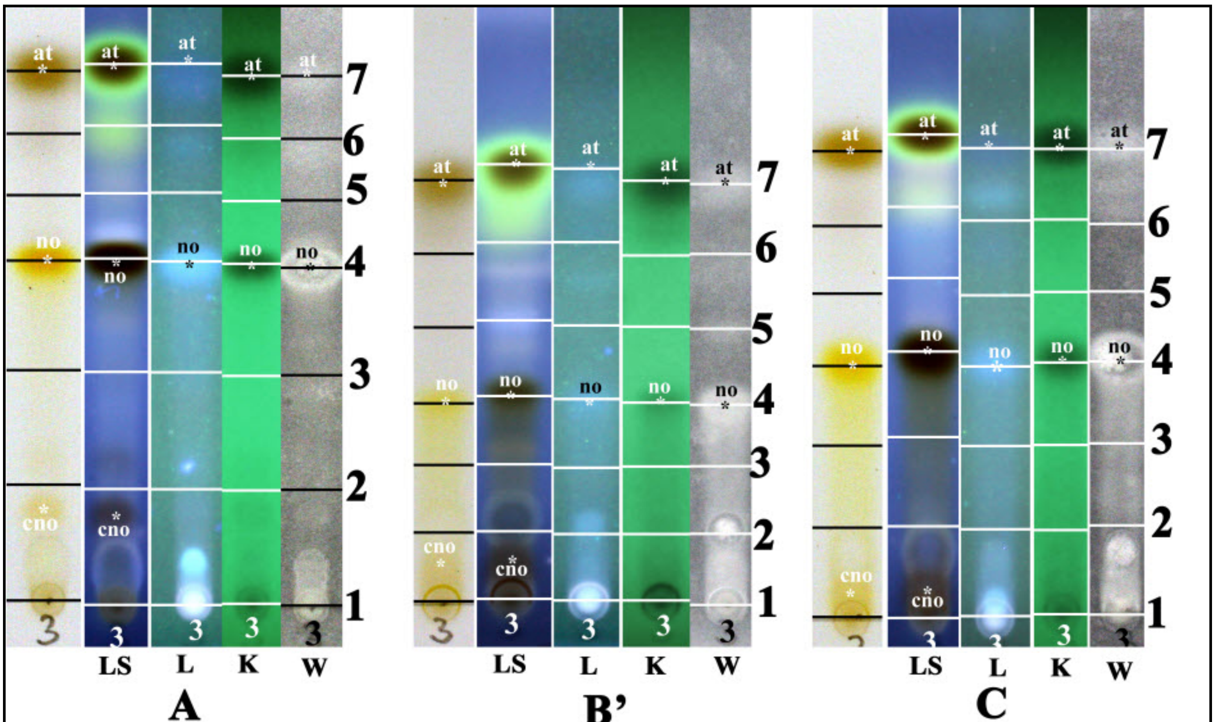
F. Schumm & J.A. Elix

Atlas of Images of Thin Layer Chromatograms of Lichen Substances

Bilderatlas von Dünnschicht-chromatogrammen von Flechten-Inhaltsstoffen



Platismatia glauca [3030] und Cladonia symphycarpa [4698]

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Atlas of Images of Thin Layer Chromatograms of Lichen Substances

Bilderatlas von Dünnschichtchromatogrammen von Flechten-Inhaltsstoffen

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Contents

Introduction

The determination of lichens it is often facilitated by a knowledge of the lichen substances present in the specimens. Thin layer chromatography (TLC) has greatly improved the speed and certainty of recognition of lichen substances by means that are simple to use and relatively inexpensive. Standardized methodology and further refinements of analytical TLC procedures for detecting and comparing lichen metabolites have been reported by C.F. Culberson (1970). For the identification of the TLC spots observed one can compare the relative Rf values (Elix, 2014). Unfortunately these Rf values often vary by up to 5 % for various reasons (in particular relative humidity) and a definite identification requires experience and is often more difficult than indicated in the literature. Therefore we believe that the collection of HPTLC images presented here will assist in the identification of the spots, especially since we show the HPTLC plates under various UV-light before and after applying sulfuric acid and heat, and in water.

In our book *Images from Lichenes Australasici Exsiccati and of other characteristic Australasian Lichens* published in 2014, many of the specimens were accompanied by images of such HPTLC plates as an aid to their identification. Subsequently we decided to expand the number of plates to present the images produced by as many lichen substances as possible. We thank Dr Harrie Sipman (Berlin) for supplying us with many purified compounds from the Huneck collection of lichen substances.

In some cases we have intentionally included more than one plate for a particular lichen substance in order to demonstrate the variability observed in the Rf values, colour of the spots etc.

Here we used small 5 x 5 cm HPTLC plates. Although the resolution of the spots is not as definitive as with professional 20 x 20 cm plates, usually the majority of substances are separated. These plates have the advantage of being relatively inexpensive, of needing only 1-2 cm^3 of solvents per run and can be used at home by amateurs with a limited budget. The images show what can be achieved with these small plates. The method for using these plates is described below.

How to use the plates

Of course it is an advantage to know what substances are expected for a particular lichen so that it is possible to compare the one's observed results with selected plates in this book. In other cases more extensive searches and comparisons with published Rf values cannot be avoided.

Remarks on the Rf values

In most Rf tables (Elix 2014) or in the Wintabolites program the following relative positions are used:

Elix: $0 \leq Y \leq 100$
solvent A: start = 0, norstictic acid = 40, atranorin = 75
solvent B: start = 0, norstictic acid = 29, atranorin = 78
solvent B’: start = 0, norstictic acid = 32, atranorin = 73
solvent C: start = 0, norstictic acid = 30, atranorin = 79

We use another system here for determining the relative positions of the spots which is more convenient when the 5 x 5 cm HPTLC plates are used. It can be seen at the sides of the plates in the published images. This „1-7“ position system was previously introduced by Schumm (2002).

Here $1 \leq X \leq 7$
solvent A,B’/B, C: 1 = start position, 4 = position of norstictic acid, 7 = position of atranorin. For better comparisons we further drew additional lines 2, 3 between the section 1 to 4 and 5, 6 between the section 4 to 7.

A conversion from the 0-100 Rf values for 20 x 20 cm TLC plates to the 1-7 system for 5 x 5 HPTLC plates is only approximate. The following linear interpolation formula may aid in this.

Conversion of Rf values here (1.. x ..7) to Rf values in Elix (2014), (0.. y ..100)

solvent A

if $x \leq 4$: $y = (x - 1) \cdot \frac{40}{3}$

if $x > 4$: $y = (x - 4)\frac{35}{3} + 40$

solvent B’

if $x \leq 4$: $y = (x - 1) \cdot \frac{32}{3}$

if x > 4: $y = (x - 4) \cdot \frac{41}{3} + 32$

solvent C

if x ≤ 4: $y = (x - 1) \cdot 10$

if x > 4: $y = (x - 4) \cdot \frac{49}{3} + 30$

Conversion of Rf values (0.. y ..100) in Elix (2014) in the relative Rf values here (1.. x ..7): I think that the examples would help

solvent A

if y ≤ 40: $x = 1 + \frac{(3 \cdot y)}{40}$

if y > 40: $x = 4 + 3 \cdot \frac{(y - 40)}{(75 - 40)}$

solvent B'

if y ≤ 32 $x = 1 + 3 \cdot \frac{y}{32}$

if y > 32: $x = 4 + 3 \cdot \frac{(y-32)}{(78-32)}$

solvent C

if y ≤ 30: $x = 1 + 3 \cdot \frac{y}{30}$

if x > 30: $x = 4 + 3 \cdot \frac{(y-30)}{(79-30)}$

Example 1: In our plate we find in A a spot at position x = 3,6.
Then the wintabulites Rf should be

$$y = (x - 1) \cdot \frac{40}{3} = (3{,}6 - 1) \cdot \frac{40}{3} = 34{,}7$$

Example 2: The wintabulites Rf in A is y = 60,5.
Then the spot is expected on our plate in position

$$x = 4 + 3 \cdot \frac{(y-40)}{(75-40)} = 4 + 3 \cdot \frac{(60{,}5-40)}{35} = 5{,}76$$

The presentation of the plates and abbreviations used:
Each plate contains 3 mounted groups of HPTLC for the solvents A, B/B’, C:

A = Toluene : Dioxane : Glacial acetic acid = 39.13 : 9.78 : 1.09 ml
B = n-Hexane : Diethyl Ether : Formic acid = 26.00 : 20.00 : 4.00 ml
B’ = n-Hexane : Methyl tert-butyl ether : Formic acid = 30.43 : 15.65 : 3.91 ml [note methyl tert-butyl ether is a potent allergen]
C = Toluene : Glacial acetic acid = 42.39 : 7.61 ml

Each plate shows the results for

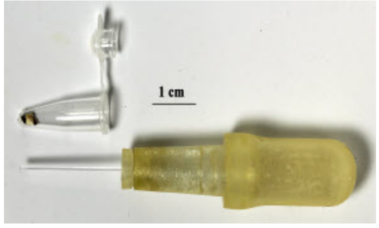
- = In daylight - after spraying with 10% sulphuric acid and drying at 90-100°C for 20-30 min.
LS = longwave UV-light (366 nm) after acid/heat treatment
L = longwave UV-light (366 nm) before acid/heat treatment
K = shortwave UV-light (254 nm) before acid/heat treatment
P = daylight without acid treatment for detecting pigments

Each plate is labelled with the herbarium number [...] (F. Schumm) and the plate number p.. The plates are stored in Wangen. The origin of the lichen specimens analysed are noted, albeit it in an abbreviated form when published previously in Schumm & Elix (2014). If a purified substance from the Huneck collection was used, then the substance number is given.

For the images a Canon EOS 40D and a Canon EOS 600D camera was used. Although the same adjustments were used the images for L have a more reddish background with the EOS 600D camera and a more bluish background with the EOS 40D camera.

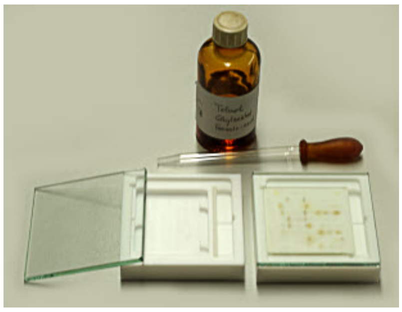
Brief instructions

a) Extraction of 1-2 apothecia for example, in 0.2 ml PCR-tubes with 1-3 drops acetone.



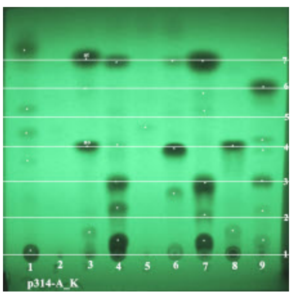
b) Apply the extracts with a 0.5 µl microcapillary and a stencil for 9 positions (spots) on a 5 x 5 cm HPTLC-plate (Merck HPTLC Kieselgel 60 F254, no. 1.05635.0001). The 3rd row is always reserved for an extract of Cladonia symphycarpa with norstictic acid and atranorin s reference standards.

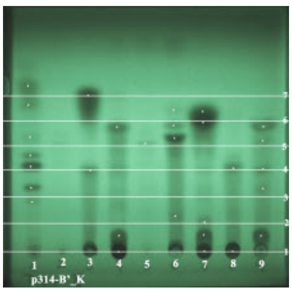
c) Develop the plates in the horizontal chamber following Ljubomir Kraus (1994) in the three solvents A, B' and C, stored in 50 ml bottles

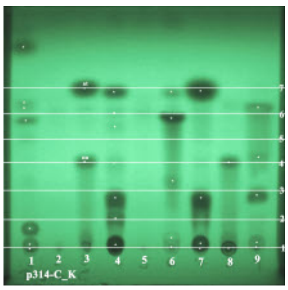


A = Toluene : Dioxane : Glacial acetic acid = 39.13 : 9.78 : 1.09 ml
B' = n-Hexane : Methyl tert-butyl ether : Formic acid = 30.43 : 15.65 : 3.91 ml [note methyl tert-butyl ether is a potent allergen]
C = Toluene : Glacial acetic acid = 42.39 : 7.61 ml

d) Dry the plates. Images of the plates in longwave (366 nm, = L) and shortwave (254 nm = K) UV-light and after spraying with water (= W). For pigments are also recorded dry in daylight (= P). For the UV-photographs we use a small UV lamp and the UV in transmission mode.

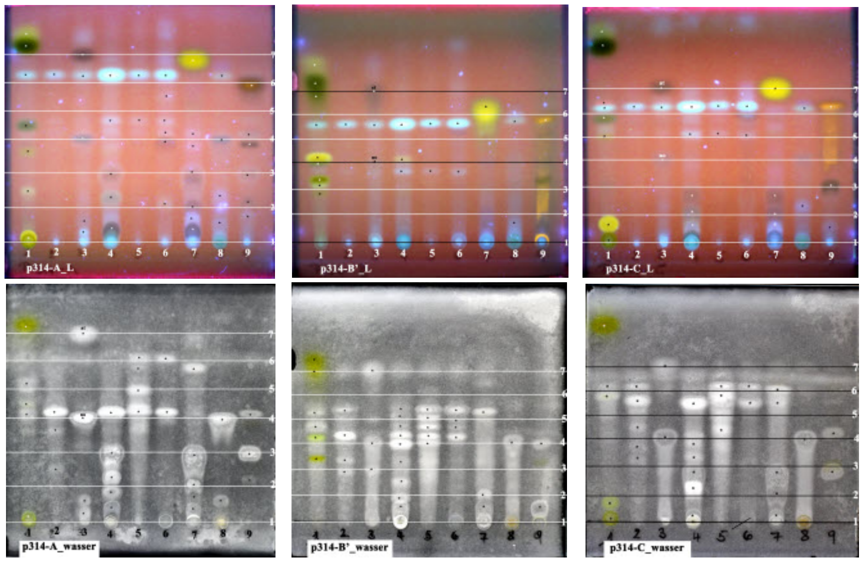






L

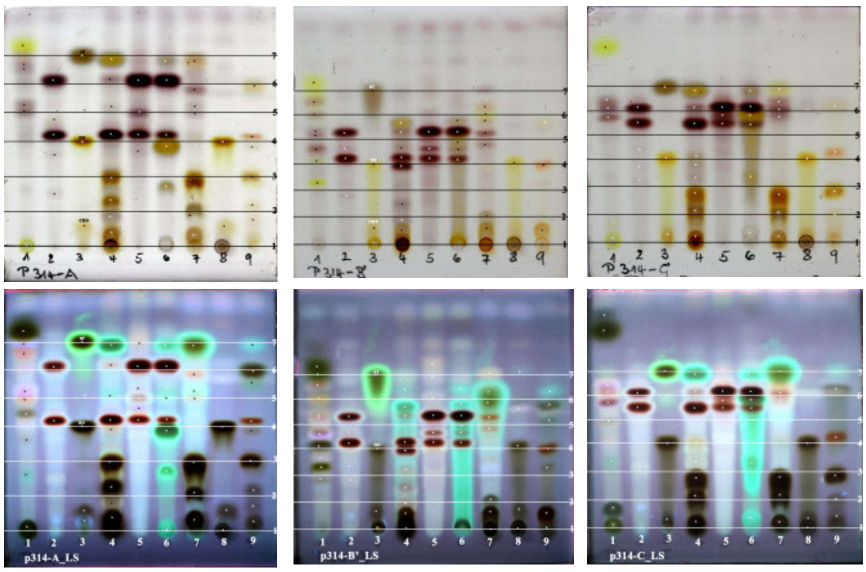
W



A B' C

e) Spray with 10% sulphuric acid and dry at 90-100°C for 20-30 min in a oven [beware fumes]. Images then recorded in daylight and longwave UV-light (=LS).

LS



A B' C

For better comparisons of the resultant spots we devided the plates in two sections by drawing the three horizontal lines. 1= origin, 4= position of norstictic acid, 7= position of atranorin. Further we drew additional lines 2, 3 and 5,6 in the two segments. For the images of the plates illustrated in the book, we collected the relevant rows for a particular specimen. Each plate is labelled with the herbarium number [.] (F.Schumm) and the plate number p..

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Einleitung

Die Bestimmung von Flechten wird häufig erleichtert, wenn man die Flechten-Inhaltsstoffe der zu bestimmenden Proben kennt. Die Dünnschichtchromatographie (TLC) hat die Geschwindigkeit und Sicherheit der Erkennung von Inhaltsstoffen sehr verbessert und sie ist einfach anzuwenden und relativ preiswert. C.F. Culberson (1970) veröffentlichte eine standardisierte Methode und weitere Verbesserungen des TLC Verfahrens, um Flechteninhaltsstoffe zu entdecken und zu vergleichen. Um erhaltene TLC Flecke zu bestimmen kann man sie mit den relativen Rf-Werten (Elix, 2014) vergleichen. Leider variieren diese Rf-Werte aus verschiedensten Gründen (besonders wegen unterschiedlicher Feuchtigkeit) um etwa 5 %. Eine endgültige Bestimmung erfordert Erfahrung und ist schwieriger als es aus der Literatur hervorgeht. Daher glauben wir, dass die hier gezeigte Sammlung von HPTLC Bildern bei der Bestimmung der erhaltenen Flecke eine gute Hilfe ist, insbesondere weil wir die HPTLC Platten auch unter verschiedenem UV-Licht vor und nach der Behandlung mit Schwefelsäure und in Wasser zeigen.

In unserem Buch *Images from Lichenes Australasici Exsiccati and of other characteristic Australasian Lichens*, 2014 veröffentlicht, sind viele Arten mit solchen HPTLC Bildern versehen, die als Bestimmungshilfe dienen sollen. Es lag daher nahe, die Zahl der Platten durch möglichst viele Flechtenstoffe zu erweitern und gesondert zu veröffentlichen. Wir bedanken wir uns bei H. Sipman (Berlin), der uns aus der Sammlung von S. Huneck viele gereinigte Substanzen zur Untersuchung geschickt hat.

Bei einer Reihe von Inhaltsstoffen wurden ganz bewusst mehrere Chromatogramme abgebildet, um die Schwankungen in den Rf-Werten, Farben der Flecke zu zeigen.

Wir verwenden hier 5 x 5 cm kleine HPTLC Platten. Sie haben zwar nicht das hohe Auflösungsvermögen wie 20 x 20 cm große TLC Platten, zeigen aber meistens die Inhaltsstoffe genügend getrennt. Ihr Vorteil ist der geringere Preis und der sehr geringe Verbrauch an Laufmitteln, so dass sie auch vom Amateur zu Hause benutzt werden können. Dieser Atlas zeigt, was man mit diesen Platten erreichen kann und wo ihre Grenzen liegen. Eine knappe bebilderte Anleitung, wie die HPTLCs hier entstanden sind, geben wir weiter unten.

Anwendung der Tafeln:
Es ist natürlich von Vorteil, wenn man schon die zu erwartenden Inhaltsstoffe seiner speziellen Probe kennt und die eigenen Resultate gezielt in diesem Atlas nachschlagen kann. Sonst ist ein u.U. recht langwieriges Suchen und ein Vergleichen mit publizierten Rf-Werten nicht vermeidbar.

Bemerkungen zu den Rf-Werten:
In den meisten Rf-Tabellen (Elix 2014) oder in dem PC-Programm Wintabulites werden folgende relativen Positionsangaben verwendet:

Elix: $0 \leq Y \leq 100$
Laufmittel A: 0 = Startlinie, 40 = Norstictinsäure, 75 = Atranorin
Laufmittel B: 0 = Startlinie, 29 = Norstictinsäure, 78 = Atranorin
Laufmittel B': 0 = Startlinie, 32 = Norstictinsäure, 73 = Atranorin
Laufmittel C: 0 = Startlinie, 30 = Norstictinsäure, 79 = Atranorin

Wir verwenden hier ein anderes System, um die relativen Positionen anzugeben, das für die kleinen 5x5 cm HPTLCs bequemer ist. Dies kann an den Seiten der hier publizierten Bilder gesehen werden.
Dieses „1-7“ Positionssystem wurde früher von Schumm (2002) eingeführt.

Hier $1 \leq X \leq 7$
Laufmittel A,B',C: 1 = Startlinie, 4 = Position von Norstictinsäure, 7 = Position von Atranorin. Zur besseren Orientierung ziehen wir zusätzliche äquidistante Teilungslinien 2,3 bzw. 5,6 in die jeweiligen Bereiche 1 bis 4 bzw. 4 bis 7 ein.

Eine Umrechnung der 0-100 Rf-Werte für 20 x 20 TLC Platen in das 1-7 System für 5 x 5 Platten ist nur angenähert möglich. Die folgenden linear interpolierenden Formeln mögen dazu eine Hilfe sein.

Umrechnung von Rf-Werten hier (1.. x ..7) in Rf-Werte bei Elix (2014), (0.. y ..100)

Laufmittel A

für $x \leq 4$: $y = (x - 1) \cdot \frac{40}{3}$

für x > 4: $y = (x-4)\frac{35}{3} + 40$

Laufmittel B’

für x ≤ 4: $y = (x-1) \cdot \frac{32}{3}$

für x > 4: $y = (x-4) \cdot \frac{41}{3} + 32$

Laufmittel C

für x ≤ 4: $y = (x-1) \cdot 10$

für x > 4: $y = (x-4) \cdot \frac{49}{3} + 30$

Umrechnung von Rf-Werten (0.. y ..100) bei Elix(2014) in die hier verwendeten relativen Rf-Werte (1.. x ..7):

Laufmittel A

für y ≤ 40: $x = 1 + \frac{(3 \cdot y)}{40}$

für y > 40: $x = 4 + 3 \cdot \frac{(y-40)}{(75-40)}$

Laufmittel B’

für y ≤ 32: $x = 1 + 3 \cdot \frac{y}{32}$

für y > 32: $x = 4 + 3 \cdot \frac{(y-32)}{(78-32)}$

Laufmittel C

für y ≤ 30: $x = 1 + 3 \cdot \frac{y}{30}$

für x > 30: $x = 4 + 3 \cdot \frac{(y-30)}{(79-30)}$

Beispiel 1: In A lesen wir auf unseren Platten bei einem Fleck x=3,6 ab. Der Wintabulites Rf-Wert ist dann:

$$y = (x-1) \cdot \frac{40}{3} = (3{,}6-1) \cdot \frac{40}{3} = 34{,}7$$

Beispiel 2: Der Wintabulites Rf-Wert in A ist y=60,5. Auf unseren Platten sollte der Fleck dann bei folgender Position zu finden sein:

$$x = 4 + 3 \cdot \frac{(y-40)}{(75-40)} = 4 + 3 \cdot \frac{(60{,}5-40)}{35} = 5{,}76$$

Aufbau der Tafeln und verwendete Abkürzungen:
Jede Tafel enthält 3 montierte Gruppen von HPTLCs für die Laufmittel A, B'/B und C:

A = Toluol : Dioxan : Eisessig = 39.13 : 9.78 : 1.09 ml
B = Hexan : Ether : Ameisensäure = 26.00 : 20.00 : 4.00 ml
B' = Hexan : Methyl-tert-Butylether : Ameisensäure = 30.43 : 15.65 : 3.91 ml
C = Toluol : Eisessig = 42.39 : 7.61 ml

In jeder Gruppe sind abgebildet die Ergebnisse für

- Tageslicht nach Besprühen mit 10% Schwefelsäure und Trocknen bei 90-100°C für 20-30 min

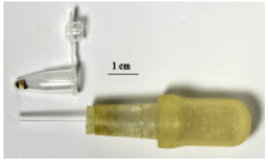
LS = langwelliges (366 nm) UV-Licht nach Säure- und Hitzebehandlung
L = langwelliges (366 nm) UV-Licht vor Säure- und Hitzebehandlung
K = kurzwelliges (254 nm) UV-Licht vor Säure- und Hitzebehandlung
P = Tageslicht ohne Säurebehandlung bei Pigmenten

Jede Tafel ist beschriftet mit der Herbarnummer [..] (F. Schumm) und der HPTLC Nummer. Die Platten werden in Wangen aufbewahrt. Die Herkunft der analysierten Flechtenarten ist notiert, allerdings abgekürzt wenn sie zuvor schon in Schumm & Elix (2012) veröffentlicht wurden. Wenn eine gereinigte Substanz aus der Sammlung S. Huneck benutzt wurde, dann wird die Substanznummer angegeben.

Die Bilder wurden mit einer EOS 40D und einer EOS 600D Kamera aufgenommen, wobei eigentümlicher Weise die **L-**Streifen bei völlig gleichen Bedingungen und Kameraeinstellungen bei der EOS 600D einen rotvioletten, bei der EOS 40D einen mehr blauen Hintergrund aufweisen.

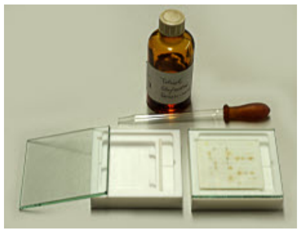
Kurzanleitung zur Herstellung der 5x5 cm HPTLC-Platten
Ausfühliche Anleitungen zur TLC findet man z.B. bei Elix (2014), Orange et al. (2001) und Huneck et al. (1996). Hier soll nur kurz beschrieben werden, wie die kleinen HPTLC-Platten für dieses Buch hergestellt wurden.

a) Extraktion von z.B. 1-2 Apothecien in 0.2 ml PCR-Gefäßen in 1-3 Tropfen Aceton.



b) Auftragen der Extrakte mit einer 0.5 µl Mikrokapillare und einer Schablone für 9 Positionen auf einer 5 x 5 cm großen HPLC-Platte (Merck HPTLC Kieselgel 60 F254, 1.05635.0001). Die 3. Bahn ist immer für Cladonia symphycarpia zur Eichung mit Norstictinsäure und Atranorin reserviert.

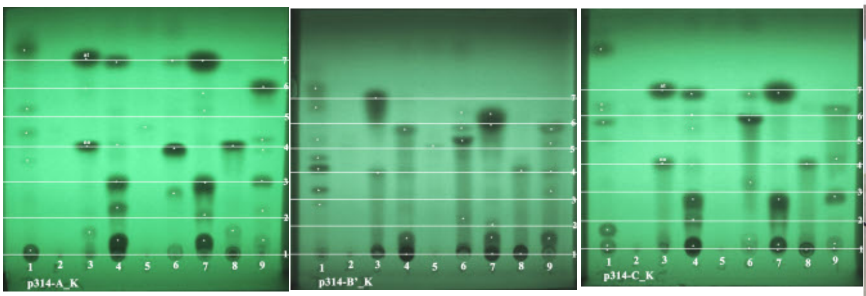
c) Entwicklung in der horizontalen Trennkammer nach Ljubomir Kraus (H-Trennkammer, Glasfrittenstäbchen, Glasscheibe) in den drei Laufmitteln A, B' und C, welche im 50 ml Fläschen vorrätig gehalten werden. Fig 3.



A = Toluol : Dioxan : Eisessig = 39.13 : 9.78 : 1.09 ml
B = Hexan : Ether : Ameisensäure = 26.00 : 20.00 : 4.00 ml
B' = Hexan : Methyl-tert-Butylether : Ameisensäure = 30.43 : 15.65 : 3.91 ml
C = Toluol : Eisessig = 42.39 : 7.61 ml

d) Trocknen. Fotos in langwelligem (366 nm, =L) und kurzwelligem (254 nm, =K) UV-Licht und nach Besprühen mit Wasser (=W). Ggf bei Pigmenten auch trocken im Tageslicht (=P).

