation in chromosome numbers. The gametic chromosome numbers [(n = 7) Fig 3.1 (O)] confirmed the somatic chromosome numbers (2n = 14) observed. Both chromosome numbers confirmed earlier studies (Table 3.1). The specimens were obtained from different localities.

3.2.1.6 *Lachenalia orchioides* (L.) Ait. (long flower form)

The chromosome numbers obtained from the 18 specimens of *L. orchioides,* showed no variation in chromosome numbers [(2n =14) Fig 3.1 (J, L – N)]. Although a tetraploid was reported, none were observed during this study. The gametic chromosome numbers [(n = 7) Fig 3.1 K], confirmed the somatic chromosome numbers and both supported the previous reports (Table 3.1). The specimens were obtained from different localities.

3.2.2 Discussion:

The somatic chromosome numbers of 2n = 12, 14, 24, 28, 42 (Table 3.1) were observed in the *L. orchioides* group. Most of the chromosome numbers observed, confirmed previous reports (Table 3.1). Johnson & Brandham (1997) reported the first hexaploid (2n = 6x = 42) in the *L. orchioides* group for the species *L. elegans*. This chromosome number was confirmed in this study. Gametic chromosome numbers of n = 6, 7, 14 and 21 were observed, which led to two different basic chromosome numbers, x = 6 and 7. Ornduff and Watters (1978) reported a third basic chromosome number, x = 5. The basic chromosome number (x) represents the lowest gametic chromosome number in a taxon (Rieger, 1976).

The three different basic chromosome numbers of x = 5, 6 and 7 are not evenly spread throughout the group, instead it is only restricted to one species, *L. mutabilis*. The occurrence of the basic chromosome number, x = 5 was resolved by the occurrence of a reciprocal or Robertsonian translocation (Ornduff & Watters, 1978;

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Johnson & Brandham, 1997), which led to dysploidy. Dysploidy occurs frequently throughout the whole Hyacinthaceae family. Pfosser & Speta (1999) suggested that the occurrence of dysploidy in some genera of this family led to the variation in chromosome numbers

However two other basic chromosome numbers remain, x = 6 and 7. Spies *et al*. (2000) suggested that the original basic chromosome number being x = 7 after testing three hypotheses:

- Original basic chromosome number, x = 5, with a misidentification of B – chromosomes that gave birth to the other two basic chromosome numbers. However no chromosomal abnormalities were observed and only bivalents occurred.

- Original basic chromosome number, x = 7, where dysploidy lead to lower basic chromosome numbers, x = 5 and 6, but the chromosome morphology of the specimens in question showed no sign of Robertsonian translocations.

- Original basic chromosome number, x = 7, where an aneuploid series occurred.

The basic chromosome number of x = 7 seems to be the predominant basic chromosome number, because it occurs most commonly throughout the *L. orchioides* group. Therefore the study confirms previous studies (Crosby, 1986) that suggested x = 7 to be the original basic chromosome number for this group and that both x = 5 and 6 were derived from seven.

Different chromosome numbers can be attributed to evolutionary events such as polyploidisation and aneuploidy. Seven being the predominant basic chromosome number of this group, suggests polyploid levels that ranges from diploids to octaploids. Diploids occur more frequently throughout the group. From a total of approximately 10 chromosomal reports made in this group, 8 reports indicate that diploids are most common, while very little polyploidy has been reported in the *L. orchioides* group [Moffett (1936), De Wet (1957), Ornduff & Watters (1978), Crosby

(1986), Hancke & Liebenberg (1990), Hancke (1991), Johnson & Brandham (1997); Kleynhans (1997), Spies *et al.*(2000), Spies *et al.*(2002)].

The L. orchioides group can thus be classified as ‘n young polyploid complex (a complex where the diploids are more common). *L. elegans* are the only species in this group that forms a young mature polyploid complex on its own, because of the polyploid levels (2x to 8x) that occurs within the species. Although diploids have previously been reported for this species, it did not occur as frequent as in the other species in the *L. orchioides* group. According to Stebbins (1956) a young mature complex can be described as a complex where the diploids are less common than the polyploids and tend to be endemic.

3.3 Conclusion:

No new chromosome numbers were observed during this study, but most of the chromosome numbers obtained confirmed previous studies (Table 3.1). Polyploidy occurred in two of the five species studied. The relatively primitive basic chromosome numbers indicate that the *Lachenalia orchioides* group are not originally polyploid and therefore it confirms this group being a young polyploid complex. This indicates that the species studied are very closely related to one another. It also suggests that *L. fistulosa* be considered as part of the *L. orchioides* group, because they share the same basic chromosome number. According to Burger (1995) the basic chromosome number can only be used in cladistic analysis of closely related taxa and that two unrelated genera or even species can share the same basic chromosome numbers. Only further studies (molecular studies) might be able to resolve the placement of *L. fistulosa*, because the *L. aloides* group also have a basic chromosome number of seven.

This study shows that the species studied might be part of a young polyploid complex, with basic chromosome numbers of x = 6 and 7. Except for the polyploids in *Lachenalia elegans and L. mutabilis* as well as the different basic chromosome numbers in *L. mutabilis,* there is none to very little variation in chromosome number in the *Lachenalia orchioides* group.

At this stage it seems as if polyploidy is a determining factor in the evolution of this group along with the different basic chromosome numbers observed in *L. mutabilis*. Studies such as molecular cytogenetics (GISH and FISH) together with other molecular studies, might resolve the chromosomal evolution of this group as well as the species within the group.

4.1 Introduction

Methods such as morphology, anatomy, physiology, palaeontology and cytology were previously used to resolve the evolutionary pathways of flowering plants (angiosperms). In the past decade, however, systematists relied on molecular studies [restriction site mapping, comparative sequencing, PCR-based techniques (protein sequencing, DNA sequencing, especially chloroplast DNA, etc.) and other molecular methods] for this very purpose (Soltis & Soltis, 1998). DNA sequencing became affordable and easy to use for phylogenetic studies at all levels (Doyle, 1993; Alnouche & Bayer, 1997).

The sequencing of the chloroplast genome had become very popular, because it evolves slowly, it is experimentally tractable and it has been described as an evolutionary stable molecule (Clegg et al., 1991; Doyle, 1993; Judd et al. 1999). An average chloroplast genome contains about 120kbp of unique sequences – enough to code for at least 120 genes if it can be assumed that an average gene contains about 1kbp (Sugiura, 1992).

The plastid trn_{L-F} region (consisting of an intron and an intergenic spacer) can easily be amplified in most taxa and it contains non-coding regions, which display a high frequency of mutations (Taberlet et al., 1991). These regions exhibit more variation than most coding regions and therefore it can be used for phylogenetic inference below familial level (Taberlet et al., 1991; Gielly & Taberlet, 1994; Gielly & Taberlet, 1996).

The sequences of the trn_{L-F} region, together with the cytogenetics as described in chapter 3, provide an opportunity to address the placement of each of the species included in this study, into the *Lachenalia orchioides* group.

The aim of this study is to identify the evolutionary origin of the chromosome numbers as well as the placement of *L.mutabilis* in the *Lachenalia orchioides* group.

4.2 Results

After the alignment of the trn_{L-F} region sequences, a consensus length of 815 bp for the dataset with all the species, 805 bp for the dataset with all the species with a basic chromosome number of seven, 804 bp for the dataset with all the species with a basic chromosome number of six, 761bp for the dataset with all the *L. mutabilis* specimens and 760 bp for the dataset with all the *L. mutabilis* specimens with a basic chromosome number of seven were obtained (Appendixes A, B, C, D, E respectively). The alignment of the trn_{L-F} intron sequences, resulted in a consensus length of 695 bp for the dataset with all the species, 685 bp for the dataset with all the species with a basic chromosome number of seven and 683 bp for the dataset with all the species with a basic chromosome number of six, 635 bp for the dataset with all the *L. mutabilis* specimens and 632 bp for the dataset with all the *L. mutabilis* specimens with a basic chromosome number of seven were obtained (Appendixes F, G, H, I, J respectively).

The PAUP analysis of the trn_{L-F} intron for the dataset with all the species resulted in a strict consensus cladogram (Fig 4.1) of 98 steps with a consistency index (CI) of 0.8776, a retention index (RI) of 0.9893 and 66 informative characters, while a strict consensus (Fig 4.2) for the trn_{L-F} region of 385 steps with a CI of 0.8078, a RI of 0.9797 and 222 informative characters were obtained. The CI values of both cladograms (Fig. 4.1 & 4.2) indicated actual synapomorpholy of more than 80% of the character state change observed. Most of the clades are well supported by Bootstrap- and Jackknife values that range between 51 and 89%, although some clades show lack of support.

The strict consensus (Fig 4.3) of the trn_{L-F} intron, with dataset of all the species with x = 7, had a length of 96, a CI of 0.8750, a RI of 0.9887 and 65 informative characters. The trn_{L-F} region for the same dataset, resulted in a strict consensus (Fig 4.4) of 140 steps with CI = 0.8786, RI = 0.9769 and 96 informative characters out of a total of 390 characters. Only 87% of the character state changes observed seems to be actual synapomorphies.

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From the dataset of all species with x = 6, a strict consensus (Fig 4.5) from three equally parsimonious trees of 69 steps, CI = 0.9855, RI = 0.9947 and 51 informative characters was obtained for the trn_{L-F} intron and for the trn_{L-F} region a strict consensus (Fig 4.6) of 106 steps with CI = 0.9717, RI = 0.9894 and 76 informative characters was obtained.

Lachenalia mutabilis being the only species in the *L. orchioides* group that has more than one different basic chromosome numbers were studied individually. The PAUP analysis of the dataset with all the *L. mutabilis* specimens included in this study, resulted in a strict consensus (Fig 4.7) of 76 steps, with a CI value of 0.9605, a RI value of 0.9847 and 52 informative characters for the trn_{L-F} intron (Appendix H) and a strict consensus cladogram (Fig 4.8) of 116 steps with CI = 0.9397, RI = 0.9834 and 79 informative characters for the
trn_{L-F} region (Appendix I).

The dataset with *L. mutabilis* specimens with x = 7 resulted in a strict consensus (Fig 4.9) with a length of 74, a CI of 0.9595, a RI = 0.9849 and 51 informative characters for the trn_{L-F} intron (Appendix J) and for the trn_{L-F} region (Appendix K) for the same dataset, a strict consensus (Fig 4.10) of 106 steps, a CI value of 0.9623, a RI value of 0.9862 and 75 informative characters was obtained.

The datasets of all species with x = 6 and the *L. mutabilis* specimens with x = 6 are the same and therefore the cladograms (Fig 4.5 and Fig 4.6) for the trn_{L-F} intron and trn_{L-F} region respectively, were the same.

In all the above cladograms, only 20% up to 27% of all characters were phylogenetically informative. Sites such as these are described to be sites where at least two species or specimens share a common synapomorphic character (Hamby & Zimmer, 1988).

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4.3 Discussion

The *L. mutabilis* specimens (*Spies 6744* & *Spies 6771*) in Fig. 4.2 form a sister alliance, which are supported by the fact that they have the same chromosome number 2n = 12, they belong to the same species and both specimens are diploid. The Bootstrap – and Jackknife values (64% & 52% respectively) support this grouping strongly.

From the sister alliance of *Spies 6744* and *Spies 6771*t is clear that the ancestor of these specimens had a somatic chromosome number of 2n = 14 and therefore a basic chromosome number of x = 7. This support the hypothesis as discussed in chapter 3, which states that the somatic chromosome number of 2n = 12 were derived from 2n = 14 and therefore seven is emphasised as the original basic chromosome number of this species. This monophyly is also very well supported in figure 4.2 (the strict consensus of the trn_{L-F} region with dataset of all species studied), figure 4.7 (the strict consensus of the trn_{L-F} intron with dataset of all *L. mutabilis* specimens studied), and figure 4.8 (the strict consensus of the trn_{L-F} region with dataset of all *L. mutabilis* specimens studied). The sister alliance between *L. mutabilis* specimens (*Spies 6766* and *Spies 6767*) are being supported by same basic chromosome number and diploidy (Fig. 4.2). Almost all sister groups are supported by having the same chromosome number or being part of the same species.

The phylogeny of *Lachenalia mutabilis* as a species in the *L. orchioides* group stands in question, because of the different basic chromosome numbers [x = 5, 6 & 7 (Ornduff & Watters, 1978; Johnson & Brandham, 1997; Spies *et al.*, 2000) that exists within the species. Chromosome numbers alone could not support the existence of this species in the *L. orchioides* group. There was no real evidence that x = 7 are the original basic chromosome number of the species, because no abnormalities were obtained during meiotic analysis. *L. mutabilis* is also the only species in the *L. orchioides* group that have different basic chromosome numbers.

L. mutabilis being a monophyletic group are strongly supported throughout this study (Fig 4.1 – 4.10). In figures 4.7 and 4.8 it is clear that the basic chromosome number

of x = 6 were derived from the specimens with the basic chromosome number of x = 7. This is very well supported by the hypothesis as discussed in chapter 3 as well as Spies *et al.* (2000). If x =6 was a basic chromosome number that exists out of own right, it would have fallen out in all the cladograms as a monophyletic group on its own. Instead it forms a monophyletic group with all the other *L.mutabilis* specimens.

It was expected of the long-flowered *L. orchioides* specimens to group together, because it must more or less have the same DNA sequence. If this study was based on chromosome numbers and morphology alone, it would have been easy to live up to this expectancy, but the molecular study shows that is not so easy to resolve the relationship within a species let alone amongst different species although they belong to the same group, genus or family. All the long- flowered specimens used in this study can be found in the same clade although it does not form a monophyletic group for this species. The short flowered specimens (*Spies 8069* and *Spies 8073*) together with some of the long flowered specimens can be found in the same clade. From this grouping, the ancestor of the specimens seem to have a basic chromosome number of x = 7. Similar chromosome numbers and diploidy support the arrangement amongst these specimens.

The monophyly obtained from the *L. elegans* specimens, resembles the clustering of polyploids with a diploid ancestor. This monophyletic group form a paraphyletic alliance with the diploid specimens, *Spies 8069, Spies 8073, Spies 8089* & *Spies 8090* (Fig. 4.2), which represents some of the other species used in this study. The paraphyly is an indication that the *L. orchioides* accessions are very closely related to each other and to the *L. elegans* species. Together these two paraphyletic groups forms a monophyletic group and therefore it supports the close relationship statement. In the monophyletic group with the *L. orchioides* and *L.elegans*, it is clear that the diploid chromosome numbers gave origin to the polyploids obtained. These results are strongly supported by figures 4.3 (The cladogram of the trn_{L-F} intron of the dataset with all specimens with x = 7) & Fig. 4.4 (The cladogram of the trn_{L-F} region of the dataset with all specimens with x = 7).

The cladogram of the trn_{L-F} intron of the dataset with all specimens with x = 7 (Fig 4.3) display an overall monophyly, which indicates what all the other cladograms (Fig

4.1 – 4.10) supports: the species in this study are closely related. The cladograms (Fig. 4.1-4.4) indicated that *L. aloides*, which is an outgroup, form part of the monophyly of the *L. orchioides* group. This outgroup also have a basic chromosome number of x =7, which supports this grouping. In the cladograms with the *L.* mutabilis specimens, this outgroup forms an alliance with *L.* pusilla, which also have a basic chromosome number of seven. This alliance is very well supported by Bootstrap and Jackknife values (Fig. 4.5: 71% and 62%, Fig. 4.6: 60% and 54%, Fig. 4.7: 87% and 81%, Fig. 4.8: 74% and 69%, Fig. 4.9: 69% and 64%, Fig. 4.10: 75% and 64%. All the other outgroups forms a paraphyletic group with the *L. orchioides* group, which indicates close relationships. The paraphyly of the *L. orchioides* group with all the other outgroups are very well supported by Bootstrap and Jackknife values of 100% and therefore the *L. orchioides* group as described by Crosby (1986) do have the right to exist.

4.4 Conclusion

The trn_{L-F} intron and the trn_{L-F} region sequences confirmed the monophyly of the *L. orchioides* group as part of the genus *Lachenalia*. The evolutionary origin of the chromosome numbers (x = 7 being the predominant basic chromosome number of this group) of this group seems to be resolved through the above-mentioned sequences. Through the sequences of the plastid trn_{L-F} region and intron, it is clear that the difference in basic chromosome numbers in *L. mutabilis* can be ascribed by factors such as environment, meiotic abnormalities, etc., because the overall monophyly of the *L. orchioides* group indicates that the species within the group are closely related and therefore the position of *L. mutabilis* in this group has been resolve. *Lachenalia fistulosa* however has not been classified into a group yet. The possibility that it might be an intermediate cannot be excluded until more studies are done and it is proven otherwise. For the moment this evidence is enough to recommend this species to be part of the *L. orchioides* group.

It should be safe to say that the original basic chromosome number for the *L. orchioides* group is x = 7 (supported by molecular data) and that all the species used in this study are closely related.

The phylogeny of the *Lachenalia orchioides* group was not resolved in detail, but at least some light was shed on some phylogenetical aspects.

Classification based on phylogeny can be produced by determining the phylogeny or evolutionary history of plants (Judd *et al.*, 1999). Such a study (phylogenetic investigation) does not only indicate the evolutionary pathways of an organism, but it also indicates the relationships between organisms (Qui *et al,* 1999). Koehler *et al.* (2002) suggested the importance of multiple sources of phylogenetic information in order to resolve the true phylogeny of organisms. Many different phylogenetic techniques (cytogenetics, molecular studies etc.) can be applied in order to resolve the phylogeny of certain organisms.

The genus *Lachenalia* is endemic to South Africa and it contains more than a hundred species. This is a genus of exceptional morphological variation, which is of economical importance in the flower-industry. A breeding-programme for *Lachenalia* commenced in 1965 at ARC-Roodeplaat and twenty-five cultivars have been registered since.

Any breeding-programme can be demanding and therefore it is very useful to know the genomic relationships of the plants involved, in order to determine which taxa to cross with each other. The ideal would be genomic correspondence of great extend to produce a fertile progeny, which could also lead to heterosis if any differences occur. Therefore it is very important to balance the genomic correspondence for fertility with the differences which lead to heterosis in groups, families, genera, species, etc.

The aim of this study was to determine the extend of genomic correspondence and differences in the *Lachenalia orhioides* group in order to see whether the degree of differences would be enough to support the occurrence of heterosis, and still have a fertile progeny.

Many cytogenetic studies have been conducted on the *L. orchioides* group (Chapter 3, Table 3.1). The predominant basic chromosome number throughout the group was determined to be x = 7 with the exception of *L. mutabilis.* Two different basic chromosome numbers (x = 6 and 7) have been determined for this species during this study, with a third basic chromosome number of x = 5 previously reported (Ornduff &

Watters, 1978, Johnson & Brandham, 1997). The monophyly (Fig. 4.1 – 4.4) of the group as determined by the cpDNA sequence data indicates that *L. mutabilis* is part of this group and therefore the basic chromosome number of this species should also be seven.

The questions that need to be answered in this aspect are the influence of evolution on this species:

- Were the lower basic chromosome numbers (x = 5 and 6) derived secondarily from seven? or
- Can *L. mutabilis* be seen as the origin of the *L. orchioides* group, with five and six as primary basic chromosome numbers?

Spies *et al.* (2000) suggested three possibilities that could have led to the three different basic chromosome numbers: Dysploidy, B-chromosomes and an aneuploid series. Dysploidy has been defined as the decrease of chromosome number without the loss of any genetic material. The absence of visible morphological chromosome changes eliminates dysploidy as a possible point of origin for the lower basic chromosome numbers. This phenomenon usually goes hand in hand with the formation of longer chromosomes. These chromosomes are the result of centric fusion between two acrocentric chromosomes.

The possibility of mis-identified B-chromosomes can also be eliminated by the fact that the rest of the group has seven as predominant basic chromosome number. The only B-chromosomes ever reported in the *L. mutabilis* species, were in hybrids of *L. mutabilis* and *L. aloides* var. *quadricolor*, where B-chromosomes were observed in the latter parent (Hancke & Liebenberg, 1990). The hypothesis that remains is that aneuploidy occurs within the species. The absence of multivalents during meiosis indicates that aneuploidy takes place through the loss of homologous chromosome pairs. This is also an indication that *L. mutabilis* represents the most advanced species in the group and that the lower basic chromosome numbers might lead to speciation in course of time.

The geographical distributional area of the *L. mutabilis* species (Fig. 3.2) supports speciation of the specimens with lower basic chromosome numbers which can be find in the northern and north-western parts of the geographical distributional area. This also indicates that the possible new group might have suffered the loss of chromosome(s), in order to adapt to the new environment, because genetic recombination through meiosis allows species to adapt themselves to environmental changes. A thorough population-cytogenetic study on the *L. mutabilis* species needs to be conducted to clarify this phenomenon.

Polyploidy is a relatively common phenomenon in the *L. orchioides* group with ploidy levels that ranges from diploids (2x) to octaploids (8x). It is present in four (66%) of the six species in the group, while the percentage polyploidy specimens in the genus is only 44% (Spies *et al.,* 2002). However, there is not enough cytogenetic evidence to explain why the ratio of polyploids in the *L. orchioides* group is higher than that of the genus as a whole.

The basic chromosome number of seven indicates that the different species in the group should be able to cross with one another to form intraspecific hybrids. The common occurrence of polyploidy in the group also indicates that mechanisms exist that can overcome infertility problems after hybridisation.

The molecular data from this study (Fig. 4.1 -4.10), confirms that *L. mutabilis* is the most advanced species in the group. The feeble resolution of the cladograms with all the *L. mutabilis* specimens (Fig. 4.7 & 4.8) used in this study indicates the possibility of reticulating evolution. This means that gene flow between the specimens with x = 6 and 7 still exists or that the lower basic chromosome numbers occurred several times. Gene flow can shift gene frequencies through the exchange of individuals and genetic information between populations, but according to the principle of parsimony, hybridisation seems to be the most viable option.

The preceding data are being supported by the results obtained from crossings between plants with x = 6 (2n = 12) and x = 7 (2n = 14). In these crosses a high frequency of

sterile hybrids with 2n = 13 were expected. All the hybrids, however, seemed to be fertile and all had the somatic chromosome number (12 or 14) of one of the parents. The reason for this phenomenon is indistinct. The absence of the expected frequency can be ascribed to some or other mechanism in the plant which can stabilize the plant cytogenetically. If ever such a mechanism exists, more meiotic cells should be studied in order to observe hybrids with 2n = 13. The chromosomes in general were too small to determine whether the univalent did undergo chromatid -separation during anaphase I, in order to obtain a seven-seven separation. Alternatively the additional chromosome could have disappeared during the process of mitosis during the developing of the plant in order to obtain a hybrid with 2n = 12 or it could have doubled to give a hybrid with 2n = 14. A cytogenetic study should be conducted on the hybrids from the germination stage in order to determine the specific mechanism responsible for this phenomenon.

The practical implication of this study to the breeder is that the species in this group have enough genomic correspondence to be able to form fertile hybrids and if this was not possible, then polyploidisation would be able to overcome infertility. However, it was not possible to determine the degree of heterosis in the group, due to the lack of sufficient hybrids although this phenomenon might occur. The presence of different ploidy levels give breeders the opportunity to experiment with crossings between different ploidy levels in order to obtain sterile hybrids. The advantage of sterile hybrids is the longlivety of the flowers. This directly impacts on the consumer acceptance of the product and gives it an advantage above similar floriculture products like hyacinths.

The genus *Lachenalia* belongs to the family Hyacinthaceae and the order Asparagales. *Lachenalia* is commonly known as the 'Cape Cowslip' and this small bulbous geophyte is endemic to South Africa. The genus contains hundred and twenty species and is essentially a genus of the winter rainfall regions of southern Africa. In an attempt to produce new and better ornamentals, breeding-programmes were developed. The Roodeplaat Vegetable and Ornamental Plant Institute of the ARC (ARC-Roodeplaat) developed an economically viable breeding-programme in South Africa, for the genus *Lachenalia.* The exceptional morphological variation in the genus *Lachenalia* led to the initiation of this breeding-programme in which the genus was developed into an ideal pot plant and twenty-five cultivars have been registered since. Factors of importance in the breeding programme are flower size, genetic variation within the genus, as well as polyploidy. Different chromosome numbers as well as different basic chromosome numbers have been reported for more than fifty *Lachenalia* species. When Crosby (1986) reviewed the genus, chromosome studies [made by Moffett (1936) and Crosby (1986)] lead to the division of the genus into five provisional groups. Basic chromosome numbers were used as one of the criteria in the delimitation of these groups. These chromosome numbers can contribute enormously to the taxonomic classification of the *Lachenalia* species. Very little DNA sequencing has been done in the genus *Lachenalia.*

During this study chromosome numbers (mitosis and meiosis) and DNA sequencing (trnL-F region) were used to evaluate the phylogenetic relationships of the species within the *Lachenalia* orchioides group. Clustal G was used to align the sequences and PAUP to determine the phylogenetic relationship.

The somatic chromosome numbers of 2n = 12, 14, 24, 28, 42 were observed in the *L. orchioides* group. Different basic chromosome numbers (6 and 7) were observed within *L. mutabilis*, but within the rest of the group the basic chromosome number was 7. The basic chromosome number of x = 7 occurs most frequently throughout the *L. orchioides* group and thus seems to be the predominant basic chromosome number. DNA sequencing results supported x=7 as original basic chromosome number of the *L. orchioides* group. *L. fistulosa* has not been classified into a group yet. The strict consensus cladograms (Fig. 4.1-4.4) as well as the basic chromosome

number of seven supports *L. fistulosa* as part of this group. These results support the monophyly of the *L. orchioides* group, which indicates close relationships.

The phylogenetic analysis did not resolve the variation in chromosome numbers of *L. mutabilis*. Molecular cytogenetics (GISH and FISH) together with sequencing of more genes may help to resolve this relationship.

Keywords: *Lachenalia orchioides* group, cytogenetics, basic chromosome number, DNA-sequencing, trn_{L-F} region, genomic relationships.

Die genus *Lachenalia* behoort tot die familie Hyacinthaceae en die orde Asparagales. Hierdie genus is alom bekend as die 'Kaapse Sleutelblom' en is ook endemies tot Suid-Afrika. *Lachenalia* bestaan uit meer as 'n honderd spesies en dit is hoofsaaklik 'n genus wat voorkom in die winterrëenval-gebiede van Suid-Afrika. In die soeke na nuwer en beter sier-plante, is teelprogram ontwikkel. Die Landbou navorsingsraad te Roodeplaat (LNR-Roodeplaat), Pretoria het 'n teelprogram van groot ekonomiese waarde vir *Lachenalia* in Suid-Afrika ontwikkel. Die uitsonderlike morfologiese variasie van die genus het gelei tot die teelprogram waarin die genus tot die ideale potplant ontwikkel is. Vyf-en-twintig kultivars is al geregistreer sedert die begin van hierdie teelprogram. Faktore wat 'n groot rol speel in hierdie teelprogram, is: blomgrootte, genetiese variasie in die genus asook poliploïdie. Versillende chromosoomgetalle sowel as basiese chromosoomgetalle vir meer as vyftig *Lachenalia* spesies is reeds bekend. Crosby (1986) het die genus in oorsig geneem en na verskeie chromosoom-studies (Moffett, 1936; Crosby, 1986) is die genus in vyf voorlopige groepe ingedeel. Basiese chromosoomgetalle was gebruik as een van die bepalende kenmerke in die indeling van hierdie groepe. Hierdie chromosoomgetalle kan grootliks bydrae tot die taksonomiese klassifikasie van die spesies in die genus. Baie min molekulêre werk, veral DNA volgordebepaling is van te vore op *Lachenalia* gedoen.

Chromosoomgetalle (mitose en meiose) asook DNA volgordebepaling is in hierdie studie gebruik om die genomiese verhoudings van die spesies in die *Lachenalia orchioides* groep te evalueer. Die DNA volgordes is in lyn gestel deur Clustal G te gebruik en PAUP is gebruik om al die kladogramme op te stel.

Somatiese chromosoomgetalle van 2n = 12, 14, 24, 28 en 42 is tydens hierdie studie in die *L. orchioides* groep waargeneem. Verskillende basiese chromosoomgetalle van x = 6 en 7 is vir *L. mutabilis* waargeneem, terwyl die res van die groep 'n deurlopende basiese chromosoomgetal van sewe getoon het. Die basiese chromosoomgetal van sewe word as oorheersende basiese chromosoomgetal beskou, omdat dit deurlopend in die groep voorkom. Die DNA volgordebepaling resultate het sewe as basiese chromosoomgetal van die *L. orchioides* groep gesteun. *L. fistulosa* was nog nooit van te vore in enige van die groepe ingedeel nie, maar al die kladogramme (Fig. 4.1-4.4) asook die basiese chromosoomgetal van die

spesie dui daarop dat dit tot die *L. orchioides* groep behoort. Al die resultate steun die monofilie van die groep, wat ‘n aanduiding is dat al die spesies in die groep naverwant aan mekaar is.

Die filogenetiese analise het nie die voorkoms van die verskillende basiese chromosoomgetalle in *L. mutabilis* opgelos nie. Molekulêre sitogenetika (GISH en FISH) tesame met die DNA volgordebepalings van meer gene, mag dalk lig op die verwantskappe werp.

Sleutelwoorde: *Lachenalia orchioides* groep, sitogenetika, basiese chromosoomgetalle, DNA volgordebepaling, trn_{L-F} gebied, genomiese verwantskappe.

ALBERT, V.A., BACKLUND, A., BREMER, K., CHASE, M.W., MANHART, J.R., MISHLER, B.D. & NIXON, K.D. 1994. Functional constraints and *rbc*L evidence for land plant phylogeny. *Annals of the Missouri Botanical Gardens* 81: 534-567.

ALNOUCHE, M.L. & BAYER, R.J. 1997. On the origins of the tetraploid *Bromus* species (section Bromus, Poaceae). Insights from internal transcribed spacer sequences of nuclear ribosomal DNA. *Genome* 40: 730-743.

ALVERSON, W.S., KAROL, K.G., BAUM, D.A., CHASE, M.W., SWENSEN, S.M., McCOURT, R. & SYTSMA, K. 1998. Circumscription of the Malvales and relationships to other Rosidae: evidence from *rbc*L sequence data. *American Journal of Botany* 85: 876-887.

ARNOLD, T.H. & DE WET, B.C. 1993. Plants of Southern Africa: Names and distribution. *Memoirs of the Botanical Survey of South Africa* No. 62: 135, 146-155. National Botanical Institute, Pretoria.

ASMUSSEN, C.B., BAKER, W.J. & DRANSFIELD, J. 2002. Phylogeny of the palm family (Arecaceae) based on *rps 16* intron and *trn*L-F cpDNA sequences. In: Wilson, K.L., Morisson, D.A. (eds.) Systematics and evolution of monocots, CSIRO, Melbourne pp 519-530.

BAKER, J.G. 1897. *Lachenalia Jacq.* In: *Flora Capensis* 6: 421-436, Ed Thistleton-Deyer, W.T., Reeve & Co., London.

BALDWIN, B.G. 1992. Phylogenetic utility of the internal transcribed spacers of nuclear ribosomal DNA in plants: An example of the Compositaeae. *Molecular Phylogenetics and Evolution* 1: 3-16.

BALDWIN, B.G., SANDERSON, M.J., PORTER, J.M., WOJCIECHOWSKI, M.F., CAMPBELL, C.S. & DONOGHUE, M.J. 1995. Utility of nuclear ribosomal DNA internal transcribed spacer sequences in phylogenetic analysis of angiosperms. *Annals of the Missouri Botanical Garden* 82: 247-277.

BARKER, W.F. 1933. *Flowering Plants of South Africa* 13t. 508.

BARKER, W.F. 1989. New taxa and nomenclatural changes in *Lachenalia*. *South African Journal of Botany* 55: 630-646.

BARKER, N.P., LINDER, H.P. & HARLEY, E.H. 1995. Polyphyly of Arundinoidiae (Poaceae): Evidence from *rbc*L sequence data. *Systematic Botany* 20: 423-435.

BAYER, R.J., SOLTIS, D.E. & SOLTIS, P.S. 1996. Phylogenetic inferences in *Antennaria* (Asteraceae: Gnaphalieae: Cassiniinae) based on sequences from nuclear ribosomal DNA internal transcribed spacers. *American Journal of Botany* 83: 516-527.

BOHS, L. & OLMSTEAD, R.G. 1997. Phylogenetic relationships in Solanum (Solanaceae) based in *ndhF* sequences. *Systematic Botany* 22: 5-17.

BOWE, L.M. & de PAMPHILIS, C.W. 1997. Conflict and congruence among tree plant genetic compartments: Phylogenetic analysis of seed plants from the gene sequences, *cox1, rbc*L & 18S rDNA. *American Journal of Botany* 84: 178-179.

BOWEN, C.C. 1956. Freezing by liquid carbon dioxide in making slides permanent. *Stain Technology* 31: 87-90

BOUSQUET, J., STRAUSS, S.H., DOERKENSEN, A.D. & PRICE, R.A. 1992. Extensive variation in evolutionary rate of *rbc*L gene sequences among seed plants. *Proceedings of the National Academy of Sciences USA* 89: 7844-7848.

BRAMLEY, W. 1970. New Lily makes its bow. *Farmer's Weekly* pp68-71.

BREDBOOK, J.R. & BOGORAD, L. 1976. Endonuclease recognition site mapped on *Zea mays* chloropplast DNA. *Proc National Academy of Science* USA 73: 4309-4319.

BREDBOOK, J.R., KOLODNER, R. & BOGORAD, L. 1977. *Zea mays* chloroplast ribosomal RNA genes are part of a 22 000 base pair inverted repeat. *Cell* 11: 739-749.

BREMER, B., ANDREASEN, K. & OLSSON, D. 1995. Subfamilial and tribal relationships in the Rubiaceae based on *rbc*L sequence data. *Annals of the Missouri Botanical Gardens* 82: 383-397.

BREMER, B., OLMSTEAD, R.G., STRUWE, L. & SWEERE, J.A. 1994. *rbc*L sequence support exclusion of Retzia, Desfontainia & Nicodemia from the Gentianales. *Plant Systematic Evolution* 190: 213-230.

BROWN, T.A. 1989. *Genetics: A molecular approach.* London: Van Nostrand Reinhold.

BRUNSFELD, S.J., SOLTIS, P.S., SOLTIS, D.E., GADEK, P.A., QUINN, C.J., STRENGE, D.D. & RANKER, T.A. 1994. Phylogenetic relationships among the genera of Taxodiaceae and Cupressaceae: Evidence from *rbc*L sequences. *Systematic Botany* 19: 253-262.

BURGER, T.H. 1995. *The value of certain cytogenetic and molecular techniques in plant systematics.* M.Sc thesis, University of the Free State, Bloemfontein. South Africa.

CARLSWARD, B.S., WHITTEN, W.M. & WILLIAMS, N.H. 2003. Molecular phylogenetics of neotropical leafless Angraecinae (Orchidaceae): Reevaluation of generic concepts. *International Journal of Plant Sciences* 164: 43-51.

CARNOY, J.B. 1886. La cytodierèse de l'oeuf. *Cellule* 3: 1-92.

CATALÁN, M.P., KELLOGG, E.A. & OLMSTEAD, R.G. 1997. Phylogeny of Poaceae subfamily Pooideae based on chloroplast *ndhF* gene sequences. *Molecular Phylogenetics and Evolution* 8: 150-166.

CHASE, M.W., SOLTIS, D.E., OLMSTEAD, R.G., MORGAN, D., LES, D.H., MISHLER, B.D., DUVALL, M.R., PRICE, R.A., HILLS, H.G., QUI, Y-L., KRON, K.A., RETTIG, R.A., CONTI, E., PALMER, J.D., MANHART, J.R., SYTSMA, K.J., MICHEALS, H.J., KRESS, W.J., KAROL, K.G., CLARK, W.D., HEDREN, M., GAUT, B.S., JANSEN, R.K., KIM, K-J., WIMPEE, C.F., SMITH, J.F., FURNIER, G.R., STRAUSS, S.H., XIANG, Q-Y., PLUNKETT,

G.M., SOLTIS, P.S., SWENSON, S.M., WILLIAMS, S.E., GADEK, P.A., QUINN, C.J., EGUIARTE, L.E., GOLENBERG, E., LEARN, G.H. Jr., GRAHAM, S.W., BARRETT, S.C.H., DAYANANDAN, S. & ALBERT, V.A. 1993. Phylogenetics of seed plants: An analysis of nucleotide sequences from the plastid gene *rbc*L. *Annals of the Missouri Botanical Garden* 80: 528-580.

CHASE, M.W., DE BRUIJN, A.Y., COX, A.V., REEVES, G., RUDALL, P.J., JOHNSON, M.A.T. & EGUIARTE, L.E. 2000. Phylogenetics of Asphodeloideae (Asparagales): An analysis of plastid *rbc*L and *trn*L-F DNA sequences. *Annals of Botany* (London) 86: 935-951.

CHASSOT, P., NEMOMISSA, S., YUAN, Y-M. & KüPFER, P. 2001. High paraphyly of *Swertia* L. (Gentianaceae) in the *Gentianella*-lineage as revealed by nuclear and chloroplast DNA sequence variation. *Plant Systematics and Evolution* 229: 1-21.

CHIANG, T-Y. & SCHAAL, B.A. 2000. Molecular evolution and phylogeny of the *atpB-rbc*L spacer of chloroplast DNA in the true mosses. *Genome* 43: 417-426.

CIVEYREL, L., LE THOMAS, A., FERGUSON, K. & CHASE, M.W. 1998. Critical re-examination of palynological characters used to delimit Asclepiadaceae in comparison to the molecular phylogeny obtained from plastid *matK* sequence. *Molecular Phylogeny Evolution* 9: 517-527.

CLARK, L.G., ZHANG, W. & WENDEL, J.F. 1995. A phylogeny of the grass family (Poaceae) based on *ndhF* sequence data. *Systematic Botany* 20: 436-460.

CLEGG, M.T., LEARN, G.H. & GOLENBERG, E.M. 1991. Molecular evolution of chloroplast DNA. In*: Evolution at the molecular level*. R.K. Selander, A.G. Clark & T.S. Whittam (Editors). Sinauer Associates Inc. Sunderland, Massachusetts.

CLEVINGER, C.C. & PANERO, J.L. 1998. A phylogeny of the grass family (Poaceae) based on *ndhF* sequence data. *Systematic Botany* 20: 436-460.

COBB, B.D. & CLARKSON, S.A. 1994. A simple procedure for optimising the polymerase chain reaction (PCR) using modified Taguchi methods. *Nucleic Acids Research* 22: 3801-3805.

COERTZE, A.F. & HANCKE, F.L. 1987. Ontwikkeling van *Lachenalias* tot kommersiële potplantproduksie. *Navorsingskeur: Plantproduksie* pp125-126. Departement van Landbou en Watervoorsiening, Pretoria.

CONTI, E., FISCHBACH, A. & SYTSMA, K.J. 1993. Tribal relationships in Onagraceae: implications from *rbc*L sequence data. *Annals of the Missouri Botanical Gardens* 80: 672-685.

COSNER, M.E., JANSEN, R.K. & LAMMERS, T.G. 1994. Phylogenetic relationships in the Campanulales based on *rbc*L sequence. *Plant Systematic Evolution* 190: 79-95.

COX, A.V., PRIDGEON, A.M., ALBERT, V.A. & CHASE, M.W. 1997. Phylogenetics of the slipper orchids (Cypripedioideae, Orchiodaceae): nrDNA ITS sequences. *Plant Systematic Evolution* 208: 197-223.

CRAWFORD, D.J. 2000. Plant macromolecular systematics in the past 50 years: one view. *Taxon* 49: 479-501.

CRONQUIST, A. 1981. An intergrated system of classification of flowering plants. Columbia University Press, New York.

CROSBY, T.S. 1978. Hybridisation in the genus *Lachenalia. Veld & Flora* 64: 87-90.

CROSBY, T.S. 1986. The genus *Lachenalia. The Plantsman* 8: 129-166.

CUBAS, P., PARDO, C. & TAHIRI, H. 2002. Molecular approach to the phylogeny and systematics of *Cytisus* (Leguminosae) and related genera based on nucleotide sequences of nr DNA (ITS region) and cpDNA (*trn*L-F intergenic spacer). *Plant Systematics and Evolution* 233: 223-242.

CUéNOUD, P., SAVOLAINEN, V., CHATROU, L.W., POWELL, M., GRAYER, R.J. & CHASE, M.W. 2002. Molecular phylogenetics of Caryophyllales based on

nuclear 18S rDNA and plastid *rbc*L, *atpB,* and *matK* DNA sequences. *American Journal of Botany* 89; 132-144.

DAHLGREN, R.M.T. & CLIFFORD, H.T. & YEO, P.F. 1982. *The monocotyledons: A comparative study.* Academic press, London.

DAHLGREN, R.M.T., CLIFFORD, H.T. & YEO, P.F. 1985. The families of monocotyledons: Structure, Evolution and Taxonomy. Springer-Verlag, New York.

DARLINGTON, C.D. & LACOUR, L.F. 1976. *The handling of chromosomes.* pp 1-201. Allen & Unwin Ltd., London.

DE WET, J.M.J. 1957. Chromosome numbers in the Scilleae. *Cytologia* 22: 145-159.

DOEBLEY, J.F., DURBIN, M., GOLENBERG, E.M., CLEGG, M.T. & MA, D.P. 1990. Evolutionary analysis of the large subunit of carboxylase (*rbc*L) nucleotide sequence among grasses (Gramineae). *Evolution* 44: 1097-1108.

DONOGHUE, M.J., OLMSTEAD, R.G., SMITH, J.F. & PALMER, J.D. 1992. Phylogenetic relationships of Disacales based on *rbc*L sequences. *Annals of the Missouri Botanical Gardens* 79: 333-345.

DOWNIE, S.R., RAMANATH, S., KATZ-DOWNIE, D.S. & LLANAS, E. 1998. Molecular systematics of Apiaceae subfamily Apioideae. Phylogenetic analysis of nuclear ribosomal DNA internal transcribed spacer and plastid *RPOC 1* intron sequence. *American Journal of Botany* 85; 563-591.

DOYLE, J.J. 1993. DNA, phylogeny and the flowering of plant systematics. *Bio Science* 43: 380-389.

DOYLE, J.J., DOYLE, J.L., BALLENGER, J.A., DICKSON, E.E., KAJILA, T. & OHASHI, H. 1997. A phylogeny of the chloroplast gene *rbc*L, in the Leguminosae: Taxonomic correlations and insights into evolution of nodulation. *American Journal of Botany* 84: 541-554.

DUNCAN, G.D. 1988. The *Lachenalia* Handbook. National Botanical Gardens, Cape Town, South Africa.

DUNCAN, G.D. 2002. In: **MANNING, J., GOLDBLATT, P. & SNIJMAN, D.** 2002. The color encyclopedia of Cape bulbs. Timber Press, Inc., Cambridge, UK.

DUVALL, M.R., CLEGG, M.T., CHASE, M.W., CLARK, W.D. KRESS, W.J., EGUIARTE, L.E., SMITH, J.F., GAUT, B.S., ZIMMER, E.A. & LEARNS, G.H. (Jr). 1993. Phylogenetic hypotheses for the monocotyledons constructed from *rbc*L sequence data. *Annals of the Missouri Botanical Gardens* 80: 607-619.

ERIKSSON, T. & DONOGHUE, M.J. 1997. Phylogenetic relationships of *Sambucus* and *Adoxa* (Adoxoideae, Adoxaceae) based on nuclear ribosomal (ITS) sequences and preliminary morphological data. *Systematic Botany* 22: 555-573.

FARRIS, J.S. 1989a. The retention index and homoplasy excess. *Systematic Zoology* 38: 406-407

FARRIS, J.S. 1989b. The retention index and rescaled consistency index. *Cladistics* 5: 417-419.

FAY, M.F. & CHASE, M.W. 1996. Resurrection of Themidaceae for the Brodiaea alliance and recircumscription of Alliaceae, Amaryllidaceae & Agapanthoideae. *Taxon* 45: 441-451.

FAY, M.F., BAYER, C., ALVERSON, W.S., DE BRUIJN, A.Y. & CHASE, M.W. 1998. Plastid *rbc*L sequence data indicate a close affinity between Diegodendron and Bixa. *Taxon* 47: 43-50.

FAY, M.F., RUDALL, P.J., SULLIVA, S., STOBART, K.L., DE BRUIJN, A.Y., REEVES, G., QAMARUZ-ZAMOM, F., HONG, W.P., JOSEPH, J., HAHN, W.J., CONRAN, J.G. & CHASE, M.W. 2000. Phylogenetic studies of Asparagales based on four plastid DNA regions. In: K.L. Wilson & D.A. Morrison. Monocots: Systematics and Evolution pp 360-371. CSIRO publishing. Collingwood, Australia.

FELSENSTEIN, J. 1985. Confidence limits on phylogenies: an approach using the bootstrap. *Evolution* 2:286-293.

FERNANDO, E.S., GADEK, P.A. & QUINN, C.J. 1995. Simaroubaceae, and artificial construct: Evidence from *rbc*L sequence variation. *American Journal of Botany* 82: 92-103.

FUJII, N., TOMARU, N., OKUYAMA, K., KOJKE, T., MIKAMI, T. & UEDA, K. 2002. Chloroplast DNA phylogeography of *Fagus crenata* (Fagaceae) in Japan. *Plant Systematics and Evolution* 232: 21-33.

FUKUDA, T., YOKOYAMA, J. & TSUKAYA, H. 2003. Phylogenetic relationships among species in the genera *Chisocheton* and *Guarea* that have unique indeteminate leaves as inferred from sequences of chloroplast DNA. *International Journal of Plant Sciences* 164: 13-24.