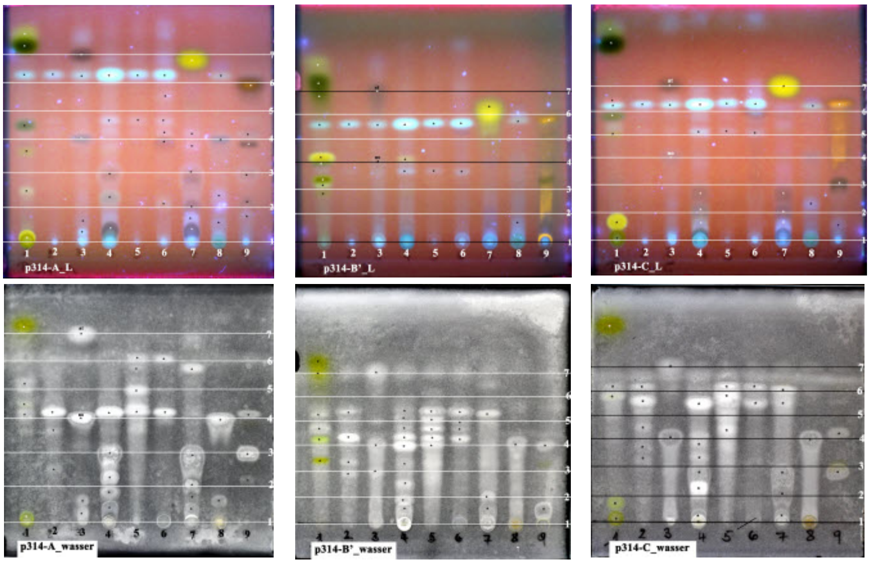
K



A B' C

L

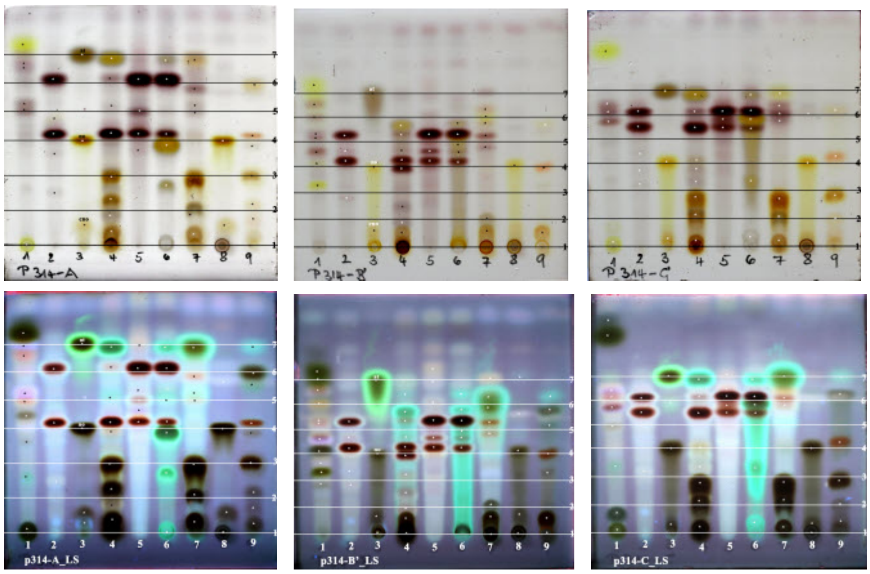
W



A B’ C

e) Besprühen mit 10% Schwefelsäure und Trocknen bei 90-100 °C für 20-30 min im Wärmeschrank. Fotos bei Tageslicht und langwelligem UV Licht (=LS).

LS



A B’ C

Zur besseren Orientierung ziehen wir horizontale Hilfslinien. 1 = Startlinie, 4 = Position der Norstictinsäure, 7 = Position des Atranorins und zusätzliche Teilungslinien 2,3 bzw. 5,6 in die jeweiligen Bereiche. Für die jeweiligen Arten haben wir die passenden Spalten zusammenmontiert und unten die Herbarnummer [..] und die Plattennummer (p..) festgehalten. Die Platten werden in Wangen aufbewahrt.

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Germany

John A. Elix
Canberra
Australia

Material und Bezugsnachweis für deutsche Leser

Nicht ohne Bedenken geben wir hier einen Bezugsquellennachweis, obwohl ein solcher schnell veraltet. Doch ist es heute teils derart umständlich für Amateure an Chemikalien zu gelangen, dass wir darauf nicht verzichten wollen.

HPTLC-Platten

für die abgebildeten Chromatogramme wurden folgende Platten verwendet:
Merck: 1.05635.0001 HPTLC Kieselgel 60 F_{254} Multiformat vorgeritzt auf 5 x 5 cm ex Glasplatten 10 x 10 cm (HX 302222).
Bem.: HPTLC-Platten besitzen eine mittlere Korngröße von 5 µm, während übliche DC-Platten 15 µm Korngrößen verwenden.

Der Vertrieb von Merck Produkten läuft über den Großhandel insbesondere „***VWR International GmbH*** - Chemikalien und Laborbedarf"
(https://de.vwr.com/app/Header?tmpl=/products/chromatography.htm).
Allerdings liefert VWR nicht an Privatpersonen, so dass es erforderlich ist, dort über einen weiteren Zwischenhändler zu bestellen.
Der Autor hat gute Erfahrungen gemacht mit folgender Firma, über welche man die Platten problemlos bei VWR bestellen kann

> ***Laborfachgeschäft Dietmar Reinecke***
> Lauteschlägerstr. 1a
> 64289 Darmstadt
> Tel.: 06151/719339
> www.laborfachgeschaeft.de
> anfrage@laborfachgeschäft

Der Preis einer Packung mit 25 Platten 10x10 cm betrug Dez. 2013 ca. 265 Euro incl. 19% MwSt
Auch die Firma

> ***biostep GmbH***
> Meinersdorfer Straße 47a
> 09387 Jahnsdorf
> Deutschland
> Telefon 03721 3905-0
> www.biostep.de
> info@biostep.de

liefert solche vorgeritzten Platten. Man kann von dort auch fertig auf 5 x 5 cm geschnittene, allerdings recht teure Platten erwerben.

Kleine, 5 x 5 cm große Horizontale Trennkammer nach Ljubomir Kraus (H-Kammer)
Diese Trennkammer wurde von DESAGA (Sarstedt-Gruppe) produziert und auch wenn DESAGA nicht mehr im Internet zu finden ist, so ist das Produkt noch im Handel und z.B. bei VWR in den Listen aufgeführt.

Die Trennkammer besteht aus 3 Teilen, die gesondert zu bestellen sind. (Die Preise stammen von 2011 ohne MwSt, inzwischen entsprechend teurer)

> H-Trennkammer (DESAGA Nr. 120150; 102.- Euro)
> Glasscheibe 4 mm dick (DESAGA Nr. 120156; 9.- Euro)
> Glasfrittenstäbchen 50 mm, 5 Stück per Set (DESAGA Nr. 120155; 43,50 Euro)

zum Auftragen der Proben benötigt man noch

Schablone für 9 Auftragspositionen (DESAGA Nr. 120135; 29.- Euro)

Mikrokapillaren 0,5 µl, Länge 32 mm, 100 Stück per Set, 1 Halter (Desaga Nr. 120192; 13,50 Euro)

außer VWR führt das meiste auch folgende im Internet vertretene Firma

biostep GmbH
Meinersdorfer Straße 47a
09387 Jahnsdorf
Deutschland
Telefon 03721 3905-0
www.biostep.de
info@biostep.de

Die Bestellnummern sind bei der Firma biostep im wesentlichen die alten DESAGA-Nummern mit vorangestelltem BS.

(Die hier angegebenen Preise vom Dez. 2013 sind ohne MwSt und Versand zu verstehen)

BS 120150 - H-Trennkammer; 130.- Euro
BS 120155 - Frittenstäbchen; 47.- Euro
BS 120156 - Glasdeckscheibe; 11.- Euro
BS 120135 - Auftragsschablone; 33.- Euro
BS 120.192 - Mikro-Kapillaren; 0,5 µl; 13 Euro
BS 124.000 Spezialzerstäuber 100 ml, mit Gummigebläse 75.- Eu

PCR-Gefäße

zur Extraktion kleinster Flechtenmengen mit Aceton eignen sich spitz zulaufende und verschließbare PCR-Reaktionsgefäße für 0,2 ml. Solche werden von vielen Firmen angeboten und ihre Beschaffung ist unproblematisch

Beispiele:

Biostep: 0101101 PCR-Gefäße 0,2 ml-Tube, flacher Deckel klar: 1000St; 41.- Euro

oder Firma

A. Hartenstein - Gesellschaft für Labor und Medizintechnik mbH
Estenfelder Straße 74/76
97078 Würzburg
Tel.: 0931/24522
Email info@laborversand.de
www.laborversand.de

1 x 1000 PCR-Gefäße 0.2 ml, natur mit gewölbtem Deckel: 39.- Euro (Preis 2006)

Chemikalien

Diese bestellt der Autor ebenfalls bei der oben genannten Firma ***Laborfachgeschäft Dietmar Reinecke***

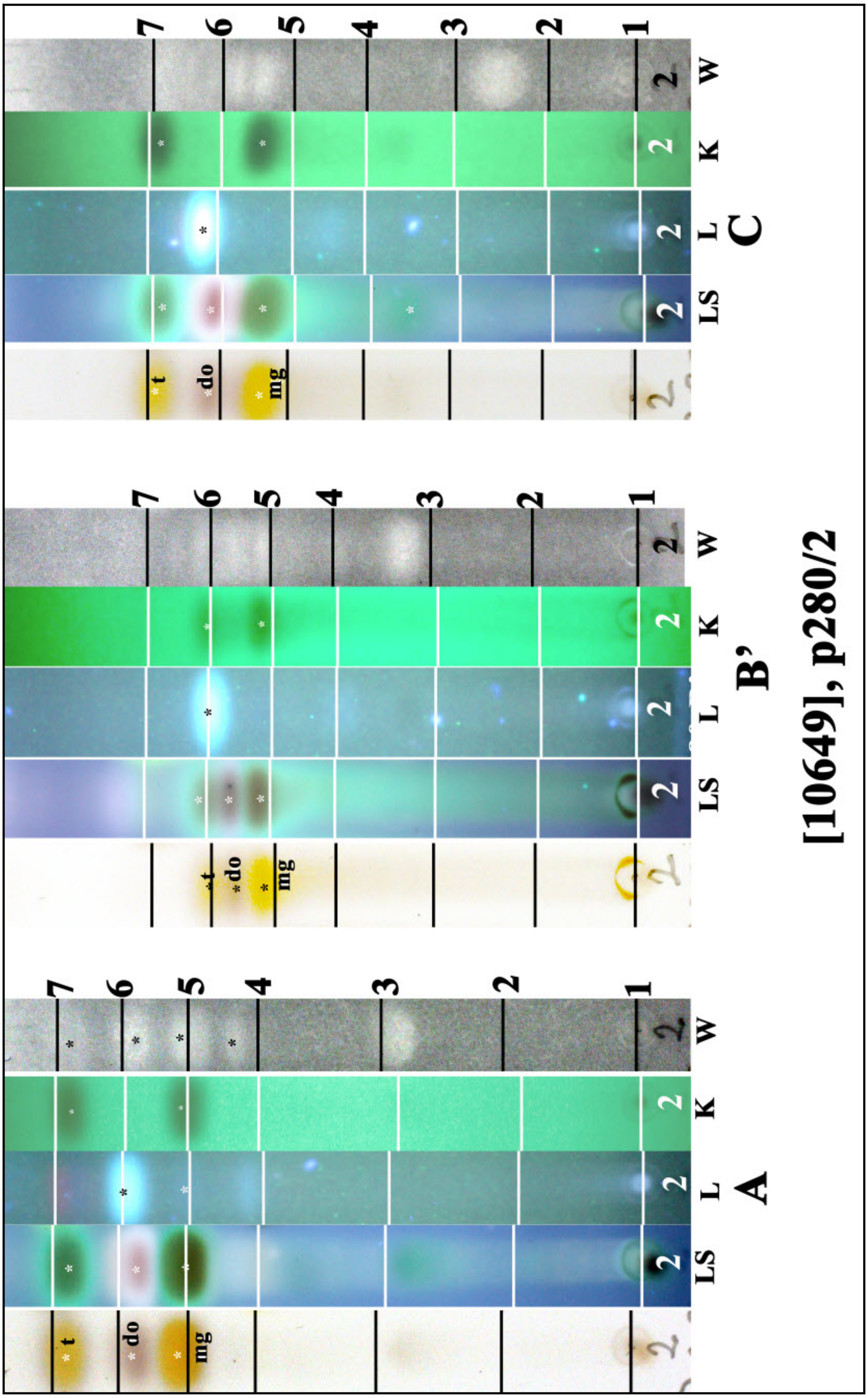
Folgenden Laufmittelmischungen wurden verwendet (Volumanteile in ccm) und in braunen 50 ml Glasflaschen aufbewahrt.

A: Toluol / Dioxan / Eisessig = 39,13 / 9,78 / 1,09
B’: Hexan/Methyl-tert-Butylether/ Ameisensäure = 30,43 / 15,65 / 3,91
C: Toluol / Eisessig = 42,5 / 7,5

ungefähre Preise div. Chemikalien

Tert-Butyl-Methylether 99% pure, 1 Liter- 21.-- Euro
Anisol 100 ml - 9.-- Euro
Para-Phenylendiamin 250 g - 29.-- Euro

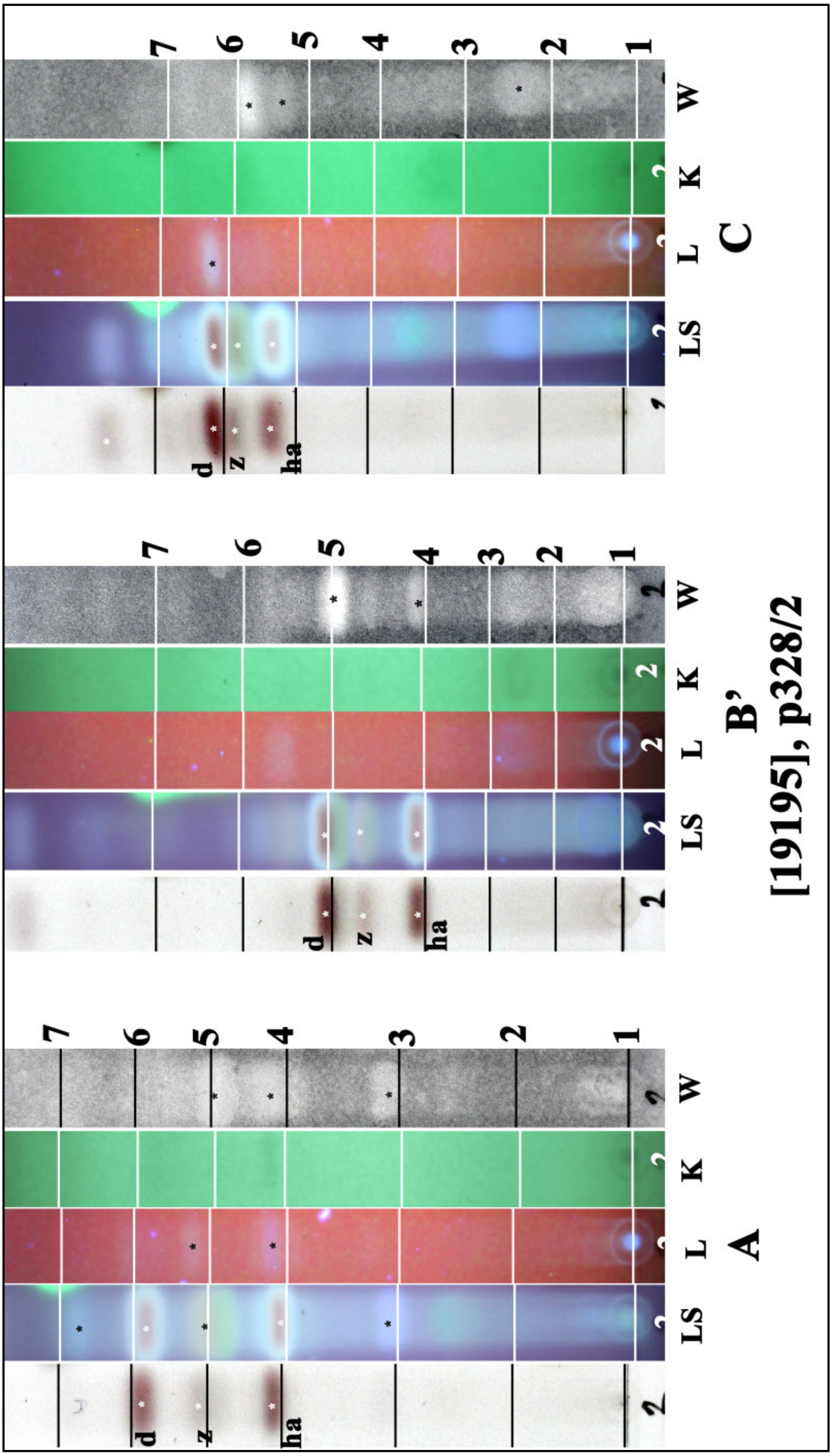
15α-acetoxyhopane-22-ol
= dolichorrhizin



do: 15α-acetoxyhopane-22-ol, t: tenuiorin, mg: methyl gyrophorate

Peltigera dissecta, [10649], Portugal, Azoren, Sao Miguel, NE from Lagoa do Fogo near Lombadas; Erica bewachsene steile Lavahänge, 37°46.863' N, 25°27.470' W, 640 m. Leg. F. Schumm 02.06.2003, det. A. Aptroot 2010.

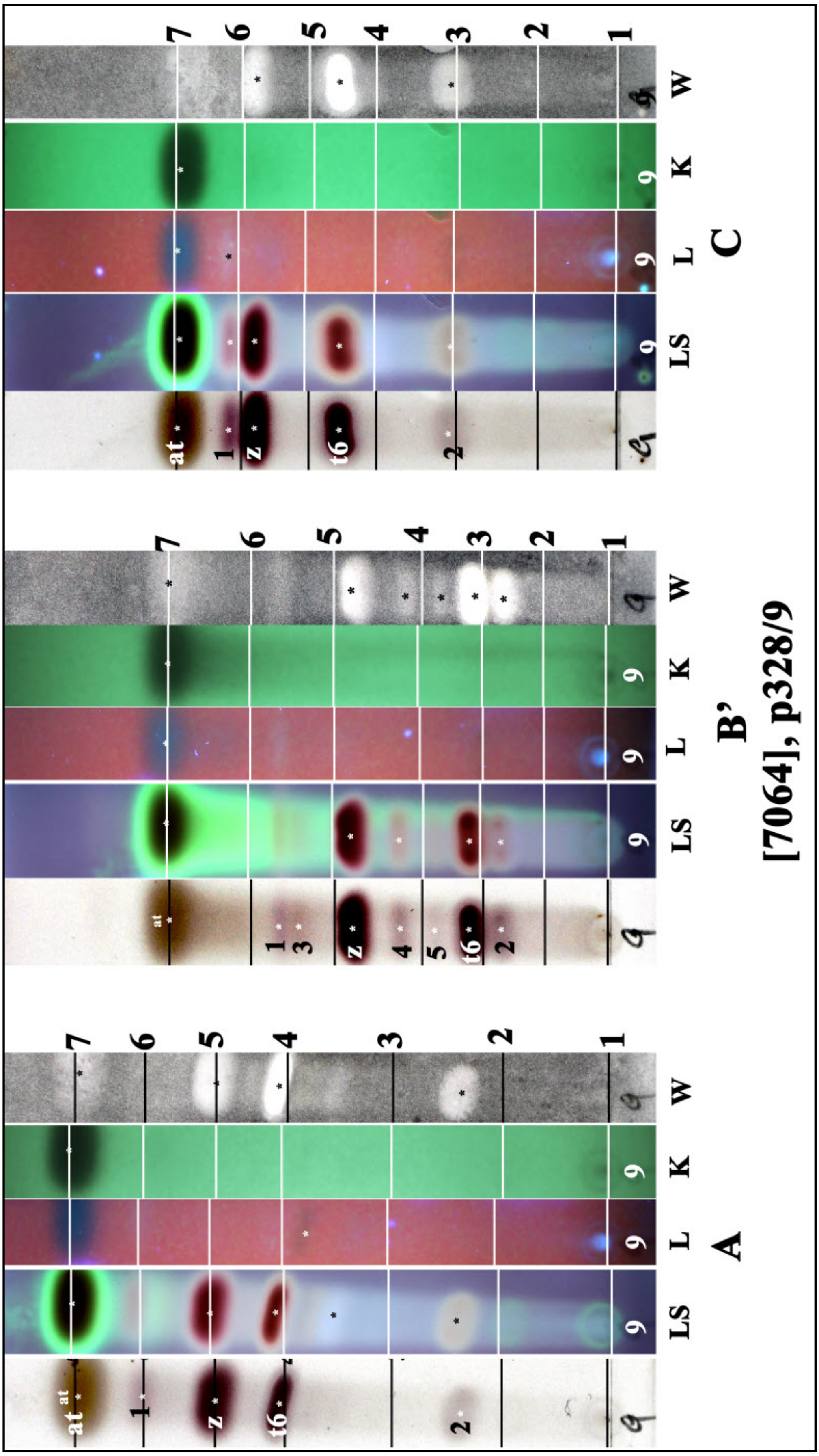
15α-acetoxyhopane-22-ol
= dolichorrhizin



d: dolichorrhizin (= **15α-acetoxyhopane-22-ol**), z: zeorin, ha: hopane-15α,22-diol, conf. J.A. Elix.

Nephroma parile , [19195], Norway, Eidford, 60.469° N, 7.066° E, 40 m, growing on shady deciduous tree. Leg. F. Schumm 21.06.2014.

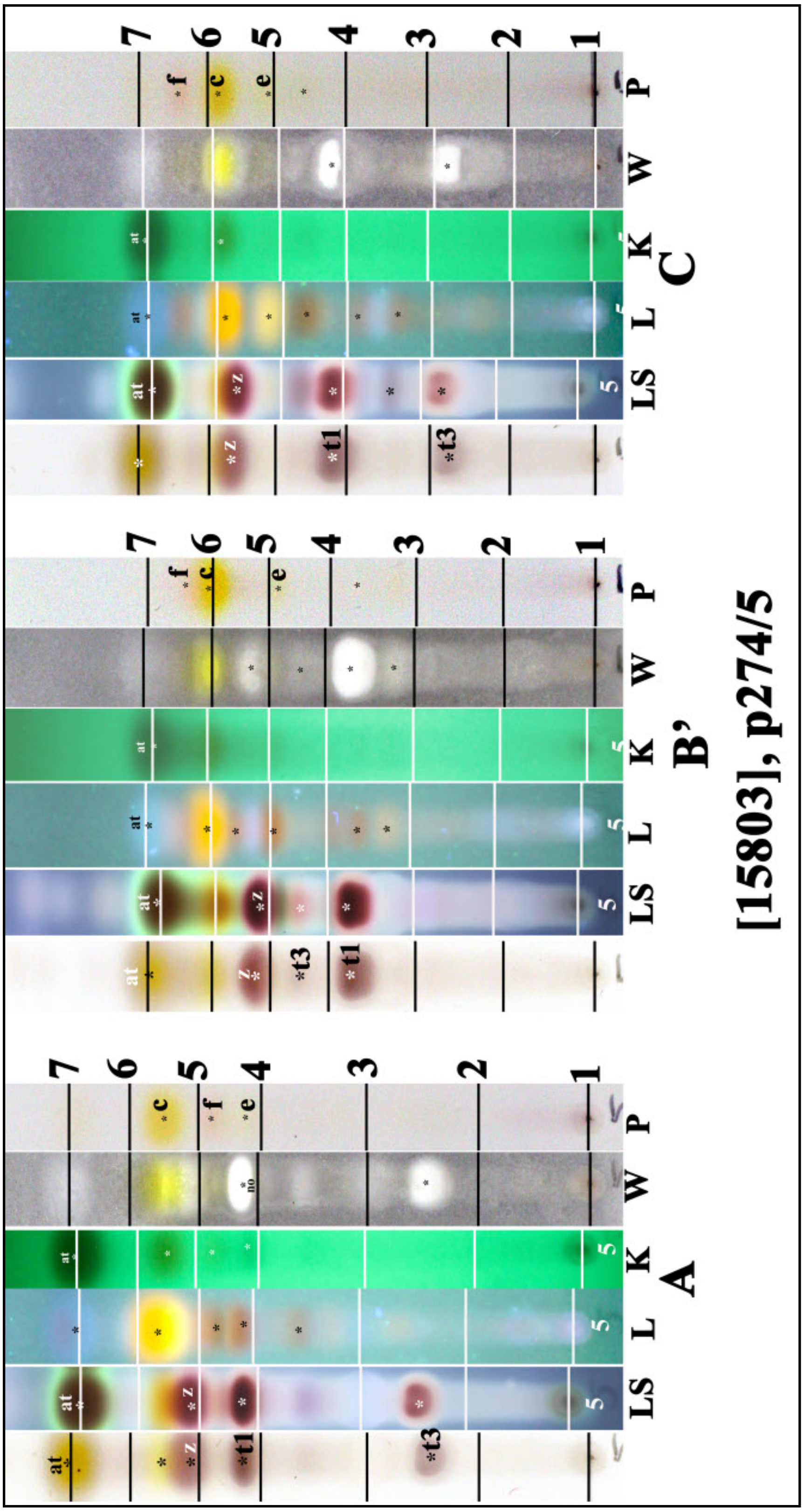
16β-acetoxyhopane-22-ol



at: atranorin, z: zeorin, t6: 16β-acetoxyhopane-6α,22-diol,
1: 16β-acetoxyhopane-22-ol, 2: leucotylin,
3: 6α-acetoxy-22-hydroxyhopane-25-oic acid,
4: 6α,16β-diacetoxyhopane-22-ol, 5: 6α-acetoxyhopane-16β,22-diol.

Heterodermia isidiophora, [7064], Indonesien, Bali, valley of the kings graves (Tal der Königsgräber), growing on rocks. Leg. D. & F. Schumm, 30.12.1985.

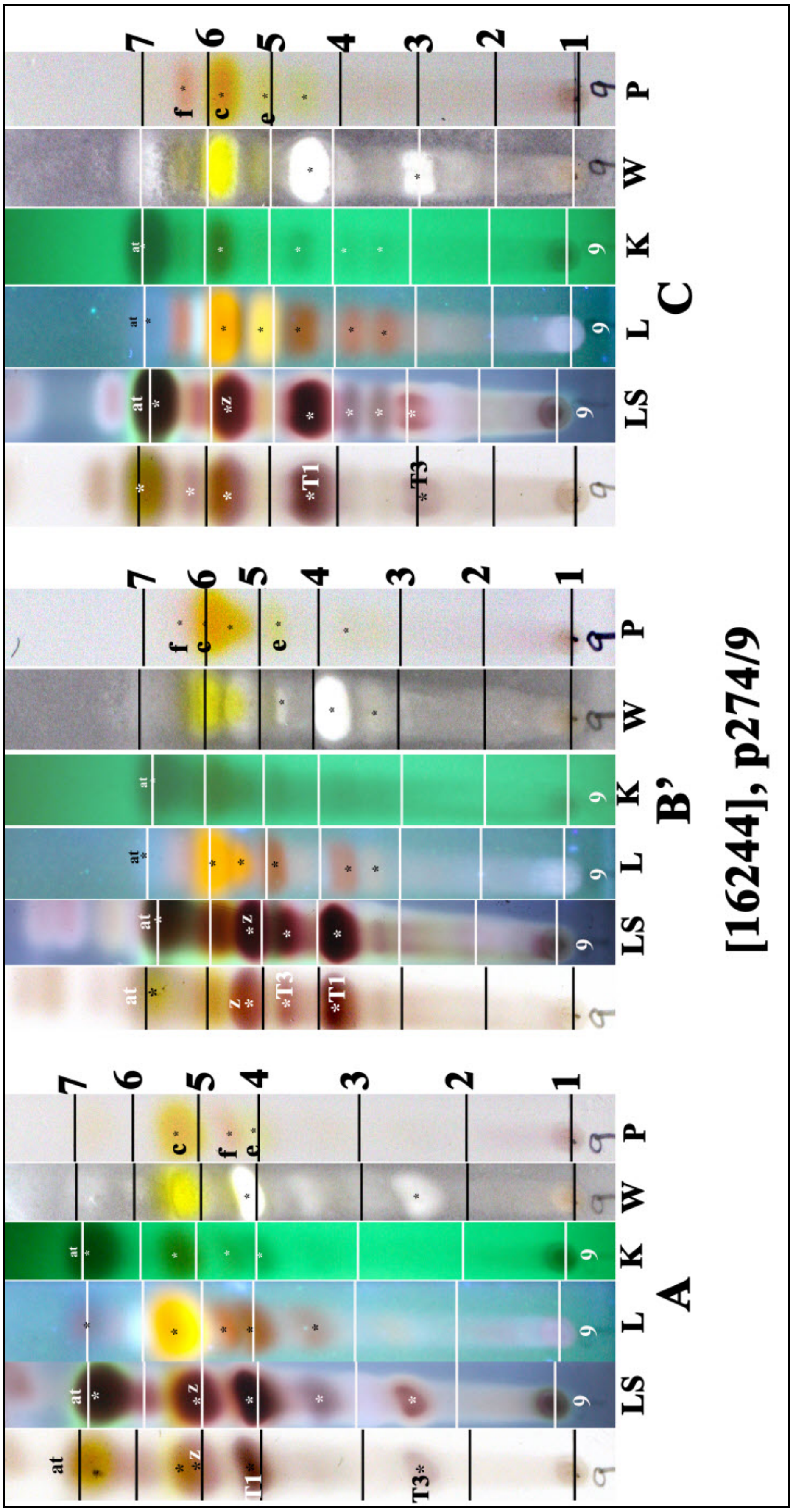
16β-acetoxyhopane-6α,22-diol



at: atranorin, z: zeorin, **t1: 16β-acetoxyhopane-6α,22-diol**, t3: leucotylin,
c: 7-chloroemodin, e: emodin, f: flavoobscurins

Heterodermia obscurata, [15803], Australia, Western Australia, 75 km south of Mt. Chudalup, wetland with *Agonis junipera* and *Eucalyptus marginata,* 34.734° S, 116,088° E, 75 m. Leg. F. Schumm & E. Stocker-Wörgötter, 24.10.2009. Chemistry: atranorin (major), zeorin (major), 16β-acetoxyhopane-6α, 22-diol (major), leucotylin (major), 7-chloroemodin (submajor), emodin (minor), flavoobscurins (trace) by HPTLC, anal. F. Schumm.

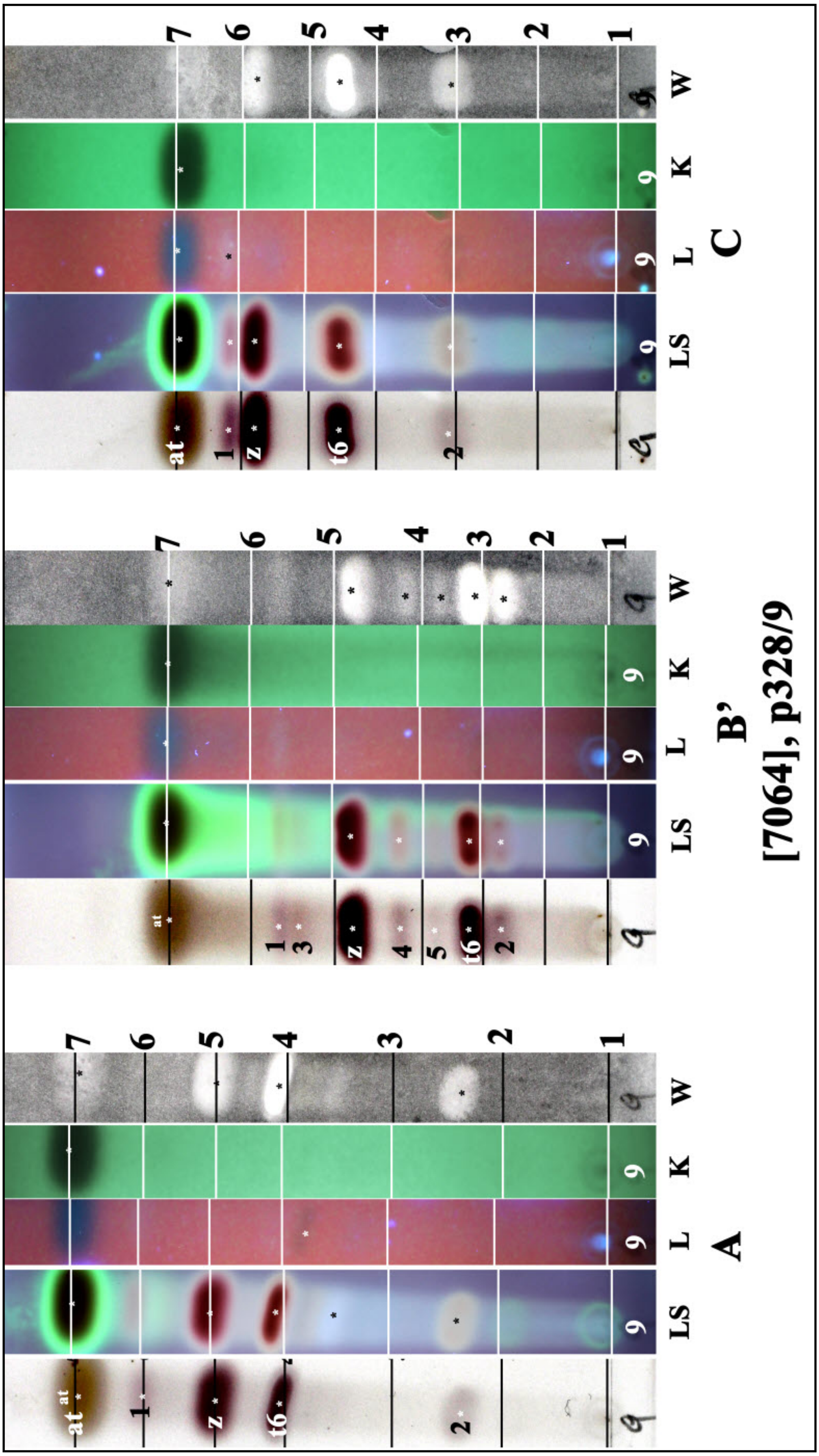
16β-acetoxyhopane-6α,22-diol



at: atranorin, z: zeorin, **T1: 16β-acetoxyhopane-6α,22-diol**, T3: leucotylin,
c: 7-chloroemodin. e: emodin, f: flavoobscurins

Heterodermia obscurata, [16244], Australia, New South Wales, between Bermagui and Tathra, on way from Aragunnu Beach to the Mimosa Rocks, 36.585° S, 150.056° E, 10 m, growing on rocks. Leg. F. Schumm & E. Stocker-Wörgötter, 12.11.2009.

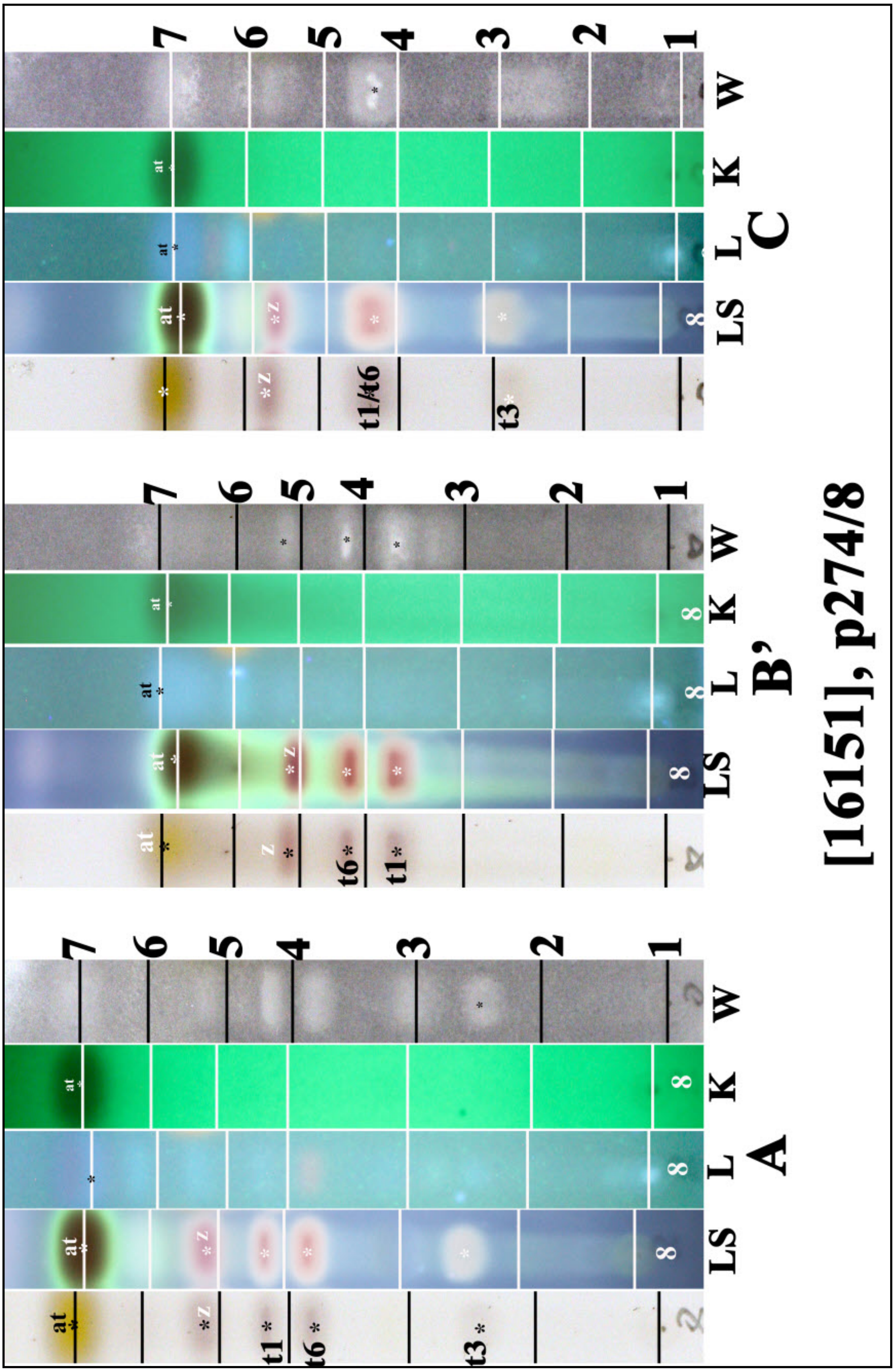
16β-acetoxyhopane-6α,22-diol



at: atranorin, z: zeorin, **t6: 16β-acetoxyhopane-6α,22-diol,**
1: 16β-acetoxyhopane-22-ol, 2: leucotylin,
3: 6α-acetoxy-22-hydroxyhopane-25-oic acid,
4: 6α,16β-diacetoxyhopane-22-ol, 5: 6α-acetoxyhopane-16β,22-diol.

Heterodermia isidiophora, [7064], Indonesien, Bali, valley of the kings graves (Tal der Königsgräber), growing on rocks. Leg. D. & F. Schumm, 30.12.1985.

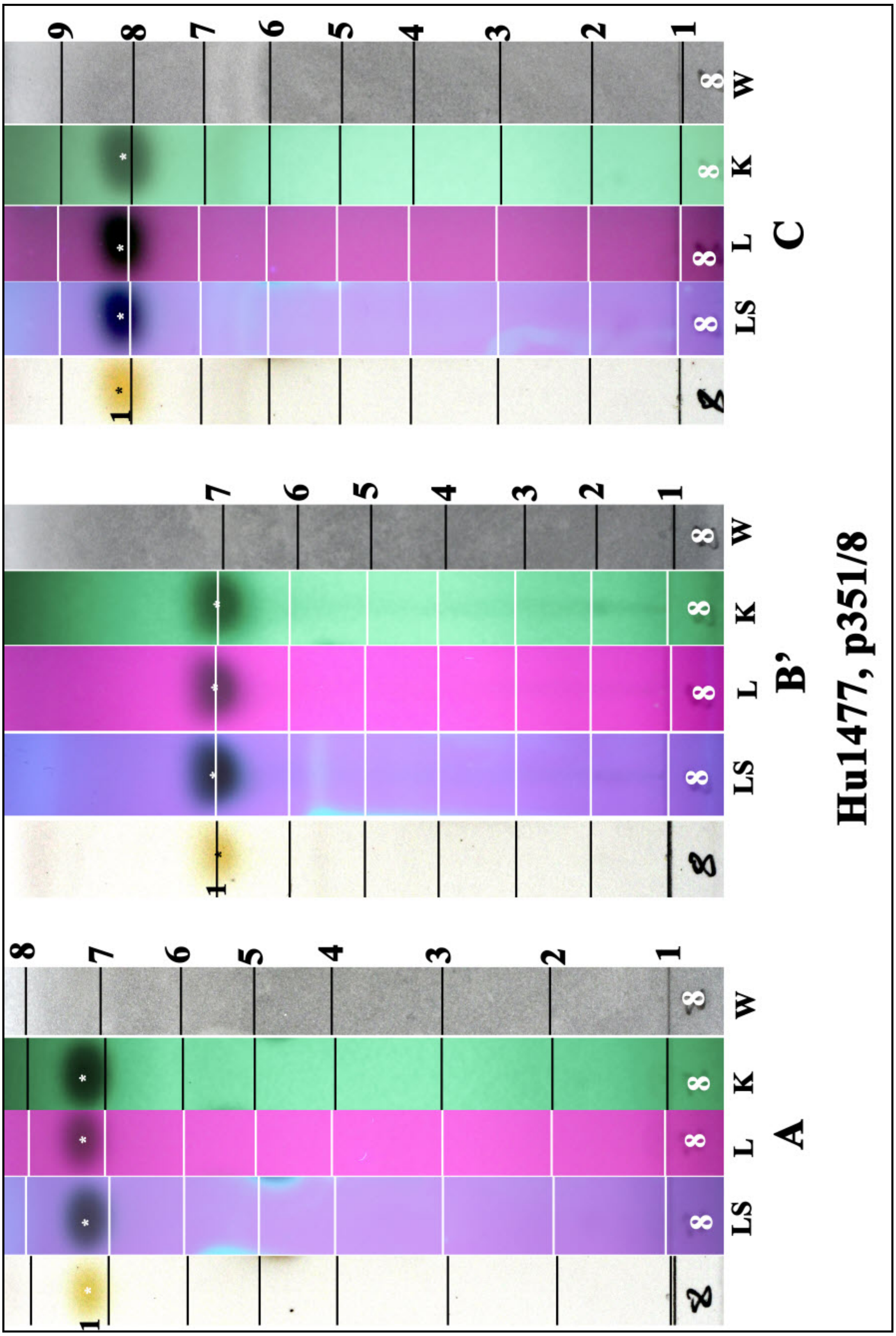
16β-acetoxyhopane-6α, 22-diol



at: atranorin, z: zeorin, **t1: 16β-acetoxyhopane-6α, 22-diol,**
t6: 6α-acetoxyhopane-16β,22-diol, t3: leucotylin

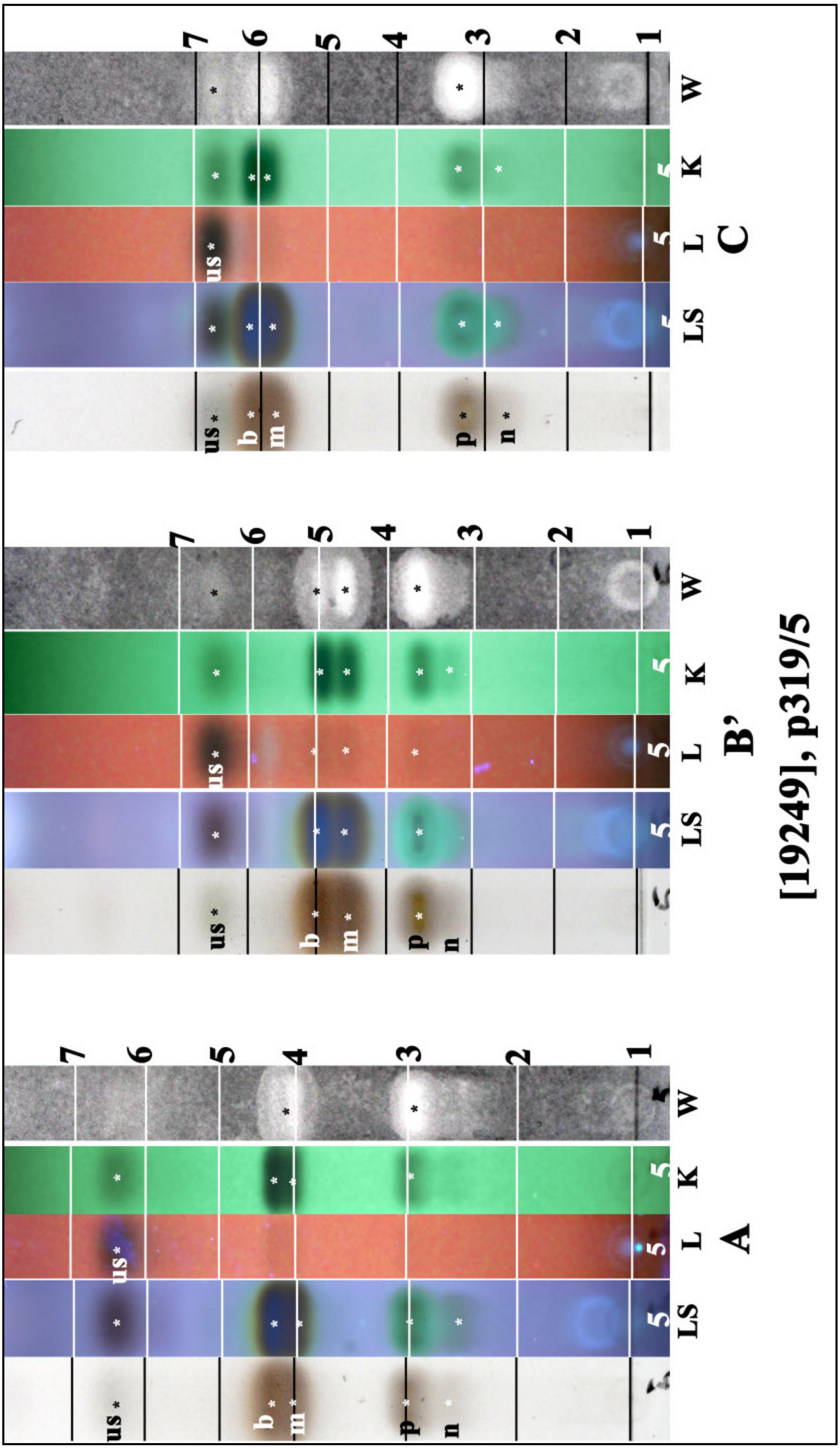
Heterodermia tremulans, [16151], Australia (SE), Burrewarra Point near Tomakin, Guerilla Bay, Banksia Walk, 35.831° S, 150,229° E, 36 m. Leg. F. Schumm & E. Stocker-Wörgötter, 10.11.2009.

2,4-dichlorolichexanthone



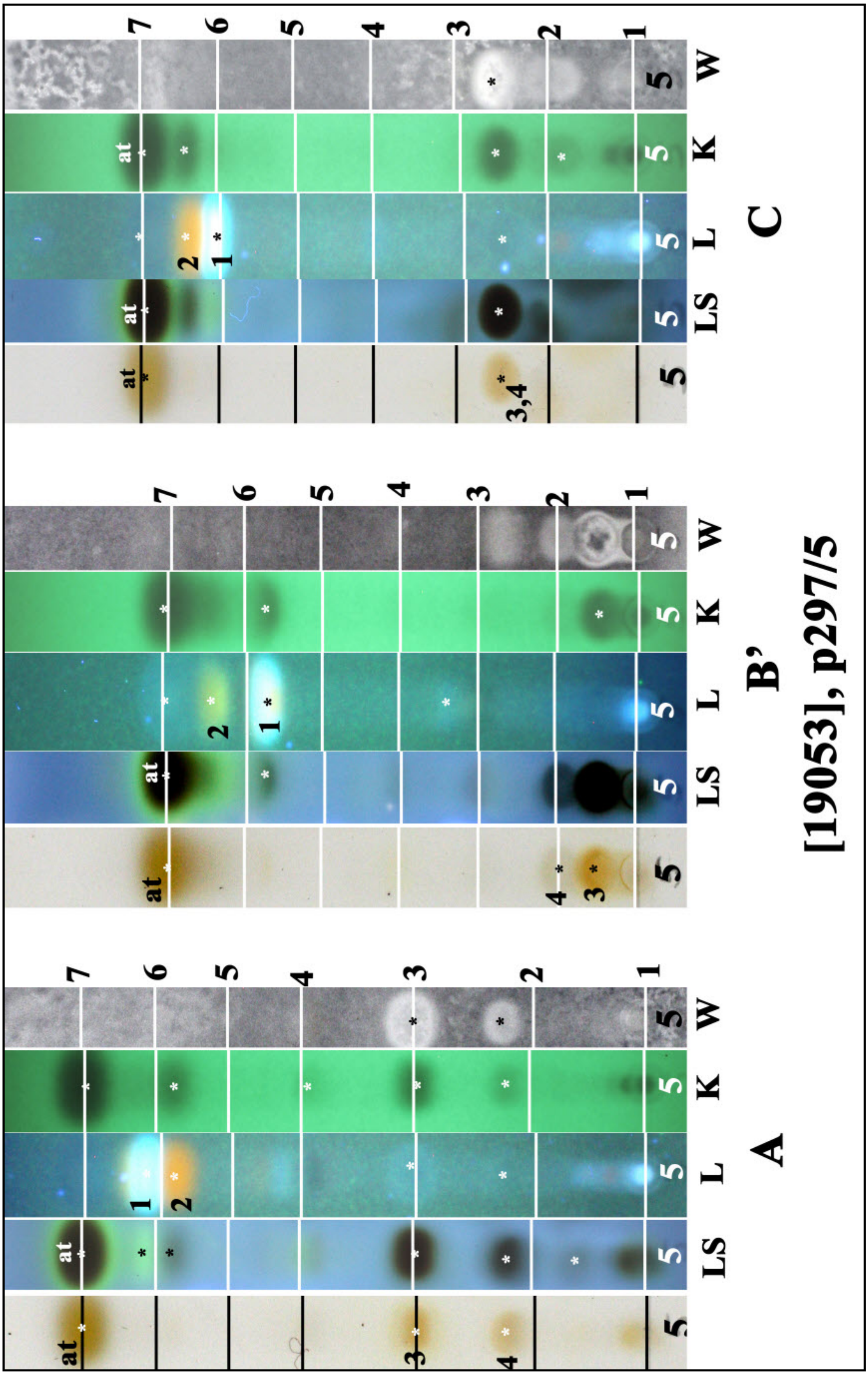
S. Huneck's collection of lichen substances No 1477: 2,4-dichloro-lichexanthone
Botanisches Museum Berlin-Dahlem

2,4’-di-*O*-methylnorsekikaic acid



Ramalina leiodea, [19249], Australia, Queensland, Tin Can Inlet, Tin Can Bay, 25°54' S, 153°01' E, sea level.

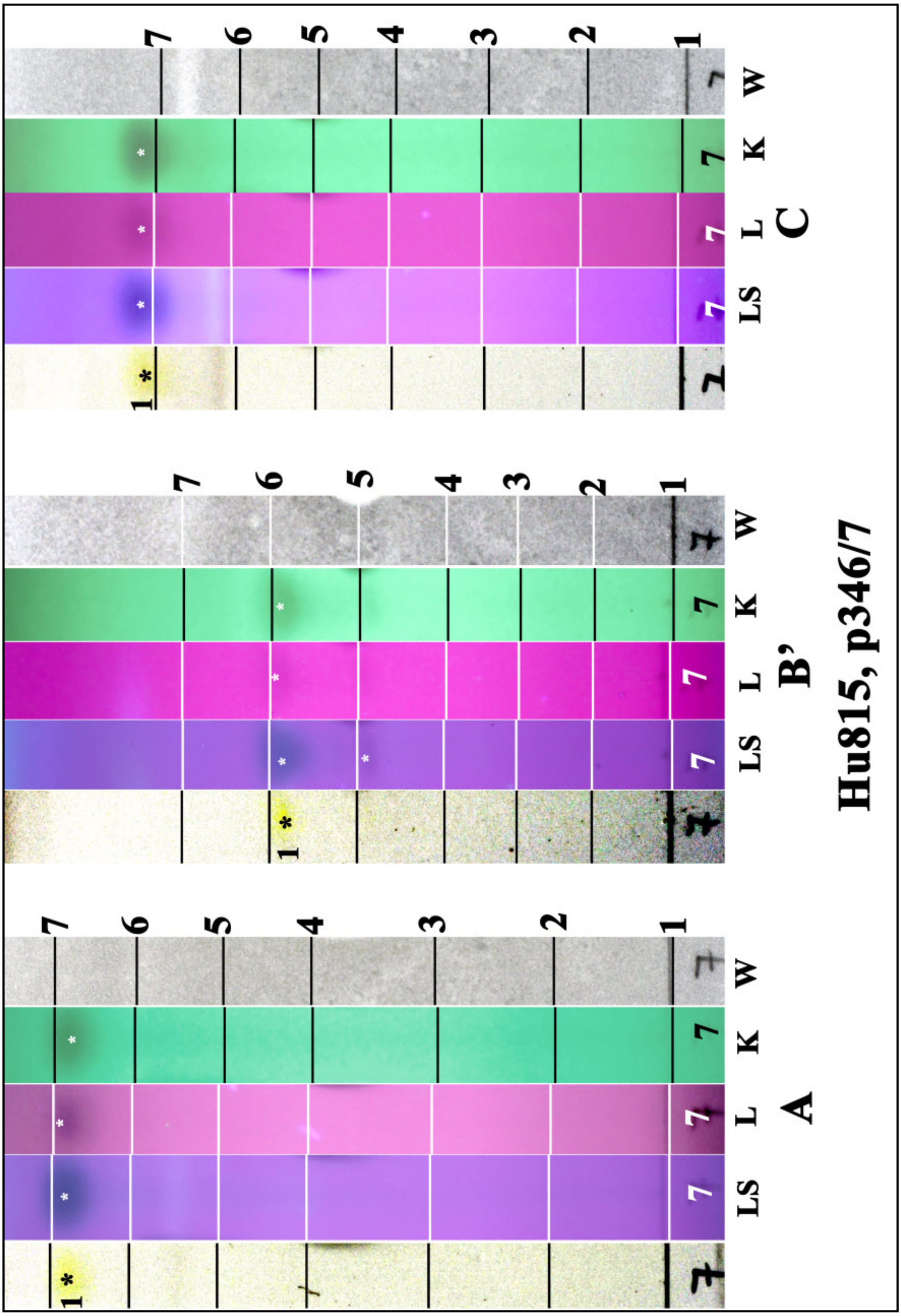
2,5,7-trichloro-3-*O*-methylnorlichexanthone



1: 2,5,7-trichloro-3-*O*-methylnorlichexanthone, 2: 5,7-dichloro-3-*O*-methylnorlichexanthone, 3,4: unknown, conf. J.A. Elix

Lecanora epibryon subsp. ***xanthophora*** [19053], Australia, New South Wales, Buckenbowra River Estuary, 7.5 km west of Batemans Bay, 35°42' S, 150°06' E, 5 m, growing on *Casuarina glauca* tidal stream

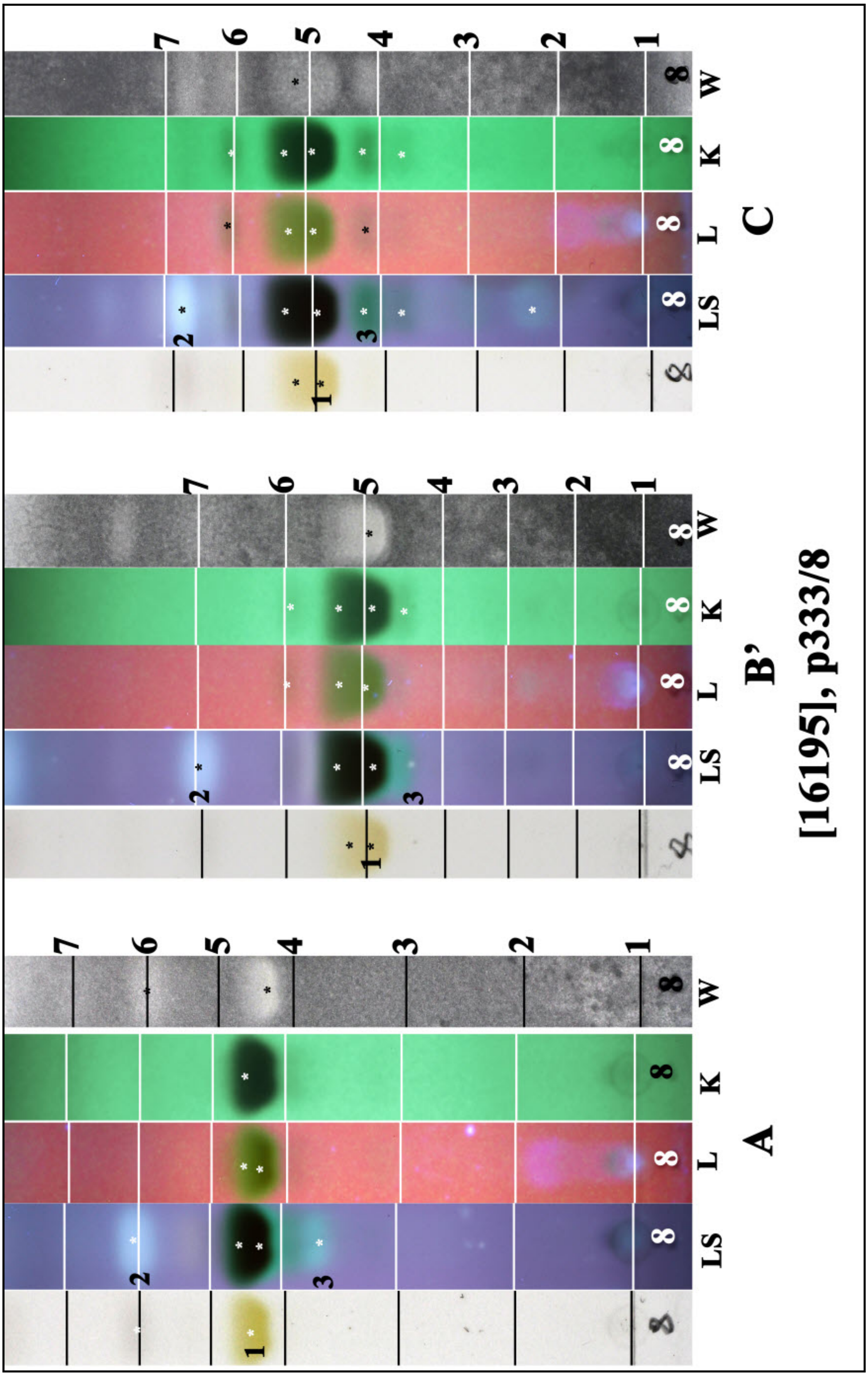
2,5-dichlorolichexanthone



1: 2,5-dichlorolichexanthone

S. Huneck’s collection of lichen substances No 815:
2,5-dichlorolichexanthone, conf. J.A. Elix,
Botanisches Museum Berlin-Dahlem