GARCIA-JACAS, N., SUSANNA, A., GARNATJE, T. & VILATERSANA, R. 2001. Generic delimitation and phylogeny of the subtribe Centaureinae (Asteraceae); A combined nuclear and chloroplast DNA analysis. *Annals of Botany* 87: 503-515.

GE, S., LI, A., LU, B., ZHANG, S. & HONG, D. 2002. A phylogeny of the rice tribe Oryzeae (Poaceae) based on *matK* sequence data. *American Journal of Botany* 89: 1967-1972.

GIELLY, L. & TABERLET, P. 1994. The use of chloroplast DNA to resolve plant phylogenies: non-coding versus *rbc*L sequences. *Molecular Biology and Evolution* 11: 769-777.

GIELLY, L. & TABERLET, P. 1996. A phylogeny of the European gentians inferred from chloroplast *trnL* (UAA) intron sequences. *Botanical Journal of the Linneaen Society* 120: 57-75.

GOLDING, J.S. (ed.) 2002. Southern African Plant Red Data Lists. *Southern African Botanical Diversity Network Report* No. 14. SABONET, Pretoria, South Africa.

GOREMYKIN, V , BOBROVA, V., PAHNKE, J., TROITSKY, A., ANTONOV, A. & MARTIN, W. 1996. Noncoding sequences from the slowly evolving chloroplast inverted repeat in addition to *rbc*L data do not support Gnetalean affinities of angiosperms. *Molecular Biology and Evolution* 13: 383-396.

GOTTLIEB, L.D. & JAIN, S.K. 1988. Plant Evolutionary Biology. pp 3-79. Chapman and Hall, New York.

GRANT, V. 1981. *Plant Speciation.* 2nd edition. Columbia University Press, New York.

HALL, J.C., SYTSMA, K.J. & ILTIS, H.H. 2002. Phylogeny of Capparaceae and Brassicaceae based on chloroplast sequence data. *American Journal of Botany* 89: 1826-1842.

HAMBY, R.K. & ZIMMER, E.A. 1988. Ribosomal RNA sequences for inferring phylogeny within the grass family (Poaceae). *Plant Systematics and Evolution* 160: 29-37

HAMBY, R.K. & ZIMMER, E.A. 1992. Ribosomal RNA as phylogenetic tool in plant systematics. In: *Molecular systematics of plants,* eds. P.S. Soltis, D.E. Soltis & J.J. Doyle. pp 50-91. Chapman and Hall, New York.

HANCKE, F.L. 1987. Teling en seleksie van *Lachenalia.* Annual report 1987/88, ARC-Roodeplaat, Pretoria, South Africa.

HANCKE, F.L. 1988. Teling en seleksie van *Lachenalia.* Annual report 1988/89, ARC-Roodeplaat, Pretoria, South Africa.

HANCKE, F.L. 1991. 'n Sitotaksonomiese ondersoek van sewe *Lachenalia* spesies vir gebruik in 'n blomteeltprogram. M.Sc. thesis, University of Pretoria, Pretoria, South Africa.

HANCKE, F.L. 1992. Teling en seleksie van *Lachenalia.* Annual report 1992/93, ARC-Roodeplaat, Pretoria, South Africa.

HANCKE, F.L. & LIEBENBERG, H. 1990. B-chromosomes in some *Lachenalia* species and hybrids. *Journal of South African Botany* 56: 659-664.

HANCKE, F.L. & LIEBENBERG, H. 1998. Meiotic studies of interspesific *Lachenalia* hybrids and their parents. *South African Journal of Botany* 64: 250-255.

HANCKE, F.L., KLEYNHANS, R., LOUW, E., ROODBOL, F. & OELOFSE, O. 1993. Ontwikkeling van *Lachenalia* kultivars. Annual report 1993/94, ARC-Roodeplaat, Pretoria, South Africa.

HANCKE, F.L., KLEYNHANS, R., LOUW, E., ROODBOL, F. & OELOFSE, O. 1994. Ontwikkeling van *Lachenalia* kultivars. Annual report 1994/95, ARC-Roodeplaat, Pretoria, South Africa.

HARDING, J., SINGH, F. & MOL, J.N.M. 1991. *Genetics and breeding of ornamental species*. Kluwer Academic Publishers, Netherlands.

HEYWOOD, V.H. 1993.Flowering plants of the world. Mayflower, New York.

HODKINSON, T.R., CHASE, M.W., TAKAHASHI, C., LEITCH, I.J., BENNETT, M.D. & RENVOIZE, S.A. 2002. The use of DNA sequencing (ITS and *trn*L-F), AFLP, and fluorescent *in situ hybridisation* to study alloploid *Miscanthus* (Poaceae). *American Journal of Botany* 89: 279-286.

HSIAO, C., CHATTERTON, N.J., ASAY, K.H. & JENSEN, K.B. 1994. Phylogenetic relationships of ten grass species: An assessment of phylogenetic utility of the internal transcribed spacer region in nuclear ribosomal DNA in monocots. *Genome* 37: 112-120

HUBER, H. 1969. Die samenmerkmale und verwandtschaftsverhältnisse der Liliiflorae. *Mitt Bot Staatssamml Muechen* 8: 219-538.

JANSEN, R.K., WALLACE, R.S., KIM, K-J. & CHAMBERS, K.L.1991. Systematic implications of chloroplast DNA variation in the subtribe Microseridinae (Asteraceae; Lactuceae). *American Journal of Botany* 78: 1015-1027.

JOBST, J., KING, K. & HEMLEBEN, V. 1998. Molecular evolution of the internal transcribed spacers (ITS1 & ITS2) and phylogenetic relationships among species of the family Cucurbitaceae. *Molecular Phylogeny Evolution* 9: 204-219.

JOHNSON, L.A. & SOLTIS, D.E. 1994. *matK* DNA sequences and phylogenetic reconstruction in Saxifragaceae s. s. *Systematic Botany* 19: 143-156.

JOHNSON, L.A., SCHULTZ, J.L., SOLTIS, D.E. & SOLTIS, P.S. 1996. Monophyly and generic relationships of Polemoniaceae based on *matK* sequences. *American Journal of Botany* 83: 1207-1224.

JOHNSON, M.A.T. & BRANDHAM, P.E. 1997. New chromosome numbers in petaloid monocotyledons and in other miscellaneous agiosperms. *Kew Bulletin* 52: 121-138.

JUDD, W.S., CAMPBELL, C.S., KELLOGG, E.A. & STEVENS, P.F. 1999. *Plant systematics. A phylogenetic approach*. Sinauer Associates, USA.

KHONG, H-Z., CHEN, Z-D. & LU, A-M. 2002. Phylogeny of *Chloranthaceae)* based on nuclear ribosomal ITS and plastid *trn*L-F sequence data. *American Journal of Botany* 89: 940-946.

KILA, Y., UEDA, K. & KADOTA, Y. 1995. Molecular phylogeny and evaluation of the Asian *Acanitum* subgenus Aconitum (Ranunculaceae). *Journal of Plant Research* 108: 429-442.

KIM, J.H., T'HART, H. & MES, T.H. 1996. The phylogenetic position of East Asian *Sedum* species (Crassulaceae) based on chloroplast DNA *trn*L (UAA) – *trn*F (GAA) intergenic spacer sequence variation. *Acta Botanica Neerlandica* 45: 309-321.

KLEYNHANS, R. 1997. Genetic variation in *Lachenalia bulbifera*. M.Sc thesis, University of the Free State, Bloemfontein, South Africa.

KLEYNHANS, R. & HANCKE, F.L. 2002. Problems and Breeding strategies for the development of new *Lachenalia* cultivars. *Acta Horticulturae* 570: 233-237.

KLEYNHANS, R. & SPIES, J.J. 1999. Chromosome number and morphological variation in *Lachenalia bulbifera* (Hyacinthaceae). *South African Journal of Botany* 65: 357-360.

KOEHLER, S., WLLIAMS, N.H., WHITTEN, W.M. & AMARAL, M. do C. 2002. Phylogeny of the *Bifrenaria* (Orchidaceae) complex based on morphology ad sequence data from nuclear rDNA ITS and chloroplast *trn*L-F region. *International Journal of Plant Sciences* 163: 1055-1066.

KRON, K.A. & KING, J.M. 1996. Cladistic relationships of *Kalmia, leiophyllum,* and *loiseleuria* (Phyllodoceae, Ericaceae) based on *rbc*L and nrITS data. *Systematic Botany* 21: 17-29.

KRON, K.A., POWELL, E.A. & LUTEYN, J.L. 2002. Phylogenetic relationships within the blueberry tribe (Vaccinieae, Ericaceae) based on sequence data from *matK* and nuclear ribosomal ITS regions, with comments on the placement of *Satyria*. *American Journal of Botany* 89: 327-336.

LANYON, S.M. 1985. Detecting internal inconsistencies in distance data. *Systematic Zoology* 34: 397-403.

LE ROUX, A. & SCHELPE, E.A.C.L.E. 1981. Colourplates. *South African Wild Flower Guide 1: Namaqualand & Clanwilliam,* pp 34-36.

LI, J., BOGLE, A.L. & KLEIN A.S. 1997. Interspesific relationships & genetic divergence of the disjunct genus *Liquidambar* (Hamamelidaceae) inferred fromDNA sequence of the plastid gene *matK. Rhodora* 99: 299-340.

LI, W-H. & GRAUR, D. (1991). Fundamentals of Molecular Evolution. Sinauer Associates, Sunderland, Massachusetts.

LLEDO, M.D., CRESPO, M.B., CAMERON, K.M., FAY, M.F. & CHASE, M.W. 1998. Systematics of Plumbaginaceae based upon cladistic analysis of *rbc*L sequence data. *Systematic Botany* 23: 21-29.

LLEDO, M.D., KARIS, P.O., CRESPO, M.B., FAY, M.F. & CHASE, M.W. 2001. Phylogenetic position and taxonomic status of the genus *Aegialitis* and subfamilies Staticoideae and Plumbaginoideae (Plumbaginaceae): evidence from plastid DNA sequences and morphology. *Plant Systematics and Evolution* 229: 107-124.

LOPéZ, G.G., KAMIYA, K. & HARADA, K. 2002. Phylogenetic relationships of *Diploxylon* pines (subgenus *Pinus*) based on plastid sequence data. *International Journal of Plant Sciences* 163: 737-747.

LUBBINGE, J. 1980. *Lachenalia* breeding I. Introduction. *Acta Horticulturae* 109:289-295.

MAGUIRE, T.L., RONAN, J.G., COLLINS, G.G. & SEDGELEY, M. 1997. Molecular analysis of interspesific and intergenic relationships of *Banksia*, using RAPD's and non-coding cpDNA sequences. *Theoretical and Applied Genetics* 95: 253-260.

MANNING, J.C. & VAN DER MERWE, A.M. 2002. Systematics of the genus *Daubenya* (Hyacinthaceae: Massonieae). *Bothalia* 32: 133-150

MASON, H. 1972. Colourplates. *Western Cape Sandveld Flowers,* pp 30-33.

MAST, A.R. & GIVNISH, T.J. 2002. Historical biiogeography and the origin of stomatal distributions in *Banksia* and *Dryandra* (Proteaceae) based on their cpDNA phylogeny. *American Journal of Botany* 89: 1311-1323.

MAYER, V., MöLLER, M., PERRET, M. & WEBER, A. 2003. Phylogenetic position and generic diffiretiation of Epithemateae (Gesneriaceae) inferred from plastid DNA sequence data. *American Journal of Botany* 90: 321-329.

MAXAM, A.M. & GILLBERT,W. 1977. A new method of sequencing DNA. *Proceedings of the National Academy of Science, USA* 74: 5463-5467.

MC DADE, L.A. & MOODY, M.L. 1999. Phylogenetic relationships among Acanthaceae: Evidence from noncoding *trn*L- *trn*F chloroplast DNA sequences. *American Journal of Botany* 86: 70-80.

MEEROW, A.W., FAY, M.F., GUY, C.L., LI, Q-B., ZAMAN, F.Q. & CHASE, M.W. 1999. Systematics of Amaryllidaceae based on cladistic analysis of plastid *rbc*L and *trn*L-F sequence data. *American Journal of Botany* 86: 1325-1345.

MEEROW, A.W., GUY, C.L., LI, Q-B., YANG, S-L. 2000. Phylogeny of the American Amaryllidaceae based on nrDNA ITS sequences. *Systematic Botany* 25: 708-726.

MEEROW, A.W., LEHMILLER, D. & CLAYTON, J.R. 2003. Phylogeny and biogeography of *Crinum* L. (Amaryllidaceae) inferred from nuclear and limited plastid non-coding DNA sequences. *Botanical Journal of the Linnean Society* 141: 349-363.

MEEROW, A.W. & SNJIMAN, D.A. 2001. Phylogeny of Amaryllidaceae Tribe Amaryllideae based on nrDNA ITS sequences and morphology. *American Journal of Botany* 88: 2321-2330.

MES, T.H., VAN BREDERODE, J. & T'HART, H. 1996. Origin of the woody *Macaronesien* Sempervivoideae and the phylogenetic position of East African species of *Aeonium*. *Botanica Acta* 109: 477-491.

MES, T.H., WIJERS, G.J. & T'HART, H. 1997. Phylogenetic relationships in *Monanthes* (Crassuluceae) based on morphological, chloroplast and nuclear DNA variation. *Journal of Evolutionary Biology* 10: 193-216.

MEVE, U. & LIEDE, S. 2001. Inclusion of *Tenaris* and *Macropetalum* in *Brachystelma* (Apocynaceae-Asclepiadoideae-Ceropegieae) inferred from non-coding nuclear and chloroplast DNA sequences. *Plant Systematics and Evolution* 228: 89-105.

MILLER, J.T. & BAYER, R.J. 2001. Molecular phylogenetics of Acacia (Fabaceae: Mimosoideae) based on the chloroplast *matK* coding sequence and flanking *trn*K intron spacer regions. *American Journal of Botany* 88: 697-705.

MOFFETT, A.A. 1936. The Cytology of *Lachenalia. Cytologia* 7: 490-498.

MOGFORD, D.J. 1978. Centromeric heterochromatin in *Lachenalia tricolor* (L.) Thunb. *South African Journal of Botany* 44: 111-117.

MöLLER, M. & CRONK, Q.C.B. 1997. Origin and relationships of Saintpaulia (Gesneriaceae) based on nrDNA ITS sequences. *American Journal of Botany* 84: 956-965.

MOORE, F.W. 1891. *Lachenalias. Journal of the Royal Horticultural Society* 216-231.

MOORE, F.W. 1905. *Lachenalia* hybrids. *The Gardeners Cronicle* 37:210-211.

MORT, M.E., SOLTIS, D.E. & SOLTIS, P.S. 1998. Molecular systematics of *Crassulaceae* based on *matK* sequence data. *American Journal of Botany* 85 Supplement: 145-146.

MORT, M.E., SOLTIS, D.E., SOLTIS, P.S., FRANCISCO-ORTEGA, J. & SANTOS-GUERRA, A. 2001. Phylogenetic relationships and evolution of Crassulaceae inferred from *matK* sequence data. *American Journal of Botany* 88: 76-91.

MORTON, C.M., CHASE, M.W., KRON, K.A. & SWENSEN, S.M. 1996. A molecular evaluation of the monophyly of the order Ebenales based upon *rbc*L sequence data. *Systematic Botany* 21: 567-586.

MUELLNER, A.N., SAMUEL, R., JOHNSON, S.A., CHEEK, M., PENNINGTON, T.D. & CHASE, M.W. 2003. Molecular phylogenetics of Meliaceae

(Spapindales) based on nuclear and plastid DNA sequences. *American Journal of Botany* 90: 471-480.

MUMMENHOFF, K., BRüGGEMANN, H. & BOWMAN, J.L. 2001. Chloroplast DNA phylogeny and biogeography of *Lepidium* (Brassicaceae). *American Journal of Botany* 88: 2051-2063.

MUNRO, S.L. & LINDER, H.P. 1998. The phylogenetic postion of Prionium (Juncaceae) within the order Juncales based on morphological & *rbc*L data. *Systematic Botany* 23: 43-55.

NEYLAND, R & URBATSCH, L.E. 1996. Phylogeny of subfamily Epidendroideae (Orchidaceae) inferred from *ndhF* chloroplast gene sequences. *American Journal of Botany* 83: 1195-1206.

NICHOLL, D.S.T. 1994. An Introductionto genetic engineering. Cambridge University Press.

NORDENSTAM, B. 1982. Chromosome numbers of southern African plants 2. *Journal of South African Botany* 48: 273-275.

NYFFLER, R. 2002. Phylogenetic relationships in the cactus family (Cactaceae) based on evidence from *trn*K, *matK* and *trn*L-*trn*F sequences. *American Journal of Botany* 89: 312-326.

OLMSTEAD, R.G. & PALMER, J.D. 1994. Chloroplast DNA systematics: A review of methods and analysis. *American Journal of Botany* 81: 1205-1224.

ORNDUFF, R. & WATTER, P.J. 1978. Chromosome numbers in *Lachenalia* (Liliaceae). *Journal of South African Botany* 44: 387-390.

PALMER, J.D. 1985. Comparative organisation of chloroplast genomes. *Annual Review of Genetics* 19: 325-354.

PALMER, J.D. 1992. Mitochondrial DNA in plant systematics: applications and limitations. In: *Molecular Systematics of Plants*, eds. P.S. Soltis, D.E. Soltis & J.J. Doyle, pp 36-49. Chapman & Hall, New York.

PALMER, J.D., JANSEN, R.K., MICHEALS, H.J., CHASE, M.W. & MANHART, J.R. 1988. Chloroplast DNA variation and plant phylogeny. *Annals of Missouri Botanical Gardens* 75: 1180-1206.

PELSER, P.B., GRAVENDEEL, B. & VAN DER MEIJDEN, R. 2002. Tackling speciose genera: species composition and phylogenetic position of *Senecio* sect. *Jacobaea* (Asteraceae) based on plastid and nrDNA sequences. *American Journal of Botany* 89: 929-939.

PERSSON, C. 2001. Phylogenetic relationships in *Polygalaceae* based on plastid DNA sequences from the *trn*L-F region. *Taxon* 50: 763-779.

PFOSSER, M. & SPETA, F. 1999. Phylogenetics of Hyacinthaceae based on plastid DNA sequences. *Annals of the Missouri botanical gardens* 86: 852-875.

PLUNKETT, G.M., SOLTIS, D.E. & SOLTIS, P.S. 1996. Evolutionary patterns in Apiaceae: Inferences based on *matK* sequence data. *Systematic Botany* 21: 477-495.

PLUNKETT, G.M., SOLTIS, D.E. & SOLTIS, P.S. 1997. Clarification of the relationship between Apiaceae: Inferences based on *matK* and *rbc*L sequence data. *American Journal of Botany* 84: 565-580.

PRIDGEON, A.M., SOLANO, R. & CHASE, M.W. 2001. Phylogenetic relationships in Pleurotrhallidinae (Orchidaceae): combined evidence from nuclear and plastid DNA sequences. *American Journal of Botany* 88: 2286-2308.

PRYER, K.M., SMITH, A.R. & SKOG, J.E. 1995. Phylogenetic relationships of extant ferns based on evidence from morphology and *rbc*L sequences. *American Fern Journal* 85: 203-282.

POTTER, D., GAO, F., BORTIRI, P.E., OH, S-H. & BAGGETT, S. 2002. Phylogenetic relationships in Rosaceae inferred from chloroplast *matK* and *trn*L-*trn*F nucleotide sequence data. *Plant Systematics and Evolution* 231: 77-89.

PYCK, N., VAN LYSEBETTEN, A., STESSENS, J. & SMETS, E. 2002. The phylogeny of Patrinieae sensu Graebner (Valerianaceae) revisited: Additional evidence from *ndhF* sequence data. *Plant Systematics and Evolution* 233: 29-46.

QUI, Y.L., LEE, J.H., BERNASCONI-QUADRONI, F., SOLTIS, D.E., SOLTIS, P.S., ZANIS, M., ZIMMER, E.A., CHEN, Z.D., SAVOLAINEN, V. & CHASE, M.W.

1999. The earliest angiosperms: evidence from mitochondrial, plastid and nuclear genomes. *Nature* 402: 404-407.

RAVEN, P.H. 1975. The bases of angiosperm phylogeny: Cytology. *Annals of the Missouri Botanical Gardens.* 62:724-764.

RAZAFIMANDIMBISON, S.G. & BREMER, B. 2002. Phylogeny and classification of Naucleeae s.l. (Rubiaceae) inferred from molecular (ITS, *rbc*L, and *trn*T-F) and morphological data. *American Journal of Botany* 89: 1027-1041.

RICE, E.G. & COMPTON, R.H. 1951. Colourplates. *Wild Flowers of the Cape Good Hope,* plates 236-239.

RICE, K.A., DONOGHUE, M.J. & OLMSTEAD, R.G. 1997. Analysing large datasets: *rbc*L 500 revisited, *Systematic Biology* 46: 554-563.

RICHARDSON, J.E., FAY, M.F., CRONK, Q.C.B., BOWMAN, D. & CHASE, M.W. 1997. A molecular analysis using *rbc*L and *trn*L-F plastid sequences. *American Journal of Botany* 84: Supplement 227.

RICHARDSON, J.E., WEITZ, F.M., FAY, M.F., CRONK, Q.C.B., LINDER, H.P., REEVES, G. & CHASE, M.W. 2001. Phylogenetic analysis of *Phylica* L. (*Rhamnaceae*) with emphasis on island species: evidence from plastid *trn*L-F and nuclear internal transcribed spacer (ribosomal) DNA sequences. *Taxon* 50: 405-427.

RIEGER, R., MICHEALIS, A. & GREEN, M.M. 1976. *Glossary of Genetics and Cytogenetics.* pp 1-647. Springer-Verlag, Berlin.

RILEY, H.P. 1962. Chromosome studies in some South African monocotyledons. *Canadian Journal of Genetics and Cytology* 4: 40-55.

ROGSTAD, S.H. 1992. Saturated NaCl-CTAB solution as a means of field preservation of leaves for DNA analysis. *Taxon* 41: 701-708.

ROVA, J.H.E., DELPRETE, P.G., ANDERSSON, L. & ALBERT, V.A. 2002. A *trn*L-F cp DNA sequence study of the Condamineeae-Rondeletieae-Sipaneeae complex with implications on the phylogeny of the Rubiaceae. *American Journal of Botany* 89: 145-159.

SALAZAR, G.A., CHASE, M.W., ARENAS, M.A.S. & INGROUILLE, M. 2003. Phylogenetics of Cranichideae with emphasis on Spiranthinae (Orchidaceae, Orchidoideae): evidence from plastid and nuclear DNA sequences. *American Journal of Botany* 90: 777-795.

SAMEUL, R., STUESSY, T.F., TREMETSBERGER, K., BAEZA, C.M. & SILJAK-YAKOVIEV, S. 2003. Phylogenetic relationships among species of *hypochaeris* (asteraceae, Cichoriae) based on ITS, plastid *trn*L intron, *trn*L-F spacer, and *matK* sequences. *American Journal of Botany* 90: 496-507.

SANDERS, E.R., KAROL, K.G. & McCOURT, R.M. 2003. Occurrence of *matK* in a *trn*K group II intron in charophyte green algae and phylogeny of the Characeae. *American Journal of Botany* 90: 628-633.

SANG, T., CRAWFORD, D.J. & STUESSY, T.F. 1997.Chloroplast DNA phylogeny, reticulate evolution, and biogeography of *Paeonia* (Paeoniaceae). *American Journal of Botany* 84: 1120-1136.

SANGER, T., NICKLEN, S. & COULSON, A.R. 1977. DNA sequencing with chain termination inhibitors. *Proceedings of the National Academy of Science, USA* 74:5463-5467.

SHI, S., HUANG, Y., ZHONG, Y., DU, Y., ZHANG, Q., CHANG, H. & BOUFFORD, D.E. 2001. Phylogeny of the Altingiaceae based on cpDNA *matK*, PY-IGS and nrDNA ITS sequences. *Plant Systematics and Evolution* 230: 13-24.

SIDALL, M.E. 1995. Another monophyly index: revisiting the jackknife. *Cladistics* 11: 33-56.

SINCLAIR, W.T., MILL, R.R., GARDENER, M.F., WOLTZ, P., JAFFRé, T. PRESTON, J., HOLLINGSWORTH, M.L., PONGE, A. & MöLLER, M. 2002. Evolutionary relationships of the New Caledonian heterotrophic conifer, *Parasitaxus usta* (Podocarpaceae), inferred from chloroplast *trnL-F* intron/ spacer and nuclear rDNA ITS 2 sequences. *Plant Systematics and Evolution* 233: 79-104.

SINGH, R.J. 1993. *Plant cytogenetics.* CRC Press, Incorporated, 2000 Corporate Baulevard, North West, Boca Raton, Florida, 33431.

SOLTIS, P.S. & SOLTIS, D.E. 1995. Alternative genes for phylogenetic reconstruction in plants: Introduction. *Annals of the Missouri Botanical Gardens* 82: 147-148.

SOLTIS, D.E. & SOLTIS, P.S. 1998. Choosing an approach and an appropriate gene for phylogenetic analysis. In: *Molecular systematics of plants* II. Soltis, D.E., Soltis, P.S. & Doyle, J.J. (Editors). Kluwer Academic Publishers. Boston, Dordrecht, London. Pp: 1-86.

SOLTIS, D.E., KUZOFF, R.K., CONTI, E., GORNALL, R. & FERGUSON, K. 1996. *matK* and *rbc*L gene sequence data indicate that *Saxifraga* (Saxifragaceae) is polyphyletic. *American Journal of Botany* 83: 371-382.

SOLTIS, P.S., SOLTIS, D.E. & DOYLE, J.J. 1992. Preface. In: *Molecular systematics of plants,* eds. P.S. Soltis, D.E. Soltis & J.J. Doyle. pp ix-xii. Chapman and Hall, New York.

SOLTIS, D.E., TAGO-NAKAZAWA, M., XIANG, Q-Y., KAWANO, S., MURATA, J., WAKABAYASHI, M. & HIBSCH-JETTER, C. 2001. Phylogenetic relationships and evolution in Chrysosplenium (Saxifragaceae) based on *matK* sequence data. *American Journal of Botany* 88: 883-893.

SPETA, F. 1979. Karyological investigation in *Scilla* in regard to their importance for taxonomy. *Webbia* 34: 419-431.

SPETA, F. 1998. *Hyacinthaceae* In: *The Families and genera of vascular plants*, eds. K. Kubitzki, 261-285, Springer, New York.

SPIES, J.J., DUPREEZ, J.L., MINNAAR, A. & KLEYNHANS, R. 2000. Hyacinthaceae: Chromosome studies on African plants. 13. *L. mutabilis, L. pustulata, L. unicolor. Bothalia* 30: 106-111.

SPIES, J.J., VAN DER MERWE, E., DU PLESSIS, H. & SAAYMAN, E.J.L. 1991. Basic chromosome numbers and polyploid levels in some South African and Australian grasses (Poaceae). *Bothalia* 21: 163-170.

SPIES, J.J., VAN ROOYEN, P. & KLEYNHANS, R. 2002. The subgeneric delimitation of *Lachenalia* (Hyacinthaceae). *Acta Horticulturae* 570: 225-231.

STARR, J.R., BAYER, R.J. & FORD, B.A. 1999. The phylogenetic position of *Carex* section *Phyllostachys* and ITS implications for phylogeny and subgeneric

circumscription in *Carex* (Cyperaceae). *American Journal of Botany* 86: 563-577

STEBBINS, G.L. 1971. *Chromosomal Evolution in Higher Plants*. Edward Anorld, London.

STEELE, K.P. & VILGALYS, R. 1994. Phylogenetic analysis of Polemoniaceae using nucleotide sequences of the plastid gene *matK*. *Systematic Botany* 19: 126-142.

SUGIURA, M. 1992. The chloroplast gene. *Plant Molecular Biology* 19: 149-158.

SUN, H., MC LEWIN, W. & FAY, M.F. 2001. Molecur phylogeny of *Helleborus* (*Ranunculaceae*), with emphasis on the East Asian – Mediterranean disjunction. *Taxon* 50: 1001-1018.

SWANSON, C.P., MERZ, T. & YOUNG, W.J. 1967. *Cytogenetics.* Prentice-Hall, Incorporated, Englewood Cliffs, New Jersey.

SWOFFORD, D.L. 1998. *PAUP*. Phylogenetic analysis using parsimony (* and other methods). Version 4.0ß5 for Macintosh*. Sinauer Associates, Sunderland, Massachusetts.

SYTSMA, K.J., ZJHIA, **M.L., NEPOKROEFF, M., QUINN, C.J. & WILSON, P.G.** 1998. Phylogenetic relationships, morphological evolution and biogeography in Myrtaceae based on *ndhF* sequence analysis. *American Journal of Botany* 85 Supplement: 161.

TABERLET, P., GIELLY, L., PAUTOU, G. & BOUVET, J. 1991. Universal primers for amplification of three non-coding regions of chloroplast DNA. *Plant Molecular Biology.* 17:1105-1109.

TAGUCHI, G. 1986. *Introduction to quality engineering.* Asian Productivity Organisation. UNIPUB, New York.

TAGUCHI, G. & WU, Y. 1980. *Introduction to off-line quality control.* Japan Quality Control Organisation. Nagoya, Japan.

THOMPSON,J.D., GIBSON,T.J., PLEWNIAK,F., JEANMOUGIN,F. AND HIGGINS,D.G. 1997. The Clustal X windows interface: flexible strategies for

multiple sequence alignment aided by quality analysis tools. Nucleic Acids Research, 24:4876-4882. **Clustal G** (Gebaseer op Clustal X)

TERRY, R.G., BROWN, G.K. & OLMSTEAD, R.G. 1997a. Examination of subfimilial phylogeny in Bromeliaceae using comparative sequencing of the plastid locus *ndhF*. *American Journal of Botany* 84: 664-670.

TERRY, R.G., BROWN, G.K. & OLMSTEAD, R.G. 1997b. Phylogenetic relationships in subfamily Tillandsioideae (Bromeliaceae) using *ndhF* sequences. *Systematic Botany* 22: 333-345.

VALIEJO-ROMAN, C.M., TERENTIEVA, E.I., SAMIGULLIN, T.H. & PIMENOV, M.G. 2002. nrDNA ITS sequences and affinities of Sino-Himalayan Apioideae (Umbelliferae). *Taxon* 51: 685-701.

VAN DEN HEEDE, C.J., VIANE, R.L.L. & CHASE, M.W. 2003. Phylogenetic analysis of *Asplenium* subgenus *Ceterach* (Pteridophyta: Aspleniaceae) based on plastid and nuclear ribosomal ITS DNA sequences. *American Journal of Botany* 90: 481-495.

VAN DER BANK, M., FAY, M.F. & CHASE, M.W. 2002. Molecular phylogenetics of Thymelaeaceae with particular reference to African and Australian genera. *Taxon* 51: 329- 339.

WEDIN, M., BALOCH, E. & GRUBE, M. 2002. Parsimony analysis of mtSSU and nITS rDNA sequences reveal the natural relationships of the lichen families Physciaceae and Caliaceae. *Taxon* 51: 655-660.

WHITLOCK, B.A., KAROL, K.G. & ALVERSON, W.S. 2003. Chloroplast DNA sequencing confirm the placement of the enigmatic *Oceanopapaver* within *Corchorus* (Grewioideae: Malvaceae S.L. formerly Tiliaceae). *International Journal of Plant Sciences* 164: 35-41.

WILSON, P.G., GADEK, P.A. & QUINN, P.J. 1996. Phylogeny of Myrtaceae and its allies based on *matK* sequence data. *American Journal of Botany* 83 Supplement: 202.

XIANG, Q-Y., SOLTIS, D.E. & SOLTIS, P.S. 1998. Phylogenetic relationships of Cornaceae and close relatives inferred from *matK* and *rbc*L sequences. *American Journal of Botany* 85: 285-297.

YOO, K-O., PORTER, P., LOWRY, H. & WEN, J. 2002. Discordance of chloroplast and nuclear ribosomal DNA data in *Osmorhiza* (Apiceae). *American Journal of Botany* 89: 966-971.

YOUNG, N.D., HEALY. 2003. Gapcoder automates the use of indel characters in phylogenetic analysis. *BMC Bioinformatics* 4:6

ZIMMER, E.A., RAOLSON, E.H., SKOG, L.E., BOGGA, J.K. & IDNURM, A. 2002. Phylogenetic relationships in the Gesneriodeae (Gesneriaceae) based on nrDNA ITS and cpDNA *trn*L-F and *trn*E-T spacer region sequences. *American Journal of Botany* 89: 296-311.

ZURAWSKI, G., BOTTOMLEY, W. & WHITFIELD, P.R. 1984. Junctions of the large single copy region of the inverted repeats in *Spinacia oleracea* and *Nicotiana debneyi* chloroplast DNA: sequence of the genes for $tRNA^{HIS}$ and the ribosomal proteins S19 and L2. *Nucleic Acids Research* 12: 6547-6558.

APPENDIX A: Aligned sequences of the trn_{L-F} region of the dataset with all specimens studied, using CLUSTAL G. *Indicates sequences from Paula Spies.

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                                1                                                 50
L. mutabilis 6753               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6756               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6757               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6762               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 8000               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6746               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 8047               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6745               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6755               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6772               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6764               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6770               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6773               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6766               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6776               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6775               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 8006               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6744               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6771               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 8042               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6768               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6750               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6767               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6751               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6749               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6747               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 8032               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. arbuthnotiae 7711*           GGAAGAATCGAATATTATT-TGAAAAACTGATTAATCGGACGAGGAATAA
L. arbuthnotiae 8054            GGAAGAATCGAATATTATT-TGAAAAACTGATTAATCGGACGAGGAATAA
L. arbuthnotiae 8055            GGAAGAATCGAATATTATT-TGAAAAACTGATTAATCGGACGAGGAATAA
L. fistulosa 8064               GGAAGAATCGAATATAATTACGAA-AACTGATTAATCGGACGAGGAATAA
L. fistulosa 8058               GGAAGAATCGAATATTATT-TGAAAAACTGATTAATCGGACGAGGAATAA
L. fistulosa 8062               G-----------TATAATTACGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8089              G-----------TATAATTACGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8093              G-----------TATAATTACGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8073              G-----------TATAATTACGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8090              G-----------TATAATTACGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8069              G-----------TATAATTACGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 7802*             GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8100              GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 7806*             GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8101              GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 8022                 GGAAGAATCGAATATAGTTACGAA-AACTGATTAATCGG-CGAGGAATAA
L. elegans 8019                 GGAAGAATCGAATATAATTACCAAAAACTGATTAATCGG-CGAGGAATAA
L. elegans 8024                 GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 8027                 GGAAGAATCGAATATAGTTACGAAAAACTGATTAATCGG-CGAGGAATAA
L. elegans 7735*                GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 7736*                GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 8026                 GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 7734*                GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 8018                 GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 7737*                GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 8020                 GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. rosea 7827*                  GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. unicolor 7846*               GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. aloides 7698*                GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. pusilla 7820*                GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
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L. unifolia 7850*        GGAAGAATC-AATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
M. depressa 7870*        GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA

                         51                                                100
L. mutabilis 6753        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6756        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6757        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6762        --AGAGAGTACCGG--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 8000        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6746        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 8047        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6745        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6755        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6772        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6764        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6770        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6773        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6766        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6776        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6775        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 8006        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6744        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6771        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 8042        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6768        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6750        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6767        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6751        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6749        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6747        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 8032        --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. arbuthnotiae 7711*    AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. arbuthnotiae 8054     AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. arbuthnotiae 8055     AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. fistulosa 8064        AGAGAGAGTACCGTTCTACATGTCAATACCCACAACA-TGGATTTTTATT
L. fistulosa 8058        AGAGAGAGTACCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. fistulosa 8062        AGAGAGAGTACCGTTCTACATGTCAATACCCACAACA-TGGATTTTTATT
L. orchioides 8089       AGAGAGAGTACCGTTCTACATGTCAATACCGACAACAATGGATTTTTATT
L. orchioides 8093       AGAGAGAGTACCGTTCTACATGTCAATACCGACAACAATGGATTTTTATT
L. orchioides 8073       AGAGAGAGTACCGTTCTACATGTCAATACCGACAACAATGGATTTTTATT
L. orchioides 8090       AGAGAGAGTACCGTTCTACATGTCAATACCGACAACAATGGATTTTTATT
L. orchioides 8069       AGAGAGAGTACCGTTCTACATGTCAATACCGACAACAATGGATTTTTATT
L. orchioides 7802*      AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. orchioides 8100       AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. orchioides 7806*      AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. orchioides 8101       AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. elegans 8022          AGAGAGAGTACCGTTCTACATGTCAATACCGACAACA-TGGATTTTTATT
L. elegans 8019          AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 8024          AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 8027          AGAGAGAGTACCGTTCTACATGTCAATACCCACAACA-TGGATTTTTATT
L. elegans 7735*         AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 7736*         AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 8026          AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 7734*         AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 8018          AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 7737*         AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 8020          AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. rosea 7827*           AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. unicolor 7846*        AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. aloides 7698*         AGAGAGAGTCCTGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. pusilla 7820*         AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
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L. unifolia 7850*        AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
M. depressa 7870*        AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA

                         101                                              150
L. mutabilis 6753        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAA-GTCATGTCAACTT
L. mutabilis 6756        GGGGGATAGAGGGACTTGAACCCTCACGATTTCTATAGTCATGTCAACTT
L. mutabilis 6757        GGGGGATAGAGGGACTTGAACCCTCACGATTTCTATAGTCATGTCAACTT
L. mutabilis 6762        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 8000        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6746        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAA-T-ATGTCAACTT
L. mutabilis 8047        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6745        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6755        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAA-GTCATGTCAACTT
L. mutabilis 6772        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6764        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6770        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6773        GGGG-ATAGAGGGACTTGA-CCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6766        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6776        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6775        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 8006        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6744        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6771        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 8042        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6768        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6750        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6767        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6751        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6749        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6747        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 8032        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAG-CATGTCAACTT
L. arbuthnotiae 7711*    GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. arbuthnotiae 8054     GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. arbuthnotiae 8055     GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. fistulosa 8064        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAA-GTCATGTCAACTT
L. fistulosa 8058        GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. fistulosa 8062        GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAA-GTCATGTCAACTT
L. orchioides 8089       GGGG-ATAGAGGGACTTGAACCCTCCCGATTTCTAAAG-CATGTCAACTT
L. orchioides 8093       GGGG-ATAGAGGGACTTGAACCCTCCCGATTTCTAAAG-CATGTCAACTT
L. orchioides 8073       GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. orchioides 8090       GGGG-ATAGAGGGACTTGAACCCTCCCGATTTCTAAAG-CATGTCAACTT
L. orchioides 8069       GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. orchioides 7802*      GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. orchioides 8100       GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. orchioides 7806*      GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. orchioides 8101       GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 8022          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. elegans 8019          GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 8024          GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 8027          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. elegans 7735*         GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 7736*         GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 8026          GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 7734*         GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 8018          GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 7737*         GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 8020          GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. rosea 7827*           GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. unicolor 7846*        GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. aloides 7698*         GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. pusilla 7820*         GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
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L. unifolia 7850*        GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
M. depressa 7870*        GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT

                                 151                                     200
L. mutabilis 6753        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6756        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6757        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6762        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 8000        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6746        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA---ACGGAT
L. mutabilis 8047        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6745        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6755        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6772        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6764        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6770        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6773        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6766        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6776        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6775        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACG-AT
L. mutabilis 8006        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6744        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6771        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 8042        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA---ACGGAT
L. mutabilis 6768        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6750        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6767        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6751        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6749        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6747        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 8032        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. arbuthnotiae 7711*    CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. arbuthnotiae 8054     CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. arbuthnotiae 8055     CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. fistulosa 8064        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. fistulosa 8058        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. fistulosa 8062        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. orchioides 8089       CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA-CGACGGAT
L. orchioides 8093       CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA-CGACGGAT
L. orchioides 8073       CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. orchioides 8090       CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA-CGACGGAT
L. orchioides 8069       CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. orchioides 7802*      CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. orchioides 8100       CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. orchioides 7806*      CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. orchioides 8101       CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 8022          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. elegans 8019          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 8024          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 8027          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. elegans 7735*         CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 7736*         CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 8026          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 7734*         CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 8018          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 7737*         CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 8020          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. rosea 7827*           CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. unicolor 7846*        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. aloides 7698*         CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. pusilla 7820*         CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
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L. unifolia 7850*          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
M. depressa 7870*          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T

                           201                                              250
L. mutabilis 6753          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCAT-TG
L. mutabilis 6756          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6757          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6762          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 8000          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6746          TT---T--C--CT-TAC---ATAAA-T-T--------------TC---TG
L. mutabilis 8047          TT---TTCC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6745          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6755          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6772          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6764          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6770          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6773          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6766          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6776          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6775          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 8006          TT---T-CCCTCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6744          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6771          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATT-G
L. mutabilis 8042          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6768          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6750          TT---T-CC-TC-T-TA---ATAAA-T-T--------------TCATGTG
L. mutabilis 6767          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6751          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6749          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6747          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 8032          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. arbuthnotiae 7711*      TCAAGT-CCCTCTATCCC-CAATAAA--------------AAGATCATTG
L. arbuthnotiae 8054       TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. arbuthnotiae 8055       TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. fistulosa 8064          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. fistulosa 8058          TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. fistulosa 8062          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. orchioides 8089         TT-----CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. orchioides 8093         TT-----CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. orchioides 8073         TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. orchioides 8090         TT-----CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. orchioides 8069         TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. orchioides 7802*        TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. orchioides 8100         TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. orchioides 7806*        TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. orchioides 8101         TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 8022            TT---T-CC-TCT-TAC---ATAAAAT-T--------------TCATTTG
L. elegans 8019            TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 8024            TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 8027            TT---T-CC-TCT-TAC---ATAAAAT-T--------------TCATTTG
L. elegans 7735*           TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 7736*           TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 8026            TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 7734*           TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 8018            TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 7737*           TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 8020            TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. rosea 7827*             TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. unicolor 7846*          TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATTATTTG
L. aloides 7698*           TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. pusilla 7820*           TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
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L. unifolia 7850*          TCAAGT-CCCTCTATCCCCAATAAA--------------AAGACCATTTG
M. depressa 7870*          TCAAGT-CCCTCTATCCCCAATAAACTGTCCCCAATAAAAAGACCATTTG

                           251                                              300
L. mutabilis 6753          --T-CGGTA-TG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6756          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6757          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6762          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 8000          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6746          ----CGGTATTGACAC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 8047          --T-CGGTATTG--CC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6745          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6755          --T-CGGTA-TG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6772          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6764          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6770          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6773          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6766          --T-CGGTATTG--AC-AT------GTAGGACGGGACTCTCTCTTTATT-
L. mutabilis 6776          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6775          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 8006          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6744          --T-CGG-ATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6771          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 8042          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6768          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6750          --T-CG-TATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6767          --T-CGGTATTG--AC-AT------GTAGGACGGGACTCTCTCTTTATT-
L. mutabilis 6751          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6749          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6747          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 8032          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. arbuthnotiae 7711*      ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. arbuthnotiae 8054       ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. arbuthnotiae 8055       ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. fistulosa 8064          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. fistulosa 8058          ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. fistulosa 8062          --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. orchioides 8089         --T-CGGTATTGG-AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. orchioides 8093         --T-CGGTATTGG-AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. orchioides 8073         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. orchioides 8090         --T-CGGTATTGG-AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. orchioides 8069         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. orchioides 7802*        ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. orchioides 8100         ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. orchioides 7806*        ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. orchioides 8101         ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. elegans 8022            --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. elegans 8019            ACTTC----TT--AACTATTTATCTTTA--TC----CTC-CTTTTT-TT-
L. elegans 8024            ACTTC----TT--AACTATTTATCTTTA--TC----CTC-CTTTTT-TT-
L. elegans 8027            --T-CGGTATTG-AACTATTTATCTTTAG-ACGGGACTCTCTCTTTATT-
L. elegans 7735*           ACTTC----TT--AACTATTTATCTTTA--TC----CTC-CTTTTT-TT-
L. elegans 7736*           ACTTC----TT--AACTATTTATCTTTA--TC----CTC-CTTTTT-TT-
L. elegans 8026            ACTTC----TT--AACTATTTATCTTTA--TC----CTC-CTTTTT-TT-
L. elegans 7734*           ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. elegans 8018            ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. elegans 7737*           ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. elegans 8020            ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. rosea 7827*             ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. unicolor 7846*          ACTTC----TT--AACTATC-----T-A--TC----CTC-CTTTTT-TT-
L. aloides 7698*           ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. pusilla 7820*           ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TTT
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L. unifolia 7850*          ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
M. depressa 7870*          ACTTC----TT--AACTAT------TTA--TC----TTC-CTTTTT-TT-