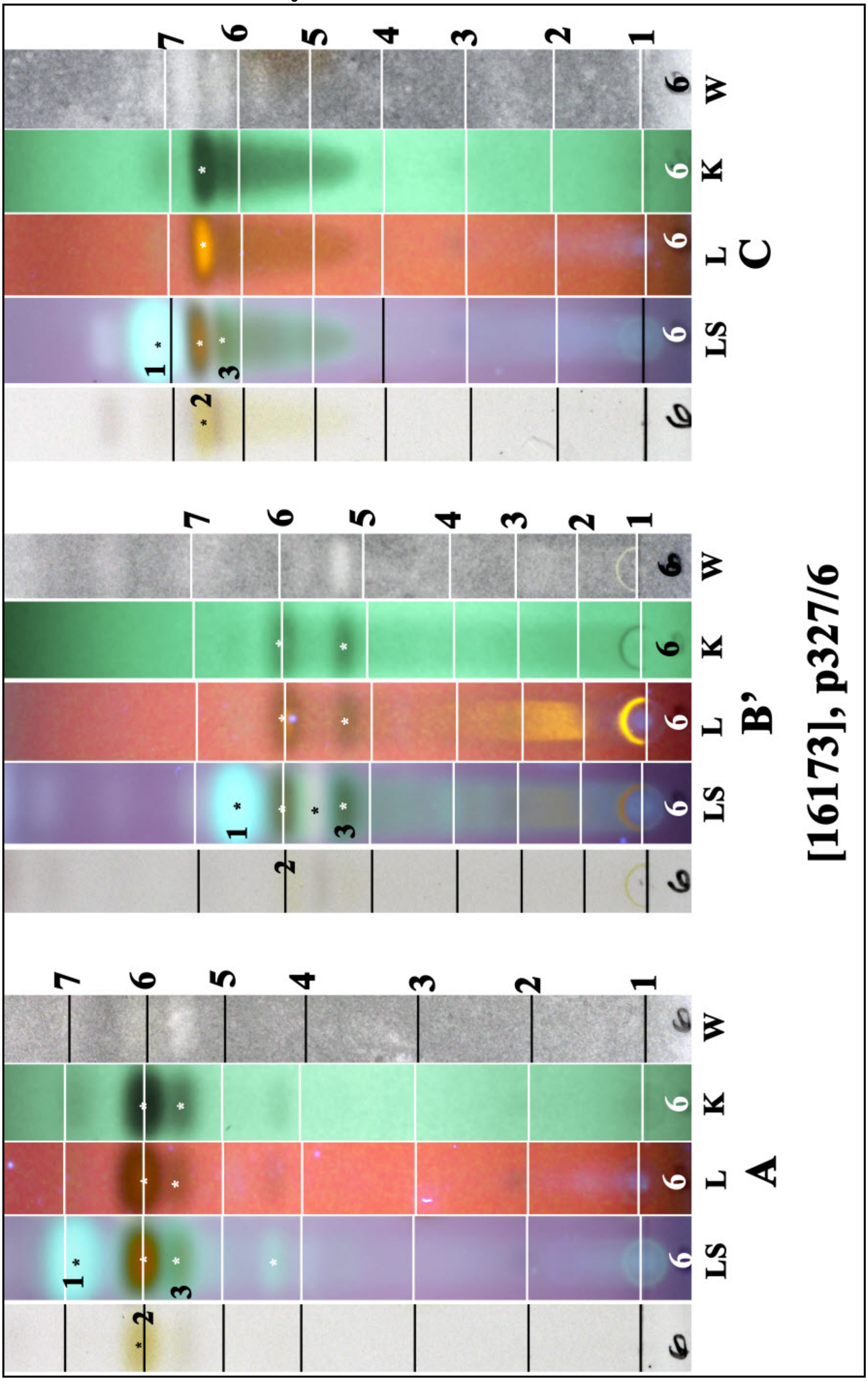
2,5-dichloronorlichexanthone



1: isoarthothelin and arthothelin, 2: lichexanthone, 3: 2,5-dichloronorlichexanthone

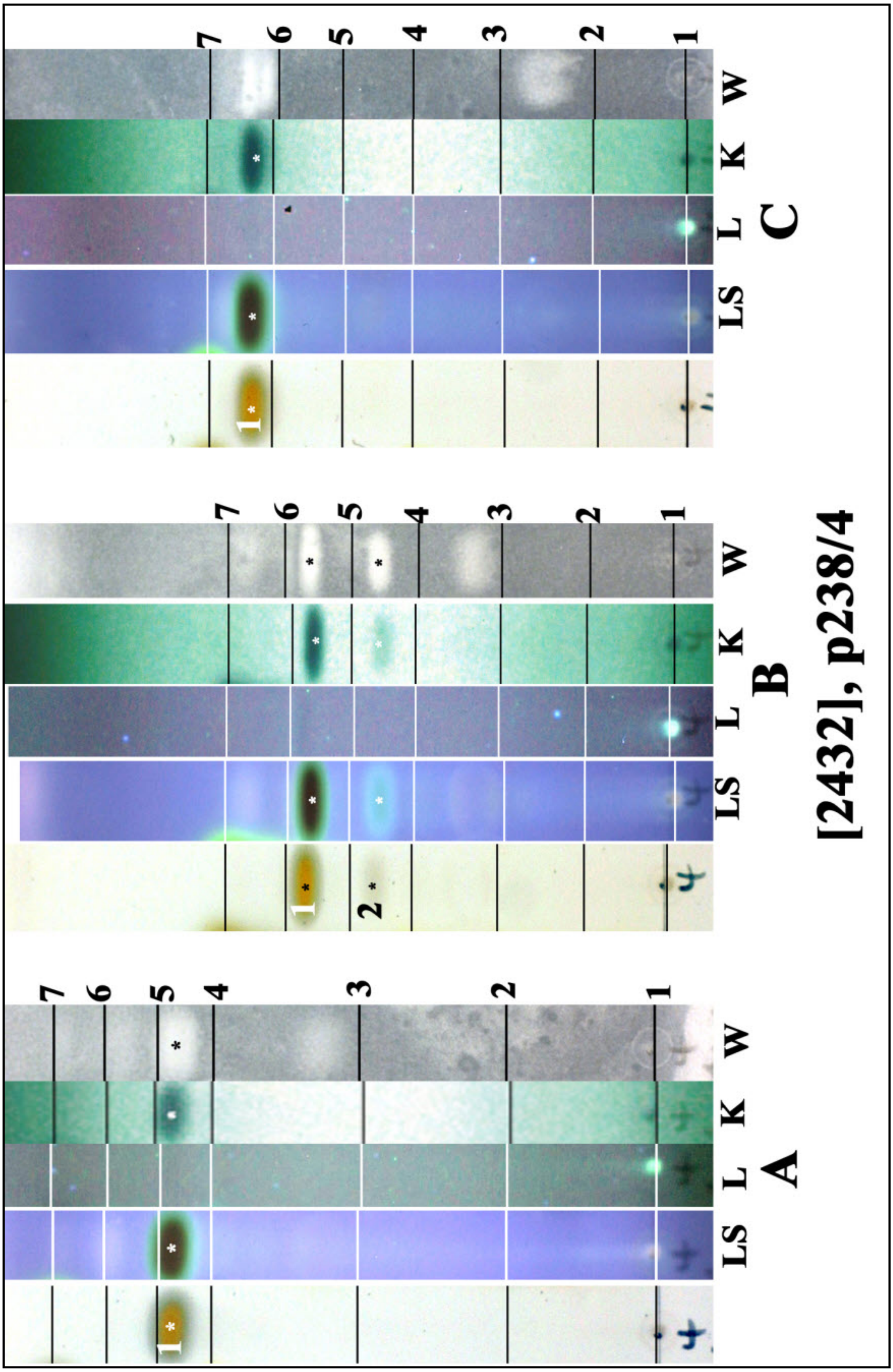
Buellia aeruginosa [16195], Australia, New South Wales, Mystery Bay south of Narooma, Pool Beach, 36.305° S, 150.136° E, 0 m. Leg. F. Schumm & E. Stocker-Wörgötter, 11.11.2009, det. F. Schumm, conf. J.A. Elix.

2-chloro-6-*O*-methylnorlichexanthone



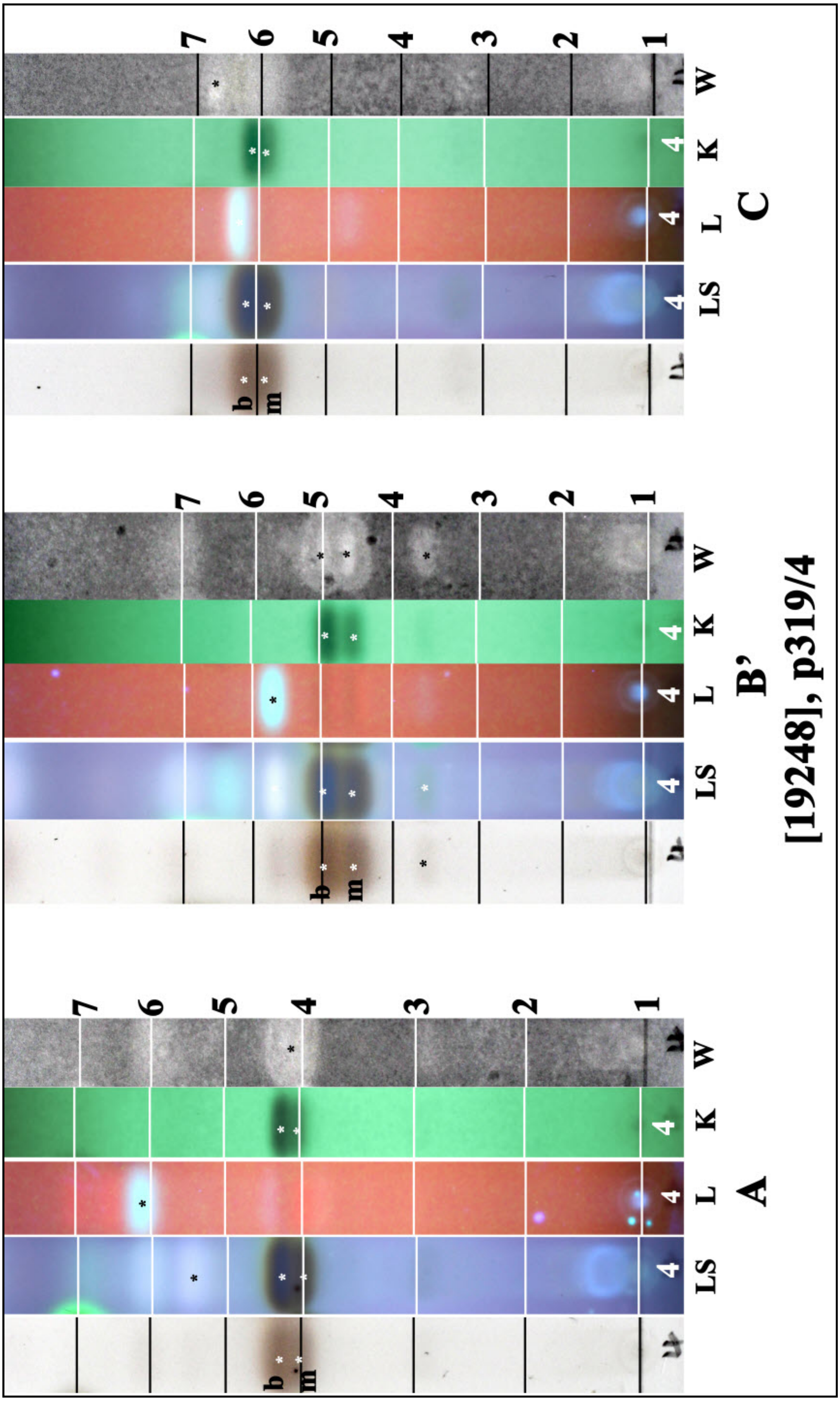
Pertusaria xanthoplaca, [16173], Australia, New South Wales, Tomakin, rocks near the sea, 35.830° S, 150.20554° E, 0 m. Leg. F. Schumm & E. Stocker-Wörgötter, 10.11.2009.

2-*O*-methylconfluentic acid



Pertusaria saximontana, [2432], USA, Colorado, Garfield County, Grand Hogback 19,2 km NE of Riffle at Rifle Falls, 2150 m, on dead and weathered wood of standing tree-trunks of *Juniperus osteosperma* and *Pinus edulis*. Leg. W.A. Weber, Kunkel & Munger,13. June 1974. Lichenes Exsiccati 459

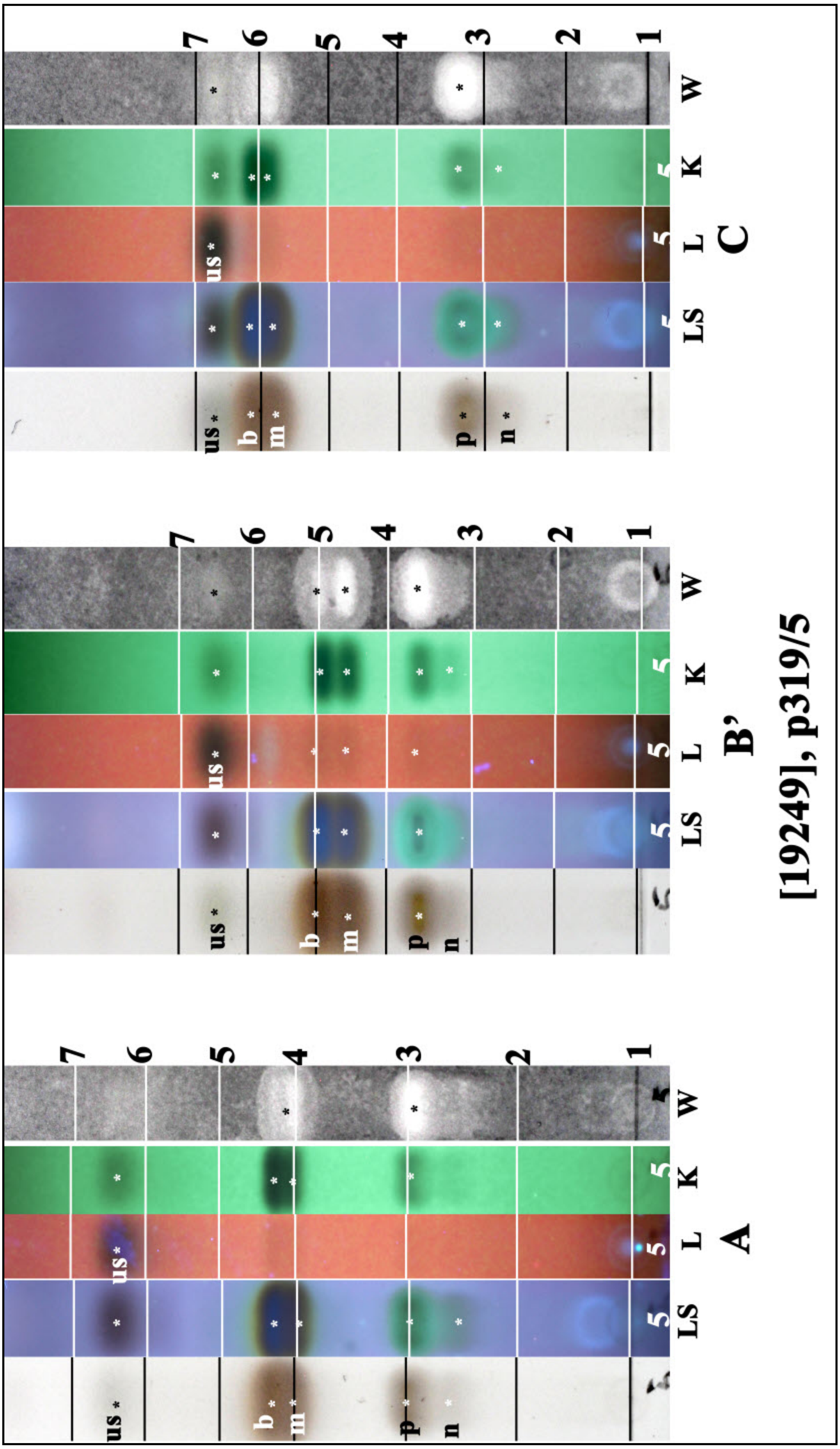
2-*O*-methylsekikaic acid



b: boninic acid, m: 2-*O*-methylsekikaic acid

Ramalina leiodea,[19248], Norfolk Island, Rocky Point Reserve, 29°03' S, 167°55' E, 40 m.

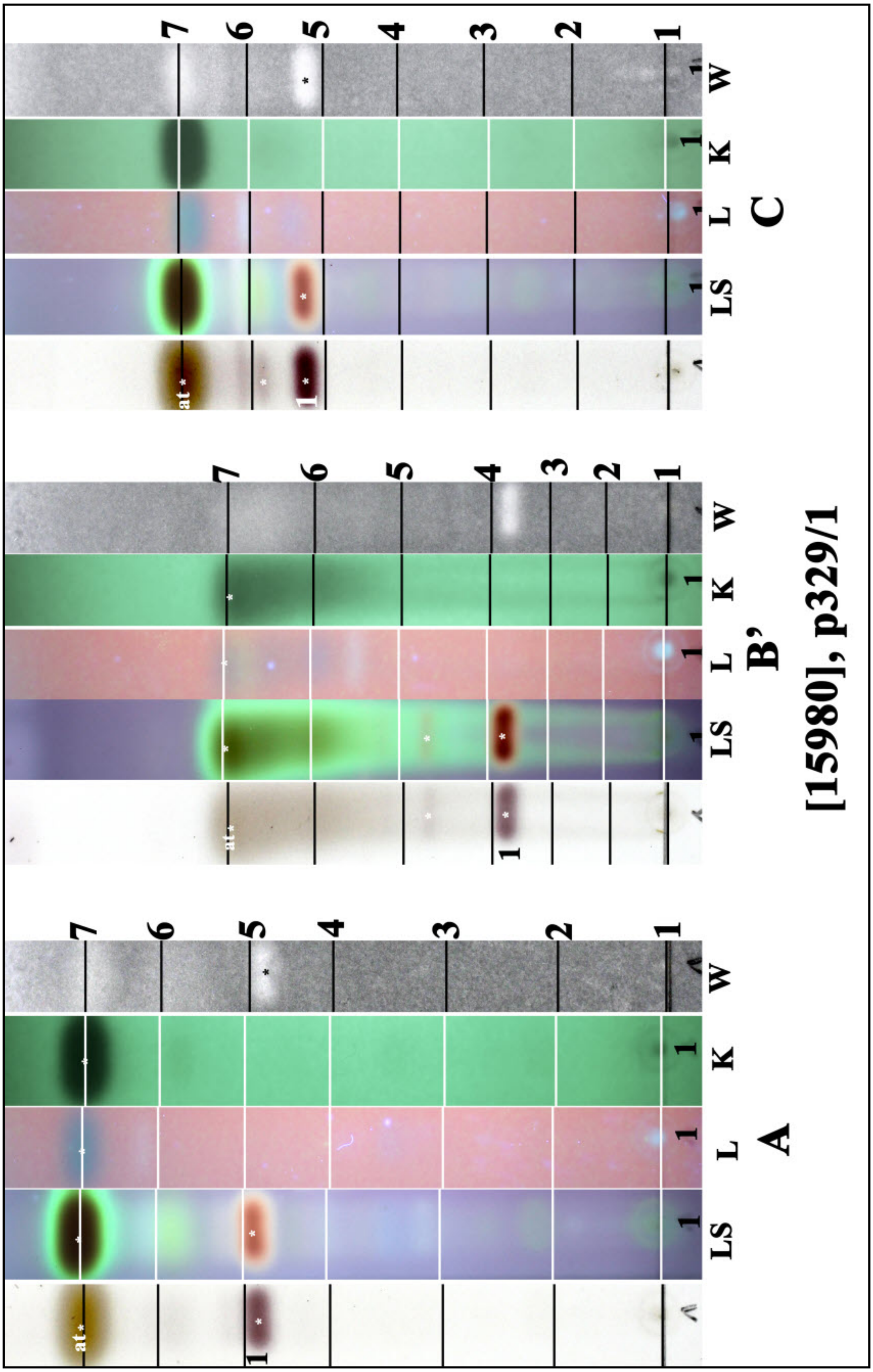
2-*O*-methylsekikaic acid



us: usnic acid, b: boninic acid, **m: 2-*O*-methylsekikaic acid**,
p: 4’-*O*-methylpaludosic acid, n: 2,4’-di-*O*-methylnorsekikaic acid

Ramalina leiodea, [19249], Australia, Queensland, Tin Can Inlet, Tin Can Bay, 25°54' S, 153°01' E, sea level.

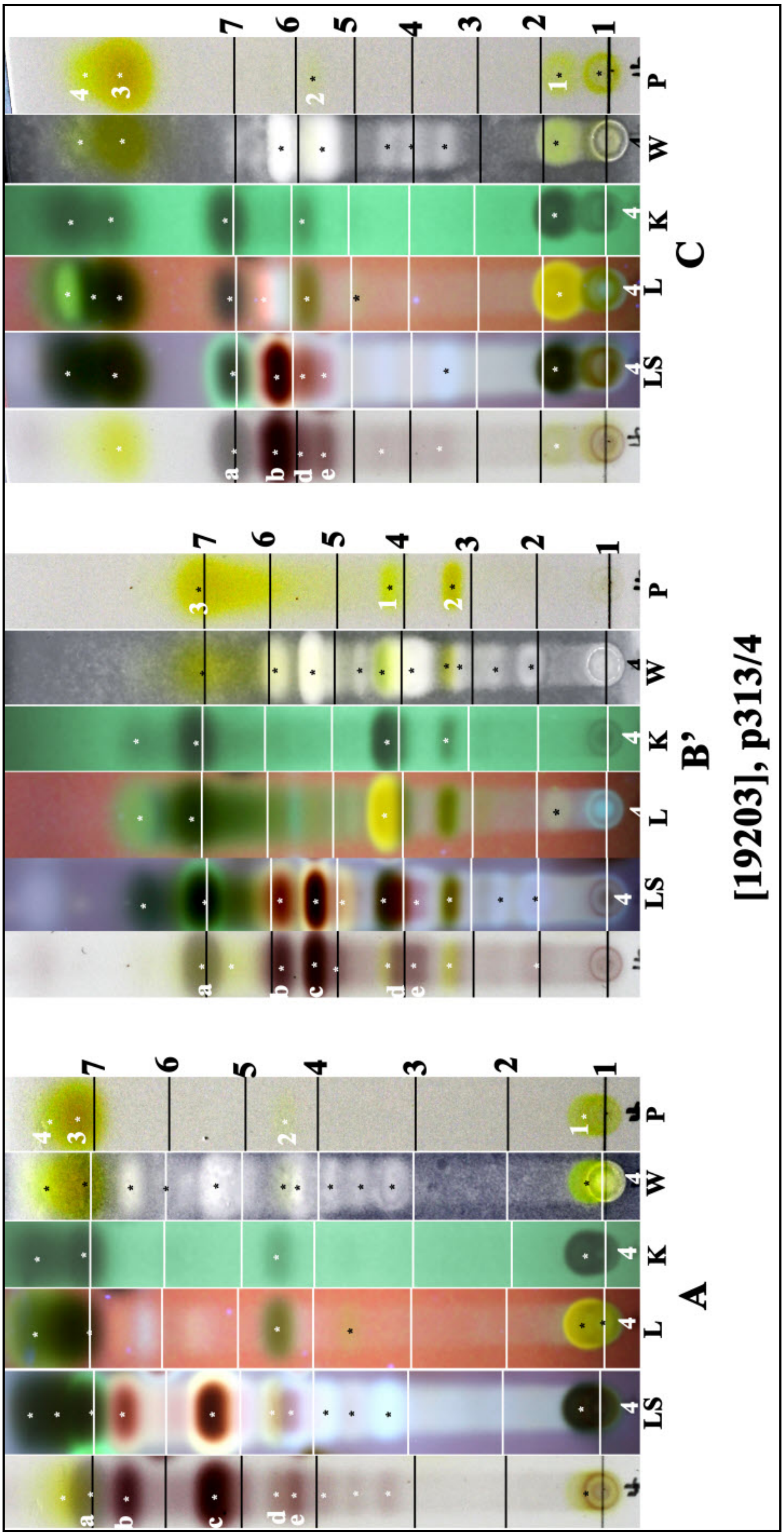
20α-acetoxyzeorin
[= 20α-acetoxy-hopane-6α,22-diol]



at: atranorin, 1: **20α-acetoxyzeorin** (= 20α-acetoxy-hopane-6α,22-diol), vid. Elix

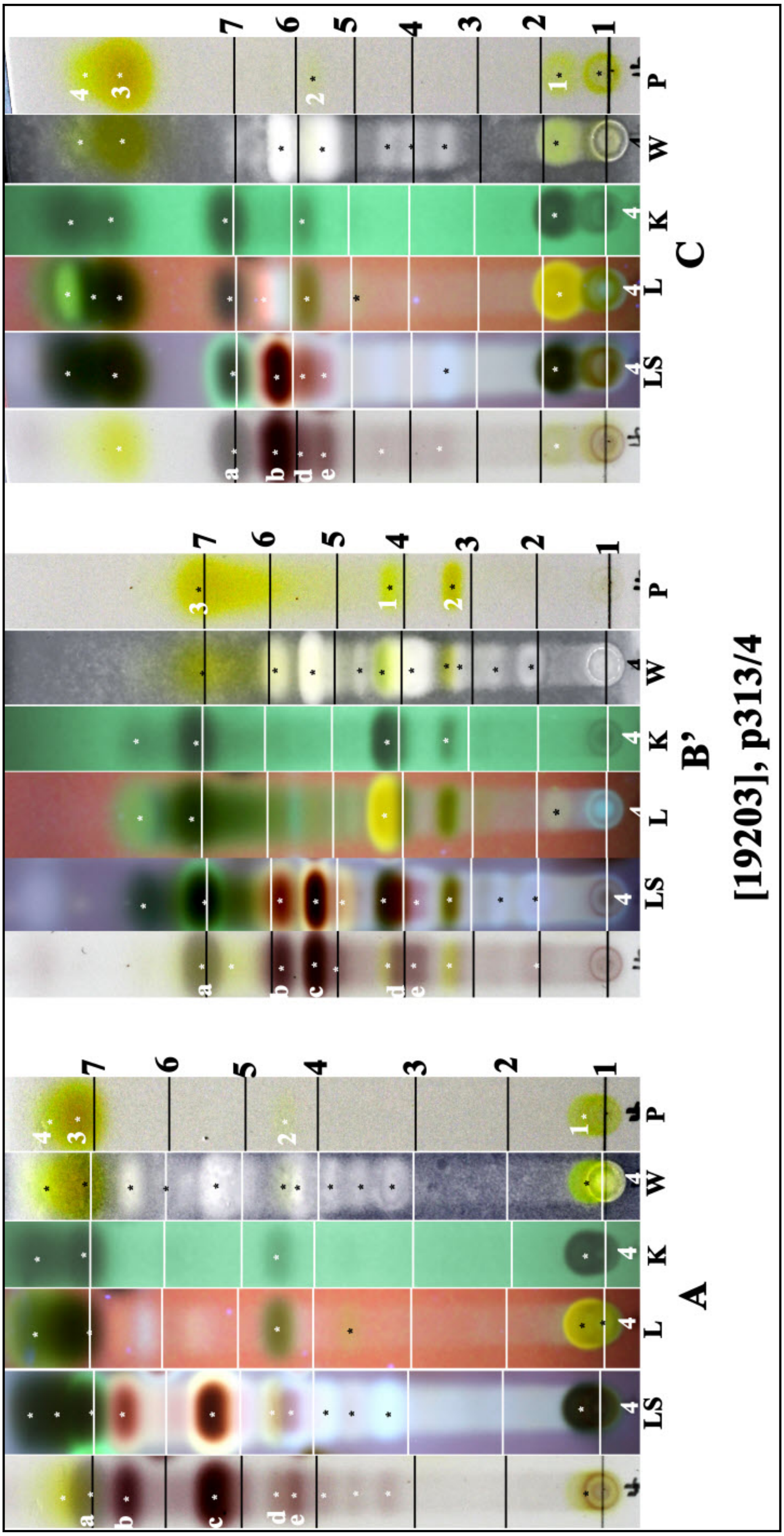
Physcia austrostellaris, [15980], Australia, Australian Capital Territory, Canberra, Hackett, Mt. Majura Nature Park, Casuarina trail, 35,24560° S, 149,17621° E, 790 m. Leg. F. Schumm & E. Stocker-Wörgötter, 03.11.2009. HPTLC vid Elix.

22α-hydroxy-3,4-secostict-4(23)-enaldehyde



Pseudocyphellaria degelii, [19203], New Zealand, South Island, Canterbury, Porters Pass, south-west slopes of Foggy Peak, Torlesse Range, 1000 m, growing on soil and debris in subalpine heath.

22α-hydroxy-3,4-secostict-4(23)-enoic acid

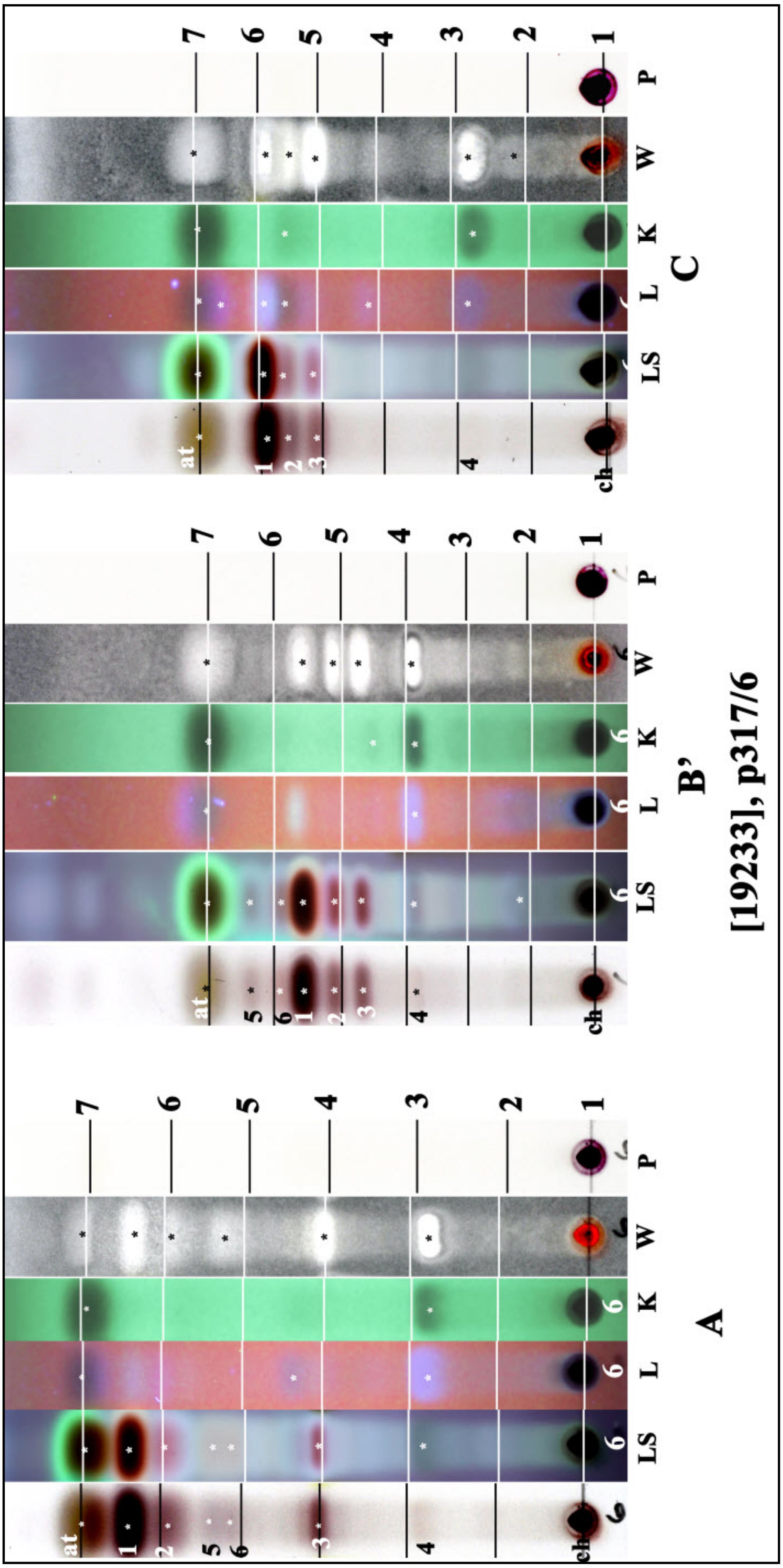


a: 22α-hydroxy-3,4-secostict-4(23)-enaldehyde
b: 22α-hydroxy-3,4-secostict-4(23)-enoic acid
c: stictane-3β,22-diol
d: 3β-acetoxystictane-2,22-diol
e: 2α-acetoxystictane-3β,22-diol

1: pulvinic acid
2: pulvinamide
3: pseudocyphellarin A
4: pulvinic dilactone + calycin

Pseudocyphellaria degelii, [19203], New Zealand, South Island, Canterbury, Porters Pass, south-west slopes of Foggy Peak, Torlesse Range, 1000 m, growing on soil and debris in subalpine heath.

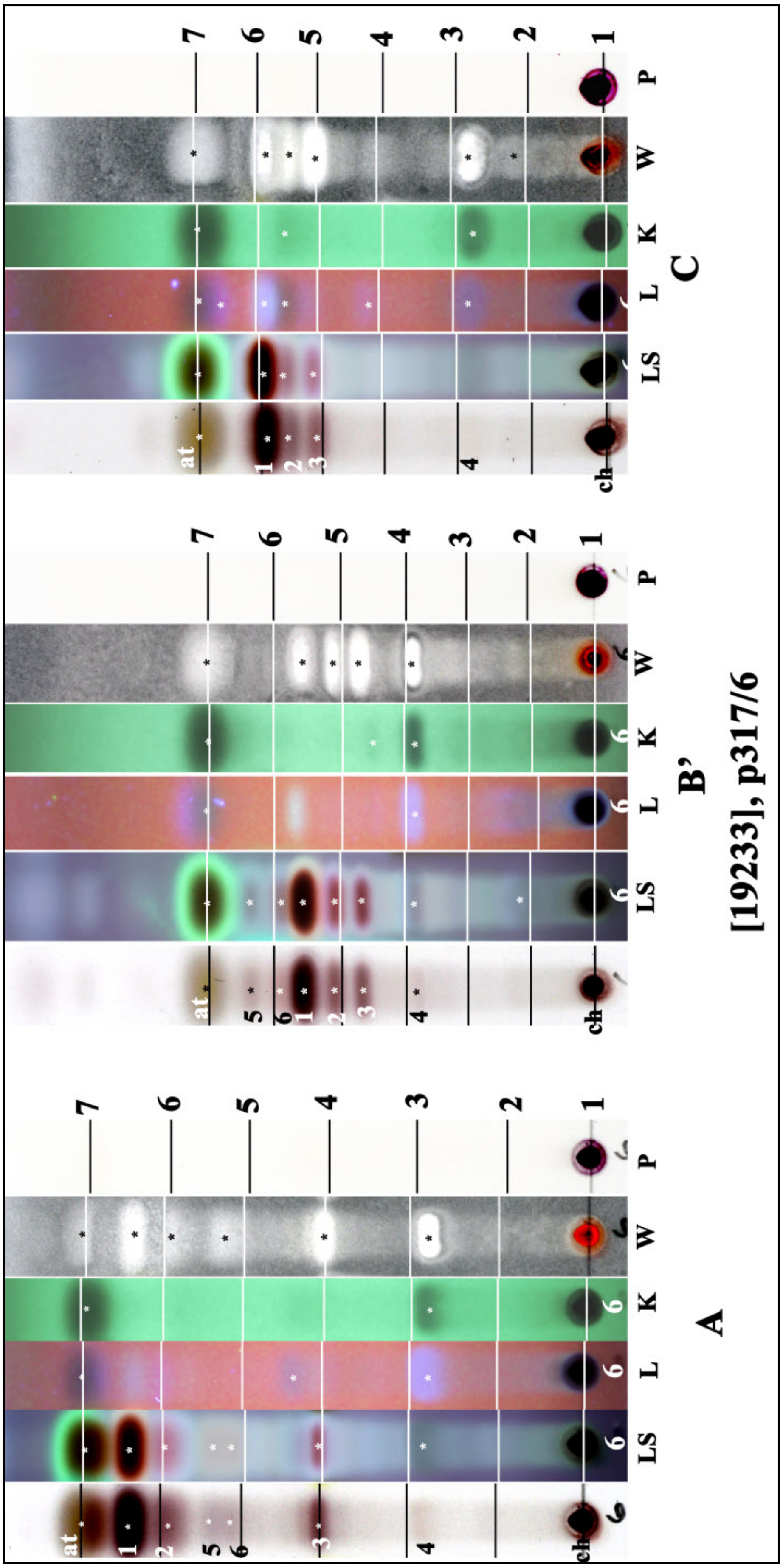
25-acetoxy-20,24-epoxydammarane-3β-ol



at: atranorin, ch: chiodectonic acid, **1: 25-acetoxy-20,24-epoxydammarane-3β-ol**, 2: methyl 3-*O*-acetoxypyxinate, 3: 25-acetoxy-20,24-epoxydammarone-3-one, 4: pyxinic acid, 5: methyl pyxinate, 6: unknown

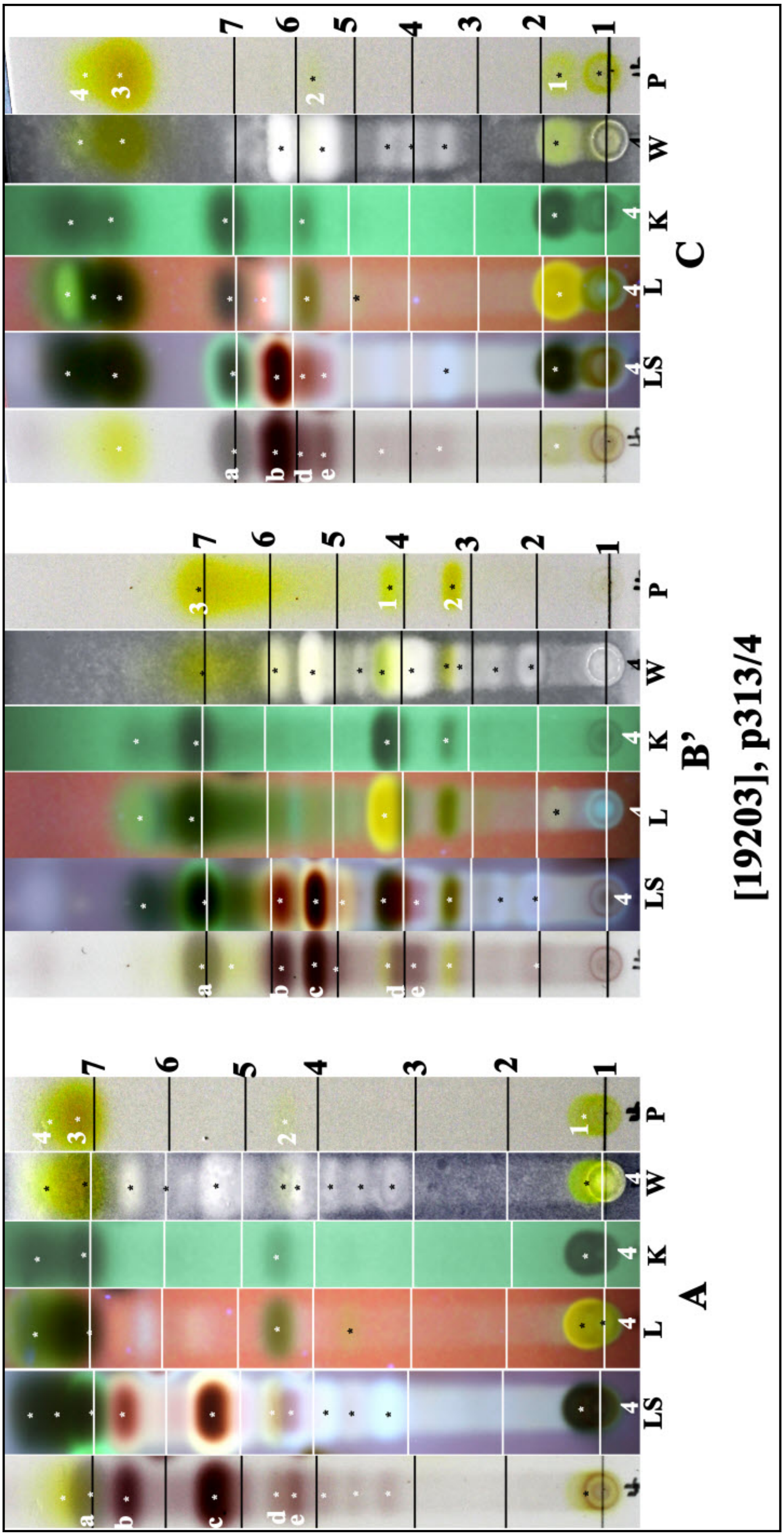
Pyxine coccifera **,** [19233], Australia, Northern Territory, Tabletop Range, Litchfield Park, 25 km south-west of Batchelor, 15°11' S, 130°50' E, 180 m.

25-acetoxy-20,24-epoxydammarone-3-one



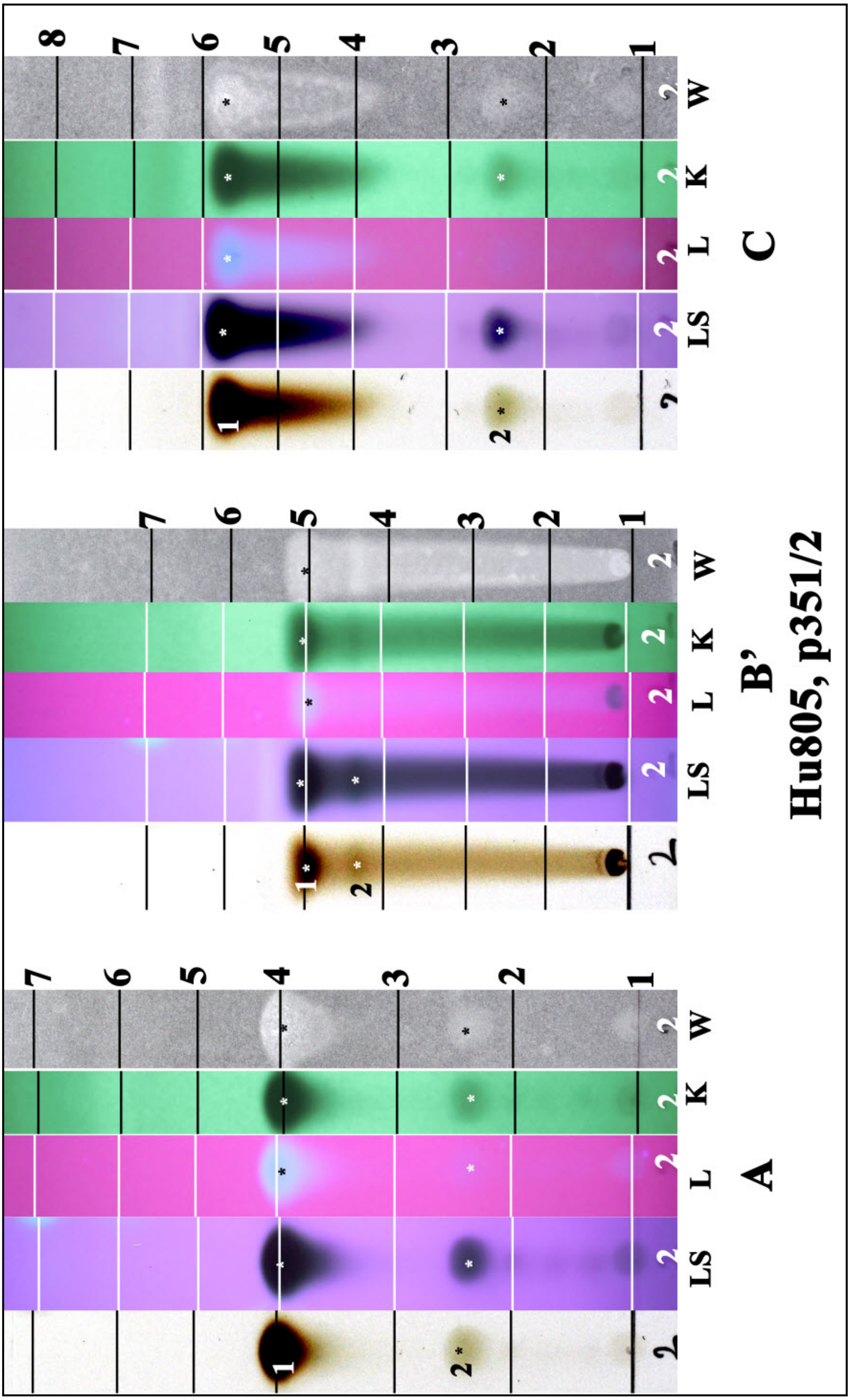
Pyxine coccifera **,** [19233], Australia, Northern Territory, Tabletop Range, Litchfield Park, 25 km south-west of Batchelor, 15°11' S, 130°50' E, 180 m.

2α-acetoxystictane-3β,22-diol



Pseudocyphellaria degelii, [19203], New Zealand, South Island, Canterbury, Porters Pass, south-west slopes of Foggy Peak, Torlesse Range, 1000 m, growing on soil and debris in subalpine heath.

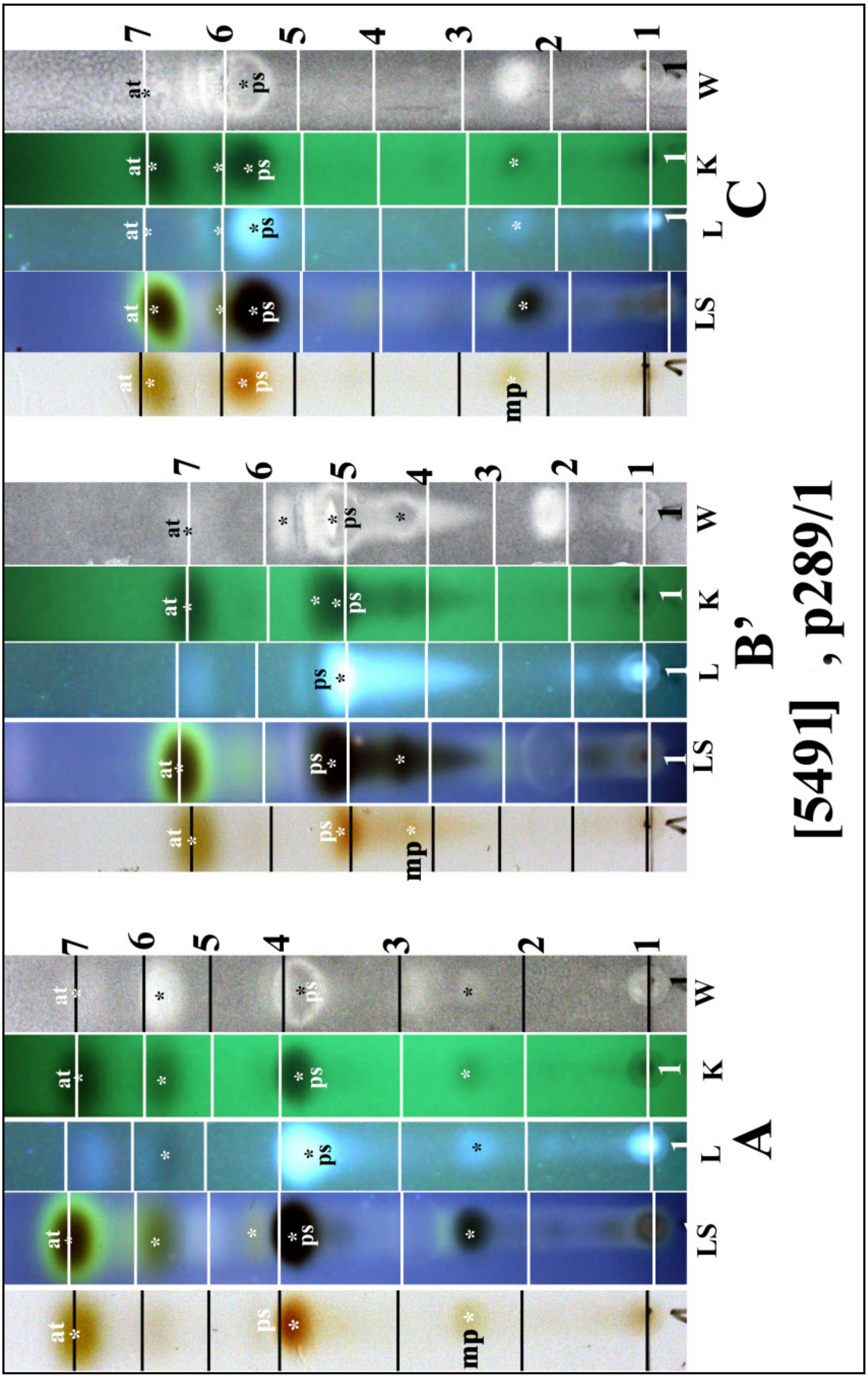
2’-*O*-demethylpsoromic acid



1: psoromic acid, **2: 2’-*O*-demethylpsoromic acid**, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 805: psoromic acid
Botanisches Museum Berlin-Dahlem

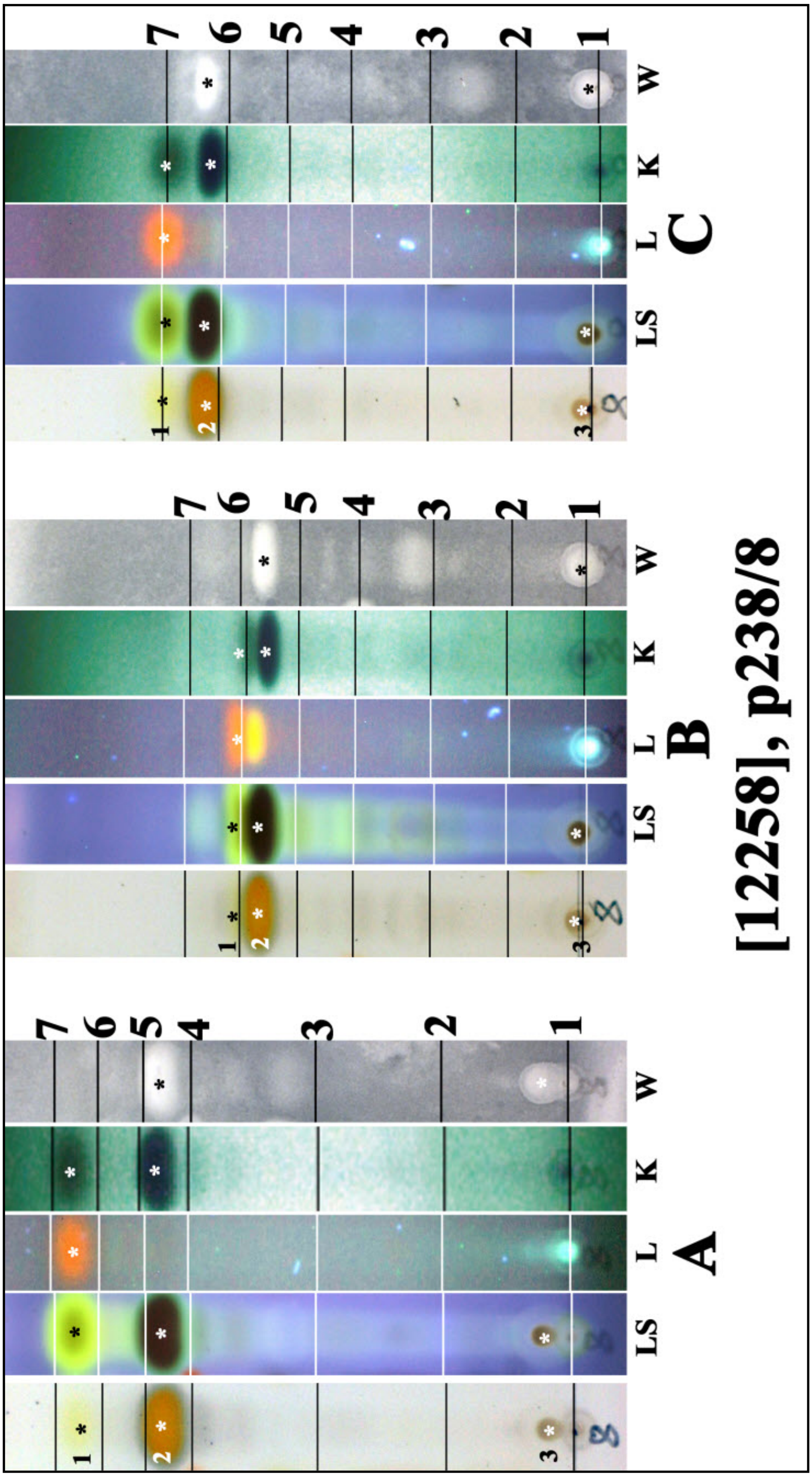
2’-*O*-demethylpsoromic acid



ps: psoromic acid, at: atranorin, mp: **2’-*O*-demethylpsoromic acid**

Lecanora subcarpinea [5491], Germany, Schwäbische Alb, Kreis Tübingen, an der Nordkante der Hochfläche des Farrenbergs südlich Mössingen, 810 m; 48°23.206’ N, 9°04.577’ E; on bark of Carpinus. Leg. et det. F. Schumm 03.04.1999.

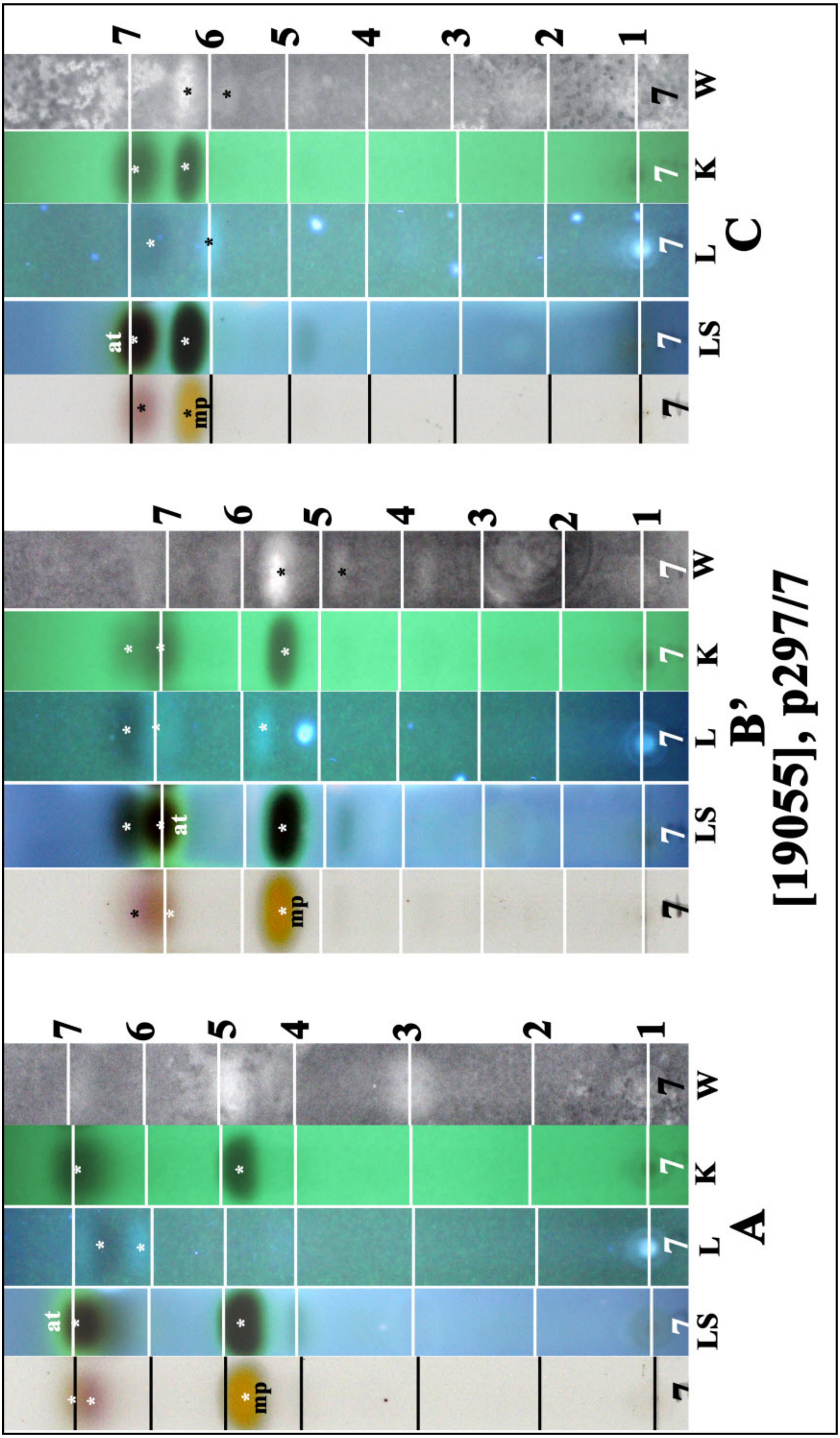
2'-*O*-methylperlatolic acid



1: coronaton (= 4,5-dichlorolihexanthone), **2: 2'-*O*-methylperlatolic acid,**
3: decomposition or hydrolysis product, conf. J.A. Elix

Pertusaria mesotropa, [12258], USA, Mexico, Sonora, 12 km W of Yecora on road to La Mesa del Campanero, local name -"El puerto de los Huesos", 28°16'0" N, 109°1'0' W, 1790 m; oak woodland, on *Quercus arizonica.* Leg. T,H. Nash III 30. May 1975 (# 10859), det. H.T. Lumbsch & M.I. Messuti 1998.