                           301                                              350
L. mutabilis 6753          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----
L. mutabilis 6756          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----
L. mutabilis 6757          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----
L. mutabilis 6762          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----
L. mutabilis 8000          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----
L. mutabilis 6746          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----
L. mutabilis 8047          ---TCGTCCGATTA-TCAATCAGTTTTTCAAAAA-GG-GGTCTATT----
L. mutabilis 6745          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----
L. mutabilis 6755          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----
L. mutabilis 6772          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----
L. mutabilis 6764          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----
L. mutabilis 6770          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----
L. mutabilis 6773          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----
L. mutabilis 6766          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----
L. mutabilis 6776          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----
L. mutabilis 6775          -C-TCGTCCGATTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----
L. mutabilis 8006          -C-TCGTCCGATTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----
L. mutabilis 6744          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----
L. mutabilis 6771          -C-TCG-CCGATTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----
L. mutabilis 8042          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAA-GG-GGTCTATT----
L. mutabilis 6768          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----
L. mutabilis 6750          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----
L. mutabilis 6767          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----
L. mutabilis 6751          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----
L. mutabilis 6749          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----
L. mutabilis 6747          -C-TCGTCCGATTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----
L. mutabilis 8032          -C-TCGTCCGATTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----
L. arbuthnotiae 7711*       -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. arbuthnotiae 8054       -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. arbuthnotiae 8055       -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. fistulosa 8064          -C-TCGTCCGATTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----
L. fistulosa 8058          -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. fistulosa 8062          -C-TCGTCCGATTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----
L. orchioides 8089         -C-TCGTCCGATTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----
L. orchioides 8093         -C-TCGTCCGATTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----
L. orchioides 8073         -C-TCGTCCGATTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----
L. orchioides 8090         -C-TCGTCCGATTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----
L. orchioides 8069         -C-TCGTCCGATTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----
L. orchioides 7802*        -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. orchioides 8100         -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. orchioides 7806*        -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. orchioides 8101         -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. elegans 8022            -C-TCGTCCGATTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----
L. elegans 8019            -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTACT----
L. elegans 8024            -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTACT----
L. elegans 8027            -C-TCGTCCGATTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----
L. elegans 7735*           -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTACT----
L. elegans 7736*           -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTACT----
L. elegans 8026            -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTACT----
L. elegans 7734*           -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. elegans 8018            -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. elegans 7737*           -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. elegans 8020            -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. rosea 7827*             -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. unicolor 7846*          TCGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. aloides 7698*           -CGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
L. pusilla 7820*           TCGTAG--CGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----
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L. unifolia 7850*        TCGTAG--CGGTTAG---------TT--CA-AATATCTT-TCTATTCATT
M. depressa 7870*        -CGTAG--TGGTTAAT-AA--A--TT--CA-A-TATCTT-TCTATTCATT

                         351                                             400
L. mutabilis 6753        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6756        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6757        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6762        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 8000        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6746        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 8047        AAACTCTGGAATGA----TTT-GATC-CTGAA-TATTCGATTCTTCC--G
L. mutabilis 6745        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6755        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6772        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6764        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6770        AAACTCTGGAATGA----TT---T-GATCACTGAA-TATATTCTTCC--G
L. mutabilis 6773        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6766        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6776        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6775        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 8006        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6744        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6771        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 8042        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6768        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6750        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6767        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6751        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6749        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 6747        AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATTCTTCC--G
L. mutabilis 8032        AAACTCTGGAATGAATGATTT-GATCACTGAA-TATTCGATTCTTCC--G
L. arbuthnotiae 7711*    ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. arbuthnotiae 8054     ATACTCT----T--------TCG--CA---AA-TA---GAT----NNGGG
L. arbuthnotiae 8055     ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. fistulosa 8064        AAACTCTGGAATGAATGATTT-GATCACTGAA-TATTCGATTCTTCC--G
L. fistulosa 8058        ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. fistulosa 8062        AAACTCTGGAATGAATGATTT-GATCACTGAA-TATTCGATTCTTCC--G
L. orchioides 8089       AAACTCTGGAATGAATGATTT-GATCACTGAA-TATTCGATTCTTCC--G
L. orchioides 8093       AAACTCTGGAATGAATGATTT-GATCACTGAA-TATTCGATTCTTCC--G
L. orchioides 8073       AAACTCTGGAATGAATGATTT-GATCACTGAA-TATTCGATTCTTCC--G
L. orchioides 8090       AAACTCTGGAATGAATGATTT-GATCACTGAA-TATTCGATTCTTCC--G
L. orchioides 8069       AAACTCTGGAATGAATGATTT-GATCACTGAA-TATTCGATTCTTCC--G
L. orchioides 7802*      ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. orchioides 8100       ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. orchioides 7806*      ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. orchioides 8101       ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. elegans 8022          AAACTCTGGAATGAATGATTT-GATCACTGAA-TATTCGATTCTTCC--G
L. elegans 8019          ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. elegans 8024          ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. elegans 8027          AAACTCTGGAATGAATGATTT-GATCACTGAA-TATTCGATTCTTCC--G
L. elegans 7735*         ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. elegans 7736*         ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. elegans 8026          ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. elegans 7734*         ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. elegans 8018          ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. elegans 7737*         ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. elegans 8020          ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. rosea 7827*           ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. unicolor 7846*        ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. aloides 7698*         ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
L. pusilla 7820*         ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
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L. unifolia 7850*        ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG
M. depressa 7870*        ATACTCT----T--------TCG--CA---AA-TA---GAT----CCGGG

                                401                                       450
L. mutabilis 6753         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT-
L. mutabilis 6756         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 6757         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 6762         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 8000         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT-
L. mutabilis 6746         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT-
L. mutabilis 8047         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT-
L. mutabilis 6745         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT-
L. mutabilis 6755         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT-
L. mutabilis 6772         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT-
L. mutabilis 6764         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT-
L. mutabilis 6770         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 6773         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 6766         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 6776         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 6775         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 8006         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 6744         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT-
L. mutabilis 6771         TCAACTTC-ATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT-
L. mutabilis 8042         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT-
L. mutabilis 6768         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 6750         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 6767         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 6751         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 6749         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 6747         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. mutabilis 8032         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. arbuthnotiae 7711*     -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. arbuthnotiae 8054      -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. arbuthnotiae 8055      -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. fistulosa 8064         TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. fistulosa 8058         -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. fistulosa 8062         TCAACTTCGATTGGAATAGATCCACCTCTGAA-TTTGCATATATTGCAT-
L. orchioides 8089        TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. orchioides 8093        TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. orchioides 8073        TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. orchioides 8090        TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. orchioides 8069        TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. orchioides 7802*       -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. orchioides 8100        -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. orchioides 7806*       -CAAAATC--TTGG-ATCTATTC----CT-A--TTAGG---T-TTGAATA
L. orchioides 8101        -CAAAATC--TTGG-ATCTATTC----CT-A--TTAGG---T-TTGAATA
L. elegans 8022           TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. elegans 8019           -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. elegans 8024           -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. elegans 8027           TCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT-
L. elegans 7735*          -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. elegans 7736*          -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. elegans 8026           -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. elegans 7734*          -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. elegans 8018           -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. elegans 7737*          -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. elegans 8020           -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. rosea 7827*            -CAAAATC--TTGG-ATCTATCCATCCCT-A--TTAGG---T-TTGAATA
L. unicolor 7846*         -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. aloides 7698*          -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
L. pusilla 7820*          -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA
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L. unifolia 7850*        -CAAAATC--TTG-----TATCC----CT-A--TTAGG---T-TTGAATA
M. depressa 7870*        -CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATA

                         451                                              500
L. mutabilis 6753        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6756        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6757        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6762        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 8000        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6746        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 8047        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6745        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6755        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6772        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6764        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6770        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6773        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6766        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6776        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6775        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 8006        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6744        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-AT-AATC--
L. mutabilis 6771        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 8042        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6768        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6750        -ATACG-GTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6767        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6751        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6749        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 6747        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. mutabilis 8032        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. arbuthnotiae 7711*    GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. arbuthnotiae 8054     GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. arbuthnotiae 8055     GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. fistulosa 8064        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. fistulosa 8058        GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. fistulosa 8062        -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. orchioides 8089       -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. orchioides 8093       -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. orchioides 8073       -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. orchioides 8090       -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. orchioides 8069       -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. orchioides 7802*      GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. orchioides 8100       GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. orchioides 7806*      GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. orchioides 8101       GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. elegans 8022          -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. elegans 8019          GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. elegans 8024          GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. elegans 8027          -ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--
L. elegans 7735*         GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. elegans 7736*         GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. elegans 8026          GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. elegans 7734*         GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. elegans 8018          GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. elegans 7737*         GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. elegans 8020          GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. rosea 7827*           GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. unicolor 7846*        GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. aloides 7698*         GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
L. pusilla 7820*         GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
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L. unifolia 7850*        GATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCC
M. depressa 7870*        GATACCTG--TACA-AATGAACAT--ATAT--GGTCAAGGAAT---TCCC

                         501                                             550
L. mutabilis 6753        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6756        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6757        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6762        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 8000        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6746        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 8047        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6745        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6755        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6772        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6764        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6770        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6773        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6766        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6776        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6775        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 8006        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6744        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6771        GT--T-G-A-TATG-C--AGT--A-G-T-A--A--CGTACGTATT-GATA
L. mutabilis 8042        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6768        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6750        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6767        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6751        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6749        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 6747        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. mutabilis 8032        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. arbuthnotiae 7711*    ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. arbuthnotiae 8054     ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. arbuthnotiae 8055     ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. fistulosa 8064        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. fistulosa 8058        ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. fistulosa 8062        GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. orchioides 8089       GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. orchioides 8093       GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. orchioides 8073       GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. orchioides 8090       GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. orchioides 8069       GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. orchioides 7802*      ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. orchioides 8100       ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. orchioides 7806*      ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. orchioides 8101       ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. elegans 8022          GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. elegans 8019          ATTATTGAATTAT-TCACAGCCCATAATCATTATCCTTAC--ATTACA-A
L. elegans 8024          ATTATTGAATTAT-TCACAGCCCATAATCATTATCCTTAC--ATTACA-A
L. elegans 8027          GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATA
L. elegans 7735*         ATTATTGAATTAT-TCACAGCCCATAATCATTATCCTTAC--ATTACA-A
L. elegans 7736*         ATTATTGAATTAT-TCACAGCCCATAATCATTATCCTTAC--ATTACA-A
L. elegans 8026          ATTATTGAATTAT-TCACAGCCCATAATCATTATCCTTAC--ATTACA-A
L. elegans 7734*         ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. elegans 8018          ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. elegans 7737*         ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. elegans 8020          ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. rosea 7827*           ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. unicolor 7846*        ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. aloides 7698*         ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
L. pusilla 7820*         ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A
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L. unifolia 7850*        ATTATTGAATTAT-TCAC----CATA-TCATTATCCTTAC--ATTACA-A
M. depressa 7870*        ATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-A

                         551                                              600
L. mutabilis 6753        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. mutabilis 6756        TATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCT
L. mutabilis 6757        TATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCT
L. mutabilis 6762        TATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCT
L. mutabilis 8000        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. mutabilis 6746        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. mutabilis 8047        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. mutabilis 6745        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. mutabilis 6755        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. mutabilis 6772        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. mutabilis 6764        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. mutabilis 6770        TATA-GGTCCACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCT
L. mutabilis 6773        TATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCT
L. mutabilis 6766        TATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCT
L. mutabilis 6776        TATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCT
L. mutabilis 6775        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. mutabilis 8006        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. mutabilis 6744        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. mutabilis 6771        TATA-GGTCCACCCTTTCTTTAATTTGCGATAGAAGGAT-TGATTATTCT
L. mutabilis 8042        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. mutabilis 6768        TATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCT
L. mutabilis 6750        TATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCT
L. mutabilis 6767        TATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCT
L. mutabilis 6751        TATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCT
L. mutabilis 6749        TATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCT
L. mutabilis 6747        TATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCT
L. mutabilis 8032        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. arbuthnotiae 7711*    AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. arbuthnotiae 8054     AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. arbuthnotiae 8055     AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. fistulosa 8064        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. fistulosa 8058        AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. fistulosa 8062        TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. orchioides 8089       TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. orchioides 8093       TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. orchioides 8073       TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. orchioides 8090       TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. orchioides 8069       TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCT
L. orchioides 7802*      AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. orchioides 8100       AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. orchioides 7806*      AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. orchioides 8101       AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. elegans 8022          TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T----ATTCT
L. elegans 8019          AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. elegans 8024          AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. elegans 8027          TATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T----ATTCT
L. elegans 7735*         AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. elegans 7736*         AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. elegans 8026          AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. elegans 7734*         AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. elegans 8018          AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. elegans 7737*         AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. elegans 8020          AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. rosea 7827*           AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. unicolor 7846*        AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. aloides 7698*         AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
L. pusilla 7820*         AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A
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L. unifolia 7850*        AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAAA---A
M. depressa 7870*        AAAAA-GTC-----TT-CTT---TTT------GAA-GATCT-AAGA---A

                         601                                              650
L. mutabilis 6753        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6756        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6757        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6762        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 8000        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6746        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 8047        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6745        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6755        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6772        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6764        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6770        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6773        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6766        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6776        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6775        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 8006        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6744        ATTCCGGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6771        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 8042        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6768        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6750        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6767        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6751        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6749        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 6747        ATTCCTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAAC
L. mutabilis 8032        ATTCCTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAAC
L. arbuthnotiae 7711*    ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. arbuthnotiae 8054     ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. arbuthnotiae 8055     ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. fistulosa 8064        ATTCCTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAAC
L. fistulosa 8058        ATT-CGG--ACTG-------------G--GTCAA----ATT--TTT-AAT
L. fistulosa 8062        ATTCCTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAAC
L. orchioides 8089       ATTCCTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAAC
L. orchioides 8093       ATTCCTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAAC
L. orchioides 8073       ATTCCTGTTATTATA----AC-CAACGTAGTCAACTCCATTCGTTAGAAC
L. orchioides 8090       ATTCCTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAAC
L. orchioides 8069       ATTCCTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAAC
L. orchioides 7802*      ATT-CGG--ACTG-------------G--GTCAA----ATT--TTT-AAT
L. orchioides 8100       ATT-CGG--ACTG-------------G--GTCAA----ATT--TTT-AAT
L. orchioides 7806*      ATT-CGG--ACTG-------------G--GTCAA----ATT--TTT-AAT
L. orchioides 8101       ATT-CGG--ACTG-------------G--GTCAA----ATT--TTT-AAT
L. elegans 8022          ATTCCTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAAC
L. elegans 8019          ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. elegans 8024          ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. elegans 8027          ATTCCTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAAC
L. elegans 7735*         ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. elegans 7736*         ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. elegans 8026          ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. elegans 7734*         ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. elegans 8018          ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. elegans 7737*         ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. elegans 8020          ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. rosea 7827*           ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. unicolor 7846*        ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
L. aloides 7698*         ATT-CGG--ACTG-------------G--GTCAA----ATT--TTT-AAT
L. pusilla 7820*         ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
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L. unifolia 7850*        ATT-CGG--ACTA-------------G--GTCAA----ATT--TTT-AAT
M. depressa 7870*        ATT-CAG--ACTA-------------G--GTCAA----ATT--TTT-AAT

                         651                                             700
L. mutabilis 6753        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6756        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6757        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6762        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 8000        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6746        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 8047        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6745        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6755        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6772        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6764        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6770        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6773        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6766        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6776        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6775        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 8006        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6744        AGCTTCCATTG-GTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6771        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 8042        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6768        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6750        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6767        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6751        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6749        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 6747        AGCTTCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAG
L. mutabilis 8032        AGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTT-AT-TCTAG
L. arbuthnotiae 7711*    AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. arbuthnotiae 8054     AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. arbuthnotiae 8055     AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. fistulosa 8064        AGCTTCCATTGAGTCTCT-GCACC--TATCCCT-TTTTTTTTAT-TCTAG
L. fistulosa 8058        AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. fistulosa 8062        AGCTTCCATTGAGTCTCT-GCACC--TATCCCT-TTTTTTTTAT-TCTAG
L. orchioides 8089       AGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTT-AT-TCTAG
L. orchioides 8093       AGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTT-AT-TCTAG
L. orchioides 8073       AGCTTCCATTGAGTCTCT-GCACC--TATCCCCTTTTTTTTTAT-TCTAG
L. orchioides 8090       AGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTT-AT-TCTAG
L. orchioides 8069       AGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTTTAT-TCTAG
L. orchioides 7802*      AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. orchioides 8100       AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. orchioides 7806*      AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. orchioides 8101       AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. elegans 8022          AGCTTCCATTGAGTCTCT-GCACC--TATCCCCCTTTTTTTTCTATCTAG
L. elegans 8019          AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. elegans 8024          AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. elegans 8027          AGCTTCCATTGAGTCTCT-GCACC--TATCCCCCTTTTTTTTCTATCTAG
L. elegans 7735*         AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. elegans 7736*         AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. elegans 8026          AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. elegans 7734*         AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. elegans 8018          AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. elegans 7737*         AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. elegans 8020          AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. rosea 7827*           AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. unicolor 7846*        AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. aloides 7698*         AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
L. pusilla 7820*         AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-
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L. unifolia 7850*       AGTTT---TTG-GTCTA-------TTTA--C-----------AT----A-
M. depressa 7870*       AGTTT---TTG-GTCTATTTAA--TTTA--C-----------AT----A-

                         701                                              750
L. mutabilis 6753        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6756        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6757        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6762        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 8000        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6746        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTCCA
L. mutabilis 8047        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6745        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6755        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6772        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6764        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6770        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6773        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6766        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6776        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6775        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 8006        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6744        TC-AGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6771        TT-AGTTTTTAAACCCT-GTTTTTC-TAAAAAT-AAAGAT-TTGGCTCCA
L. mutabilis 8042        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTCCA
L. mutabilis 6768        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6750        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6767        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6751        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6749        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 6747        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. mutabilis 8032        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. arbuthnotiae 7711*    -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. arbuthnotiae 8054     -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. arbuthnotiae 8055     -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. fistulosa 8064        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. fistulosa 8058        -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. fistulosa 8062        TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. orchioides 8089       TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. orchioides 8093       TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. orchioides 8073       TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTCCA
L. orchioides 8090       TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. orchioides 8069       TCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-A
L. orchioides 7802*      -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. orchioides 8100       -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. orchioides 7806*      -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. orchioides 8101       -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. elegans 8022          TCTAGTTTTTAAACCCTTGTTTTTC-T-------AAAGAT-T-GGCTC-A
L. elegans 8019          -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. elegans 8024          -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. elegans 8027          TCTAGTTTTTAAACCCTTGTTTTTC-T-------AAAGAT-T-GGCTC-A
L. elegans 7735*         -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. elegans 7736*         -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. elegans 8026          -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. elegans 7734*         -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. elegans 8018          -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. elegans 7737*         -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. elegans 8020          -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. rosea 7827*           -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. unicolor 7846*        -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ATT--A
L. aloides 7698*         -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
L. pusilla 7820*         -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
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L. unifolia 7850*        -C-A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--A
M. depressa 7870*        -C-A-TAT-TACA---TAG------ATA----TAAGT-ATCT--ACT--A

                         751                      778
L. mutabilis 6753        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6756        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6757        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6762        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 8000        GGATTGCC-CATTTTT-GTTCCAGGGG
L. mutabilis 6746        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 8047        GGATTGCC-CATTTTT-GTTCCAGGGG
L. mutabilis 6745        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6755        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6772        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6764        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6770        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6773        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6766        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6776        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6775        GGATTGCC-CATTTTT-GTTCCAGGGG
L. mutabilis 8006        GGATTGCC-CATTTTT-GTTCCAGGGG
L. mutabilis 6744        G-ATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6771        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 8042        GGATTGCC-CATTTTT-GTTCCAGGGG
L. mutabilis 6768        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6750        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6767        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6751        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6749        GGATTGCC-CATTTTTAGTTCCAGGGG
L. mutabilis 6747        GGATTGCC-CATTTTT-GTTCCAGGGG
L. mutabilis 8032        GGATTGCC-CATTTTTAGTTCCAGGGG
L. arbuthnotiae 7711*    GGA-TG----AT-----G---CACGGG
L. arbuthnotiae 8054     GGA-TG----AT-----G---CACGGG
L. arbuthnotiae 8055     GGA-TG----AT-----G---CACGGG
L. fistulosa 8064        GGATTGCC-CATTTTTAGTTCCAGGGG
L. fistulosa 8058        GGA-TG----AT-----G---CACGGG
L. fistulosa 8062        GGATTGCC-CATTTTTAGTTCCAGGGG
L. orchioides 8089       GGATTGCC-CATTTTTAGTTCCAGGGG
L. orchioides 8093       GGATTGCC-CATTTTTAGTTCCAGGGG
L. orchioides 8073       GGATTGCC-CATTTTTAGTTCCAGGGG
L. orchioides 8090       GGATTGCC-CATTTTTAGTTCCAGGGG
L. orchioides 8069       GGATTGCC-CATTTTTAGTTCCAGGGG
L. orchioides 7802*      GGA-TG----AT-----G---CACGGG
L. orchioides 8100       GGA-TG----AT-----G---CACGGG
L. orchioides 7806*      GGATTG----AT-----G---CACGGG
L. orchioides 8101       GGATTG----AT-----G---CACGGG
L. elegans 8022          GGATTGCC-CATTTTTAGTTCCAGGGG
L. elegans 8019          GGA--G----AT-----G---CACGGG
L. elegans 8024          GGA--G----AT-----G---CACGGG
L. elegans 8027          GGATTGCC-CATTTTTAGTTCCAGGGG
L. elegans 7735*         GGA-TG----AT-----G---CACGGG
L. elegans 7736*         GGA--G----AT-----G---CACGGG
L. elegans 8026          GGA--G----AT-----G---CACGGG
L. elegans 7734*         GGA-TG----AT-----G---CACGGG
L. elegans 8018          GGA-TG----AT-----G---CACGGG
L. elegans 7737*         GGA--G----AT-----G---CACGGG
L. elegans 8020          GGA--G----AT-----G---CACGGG
L. rosea 7827*           GGA-TG----AT-----G---CACGGG
L. unicolor 7846*        GGA--G----AT-----G---CACGGG
L. aloides 7698*         GGA-TG----AT-----G---CACGGG
L. pusilla 7820*         GGA-TG----AT-----G---CACGGG
```

*L. unifolia 7850** GGA--G----AT-----G---CACGGG
*M. depressa 7870** GGA--G----AT-----G---CACGGG

APPENDIX B: Aligned sequences of the trn_{L-F} region of the dataset with all specimens with a basic chromosome number of 7, using CLUSTAL G. *Indicates sequences from Paula Spies.

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                                1                                                  50
L. mutabilis 6753               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6756               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6757               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6762               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 8000               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 8047               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6745               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6755               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6764               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6770               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6773               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6766               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6776               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 8042               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6768               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6767               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6749               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 6747               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. mutabilis 8032               GGAA---TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT--
L. arbuthnotiae 7711*           GGAAGAATCGAATATTATT-TGAAAAACTGATTAATCGGACGAGGAATAA
L. arbuthnotiae 8054            GGAAGAATCGAATATTATT-TGAAAAACTGATTAATCGGACGAGGAATAA
L. arbuthnotiae 8055            GGAAGAATCGAATATTATT-TGAAAAACTGATTAATCGGACGAGGAATAA
L. fistulosa 8064               GGAAGAATCGAATATAATTACGAA-AACTGATTAATCGGACGAGGAATAA
L. fistulosa 8058               GGAAGAATCGAATATTATT-TGAAAAACTGATTAATCGGACGAGGAATAA
L. fistulosa 8062               G-----------TATAATTACGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8089              G-----------TATAATTACGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8093              G-----------TATAATTACGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8073              G-----------TATAATTACGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8090              G-----------TATAATTACGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8069              G-----------TATAATTACGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 7802*             GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8100              GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 7806*             GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. orchioides 8101              GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 8022                 GGAAGAATCGAATATAGTTACGAA-AACTGATTAATCGG-CGAGGAATAA
L. elegans 8019                 GGAAGAATCGAATATAATTACCAAAAACTGATTAATCGG-CGAGGAATAA
L. elegans 8024                 GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 8027                 GGAAGAATCGAATATAGTTACGAAAAACTGATTAATCGG-CGAGGAATAA
L. elegans 7735*                GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 7736*                GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 8026                 GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 7734*                GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 8018                 GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 7737*                GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. elegans 8020                 GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. rosea 7827*                  GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. unicolor 7846*               GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. aloides 7698*                GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. pusilla 7820*                GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
L. unifolia 7850*               GGAAGAATC-AATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA
M. depressa 7870*               GGAAGAATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAA

                                51                                                 100
L. mutabilis 6753               --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
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L. mutabilis 6756          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6757          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6762          --AGAGAGTACCGG--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 8000          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 8047          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6745          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6755          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6755          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6770          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6773          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6766          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6776          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 8042          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6768          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6767          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6749          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 6747          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. mutabilis 8032          --AGAGAGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATT
L. arbuthnotiae 7711*      AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. arbuthnotiae 8054       AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. arbuthnotiae 8055       AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. fistulosa 8064          AGAGAGAGTACCGTTCTACATGTCAATACCCACAACA-TGGATTTTTATT
L. fistulosa 8058          AGAGAGAGTACCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. fistulosa 8062          AGAGAGAGTACCGTTCTACATGTCAATACCCACAACA-TGGATTTTTATT
L. orchioides 8089         AGAGAGAGTACCGTTCTACATGTCAATACCGACAACAATGGATTTTTATT
L. orchioides 8093         AGAGAGAGTACCGTTCTACATGTCAATACCGACAACAATGGATTTTTATT
L. orchioides 8073         AGAGAGAGTACCGTTCTACATGTCAATACCGACAACAATGGATTTTTATT
L. orchioides 8090         AGAGAGAGTACCGTTCTACATGTCAATACCGACAACAATGGATTTTTATT
L. orchioides 8069         AGAGAGAGTACCGTTCTACATGTCAATACCGACAACAATGGATTTTTATT
L. orchioides 7802*        AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. orchioides 8100         AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. orchioides 7806*        AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. orchioides 8101         AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGGAATTTTATA
L. elegans 8022            AGAGAGAGTACCGTTCTACATGTCAATACCGACAACA-TGGATTTTTATT
L. elegans 8019            AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 8024            AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 8027            AGAGAGAGTACCGTTCTACATGTCAATACCCACAACA-TGGATTTTTATT
L. elegans 7735*           AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 7736*           AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 8026            AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 7734*           AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 8018            AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 7737*           AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. elegans 8020            AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. rosea 7827*             AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. unicolor 7846*          AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. aloides 7698*           AGAGAGAGTCCTGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. pusilla 7820*           AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
L. unifolia 7850*          AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA
M. depressa 7870*          AGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATA

                           101                                             150
L. mutabilis 6753          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAA-GTCATGTCAACTT
L. mutabilis 6756          GGGGGATAGAGGGACTTGAACCCTCACGATTTCTATAGTCATGTCAACTT
L. mutabilis 6757          GGGGGATAGAGGGACTTGAACCCTCACGATTTCTATAGTCATGTCAACTT
L. mutabilis 6762          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 8000          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 8047          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6745          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6755          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAA-GTCATGTCAACTT
L. mutabilis 6755          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
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L. mutabilis 6770          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6773          GGGG-ATAGAGGGACTTGA-CCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6766          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6776          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 8042          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6768          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6767          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6749          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 6747          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. mutabilis 8032          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAG-CATGTCAACTT
L. arbuthnotiae 7711*      GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. arbuthnotiae 8054       GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. arbuthnotiae 8055       GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. fistulosa 8064          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAA-GTCATGTCAACTT
L. fistulosa 8058          GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. fistulosa 8062          GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAA-GTCATGTCAACTT
L. orchioides 8089         GGGG-ATAGAGGGACTTGAACCCTCCCGATTTCTAAAG-CATGTCAACTT
L. orchioides 8093         GGGG-ATAGAGGGACTTGAACCCTCCCGATTTCTAAAG-CATGTCAACTT
L. orchioides 8073         GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. orchioides 8090         GGGG-ATAGAGGGACTTGAACCCTCCCGATTTCTAAAG-CATGTCAACTT
L. orchioides 8069         GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. orchioides 7802*        GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. orchioides 8100         GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. orchioides 7806*        GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. orchioides 8101         GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 8022            GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. elegans 8019            GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 8024            GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 8027            GGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTT
L. elegans 7735*           GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 7736*           GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 8026            GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 7734*           GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 8018            GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 7737*           GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. elegans 8020            GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. rosea 7827*             GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. unicolor 7846*          GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. aloides 7698*           GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. pusilla 7820*           GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
L. unifolia 7850*          GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT
M. depressa 7870 *         GGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTT

                                   151                                     200
L. mutabilis 6753          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6756          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6757          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6762          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 8000          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 8047          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6745          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6755          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6755          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6770          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6773          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6766          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6776          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 8042          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA---ACGGAT
L. mutabilis 6768          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6767          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 6749          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
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L. mutabilis 6747          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. mutabilis 8032          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. arbuthnotiae 7711*      CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. arbuthnotiae 8054       CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. arbuthnotiae 8055       CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. fistulosa 8064          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. fistulosa 8058          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. fistulosa 8062          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. orchioides 8089         CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA-CGACGGAT
L. orchioides 8093         CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA-CGACGGAT
L. orchioides 8073         CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. orchioides 8090         CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA-CGACGGAT
L. orchioides 8069         CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. orchioides 7802*        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. orchioides 8100         CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. orchioides 7806*        CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. orchioides 8101         CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 8022            CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. elegans 8019            CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 8024            CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 8027            CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGAT
L. elegans 7735*           CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 7736*           CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 8026            CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 7734*           CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 8018            CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 7737*           CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. elegans 8020            CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. rosea 7827*             CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. unicolor 7846*          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. aloides 7698*           CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. pusilla 7820*           CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
L. unifolia 7850*          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T
M. depressa 7870*          CGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-T

                           201                                           250
L. mutabilis 6753          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCAT-TG
L. mutabilis 6756          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6757          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6762          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 8000          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 8047          TT---TTCC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6745          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6755          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6755          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6770          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6773          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6766          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6776          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 8042          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6768          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6767          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6749          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 6747          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. mutabilis 8032          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. arbuthnotiae 7711*      TCAAGT-CCCTCTATCCC-CAATAAA--------------AAGATCATTG
L. arbuthnotiae 8054       TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. arbuthnotiae 8055       TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. fistulosa 8064          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. fistulosa 8058          TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. fistulosa 8062          TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
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L. orchioides 8089        TT-----CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. orchioides 8093        TT-----CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. orchioides 8073        TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. orchioides 8090        TT-----CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. orchioides 8069        TT---T-CC-TCT-TAC---ATAAA-T-T--------------TCATTTG
L. orchioides 7802*       TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. orchioides 8100        TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. orchioides 7806*       TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. orchioides 8101        TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 8022           TT---T-CC-TCT-TAC---ATAAAAT-T--------------TCATTTG
L. elegans 8019           TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 8024           TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 8027           TT---T-CC-TCT-TAC---ATAAAAT-T--------------TCATTTG
L. elegans 7735*          TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 7736*          TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 8026           TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 7734*          TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 8018           TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 7737*          TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. elegans 8020           TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. rosea 7827*            TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. unicolor 7846*         TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATTATTTG
L. aloides 7698*          TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. pusilla 7820*          TCAAGT-CCCTCTATCCCCAATAAA--------------AAGATCATTTG
L. unifolia 7850*         TCAAGT-CCCTCTATCCCCAATAAA--------------AAGACCATTTG
M. depressa 7870*         TCAAGT-CCCTCTATCCCCAATAAACTGTCCCCAATAAAAAGACCATTTG

                          251                                          300
L. mutabilis 6753         --T-CGGTA-TG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6756         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6757         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6762         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 8000         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 8047         --T-CGGTATTG--CC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6745         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6755         --T-CGGTA-TG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6755         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6770         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6773         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6766         --T-CGGTATTG--AC-AT------GTAGGACGGGACTCTCTCTTTATT-
L. mutabilis 6776         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 8042         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6768         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6767         --T-CGGTATTG--AC-AT------GTAGGACGGGACTCTCTCTTTATT-
L. mutabilis 6749         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 6747         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. mutabilis 8032         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. arbuthnotiae 7711*     ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. arbuthnotiae 8054      ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. arbuthnotiae 8055      ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. fistulosa 8064         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. fistulosa 8058         ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. fistulosa 8062         --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. orchioides 8089        --T-CGGTATTGG-AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. orchioides 8093        --T-CGGTATTGG-AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. orchioides 8073        --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. orchioides 8090        --T-CGGTATTGG-AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. orchioides 8069        --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. orchioides 7802*       ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. orchioides 8100        ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. orchioides 7806*       ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
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L. orchioides 8101        ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. elegans 8022           --T-CGGTATTG--AC-AT------GTAG-ACGGGACTCTCTCTTTATT-
L. elegans 8019           ACTTC----TT--AACTATTTATCTTTA--TC----CTC-CTTTTT-TT-
L. elegans 8024           ACTTC----TT--AACTATTTATCTTTA--TC----CTC-CTTTTT-TT-
L. elegans 8027           --T-CGGTATTG-AACTATTTATCTTTAG-ACGGGACTCTCTCTTTATT-
L. elegans 7735*          ACTTC----TT--AACTATTTATCTTTA--TC----CTC-CTTTTT-TT-
L. elegans 7736*          ACTTC----TT--AACTATTTATCTTTA--TC----CTC-CTTTTT-TT-
L. elegans 8026           ACTTC----TT--AACTATTTATCTTTA--TC----CTC-CTTTTT-TT-
L. elegans 7734*          ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. elegans 8018           ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. elegans 7737*          ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. elegans 8020           ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. rosea 7827*            ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. unicolor 7846*         ACTTC----TT--AACTATC-----T-A--TC----CTC-CTTTTT-TT-
L. aloides 7698*          ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
L. pusilla 7820*          ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TTT
L. unifolia 7850*         ACTTC----TT--AACTAT------TTA--TC----CTC-CTTTTT-TT-
M. depressa 7870*         ACTTC----TT--AACTAT------TTA--TC----TTC-CTTTTT-TT-

                          301                                           350
L. mutabilis 6753         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GGTCTATT----A
L. mutabilis 6756         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GATCTATT----A
L. mutabilis 6757         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GATCTATT----A
L. mutabilis 6762         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GATCTATT----A
L. mutabilis 8000         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GGTCTATT----A
L. mutabilis 8047         ---TCGTCCGATTA-TAATCAGTTTTTCAAAAA-GG-GGTCTATT----A
L. mutabilis 6745         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GGTCTATT----A
L. mutabilis 6755         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GGTCTATT----A
L. mutabilis 6755         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GGTCTATT----A
L. mutabilis 6770         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GATCTATT----A
L. mutabilis 6773         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GATCTATT----A
L. mutabilis 6766         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GATCTATT----A
L. mutabilis 6776         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GATCTATT----A
L. mutabilis 8042         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAA-GG-GGTCTATT----A
L. mutabilis 6768         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GATCTATT----A
L. mutabilis 6767         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GATCTATT----A
L. mutabilis 6749         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GATCTATT----A
L. mutabilis 6747         -C-TCGTCCGATTA-TAATCAGTTTTTCAAAAAAGG-GATCTATT----A
L. mutabilis 8032         -C-TCGTCCGATTA-T---CAGTTTTTCAAAAAAGG-GGTCTATT----A
L. arbuthnotiae 7711*     -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. arbuthnotiae 8054      -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. arbuthnotiae 8055      -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. fistulosa 8064         -C-TCGTCCGATTA-T---CAGTTTTTCAAAAAAGG-GGTCTATT----A
L. fistulosa 8058         -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. fistulosa 8062         -C-TCGTCCGATTA-T---CAGTTTTTCAAAAAAGG-GGTCTATT----A
L. orchioides 8089        -C-TCGTCCGATTA-T---CAGTTTTTCAAAAAAGG-GGTCTATT----A
L. orchioides 8093        -C-TCGTCCGATTA-T---CAGTTTTTCAAAAAAGG-GGTCTATT----A
L. orchioides 8073        -C-TCGTCCGATTA-T---CAGTTTTTCAAAAAAGG-GGTCTATT----A
L. orchioides 8090        -C-TCGTCCGATTA-T---CAGTTTTTCAAAAAAGG-GGTCTATT----A
L. orchioides 8069        -C-TCGTCCGATTA-T---CAGTTTTTCAAAAAAGG-GGTCTATT----A
L. orchioides 7802*       -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. orchioides 8100        -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. orchioides 7806*       -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. orchioides 8101        -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. elegans 8022           -C-TCGTCCGATTA-T---CAGTTTTTCAAAAAAGG-GGTCTATT----A
L. elegans 8019           -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTACT----A
L. elegans 8024           -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTACT----A
L. elegans 8027           -C-TCGTCCGATTA-T---CAGTTTTTCAAAAAAGG-GGTCTATT----A
L. elegans 7735*          -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTACT----A
L. elegans 7736*          -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTACT----A
L. elegans 8026           -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTACT----A
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L. elegans 7734*          -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. elegans 8018           -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. elegans 7737*          -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. elegans 8020           -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. rosea 7827*            -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. unicolor 7846*         TCGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. aloides 7698*          -CGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. pusilla 7820*          TCGTAG--CGGTTAATAA--A--TT--CA-A-TATCTT-TCTATT----A
L. unifolia 7850*         TCGTAG--CGGTTAG--------TT--CA-AATATCTT-TCTATTCATTA
M. depressa 7870*         -CGTAG--TGGTTAATAA--A--TT--CA-A-TATCTT-TCTATTCATTA

                          351                                             400
L. mutabilis 6753         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 6756         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 6757         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 6762         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 8000         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 8047         AACTCTGGAATGA----TTT-GATC-CTGAATATTCGATTCTTCC--GTC
L. mutabilis 6745         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 6755         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 6755         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 6770         AACTCTGGAATGA----TT---T-GATCACTAA-TATATTCTTCC--GTC
L. mutabilis 6773         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 6766         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 6776         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 8042         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 6768         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 6767         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 6749         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 6747         AACTCTGGAATGA----TTT-GATCACTGAATATTCGATTCTTCC--GTC
L. mutabilis 8032         AACTCTGGAATGAATGATTT-GATCACTGAATATTCGATTCTTCC--GTC
L. arbuthnotiae 7711*     TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. arbuthnotiae 8054      TACTCT----T--------TCG--CA---AATA---GAT----NNGGG-C
L. arbuthnotiae 8055      TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. fistulosa 8064         AACTCTGGAATGAATGATTT-GATCACTGAATATTCGATTCTTCC--GTC
L. fistulosa 8058         TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. fistulosa 8062         AACTCTGGAATGAATGATTT-GATCACTGAATATTCGATTCTTCC--GTC
L. orchioides 8089        AACTCTGGAATGAATGATTT-GATCACTGAATATTCGATTCTTCC--GTC
L. orchioides 8093        AACTCTGGAATGAATGATTT-GATCACTGAATATTCGATTCTTCC--GTC
L. orchioides 8073        AACTCTGGAATGAATGATTT-GATCACTGAATATTCGATTCTTCC--GTC
L. orchioides 8090        AACTCTGGAATGAATGATTT-GATCACTGAATATTCGATTCTTCC--GTC
L. orchioides 8069        AACTCTGGAATGAATGATTT-GATCACTGAATATTCGATTCTTCC--GTC
L. orchioides 7802*       TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. orchioides 8100        TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. orchioides 7806*       TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. orchioides 8101        TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. elegans 8022           AACTCTGGAATGAATGATTT-GATCACTGAATATTCGATTCTTCC--GTC
L. elegans 8019           TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. elegans 8024           TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. elegans 8027           AACTCTGGAATGAATGATTT-GATCACTGAATATTCGATTCTTCC--GTC
L. elegans 7735*          TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. elegans 7736*          TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. elegans 8026           TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. elegans 7734*          TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. elegans 8018           TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. elegans 7737*          TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. elegans 8020           TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. rosea 7827*            TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. unicolor 7846*         TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. aloides 7698*          TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
L. pusilla 7820*          TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
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L. unifolia 7850*        TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C
M. depressa 7870*        TACTCT----T--------TCG--CA---AATA---GAT----CCGGG-C

                                401                                      450
L. mutabilis 6753        AACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--A
L. mutabilis 6756        AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. mutabilis 6757        AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. mutabilis 6762        AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. mutabilis 8000        AACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--A
L. mutabilis 8047        AACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--A
L. mutabilis 6745        AACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--A
L. mutabilis 6755        AACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--A
L. mutabilis 6755        AACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--A
L. mutabilis 6770        AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. mutabilis 6773        AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. mutabilis 6766        AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. mutabilis 6776        AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. mutabilis 8042        AACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--A
L. mutabilis 6768        AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. mutabilis 6767        AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. mutabilis 6749        AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. mutabilis 6747        AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. mutabilis 8032        AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. arbuthnotiae 7711*    AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. arbuthnotiae 8054     AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. arbuthnotiae 8055     AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. fistulosa 8064        AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. fistulosa 8058        AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. fistulosa 8062        AACTTCGATTGGAATAGATCCACCTCTGAA-TTTGCATATATTGCAT--A
L. orchioides 8089       AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. orchioides 8093       AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. orchioides 8073       AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. orchioides 8090       AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. orchioides 8069       AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. orchioides 7802*      AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. orchioides 8100       AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. orchioides 7806*      AAAATC--TTGG-ATCTATTC----CT-A--TTAGG---T-TTGAATAGA
L. orchioides 8101       AAAATC--TTGG-ATCTATTC----CT-A--TTAGG---T-TTGAATAGA
L. elegans 8022          AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. elegans 8019          AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. elegans 8024          AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. elegans 8027          AACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--A
L. elegans 7735*         AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. elegans 7736*         AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. elegans 8026          AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. elegans 7734*         AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. elegans 8018          AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. elegans 7737*         AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. elegans 8020          AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. rosea 7827*           AAAATC--TTGG-ATCTATCCATCCCT-A--TTAGG---T-TTGAATAGA
L. unicolor 7846*        AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. aloides 7698*         AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. pusilla 7820*         AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA
L. unifolia 7850*        AAAATC--TTG-----TATCC----CT-A--TTAGG---T-TTGAATAGA
M. depressa 7870*        AAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGA

                                451                                      500
L. mutabilis 6753        TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6756        TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6757        TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6762        TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
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L. mutabilis 8000          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 8047          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6745          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6755          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6755          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6770          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6773          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6766          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6776          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 8042          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6768          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6767          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6749          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 6747          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. mutabilis 8032          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. arbuthnotiae 7711*      TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. arbuthnotiae 8054       TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. arbuthnotiae 8055       TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. fistulosa 8064          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. fistulosa 8058          TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. fistulosa 8062          TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. orchioides 8089         TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. orchioides 8093         TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. orchioides 8073         TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. orchioides 8090         TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. orchioides 8069         TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. orchioides 7802*        TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. orchioides 8100         TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. orchioides 7806*        TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. orchioides 8101         TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. elegans 8022            TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. elegans 8019            TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. elegans 8024            TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. elegans 8027            TACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT
L. elegans 7735*           TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. elegans 7736*           TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. elegans 8026            TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. elegans 7734*           TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. elegans 8018            TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. elegans 7737*           TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. elegans 8020            TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. rosea 7827*             TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. unicolor 7846*          TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. aloides 7698*           TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. pusilla 7820*           TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
L. unifolia 7850*          TACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCAT
M. depressa 7870*          TACCTG--TACA-AATGAACAT--ATAT--GGTCAAGGAAT---TCCCAT

                           501                                             550
L. mutabilis 6753          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 6756          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 6757          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 6762          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 8000          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 8047          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 6745          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 6755          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 6755          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 6770          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 6773          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 6766          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
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L. mutabilis 6776          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 8042          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 6768          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 6767          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 6749          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 6747          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. mutabilis 8032          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. arbuthnotiae 7711*      TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. arbuthnotiae 8054       TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. arbuthnotiae 8055       TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. fistulosa 8064          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. fistulosa 8058          TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. fistulosa 8062          --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. orchioides 8089         --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. orchioides 8093         --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. orchioides 8073         --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. orchioides 8090         --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. orchioides 8069         --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. orchioides 7802*        TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. orchioides 8100         TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. orchioides 7806*        TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. orchioides 8101         TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. elegans 8022            --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. elegans 8019            TATTGAATTAT-TCACAGCCCATAATCATTATCCTTAC--ATTACA-AAA
L. elegans 8024            TATTGAATTAT-TCACAGCCCATAATCATTATCCTTAC--ATTACA-AAA
L. elegans 8027            --TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATA
L. elegans 7735*           TATTGAATTAT-TCACAGCCCATAATCATTATCCTTAC--ATTACA-AAA
L. elegans 7736*           TATTGAATTAT-TCACAGCCCATAATCATTATCCTTAC--ATTACA-AAA
L. elegans 8026            TATTGAATTAT-TCACAGCCCATAATCATTATCCTTAC--ATTACA-AAA
L. elegans 7734*           TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. elegans 8018            TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. elegans 7737*           TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. elegans 8020            TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. rosea 7827*             TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. unicolor 7846*          TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. aloides 7698*           TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. pusilla 7820*           TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA
L. unifolia 7850*          TATTGAATTAT-TCAC----CATA-TCATTATCCTTAC--ATTACA-AAA
M. depressa 7870*          TATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAA

                           551                                           600
L. mutabilis 6753          TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. mutabilis 6756          TA-GGTCACCCTTTCTTTAATTT----AGAAGGAT-TGATTATTCTATTC
L. mutabilis 6757          TA-GGTCACCCTTTCTTTAATTT----AGAAGGAT-TGATTATTCTATTC
L. mutabilis 6762          TA-GGTCACCCTTTCTTTAATTT----AGAAGGAT-TGATTATTCTATTC
L. mutabilis 8000          TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. mutabilis 8047          TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. mutabilis 6745          TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. mutabilis 6755          TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. mutabilis 6755          TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. mutabilis 6770          TA-GGTCACCCTTTCTTTAATTT----AGAAGGAT-TGATTATTCTATTC
L. mutabilis 6773          TA-GGTCACCCTTTCTTTAATTT----AGAAGGAT-TGATTATTCTATTC
L. mutabilis 6766          TA-GGTCACCCTTTCTTTAATTT----AGAAGGAT-TGATTATTCTATTC
L. mutabilis 6776          TA-GGTCACCCTTTCTTTAATTT----AGAAGGAT-TGATTATTCTATTC
L. mutabilis 8042          TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. mutabilis 6768          TA-GGTCACCCTTTCTTTAATTT----AGAAGGAT-TGATTATTCTATTC
L. mutabilis 6767          TA-GGTCACCCTTTCTTTAATTT----AGAAGGAT-TGATTATTCTATTC
L. mutabilis 6749          TA-GGTCACCCTTTCTTTAATTT----AGAAGGAT-TGATTATTCTATTC
L. mutabilis 6747          TA-GGTCACCCTTTCTTTAATTT----AGAAGGAT-TGATTATTCTATTC
L. mutabilis 8032          TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. arbuthnotiae 7711*      AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
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L. arbuthnotiae 8054      AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. arbuthnotiae 8055      AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. fistulosa 8064         TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. fistulosa 8058         AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. fistulosa 8062         TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. orchioides 8089        TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. orchioides 8093        TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. orchioides 8073        TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. orchioides 8090        TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. orchioides 8069        TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-TGATTATTCTATTC
L. orchioides 7802*       AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. orchioides 8100        AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. orchioides 7806*       AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. orchioides 8101        AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. elegans 8022           TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-T----ATTCTATTC
L. elegans 8019           AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. elegans 8024           AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. elegans 8027           TA-GGTCACCCTTTCTTTAATTTCGATAGAAGGAT-T----ATTCTATTC
L. elegans 7735*          AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. elegans 7736*          AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. elegans 8026           AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. elegans 7734*          AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. elegans 8018           AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. elegans 7737*          AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. elegans 8020           AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. rosea 7827*            AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. unicolor 7846*         AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. aloides 7698*          AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. pusilla 7820*          AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-
L. unifolia 7850*         AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAAA---AATT-
M. depressa 7870*         AAA-GTC----TT-CTT---TTT-----GAA-GATCT-AAGA---AATT-

                          601                                             650
L. mutabilis 6753         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6756         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6757         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6762         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 8000         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 8047         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6745         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6755         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6755         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6770         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6773         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6766         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6776         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 8042         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6768         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6767         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6749         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 6747         CTGTTATTATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. mutabilis 8032         CTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. arbuthnotiae 7711*     CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. arbuthnotiae 8054      CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. arbuthnotiae 8055      CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. fistulosa 8064         CTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. fistulosa 8058         CGG--ACTG-------------G--GTCAA----ATT--TTT-AATAGTT
L. fistulosa 8062         CTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. orchioides 8089        CTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. orchioides 8093        CTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. orchioides 8073        CTGTTATTATA----AC-CAACGTAGTCAACTCCATTCGTTAGAACAGCT
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L. orchioides 8090        CTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. orchioides 8069        CTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. orchioides 7802*       CGG--ACTG-------------G--GTCAA----ATT--TTT-AATAGTT
L. orchioides 8100        CGG--ACTG-------------G--GTCAA----ATT--TTT-AATAGTT
L. orchioides 7806*       CGG--ACTG-------------G--GTCAA----ATT--TTT-AATAGTT
L. orchioides 8101        CGG--ACTG-------------G--GTCAA----ATT--TTT-AATAGTT
L. elegans 8022           CTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. elegans 8019           CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. elegans 8024           CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. elegans 8027           CTGTTATTATA----ACACAACGTAGTCAACTCCATTCGTTAGAACAGCT
L. elegans 7735*          CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. elegans 7736*          CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. elegans 8026           CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. elegans 7734*          CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. elegans 8018           CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. elegans 7737*          CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. elegans 8020           CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. rosea 7827*            CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. unicolor 7846*         CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. aloides 7698*          CGG--ACTG-------------G--GTCAA----ATT--TTT-AATAGTT
L. pusilla 7820*          CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
L. unifolia 7850*         CGG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT
M. depressa 7870*         CAG--ACTA-------------G--GTCAA----ATT--TTT-AATAGTT

                          651                                             700
L. mutabilis 6753         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6756         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6757         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6762         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 8000         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 8047         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6745         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6755         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6755         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6770         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6773         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6766         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6776         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 8042         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6768         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6767         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6749         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 6747         TCCATTGAGTCTCT-GCACC--TATCCC--TTTTTTT-AT-TCTAGTCTA
L. mutabilis 8032         TCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTT-AT-TCTAGTCTA
L. arbuthnotiae 7711*     T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. arbuthnotiae 8054      T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. arbuthnotiae 8055      T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. fistulosa 8064         TCCATTGAGTCTCT-GCACC--TATCCCT-TTTTTTTTAT-TCTAGTCTA
L. fistulosa 8058         T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. fistulosa 8062         TCCATTGAGTCTCT-GCACC--TATCCCT-TTTTTTTTAT-TCTAGTCTA
L. orchioides 8089        TCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTT-AT-TCTAGTCTA
L. orchioides 8093        TCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTT-AT-TCTAGTCTA
L. orchioides 8073        TCCATTGAGTCTCT-GCACC--TATCCCCTTTTTTTTTAT-TCTAGTCTA
L. orchioides 8090        TCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTT-AT-TCTAGTCTA
L. orchioides 8069        TCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTTTAT-TCTAGTCTA
L. orchioides 7802*       T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. orchioides 8100        T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. orchioides 7806*       T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. orchioides 8101        T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. elegans 8022           TCCATTGAGTCTCT-GCACC--TATCCCCCTTTTTTTTCTATCTAGTCTA
L. elegans 8019           T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
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L. elegans 8024          T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. elegans 8027          TCCATTGAGTCTCT-GCACC--TATCCCCCTTTTTTTTCTATCTAGTCTA
L. elegans 7735*         T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. elegans 7736*         T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. elegans 8026          T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. elegans 7734*         T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. elegans 8018          T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. elegans 7737*         T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. elegans 8020          T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. rosea 7827*           T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. unicolor 7846*        T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. aloides 7698*         T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. pusilla 7820*         T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A
L. unifolia 7850*        T---TTG-GTCTA-------TTTA--C-----------AT----A--C-A
M. depressa 7870*        T---TTG-GTCTATTTAA--TTTA--C-----------AT----A--C-A

                         701                                              750
L. mutabilis 6753        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 6756        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 6757        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 6762        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 8000        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 8047        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 6745        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 6755        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 6755        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 6770        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 6773        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 6766        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 6776        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 8042        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTCCAGGAT
L. mutabilis 6768        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 6767        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 6749        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 6747        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. mutabilis 8032        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. arbuthnotiae 7711*    -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. arbuthnotiae 8054     -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. arbuthnotiae 8055     -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. fistulosa 8064        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. fistulosa 8058        -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. fistulosa 8062        GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. orchioides 8089       GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. orchioides 8093       GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. orchioides 8073       GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTCCAGGAT
L. orchioides 8090       GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. orchioides 8069       GTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGAT
L. orchioides 7802*      -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. orchioides 8100       -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. orchioides 7806*      -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGAT
L. orchioides 8101       -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGAT
L. elegans 8022          GTTTTTAAACCCTTGTTTTTC-T-------AAAGAT-T-GGCTC-AGGAT
L. elegans 8019          -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. elegans 8024          -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. elegans 8027          GTTTTTAAACCCTTGTTTTTC-T-------AAAGAT-T-GGCTC-AGGAT
L. elegans 7735*         -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. elegans 7736*         -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. elegans 8026          -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. elegans 7734*         -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. elegans 8018          -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. elegans 7737*         -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
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L. elegans 8020          -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. rosea 7827*           -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. unicolor 7846*        -TAT-TACA---TAG------ATA----TCA----TCT--ATT--AGGA-
L. aloides 7698*         -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. pusilla 7820*         -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
L. unifolia 7850*        -TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGGA-
M. depressa 7870*        -TAT-TACA---TAG------ATA----TAAGT-ATCT--ACT--AGGA-

                         751                773
L. mutabilis 6753        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6756        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6757        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6762        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 8000        TGCCCATTTTT-GTTCCAGGGG
L. mutabilis 8047        TGCCCATTTTT-GTTCCAGGGG
L. mutabilis 6745        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6755        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6755        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6770        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6773        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6766        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6776        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 8042        TGCCCATTTTT-GTTCCAGGGG
L. mutabilis 6768        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6767        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6749        TGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6747        TGCCCATTTTT-GTTCCAGGGG
L. mutabilis 8032        TGCCCATTTTTAGTTCCAGGGG
L. arbuthnotiae 7711*    TG---AT-----G---CACGGG
L. arbuthnotiae 8054     TG---AT-----G---CACGGG
L. arbuthnotiae 8055     TG---AT-----G---CACGGG
L. fistulosa 8064        TGCCCATTTTTAGTTCCAGGGG
L. fistulosa 8058        TG---AT-----G---CACGGG
L. fistulosa 8062        TGCCCATTTTTAGTTCCAGGGG
L. orchioides 8089       TGCCCATTTTTAGTTCCAGGGG
L. orchioides 8093       TGCCCATTTTTAGTTCCAGGGG
L. orchioides 8073       TGCCCATTTTTAGTTCCAGGGG
L. orchioides 8090       TGCCCATTTTTAGTTCCAGGGG
L. orchioides 8069       TGCCCATTTTTAGTTCCAGGGG
L. orchioides 7802*      TG---AT-----G---CACGGG
L. orchioides 8100       TG---AT-----G---CACGGG
L. orchioides 7806*      TG---AT-----G---CACGGG
L. orchioides 8101       TG---AT-----G---CACGGG
L. elegans 8022          TGCCCATTTTTAGTTCCAGGGG
L. elegans 8019          -G---AT-----G---CACGGG
L. elegans 8024          -G---AT-----G---CACGGG
L. elegans 8027          TGCCCATTTTTAGTTCCAGGGG
L. elegans 7735*         TG---AT-----G---CACGGG
L. elegans 7736*         -G---AT-----G---CACGGG
L. elegans 8026          -G---AT-----G---CACGGG
L. elegans 7734*         TG---AT-----G---CACGGG
L. elegans 8018          TG---AT-----G---CACGGG
L. elegans 7737*         -G---AT-----G---CACGGG
L. elegans 8020          -G---AT-----G---CACGGG
L. rosea 7827*           TG---AT-----G---CACGGG
L. unicolor 7846*        -G---AT-----G---CACGGG
L. aloides 7698*         TG---AT-----G---CACGGG
L. pusilla 7820*         TG---AT-----G---CACGGG
L. unifolia 7850*        -G---AT-----G---CACGGG
M. depressa 7870*        -G---AT-----G---CACGGG
```