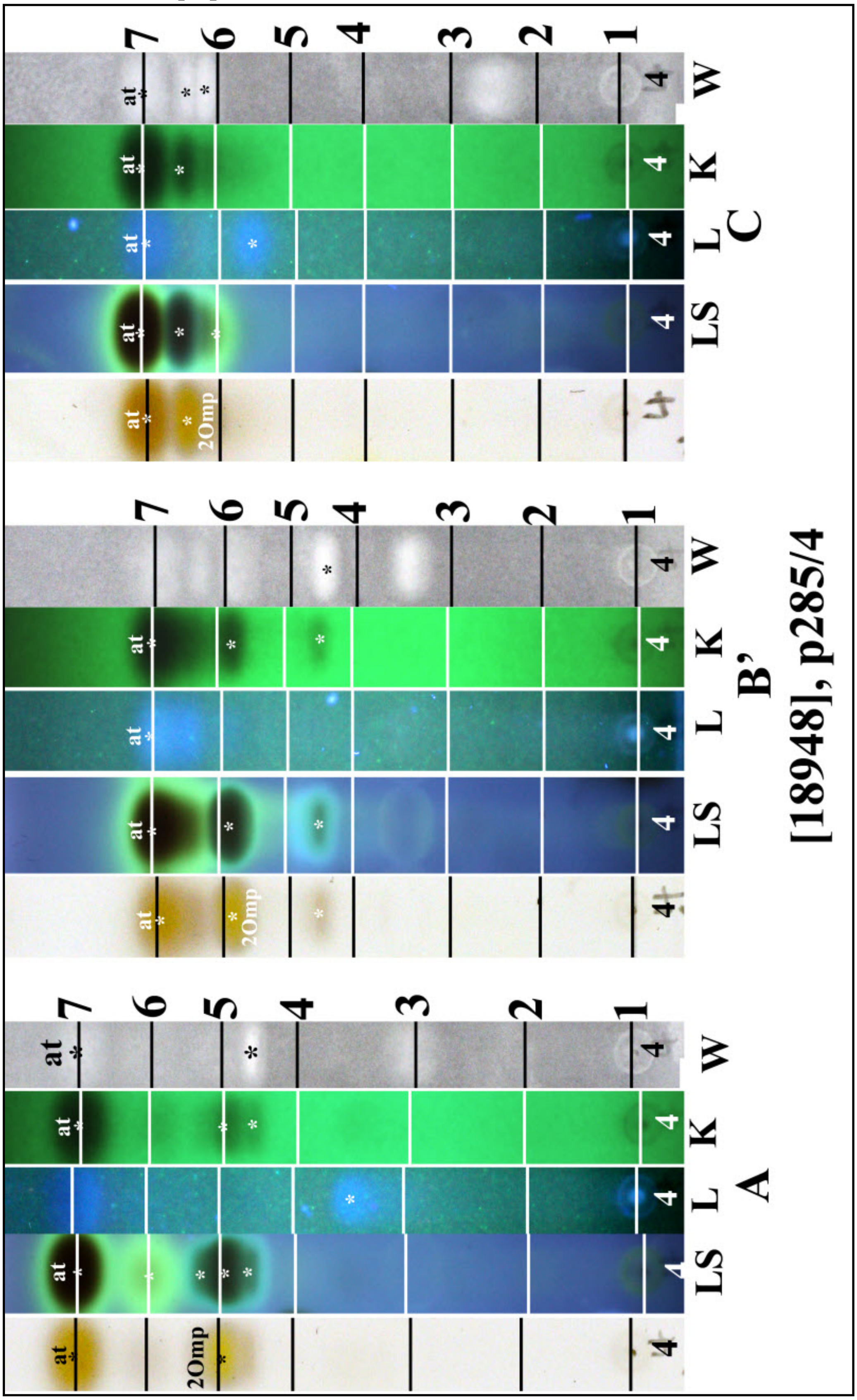
2’-*O*-methylperlatolic acid



at: atranorin, mp: 2’-*O*-methylperlatolic acid

Lecanora helva, [19055], Norfolk Islands, Flat Rock Bay Picnic Area.

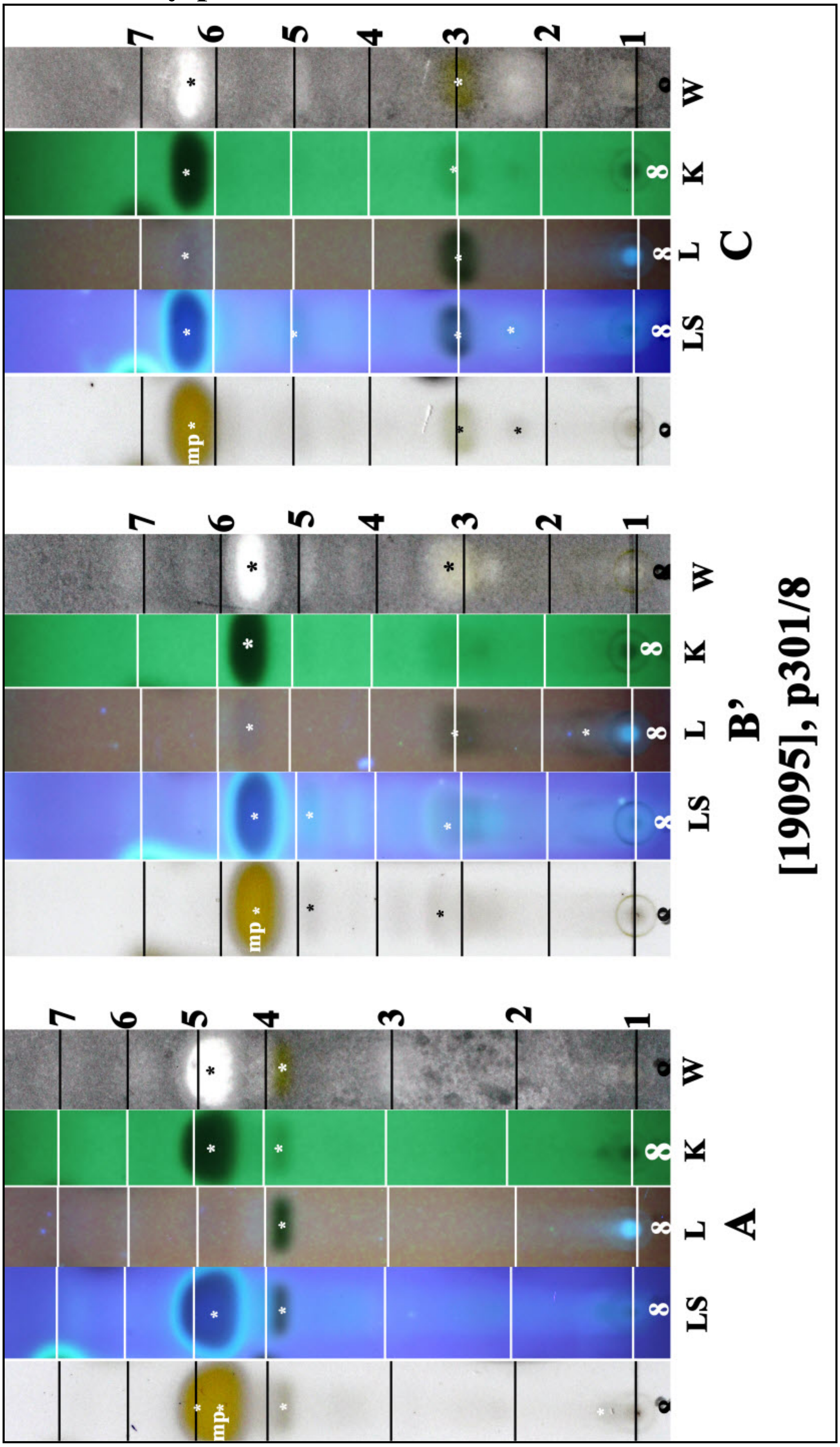
2’-*O*-methylperlatolic acid



at: atranorin, 2Omp: – in A,C composite spots containing 2’-*O*-methylperlatolic acid, 2’-*O*-methylhyperlatolic acid, 2’-*O*-methylisohyperlatolic acid, 2’-*O*-methylsuperlatolic acid, – in B 2’-*O*-methylperlatolic acid is somwhat slower and the other three form a broad composite spot.

Lecanora austrosorediosa (= ***Biatora sorediosa),*** [18948], Australia, Northern Territory, Umbrawarra Gorge, 22 km south-west of Pine Creek.

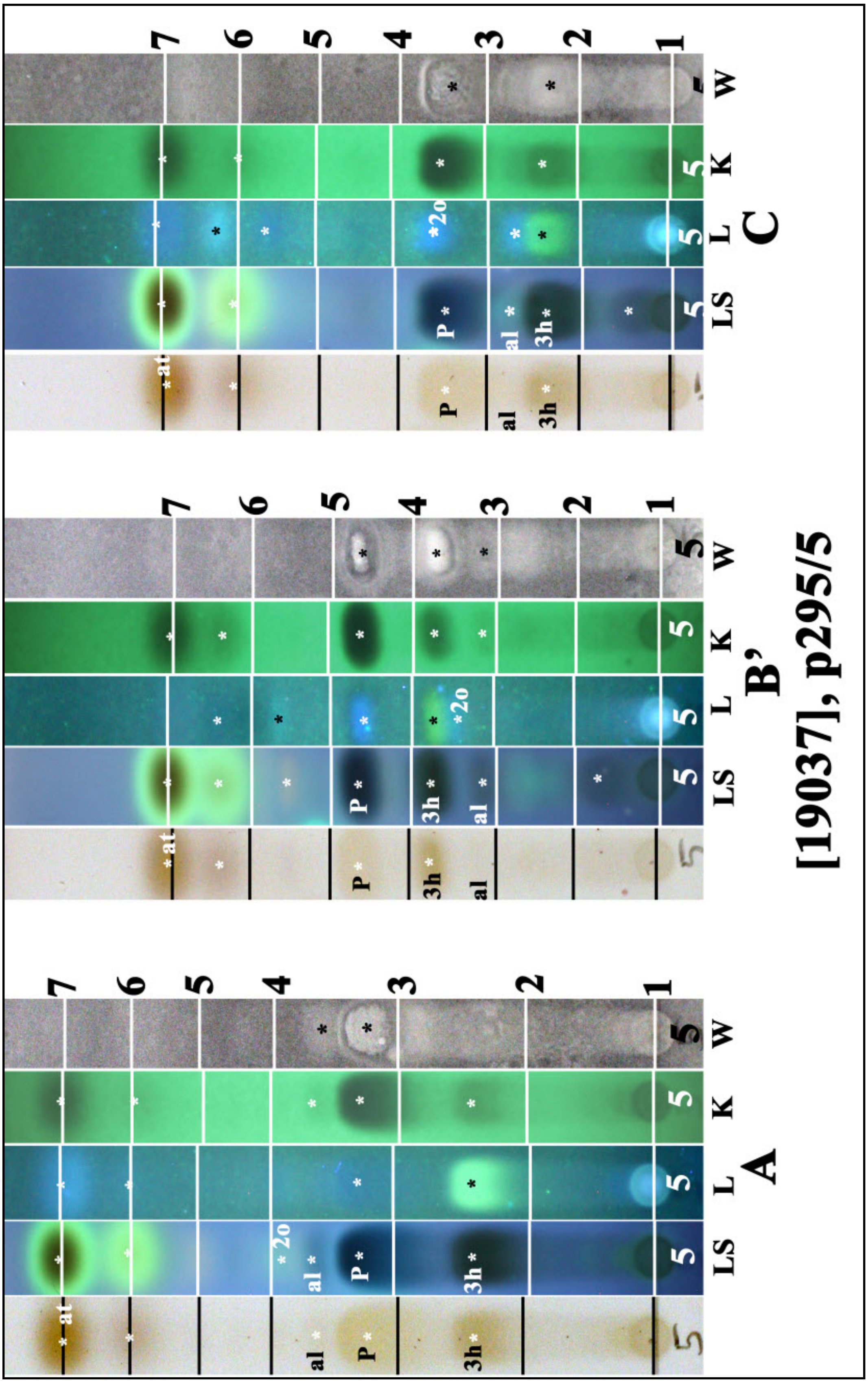
2'-*O*-methylperlatolic acid



mp: 2'-*O*-methylperlatolic acid

Paraporpidia glauca, [19095], Australia, Western Australia, Bindoola Creek, Gibb River Road, 53 km south-west of Wyndham.

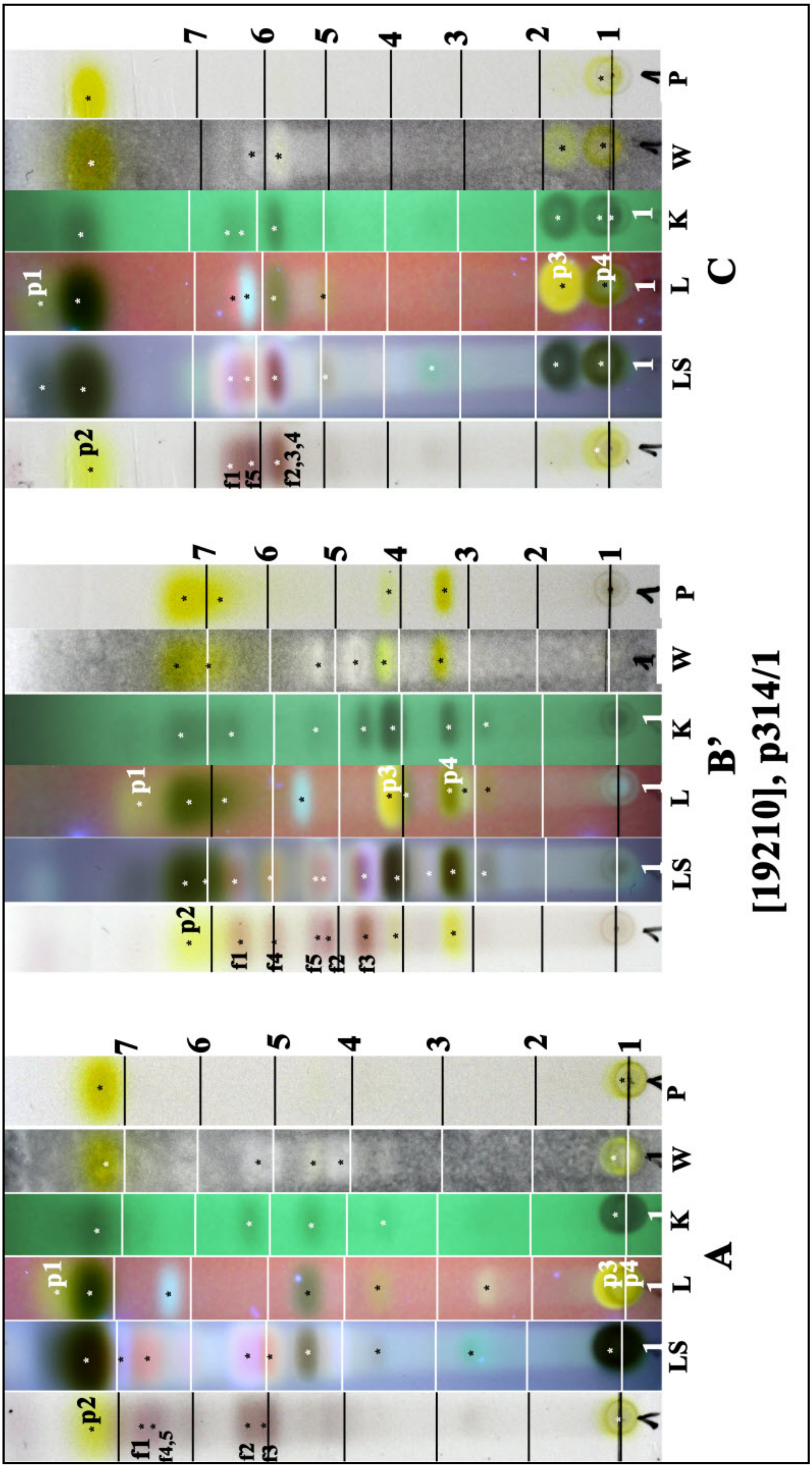
3-hydroxyphysodic acid



at: atranorin, chloroatranorin, p: physodic acid (major), **3h: 3-hydroxyphysodic acid**, 2o: 2'*O*-methylphysodic acid (minor), al: alectoronic acid (trace)

Hypogymnia billardieri [19037], Australia, New South Wales, Jerrabomberra Hills

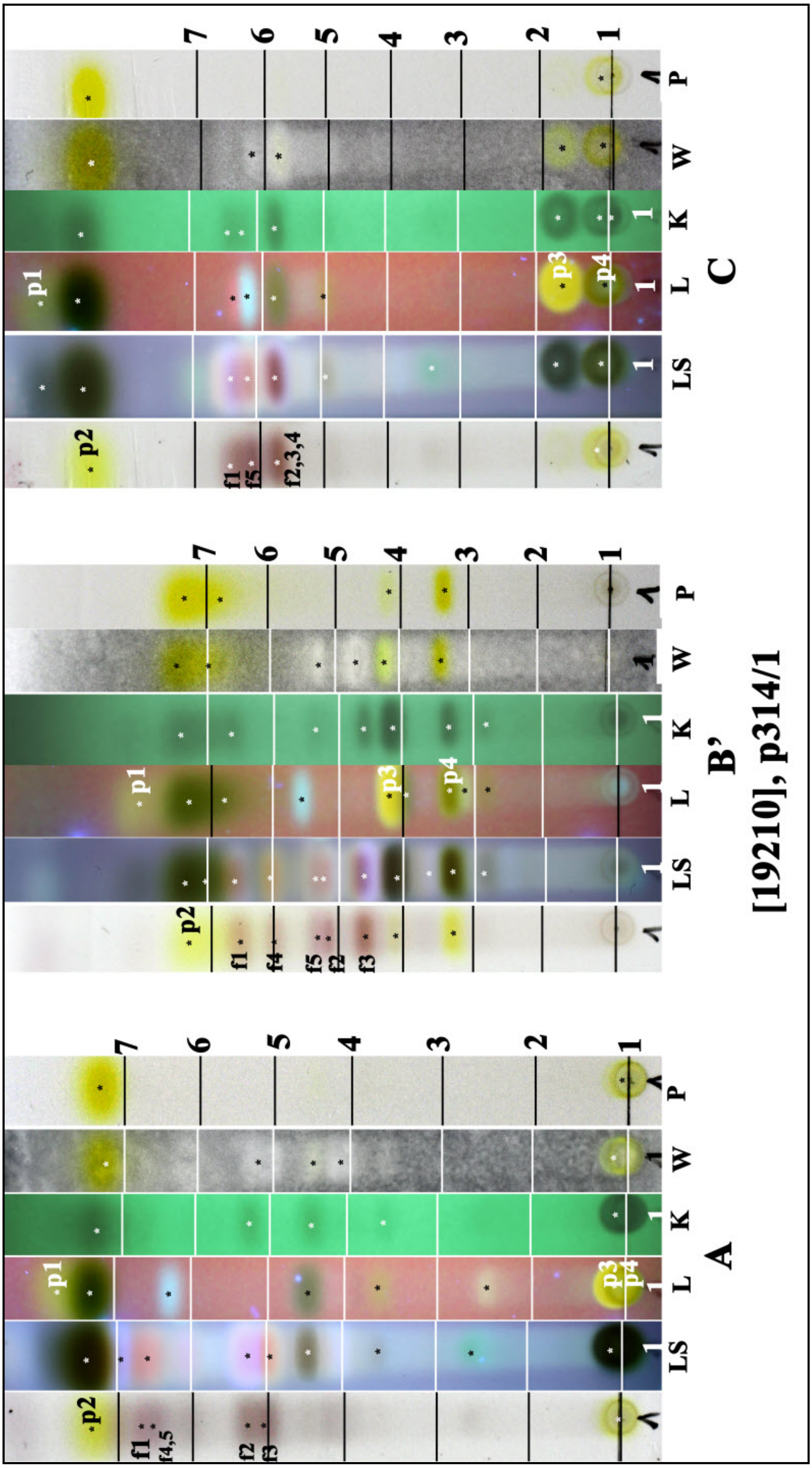
3β-acetoxyfern-9(11)-en-12-one



p1: pulvinic dilactone, p2: calycin, p3: pulvinic acid, p4: unknown, **f1: 3β-acetoxyfern-9(11)-en-12-one**, f2: 3β-hydroxyfern-9(11)-en-12-one, f3: fern-9(11)-en-3β,12β-diol, f4: 3β-acetoxyfern-9(11)-en-12β-ol, f5: 3β-acetoxyfern-9(11)-en-19β-ol.

Crocodia poculifera, (= ***Pseudocyphellaria poculifera***)**,** **[**19210], Norfolk Island. Mt. Pitt Reserve, in the vicinity of Broken Pine, 29°00'30'' S, 167°56'30'' E, 320 m.

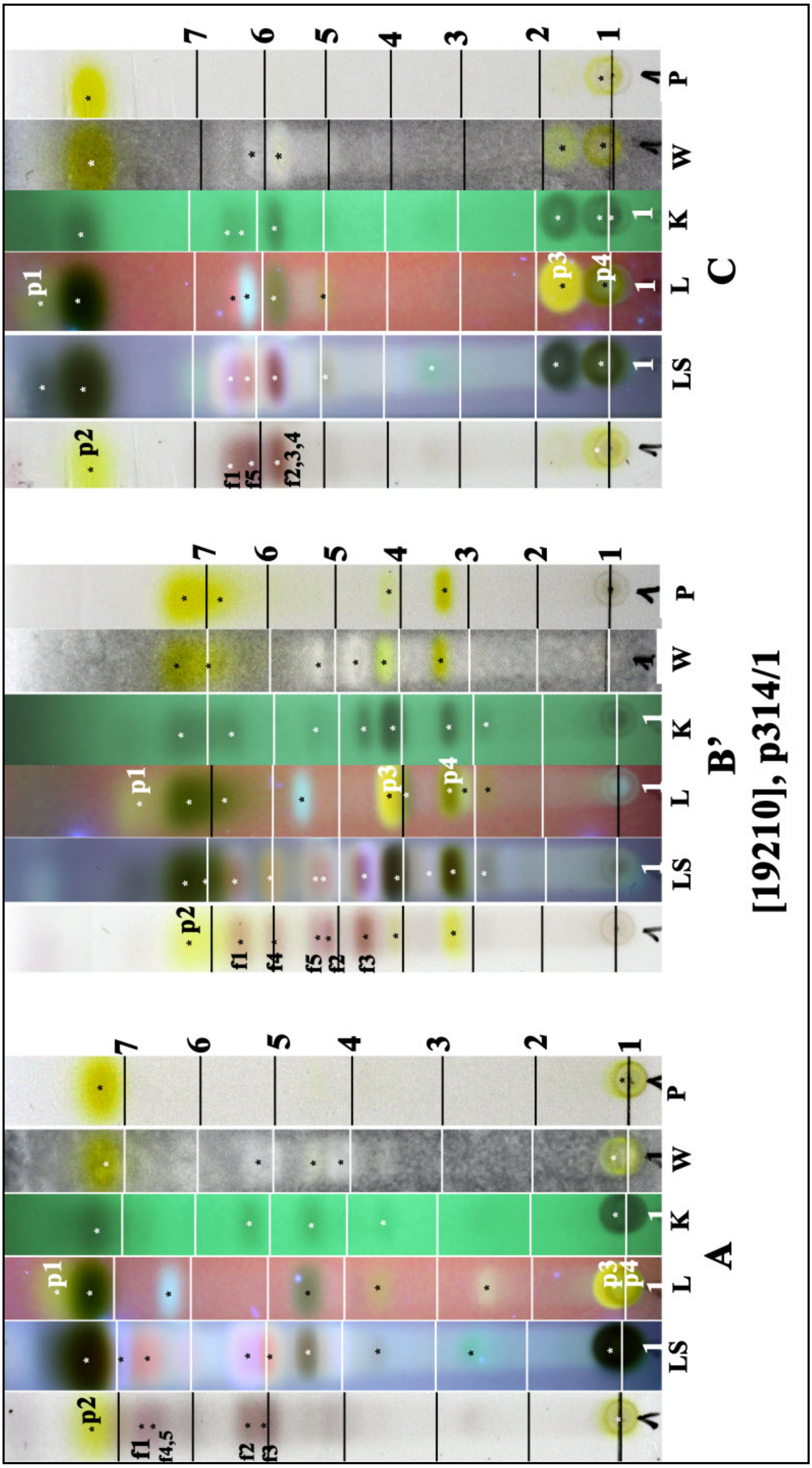
3β-acetoxyfern-9(11)-en-12β-ol



p1: pulvinic dilactone, p2: calycin, p3: pulvinic acid, p4: unknown, f1: 3β-acetoxyfern-9(11)-en-12-one, f2: 3β-hydroxyfern-9(11)-en-12-one, f3: fern-9(11)-en-3β,12β-diol, **f4: 3β-acetoxyfern-9(11)-en-12β-ol**, f5: 3β-acetoxyfern-9(11)-en-19β-ol.

Crocodia poculifera, (= ***Pseudocyphellaria poculifera***), **[**19210], Norfolk Island. Mt. Pitt Reserve, in the vicinity of Broken Pine, 29°00'30" S, 167°56'30" E, 320 m.

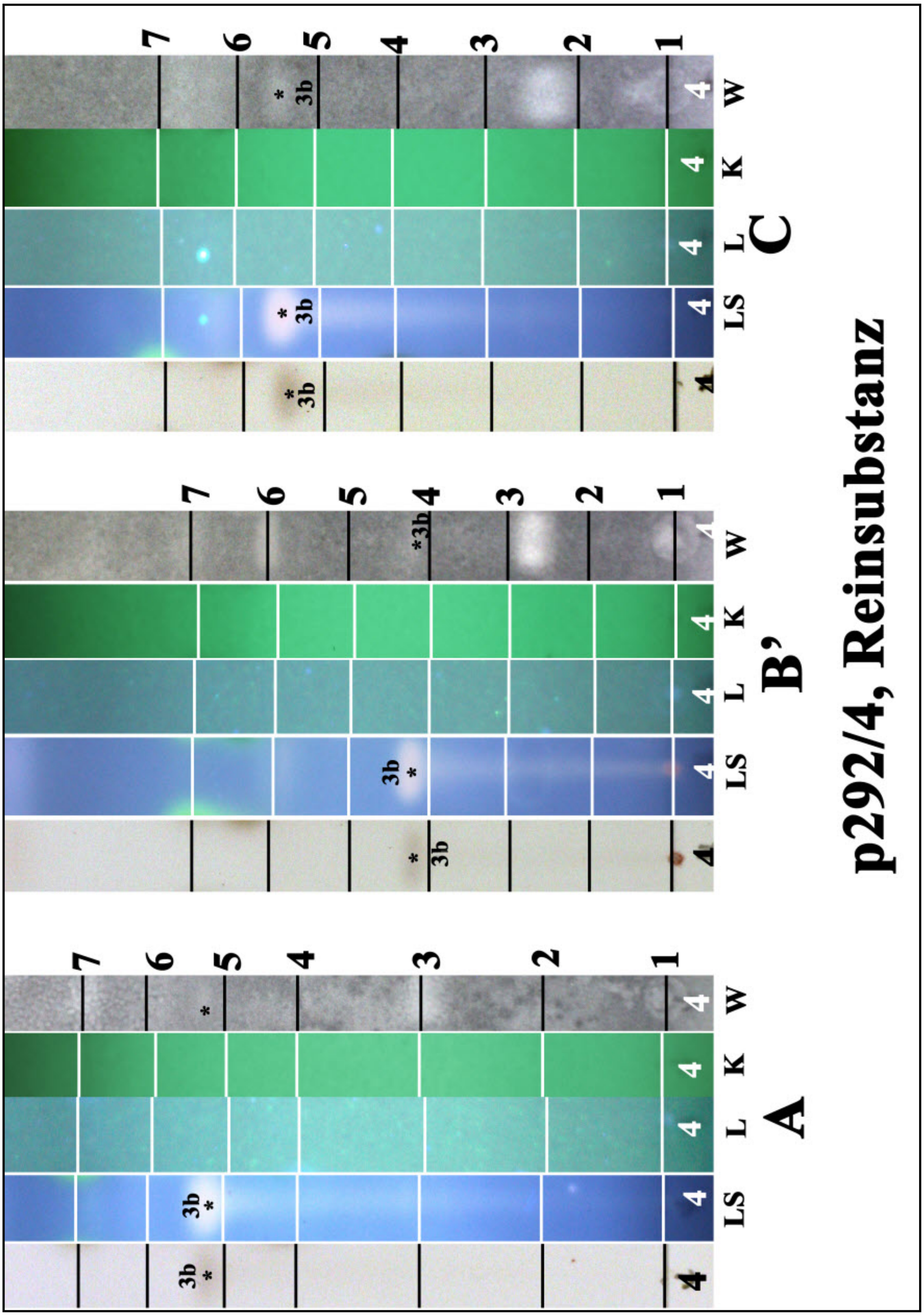
3β-acetoxyfern-9(11)-en-19β-ol



p1: pulvinic dilactone, p2: calycin, p3: pulvinic acid, p4: unknown, f1: 3β-acetoxyfern-9(11)-en-12-one, f2: 3β-hydroxyfern-9(11)-en-12-one, f3: fern-9(11)-en-3β,12β-diol, f4: 3β-acetoxyfern-9(11)-en-12β-ol, **f5: 3β-acetoxyfern-9(11)-en-19β-ol**.

Crocodia poculifera, (= ***Pseudocyphellaria poculifera***), **[**19210], Norfolk Island. Mt. Pitt Reserve, in the vicinity of Broken Pine, 29°00'30'' S, 167°56'30'' E, 320 m.

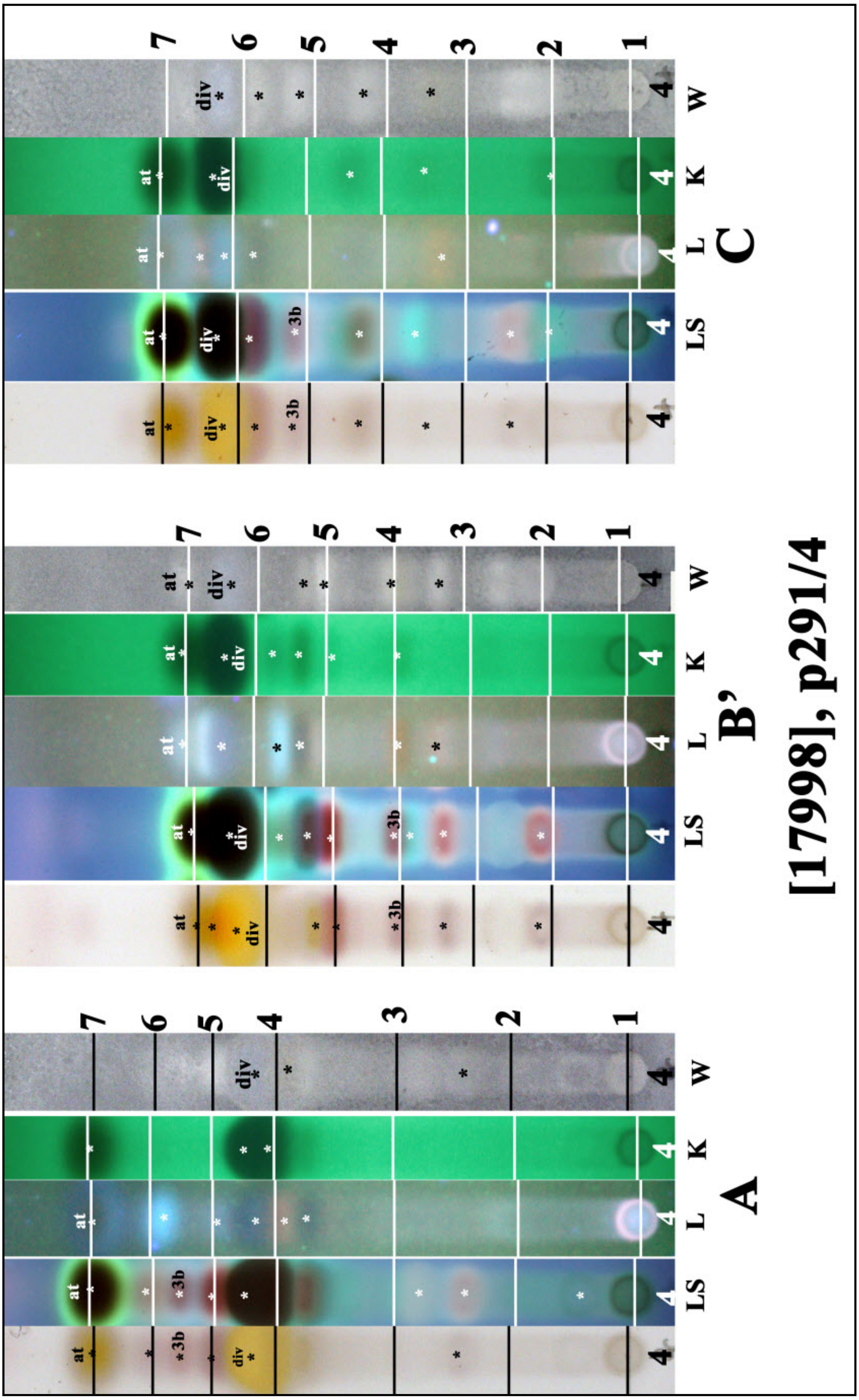
3β-acetoxyhopane-1β,22-diol



3b: 3β-acetoxyhopane-1β,22-diol

Reinsubstanz, von K.Kalb erhalten

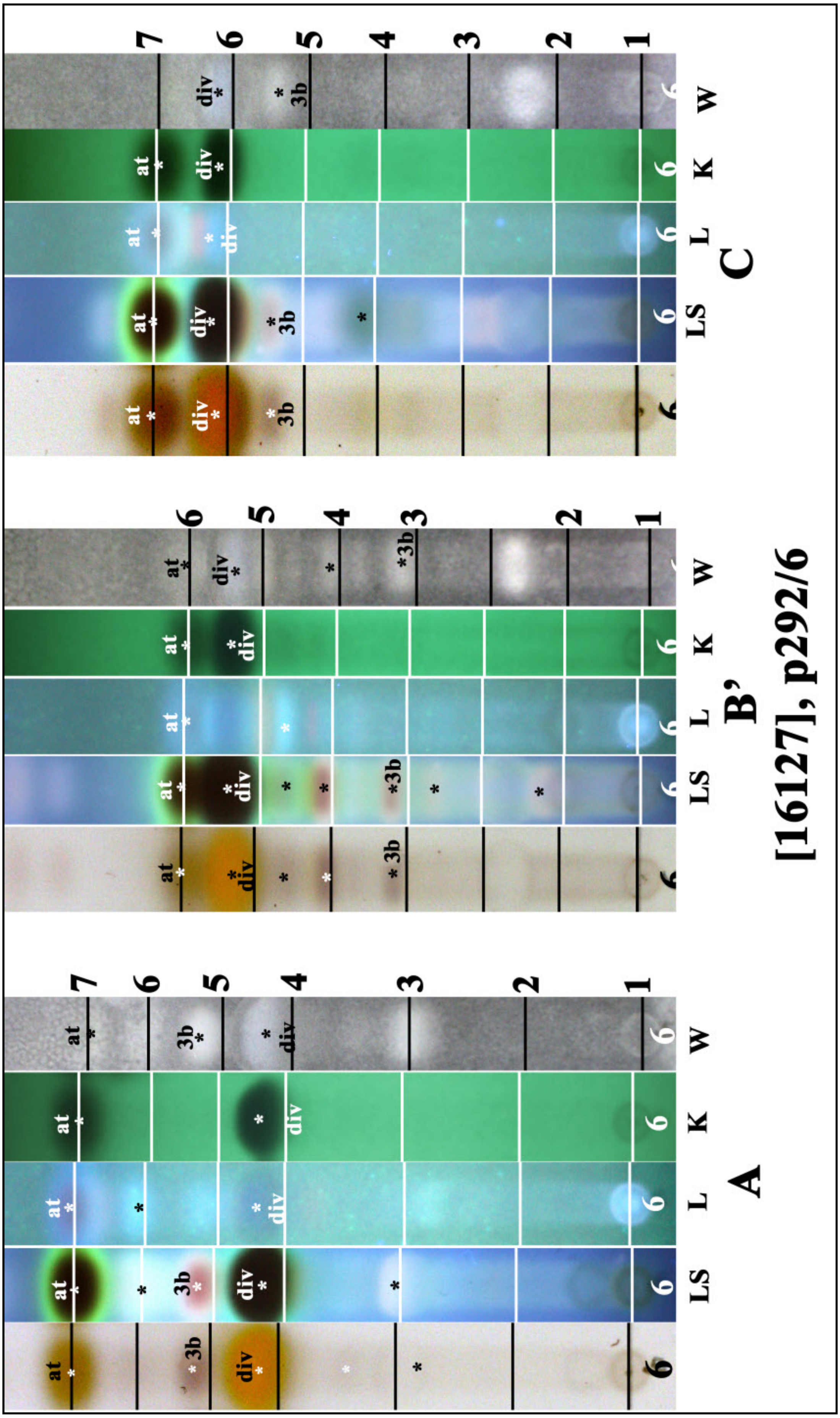
3β-acetoxyhopane-1β,22-diol



at: atranorin, div: divaricatic acid, 3b: 3β-acetoxyhopane-1β,22-diol

Dirinaria aegialita (Afzel. ex Ach.) B.J.Moore [17998], Brasilien, Santa Catarina, Ilha de Santa Catarin. nordwestlicher Teil, vor Praia do Forte, an einem beschatteten, leicht bemoosten Felsblock (Granit). 50 m. Leg. et det. K.Kalb 01.05.1980. Lichenes Neotropici 61.

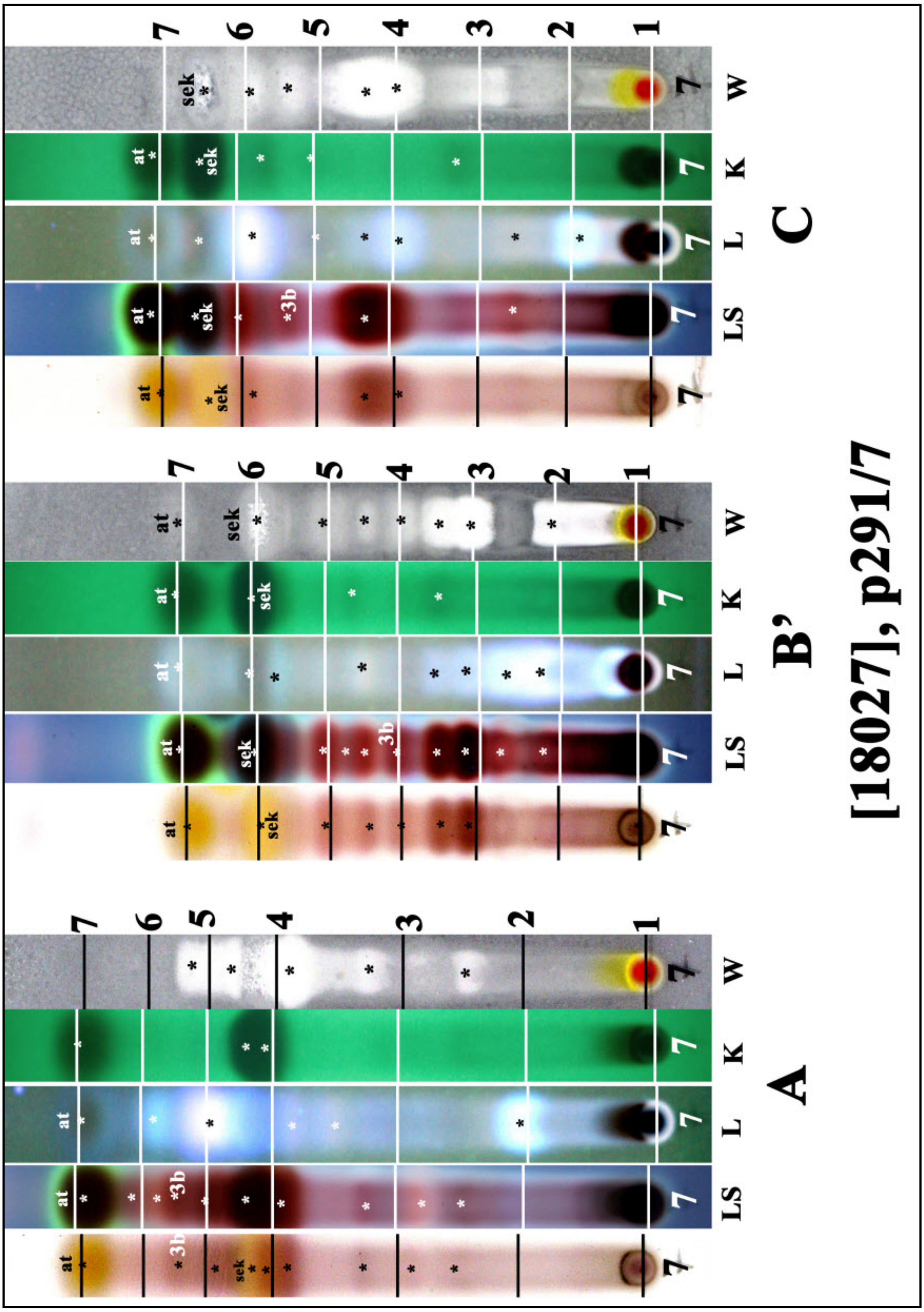
3β-acetoxyhopane-1β,22-diol



at: atranorin, div: divaricatic acid, 3b: 3β-acetoxyhopane-1β,22-diol

Dirinaria picta, [16127], Australia, New South Wales, north of Batemans Bay, Cullendulla Creek Nature Reserve

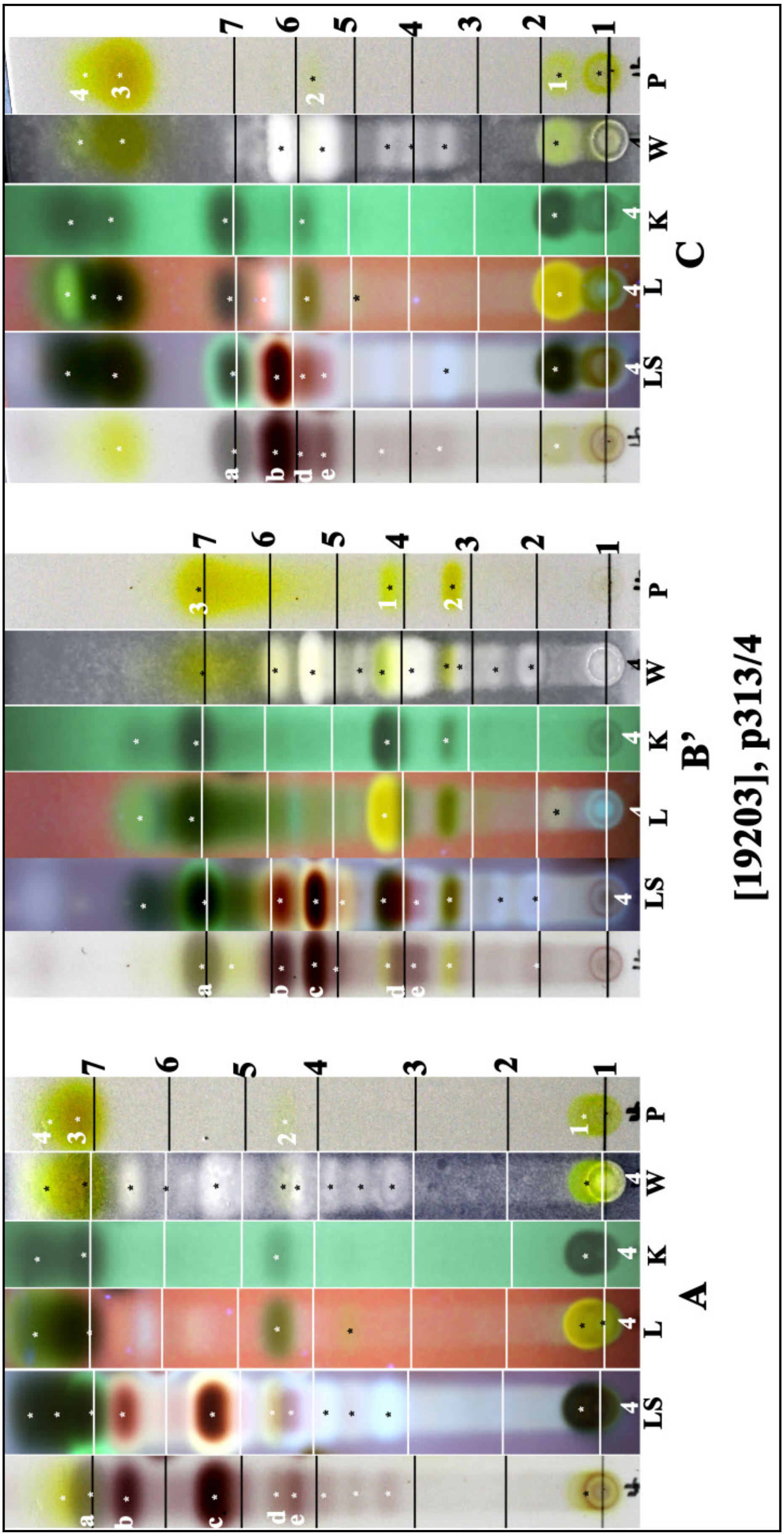
3β-acetoxyhopane-1β,22-diol



at: atranorin, sek: sekikaic acid, **3b:3β-acetoxyhopane-1β,22-diol**, red pigment is canarione (identified by K. Kalb)

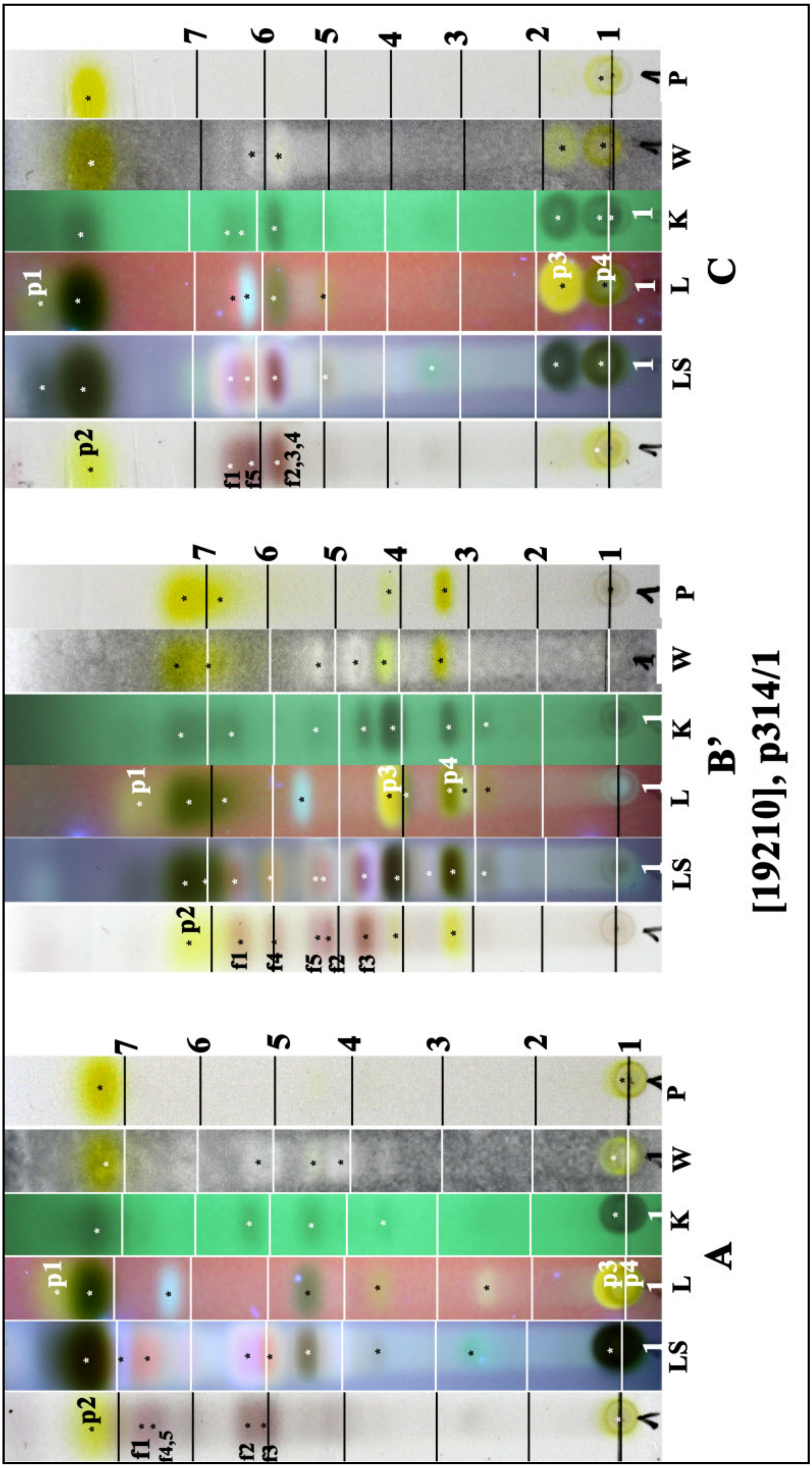
Dirinaria leopoldii, [18027], Brasilien/ Bahia, zwischen Feira de Santana und Milagres, etwa 10 km vor Milagres, in einer lichten Castinga an dünnen Ästen. 200 m. Leg. K. Kalb & M. Marcelli 21.07.1980, det. K. Kalb. Lichenes Neotropici 62. (Pigment as in Lethariella canariensis)

3β-acetoxystictane-2,22-diol



Pseudocyphellaria degelii, [19203], New Zealand, South Island, Canterbury, Porters Pass, south-west slopes of Foggy Peak, Torlesse Range, 1000 m, growing on soil and debris in subalpine heath.

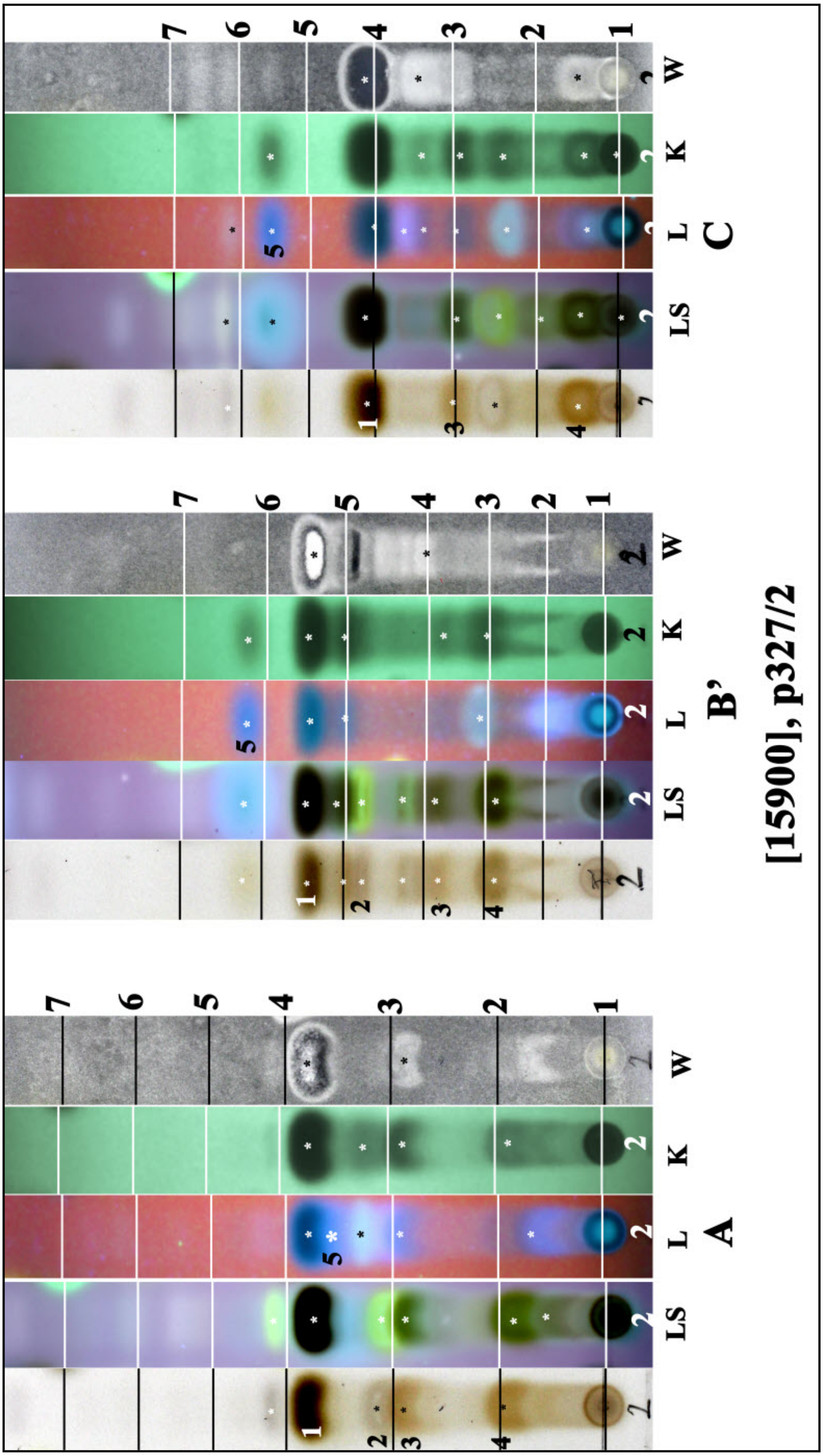
3β-hydroxyfern-9(11)-en-12-one



p1: pulvinic dilactone, p2: calycin, p3: pulvinic acid, p4: unknown, f1: 3β-acetoxyfern-9(11)-en-12-one, **f2: 3β-hydroxyfern-9(11)-en-12-one**, f3: fern-9(11)-en-3β,12β-diol, f4: 3β-acetoxyfern-9(11)-en-12β-ol, f5: 3β-acetoxyfern-9(11)-en-19β-ol.

Crocodia poculifera, (= ***Pseudocyphellaria poculifera***)**,** [19210], Norfolk Island. Mt. Pitt Reserve, in the vicinity of Broken Pine, 29°00'30" S, 167°56'30" E, 320 m.

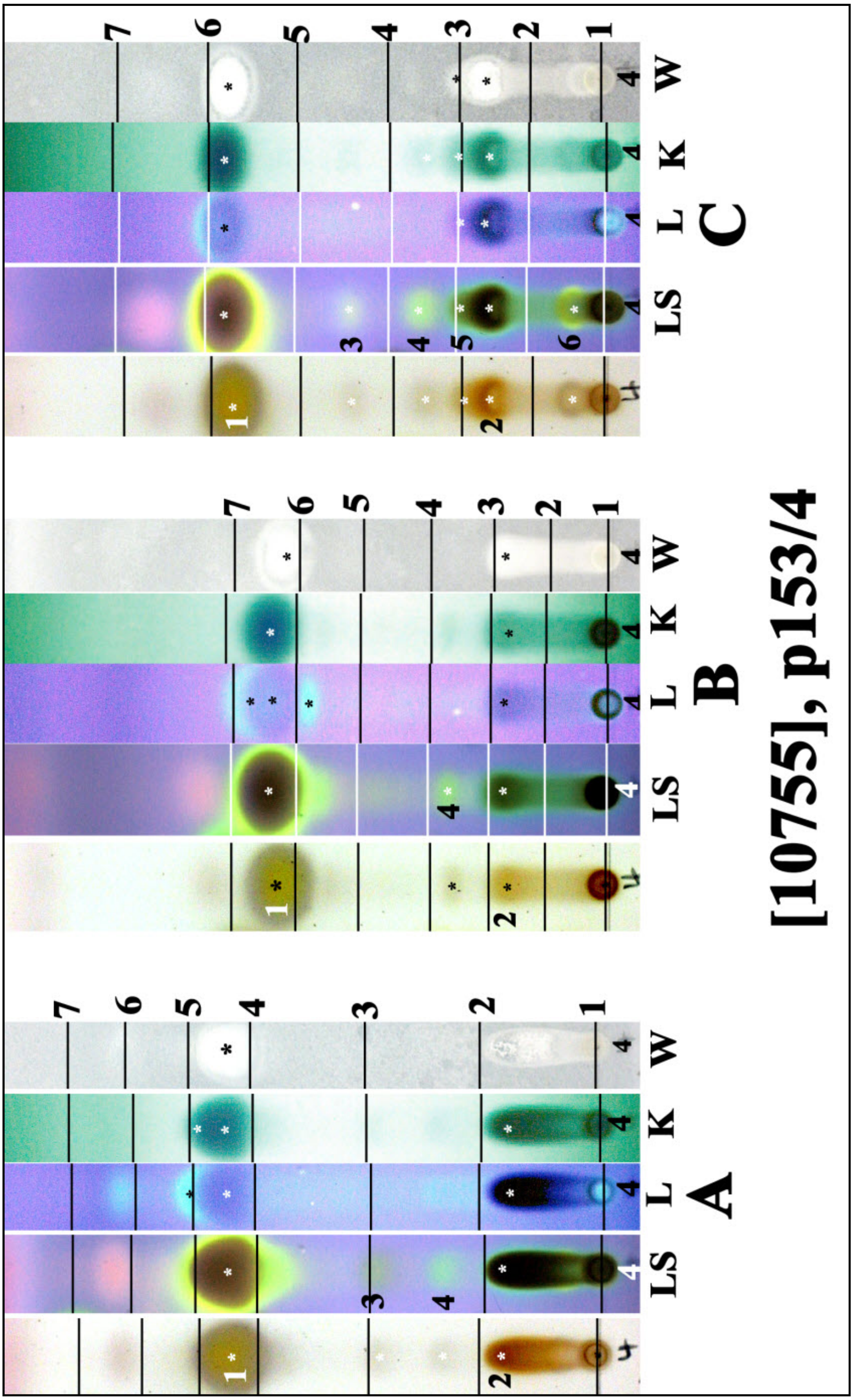
4,5-dichloronorlichexanthone



1: arthothelin, 3: **4,5-dichloronorlichexanthone**, 5: thiophanic acid, 2,4: unknown.