APPENDIX C: Aligned sequences of the trn_{L-F} region of the dataset with all *L. mutabilis* specimens with a basic chromosome number of 6, using CLUSTAL G. *Indicates sequences from Paula Spies.

```
                        1                                                  50
L. mutabilis 6746       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6772       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6775       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 8006       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6744       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6771       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6750       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6751       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. unicolor 7846*       ATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG
L. aloides 7698*        ATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG
L. pusilla 7820*        ATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG
L. unifolia 7850*       ATC-AATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG
M. depressa 7870*       ATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG

                        51                                                 100
L. mutabilis 6746       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGGAT
L. mutabilis 6772       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGGAT
L. mutabilis 6775       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGGAT
L. mutabilis 8006       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGGAT
L. mutabilis 6744       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGGAT
L. mutabilis 6771       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGGAT
L. mutabilis 6750       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGGAT
L. mutabilis 6751       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGGAT
L. unicolor 7846*       AGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG--T
L. aloides 7698*        AGTCCTGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG--T
L. pusilla 7820*        AGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG--T
L. unifolia 7850*       AGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG--T
M. depressa 7870*       AGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG--T

                        101                                                150
L. mutabilis 6746       AGAGGGACTTGAACCCTCACGATTTCTAAA-T-ATGTCAACTTCGATTGG
L. mutabilis 6772       AGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTGG
L. mutabilis 6775       AGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTGG
L. mutabilis 8006       AGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTGG
L. mutabilis 6744       AGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTGG
L. mutabilis 6771       AGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTGG
L. mutabilis 6750       AGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTGG
L. mutabilis 6751       AGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTGG
L. unicolor 7846*       AGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTGG
L. aloides 7698*        AGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTGG
L. pusilla 7820*        AGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTGG
L. unifolia 7850*       AGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTGG
M. depressa 7870*       AGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTGG

                        151                                                200
L. mutabilis 6746       AATAGATCCACCTCTGAATTTTACATATATTGCA---ACGGATTT---T-
L. mutabilis 6772       AATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T-
L. mutabilis 6775       AATAGATCCACCTCTGAATTTTACATATATTGCA--GACG-ATTT---T-
L. mutabilis 8006       AATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T-
L. mutabilis 6744       AATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T-
L. mutabilis 6771       AATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T-
L. mutabilis 6750       AATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T-
L. mutabilis 6751       AATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T-
L. unicolor 7846*       AATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT-
L. aloides 7698*        AATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT-
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L. pusilla 7820*      AATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT-
L. unifolia 7850*     AATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT-
M. depressa 7870*     AATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT-

                      201                                              250
L. mutabilis 6746     -C--CT-TAC---ATAAA-T-T--------------TC---TG----CGG
L. mutabilis 6772     CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CGG
L. mutabilis 6775     CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CGG
L. mutabilis 8006     CCCTCT-TAC---ATAAA-T-T--------------TCATTTG--T-CGG
L. mutabilis 6744     CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CGG
L. mutabilis 6771     CC-TCT-TAC---ATAAA-T-T--------------TCATT-G--T-CGG
L. mutabilis 6750     CC-TC-T-TA---ATAAA-T-T--------------TCATGTG--T-CG-
L. mutabilis 6751     CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CGG
L. unicolor 7846*     CCCTCTATCCCCAATAAA--------------AAGATTATTTGACTTC--
L. aloides 7698*      CCCTCTATCCCCAATAAA--------------AAGATCATTTGACTTC--
L. pusilla 7820*      CCCTCTATCCCCAATAAA--------------AAGATCATTTGACTTC--
L. unifolia 7850*     CCCTCTATCCCCAATAAA--------------AAGACCATTTGACTTC--
M. depressa 7870*     CCCTCTATCCCCAATAAACTGTCCCCAATAAAAAGACCATTTGACTTC--

                      251                                              300
L. mutabilis 6746     TATTGACAC-AT-GTAGACGGGACTCTCTCTTTATT--C-TCGTCCGATT
L. mutabilis 6772     TATTG--AC-AT-GTAGACGGGACTCTCTCTTTATT--C-TCGTCCGATT
L. mutabilis 6775     TATTG--AC-AT-GTAGACGGGACTCTCTCTTTATT--C-TCGTCCGATT
L. mutabilis 8006     TATTG--AC-AT-GTAGACGGGACTCTCTCTTTATT--C-TCGTCCGATT
L. mutabilis 6744     -ATTG--AC-AT-GTAGACGGGACTCTCTCTTTATT--C-TCGTCCGATT
L. mutabilis 6771     TATTG--AC-AT-GTAGACGGGACTCTCTCTTTATT--C-TCG-CCGATT
L. mutabilis 6750     TATTG--AC-AT-GTAGACGGGACTCTCTCTTTATT--C-TCGTCCGATT
L. mutabilis 6751     TATTG--AC-AT-GTAGACGGGACTCTCTCTTTATT--C-TCGTCCGATT
L. unicolor 7846*     --TT--AACTATCT-A-TC----CTC-CTTTTT-TT-TCGTAG--CGGTT
L. aloides 7698*      --TT--AACTAT-TTA-TC----CTC-CTTTTT-TT--CGTAG--CGGTT
L. pusilla 7820*      --TT--AACTAT-TTA-TC----CTC-CTTTTT-TTTTCGTAG--CGGTT
L. unifolia 7850*     --TT--AACTAT-TTA-TC----CTC-CTTTTT-TT-TCGTAG--CGGTT
M. depressa 7870*     --TT--AACTAT-TTA-TC----TTC-CTTTTT-TT--CGTAG--TGGTT

                      301                                              350
L. mutabilis 6746     A-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAATG
L. mutabilis 6772     A-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAATG
L. mutabilis 6775     A-T----CAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAATG
L. mutabilis 8006     A-T----CAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAATG
L. mutabilis 6744     A-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAATG
L. mutabilis 6771     A-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAATG
L. mutabilis 6750     A-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAATG
L. mutabilis 6751     A-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAATG
L. unicolor 7846*     AAT-AA--A--TT--CA-A-TATCTT-TCTATT----ATACTCT----T-
L. aloides 7698*      AAT-AA--A--TT--CA-A-TATCTT-TCTATT----ATACTCT----T-
L. pusilla 7820*      AAT-AA--A--TT--CA-A-TATCTT-TCTATT----ATACTCT----T-
L. unifolia 7850*     AG---------TT--CA-AATATCTT-TCTATTCATTATACTCT----T-
M. depressa 7870*     AAT-AA--A--TT--CA-A-TATCTT-TCTATTCATTATACTCT----T-

                      351                                              400
L. mutabilis 6746     ATTT-GATCACTGAATATTCGATTCTTCC--GTCAACTTCGATTGGAATA
L. mutabilis 6772     ATTT-GATCACTGAATATTCGATTCTTCC--GTCAACTTCGATTGGAATA
L. mutabilis 6775     ATTT-GATCACTGAATATTCGATTCTTCC--GTCAACTTCGATTGGAATA
L. mutabilis 8006     ATTT-GATCACTGAATATTCGATTCTTCC--GTCAACTTCGATTGGAATA
L. mutabilis 6744     ATTT-GATCACTGAATATTCGATTCTTCC--GTCAACTTCGATTGGAATA
L. mutabilis 6771     ATTT-GATCACTGAATATTCGATTCTTCC--GTCAACTTC-ATTGGAATA
L. mutabilis 6750     ATTT-GATCACTGAATATTCGATTCTTCC--GTCAACTTCGATTGGAATA
L. mutabilis 6751     ATTT-GATCACTGAATATTCGATTCTTCC--GTCAACTTCGATTGGAATA
L. unicolor 7846*     ---TCG--CA---AATA---GAT----CCGGG-CAAAATC--TTGG-ATC
L. aloides 7698*      ---TCG--CA---AATA---GAT----CCGGG-CAAAATC--TTGG-ATC
L. pusilla 7820*      ---TCG--CA---AATA---GAT----CCGGG-CAAAATC--TTGG-ATC
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L. unifolia 7850*     ---TCG--CA---AATA---GAT----CCGGG-CAAAATC--TTG-----
M. depressa 7870*     ---TCG--CA---AATA---GAT----CCGGG-CAAAATC--TTGG-ATC

                      401                                              450
L. mutabilis 6746     GATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTATATATAAT
L. mutabilis 6772     GATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTATATATAAT
L. mutabilis 6775     GATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATATATAAT
L. mutabilis 8006     GATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATATATAAT
L. mutabilis 6744     GATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTATATATAAT
L. mutabilis 6771     GATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTATATATAAT
L. mutabilis 6750     GATCCACCTCTGAATTTTGCATATATTGCAT--ATACG-GTATATATAAT
L. mutabilis 6751     GATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATATATAAT
L. unicolor 7846*     TATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--TACA-AAC
L. aloides 7698*      TATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--TACA-AAC
L. pusilla 7820*      TATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--TACA-AAC
L. unifolia 7850*     TATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--TACA-AAC
M. depressa 7870*     TATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--TACA-AAT

                      451                                              500
L. mutabilis 6746     --ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--
L. mutabilis 6772     --ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--
L. mutabilis 6775     --ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--
L. mutabilis 8006     --ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--
L. mutabilis 6744     --ATATGGAT-TCGGGTC-ATG-AT-AATC--GT--TTG-A-TATGTC--
L. mutabilis 6771     --ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--T-G-A-TATG-C--
L. mutabilis 6750     --ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--
L. mutabilis 6751     --ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--
L. unicolor 7846*     GAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATTAT-TCAC
L. aloides 7698*      GAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATTAT-TCAC
L. pusilla 7820*      GAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATTAT-TCAC
L. unifolia 7850*     GAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATTAT-TCAC
M. depressa 7870*     GAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATTAT-TCAC

                      501                                              550
L. mutabilis 6746     AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTC
L. mutabilis 6772     AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTC
L. mutabilis 6775     AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTC
L. mutabilis 8006     AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTC
L. mutabilis 6744     AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTC
L. mutabilis 6771     AGT--A-G-T-A--A--CGTACGTATT-GATATATA-GGTCCACCCTTTC
L. mutabilis 6750     AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTC
L. mutabilis 6751     AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTC
L. unicolor 7846*     AGCCCATA-TCATTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-C
L. aloides 7698*      AGCCCATA-TCATTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-C
L. pusilla 7820*      AGCCCATA-TCATTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-C
L. unifolia 7850*     ----CATA-TCATTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-C
M. depressa 7870*     AGCCCATA-TCATTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-C

                      551                                              600
L. mutabilis 6746     TTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATTATATAT
L. mutabilis 6772     TTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATTATATAT
L. mutabilis 6775     TTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATTATATAT
L. mutabilis 8006     TTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATTATATAT
L. mutabilis 6744     TTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCGGTTATTATATAT
L. mutabilis 6771     TTTAATTTGCGATAGAAGGAT-TGATTATTCTATTCCTGTTATTATATAT
L. mutabilis 6750     TTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATTATATAT
L. mutabilis 6751     TTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATTATATAT
L. unicolor 7846*     TT---TTT------GAA-GATCT-AAGA---AATT-CGG--ACTA-----
L. aloides 7698*      TT---TTT------GAA-GATCT-AAGA---AATT-CGG--ACTG-----
L. pusilla 7820*      TT---TTT------GAA-GATCT-AAGA---AATT-CGG--ACTA-----
L. unifolia 7850*     TT---TTT------GAA-GATCT-AAAA---AATT-CGG--ACTA-----
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```
M. depressa 7870*    TT---TTT------GAA-GATCT-AAGA---AATT-CAG--ACTA-----

                     601                                                650
L. mutabilis 6746    AACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT
L. mutabilis 6772    AACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT
L. mutabilis 6775    AACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT
L. mutabilis 8006    AACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT
L. mutabilis 6744    AACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTG-GTCTCT
L. mutabilis 6771    AACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT
L. mutabilis 6750    AACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT
L. mutabilis 6751    AACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT
L. unicolor 7846*    --------G--GTCAA----ATT--TTT-AATAGTTT---TTG-GTCTAT
L. aloides 7698*     --------G--GTCAA----ATT--TTT-AATAGTTT---TTG-GTCTAT
L. pusilla 7820*     --------G--GTCAA----ATT--TTT-AATAGTTT---TTG-GTCTAT
L. unifolia 7850*    --------G--GTCAA----ATT--TTT-AATAGTTT---TTG-GTCTA-
M. depressa 7870*    --------G--GTCAA----ATT--TTT-AATAGTTT---TTG-GTCTAT

                     651                                                700
L. mutabilis 6746    -GCACC--TATCCCTTTTTTTATTCTAGTCTAGTTTTTAAACCCTTGTTT
L. mutabilis 6772    -GCACC--TATCCCTTTTTTTATTCTAGTCTAGTTTTTAAACCCTTGTTT
L. mutabilis 6775    -GCACC--TATCCCTTTTTTTATTCTAGTCTAGTTTTTAAACCCTTGTTT
L. mutabilis 8006    -GCACC--TATCCCTTTTTTTATTCTAGTCTAGTTTTTAAACCCTTGTTT
L. mutabilis 6744    -GCACC--TATCCCTTTTTTTATTCTAGTC-AGTTTTTAAACCCTTGTTT
L. mutabilis 6771    -GCACC--TATCCCTTTTTTTATTCTAGTT-AGTTTTTAAACCCT-GTTT
L. mutabilis 6750    -GCACC--TATCCCTTTTTTTATTCTAGTCTAGTTTTTAAACCCTTGTTT
L. mutabilis 6751    -GCACC--TATCCCTTTTTTTATTCTAGTCTAGTTTTTAAACCCTTGTTT
L. unicolor 7846*    TTAA--TTTA--C--------AT---A--C-A-TAT-TACA---TAG---
L. aloides 7698*     TTAA--TTTA--C--------AT---A--C-A-TAT-TACA---TAG---
L. pusilla 7820*     TTAA--TTTA--C--------AT---A--C-A-TAT-TACA---TAG---
L. unifolia 7850*    ------TTTA--C--------AT---A--C-A-TAT-TACA---TAG---
M. depressa 7870*    TTAA--TTTA--C--------AT---A--C-A-TAT-TACA---TAG---

                     701                                                750
L. mutabilis 6746    TTC-TAAAAAT-AAAGAT-TTGGCTCCAGGATTGCCCATTTTTAGTTCCA
L. mutabilis 6772    TTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCA
L. mutabilis 6775    TTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT-GTTCCA
L. mutabilis 8006    TTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT-GTTCCA
L. mutabilis 6744    TTC-TAAAAAT-AAAGAT-TTGGCTC-AG-ATTGCCCATTTTTAGTTCCA
L. mutabilis 6771    TTC-TAAAAAT-AAAGAT-TTGGCTCCAGGATTGCCCATTTTTAGTTCCA
L. mutabilis 6750    TTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCA
L. mutabilis 6751    TTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCA
L. unicolor 7846*    ---ATA----TCA----TCT--ATT--AGGA--G---AT-----G---CA
L. aloides 7698*     ---ATA----TCA----TCT--ACT--AGGA-TG---AT-----G---CA
L. pusilla 7820*     ---ATA----TCA----TCT--ACT--AGGA-TG---AT-----G---CA
L. unifolia 7850*    ---ATA----TCA----TCT--ACT--AGGA--G---AT-----G---CA
M. depressa 7870*    ---ATA----TAAGT-ATCT--ACT--AGGA--G---AT-----G---CA

                     751
L. mutabilis 6746    GGGG
L. mutabilis 6772    GGGG
L. mutabilis 6775    GGGG
L. mutabilis 8006    GGGG
L. mutabilis 6744    GGGG
L. mutabilis 6771    GGGG
L. mutabilis 6750    GGGG
L. mutabilis 6751    GGGG
L. unicolor 7846*    CGGG
L. aloides 7698*     CGGG
L. pusilla 7820*     CGGG
L. unifolia 7850*    CGGG
M. depressa 7870*    CGGG
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APPENDIX D: Aligned sequences of the trn_{L-F} region of the dataset with all *L. mutabilis* specimens with a basic chromosome number of 7 and 6, using CLUSTAL G. *Indicates sequences from Paula Spies.

```
                        1                                                 50
L. mutabilis 6753       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6756       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6757       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6762       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 8000       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6746       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 8047       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6745       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6755       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6772       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6764       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6770       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6773       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6766       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6776       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6775       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 8006       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6744       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6771       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 8042       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6768       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6750       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6767       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6751       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6749       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6747       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 8032       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. unicolor 7846*       ATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG
L. aloides 7698*        ATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG
L. pusilla 7820*        ATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG
L. unifolia 7850*       ATC-AATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG
M. depressa 7870*       ATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG

                        51                                                100
L. mutabilis 6753       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6756       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGGGA
L. mutabilis 6757       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGGGA
L. mutabilis 6762       AGTACCGG--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 8000       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6746       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 8047       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6745       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6755       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6772       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6764       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6770       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6773       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6766       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6776       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6775       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 8006       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6744       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6771       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 8042       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6768       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
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L. mutabilis 6750     AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6767     AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6751     AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6749     AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6747     AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 8032     AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. unicolor 7846*     AGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG---
L. aloides 7698*      AGTCCTGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG---
L. pusilla 7820*      AGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG---
L. unifolia 7850*     AGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG---
M. depressa 7870*     AGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG---

                      101                                             150
L. mutabilis 6753     TAGAGGGACTTGAACCCTCACGATTTCTAA-GTCATGTCAACTTCGATTG
L. mutabilis 6756     TAGAGGGACTTGAACCCTCACGATTTCTATAGTCATGTCAACTTCGATTG
L. mutabilis 6757     TAGAGGGACTTGAACCCTCACGATTTCTATAGTCATGTCAACTTCGATTG
L. mutabilis 6762     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 8000     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6746     TAGAGGGACTTGAACCCTCACGATTTCTAAA-T-ATGTCAACTTCGATTG
L. mutabilis 8047     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6745     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6755     TAGAGGGACTTGAACCCTCACGATTTCTAA-GTCATGTCAACTTCGATTG
L. mutabilis 6772     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6764     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6770     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6773     TAGAGGGACTTGA-CCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6766     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6776     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6775     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 8006     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6744     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6771     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 8042     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6768     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6750     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6767     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6751     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6749     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6747     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 8032     TAGAGGGACTTGAACCCTCACGATTTCTAAAG-CATGTCAACTTCGATTG
L. unicolor 7846*     TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTG
L. aloides 7698*      TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTG
L. pusilla 7820*      TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTG
L. unifolia 7850*     TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTG
M. depressa 7870*     TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTG

                      151                                             200
L. mutabilis 6753     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6756     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6757     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6762     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 8000     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6746     GAATAGATCCACCTCTGAATTTTACATATATTGCA---ACGGATTT---T
L. mutabilis 8047     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6745     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6755     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6772     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6764     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6770     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6773     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6766     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
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L. mutabilis 6776     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6775     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACG-ATTT---T
L. mutabilis 8006     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6744     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6771     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 8042     GAATAGATCCACCTCTGAATTTTACATATATTGCA---ACGGATTT---T
L. mutabilis 6768     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6750     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6767     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6751     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6749     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6747     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 8032     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. unicolor 7846*     GAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT
L. aloides 7698*      GAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT
L. pusilla 7820*      GAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT
L. unifolia 7850*     GAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT
M. depressa 7870*     GAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT

                      201                                             250
L. mutabilis 6753     -CC-TCT-TAC---ATAAA-T-T--------------TCAT-TG--T-CG
L. mutabilis 6756     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6757     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6762     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 8000     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6746     --C--CT-TAC---ATAAA-T-T--------------TC---TG----CG
L. mutabilis 8047     TCC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6745     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6755     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6772     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6764     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6770     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6773     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6766     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6776     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6775     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 8006     -CCCTCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6744     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6771     -CC-TCT-TAC---ATAAA-T-T--------------TCATT-G--T-CG
L. mutabilis 8042     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6768     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6750     -CC-TC-T-TA---ATAAA-T-T--------------TCATGTG--T-CG
L. mutabilis 6767     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6751     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6749     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6747     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 8032     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. unicolor 7846*     -CCCTCTATCCCCAATAAA--------------AAGATTATTTGACTTC-
L. aloides 7698*      -CCCTCTATCCCCAATAAA--------------AAGATCATTTGACTTC-
L. pusilla 7820*      -CCCTCTATCCCCAATAAA--------------AAGATCATTTGACTTC-
L. unifolia 7850*     -CCCTCTATCCCCAATAAA--------------AAGACCATTTGACTTC-
M. depressa 7870*     -CCCTCTATCCCCAATAAACTGTCCCCAATAAAAAGACCATTTGACTTC-

                      251                                             300
L. mutabilis 6753     GTA-TG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6756     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6757     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6762     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 8000     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6746     GTATTGACAC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 8047     GTATTG--CC-AT-GTAG-ACGGGACTCTCTCTTTATT----TCGTCCGA
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L. mutabilis 6745     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6755     GTA-TG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6772     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6764     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6770     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6773     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6766     GTATTG--AC-AT-GTAGGACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6776     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6775     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 8006     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6744     G-ATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6771     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCG-CCGA
L. mutabilis 8042     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6768     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6750     -TATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6767     GTATTG--AC-AT-GTAGGACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6751     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6749     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 6747     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. mutabilis 8032     GTATTG--AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGA
L. unicolor 7846*     ---TT--AACTATCT-A--TC----CTC-CTTTTT-TT-TCGTAG--CGG
L. aloides 7698*      ---TT--AACTAT-TTA--TC----CTC-CTTTTT-TT--CGTAG--CGG
L. pusilla 7820*      ---TT--AACTAT-TTA--TC----CTC-CTTTTT-TTTTCGTAG--CGG
L. unifolia 7850*     ---TT--AACTAT-TTA--TC----CTC-CTTTTT-TT-TCGTAG--CGG
M. depressa 7870*     ---TT--AACTAT-TTA--TC----TTC-CTTTTT-TT--CGTAG--TGG

                      301                                             350
L. mutabilis 6753     TTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAA
L. mutabilis 6756     TTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAA
L. mutabilis 6757     TTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAA
L. mutabilis 6762     TTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAA
L. mutabilis 8000     TTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAA
L. mutabilis 6746     TTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAA
L. mutabilis 8047     TTA-TCAATCAGTTTTTCAAAAA-GG-GGTCTATT----AAACTCTGGAA
L. mutabilis 6745     TTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAA
L. mutabilis 6755     TTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAA
L. mutabilis 6772     TTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAA
L. mutabilis 6764     TTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAA
L. mutabilis 6770     TTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAA
L. mutabilis 6773     TTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAA
L. mutabilis 6766     TTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAA
L. mutabilis 6776     TTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAA
L. mutabilis 6775     TTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAA
L. mutabilis 8006     TTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAA
L. mutabilis 6744     TTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAA
L. mutabilis 6771     TTA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAA
L. mutabilis 8042     TTA-TCAATCAGTTTTTCAAAAA-GG-GGTCTATT----AAACTCTGGAA
L. mutabilis 6768     TTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAA
L. mutabilis 6750     TTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAA
L. mutabilis 6767     TTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAA
L. mutabilis 6751     TTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAA
L. mutabilis 6749     TTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAA
L. mutabilis 6747     TTA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAA
L. mutabilis 8032     TTA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAA
L. unicolor 7846*     TTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----ATACTCT----
L. aloides 7698*      TTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----ATACTCT----
L. pusilla 7820*      TTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----ATACTCT----
L. unifolia 7850*     TTAG---------TT--CA-AATATCTT-TCTATTCATTATACTCT----
M. depressa 7870*     TTAAT-AA--A--TT--CA-A-TATCTT-TCTATTCATTATACTCT----
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                        351                                                 400
L. mutabilis 6753       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6756       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6757       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6762       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 8000       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6746       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 8047       TGA----TTT-GATC-CTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6745       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6755       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6772       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6764       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6770       TGA----TT---T-GATCACTGAA-TATATTCTTCC--GTCAACTTCGAT
L. mutabilis 6773       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6766       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6776       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6775       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 8006       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6744       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6771       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTC-AT
L. mutabilis 8042       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6768       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6750       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6767       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6751       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6749       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 6747       TGA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. mutabilis 8032       TGAATGATTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGAT
L. unicolor 7846*       T--------TCG--CA---AA-TA---GAT----CCGGG-CAAAATC--T
L. aloides 7698*        T--------TCG--CA---AA-TA---GAT----CCGGG-CAAAATC--T
L. pusilla 7820*        T--------TCG--CA---AA-TA---GAT----CCGGG-CAAAATC--T
L. unifolia 7850*       T--------TCG--CA---AA-TA---GAT----CCGGG-CAAAATC--T
M. depressa 7870*       T--------TCG--CA---AA-TA---GAT----CCGGG-CAAAATC--T

                        401                                                 450
L. mutabilis 6753       TGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTAT
L. mutabilis 6756       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. mutabilis 6757       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. mutabilis 6762       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. mutabilis 8000       TGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTAT
L. mutabilis 6746       TGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTAT
L. mutabilis 8047       TGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTAT
L. mutabilis 6745       TGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTAT
L. mutabilis 6755       TGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTAT
L. mutabilis 6772       TGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTAT
L. mutabilis 6764       TGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTAT
L. mutabilis 6770       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. mutabilis 6773       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. mutabilis 6766       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. mutabilis 6776       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. mutabilis 6775       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. mutabilis 8006       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. mutabilis 6744       TGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTAT
L. mutabilis 6771       TGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTAT
L. mutabilis 8042       TGGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTAT
L. mutabilis 6768       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. mutabilis 6750       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACG-GTAT
L. mutabilis 6767       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. mutabilis 6751       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. mutabilis 6749       TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
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L. mutabilis 6747     TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. mutabilis 8032     TGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTAT
L. unicolor 7846*     TGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--T
L. aloides 7698*      TGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--T
L. pusilla 7820*      TGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--T
L. unifolia 7850*     TG-----TATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--T
M. depressa 7870*     TGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--T

                      451                                             500
L. mutabilis 6753     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6756     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6757     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6762     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 8000     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6746     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 8047     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6745     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6755     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6772     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6764     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6770     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6773     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6766     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6776     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6775     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 8006     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6744     ATATAAT--ATATGGAT-TCGGGTC-ATG-AT-AATC--GT--TTG-A-T
L. mutabilis 6771     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--T-G-A-T
L. mutabilis 8042     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6768     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6750     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6767     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6751     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6749     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 6747     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. mutabilis 8032     ATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-T
L. unicolor 7846*     ACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATT
L. aloides 7698*      ACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATT
L. pusilla 7820*      ACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATT
L. unifolia 7850*     ACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATT
M. depressa 7870*     ACA-AATGAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATT

                      501                                             550
L. mutabilis 6753     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6756     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6757     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6762     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 8000     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6746     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 8047     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6745     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6755     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6772     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6764     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6770     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTCCAC
L. mutabilis 6773     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6766     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6776     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6775     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 8006     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6744     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
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L. mutabilis 6771     ATG-C--AGT--A-GT-A--A--CGTACGTATT-GATATATA-GGTCCAC
L. mutabilis 8042     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6768     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6750     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6767     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6751     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6749     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6747     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 8032     ATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. unicolor 7846*     AT-TCACAGCCCATATCATTATCCTTAC--ATTACA-AAAAAA-GTC---
L. aloides 7698*      AT-TCACAGCCCATATCATTATCCTTAC--ATTACA-AAAAAA-GTC---
L. pusilla 7820*      AT-TCACAGCCCATATCATTATCCTTAC--ATTACA-AAAAAA-GTC---
L. unifolia 7850*     AT-TCAC----CATATCATTATCCTTAC--ATTACA-AAAAAA-GTC---
M. depressa 7870*     AT-TCACAGCCCATATCATTATCCTTAC--ATTACA-AAAAAA-GTC---

                      551                                             600
L. mutabilis 6753     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6756     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6757     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6762     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 8000     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6746     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 8047     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6745     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6755     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6772     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6764     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6770     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6773     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6766     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6776     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6775     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 8006     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6744     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCGGTTATT
L. mutabilis 6771     CCTTTCTTTAATTTGCGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 8042     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6768     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6750     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6767     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6751     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6749     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6747     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 8032     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. unicolor 7846*     --TT-CTT---TTT------GAA-GATCT-AAGA---AATT-CGG--ACT
L. aloides 7698*      --TT-CTT---TTT------GAA-GATCT-AAGA---AATT-CGG--ACT
L. pusilla 7820*      --TT-CTT---TTT------GAA-GATCT-AAGA---AATT-CGG--ACT
L. unifolia 7850*     --TT-CTT---TTT------GAA-GATCT-AAAA---AATT-CGG--ACT
M. depressa 7870*     --TT-CTT---TTT------GAA-GATCT-AAGA---AATT-CAG--ACT

                      601                                             650
L. mutabilis 6753     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6756     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6757     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6762     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 8000     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6746     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 8047     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6745     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6755     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6772     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6764     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
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L. mutabilis 6770     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6773     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6766     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6776     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6775     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 8006     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6744     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTG-
L. mutabilis 6771     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 8042     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6768     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6750     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6767     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6751     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6749     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6747     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 8032     ATA----ACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. unicolor 7846*     A-------------G--GTCAA----ATT--TTT-AATAGTTT---TTG-
L. aloides 7698*      G-------------G--GTCAA----ATT--TTT-AATAGTTT---TTG-
L. pusilla 7820*      A-------------G--GTCAA----ATT--TTT-AATAGTTT---TTG-
L. unifolia 7850*     A-------------G--GTCAA----ATT--TTT-AATAGTTT---TTG-
M. depressa 7870*     A-------------G--GTCAA----ATT--TTT-AATAGTTT---TTG-

                      651                                             700
L. mutabilis 6753     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6756     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6757     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6762     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 8000     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6746     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 8047     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6745     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6755     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6772     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6764     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6770     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6773     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6766     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6776     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6775     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 8006     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6744     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTC-AGTTTTTAAACC
L. mutabilis 6771     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTT-AGTTTTTAAACC
L. mutabilis 8042     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6768     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6750     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6767     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6751     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6749     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 6747     GTCTCT-GCACC--TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACC
L. mutabilis 8032     GTCTCT-GCACC--TATCCCTTTTTTTTATTCTAGTCTAGTTTTTAAACC
L. unicolor 7846*     GTCTATTTAA--TTTA--C---------AT---A--C-A-TAT-TACA--
L. aloides 7698*      GTCTATTTAA--TTTA--C---------AT---A--C-A-TAT-TACA--
L. pusilla 7820*      GTCTATTTAA--TTTA--C---------AT---A--C-A-TAT-TACA--
L. unifolia 7850*     GTCTA-------TTTA--C---------AT---A--C-A-TAT-TACA--
M. depressa 7870*     GTCTATTTAA--TTTA--C---------AT---A--C-A-TAT-TACA--

                      701                                             750
L. mutabilis 6753     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6756     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6757     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6762     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
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L. mutabilis 8000     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6746     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTCCAGGATTGCCCATTTTT
L. mutabilis 8047     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6745     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6755     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6772     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6764     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6770     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6773     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6766     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6776     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6775     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 8006     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6744     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AG-ATTGCCCATTTTT
L. mutabilis 6771     CT-GTTTTTC-TAAAAAT-AAAGAT-TTGGCTCCAGGATTGCCCATTTTT
L. mutabilis 8042     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTCCAGGATTGCCCATTTTT
L. mutabilis 6768     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6750     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6767     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6751     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6749     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 6747     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. mutabilis 8032     CTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT
L. unicolor 7846*     -TAG------ATA----TCA----TCT--ATT--AGGA--G---AT----
L. aloides 7698*      -TAG------ATA----TCA----TCT--ACT--AGGA-TG---AT----
L. pusilla 7820*      -TAG------ATA----TCA----TCT--ACT--AGGA-TG---AT----
L. unifolia 7850*     -TAG------ATA----TCA----TCT--ACT--AGGA--G---AT----
M. depressa 7870*     -TAG------ATA----TAAGT-ATCT--ACT--AGGA--G---AT----

                      751
L. mutabilis 6753     AGTTCCAGGGG
L. mutabilis 6756     AGTTCCAGGGG
L. mutabilis 6757     AGTTCCAGGGG
L. mutabilis 6762     AGTTCCAGGGG
L. mutabilis 8000     -GTTCCAGGGG
L. mutabilis 6746     AGTTCCAGGGG
L. mutabilis 8047     -GTTCCAGGGG
L. mutabilis 6745     AGTTCCAGGGG
L. mutabilis 6755     AGTTCCAGGGG
L. mutabilis 6772     AGTTCCAGGGG
L. mutabilis 6764     AGTTCCAGGGG
L. mutabilis 6770     AGTTCCAGGGG
L. mutabilis 6773     AGTTCCAGGGG
L. mutabilis 6766     AGTTCCAGGGG
L. mutabilis 6776     AGTTCCAGGGG
L. mutabilis 6775     -GTTCCAGGGG
L. mutabilis 8006     -GTTCCAGGGG
L. mutabilis 6744     AGTTCCAGGGG
L. mutabilis 6771     AGTTCCAGGGG
L. mutabilis 8042     -GTTCCAGGGG
L. mutabilis 6768     AGTTCCAGGGG
L. mutabilis 6750     AGTTCCAGGGG
L. mutabilis 6767     AGTTCCAGGGG
L. mutabilis 6751     AGTTCCAGGGG
L. mutabilis 6749     AGTTCCAGGGG
L. mutabilis 6747     -GTTCCAGGGG
L. mutabilis 8032     AGTTCCAGGGG
L. unicolor 7846*     -G---CACGGG
L. aloides 7698*      -G---CACGGG
L. pusilla 7820*      -G---CACGGG
L. unifolia 7850*     -G---CACGGG
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*M. depressa 7870** -G---CACGGG

APPENDIX E: Aligned sequences of the trn_{L-F} region of the dataset with all *L. mutabilis* specimens with a basic chromosome number of 7, using CLUSTAL G. *Indicates sequences from Paula Spies.

```
                        1                                                  50
L. mutabilis 6753       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6756       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6757       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6762       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 8000       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 8047       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6745       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6755       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6764       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6770       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6773       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6766       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6776       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 8042       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6768       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6767       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6749       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 6747       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. mutabilis 8032       -TCGAATATAATTACGAAAAACTGATTAATCGGACGAGGAAT----AGAG
L. unicolor 7846*       ATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG
L. aloides 7698*        ATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG
L. pusilla 7820*        ATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG
L. unifolia 7850*       ATC-AATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG
M. depressa 7870*       ATCGAATATTATTATGAAAAACTGATTAATCGGACGAGGAATAAAGAGAG

                        51                                                 100
L. mutabilis 6753       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6756       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGGGA
L. mutabilis 6757       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGGGA
L. mutabilis 6762       AGTACCGG--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 8000       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 8047       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6745       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6755       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6764       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6770       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6773       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6766       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6776       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 8042       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6768       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6767       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6749       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 6747       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. mutabilis 8032       AGTACCGT--TACATGTCAATACCGACAACAATGGATTTTTATTGGGG-A
L. unicolor 7846*       AGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG---
L. aloides 7698*        AGTCCTGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG---
L. pusilla 7820*        AGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG---
L. unifolia 7850*       AGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG---
M. depressa 7870*       AGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTTATAGGG---

                        101                                                150
L. mutabilis 6753       TAGAGGGACTTGAACCCTCACGATTTCTAA-GTCATGTCAACTTCGATTG
L. mutabilis 6756       TAGAGGGACTTGAACCCTCACGATTTCTATAGTCATGTCAACTTCGATTG
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L. mutabilis 6757     TAGAGGGACTTGAACCCTCACGATTTCTATAGTCATGTCAACTTCGATTG
L. mutabilis 6762     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 8000     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 8047     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6745     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6755     TAGAGGGACTTGAACCCTCACGATTTCTAA-GTCATGTCAACTTCGATTG
L. mutabilis 6764     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6770     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6773     TAGAGGGACTTGA-CCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6766     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6776     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 8042     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6768     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6767     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6749     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 6747     TAGAGGGACTTGAACCCTCACGATTTCTAAAGTCATGTCAACTTCGATTG
L. mutabilis 8032     TAGAGGGACTTGAACCCTCACGATTTCTAAAG-CATGTCAACTTCGATTG
L. unicolor 7846*     TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTG
L. aloides 7698*      TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTG
L. pusilla 7820*      TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTG
L. unifolia 7850*     TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTG
M. depressa 7870*     TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCATGTCAACTTCGATTG

                      151                                             200
L. mutabilis 6753     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6756     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6757     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6762     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 8000     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 8047     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6745     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6755     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6764     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6770     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6773     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6766     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6776     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 8042     GAATAGATCCACCTCTGAATTTTACATATATTGCA---ACGGATTT---T
L. mutabilis 6768     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6767     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6749     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 6747     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. mutabilis 8032     GAATAGATCCACCTCTGAATTTTACATATATTGCA--GACGGATTT---T
L. unicolor 7846*     GAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT
L. aloides 7698*      GAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT
L. pusilla 7820*      GAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT
L. unifolia 7850*     GAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT
M. depressa 7870*     GAATAGATCCACCTCTGAATTTTACATATATTGCAGTGAGGG-TTCAAGT

                      201                                             250
L. mutabilis 6753     -CC-TCT-TAC---ATAAA-T-T--------------TCAT-TG--T-CG
L. mutabilis 6756     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6757     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6762     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 8000     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 8047     TCC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6745     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6755     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6764     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6770     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6773     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
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L. mutabilis 6766     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6776     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 8042     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6768     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6767     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6749     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 6747     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. mutabilis 8032     -CC-TCT-TAC---ATAAA-T-T--------------TCATTTG--T-CG
L. unicolor 7846*     -CCCTCTATCCCCAATAAA--------------AAGATTATTTGACTTC-
L. aloides 7698*      -CCCTCTATCCCCAATAAA--------------AAGATCATTTGACTTC-
L. pusilla 7820*      -CCCTCTATCCCCAATAAA--------------AAGATCATTTGACTTC-
L. unifolia 7850*     -CCCTCTATCCCCAATAAA--------------AAGACCATTTGACTTC-
M. depressa 7870*     -CCCTCTATCCCCAATAAACTGTCCCCAATAAAAAGACCATTTGACTTC-

                      251                                             300
L. mutabilis 6753     GTA-TG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 6756     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 6757     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 6762     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 8000     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 8047     GTATTG-CC-AT-GTAG-ACGGGACTCTCTCTTTATT----TCGTCCGAT
L. mutabilis 6745     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 6755     GTA-TG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 6764     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 6770     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 6773     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 6766     GTATTG-AC-AT-GTAGGACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 6776     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 8042     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 6768     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 6767     GTATTG-AC-AT-GTAGGACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 6749     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 6747     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. mutabilis 8032     GTATTG-AC-AT-GTAG-ACGGGACTCTCTCTTTATT--C-TCGTCCGAT
L. unicolor 7846*     ---TT-AACTATC-T-A--TC----CTC-CTTTTT-TT-TCGTAG--CGG
L. aloides 7698*      ---TT-AACTAT--TTA--TC----CTC-CTTTTT-TT--CGTAG--CGG
L. pusilla 7820*      ---TT-AACTAT--TTA--TC----CTC-CTTTTT-TTTTCGTAG--CGG
L. unifolia 7850*     ---TT-AACTAT--TTA--TC----CTC-CTTTTT-TT-TCGTAG--CGG
M. depressa 7870*     ---TT-AACTAT--TTA--TC----TTC-CTTTTT-TT--CGTAG--TGG

                     301                                              350
L. mutabilis 6753      TA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAAT
L. mutabilis 6756      TA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAAT
L. mutabilis 6757      TA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAAT
L. mutabilis 6762      TA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAAT
L. mutabilis 8000      TA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAAT
L. mutabilis 8047      TA-TCAATCAGTTTTTCAAAAA-GG-GGTCTATT----AAACTCTGGAAT
L. mutabilis 6745      TA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAAT
L. mutabilis 6755      TA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAAT
L. mutabilis 6764      TA-TCAATCAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAAT
L. mutabilis 6770      TA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAAT
L. mutabilis 6773      TA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAAT
L. mutabilis 6766      TA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAAT
L. mutabilis 6776      TA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAAT
L. mutabilis 8042      TA-TCAATCAGTTTTTCAAAAA-GG-GGTCTATT----AAACTCTGGAAT
L. mutabilis 6768      TA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAAT
L. mutabilis 6767      TA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAAT
L. mutabilis 6749      TA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAAT
L. mutabilis 6747      TA-TCAATCAGTTTTTCAAAAAAGG-GATCTATT----AAACTCTGGAAT
L. mutabilis 8032      TA-T----CAGTTTTTCAAAAAAGG-GGTCTATT----AAACTCTGGAAT
L. unicolor 7846*      TTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----ATACTCT----
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L. aloides 7698*      TTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----ATACTCT----
L. pusilla 7820*      TTAAT-AA--A--TT--CA-A-TATCTT-TCTATT----ATACTCT----
L. unifolia 7850*     TTAG---------TT--CA-AATATCTT-TCTATTCATTATACTCT----
M. depressa 7870*     TTAAT-AA--A--TT--CA-A-TATCTT-TCTATTCATTATACTCT----

                      351                                             400
L. mutabilis 6753     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 6756     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 6757     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 6762     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 8000     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 8047     GA----TTT-GATC-CTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 6745     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 6755     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 6764     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 6770     GA----TT---T-GATCACTGAA-TATATTCTTCC--GTCAACTTCGATT
L. mutabilis 6773     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 6766     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 6776     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 8042     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 6768     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 6767     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 6749     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 6747     GA----TTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. mutabilis 8032     GAATGATTT-GATCACTGAA-TATTCGATTCTTCC--GTCAACTTCGATT
L. unicolor 7846*     T--------TCG--CA---AA-TA---GAT----CCGGG-CAAAATC--T
L. aloides 7698*      T--------TCG--CA---AA-TA---GAT----CCGGG-CAAAATC--T
L. pusilla 7820*      T--------TCG--CA---AA-TA---GAT----CCGGG-CAAAATC--T
L. unifolia 7850*     T--------TCG--CA---AA-TA---GAT----CCGGG-CAAAATC--T
M. depressa 7870*     T--------TCG--CA---AA-TA---GAT----CCGGG-CAAAATC--T

                      401                                             450
L. mutabilis 6753     GGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTATA
L. mutabilis 6756     GGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATA
L. mutabilis 6757     GGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATA
L. mutabilis 6762     GGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATA
L. mutabilis 8000     GGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTATA
L. mutabilis 8047     GGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTATA
L. mutabilis 6745     GGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTATA
L. mutabilis 6755     GGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTATA
L. mutabilis 6764     GGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTATA
L. mutabilis 6770     GGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATA
L. mutabilis 6773     GGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATA
L. mutabilis 6766     GGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATA
L. mutabilis 6776     GGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATA
L. mutabilis 8042     GGAATAGATCCACCTCTGAATTTTACATATATTGCAT--ATACGTGTATA
L. mutabilis 6768     GGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATA
L. mutabilis 6767     GGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATA
L. mutabilis 6749     GGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATA
L. mutabilis 6747     GGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATA
L. mutabilis 8032     GGAATAGATCCACCTCTGAATTTTGCATATATTGCAT--ATACGTGTATA
L. unicolor 7846*     TGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--T
L. aloides 7698*      TGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--T
L. pusilla 7820*      TGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--T
L. unifolia 7850*     TG-----TATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--T
M. depressa 7870*     TGG-ATCTATCC----CT-A--TTAGG---T-TTGAATAGATACCTG--T

                      451                                             500
L. mutabilis 6753     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 6756     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 6757     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
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L. mutabilis 6762     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 8000     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 8047     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 6745     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 6755     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 6764     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 6770     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 6773     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 6766     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 6776     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 8042     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 6768     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 6767     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 6749     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 6747     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. mutabilis 8032     TATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC--GT--TTG-A-TA
L. unicolor 7846*     ACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATT
L. aloides 7698*      ACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATT
L. pusilla 7820*      ACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATT
L. unifolia 7850*     ACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATT
M. depressa 7870*     ACA-AATGAACAT--ATAT--GGTCAAGGAAT---TCCCATTATTGAATT

                      501                                             550
L. mutabilis 6753     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6756     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6757     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6762     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 8000     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 8047     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6745     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6755     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6764     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6770     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTCCAC
L. mutabilis 6773     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6766     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6776     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 8042     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6768     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6767     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6749     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 6747     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. mutabilis 8032     TGTC--AGT--ATG-T-AT-A--CGTACGTATTAGATATATA-GGTC-AC
L. unicolor 7846*     AT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAAAAA-GTC--
L. aloides 7698*      AT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAAAAA-GTC--
L. pusilla 7820*      AT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAAAAA-GTC--
L. unifolia 7850*     AT-TCAC----CATA-TCATTATCCTTAC--ATTACA-AAAAAA-GTC--
M. depressa 7870*     AT-TCACAGCCCATA-TCATTATCCTTAC--ATTACA-AAAAAA-GTC--

                      551                                             600
L. mutabilis 6753     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6756     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6757     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6762     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 8000     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 8047     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6745     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6755     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6764     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6770     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6773     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6766     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
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L. mutabilis 6776     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 8042     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6768     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6767     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6749     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 6747     CCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTATTCCTGTTATT
L. mutabilis 8032     CCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTATTCCTGTTATT
L. unicolor 7846*     ---TT-CTT---TTT------GAA-GATCT-AAGA---AATT-CGG--AC
L. aloides 7698*      ---TT-CTT---TTT------GAA-GATCT-AAGA---AATT-CGG--AC
L. pusilla 7820*      ---TT-CTT---TTT------GAA-GATCT-AAGA---AATT-CGG--AC
L. unifolia 7850*     ---TT-CTT---TTT------GAA-GATCT-AAAA---AATT-CGG--AC
M. depressa 7870*     ---TT-CTT---TTT------GAA-GATCT-AAGA---AATT-CAG--AC

                      601                                             650
L. mutabilis 6753     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6756     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6757     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6762     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 8000     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 8047     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6745     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6755     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6764     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6770     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6773     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6766     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6776     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 8042     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6768     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6767     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6749     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 6747     ATATATAACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. mutabilis 8032     ATA----ACACAACGTAGTCAACTCCATTCGTTAGAACAGCTTCCATTGA
L. unicolor 7846*     TA-------------G--GTCAA----ATT--TTT-AATAGTTT---TTG
L. aloides 7698*      TG-------------G--GTCAA----ATT--TTT-AATAGTTT---TTG
L. pusilla 7820*      TA-------------G--GTCAA----ATT--TTT-AATAGTTT---TTG
L. unifolia 7850*     TA-------------G--GTCAA----ATT--TTT-AATAGTTT---TTG
M. depressa 7870*     TA-------------G--GTCAA----ATT--TTT-AATAGTTT---TTG

                      651                                             700
L. mutabilis 6753     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6756     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6757     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6762     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 8000     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 8047     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6745     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6755     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6764     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6770     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6773     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6766     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6776     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 8042     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6768     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6767     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6749     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 6747     GTCTCT-GCACC-TATCCC-TTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. mutabilis 8032     GTCTCT-GCACC-TATCCCTTTTTTTTATTCTAGTCTAGTTTTTAAACCC
L. unicolor 7846*     -GTCTATTTAA-TTTA--C--------AT---A--C-A-TAT-TACA---
L. aloides 7698*      -GTCTATTTAA-TTTA--C--------AT---A--C-A-TAT-TACA---
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L. pusilla 7820*     -GTCTATTTAA-TTTA--C--------AT---A--C-A-TAT-TACA---
L. unifolia 7850*    -GTCTA------TTTA--C--------AT---A--C-A-TAT-TACA---
M. depressa 7870*    -GTCTATTTAA-TTTA--C--------AT---A--C-A-TAT-TACA---

                      701                                              750
L. mutabilis 6753     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 6756     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 6757     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 6762     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 8000     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT-
L. mutabilis 8047     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT-
L. mutabilis 6745     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 6755     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 6764     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 6770     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 6773     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 6766     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 6776     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 8042     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTCCAGGATTGCCCATTTTT-
L. mutabilis 6768     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 6767     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 6749     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. mutabilis 6747     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT-
L. mutabilis 8032     TTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTA
L. unicolor 7846*     TAG------ATA----TCA----TCT--ATT--AGGA--G---AT-----
L. aloides 7698*      TAG------ATA----TCA----TCT--ACT--AGGA-TG---AT-----
L. pusilla 7820*      TAG------ATA----TCA----TCT--ACT--AGGA-TG---AT-----
L. unifolia 7850*     TAG------ATA----TCA----TCT--ACT--AGGA--G---AT-----
M. depressa 7870*     TAG------ATA----TAAGT-ATCT--ACT--AGGA--G---AT-----

                      751
L. mutabilis 6753     GTTCCAGGGG
L. mutabilis 6756     GTTCCAGGGG
L. mutabilis 6757     GTTCCAGGGG
L. mutabilis 6762     GTTCCAGGGG
L. mutabilis 8000     GTTCCAGGGG
L. mutabilis 8047     GTTCCAGGGG
L. mutabilis 6745     GTTCCAGGGG
L. mutabilis 6755     GTTCCAGGGG
L. mutabilis 6764     GTTCCAGGGG
L. mutabilis 6770     GTTCCAGGGG
L. mutabilis 6773     GTTCCAGGGG
L. mutabilis 6766     GTTCCAGGGG
L. mutabilis 6776     GTTCCAGGGG
L. mutabilis 8042     GTTCCAGGGG
L. mutabilis 6768     GTTCCAGGGG
L. mutabilis 6767     GTTCCAGGGG
L. mutabilis 6749     GTTCCAGGGG
L. mutabilis 6747     GTTCCAGGGG
L. mutabilis 8032     GTTCCAGGGG
L. unicolor 7846*     G---CACGGG
L. aloides 7698*      G---CACGGG
L. pusilla 7820*      G---CACGGG
L. unifolia 7850*     G---CACGGG
M. depressa 7870*     G---CACGGG
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APPENDIX F: Aligned sequences of the INTRON of the dataset with all specimens studied, using CLUSTAL G. *Indicates sequences from Paula Spies.

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                                1                                                 50
L. mutabilis 6753               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6756               ACAATGGATTTTTATTGGGGGATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6757               ACAATGGATTTTTATTGGGGGATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6762               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 8000               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6746               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 8047               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6745               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6755               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6772               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6764               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6770               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6773               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGA-CCCTCACGATTTCT
L. mutabilis 6766               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6776               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6775               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 8006               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6744               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6771               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 8042               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6768               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6750               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6767               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6751               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6749               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6747               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 8032               ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. arbuthnotiae 7711*           ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. arbuthnotiae 8054            ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. arbuthnotiae 8055            ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. fistulosa 8064               ACA-TGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. fistulosa 8058               ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. fistulosa 8062               ACA-TGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. orchioides 8089              ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCCCGATTTCT
L. orchioides 8093              ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCCCGATTTCT
L. orchioides 8073              ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. orchioides 8090              ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCCCGATTTCT
L. orchioides 8069              ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. orchioides 7802*             ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. orchioides 8100              ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. orchioides 7806*             ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. orchioides 8101              ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 8022                 ACA-TGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. elegans 8019                 ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 8024                 ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 8027                 ACA-TGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. elegans 7735*                ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 7736*                ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 8026                 ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 7734*                ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 8018                 ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 7736*                ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 8020                 ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. rosea 7827*                  ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. unicolor 7846*               ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. aloides 7698*                ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. pusilla 7820*                ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
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L. unifolia 7850*        ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
M. depressa 7870*        ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T

                         51                                              100
L. mutabilis 6753        AA-GTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6756        ATAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6757        ATAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6762        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 8000        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6746        AAA-T----ACGGATTT---T--C--CT-TAC---ATAAA-T-T------
L. mutabilis 8047        AAAGTC--GACGGATTT---TTCC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6745        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6755        AA-GTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6772        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6764        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6770        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6773        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6766        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6776        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6775        AAAGTC--GACG-ATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 8006        AAAGTC--GACGGATTT---T-CCCTCT-TAC---ATAAA-T-T------
L. mutabilis 6744        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6771        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 8042        AAAGTC---ACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6768        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6750        AAAGTC--GACGGATTT---T-CC-TC-T-TA---ATAAA-T-T------
L. mutabilis 6767        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6751        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6749        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6747        AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 8032        AAAG-C--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. arbuthnotiae 7711*    AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCC-CAATAAA---------
L. arbuthnotiae 8054     AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. arbuthnotiae 8055     AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. fistulosa 8064        AA-GTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. fistulosa 8058        AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. fistulosa 8062        AA-GTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. orchioides 8089       AAAG-C-CGACGGATTT-----CC-TCT-TAC---ATAAA-T-T------
L. orchioides 8093       AAAG-C-CGACGGATTT-----CC-TCT-TAC---ATAAA-T-T------
L. orchioides 8073       AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. orchioides 8090       AAAG-C-CGACGGATTT-----CC-TCT-TAC---ATAAA-T-T------
L. orchioides 8069       AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. orchioides 7802*      AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. orchioides 8100       AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. orchioides 7806*      AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. orchioides 8101       AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 8022          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAAAT-T------
L. elegans 8019          AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 8024          AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 8027          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAAAT-T------
L. elegans 7735*         AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 7736*         AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 8026          AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 7734*         AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 8018          AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 7736*         AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 8020          AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. rosea 7827*           AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. unicolor 7846*        AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. aloides 7698*         AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. pusilla 7820*         AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
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L. unifolia 7850*        AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
M. depressa 7870*        AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAACTGTCCCCAA

                         101                                           150
L. mutabilis 6753        --------TCAT-TG--T-CGGTA-TG--AC-AT------GTAG-AACGG
L. mutabilis 6756        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6757        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6762        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 8000        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6746        --------TC---TG----CGGTATTGACAC-AT------GTAG-AACGG
L. mutabilis 8047        --------TCATTTG--T-CGGTATTG--CC-AT------GTAG-AACGG
L. mutabilis 6745        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6755        --------TCATTTG--T-CGGTA-TG--AC-AT------GTAG-AACGG
L. mutabilis 6772        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6764        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6770        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6773        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6766        --------TCATTTG--T-CGGTATTG--AC-AT------GTAGGAACGG
L. mutabilis 6776        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6775        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 8006        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6744        --------TCATTTG--T-CGG-ATTG--AC-AT------GTAG-AACGG
L. mutabilis 6771        --------TCATT-G--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 8042        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6768        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6750        --------TCATGTG--T-CG-TATTG--AC-AT------GTAG-A-CGG
L. mutabilis 6767        --------TCATTTG--T-CGGTATTG--AC-AT------GTAGGAACGG
L. mutabilis 6751        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6749        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6747        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 8032        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. arbuthnotiae 7711*    -----AAGATCATTGACTTC----TT--AACTAT------TTA--T-C--
L. arbuthnotiae 8054     ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. arbuthnotiae 8055     ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. fistulosa 8064        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. fistulosa 8058        ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. fistulosa 8062        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. orchioides 8089       --------TCATTTG--T-CGGTATTGG-AC-AT------GTAG-AACGG
L. orchioides 8093       --------TCATTTG--T-CGGTATTGG-AC-AT------GTAG-AACGG
L. orchioides 8073       --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. orchioides 8090       --------TCATTTG--T-CGGTATTGG-AC-AT------GTAG-AACGG
L. orchioides 8069       --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. orchioides 7802*      ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. orchioides 8100       ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. orchioides 7806*      ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. orchioides 8101       ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. elegans 8022          --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. elegans 8019          ----AAGATCATTTGACTTC----TT--AACTATTTATCTTTA--T-C--
L. elegans 8024          ----AAGATCATTTGACTTC----TT--AACTATTTATCTTTA--T-C--
L. elegans 8027          --------TCATTTG--T-CGGTATTG-AACTATTTATCTTTAG-AACGG
L. elegans 7735*         ----AAGATCATTTGACTTC----TT--AACTATTTATCTTTA--T-C--
L. elegans 7736*         ----AAGATCATTTGACTTC----TT--AACTATTTATCTTTA--T-C--
L. elegans 8026          ----AAGATCATTTGACTTC----TT--AACTATTTATCTTTA--T-C--
L. elegans 7734*         ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. elegans 8018          ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. elegans 7736*         ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. elegans 8020          ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. rosea 7827*           ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. unicolor 7846*        ----AAGATTATTTGACTTC----TT--AACTATC-----T-A--T-C--
L. aloides 7698*         ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. pusilla 7820*         ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
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L. unifolia 7850*        ----AAGACCATTTGACTTC----TT--AACTAT------TTA--T-C--
M. depressa 7870*        TAAAAAGACCATTTGACTTC----TT--AACTAT------TTA--T-C--

                         151                                             200
L. mutabilis 6753        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6756        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6757        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6762        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 8000        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6746        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 8047        GACTCTCTCTTTATT-----TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6745        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6755        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6772        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6764        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6770        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6773        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6766        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6776        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6775        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. mutabilis 8006        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. mutabilis 6744        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6771        GACTCTCTCTTTATT---C-TC-G-CCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 8042        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6768        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6750        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6767        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6751        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6749        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6747        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 8032        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. arbuthnotiae 7711*    --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. arbuthnotiae 8054     --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. arbuthnotiae 8055     --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. fistulosa 8064        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. fistulosa 8058        --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. fistulosa 8062        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. orchioides 8089       GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. orchioides 8093       GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. orchioides 8073       GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. orchioides 8090       GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. orchioides 8069       GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. orchioides 7802*      --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. orchioides 8100       --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. orchioides 7806*      --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. orchioides 8101       --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 8022          GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. elegans 8019          --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 8024          --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 8027          GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. elegans 7735*         --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 7736*         --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 8026          --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 7734*         --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 8018          --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 7736*         --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 8020          --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. rosea 7827*           --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. unicolor 7846*        --CTC-CTTTTT-TT--TCGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. aloides 7698*         --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. pusilla 7820*         --CTC-CTTTTT-TTTTTCGTAAG--CGGTTCAAAT-AA--A--TT--CA
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L. unifolia 7850*        --CTC-CTTTTT-TTT-TCGTAAG--CGGTTCAG----------TT--CA
M. depressa 7870*        --TTC-CTTTTT-TT---CGTAAG--TGGTTCAAAT-AA--A--TT--CA

                         201                                             250
L. mutabilis 6753        AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6756        AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6757        AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6762        AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 8000        AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6746        AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 8047        AAAA-GG-GGTCTATT----AAACTCTGGAATGA----TTT-GATC-CTG
L. mutabilis 6745        AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6755        AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6772        AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6764        AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6770        AAAAAGG-GATCTATT----AAACTCTGGAATGA----TT---T-GATCA
L. mutabilis 6773        AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6766        AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6776        AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6775        AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 8006        AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6744        AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6771        AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 8042        AAAA-GG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6768        AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6750        AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6767        AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6751        AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6749        AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6747        AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 8032        AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. arbuthnotiae 7711*    -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. arbuthnotiae 8054     -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. arbuthnotiae 8055     -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. fistulosa 8064        AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. fistulosa 8058        -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. fistulosa 8062        AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. orchioides 8089       AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. orchioides 8093       AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. orchioides 8073       AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. orchioides 8090       AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. orchioides 8069       AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. orchioides 7802*      -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. orchioides 8100       -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. orchioides 7806*      -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. orchioides 8101       -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. elegans 8022          AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. elegans 8019          -A-TATCTT-TCTACT----ATACTCT----T--------TCG--CA---
L. elegans 8024          -A-TATCTT-TCTACT----ATACTCT----T--------TCG--CA---
L. elegans 8027          AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. elegans 7735*         -A-TATCTT-TCTACT----ATACTCT----T--------TCG--CA---
L. elegans 7736*         -A-TATCTT-TCTACT----ATACTCT----T--------TCG--CA---
L. elegans 8026          -A-TATCTT-TCTACT----ATACTCT----T--------TCG--CA---
L. elegans 7734*         -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. elegans 8018          -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. elegans 7736*         -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. elegans 8020          -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. rosea 7827*           -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. unicolor 7846*        -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. aloides 7698*         -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. pusilla 7820*         -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
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L. unifolia 7850*        -AATATCTT-TCTATTCATTATACTCT----T--------TCG--CA---
M. depressa 7870*        -A-TATCTT-TCTATTCATTATACTCT----T--------TCG--CA---

                         251                                             300
L. mutabilis 6753        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6756        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6757        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6762        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 8000        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6746        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 8047        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6745        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6755        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6772        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6764        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6770        CTGAA-TATATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6773        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6766        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6776        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6775        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 8006        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6744        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6771        AA-TATTCGATTCTTCC--GTCAACTTC-ATTGGAATAGATCCACCTCTG
L. mutabilis 8042        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6768        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6750        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6767        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6751        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6749        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 6747        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. mutabilis 8032        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. arbuthnotiae 7711*    AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. arbuthnotiae 8054     AA-TA---GAT----NNGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. arbuthnotiae 8055     AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. fistulosa 8064        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. fistulosa 8058        AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. fistulosa 8062        AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. orchioides 8089       AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. orchioides 8093       AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. orchioides 8073       AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. orchioides 8090       AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. orchioides 8069       AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. orchioides 7802*      AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. orchioides 8100       AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. orchioides 7806*      AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATTC----CT-
L. orchioides 8101       AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATTC----CT-
L. elegans 8022          AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. elegans 8019          AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. elegans 8024          AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. elegans 8027          AA-TATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTG
L. elegans 7735*         AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. elegans 7736*         AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. elegans 8026          AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. elegans 7734*         AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. elegans 8018          AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. elegans 7736*         AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. elegans 8020          AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. rosea 7827*           AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCCATCCCT-
L. unicolor 7846*        AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. aloides 7698*         AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
L. pusilla 7820*         AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-
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L. unifolia 7850*        AA-TA---GAT----CCGGG-CAAAATC--TTG-----TATCC----CT-
M. depressa 7870*        AA-TA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-

                         301                                             350
L. mutabilis 6753        AATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6756        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6757        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6762        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 8000        AATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6746        AATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 8047        AATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6745        AATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6755        AATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6772        AATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6764        AATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6770        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6773        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6766        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6776        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6775        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 8006        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6744        AATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6771        AATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 8042        AATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6768        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6750        AATTTTGCATATATTGCAT--ATACG-GTATATATAAT--ATATGGAT-T
L. mutabilis 6767        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6751        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6749        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 6747        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. mutabilis 8032        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. arbuthnotiae 7711*    A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. arbuthnotiae 8054     A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. arbuthnotiae 8055     A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. fistulosa 8064        AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. fistulosa 8058        A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. fistulosa 8062        AA-TTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. orchioides 8089       AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. orchioides 8093       AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. orchioides 8073       AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. orchioides 8090       AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. orchioides 8069       AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. orchioides 7802*      A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. orchioides 8100       A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. orchioides 7806*      A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. orchioides 8101       A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. elegans 8022          AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. elegans 8019          A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. elegans 8024          A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. elegans 8027          AATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-T
L. elegans 7735*         A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. elegans 7736*         A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. elegans 8026          A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. elegans 7734*         A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. elegans 8018          A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. elegans 7736*         A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. elegans 8020          A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. rosea 7827*           A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. unicolor 7846*        A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. aloides 7698*         A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
L. pusilla 7820*         A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
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L. unifolia 7850*        A--TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT
M. depressa 7870*        A--TTAGG---T-TTGAATAGATACCTG--TACA-AATGAACAT--ATAT

                         351                                             400
L. mutabilis 6753        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6756        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6757        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6762        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 8000        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6746        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 8047        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6745        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6755        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6772        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6764        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6770        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6773        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6766        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6776        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6775        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 8006        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6744        CGGGTC-ATG-AT-AATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6771        CGGGTC-ATG-ATTAATC--GT--T-G-A-TATG-C--AGT--A-G-T-A
L. mutabilis 8042        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6768        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6750        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6767        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6751        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6749        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 6747        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. mutabilis 8032        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. arbuthnotiae 7711*    --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. arbuthnotiae 8054     --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. arbuthnotiae 8055     --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. fistulosa 8064        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. fistulosa 8058        --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. fistulosa 8062        CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. orchioides 8089       CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. orchioides 8093       CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. orchioides 8073       CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. orchioides 8090       CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. orchioides 8069       CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. orchioides 7802*      --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. orchioides 8100       --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. orchioides 7806*      --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. orchioides 8101       --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. elegans 8022          CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. elegans 8019          --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATAATCA
L. elegans 8024          --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATAATCA
L. elegans 8027          CGGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-A
L. elegans 7735*         --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATAATCA
L. elegans 7736*         --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATAATCA
L. elegans 8026          --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATAATCA
L. elegans 7734*         --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. elegans 8018          --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. elegans 7736*         --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. elegans 8020          --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. rosea 7827*           --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. unicolor 7846*        --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. aloides 7698*         --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
L. pusilla 7820*         --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA
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L. unifolia 7850*        --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCAC----CATA-TCA
M. depressa 7870*        --GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCA

                         401                                             450
L. mutabilis 6753        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. mutabilis 6756        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT----
L. mutabilis 6757        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT----
L. mutabilis 6762        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT----
L. mutabilis 8000        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. mutabilis 6746        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. mutabilis 8047        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. mutabilis 6745        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. mutabilis 6755        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. mutabilis 6772        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. mutabilis 6764        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. mutabilis 6770        T-A--CGTACGTATTAGATATATA-GGTCCACCCTTTCTTTAATTT----
L. mutabilis 6773        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT----
L. mutabilis 6766        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT----
L. mutabilis 6776        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT----
L. mutabilis 6775        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. mutabilis 8006        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. mutabilis 6744        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. mutabilis 6771        --A--CGTACGTATT-GATATATA-GGTCCACCCTTTCTTTAATTTGCGA
L. mutabilis 8042        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. mutabilis 6768        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT----
L. mutabilis 6750        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT----
L. mutabilis 6767        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT----
L. mutabilis 6751        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT----
L. mutabilis 6749        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT----
L. mutabilis 6747        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT----
L. mutabilis 8032        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. arbuthnotiae 7711*    TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. arbuthnotiae 8054     TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. arbuthnotiae 8055     TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. fistulosa 8064        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. fistulosa 8058        TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. fistulosa 8062        T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. orchioides 8089       T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. orchioides 8093       T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. orchioides 8073       T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. orchioides 8090       T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. orchioides 8069       T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. orchioides 7802*      TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. orchioides 8100       TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. orchioides 7806*      TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. orchioides 8101       TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. elegans 8022          T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. elegans 8019          TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. elegans 8024          TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. elegans 8027          T-A--CGTACGTATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGA
L. elegans 7735*         TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. elegans 7736*         TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. elegans 8026          TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. elegans 7734*         TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. elegans 8018          TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. elegans 7736*         TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. elegans 8020          TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. rosea 7827*           TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. unicolor 7846*        TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. aloides 7698*         TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
L. pusilla 7820*         TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
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L. unifolia 7850*        TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----
M. depressa 7870*        TTATCCTTAC--ATTACA-AAAAAA-GTC-----TT-CTT---TTT----

                         451                                            500
L. mutabilis 6753        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6756        -AGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6757        -AGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6762        -AGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 8000        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6746        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 8047        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6745        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6755        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6772        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6764        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6770        -AGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6773        -AGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6766        -AGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6776        -AGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6775        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 8006        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6744        TAGAAGGAT-TGATTATTCTATTCCGGTT--ATTATATATA-ACACAACG
L. mutabilis 6771        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 8042        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6768        -AGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6750        -AGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6767        -AGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6751        -AGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6749        -AGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 6747        -AGAAGGAT-TGATTATTCTATTCCTGTT--ATTATATATA-ACACAACG
L. mutabilis 8032        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATA-----ACACAACG
L. arbuthnotiae 7711*    --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. arbuthnotiae 8054     --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. arbuthnotiae 8055     --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. fistulosa 8064        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATA-----ACACAACG
L. fistulosa 8058        --GAA-GATCT-AAGA---AATT-CGG--GGACTG--------------G
L. fistulosa 8062        TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATA-----ACACAACG
L. orchioides 8089       TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATA-----ACACAACG
L. orchioides 8093       TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATA-----ACACAACG
L. orchioides 8073       TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATA-----AC-CAACG
L. orchioides 8090       TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATA-----ACACAACG
L. orchioides 8069       TAGAAGGAT-TGATTATTCTATTCCTGTT--ATTATA-----ACACAACG
L. orchioides 7802*      --GAA-GATCT-AAGA---AATT-CGG--GGACTG--------------G
L. orchioides 8100       --GAA-GATCT-AAGA---AATT-CGG--GGACTG--------------G
L. orchioides 7806*      --GAA-GATCT-AAGA---AATT-CGG--GGACTG--------------G
L. orchioides 8101       --GAA-GATCT-AAGA---AATT-CGG--GGACTG--------------G
L. elegans 8022          TAGAAGGAT-T----ATTCTATTCCTGTT--ATTATA-----ACACAACG
L. elegans 8019          --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. elegans 8024          --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. elegans 8027          TAGAAGGAT-T----ATTCTATTCCTGTT--ATTATA-----ACACAACG
L. elegans 7735*         --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. elegans 7736*         --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. elegans 8026          --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. elegans 7734*         --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. elegans 8018          --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. elegans 7736*         --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. elegans 8020          --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. rosea 7827*           --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. unicolor 7846*        --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
L. aloides 7698*         --GAA-GATCT-AAGA---AATT-CGG--GGACTG--------------G
L. pusilla 7820*         --GAA-GATCT-AAGA---AATT-CGG--GGACTA--------------G
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L. unifolia 7850*        --GAA-GATCT-AAAA---AATT-CGG--GGACTA--------------G
M. depressa 7870*        --GAA-GATCT-AAGA---AATT-CAG--GGACTA--------------G

                         501                                             550
L. mutabilis 6753        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6756        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6757        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6762        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 8000        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6746        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 8047        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6745        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6755        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6772        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6764        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6770        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6773        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6766        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6776        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6775        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 8006        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6744        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTG-GTCTCT-GCACC--
L. mutabilis 6771        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 8042        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6768        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6750        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6767        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6751        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6749        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 6747        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. mutabilis 8032        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. arbuthnotiae 7711*    --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. arbuthnotiae 8054     --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. arbuthnotiae 8055     --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. fistulosa 8064        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. fistulosa 8058        --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. fistulosa 8062        TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. orchioides 8089       TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. orchioides 8093       TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. orchioides 8073       TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. orchioides 8090       TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. orchioides 8069       TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. orchioides 7802*      --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. orchioides 8100       --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. orchioides 7806*      --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. orchioides 8101       --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. elegans 8022          TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. elegans 8019          --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. elegans 8024          --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. elegans 8027          TAGTCA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--
L. elegans 7735*         --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. elegans 7736*         --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. elegans 8026          --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. elegans 7734*         --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. elegans 8018          --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. elegans 7736*         --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. elegans 8020          --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. rosea 7827*           --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. unicolor 7846*        --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. aloides 7698*         --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
L. pusilla 7820*         --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT
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L. unifolia 7850*          --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTA-------TT
M. depressa 7870*          --GTCAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TT

                           551                                           600
L. mutabilis 6753          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6756          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6757          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6762          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 8000          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6746          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 8047          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6745          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6755          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6772          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6764          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6770          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6773          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6766          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6776          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6775          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 8006          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6744          TATCCC--TTTTTTT-AT-TCTAGTC-AGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6771          TATCCC--TTTTTTT-AT-TCTAGTT-AGTTTTTAAACCCT-GTTTTTC-
L. mutabilis 8042          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6768          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6750          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6767          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6751          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6749          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 6747          TATCCC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. mutabilis 8032          TATCCC-TTTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. arbuthnotiae 7711*      TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. arbuthnotiae 8054       TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. arbuthnotiae 8055       TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. fistulosa 8064          TATCCCT-TTTTTTTTAT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. fistulosa 8058          TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. fistulosa 8062          TATCCCT-TTTTTTTTAT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. orchioides 8089         TATCCC-TTTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. orchioides 8093         TATCCC-TTTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. orchioides 8073         TATCCCCTTTTTTTTTAT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. orchioides 8090         TATCCC-TTTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. orchioides 8069         TATCCC-TTTTTTTTTAT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. orchioides 7802*        TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. orchioides 8100         TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. orchioides 7806*        TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. orchioides 8101         TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. elegans 8022            TATCCCCCTTTTTTTTCTATCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. elegans 8019            TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. elegans 8024            TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. elegans 8027            TATCCCCCTTTTTTTTCTATCTAGTCTAGTTTTTAAACCCTTGTTTTTC-
L. elegans 7735*           TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. elegans 7736*           TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. elegans 8026            TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. elegans 7734*           TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. elegans 8018            TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. elegans 7736*           TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. elegans 8020            TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. rosea 7827*             TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. unicolor 7846*          TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. aloides 7698*           TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
L. pusilla 7820*           TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
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L. unifolia 7850*        TA--C-----------AT----A--C-A-TAT-TACA---TAG------A
M. depressa 7870*        TA--C-----------AT----A--C-A-TAT-TACA---TAG------A

                         601                                             650
L. mutabilis 6753        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6756        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6757        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6762        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 8000        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTT-GTTCCAGGG
L. mutabilis 6746        TAAAAAT-AAAGAT-TTGGCTCCAGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 8047        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTT-GTTCCAGGG
L. mutabilis 6745        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6755        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6772        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6764        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6770        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6773        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCANNN
L. mutabilis 6766        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6776        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6775        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTT-GTTCCAGGG
L. mutabilis 8006        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTT-GTTCCAGGG
L. mutabilis 6744        TAAAAAT-AAAGAT-TTGGCTC-AG-ATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6771        TAAAAAT-AAAGAT-TTGGCTCCAGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 8042        TAAAAAT-AAAGAT-TTGGCTCCAGGATTGCC-CATTTTT-GTTCCAGGG
L. mutabilis 6768        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6750        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6767        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6751        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6749        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. mutabilis 6747        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTT-GTTCCAGGG
L. mutabilis 8032        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. arbuthnotiae 7711*    TA----TCA----TCT--ACT--AGGA-TG----AT-----G---CACGG
L. arbuthnotiae 8054     TA----TCA----TCT--ACT--AGGA-TG----AT-----G---CACGG
L. arbuthnotiae 8055     TA----TCA----TCT--ACT--AGGA-TG----AT-----G---CACGG
L. fistulosa 8064        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. fistulosa 8058        TA----TCA----TCT--ACT--AGGA-TG----AT-----G---CACGG
L. fistulosa 8062        TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. orchioides 8089       TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. orchioides 8093       TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. orchioides 8073       TAAAAAT-AAAGAT-TTGGCTCCAGGATTGCC-CATTTTTAGTTCCAGGG
L. orchioides 8090       TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. orchioides 8069       TAAAAAT-AAAGAT-TTGGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. orchioides 7802*      TA----TCA----TCT--ACT--AGGA-TG----AT-----G---CACGG
L. orchioides 8100       TA----TCA----TCT--ACT--AGGA-TG----AT-----G---CACGG
L. orchioides 7806*      TA----TCA----TCT--ACT--AGGATTG----AT-----G---CACGG
L. orchioides 8101       TA----TCA----TCT--ACT--AGGATTG----AT-----G---CACGG
L. elegans 8022          T-------AAAGAT-T-GGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. elegans 8019          TA----TCA----TCT--ACT--AGGA--G----AT-----G---CACGG
L. elegans 8024          TA----TCA----TCT--ACT--AGGA--G----AT-----G---CACGG
L. elegans 8027          T-------AAAGAT-T-GGCTC-AGGATTGCC-CATTTTTAGTTCCAGGG
L. elegans 7735*         TA----TCA----TCT--ACT--AGGA-TG----AT-----G---CACGG
L. elegans 7736*         TA----TCA----TCT--ACT--AGGA--G----AT-----G---CACGG
L. elegans 8026          TA----TCA----TCT--ACT--AGGA--G----AT-----G---CACGG
L. elegans 7734*         TA----TCA----TCT--ACT--AGGA-TG----AT-----G---CACGG
L. elegans 8018          TA----TCA----TCT--ACT--AGGA-TG----AT-----G---CACGG
L. elegans 7736*         TA----TCA----TCT--ACT--AGGA--G----AT-----G---CACGG
L. elegans 8020          TA----TCA----TCT--ACT--AGGA--G----AT-----G---CACGG
L. rosea 7827*           TA----TCA----TCT--ACT--AGGA-TG----AT-----G---CACGG
L. unicolor 7846*        TA----TCA----TCT--ATT--AGGA--G----AT-----G---CACGG
L. aloides 7698*         TA----TCA----TCT--ACT--AGGA-TG----AT-----G---CACGG
L. pusilla 7820*         TA----TCA----TCT--ACT--AGGA-TG----AT-----G---CACGG
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L. unifolia 7850*          TA----TCA----TCT--ACT--AGGA--G----AT-----G---CACGG
M. depressa 7870*          TA----TAAGT-ATCT--ACT--AGGA--G----AT-----G---CACGG

                           651
L. mutabilis 6753          G
L. mutabilis 6756          G
L. mutabilis 6757          G
L. mutabilis 6762          G
L. mutabilis 8000          G
L. mutabilis 6746          G
L. mutabilis 8047          G
L. mutabilis 6745          G
L. mutabilis 6755          G
L. mutabilis 6772          G
L. mutabilis 6764          G
L. mutabilis 6770          G
L. mutabilis 6773          N
L. mutabilis 6766          G
L. mutabilis 6776          G
L. mutabilis 6775          G
L. mutabilis 8006          G
L. mutabilis 6744          G
L. mutabilis 6771          G
L. mutabilis 8042          G
L. mutabilis 6768          G
L. mutabilis 6750          N
L. mutabilis 6767          G
L. mutabilis 6751          G
L. mutabilis 6749          G
L. mutabilis 6747          G
L. mutabilis 8032          G
L. arbuthnotiae 7711*      G
L. arbuthnotiae 8054       G
L. arbuthnotiae 8055       G
L. fistulosa 8064          G
L. fistulosa 8058          G
L. fistulosa 8062          G
L. orchioides 8089         G
L. orchioides 8093         G
L. orchioides 8073         G
L. orchioides 8090         G
L. orchioides 8069         G
L. orchioides 7802*        G
L. orchioides 8100         G
L. orchioides 7806*        G
L. orchioides 8101         G
L. elegans 8022            G
L. elegans 8019            G
L. elegans 8024            G
L. elegans 8027            G
L. elegans 7735*           G
L. elegans 7736*           G
L. elegans 8026            G
L. elegans 7734*           G
L. elegans 8018            G
L. elegans 7736*           G
L. elegans 8020            G
L. rosea 7827*             G
L. unicolor 7846*          G
L. aloides 7698*           G
L. pusilla 7820*           G
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L. unifolia 7850 G
M. depressa 7870 G

APPENDIX G: Aligned sequences of the INTRON of the dataset with all specimens with a basic chromosome number of 7, using CLUSTAL G. *Indicates sequences from Paula Spies.

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                          1                                                  50
L. mutabilis 6753         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6756         ACAATGGATTTTTATTGGGGGATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6757         ACAATGGATTTTTATTGGGGGATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6762         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 8000         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 8047         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6745         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6755         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6764         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6770         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6773         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGA-CCCTCACGATTTCT
L. mutabilis 6766         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6776         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 8042         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6768         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6767         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6749         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 6747         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. mutabilis 8032         ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. arbuthnotiae 7711*     ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. arbuthnotiae 8054      ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. arbuthnotiae 8055      ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. fistulosa 8064         ACA-TGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. fistulosa 8058         ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. fistulosa 8062         ACA-TGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. orchioides 8093        ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCCCGATTTCT
L. orchioides 8089        ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCCCGATTTCT
L. orchioides 8073        ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. orchioides 8090        ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCCCGATTTCT
L. orchioides 8069        ACAATGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. orchioides 7802*       ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. orchioides 8100        ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. orchioides 7806*       ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. orchioides 8101        ACAATGGAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 8022           ACA-TGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. elegans 8019           ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 8024           ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 8027           ACA-TGGATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCT
L. elegans 7735*          ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 7736*          ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 8026           ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 7734*          ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 8018           ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 7736*          ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. elegans 8020           ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. rosea 7827*            ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. unicolor 7846*         ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. aloides 7698*          ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. pusilla 7820*          ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
L. unifolia 7850*         ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T
M. depressa 7870*         ACAATGAAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-T

                          51                                                 100
L. mutabilis 6753         AA-GTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6756         ATAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
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L. mutabilis 6757          ATAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6762          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 8000          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 8047          AAAGTC--GACGGATTT---TTCC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6745          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6755          AA-GTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6764          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6770          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6773          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6766          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6776          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 8042          AAAGTC---ACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6768          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6767          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6749          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 6747          AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. mutabilis 8032          AAAG-C--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. arbuthnotiae 7711*      AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCC-CAATAAA---------
L. arbuthnotiae 8054       AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. arbuthnotiae 8055       AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. fistulosa 8064          AA-GTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. fistulosa 8058          AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. fistulosa 8062          AA-GTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. orchioides 8093         AAAG-C-CGACGGATTT-----CC-TCT-TAC---ATAAA-T-T------
L. orchioides 8089         AAAG-C-CGACGGATTT-----CC-TCT-TAC---ATAAA-T-T------
L. orchioides 8073         AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. orchioides 8090         AAAG-C-CGACGGATTT-----CC-TCT-TAC---ATAAA-T-T------
L. orchioides 8069         AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------
L. orchioides 7802*        AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. orchioides 8100         AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. orchioides 7806*        AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. orchioides 8101         AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 8022            AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAAAT-T------
L. elegans 8019            AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 8024            AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 8027            AAAGTC--GACGGATTT---T-CC-TCT-TAC---ATAAAAT-T------
L. elegans 7735*           AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 7736*           AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 8026            AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 7734*           AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 8018            AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 7736*           AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. elegans 8020            AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. rosea 7827*             AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. unicolor 7846*          AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. aloides 7698*           AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. pusilla 7820*           AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
L. unifolia 7850*          AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA----------
M. depressa 7870*          AAAATCGTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAACTGTCCCCAA

                           101                                            150
L. mutabilis 6753          --------TCAT-TG--T-CGGTA-TG--AC-AT------GTAG-AACGG
L. mutabilis 6756          --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6757          --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6762          --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 8000          --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 8047          --------TCATTTG--T-CGGTATTG--CC-AT------GTAG-AACGG
L. mutabilis 6745          --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6755          --------TCATTTG--T-CGGTA-TG--AC-AT------GTAG-AACGG
L. mutabilis 6764          --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6770          --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
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L. mutabilis 6773        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6766        --------TCATTTG--T-CGGTATTG--AC-AT------GTAGGAACGG
L. mutabilis 6776        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 8042        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6768        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6767        --------TCATTTG--T-CGGTATTG--AC-AT------GTAGGAACGG
L. mutabilis 6749        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 6747        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. mutabilis 8032        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. arbuthnotiae 7711*      -----AAGATCATTGACTTC----TT--AACTAT------TTA--T-C--
L. arbuthnotiae 8054     ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. arbuthnotiae 8055     ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. fistulosa 8064        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. fistulosa 8058        ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. fistulosa 8062        --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. orchioides 8093       --------TCATTTG--T-CGGTATTGG-AC-AT------GTAG-AACGG
L. orchioides 8089       --------TCATTTG--T-CGGTATTGG-AC-AT------GTAG-AACGG
L. orchioides 8073       --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. orchioides 8090       --------TCATTTG--T-CGGTATTGG-AC-AT------GTAG-AACGG
L. orchioides 8069       --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. orchioides 7802*      ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. orchioides 8100       ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. orchioides 7806*      ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. orchioides 8101       ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. elegans 8022          --------TCATTTG--T-CGGTATTG--AC-AT------GTAG-AACGG
L. elegans 8019          ----AAGATCATTTGACTTC----TT--AACTATTTATCTTTA--T-C--
L. elegans 8024          ----AAGATCATTTGACTTC----TT--AACTATTTATCTTTA--T-C--
L. elegans 8027          --------TCATTTG--T-CGGTATTG-AACTATTTATCTTTAG-AACGG
L. elegans 7735*         ----AAGATCATTTGACTTC----TT--AACTATTTATCTTTA--T-C--
L. elegans 7736*         ----AAGATCATTTGACTTC----TT--AACTATTTATCTTTA--T-C--
L. elegans 8026          ----AAGATCATTTGACTTC----TT--AACTATTTATCTTTA--T-C--
L. elegans 7734*         ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. elegans 8018          ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. elegans 7736*         ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. elegans 8020          ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. rosea 7827*           ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. unicolor 7846*        ----AAGATTATTTGACTTC----TT--AACTATC-----T-A--T-C--
L. aloides 7698*         ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. pusilla 7820*         ----AAGATCATTTGACTTC----TT--AACTAT------TTA--T-C--
L. unifolia 7850*        ----AAGACCATTTGACTTC----TT--AACTAT------TTA--T-C--
M. depressa 7870*        TAAAAAGACCATTTGACTTC----TT--AACTAT------TTA--T-C--

                         151                                             200
L. mutabilis 6753        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6756        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6757        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6762        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 8000        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 8047        GACTCTCTCTTTATT-----TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6745        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6755        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6764        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6770        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6773        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6766        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6776        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 8042        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6768        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6767        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6749        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
L. mutabilis 6747        GACTCTCTCTTTATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCA
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L. mutabilis 8032          GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. arbuthnotiae 7711*      --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. arbuthnotiae 8054       --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. arbuthnotiae 8055       --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. fistulosa 8064          GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. fistulosa 8058          --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. fistulosa 8062          GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. orchioides 8093         GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. orchioides 8089         GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. orchioides 8073         GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. orchioides 8090         GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. orchioides 8069         GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. orchioides 7802*        --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. orchioides 8100         --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. orchioides 7806*        --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. orchioides 8101         --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 8022            GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. elegans 8019            --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 8024            --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 8027            GACTCTCTCTTTATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCA
L. elegans 7735*           --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 7736*           --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 8026            --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 7734*           --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 8018            --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 7736*           --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. elegans 8020            --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. rosea 7827*             --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. unicolor 7846*          --CTC-CTTTTT-TT--TCGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. aloides 7698*           --CTC-CTTTTT-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. pusilla 7820*           --CTC-CTTTTT-TTTTTCGTAAG--CGGTTCAAAT-AA--A--TT--CA
L. unifolia 7850*          --CTC-CTTTTT-TTT-TCGTAAG--CGGTTCAG----------TT--CA
M. depressa 7870*          --TTC-CTTTTT-TT---CGTAAG--TGGTTCAAAT-AA--A--TT--CA

                           201                                          250
L. mutabilis 6753          AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6756          AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6757          AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6762          AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 8000          AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 8047          AAAA-GG-GGTCTATT----AAACTCTGGAATGA----TTT-GATC-CTG
L. mutabilis 6745          AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6755          AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6764          AAAAAGG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6770          AAAAAGG-GATCTATT----AAACTCTGGAATGA----TT---T-GATCA
L. mutabilis 6773          AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6766          AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6776          AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 8042          AAAA-GG-GGTCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6768          AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6767          AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6749          AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 6747          AAAAAGG-GATCTATT----AAACTCTGGAATGA----TTT-GATCACTG
L. mutabilis 8032          AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. arbuthnotiae 7711*      -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. arbuthnotiae 8054       -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. arbuthnotiae 8055       -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. fistulosa 8064          AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. fistulosa 8058          -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. fistulosa 8062          AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. orchioides 8093         AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
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L. orchioides 8089        AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. orchioides 8073        AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. orchioides 8090        AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. orchioides 8069        AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. orchioides 7802*       -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. orchioides 8100        -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. orchioides 7806*       -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. orchioides 8101        -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. elegans 8022           AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. elegans 8019           -A-TATCTT-TCTACT----ATACTCT----T--------TCG--CA---
L. elegans 8024           -A-TATCTT-TCTACT----ATACTCT----T--------TCG--CA---
L. elegans 8027           AAAAAGG-GGTCTATT----AAACTCTGGAATGAATGATTT-GATCACTG
L. elegans 7735*          -A-TATCTT-TCTACT----ATACTCT----T--------TCG--CA---
L. elegans 7736*          -A-TATCTT-TCTACT----ATACTCT----T--------TCG--CA---
L. elegans 8026           -A-TATCTT-TCTACT----ATACTCT----T--------TCG--CA---
L. elegans 7734*          -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. elegans 8018           -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. elegans 7736*          -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. elegans 8020           -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. rosea 7827*            -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. unicolor 7846*         -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. aloides 7698*          -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. pusilla 7820*          -A-TATCTT-TCTATT----ATACTCT----T--------TCG--CA---
L. unifolia 7850*         -AATATCTT-TCTATTCATTATACTCT----T--------TCG--CA---
M. depressa 7870*         -A-TATCTT-TCTATTCATTATACTCT----T--------TCG--CA---

                          251                                             300
L. mutabilis 6753         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6756         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6757         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6762         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 8000         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 8047         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6745         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6755         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6764         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6770         CTAA-TATATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6773         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6766         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6776         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 8042         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6768         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6767         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6749         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 6747         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. mutabilis 8032         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. arbuthnotiae 7711*     AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. arbuthnotiae 8054      AATA---GAT----NNGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. arbuthnotiae 8055      AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. fistulosa 8064         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. fistulosa 8058         AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. fistulosa 8062         AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. orchioides 8093        AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. orchioides 8089        AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. orchioides 8073        AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. orchioides 8090        AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. orchioides 8069        AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. orchioides 7802*       AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. orchioides 8100        AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. orchioides 7806*       AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATTC----CT-A
L. orchioides 8101        AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATTC----CT-A
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L. elegans 8022          AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. elegans 8019          AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. elegans 8024          AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. elegans 8027          AATATTCGATTCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGA
L. elegans 7735*         AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. elegans 7736*         AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. elegans 8026          AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. elegans 7734*         AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. elegans 8018          AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. elegans 7736*         AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. elegans 8020          AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. rosea 7827*           AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCCATCCCT-A
L. unicolor 7846*        AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. aloides 7698*         AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. pusilla 7820*         AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A
L. unifolia 7850*        AATA---GAT----CCGGG-CAAAATC--TTG-----TATCC----CT-A
M. depressa 7870*        AATA---GAT----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A

                         301                                           350
L. mutabilis 6753        ATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6756        ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6757        ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6762        ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 8000        ATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 8047        ATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6745        ATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6755        ATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6764        ATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6770        ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6773        ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6766        ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6776        ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 8042        ATTTTACATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6768        ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6767        ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6749        ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 6747        ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. mutabilis 8032        ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. arbuthnotiae 7711*    --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. arbuthnotiae 8054     --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. arbuthnotiae 8055     --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. fistulosa 8064        ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. fistulosa 8058        --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. fistulosa 8062        A-TTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. orchioides 8093       ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. orchioides 8089       ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. orchioides 8073       ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. orchioides 8090       ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. orchioides 8069       ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. orchioides 7802*      --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. orchioides 8100       --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. orchioides 7806*      --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. orchioides 8101       --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. elegans 8022          ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. elegans 8019          --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. elegans 8024          --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. elegans 8027          ATTTTGCATATATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TC
L. elegans 7735*         --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. elegans 7736*         --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. elegans 8026          --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. elegans 7734*         --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
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L. elegans 8018          --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. elegans 7736*         --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. elegans 8020          --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. rosea 7827*           --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. unicolor 7846*        --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. aloides 7698*         --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. pusilla 7820*         --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
L. unifolia 7850*        --TTAGG---T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT-
M. depressa 7870*        --TTAGG---T-TTGAATAGATACCTG--TACA-AATGAACAT--ATAT-

                         351                                             400
L. mutabilis 6753        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6756        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6757        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6762        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 8000        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 8047        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6745        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6755        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6764        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6770        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6773        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6766        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6776        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 8042        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6768        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6767        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6749        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 6747        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. mutabilis 8032        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. arbuthnotiae 7711*    -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. arbuthnotiae 8054     -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. arbuthnotiae 8055     -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. fistulosa 8064        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. fistulosa 8058        -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. fistulosa 8062        GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. orchioides 8093       GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. orchioides 8089       GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. orchioides 8073       GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. orchioides 8090       GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. orchioides 8069       GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. orchioides 7802*      -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. orchioides 8100       -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. orchioides 7806*      -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. orchioides 8101       -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. elegans 8022          GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. elegans 8019          -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATAATCAT
L. elegans 8024          -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATAATCAT
L. elegans 8027          GGGTC-ATG-ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT
L. elegans 7735*         -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATAATCAT
L. elegans 7736*         -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATAATCAT
L. elegans 8026          -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATAATCAT
L. elegans 7734*         -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. elegans 8018          -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. elegans 7736*         -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. elegans 8020          -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. rosea 7827*           -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. unicolor 7846*        -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. aloides 7698*         -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. pusilla 7820*         -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT
L. unifolia 7850*        -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCAC----CATA-TCAT
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M. depressa 7870*        -GGTCAAGGAAT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCAT

                         401                                             450
L. mutabilis 6753        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. mutabilis 6756        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTT----AG
L. mutabilis 6757        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTT----AG
L. mutabilis 6762        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTT----AG
L. mutabilis 8000        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. mutabilis 8047        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. mutabilis 6745        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. mutabilis 6755        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. mutabilis 6764        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. mutabilis 6770        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTT----AG
L. mutabilis 6773        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTT----AG
L. mutabilis 6766        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTT----AG
L. mutabilis 6776        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTT----AG
L. mutabilis 8042        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. mutabilis 6768        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTT----AG
L. mutabilis 6767        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTT----AG
L. mutabilis 6749        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTT----AG
L. mutabilis 6747        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTT----AG
L. mutabilis 8032        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. arbuthnotiae 7711*    TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. arbuthnotiae 8054     TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. arbuthnotiae 8055     TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. fistulosa 8064        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. fistulosa 8058        TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. fistulosa 8062        -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. orchioides 8093       -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. orchioides 8089       -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. orchioides 8073       -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. orchioides 8090       -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. orchioides 8069       -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. orchioides 7802*      TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. orchioides 8100       TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. orchioides 7806*      TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. orchioides 8101       TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. elegans 8022          -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. elegans 8019          TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. elegans 8024          TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. elegans 8027          -A--CGTACGTATTAGATATATA-GGTCACCCTTTCTTTAATTTCGATAG
L. elegans 7735*         TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. elegans 7736*         TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. elegans 8026          TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. elegans 7734*         TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. elegans 8018          TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. elegans 7736*         TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. elegans 8020          TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. rosea 7827*           TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. unicolor 7846*        TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. aloides 7698*         TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. pusilla 7820*         TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
L. unifolia 7850*        TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G
M. depressa 7870*        TATCCTTAC--ATTACA-AAAAAA-GTC----TT-CTT---TTT-----G

                         451                                             500
L. mutabilis 6753        AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6756        AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6757        AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6762        AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 8000        AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
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L. mutabilis 8047          AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6745          AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6755          AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6764          AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6770          AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6773          AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6766          AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6776          AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 8042          AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6768          AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6767          AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6749          AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 6747          AAGGAT-TGATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGT
L. mutabilis 8032          AAGGAT-TGATTATTCTATTCCTGTT--ATTATA----ACACAACGTAGT
L. arbuthnotiae 7711*      AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. arbuthnotiae 8054       AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. arbuthnotiae 8055       AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. fistulosa 8064          AAGGAT-TGATTATTCTATTCCTGTT--ATTATA----ACACAACGTAGT
L. fistulosa 8058          AA-GATCT-AAGA---AATT-CGG--GGACTG-------------G--GT
L. fistulosa 8062          AAGGAT-TGATTATTCTATTCCTGTT--ATTATA----ACACAACGTAGT
L. orchioides 8093         AAGGAT-TGATTATTCTATTCCTGTT--ATTATA----ACACAACGTAGT
L. orchioides 8089         AAGGAT-TGATTATTCTATTCCTGTT--ATTATA----ACACAACGTAGT
L. orchioides 8073         AAGGAT-TGATTATTCTATTCCTGTT--ATTATA----AC-CAACGTAGT
L. orchioides 8090         AAGGAT-TGATTATTCTATTCCTGTT--ATTATA----ACACAACGTAGT
L. orchioides 8069         AAGGAT-TGATTATTCTATTCCTGTT--ATTATA----ACACAACGTAGT
L. orchioides 7802*        AA-GATCT-AAGA---AATT-CGG--GGACTG-------------G--GT
L. orchioides 8100         AA-GATCT-AAGA---AATT-CGG--GGACTG-------------G--GT
L. orchioides 7806*        AA-GATCT-AAGA---AATT-CGG--GGACTG-------------G--GT
L. orchioides 8101         AA-GATCT-AAGA---AATT-CGG--GGACTG-------------G--GT
L. elegans 8022            AAGGAT-T----ATTCTATTCCTGTT--ATTATA----ACACAACGTAGT
L. elegans 8019            AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. elegans 8024            AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. elegans 8027            AAGGAT-T----ATTCTATTCCTGTT--ATTATA----ACACAACGTAGT
L. elegans 7735*           AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. elegans 7736*           AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. elegans 8026            AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. elegans 7734*           AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. elegans 8018            AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. elegans 7736*           AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. elegans 8020            AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. rosea 7827*             AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. unicolor 7846*          AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. aloides 7698*           AA-GATCT-AAGA---AATT-CGG--GGACTG-------------G--GT
L. pusilla 7820*           AA-GATCT-AAGA---AATT-CGG--GGACTA-------------G--GT
L. unifolia 7850*          AA-GATCT-AAAA---AATT-CGG--GGACTA-------------G--GT
M. depressa 7870*          AA-GATCT-AAGA---AATT-CAG--GGACTA-------------G--GT

                           501                                           550
L. mutabilis 6753          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6756          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6757          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6762          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 8000          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 8047          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6745          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6755          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6764          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6770          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6773          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6766          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6776          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
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L. mutabilis 8042          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6768          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6767          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6749          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 6747          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. mutabilis 8032          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. arbuthnotiae 7711*      CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. arbuthnotiae 8054       CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. arbuthnotiae 8055       CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. fistulosa 8064          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. fistulosa 8058          CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. fistulosa 8062          CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. orchioides 8093         CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. orchioides 8089         CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. orchioides 8073         CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. orchioides 8090         CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. orchioides 8069         CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. orchioides 7802*        CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. orchioides 8100         CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. orchioides 7806*        CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. orchioides 8101         CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. elegans 8022            CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. elegans 8019            CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. elegans 8024            CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. elegans 8027            CA-ACTCCATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATC
L. elegans 7735*           CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. elegans 7736*           CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. elegans 8026            CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. elegans 7734*           CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. elegans 8018            CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. elegans 7736*           CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. elegans 8020            CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. rosea 7827*             CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. unicolor 7846*          CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. aloides 7698*           CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. pusilla 7820*           CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--
L. unifolia 7850*          CAAA----ATT--TTT-AATAGTTT---TTG-GTCTA-------TTTA--
M. depressa 7870*          CAAA----ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--

                           551                                             600
L. mutabilis 6753          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6756          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6757          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6762          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 8000          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 8047          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6745          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6755          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6764          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6770          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6773          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6766          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6776          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 8042          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6768          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6767          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6749          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 6747          CC--TTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. mutabilis 8032          CC-TTTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. arbuthnotiae 7711*      C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. arbuthnotiae 8054       C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
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L. arbuthnotiae 8055      C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. fistulosa 8064         CCT-TTTTTTTTAT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. fistulosa 8058         C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. fistulosa 8062         CCT-TTTTTTTTAT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. orchioides 8093        CC-TTTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. orchioides 8089        CC-TTTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. orchioides 8073        CCCTTTTTTTTTAT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. orchioides 8090        CC-TTTTTTTT-AT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. orchioides 8069        CC-TTTTTTTTTAT-TCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAA
L. orchioides 7802*       C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. orchioides 8100        C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. orchioides 7806*       C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. orchioides 8101        C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. elegans 8022           CCCCTTTTTTTTCTATCTAGTCTAGTTTTTAAACCCTTGTTTTTC-T---
L. elegans 8019           C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. elegans 8024           C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. elegans 8027           CCCCTTTTTTTTCTATCTAGTCTAGTTTTTAAACCCTTGTTTTTC-T---
L. elegans 7735*          C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. elegans 7736*          C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. elegans 8026           C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. elegans 7734*          C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. elegans 8018           C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. elegans 7736*          C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. elegans 8020           C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. rosea 7827*            C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. unicolor 7846*         C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. aloides 7698*          C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. pusilla 7820*          C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
L. unifolia 7850*         C-----------AT----A--C-A-TAT-TACA---TAG------ATA--
M. depressa 7870*         C-----------AT----A--C-A-TAT-TACA---TAG------ATA--

                          601                                          646
L. mutabilis 6753         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6756         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6757         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6762         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 8000         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 8047         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 6745         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6755         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6764         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6770         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6773         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCANNNN
L. mutabilis 6766         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6776         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 8042         AAT-AAAGAT-TTGGCTCCAGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 6768         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6767         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6749         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6747         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 8032         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. arbuthnotiae 7711*     --TCA----TCT--ACT--AGGA-TG---AT-----G---CACGGG
L. arbuthnotiae 8054      --TCA----TCT--ACT--AGGA-TG---AT-----G---CACGGG
L. arbuthnotiae 8055      --TCA----TCT--ACT--AGGA-TG---AT-----G---CACGGG
L. fistulosa 8064         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. fistulosa 8058         --TCA----TCT--ACT--AGGA-TG---AT-----G---CACGGG
L. fistulosa 8062         AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. orchioides 8093        AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. orchioides 8089        AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. orchioides 8073        AAT-AAAGAT-TTGGCTCCAGGATTGCCCATTTTTAGTTCCAGGGG
L. orchioides 8090        AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
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L. orchioides 8069        AAT-AAAGAT-TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. orchioides 7802*       --TCA----TCT--ACT--AGGA-TG---AT-----G---CACGGG
L. orchioides 8100        --TCA----TCT--ACT--AGGA-TG---AT-----G---CACGGG
L. orchioides 7806*       --TCA----TCT--ACT--AGGATTG---AT-----G---CACGGG
L. orchioides 8101        --TCA----TCT--ACT--AGGATTG---AT-----G---CACGGG
L. elegans 8022           ----AAAGAT-T-GGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. elegans 8019           --TCA----TCT--ACT--AGGA--G---AT-----G---CACGGG
L. elegans 8024           --TCA----TCT--ACT--AGGA--G---AT-----G---CACGGG
L. elegans 8027           ----AAAGAT-T-GGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. elegans 7735*          --TCA----TCT--ACT--AGGA-TG---AT-----G---CACGGG
L. elegans 7736*          --TCA----TCT--ACT--AGGA--G---AT-----G---CACGGG
L. elegans 8026           --TCA----TCT--ACT--AGGA--G---AT-----G---CACGGG
L. elegans 7734*          --TCA----TCT--ACT--AGGA-TG---AT-----G---CACGGG
L. elegans 8018           --TCA----TCT--ACT--AGGA-TG---AT-----G---CACGGG
L. elegans 7736*          --TCA----TCT--ACT--AGGA--G---AT-----G---CACGGG
L. elegans 8020           --TCA----TCT--ACT--AGGA--G---AT-----G---CACGGG
L. rosea 7827*            --TCA----TCT--ACT--AGGA-TG---AT-----G---CACGGG
L. unicolor 7846*         --TCA----TCT--ATT--AGGA--G---AT-----G---CACGGG
L. aloides 7698*          --TCA----TCT--ACT--AGGA-TG---AT-----G---CACGGG
L. pusilla 7820*          --TCA----TCT--ACT--AGGA-TG---AT-----G---CACGGG
L. unifolia 7850*         --TCA----TCT--ACT--AGGA--G---AT-----G---CACGGG
M. depressa 7870*         --TAAGT-ATCT--ACT--AGGA--G---AT-----G---CACGGG
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APPENDIX H: Aligned sequences of the INTRON of the dataset with all specimens with a basic chromosome number of 6, using CLUSTAL G. *Indicates sequences from Paula Spies.

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                        1                                                  50
L. mutabilis 6746       GATTTTTATTGGGGATAGAGGGACTTGAACCCTCACGATTTCTAAA-T--
L. mutabilis 6772       GATTTTTATTGGGGATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC-
L. mutabilis 6775       GATTTTTATTGGGGATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC-
L. mutabilis 8006       GATTTTTATTGGGGATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC-
L. mutabilis 6744       GATTTTTATTGGGGATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC-
L. mutabilis 6771       GATTTTTATTGGGGATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC-
L. mutabilis 6750       GATTTTTATTGGGGATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC-
L. mutabilis 6751       GATTTTTATTGGGGATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC-
L. unicolor 7846*       AAATTTTATAGGG--TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCG
L. aloides 7698*        AAATTTTATAGGG--TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCG
L. pusilla 7820*        AAATTTTATAGGG--TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCG
L. unifolia 7850*       AAATTTTATAGGG--TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCG
M. depressa 7870*       AAATTTTATAGGG--TAGA-GGAATTGAATCCTCAC--TTT-TAAAATCG

                        51                                                 100
L. mutabilis 6746       --ACGGATTT---T-C--CT-TAC---ATAAA-T-T--------------
L. mutabilis 6772       -GACGGATTT---TCC-TCT-TAC---ATAAA-T-T--------------
L. mutabilis 6775       -GACG-ATTT---TCC-TCT-TAC---ATAAA-T-T--------------
L. mutabilis 8006       -GACGGATTT---TCCCTCT-TAC---ATAAA-T-T--------------
L. mutabilis 6744       -GACGGATTT---TCC-TCT-TAC---ATAAA-T-T--------------
L. mutabilis 6771       -GACGGATTT---TCC-TCT-TAC---ATAAA-T-T--------------
L. mutabilis 6750       -GACGGATTT---TCC-TC-T-TA---ATAAA-T-T--------------
L. mutabilis 6751       -GACGGATTT---TCC-TCT-TAC---ATAAA-T-T--------------
L. unicolor 7846*       TGAGGG-TTCAAGTCCCTCTATCCCCAATAAA--------------AAGA
L. aloides 7698*        TGAGGG-TTCAAGTCCCTCTATCCCCAATAAA--------------AAGA
L. pusilla 7820*        TGAGGG-TTCAAGTCCCTCTATCCCCAATAAA--------------AAGA
L. unifolia 7850*       TGAGGG-TTCAAGTCCCTCTATCCCCAATAAA--------------AAGA
M. depressa 7870*       TGAGGG-TTCAAGTCCCTCTATCCCCAATAAACTGTCCCCAATAAAAAGA

                        101                                                150
L. mutabilis 6746       TC---TG----CGGTATTGACAC-AT-GTAGAACGGGACTCTCTCTTTAT
L. mutabilis 6772       TCATTTG--T-CGGTATTG--AC-AT-GTAGAACGGGACTCTCTCTTTAT
L. mutabilis 6775       TCATTTG--T-CGGTATTG--AC-AT-GTAGAACGGGACTCTCTCTTTAT
L. mutabilis 8006       TCATTTG--T-CGGTATTG--AC-AT-GTAGAACGGGACTCTCTCTTTAT
L. mutabilis 6744       TCATTTG--T-CGG-ATTG--AC-AT-GTAGAACGGGACTCTCTCTTTAT
L. mutabilis 6771       TCATT-G--T-CGGTATTG--AC-AT-GTAGAACGGGACTCTCTCTTTAT
L. mutabilis 6750       TCATGTG--T-CG-TATTG--AC-AT-GTAGA-CGGGACTCTCTCTTTAT
L. mutabilis 6751       TCATTTG--T-CGGTATTG--AC-AT-GTAGAACGGGACTCTCTCTTTAT
L. unicolor 7846*       TTATTTGACTTC----TT--AACTATCT-A-T-C----CTC-CTTTTT-T
L. aloides 7698*        TCATTTGACTTC----TT--AACTAT-TTA-T-C----CTC-CTTTTT-T
L. pusilla 7820*        TCATTTGACTTC----TT--AACTAT-TTA-T-C----CTC-CTTTTT-T
L. unifolia 7850*       CCATTTGACTTC----TT--AACTAT-TTA-T-C----CTC-CTTTTT-T
M. depressa 7870*       CCATTTGACTTC----TT--AACTAT-TTA-T-C----TTC-CTTTTT-T

                        151                                                200
L. mutabilis 6746       T---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGTCTA
L. mutabilis 6772       T---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGTCTA
L. mutabilis 6775       T---C-TC-GTCCGATT-A-AT----CAGTTTTTCAAAAAAGG-GGTCTA
L. mutabilis 8006       T---C-TC-GTCCGATT-A-AT----CAGTTTTTCAAAAAAGG-GGTCTA
L. mutabilis 6744       T---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGTCTA
L. mutabilis 6771       T---C-TC-G-CCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGTCTA
L. mutabilis 6750       T---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GATCTA
L. mutabilis 6751       T---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GATCTA
L. unicolor 7846*       T--TCGTAAG--CGGTTCAAAT-AA--A--TT--CA-A-TATCTT-TCTA
L. aloides 7698*        T---CGTAAG--CGGTTCAAAT-AA--A--TT--CA-A-TATCTT-TCTA
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L. pusilla 7820*      TTTTCGTAAG--CGGTTCAAAT-AA--A--TT--CA-A-TATCTT-TCTA
L. unifolia 7850*     TT-TCGTAAG--CGGTTCAG----------TT--CA-AATATCTT-TCTA
M. depressa 7870*     T---CGTAAG--TGGTTCAAAT-AA--A--TT--CA-A-TATCTT-TCTA

                      201                                             250
L. mutabilis 6746     TT----AAACTCTGGAATGATTT-GATCACTGAATATTCGATTCTTCC--
L. mutabilis 6772     TT----AAACTCTGGAATGATTT-GATCACTGAATATTCGATTCTTCC--
L. mutabilis 6775     TT----AAACTCTGGAATGATTT-GATCACTGAATATTCGATTCTTCC--
L. mutabilis 8006     TT----AAACTCTGGAATGATTT-GATCACTGAATATTCGATTCTTCC--
L. mutabilis 6744     TT----AAACTCTGGAATGATTT-GATCACTGAATATTCGATTCTTCC--
L. mutabilis 6771     TT----AAACTCTGGAATGATTT-GATCACTGAATATTCGATTCTTCC--
L. mutabilis 6750     TT----AAACTCTGGAATGATTT-GATCACTGAATATTCGATTCTTCC--
L. mutabilis 6751     TT----AAACTCTGGAATGATTT-GATCACTGAATATTCGATTCTTCC--
L. unicolor 7846*     TT----ATACTCT----T----TCG--CA---AATA---GAT----CCGG
L. aloides 7698*      TT----ATACTCT----T----TCG--CA---AATA---GAT----CCGG
L. pusilla 7820*      TT----ATACTCT----T----TCG--CA---AATA---GAT----CCGG
L. unifolia 7850*     TTCATTATACTCT----T----TCG--CA---AATA---GAT----CCGG
M. depressa 7870*     TTCATTATACTCT----T----TCG--CA---AATA---GAT----CCGG

                      251                                             300
L. mutabilis 6746     GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT
L. mutabilis 6772     GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT
L. mutabilis 6775     GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT
L. mutabilis 8006     GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT
L. mutabilis 6744     GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT
L. mutabilis 6771     GTCAACTTC-ATTGGAATAGATCCACCTCTGAATTTTACATATATTGCAT
L. mutabilis 6750     GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT
L. mutabilis 6751     GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATATATTGCAT
L. unicolor 7846*     G-CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAAT
L. aloides 7698*      G-CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAAT
L. pusilla 7820*      G-CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAAT
L. unifolia 7850*     G-CAAAATC--TTG-----TATCC----CT-A--TTAGG---T-TTGAAT
M. depressa 7870*     G-CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T-TTGAAT

                      301                                             350
L. mutabilis 6746     --ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC-
L. mutabilis 6772     --ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC-
L. mutabilis 6775     --ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC-
L. mutabilis 8006     --ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC-
L. mutabilis 6744     --ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-AT-AATC-
L. mutabilis 6771     --ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC-
L. mutabilis 6750     --ATACG-GTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC-
L. mutabilis 6751     --ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-ATTAATC-
L. unicolor 7846*     AGATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCC
L. aloides 7698*      AGATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCC
L. pusilla 7820*      AGATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCC
L. unifolia 7850*     AGATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAAT---TCC
M. depressa 7870*     AGATACCTG--TACA-AATGAACAT--ATAT--GGTCAAGGAAT---TCC

                      351                                             400
L. mutabilis 6746     -GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATA
L. mutabilis 6772     -GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATA
L. mutabilis 6775     -GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATA
L. mutabilis 8006     -GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATA
L. mutabilis 6744     -GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATA
L. mutabilis 6771     -GT--T-G-A-TATG-C--AGT--A-GT-A--A--CGTACGTATT-GATA
L. mutabilis 6750     -GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATA
L. mutabilis 6751     -GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTATTAGATA
L. unicolor 7846*     CATTATTGAATTAT-TCACAGCCCATATCATTATCCTTAC--ATTACA-A
L. aloides 7698*      CATTATTGAATTAT-TCACAGCCCATATCATTATCCTTAC--ATTACA-A
L. pusilla 7820*      CATTATTGAATTAT-TCACAGCCCATATCATTATCCTTAC--ATTACA-A
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L. unifolia 7850*     CATTATTGAATTAT-TCAC----CATATCATTATCCTTAC--ATTACA-A
M. depressa 7870*     CATTATTGAATTAT-TCACAGCCCATATCATTATCCTTAC--ATTACA-A

                      401                                             450
L. mutabilis 6746     TATA-GGTCACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTA
L. mutabilis 6772     TATA-GGTCACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTA
L. mutabilis 6775     TATA-GGTCACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTA
L. mutabilis 8006     TATA-GGTCACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTA
L. mutabilis 6744     TATA-GGTCACCCTTTCTTTAATTT-CGATAGAAGGAT-TGATTATTCTA
L. mutabilis 6771     TATA-GGTCACCCTTTCTTTAATTTGCGATAGAAGGAT-TGATTATTCTA
L. mutabilis 6750     TATA-GGTCACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTA
L. mutabilis 6751     TATA-GGTCACCCTTTCTTTAATTT-----AGAAGGAT-TGATTATTCTA
L. unicolor 7846*     AAAAA-GTC----TT-CTT---TTT------GAA-GATCT-AAGA---AA
L. aloides 7698*      AAAAA-GTC----TT-CTT---TTT------GAA-GATCT-AAGA---AA
L. pusilla 7820*      AAAAA-GTC----TT-CTT---TTT------GAA-GATCT-AAGA---AA
L. unifolia 7850*     AAAAA-GTC----TT-CTT---TTT------GAA-GATCT-AAAA---AA
M. depressa 7870*     AAAAA-GTC----TT-CTT---TTT------GAA-GATCT-AAGA---AA

                      451                                             500
L. mutabilis 6746     TTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATTCGTTAGA
L. mutabilis 6772     TTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATTCGTTAGA
L. mutabilis 6775     TTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATTCGTTAGA
L. mutabilis 8006     TTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATTCGTTAGA
L. mutabilis 6744     TTCCGGTT--ATTATATATAACACAACGTAGTCA-ACTCCATTCGTTAGA
L. mutabilis 6771     TTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATTCGTTAGA
L. mutabilis 6750     TTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATTCGTTAGA
L. mutabilis 6751     TTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATTCGTTAGA
L. unicolor 7846*     TT-CGG--GGACTA-------------G--GTCAAA----ATT--TTT-A
L. aloides 7698*      TT-CGG--GGACTG-------------G--GTCAAA----ATT--TTT-A
L. pusilla 7820*      TT-CGG--GGACTA-------------G--GTCAAA----ATT--TTT-A
L. unifolia 7850*     TT-CGG--GGACTA-------------G--GTCAAA----ATT--TTT-A
M. depressa 7870*     TT-CAG--GGACTA-------------G--GTCAAA----ATT--TTT-A

                      501                                             550
L. mutabilis 6746     ACAGCTTCCATTGAGTCTCT-GCACC--TATCCCTTTTTTTATTCTAGTC
L. mutabilis 6772     ACAGCTTCCATTGAGTCTCT-GCACC--TATCCCTTTTTTTATTCTAGTC
L. mutabilis 6775     ACAGCTTCCATTGAGTCTCT-GCACC--TATCCCTTTTTTTATTCTAGTC
L. mutabilis 8006     ACAGCTTCCATTGAGTCTCT-GCACC--TATCCCTTTTTTTATTCTAGTC
L. mutabilis 6744     ACAGCTTCCATTG-GTCTCT-GCACC--TATCCCTTTTTTTATTCTAGTC
L. mutabilis 6771     ACAGCTTCCATTGAGTCTCT-GCACC--TATCCCTTTTTTTATTCTAGTT
L. mutabilis 6750     ACAGCTTCCATTGAGTCTCT-GCACC--TATCCCTTTTTTTATTCTAGTC
L. mutabilis 6751     ACAGCTTCCATTGAGTCTCT-GCACC--TATCCCTTTTTTTATTCTAGTC
L. unicolor 7846*     ATAGTTT---TTG-GTCTATTTAA--TTTA--C--------AT---A--C
L. aloides 7698*      ATAGTTT---TTG-GTCTATTTAA--TTTA--C--------AT---A--C
L. pusilla 7820*      ATAGTTT---TTG-GTCTATTTAA--TTTA--C--------AT---A--C
L. unifolia 7850*     ATAGTTT---TTG-GTCTA-------TTTA--C--------AT---A--C
M. depressa 7870*     ATAGTTT---TTG-GTCTATTTAA--TTTA--C--------AT---A--C

                      551                                             600
L. mutabilis 6746     TAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTCCAGG
L. mutabilis 6772     TAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGG
L. mutabilis 6775     TAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGG
L. mutabilis 8006     TAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGG
L. mutabilis 6744     -AGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AG-
L. mutabilis 6771     -AGTTTTTAAACCCT-GTTTTTC-TAAAAAT-AAAGAT-TTGGCTCCAGG
L. mutabilis 6750     TAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGG
L. mutabilis 6751     TAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTGGCTC-AGG
L. unicolor 7846*     -A-TAT-TACA---TAG------ATA----TCA----TCT--ATT--AGG
L. aloides 7698*      -A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGG
L. pusilla 7820*      -A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGG
L. unifolia 7850*     -A-TAT-TACA---TAG------ATA----TCA----TCT--ACT--AGG
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M. depressa 7870*   -A-TAT-TACA---TAG------ATA----TAAGT-ATCT--ACT--AGG


                      601                 624
L. mutabilis 6746     ATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6772     ATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6775     ATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 8006     ATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 6744     ATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6771     ATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6750     ATTGCCCATTTTTAGTTCCAGGGN
L. mutabilis 6751     ATTGCCCATTTTTAGTTCCAGGGG
L. unicolor 7846*     A--G---AT-----G---CACGGG
L. aloides 7698*      A-TG---AT-----G---CACGGG
L. pusilla 7820*      A-TG---AT-----G---CACGGG
L. unifolia 7850*     A--G---AT-----G---CACGGG
M. depressa 7870*     A--G---AT-----G---CACGGG
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APPENDIX I: Aligned sequences of the INTRON of the dataset with all *L. mutabilis* specimens with a basic chromosome number of 6 and 7, using CLUSTAL G. *Indicates sequences from Paula Spies.

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                        1                                                  50
L. mutabilis 6753       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAA-GTC
L. mutabilis 6756       GATTTTTATTGGGGGATAGAGGGACTTGAACCCTCACGATTTCTATAGTC
L. mutabilis 6757       GATTTTTATTGGGGGATAGAGGGACTTGAACCCTCACGATTTCTATAGTC
L. mutabilis 6762       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 8000       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6746       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAA-T-
L. mutabilis 8047       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6745       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6755       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAA-GTC
L. mutabilis 6772       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6764       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6770       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6773       GATTTTTATTGGGG-ATAGAGGGACTTGA-CCCTCACGATTTCTAAAGTC
L. mutabilis 6766       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6776       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6775       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 8006       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6744       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6771       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 8042       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6768       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6750       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6767       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6751       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6749       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6747       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 8032       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAG-C
L. unicolor 7846*       AAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATC
L. aloides 7698*        AAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATC
L. pusilla 7820*        AAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATC
L. unifolia 7850*       AAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATC
M. depressa 7870*       AAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATC

                        51                                                 100
L. mutabilis 6753       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6756       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6757       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6762       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 8000       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6746       ---ACGGATTT---T--C--CT-TAC---ATAAA-T-T------------
L. mutabilis 8047       --GACGGATTT---TTCC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6745       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6755       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6772       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6764       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6770       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6773       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6766       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6776       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6775       --GACG-ATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 8006       --GACGGATTT---T-CCCTCT-TAC---ATAAA-T-T------------
L. mutabilis 6744       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6771       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 8042       ---ACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
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L. mutabilis 6768     --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6750     --GACGGATTT---T-CC-TC-T-TA---ATAAA-T-T------------
L. mutabilis 6767     --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6751     --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6749     --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6747     --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 8032     --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. unicolor 7846*     GTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA--------------AA
L. aloides 7698*      GTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA--------------AA
L. pusilla 7820       GTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA--------------AA
L. unifolia 78        GTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA--------------AA
M. depressa 7870*     GTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAACTGTCCCCAATAAAAA

                      101                                             150
L. mutabilis 6753     --TCAT-TG--T-CGGTA-TG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6756     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6757     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6762     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 8000     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6746     --TC---TG----CGGTATTGACAC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 8047     --TCATTTG--T-CGGTATTG--CC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6745     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6755     --TCATTTG--T-CGGTA-TG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6772     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6764     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6770     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6773     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6766     --TCATTTG--T-CGGTATTG--AC-AT-GTAGGAACGGGACTCTCTCTT
L. mutabilis 6776     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6775     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 8006     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6744     --TCATTTG--T-CGG-ATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6771     --TCATT-G--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 8042     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6768     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6750     --TCATGTG--T-CG-TATTG--AC-AT-GTAG-A-CGGGACTCTCTCTT
L. mutabilis 6767     --TCATTTG--T-CGGTATTG--AC-AT-GTAGGAACGGGACTCTCTCTT
L. mutabilis 6751     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6749     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 6747     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. mutabilis 8032     --TCATTTG--T-CGGTATTG--AC-AT-GTAG-AACGGGACTCTCTCTT
L. unicolor 7846*     GATTATTTGACTTC----TT--AACTATCT-A--T-C----CTC-CTTTT
L. aloides 7698*      GATCATTTGACTTC----TT--AACTAT-TTA--T-C----CTC-CTTTT
L. pusilla 7820*      GATCATTTGACTTC----TT--AACTAT-TTA--T-C----CTC-CTTTT
L. unifolia 7850*     GACCATTTGACTTC----TT--AACTAT-TTA--T-C----CTC-CTTTT
M. depressa 7870*     GACCATTTGACTTC----TT--AACTAT-TTA--T-C----TTC-CTTTT

                      151                                             200
L. mutabilis 6753     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGT
L. mutabilis 6756     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GAT
L. mutabilis 6757     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GAT
L. mutabilis 6762     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GAT
L. mutabilis 8000     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGT
L. mutabilis 6746     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGT
L. mutabilis 8047     TATT-----TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAA-GG-GGT
L. mutabilis 6745     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGT
L. mutabilis 6755     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGT
L. mutabilis 6772     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGT
L. mutabilis 6764     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGT
L. mutabilis 6770     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GAT
L. mutabilis 6773     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GAT
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L. mutabilis 6766     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GAT
L. mutabilis 6776     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GAT
L. mutabilis 6775     TATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCAAAAAAGG-GGT
L. mutabilis 8006     TATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCAAAAAAGG-GGT
L. mutabilis 6744     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGT
L. mutabilis 6771     TATT---C-TC-G-CCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGT
L. mutabilis 8042     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAA-GG-GGT
L. mutabilis 6768     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GAT
L. mutabilis 6750     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GAT
L. mutabilis 6767     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GAT
L. mutabilis 6751     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GAT
L. mutabilis 6749     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GAT
L. mutabilis 6747     TATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GAT
L. mutabilis 8032     TATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCAAAAAAGG-GGT
L. unicolor 7846*     T-TT--TCGTAAG--CGGTTCAAAT-AA--A--TT--CA-A-TATCTT-T
L. aloides 7698*      T-TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA-A-TATCTT-T
L. pusilla 7820*      T-TTTTTCGTAAG--CGGTTCAAAT-AA--A--TT--CA-A-TATCTT-T
L. unifolia 785       T-TTT-TCGTAAG--CGGTTCAG----------TT--CA-AATATCTT-T
M. depressa 7870*     T-TT---CGTAAG--TGGTTCAAAT-AA--A--TT--CA-A-TATCTT-T

                      201                                             250
L. mutabilis 6753     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6756     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6757     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6762     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 8000     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6746     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 8047     CTATT----AAACTCTGGAATGA----TTT-GATC-CTGAA-TATTCGAT
L. mutabilis 6745     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6755     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6772     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6764     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6770     CTATT----AAACTCTGGAATGA----TT---T-GATCACTGAA-TATAT
L. mutabilis 6773     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6766     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6776     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6775     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 8006     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6744     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6771     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 8042     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6768     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6750     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6767     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6751     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6749     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 6747     CTATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGAT
L. mutabilis 8032     CTATT----AAACTCTGGAATGAATGATTT-GATCACTGAA-TATTCGAT
L. unicolor 7846*     CTATT----ATACTCT----T--------TCG--CA---AA-TA---GAT
L. aloides 7698*      CTATT----ATACTCT----T--------TCG--CA---AA-TA---GAT
L. pusilla 7820*      CTATT----ATACTCT----T--------TCG--CA---AA-TA---GAT
L. unifolia 7850*     CTATTCATTATACTCT----T--------TCG--CA---AA-TA---GAT
M. depressa 7870*     CTATTCATTATACTCT----T--------TCG--CA---AA-TA---GAT

                      251                                             300
L. mutabilis 6753     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATA
L. mutabilis 6756     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 6757     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 6762     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 8000     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATA
L. mutabilis 6746     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATA
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L. mutabilis 8047     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATA
L. mutabilis 6745     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATA
L. mutabilis 6755     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATA
L. mutabilis 6772     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATA
L. mutabilis 6764     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATA
L. mutabilis 6770     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 6773     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 6766     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 6776     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 6775     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 8006     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 6744     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATA
L. mutabilis 6771     TCTTCC--GTCAACTTC-ATTGGAATAGATCCACCTCTGAATTTTACATA
L. mutabilis 8042     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATA
L. mutabilis 6768     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 6750     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 6767     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 6751     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 6749     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 6747     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. mutabilis 8032     TCTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATA
L. unicolor 7846*     ----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---
L. aloides 7698*      ----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---
L. pusilla 7820*      ----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---
L. unifolia 7850*     ----CCGGG-CAAAATC--TTG-----TATCC----CT-A--TTAGG---
M. depressa 7870*     ----CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---

                     301                                             350
L. mutabilis 6753     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6756     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6757     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6762     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 8000     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6746     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 8047     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6745     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6755     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6772     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6764     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6770     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6773     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6766     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6776     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6775     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 8006     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6744     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6771     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 8042     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6768     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6750     TATTGCAT--ATACG-GTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6767     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6751     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6749     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 6747     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. mutabilis 8032     TATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-
L. unicolor 7846*     T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGA
L. aloides 7698*      T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGA
L. pusilla 7820*      T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGA
L. unifolia 7850*     T-TTGAATAGATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGA
M. depressa 7870*     T-TTGAATAGATACCTG--TACA-AATGAACAT--ATAT--GGTCAAGGA
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                        351                                                 400
L. mutabilis 6753       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6756       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6757       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6762       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 8000       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6746       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 8047       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6745       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6755       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6772       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6764       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6770       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6773       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6766       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6776       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6775       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 8006       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6744       AT-AATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6771       ATTAATC--GT--T-G-A-TATG-C--AGT--A-G-T-A--A--CGTACG
L. mutabilis 8042       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6768       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6750       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6767       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6751       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6749       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 6747       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. mutabilis 8032       ATTAATC--GT--TTG-A-TATGTC--AGT--ATG-T-AT-A--CGTACG
L. unicolor 7846*       AT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC-
L. aloides 7698*        AT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC-
L. pusilla 7820*        AT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC-
L. unifolia 7850*       AT---TCCCATTATTGAATTAT-TCAC----CATA-TCATTATCCTTAC-
M. depressa 7870*       AT---TCCCATTATTGAATTAT-TCACAGCCCATA-TCATTATCCTTAC-

                       401                                                  450
L. mutabilis 6753        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T
L. mutabilis 6756        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-T
L. mutabilis 6757        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-T
L. mutabilis 6762        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-T
L. mutabilis 8000        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T
L. mutabilis 6746        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T
L. mutabilis 8047        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T
L. mutabilis 6745        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T
L. mutabilis 6755        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T
L. mutabilis 6772        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T
L. mutabilis 6764        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T
L. mutabilis 6770        TATTAGATATATA-GGTCCACCCTTTCTTTAATTT-----AGAAGGAT-T
L. mutabilis 6773        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-T
L. mutabilis 6766        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-T
L. mutabilis 6776        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-T
L. mutabilis 6775        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T
L. mutabilis 8006        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T
L. mutabilis 6744        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T
L. mutabilis 6771        TATT-GATATATA-GGTCCACCCTTTCTTTAATTTGCGATAGAAGGAT-T
L. mutabilis 8042        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T
L. mutabilis 6768        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-T
L. mutabilis 6750        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-T
L. mutabilis 6767        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-T
L. mutabilis 6751        TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-T
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L. mutabilis 6749     TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-T
L. mutabilis 6747     TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-----AGAAGGAT-T
L. mutabilis 8032     TATTAGATATATA-GGTC-ACCCTTTCTTTAATTT-CGATAGAAGGAT-T
L. unicolor 7846*     -ATTACA-AAAAAA-GTC-----TT-CTT---TTT------GAA-GATCT
L. aloides 7698*      -ATTACA-AAAAAA-GTC-----TT-CTT---TTT------GAA-GATCT
L. pusilla 7820*      -ATTACA-AAAAAA-GTC-----TT-CTT---TTT------GAA-GATCT
L. unifolia 7850*     -ATTACA-AAAAAA-GTC-----TT-CTT---TTT------GAA-GATCT
M. depressa 7870*     -ATTACA-AAAAAA-GTC-----TT-CTT---TTT------GAA-GATCT

                      451                                             500
L. mutabilis 6753     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6756     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6757     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6762     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 8000     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6746     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 8047     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6745     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6755     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6772     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6764     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6770     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6773     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6766     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6776     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6775     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 8006     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6744     GATTATTCTATTCCGGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6771     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 8042     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6768     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6750     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6767     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6751     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6749     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 6747     GATTATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCC
L. mutabilis 8032     GATTATTCTATTCCTGTT--ATTATA----ACACAACGTAGTCA-ACTCC
L. unicolor 7846*     -AAGA---AATT-CGG--GGACTA-------------G--GTCAAA----
L. aloides 7698*      -AAGA---AATT-CGG--GGACTG-------------G--GTCAAA----
L. pusilla 7820*      -AAGA---AATT-CGG--GGACTA-------------G--GTCAAA----
L. unifolia 7850*     -AAAA---AATT-CGG--GGACTA-------------G--GTCAAA----
M. depressa 7870*     -AAGA---AATT-CAG--GGACTA-------------G--GTCAAA----

                      501                                             550
L. mutabilis 6753     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6756     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6757     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6762     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 8000     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6746     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 8047     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6745     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6755     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6772     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6764     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6770     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6773     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6766     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6776     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6775     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 8006     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
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L. mutabilis 6744     ATTCGTTAGAACAGCTTCCATTG-GTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6771     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 8042     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6768     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6750     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6767     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6751     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6749     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 6747     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTT
L. mutabilis 8032     ATTCGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCCTTTTTT
L. unicolor 7846*     ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--C-------
L. aloides 7698*      ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--C-------
L. pusilla 7820*      ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--C-------
L. unifolia 7850*     ATT--TTT-AATAGTTT---TTG-GTCTA-------TTTA--C-------
M. depressa 7870*     ATT--TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--C-------

                      551                                           600
L. mutabilis 6753     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6756     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6757     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6762     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 8000     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6746     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 8047     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6745     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6755     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6772     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6764     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6770     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6773     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6766     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6776     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6775     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 8006     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6744     TTATTCTAGTC-AGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6771     TTATTCTAGTT-AGTTTTTAAACCCT-GTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 8042     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6768     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6750     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6767     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6751     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6749     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 6747     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. mutabilis 8032     TTATTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-
L. unicolor 7846*     --AT---A--C-A-TAT-TACA---TAG------ATA----TCA----TC
L. aloides 7698*      --AT---A--C-A-TAT-TACA---TAG------ATA----TCA----TC
L. pusilla 7820*      --AT---A--C-A-TAT-TACA---TAG------ATA----TCA----TC
L. unifolia 7850*     --AT---A--C-A-TAT-TACA---TAG------ATA----TCA----TC
M. depressa 7870*     --AT---A--C-A-TAT-TACA---TAG------ATA----TAAGT-ATC

                     601                                  635
L. mutabilis 6753     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6756     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6757     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6762     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 8000     TTGGCTC-AGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 6746     TTGGCTCCAGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 8047     TTGGCTC-AGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 6745     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6755     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6772     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
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L. mutabilis 6764     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6770     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6773     TTGGCTC-AGGATTGCCCATTTTTAGTTCCANNNN
L. mutabilis 6766     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6776     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6775     TTGGCTC-AGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 8006     TTGGCTC-AGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 6744     TTGGCTC-AG-ATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6771     TTGGCTCCAGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 8042     TTGGCTCCAGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 6768     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6750     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGN
L. mutabilis 6767     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6751     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6749     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6747     TTGGCTC-AGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 8032     TTGGCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. unicolor 7846*     T--ATT--AGGA--G---AT-----G---CACGGG
L. aloides 7698*      T--ACT--AGGA-TG---AT-----G---CACGGG
L. pusilla 7820*      T--ACT--AGGA-TG---AT-----G---CACGGG
L. unifolia 7850*     T--ACT--AGGA--G---AT-----G---CACGGG
M. depressa 7870*     T--ACT--AGGA--G---AT-----G---CACGGG
```

APPENDIX J: Aligned sequences of the INTRON of the dataset with all *L. mutabilis* specimens with a basic chromosome number of 7, using CLUSTAL G. *Indicates sequences from Paula Spies.

```
                        1                                                   50
L. mutabilis 6753       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAA-GTC
L. mutabilis 6756       GATTTTTATTGGGGGATAGAGGGACTTGAACCCTCACGATTTCTATAGTC
L. mutabilis 6757       GATTTTTATTGGGGGATAGAGGGACTTGAACCCTCACGATTTCTATAGTC
L. mutabilis 6762       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 8000       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 8047       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6745       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6755       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAA-GTC
L. mutabilis 6764       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6770       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6773       GATTTTTATTGGGG-ATAGAGGGACTTGA-CCCTCACGATTTCTAAAGTC
L. mutabilis 6766       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6776       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 8042       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6768       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6767       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6749       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 6747       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAGTC
L. mutabilis 8032       GATTTTTATTGGGG-ATAGAGGGACTTGAACCCTCACGATTTCTAAAG-C
L. unicolor 7846*       AAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATC
L. aloides 7698*        AAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATC
L. pusilla 7820*        AAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATC
L. unifolia 7850*       AAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATC
M. depressa 7870*       AAATTTTATAGGG---TAGA-GGAATTGAATCCTCAC--TTT-TAAAATC

                        51                                                  100
L. mutabilis 6753       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6756       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6757       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6762       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 8000       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 8047       --GACGGATTT---TTCC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6745       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6755       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6764       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6770       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6773       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6766       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6776       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 8042       ---ACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6768       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6767       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6749       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 6747       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. mutabilis 8032       --GACGGATTT---T-CC-TCT-TAC---ATAAA-T-T------------
L. unicolor 7846*       GTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA--------------AA
L. aloides 7698*        GTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA--------------AA
L. pusilla 7820*        GTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA--------------AA
L. unifolia 7850*       GTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAA--------------AA
M. depressa 7870*       GTGAGGG-TTCAAGT-CCCTCTATCCCCAATAAACTGTCCCCAATAAAAA

                        101                                                 150
L. mutabilis 6753       --TCAT-TG--T-CGGTA-TG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 6756       --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 6757       --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
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L. mutabilis 6762     --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 8000     --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 8047     --TCATTTG--T-CGGTATTG-CC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 6745     --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 6755     --TCATTTG--T-CGGTA-TG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 6764     --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 6770     --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 6773     --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 6766     --TCATTTG--T-CGGTATTG-AC-AT-GTAGGAACGGGACTCTCTCTTT
L. mutabilis 6776     --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 8042     --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 6768     --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 6767     --TCATTTG--T-CGGTATTG-AC-AT-GTAGGAACGGGACTCTCTCTTT
L. mutabilis 6749     --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 6747     --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. mutabilis 8032     --TCATTTG--T-CGGTATTG-AC-AT-GTAG-AACGGGACTCTCTCTTT
L. unicolor 7846*     GATTATTTGACTTC----TT-AACTATCT-A--T-C----CTC-CTTTTT
L. aloides 7698*      GATCATTTGACTTC----TT-AACTAT-TTA--T-C----CTC-CTTTTT
L. pusilla 7820*      GATCATTTGACTTC----TT-AACTAT-TTA--T-C----CTC-CTTTTT
L. unifolia 7850*     GACCATTTGACTTC----TT-AACTAT-TTA--T-C----CTC-CTTTTT
M. depressa 7870*     GACCATTTGACTTC----TT-AACTAT-TTA--T-C----TTC-CTTTTT

                      151                                             200
L. mutabilis 6753     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGTC
L. mutabilis 6756     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GATC
L. mutabilis 6757     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GATC
L. mutabilis 6762     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GATC
L. mutabilis 8000     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGTC
L. mutabilis 8047     ATT-----TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAA-GG-GGTC
L. mutabilis 6745     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGTC
L. mutabilis 6755     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGTC
L. mutabilis 6764     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GGTC
L. mutabilis 6770     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GATC
L. mutabilis 6773     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GATC
L. mutabilis 6766     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GATC
L. mutabilis 6776     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GATC
L. mutabilis 8042     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAA-GG-GGTC
L. mutabilis 6768     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GATC
L. mutabilis 6767     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GATC
L. mutabilis 6749     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GATC
L. mutabilis 6747     ATT---C-TC-GTCCGATT-A-ATCAATCAGTTTTTCAAAAAAGG-GATC
L. mutabilis 8032     ATT---C-TC-GTCCGATT-A-AT----CAGTTTTTCAAAAAAGG-GGTC
L. unicolor 7846*     -TT--TCGTAAG--CGGTTCAAAT-AA--A--TT--CA-A-TATCTT-TC
L. aloides 7698*      -TT---CGTAAG--CGGTTCAAAT-AA--A--TT--CA-A-TATCTT-TC
L. pusilla 7820*      -TTTTTCGTAAG--CGGTTCAAAT-AA--A--TT--CA-A-TATCTT-TC
L. unifolia 7850*     -TTT-TCGTAAG--CGGTTCAG----------TT--CA-AATATCTT-TC
M. depressa 7870*     -TT---CGTAAG--TGGTTCAAAT-AA--A--TT--CA-A-TATCTT-TC

                      201                                             250
L. mutabilis 6753     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 6756     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 6757     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 6762     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 8000     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 8047     TATT----AAACTCTGGAATGA----TTT-GATC-CTGAA-TATTCGATT
L. mutabilis 6745     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 6755     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 6764     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 6770     TATT----AAACTCTGGAATGA----TT---T-GATCACTGAA-TATATT
L. mutabilis 6773     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 6766     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
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L. mutabilis 6776     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 8042     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 6768     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 6767     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 6749     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 6747     TATT----AAACTCTGGAATGA----TTT-GATCACTGAA-TATTCGATT
L. mutabilis 8032     TATT----AAACTCTGGAATGAATGATTT-GATCACTGAA-TATTCGATT
L. unicolor 7846*     TATT----ATACTCT----T--------TCG--CA---AA-TA---GAT-
L. aloides 7698*      TATT----ATACTCT----T--------TCG--CA---AA-TA---GAT-
L. pusilla 7820*      TATT----ATACTCT----T--------TCG--CA---AA-TA---GAT-
L. unifolia 7850*     TATTCATTATACTCT----T--------TCG--CA---AA-TA---GAT-
M. depressa 7870*     TATTCATTATACTCT----T--------TCG--CA---AA-TA---GAT-

                      251                                             300
L. mutabilis 6753     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATAT
L. mutabilis 6756     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATAT
L. mutabilis 6757     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATAT
L. mutabilis 6762     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATAT
L. mutabilis 8000     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATAT
L. mutabilis 8047     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATAT
L. mutabilis 6745     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATAT
L. mutabilis 6755     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATAT
L. mutabilis 6764     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATAT
L. mutabilis 6770     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATAT
L. mutabilis 6773     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATAT
L. mutabilis 6766     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATAT
L. mutabilis 6776     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATAT
L. mutabilis 8042     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTACATAT
L. mutabilis 6768     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATAT
L. mutabilis 6767     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATAT
L. mutabilis 6749     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATAT
L. mutabilis 6747     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATAT
L. mutabilis 8032     CTTCC--GTCAACTTCGATTGGAATAGATCCACCTCTGAATTTTGCATAT
L. unicolor 7846*     ---CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T
L. aloides 7698*      ---CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T
L. pusilla 7820*      ---CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T
L. unifolia 7850*     ---CCGGG-CAAAATC--TTG-----TATCC----CT-A--TTAGG---T
M. depressa 7870*     ---CCGGG-CAAAATC--TTGG-ATCTATCC----CT-A--TTAGG---T

                      301                                             350
L. mutabilis 6753     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6756     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6757     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6762     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 8000     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 8047     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6745     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6755     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6764     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6770     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6773     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6766     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6776     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 8042     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6768     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6767     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6749     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 6747     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. mutabilis 8032     ATTGCAT--ATACGTGTATATATAAT--ATATGGAT-TCGGGTC-ATG-A
L. unicolor 7846*     -TTGAATAGATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAA
L. aloides 7698*      -TTGAATAGATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAA
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L. pusilla 7820*      -TTGAATAGATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAA
L. unifolia 7850*     -TTGAATAGATACCTG--TACA-AACGAACAT--ATAT--GGTCAAGGAA
M. depressa 7870*     -TTGAATAGATACCTG--TACA-AATGAACAT--ATAT--GGTCAAGGAA

                      351                                             400
L. mutabilis 6753     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6756     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6757     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6762     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 8000     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 8047     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6745     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6755     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6764     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6770     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6773     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6766     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6776     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 8042     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6768     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6767     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6749     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 6747     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. mutabilis 8032     TTAATC--GT--TTG-A-TATGTC--AGT--ATGT-AT-A--CGTACGTA
L. unicolor 7846*     T---TCCCATTATTGAATTAT-TCACAGCCCATATCATTATCCTTAC--A
L. aloides 7698*      T---TCCCATTATTGAATTAT-TCACAGCCCATATCATTATCCTTAC--A
L. pusilla 7820*      T---TCCCATTATTGAATTAT-TCACAGCCCATATCATTATCCTTAC--A
L. unifolia 7850*     T---TCCCATTATTGAATTAT-TCAC----CATATCATTATCCTTAC--A
M. depressa 7870*     T---TCCCATTATTGAATTAT-TCACAGCCCATATCATTATCCTTAC--A

                      401                                             450
L. mutabilis 6753     TTAGATATATA-GGTC-ACCCTTTCTTTAATTTCGATAGAAGGAT-TGAT
L. mutabilis 6756     TTAGATATATA-GGTC-ACCCTTTCTTTAATTT----AGAAGGAT-TGAT
L. mutabilis 6757     TTAGATATATA-GGTC-ACCCTTTCTTTAATTT----AGAAGGAT-TGAT
L. mutabilis 6762     TTAGATATATA-GGTC-ACCCTTTCTTTAATTT----AGAAGGAT-TGAT
L. mutabilis 8000     TTAGATATATA-GGTC-ACCCTTTCTTTAATTTCGATAGAAGGAT-TGAT
L. mutabilis 8047     TTAGATATATA-GGTC-ACCCTTTCTTTAATTTCGATAGAAGGAT-TGAT
L. mutabilis 6745     TTAGATATATA-GGTC-ACCCTTTCTTTAATTTCGATAGAAGGAT-TGAT
L. mutabilis 6755     TTAGATATATA-GGTC-ACCCTTTCTTTAATTTCGATAGAAGGAT-TGAT
L. mutabilis 6764     TTAGATATATA-GGTC-ACCCTTTCTTTAATTTCGATAGAAGGAT-TGAT
L. mutabilis 6770     TTAGATATATA-GGTCCACCCTTTCTTTAATTT----AGAAGGAT-TGAT
L. mutabilis 6773     TTAGATATATA-GGTC-ACCCTTTCTTTAATTT----AGAAGGAT-TGAT
L. mutabilis 6766     TTAGATATATA-GGTC-ACCCTTTCTTTAATTT----AGAAGGAT-TGAT
L. mutabilis 6776     TTAGATATATA-GGTC-ACCCTTTCTTTAATTT----AGAAGGAT-TGAT
L. mutabilis 8042     TTAGATATATA-GGTC-ACCCTTTCTTTAATTTCGATAGAAGGAT-TGAT
L. mutabilis 6768     TTAGATATATA-GGTC-ACCCTTTCTTTAATTT----AGAAGGAT-TGAT
L. mutabilis 6767     TTAGATATATA-GGTC-ACCCTTTCTTTAATTT----AGAAGGAT-TGAT
L. mutabilis 6749     TTAGATATATA-GGTC-ACCCTTTCTTTAATTT----AGAAGGAT-TGAT
L. mutabilis 6747     TTAGATATATA-GGTC-ACCCTTTCTTTAATTT----AGAAGGAT-TGAT
L. mutabilis 8032     TTAGATATATA-GGTC-ACCCTTTCTTTAATTTCGATAGAAGGAT-TGAT
L. unicolor 7846*     TTACA-AAAAAA-GTC-----TT-CTT---TTT-----GAA-GATCT-AA
L. aloides 7698*      TTACA-AAAAAA-GTC-----TT-CTT---TTT-----GAA-GATCT-AA
L. pusilla 7820*      TTACA-AAAAAA-GTC-----TT-CTT---TTT-----GAA-GATCT-AA
L. unifolia 7850*     TTACA-AAAAAA-GTC-----TT-CTT---TTT-----GAA-GATCT-AA
M. depressa 7870*     TTACA-AAAAAA-GTC-----TT-CTT---TTT-----GAA-GATCT-AA


                      451                                             500
L. mutabilis 6753     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 6756     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 6757     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
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L. mutabilis 6762     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 8000     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 8047     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 6745     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 6755     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 6764     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 6770     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 6773     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 6766     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 6776     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 8042     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 6768     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 6767     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 6749     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 6747     TATTCTATTCCTGTT--ATTATATATAACACAACGTAGTCA-ACTCCATT
L. mutabilis 8032     TATTCTATTCCTGTT--ATTATA----ACACAACGTAGTCA-ACTCCATT
L. unicolor 7846*     GA---AATT-CGG--GGACTA-------------G--GTCAAA----ATT
L. aloides 7698*      GA---AATT-CGG--GGACTG-------------G--GTCAAA----ATT
L. pusilla 7820*      GA---AATT-CGG--GGACTA-------------G--GTCAAA----ATT
L. unifolia 7850*     AA---AATT-CGG--GGACTA-------------G--GTCAAA----ATT
M. depressa 7870*     GA---AATT-CAG--GGACTA-------------G--GTCAAA----ATT

                      501                                             550
L. mutabilis 6753     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6756     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6757     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6762     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 8000     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 8047     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6745     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6755     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6764     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6770     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6773     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6766     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6776     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 8042     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6768     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6767     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6749     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 6747     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCC-TTTTTTTA
L. mutabilis 8032     CGTTAGAACAGCTTCCATTGAGTCTCT-GCACC--TATCCCTTTTTTTTA
L. unicolor 7846*     --TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--C---------A
L. aloides 7698*      --TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--C---------A
L. pusilla 7820*      --TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--C---------A
L. unifolia 7850*     --TTT-AATAGTTT---TTG-GTCTA-------TTTA--C---------A
M. depressa 7870*     --TTT-AATAGTTT---TTG-GTCTATTTAA--TTTA--C---------A

                      551                                             600
L. mutabilis 6753     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 6756     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 6757     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 6762     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 8000     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 8047     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 6745     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 6755     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 6764     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 6770     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 6773     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 6766     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
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L. mutabilis 6776     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 8042     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 6768     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 6767     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 6749     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 6747     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. mutabilis 8032     TTCTAGTCTAGTTTTTAAACCCTTGTTTTTC-TAAAAAT-AAAGAT-TTG
L. unicolor 7846*     T---A--C-A-TAT-TACA---TAG------ATA----TCA----TCT--
L. aloides 7698*      T---A--C-A-TAT-TACA---TAG------ATA----TCA----TCT--
L. pusilla 7820*      T---A--C-A-TAT-TACA---TAG------ATA----TCA----TCT--
L. unifolia 7850*     T---A--C-A-TAT-TACA---TAG------ATA----TCA----TCT--
M. depressa 7870      T---A--C-A-TAT-TACA---TAG------ATA----TAAGT-ATCT--

                      601                           632
L. mutabilis 6753     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6756     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6757     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6762     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 8000     GCTC-AGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 8047     GCTC-AGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 6745     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6755     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6764     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6770     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6773     GCTC-AGGATTGCCCATTTTTAGTTCCANNNN
L. mutabilis 6766     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6776     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 8042     GCTCCAGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 6768     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6767     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6749     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. mutabilis 6747     GCTC-AGGATTGCCCATTTTT-GTTCCAGGGG
L. mutabilis 8032     GCTC-AGGATTGCCCATTTTTAGTTCCAGGGG
L. unicolor 7846*     ATT--AGGA--G---AT-----G---CACGGG
L. aloides 7698*      ACT--AGGA-TG---AT-----G---CACGGG
L. pusilla 7820*      ACT--AGGA-TG---AT-----G---CACGGG
L. unifolia 7850*     ACT--AGGA--G---AT-----G---CACGGG
M. depressa 7870*     ACT--AGGA--G---AT-----G---CACGGG
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APPENDIX K: Sequences from GENBANK used to determine boundaries of the trnL-F region as well as the intron.

Lpallida(spacer)
ATAAAAAGATTATTTGACTTCTTAACTATCTATCCTCCCCTTTTTTTTCGTAAGCGGTTCAAATAAATTCAATATCTT
TCTCATTATACTCTTTCGCAAATAGATCCGGGCAGAAATCTTTGGATCTTATCCCTATTAGGTTTGAATAGATACCTG
TACAAACGAACATATATGGTCAAGGAATTCCCATTATTGAATTATTCACAGCCCATATCATTATCCTTACATTCACAA
AAAAAGTCTTCTTTTTGAAGATCTAAGAAATTCGGGGACTAGGTCAAAATTTTTAATAGTTTTTGGTCTATTTAATTT
ACATACATATTACATAGATATCATCTATTAGGATGATGCACGGGAAATG

Lpallida(intron)
NNNNNNNNNNNNNNNNGGATTGAGCCTTAGTATGGAAACCTGCTAAGTGCTAACTCCCAAATTCAGAGAAACCCTGG
AACTAAAAATGGGCAANCCTGAGCCAAATCTTTATTTTTAGAAAAACAAGGGTTTAAAAACTAGACTAGAATAAAAAA
AAGGGGATAGGTGCAGAGACTCAATGGAAGCTGTTCTAACGAATGGAGTTGACTACGTTATAATAACAGGAATAGAAT
AATCCTTCTATCGAAATTAAAGAAAGGGTGACCTATATATCTAATACGTACGTATACATACTGACATATCAAACGATT
AATCATGACCCGAATCCATATATTATATATACACGTATATGCAATATATGCAAAATTCAGAGGTGGATCTATTCCAAT
CGAAGTTGACGGAAGAATCGAATATTCAGTGATCAAATCATTCATTCCAGAGTTTAATAGATAGACCCCTTTTTTGAA
AAACTGATTAATCGGACGAGAATAAAGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTATAGTAA
GAGG

Lnamibiensis(spacer)
ATAAAAAGACCATTTGACTTCTTAACTATTTATCCTCCCTTTTTTTTCGTAAGCGGTTCAAATAAATTCAATATCTTT
CTCATTCATTATACTCTTTCGCAAATAGATCCGGGCAGAAATCTTTGTTATCCCTATTAGGTTTGAATAGATACCTGT
ACAAACGAACATATATGGTCAAGGAATTCCCATTATTGAATTATTCACAGCCCATATCATTATCCTTACATTCACAAA
AAAAGTCTTCTTTTTGAAGATCTAAGAAATTCGGGGACTAGGTCAAAATTTTTAATAGTTTTTGGTCTATTTAATTTA
CATACATATTACATAGATATCATCTACTAGGATGATGCACGGGAAATG

Lnamibiensis(intron)
NNNNNNNNNNNNNNNNTTGGATTNAGCCTTAGTATGGAAACCTGCTAAGTGCTAACTTCCAAATTCAGAGAAACCCTGG
AACTAAAAATGGGCAACCCTGAGCCAAATCTTTATTTTTAGAAAAACAAGGGTTTAAAAACTAGACTAGAATAAAAAA
AAAGGGATAGGTGCAGAGACTCAATGGAAGCTGTTCTAACGAATGGAGTTGACTACGTTGCGTTATAATAACAGGAAT
AATCCTTCTATCGAAATTAAAGAAAGGGTGACGTATATATCTAATACGTACGTATACATACTATCAAACGATTAATCA
TGACCCGAATCCATATATTATATATACACGTATGTATATGCAATATATGCAAAATTCAGAGATGGATCTATTCCAATC
GAAGTTGACGGAAGAATCGAATATTCAGTGATCAAATCATTCATTCAGAGTTTAATAGACCCCTTTTTTGAAAAACTG
ATTAATCGGACGAGAATAAAGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTATAGTAAGAGG

Laloides(spacer)
ATAAAAAGATTATTTGACTTCTTAACTATCTATCCTCCCCTTTTTTTTCGTAAGCGGTTCAAATAAATTCAATATCTT
TCTCATTATACTCTTTCGCAAATAGATCCGGGCAGAAATCTTTGGATCTTATCCCTATTAGGTTTGAATAGATACCTG
TACAAACGAACATATATGGTCAAGGAATTCCCATTATTGAATTATTCACAGCCCATATCATTATCCTTACATTCACAA
AAAAAGTCTTCTTTTTGAAGATCTAAGAAATTCGGGGACTAGGTCAAAATTTTTAATAGTTTTTGGTCTATTTAATTT
ACATACATATTACATAGATATCATCTATTAGGATGATGCACGGGAAATG

Laloides(intron)
NNNNNNNNNNCTTNNTTGNNTTGNNCCTTAGTATGGAAACCTGCTAAGTGCTAACTTCCAAATTCAGAGAAACCCTGG
AACTAAAAATGGGCAATCCTGAGCCAAATCTTTATTTTTAGAAAAACAAGGGTTTAAAAACTAGACTAGAATAAAAAA
AAGGGGATAGGTGCAGAGACTCAATGGAAGCTGTTCTAACGAATGGAGTTGACTACGTTATAATAACAAGAATAGAAT
AATCCTTCTATCGAAATTAAAGAAAGGGTGACCTATATATCTAATACGTACGTATACATACTGACATATCAAACGATT
AATCATGACCCGAATCCATGTATTATATATACACGTATATGCAATATATGCAAAATTCAGAGGTGGATCTATTCCAAT
CGAAGTTGACGGAAGAATCGAATATTCAGTGATCAAATCATTCATTCCAGAGTTTAATAGATAGACCCCTTTTTTGAA
AAACTGATTAATCGGACGAGAATAAAGAGAGAGTCCCGTTCTACATGTCAATACCGACAACAATGAAATTTATAGTAA
GAGG

APPENDIX L: References for the different chloroplast genes as discussed in Chapter 1 section 1.3.2.1.

rbcL: Donoghue *et al.,* 1992; Chase *et al.,* 1993; Conti *et al.,* 1993; Duvall *et al.,* 1993; Albert *et al.,* 1994; Bremer *et al.,* 1994; Brunsfeld *et al.,* 1994; Cosner *et al.,* 1994; Barker *et al.,* 1995; Bremer *et al.,* 1995; Fernando *et al.,* 1995; Pryer *et al.,* 1995; Bayer *et al.,* 1996; Goremykin *et al.,* 1996; Kron & King, 1996; Morton *et al.,* 1996; Soltis *et al.,* 1996; Bowe & de Pamphilis, 1997; Doyle *et al.,* 1997; Plunkett *et al.,* 1997; Rice *et al.,* 1997; Richarson *et al.,* 1997; Alverson *et al.,* 1998; Fay *et al.,* 1998; Munro & Linder, 1998; Xiang *et al.,* 1998; Meerow *et al.,* 1999; Chiang *et al.,* 2000; Garcia-Jacas *et al.,* 2001; Lledo *et al.,* 2001; Cuénoud *et al.,* 2002; López *et al.,* 2002; Razafimandimbison & Bremer, 2002; Van der Bank *et al.* 2002; Mayer *et al.,* 2003; Muellner *et al.*, 2003; Salazar *et al.*, 2003; Van den Heede *et al.*, 2003; Whitlock *et al.*, 2003.

ndhF: Clark *et al.*, 1995; Neyland & Urbatsch, 1995; Bohs & Olmstead, 1997; Catalán *et al.*, 1997; Terry *et al.*, 1997a; Terry *et al.*, 1997b; Alverson *et al.*, 1998; Clevinger & Panero, 1998; Sytsma *et al.*, 1998; Hall *et al.*, 2002; Pyck *et al.*, 2002; Whitlock *et al.*, 2003.

matK: Johnson & Soltis, 1994; Steele & Vilgalys, 1994; Soltis & Soltis, 1995; Johnson *et al.,* 1996, Soltis, *et al.,* 1996, Plunkett, *et al.,* 1996; Wilson *et al.,* 1996; Li *et al.,* 1997; Plunkett *et al.,* 1997; Civeyrel *et al.,* 1998; Mort *et al.,* 1998; Xiang *et al.,* 1998; Garcia-Jacas *et al.,* 2001; Miller & Bayer, 2001; Mort *et al.,* 2001; Pridgeon *et al.,* 2001; Shi *et al.,* 2001; Soltis *et al.,* 2001; Sun *et al.,* 2001; Cuénoud *et al.,* 2002; Ge *et al.*, 2002; Kron *et al.,* 2002; López *et al.,* 2002; Nyffler, 2002; Potter *et al.,* 2002; Carlsward *et al.*, 2003; Muellner *et al.*, 2003; Salazar *et al.*, 2003; Samuel *et al.*, 2003; Sanders *et al.*, 2003

ITS: Baldwin, 1992, Hsiao *et al.*, 1994; Baldwin *et al., 1995,* Kron & King, 1996; Cox *et al.*, 1997; Bowe & Pamphilis, 1997; Eriksson & Donoghue, 1997; Möller & Cronk, 1997; Downie *et al.*, 1998; Jobst *et al.*, 1998; Starr *et al.*, 1999; Meerow *et al.,* 2000; Chassot *et al.*, 2001; Garcia-Jacas *et al.,* 2001; Meerow & Snjiman, 2001; Meve & Liede, 2001; Pridgeon *et al.*, 2001; Richardson *et al.*, 2001; Shi *et al.*, 2001; Sun *et al.*, 2001; Cubas *et al.*, 2002; Hodkinson *et al.,* 2002; Khong *et al.*, 2002; Koehler *et al.*, 2002; Kron *et al.*, 2002; Pelser *et al.*, 2002; Razafimandimbison & Bremer, 2002; Sinclair *et al.*, 2002; Valiejo-Roman, 2002; Wedin *et al.*, 2002; Yoo *et al.,* 2002; Zimmer *et al.,* 2002; Carlsward *et al.*, 2003; Salazar *et al.*, 2003; Samuel *et al.*, 2003; Van den heede *et al.*, 2003), **combined datasets** (Richarson *et al.,* 1997; Potter *et al*., 2002; Sun *et al*., 2001; Chassot *et al*., 2001; Richardson *et al*., 2001; Pridgeon *et al*., 2001; Meve & Liede, 2001; Sinclair *et al*., 2002; Hodkinson *et al*., 2002; Zimmer *et al*., 2002; Nyffeler, 2002; Pelser, 2002; Khong *et al*., 2002; Yoo *et al*., 2002; Koehler *et al.*, 2002; Meerow *et al.*, 2003; Mayer *et al.*, 2003; Salazar *et al.*, 2003; Samuel *et al.*, 2003.

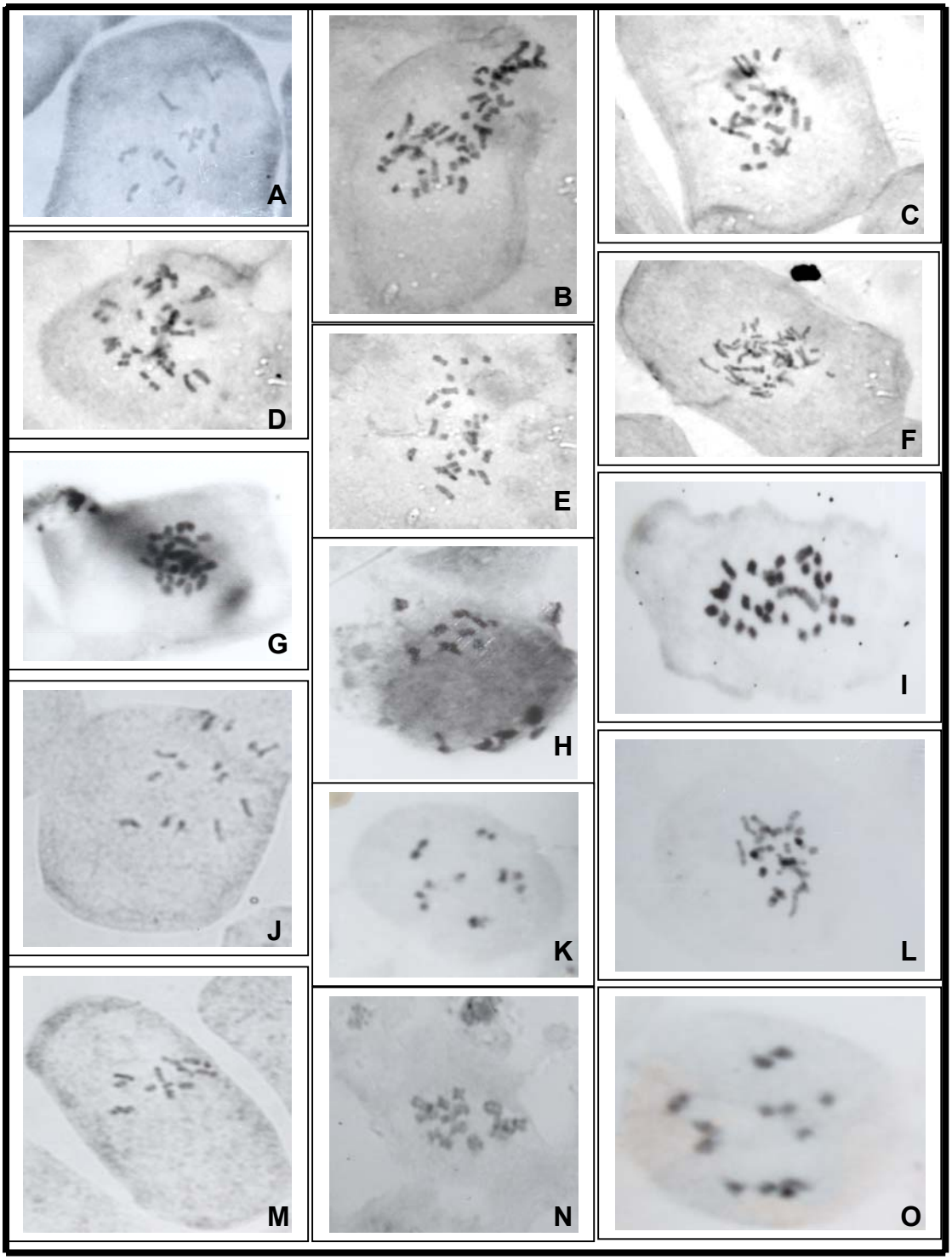

Figure 3.1: Chromosome numbers in some specimens of the *L. orchioides* group (A: *L. arbuthnotiae,* B–F, I: *L. elegans,* G–H: *L. fistulosa,* J–O: *L. orchioides*).
A, *Spies 8054,* 2n = 14; **B**, *Spies 8019*, 2n = 42; **C**, *Spies 8025,* 2n = 28; **D**, *Spies 8035* (hybrid), 2n = 28; **E**, *Spies 8021*, 2n = 28; **F**, *Spies 8024,* 2n = 42; **G**, *Spies 8056,* 2n = 14; **H**, *Spies 8058,* n = 7; **I**, *Spies 8022*, 2n = 28; **J**, *Spies 8084,* 2n = 14; **K**, *Spies 8080*, 2n = 14; **L**, *Spies 8086*, 2n = 14; **M**, *Spies 8094,* 2n = 14; **N**, *Spies 8091*, 2n = 14; **O**, *Spies 8073,* 2n = 14.

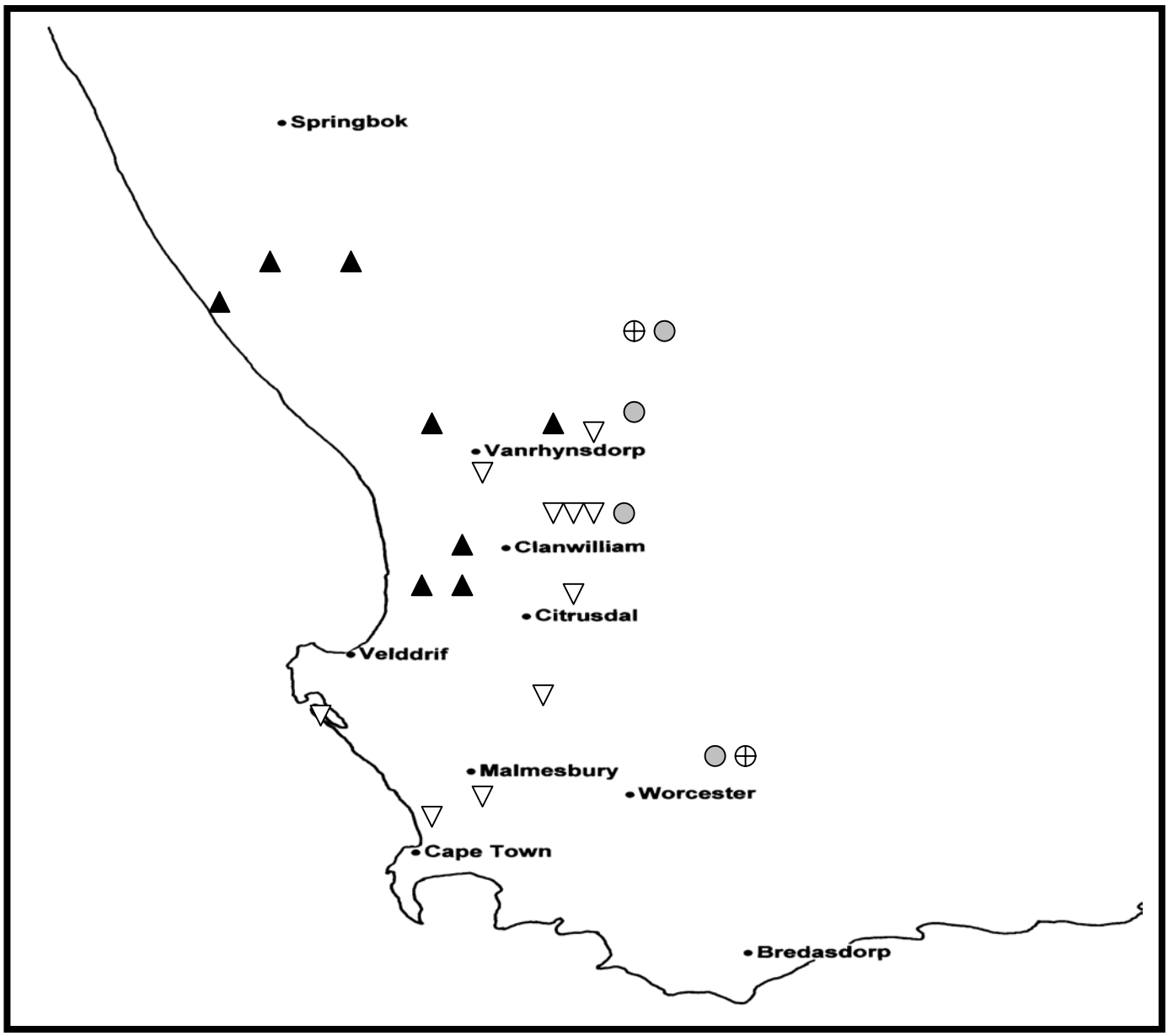

Fig. 3.2: The Geographical distributional area of both *L. mutabilis* and *L. elegans*, where:

▲ Indicates *L. mutabilis* specimens with x = 6

▽ Indicates *L. mutabilis* specimens with x = 7

◯ Indicates *L. elegans* specimens with 2n = 4x = 28

⊕ Indicates *L. elegans* specimens with 2n = 6x = 42

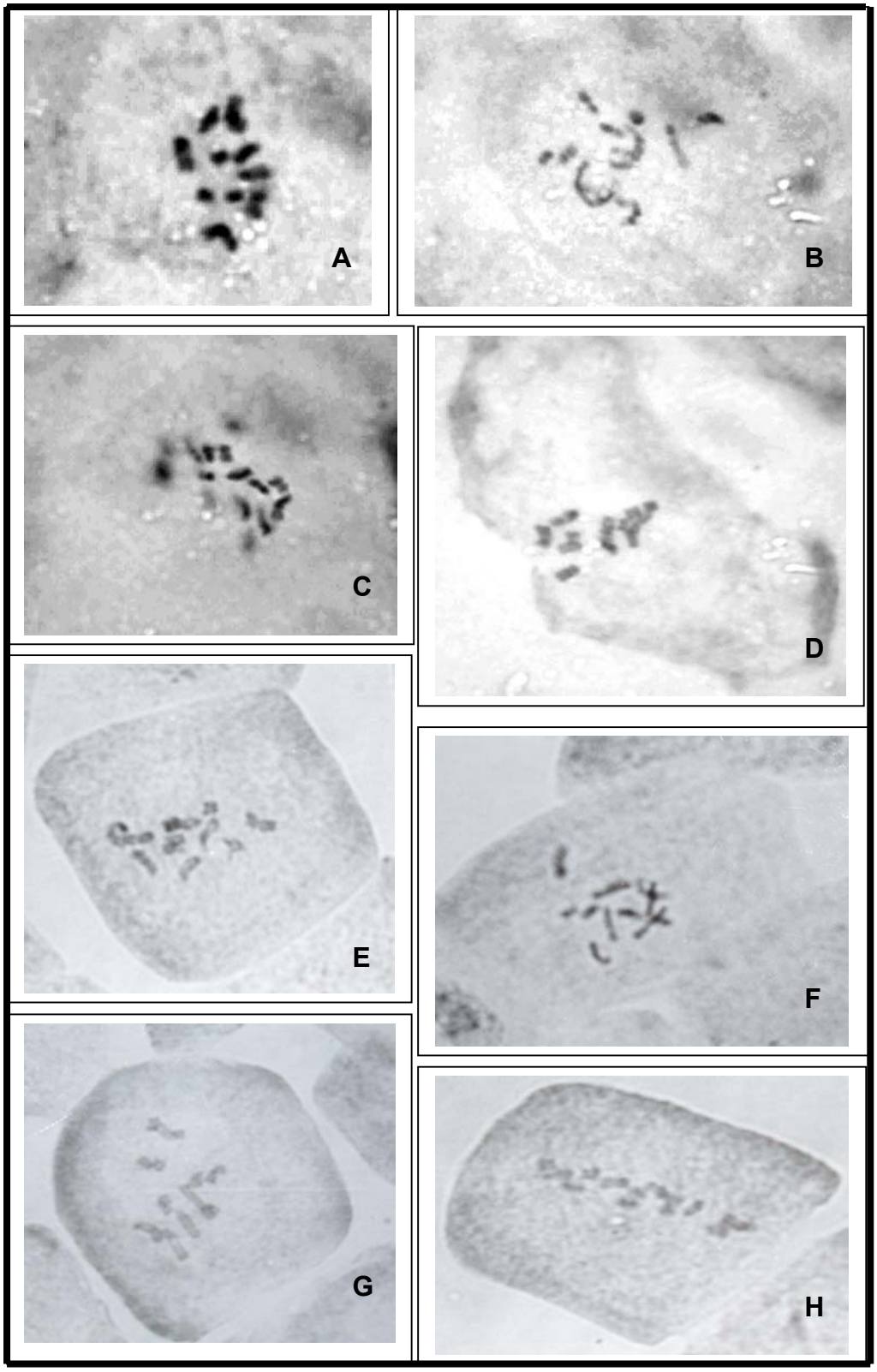

Figure 3.3: Somatic chromosome numbers in some *L. mutabilis* specimens. **A**, *Spies 8052* (hybrid), 2n = 14; **B**, *Spies 8007*, 2n = 12; **C**, *Spies 8028* (hybrid), 2n = 14; **D**, *Spies 8046* (hybrid), 2n = 12; **E**, *Spies 8048* (hybrid), 2n = 12; **F**, *Spies 6751,* 2n = 12; **G**, *Spies 8007*, 2n = 12, **H**, *Spies 8005,* 2n = 14.

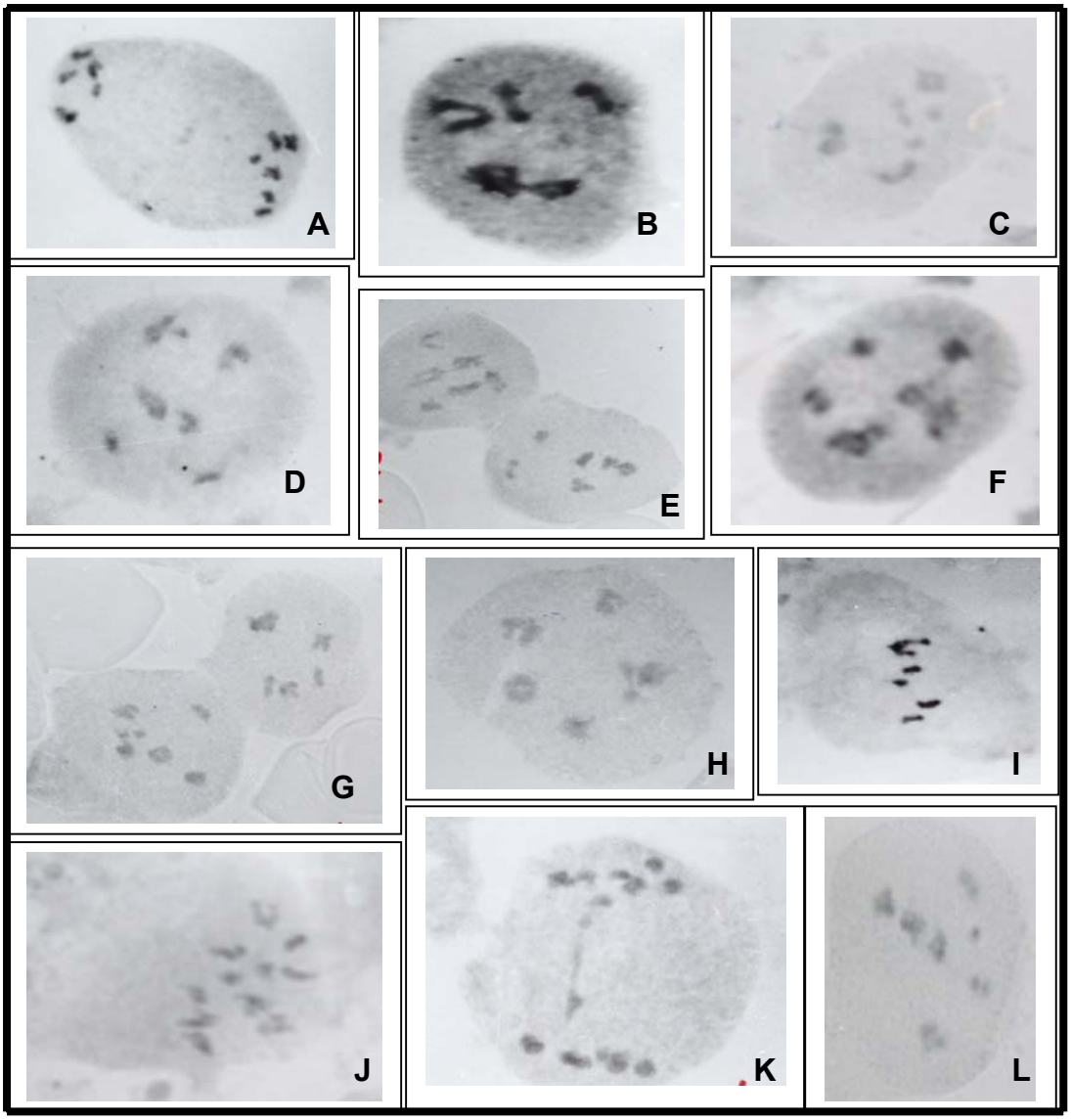

Figure 3.4: Gametic chromosome numbers in some *L. mutabilis* specimens. **A**, *Spies 6780*, n = 6; **B**, *Spies 6746*, n = 6; **C**, *Spies 8044* (hybrid), n = 6; **D**, *Spies 6779*, n = 6; **E**, *Spies 6775*, n = 6; **F**, *Spies 8013,* n = 7; **G**, *Spies 6744*, n = 6, **H**, *Spies 6751,* n = 6; **I**, *Spies 8029* (hybrid), n = 6; **J**, *Spies 6750*, n = 12; **K**, *Spies 8038* (hybrid), n = 7; **L**, *Spies 8052* (hybrid), n = 7.

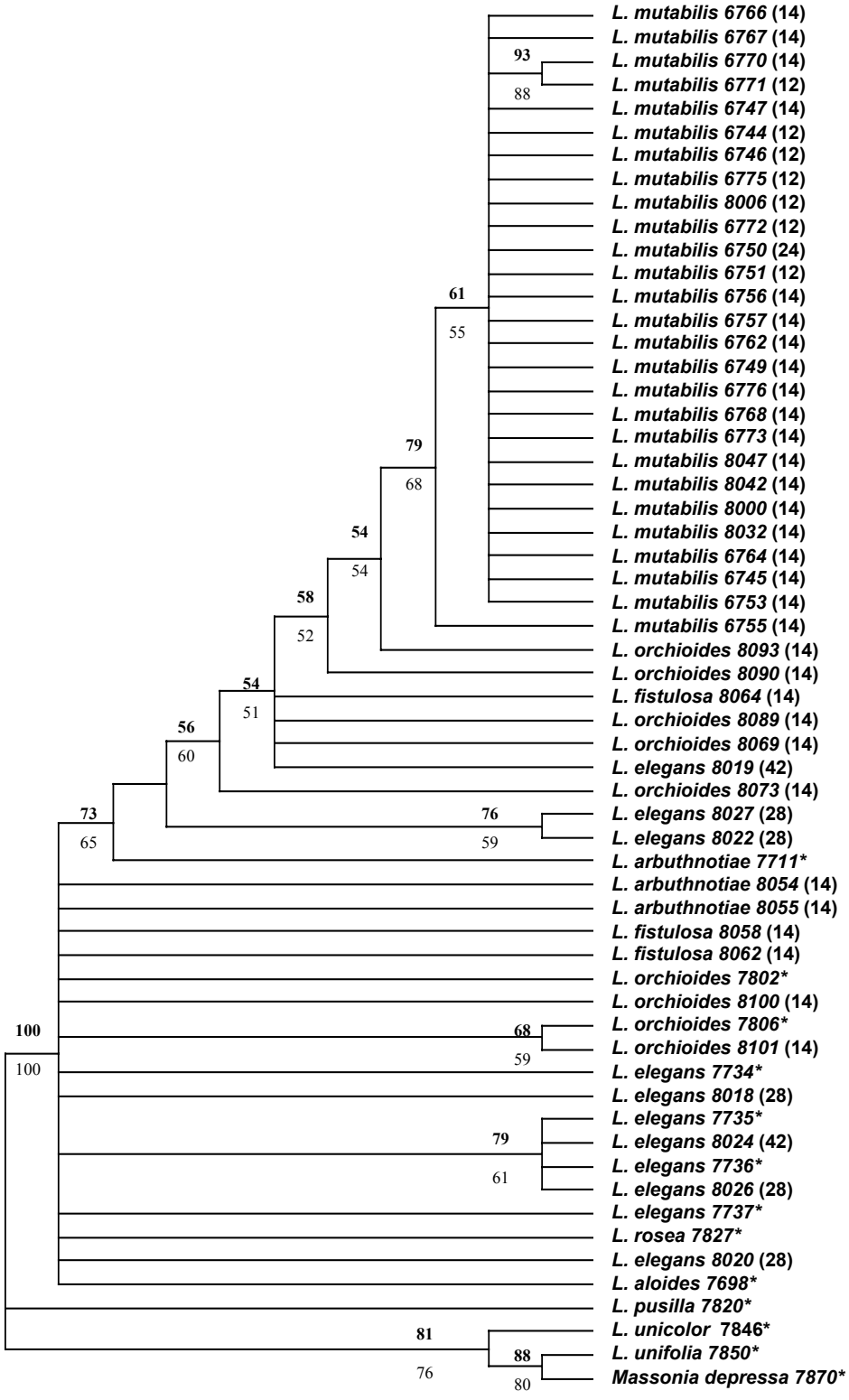

Fig. 4.1 Strict Consensus of the trn_{L-F} intron of all the species included in this study: **CI: 0. 8776, RI: 0. 9893 & Tree Length: 98.** Bootstrap values above and Jackknife below branches. Nodes with no values had Bootstrap and Jackknife values below 50%. Somatic chromosome numbers indicated in brackets.

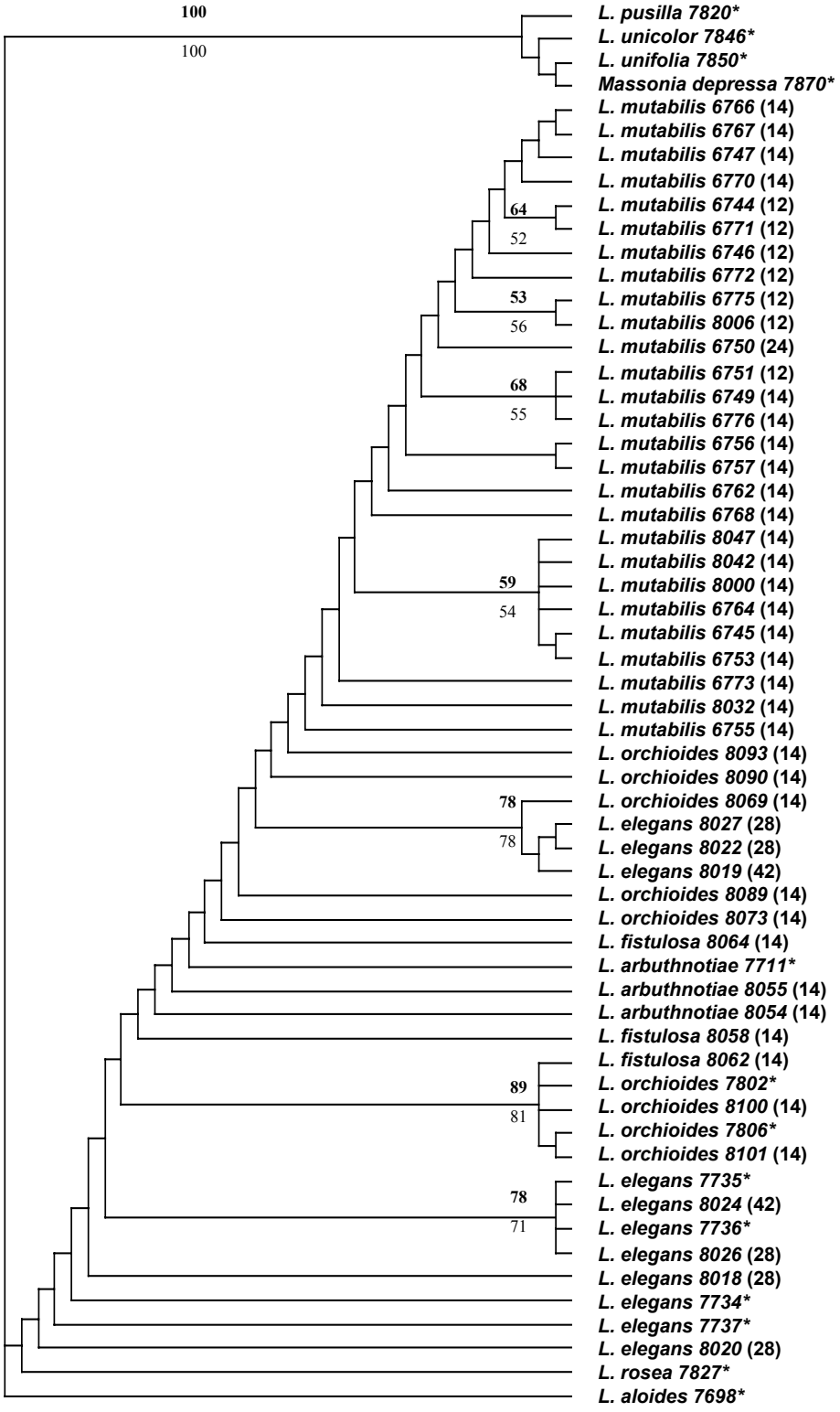

Fig. 4.2 Strict Consensus of the trn_{L-F} region of all the species included in this study: **CI: 0. 8078, RI: 0. 9797 & TL: 385.** Bootstrap values above and Jackknife below branches. Nodes with no values had bootstrap and jackknife values below 50%. Somatic chromosome numbers indicated in brackets.

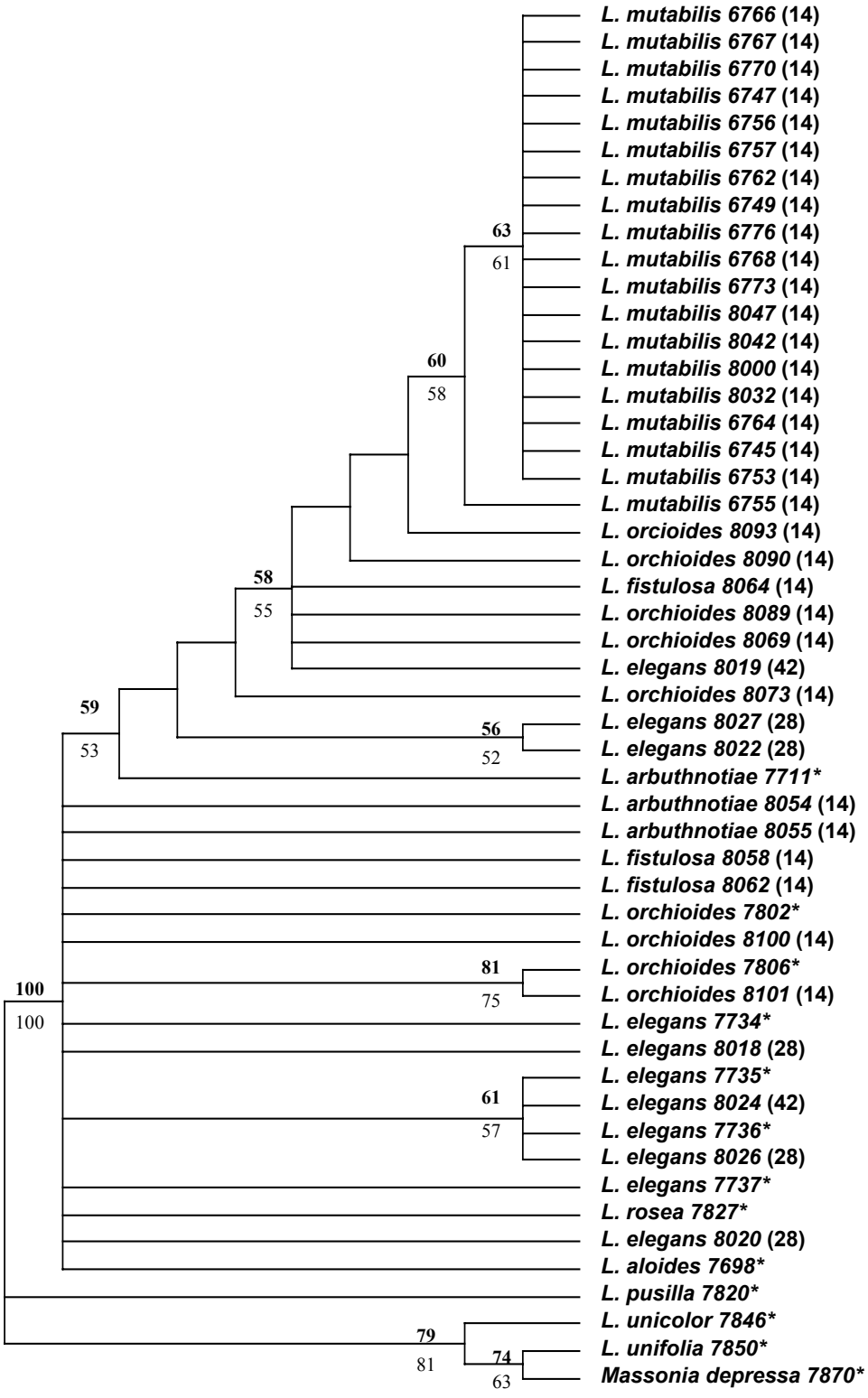

Fig. 4.3 Strict Consensus of the trn_{L-F} intron of all the species with x = 7 included in this study: **CI: 0. 8750, RI: 0. 9887 & TL: 96.** Bootstrap values above and Jackknife below branches. Nodes with no values had Bootstrap and Jackknife values below 50%. Somatic chromosome numbers indicated in brackets.

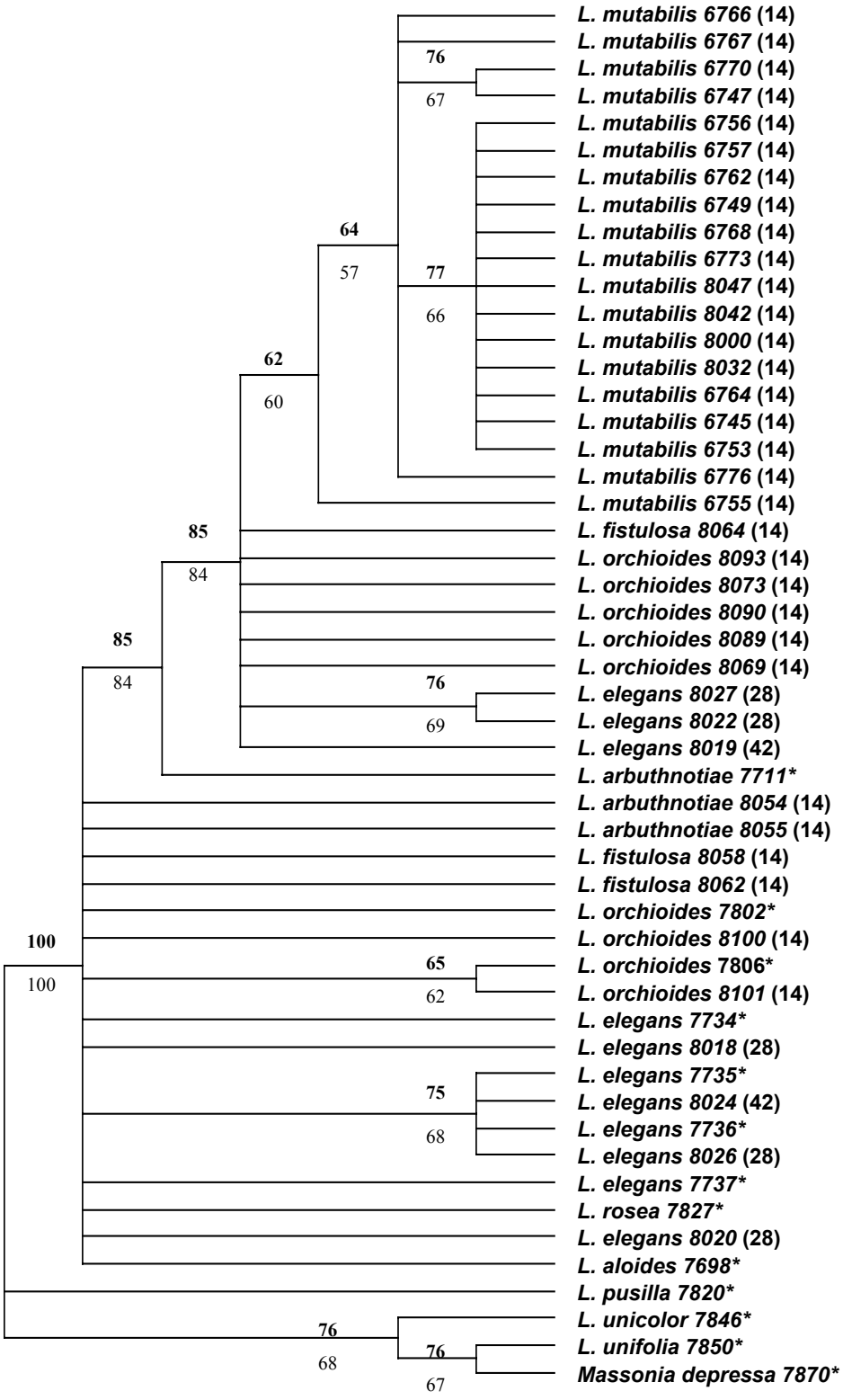

Fig. 4.4 Strict Consensus of the trn_{L-F} region of all the species with x = 7 included in this study: **CI: 0. 8786, RI: 0. 9892 & TL: 140.** Bootstrap values above and Jackknife below branches. Nodes with no values had Bootstrap and Jackknife values below 50%. Somatic chromosome numbers indicated in brackets.

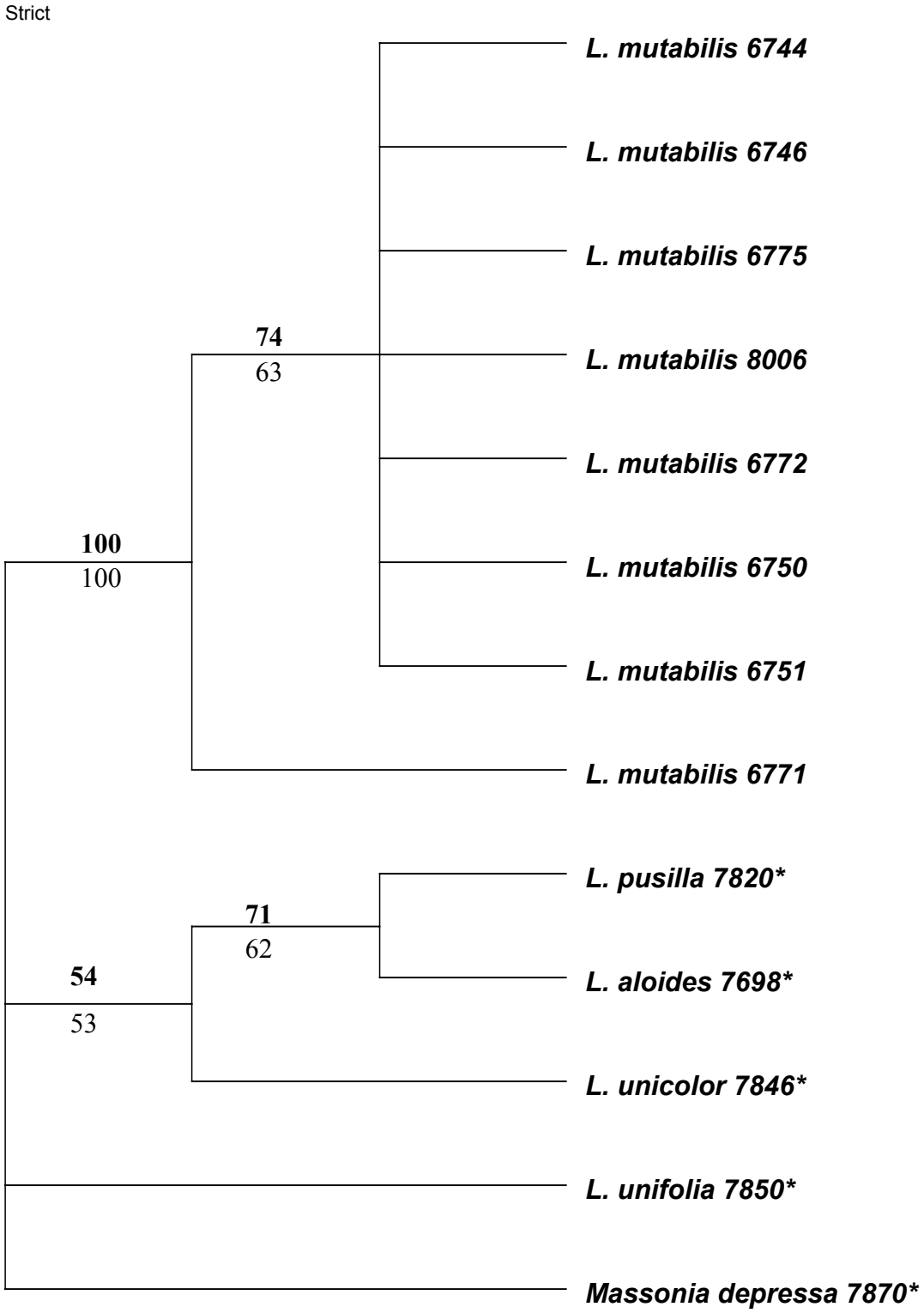

Fig. 4.5 Strict Consensus of the trn_{L-F} intron of all the species with x = 6 (2n = 12) included in this study: **CI: 0. 9855, RI: 0. 9947 & TL: 69.** Bootstrap values above and Jackknife below branches. Nodes with no values had Bootstrap and Jackknife values below 50%.

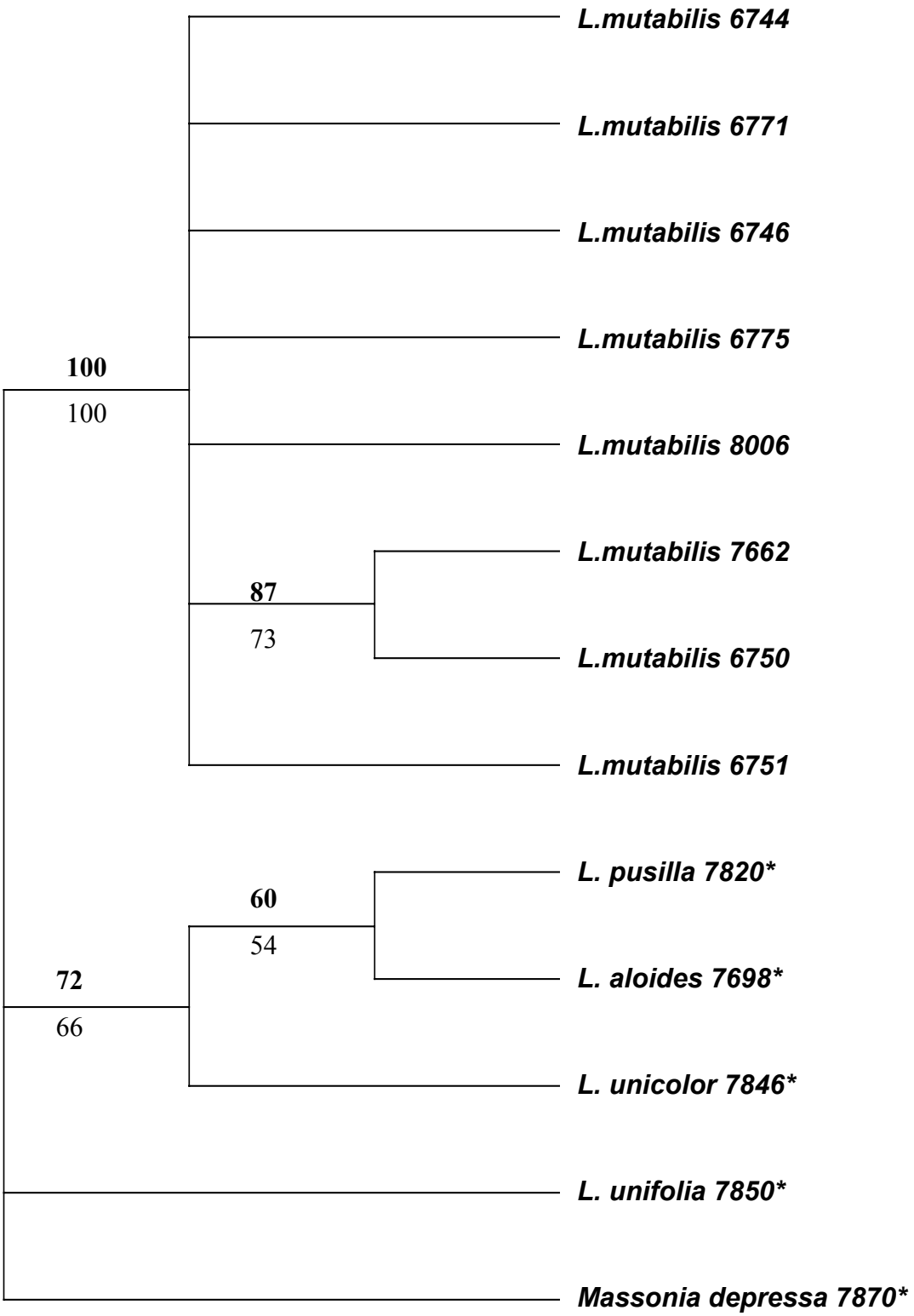

Fig. 4.6 Strict Consensus of the trn_{L-F} region of all the species with x = 6 (2n = 12) included in this study: **CI: 0. 9717, RI: 0. 9894 & TL: 106.** Bootstrap values above and Jackknife below branches. Nodes with no values had bootstrap and jackknife values below 50%.

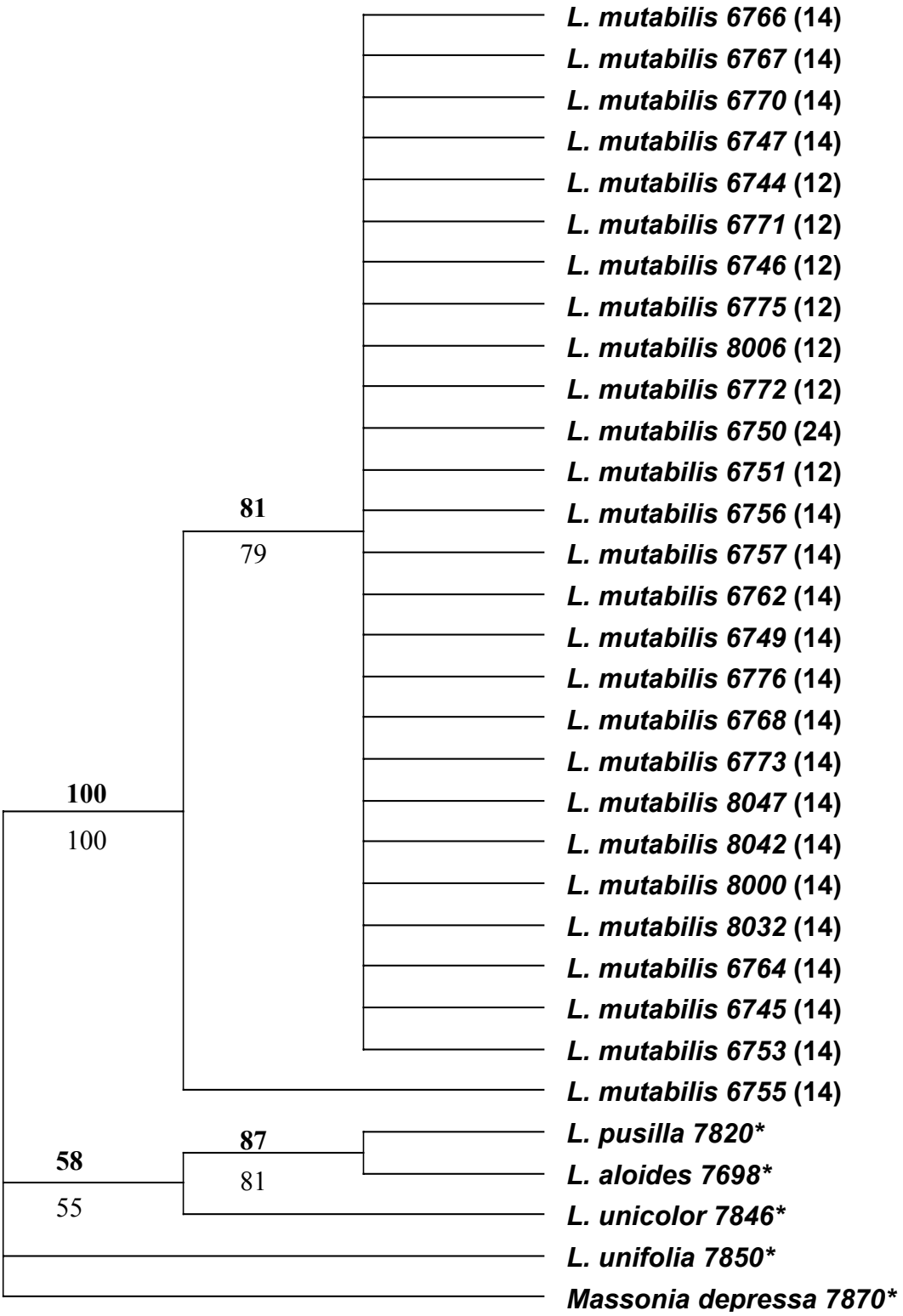

Fig. 4.7 Strict Consensus of the trn_{L-F} intron of all the *L. mutabilis* specimens included in this study: **CI: 0. 9605, RI: 0. 9847 & TL: 76.** Bootstrap values above and Jackknife below branches. Nodes with no values had Bootstrap and Jackknife values below 50%. Somatic chromosome numbers indicated in brackets.

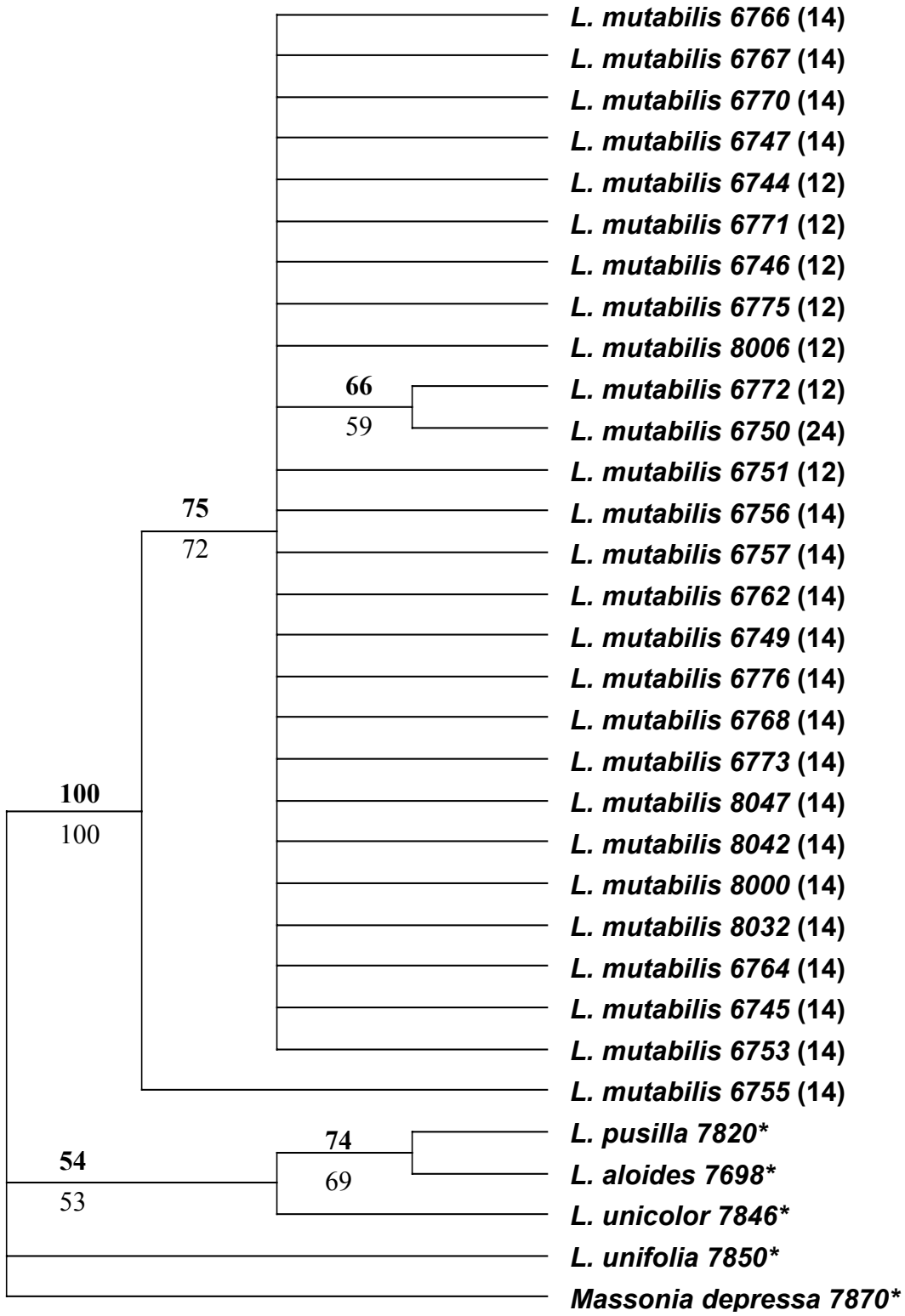

Fig. 4.8 Strict Consensus of the trn_{L-F} region of all the *L. mutabilis* specimens with included in this study: **CI: 0. 9397, RI: 0. 9768 & TL: 116.** Bootstrap values above and Jackknife below branches. Nodes with no values had Bootstrap and Jackknife values below 50%. Somatic chromosome numbers indicated in brackets.

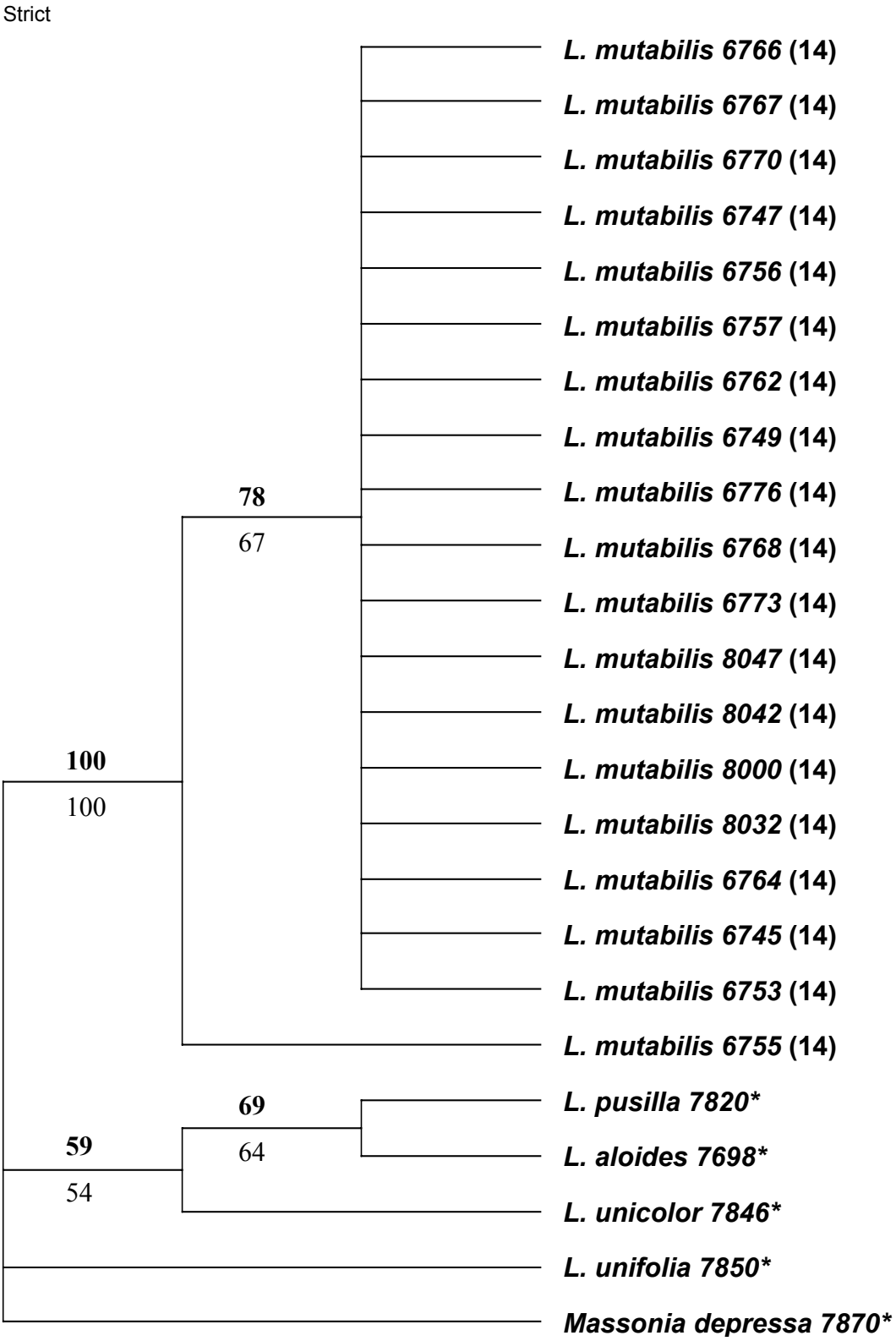

Fig. 4.9 Strict Consensus of the trn_{L-F} intron of all the *L. mutabilis* specimens with x = 7 (2n = 14) included in this study: **CI: 0. 9595, RI: 0. 9845 & TL: 74.** Bootstrap values above and Jackknife below branches. Nodes with no values had Bootstrap and Jackknife values below 50%. Somatic chromosome numbers indicated in brackets

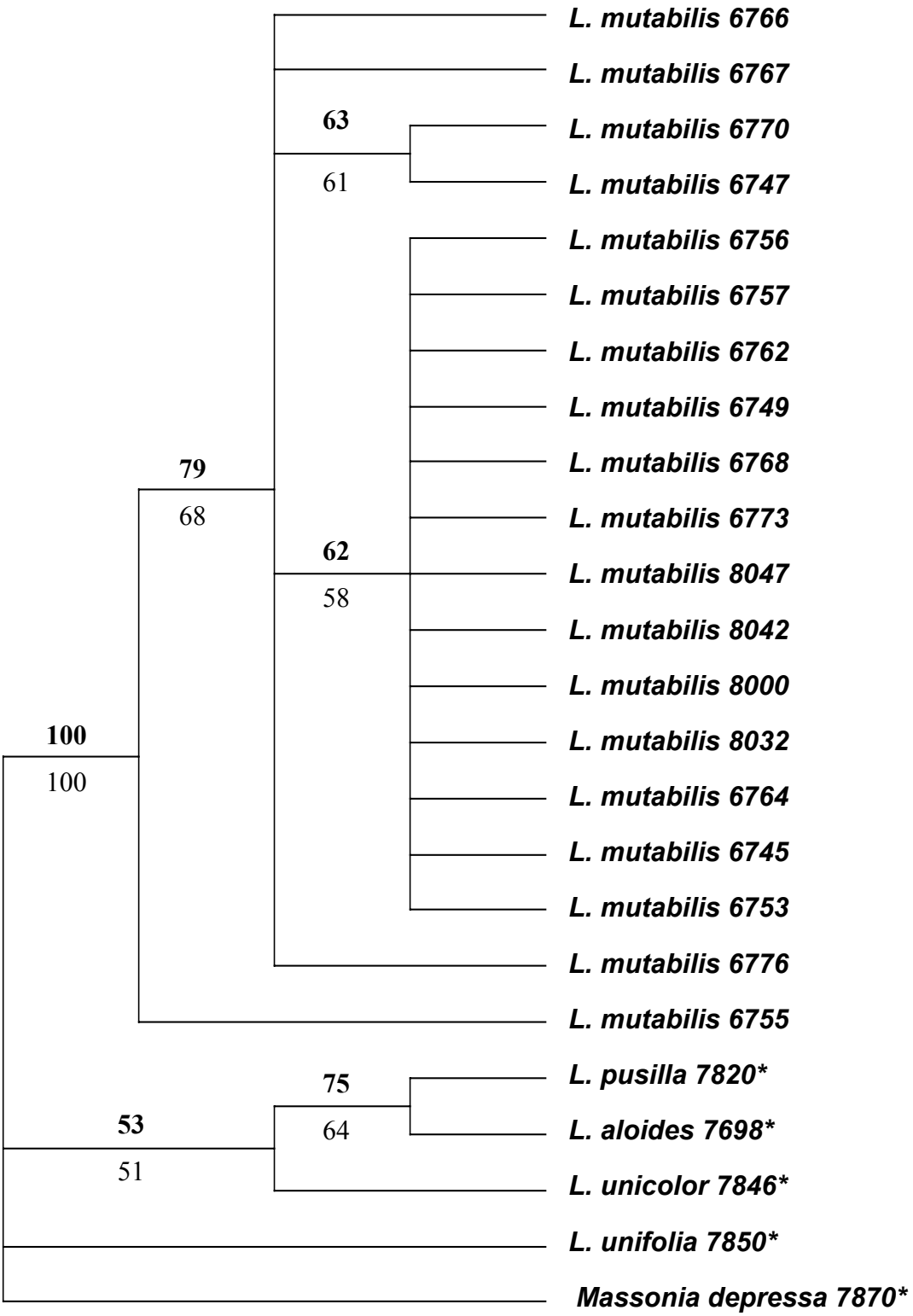

Fig. 4.10 Strict Consensus of the trn_{L-F} region of all the *L. mutabilis* specimens with x = 7 (2n = 14) included in this study: **CI: 0. 9623, RI: 0.9862 & TL: 106.** Bootstrap values above and Jackknife below. Nodes with no values had Bootstrap and Jackknife values below 50%.