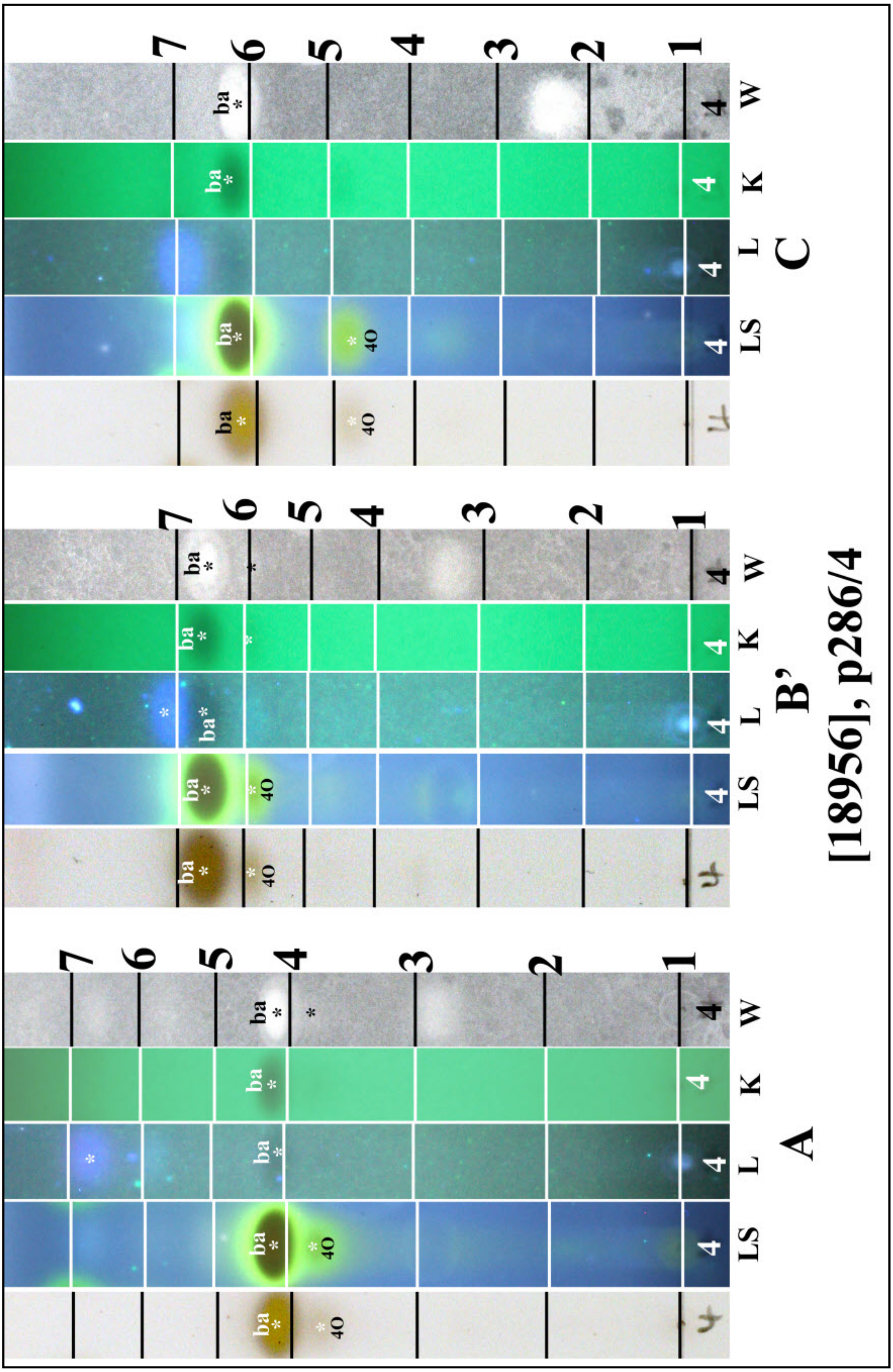
Calicium tricolor, [15900], Australia, Western Australia, north of Nornalup, Valley of the Giants, 34.970° S, 116.894° E, 177 m, growing on bark of *Eucalyptus*. Leg. F. Schumm & E. Stocker-Wörgötter, 26.10.2009.

4-*O*-demethylbarbatic acid



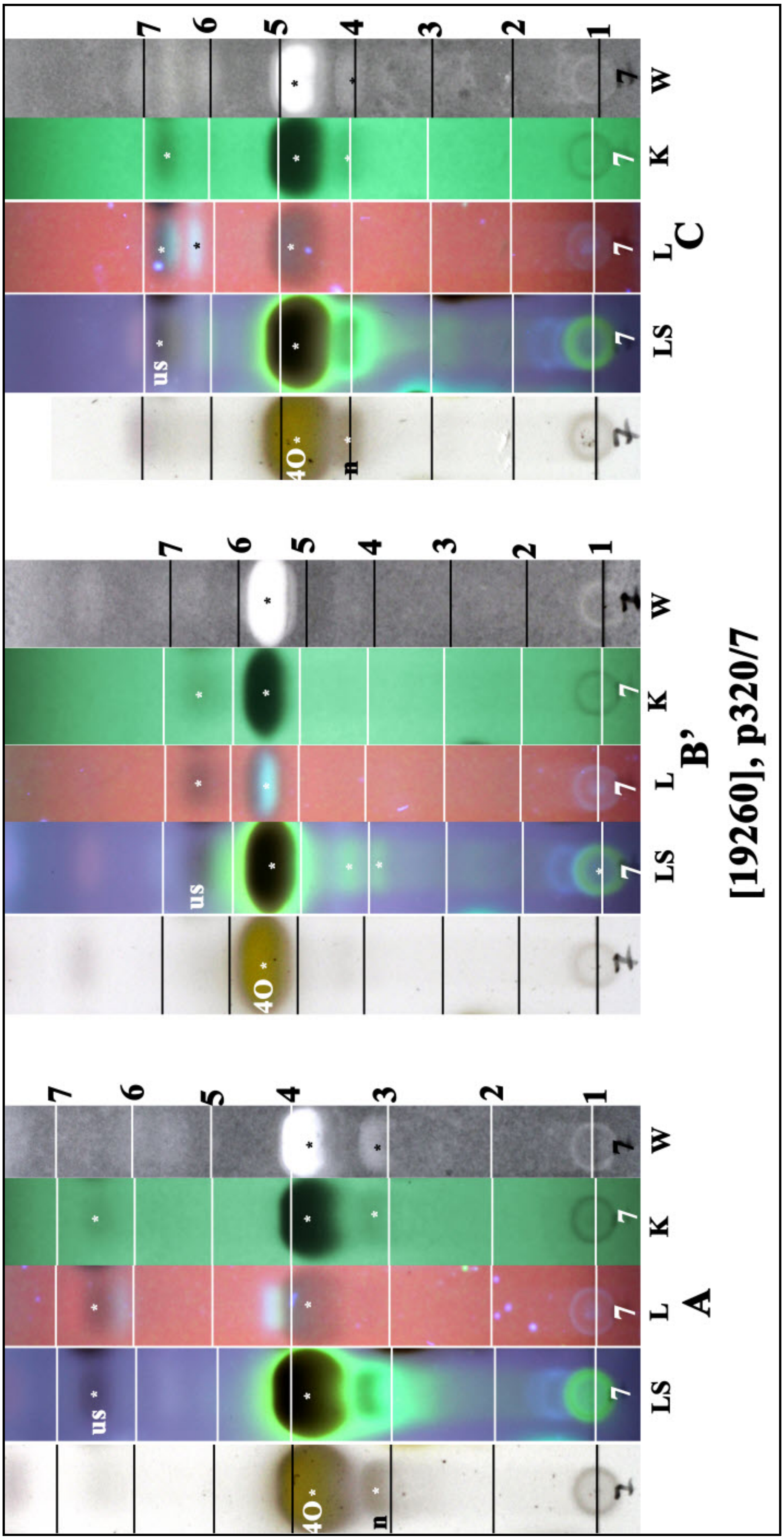
Cladonia parasitica, [10755], Germany, Baden-Württemberg, Kreis Göppingen, Rechberghausen, an Wegrändern im Ödach, Stubensandsteingebiet, Nadelwald, ca. 400 m, TK 7223. Leg. F. Schumm 13.03.1971.

4-*O*-demethylbarbatic acid



Cladia aggregata, [18956], New Zealand, South Island, Fiordland, Southern Lake.

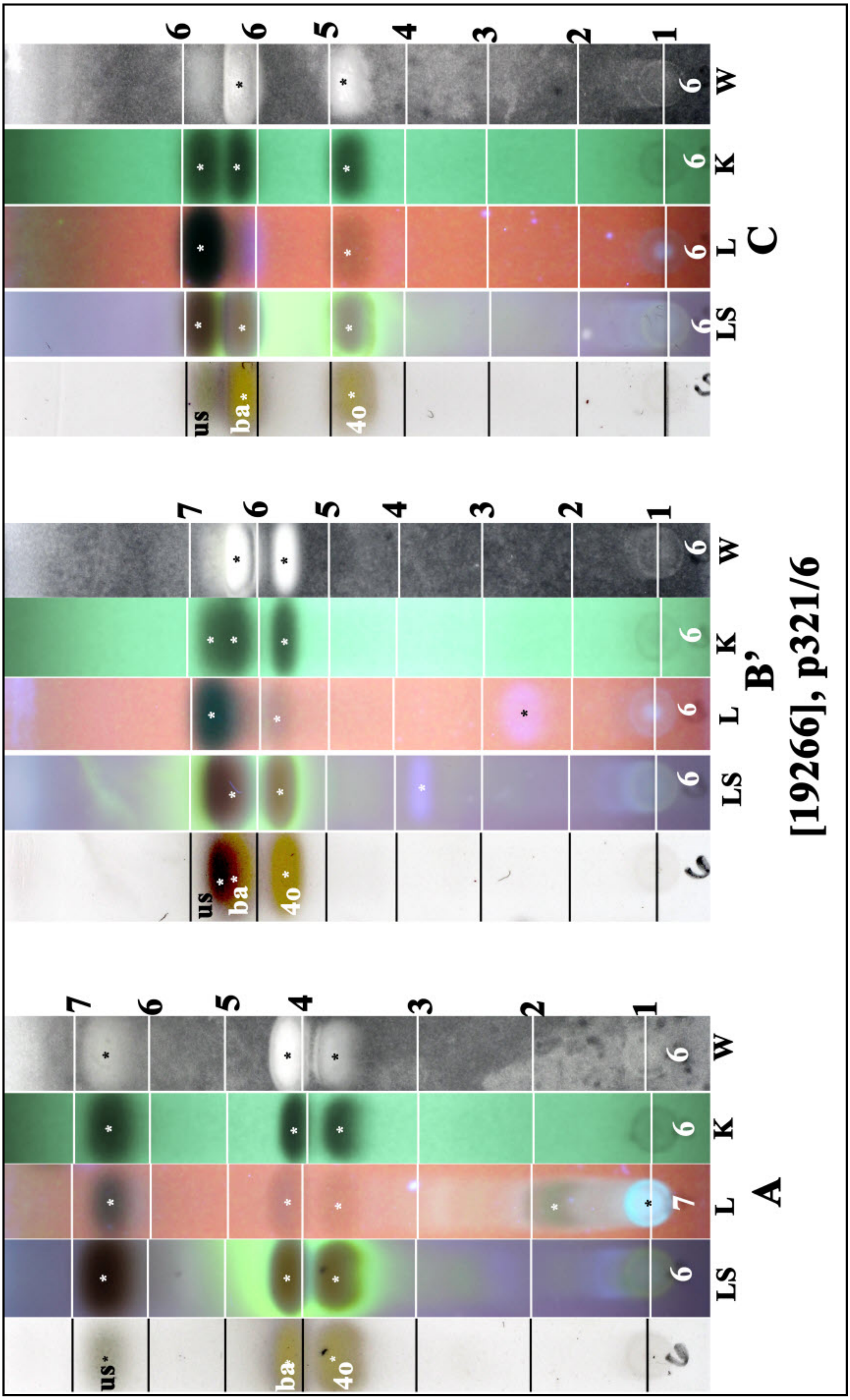
4-*O*-demethylbarbatic acid



us: usnic acid, **4O: 4-*O*-demethylbarbatic acid**, n: norobtusatic acid

Relicina demethylbarbatica, [19260], Australia, Queensland, Conway State Forest, 18 km east-north-east of Proserpine, 20°21' S, 148°45' E, 180 m.

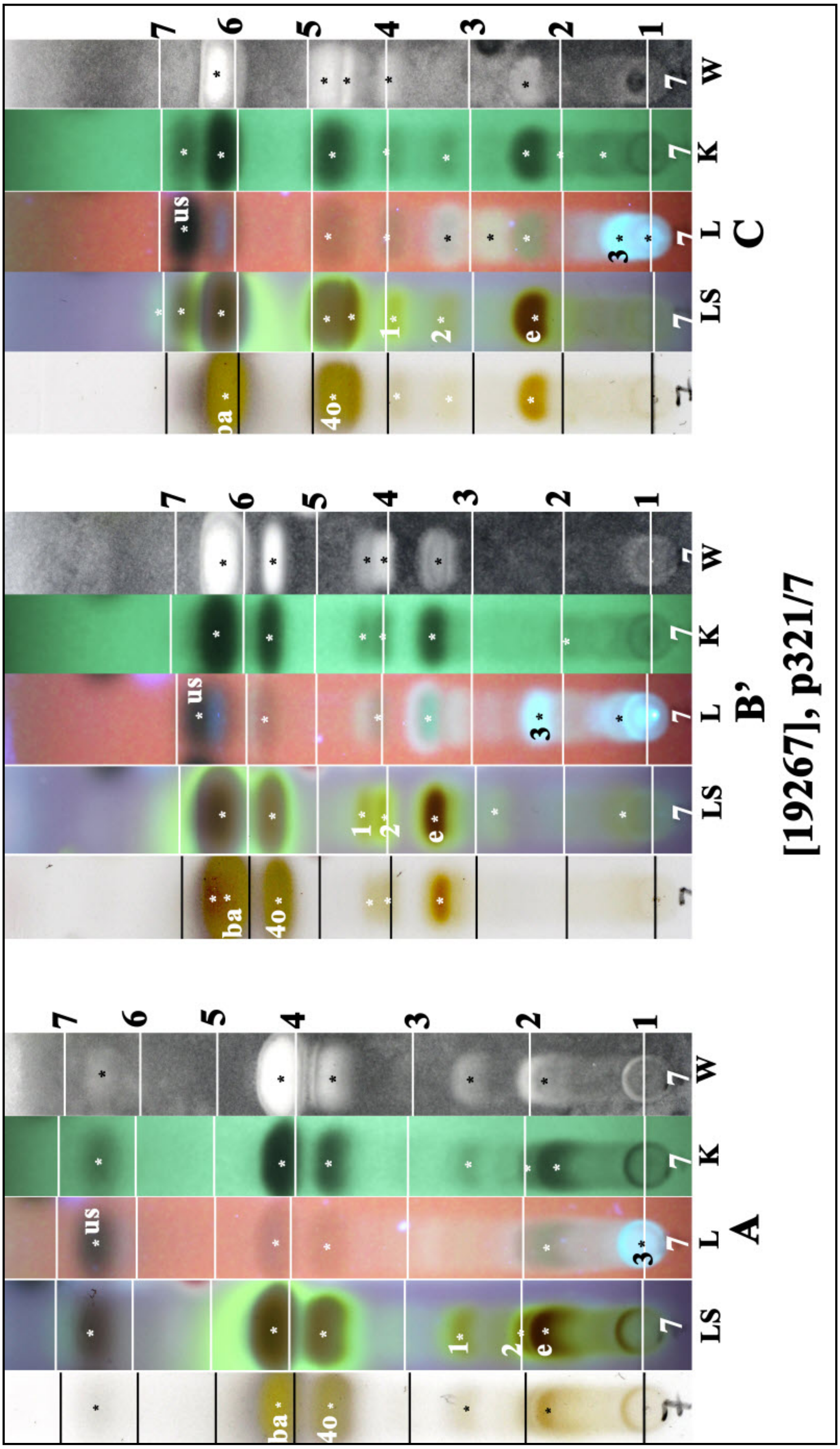
4-*O*-demethylbarbatic acid



us: usnic acid, ba: barbatic acid, **40: 4-*O*-demethylbarbatic acid**

Relicinopsis rahengensis, [19266], Australia, Northern Territory, Wangi Falls, Litchfield Park, 40 km south-west of Batchelor, 13°10' S, 130°41' E, 180 m.

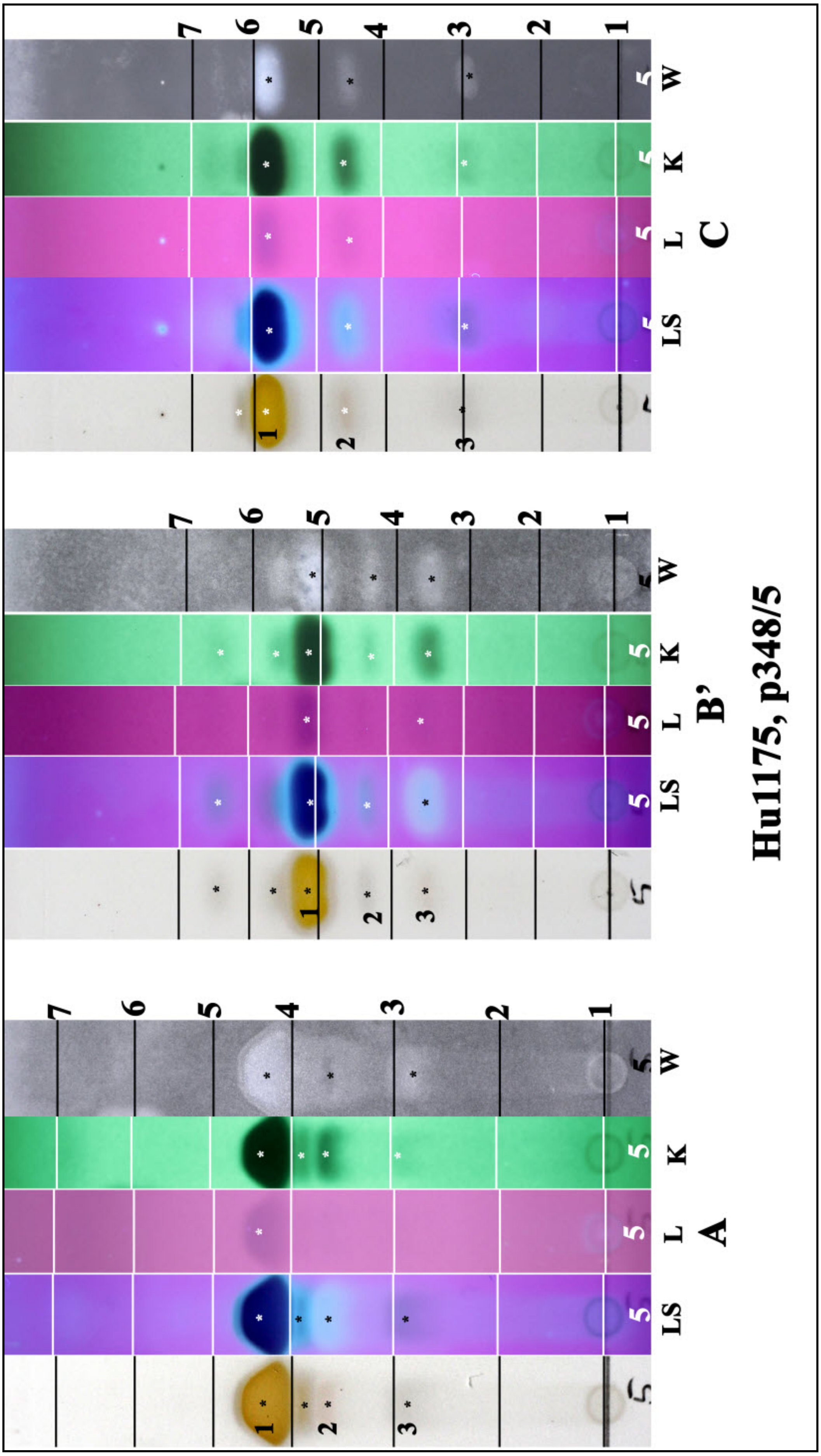
4-*O*-demethylbarbatic acid



us: usnic acid, ba: barbatic acid, **4o: 4-*O*-demethylbarbatic acid**, e: echinocarpic acid,
1: conechinocarpic acid, 2: subechinocarpic acid, 3: unknown

Relicinopsis rahengensis, [19267], Australia, Queensland, Conway State Forest, 18 km east-north-east of Proserpine, 20°21' S, 148°45' E, 180 m

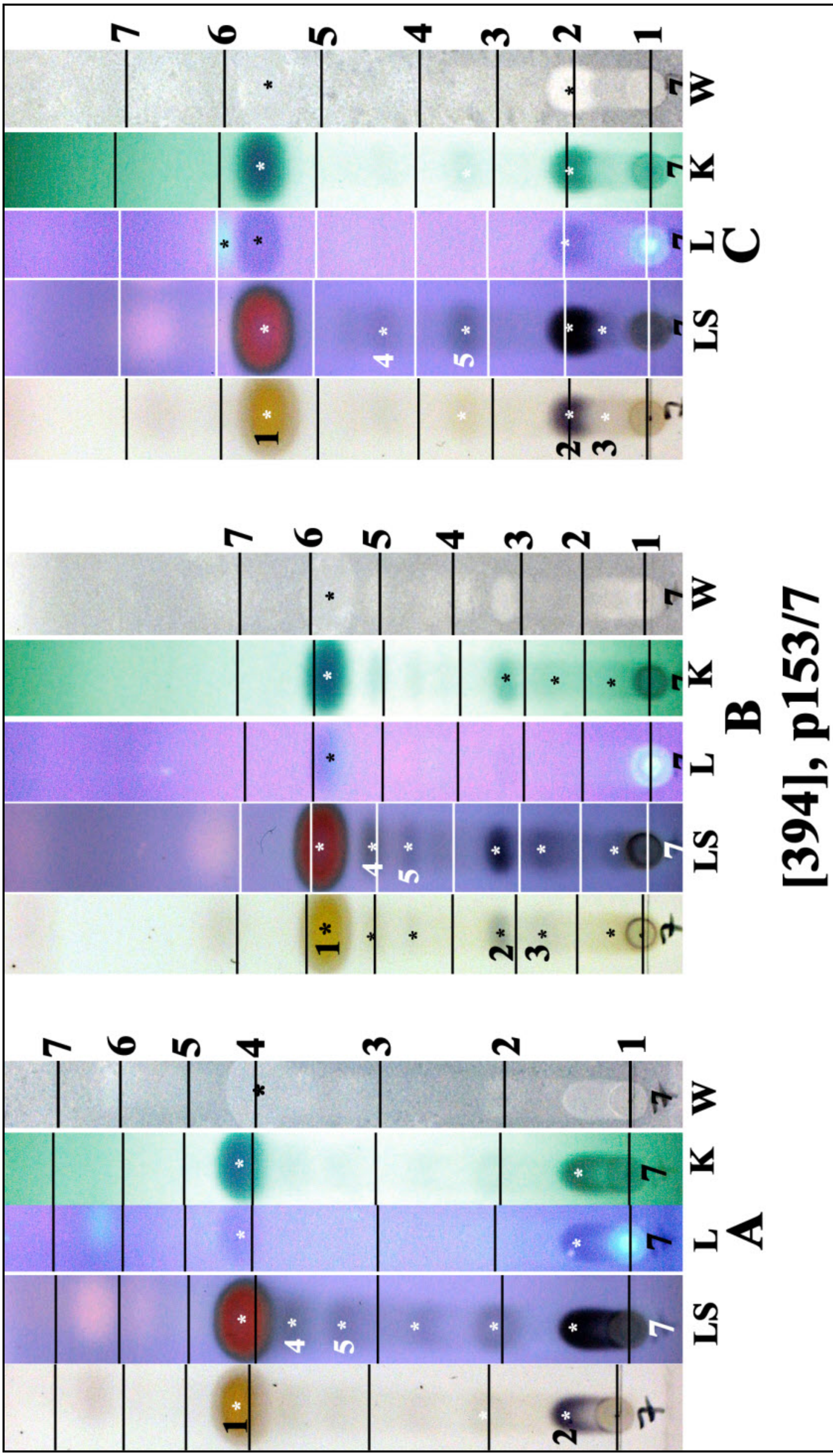
4-*O*-demethylglomelliferic acid



1: glomelliferic acid, 2: glomellic acid, 3: **4-*O*-demethylglomelliferic acid**, conf. J.A. Elix

S. Huneck's collection of lichen substances No 1175b: glomelliferic acid. Botanisches Museum Berlin-Dahlem

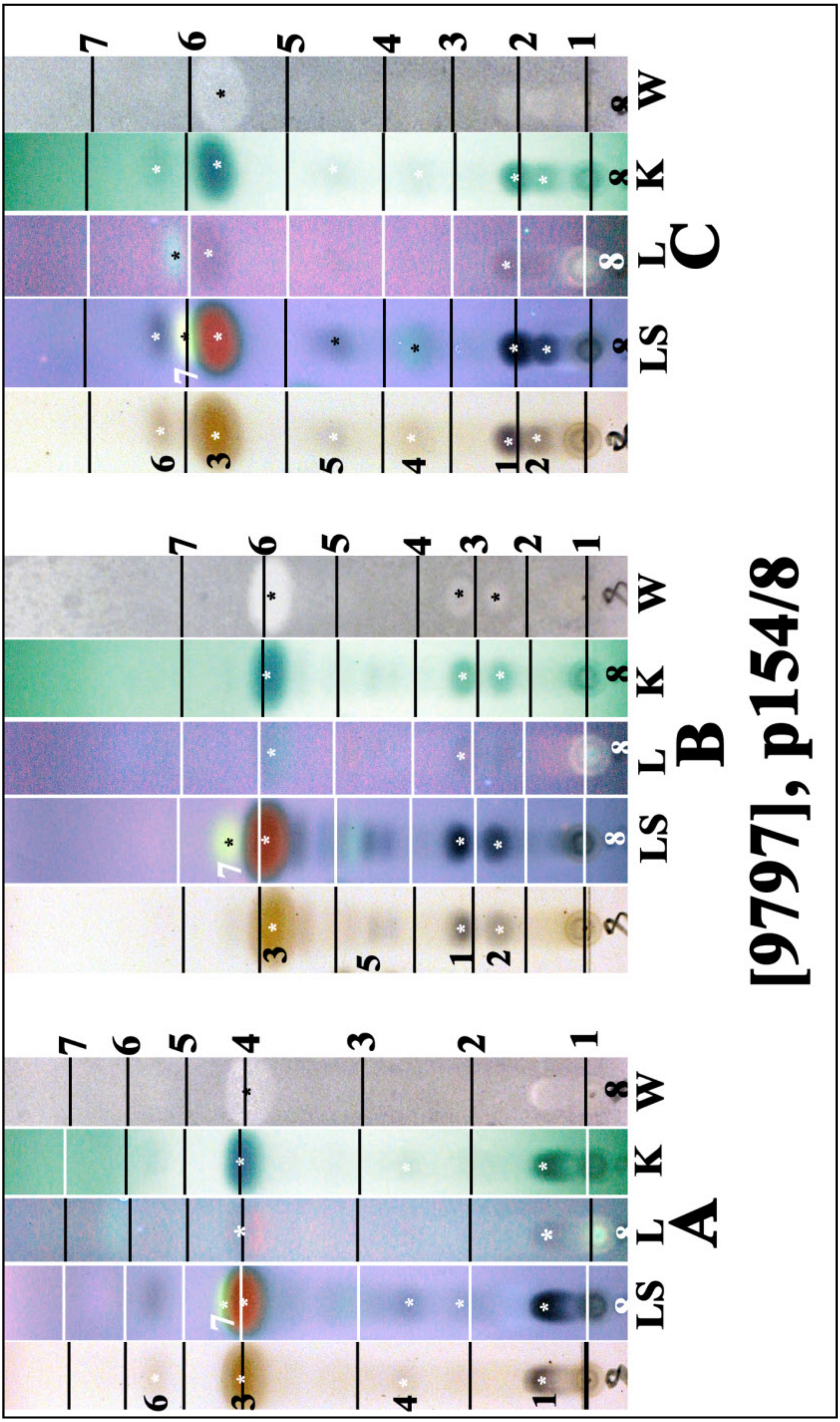
4-*O*-demethylgrayanic acid



1: grayanic acid, 2: fumarprotocetraric acid, 3: protocetraric acid, 4: congrayanic acid ,**5: 4-*O*-demethylgrayanic acid**, conf. J.A. Elix

Cladonia grayi, [394], Germany, Baden-Württemberg, Schwarzwald, Freudenstadt, TK 7516. Leg. F. Schumm, 4.05.1967.

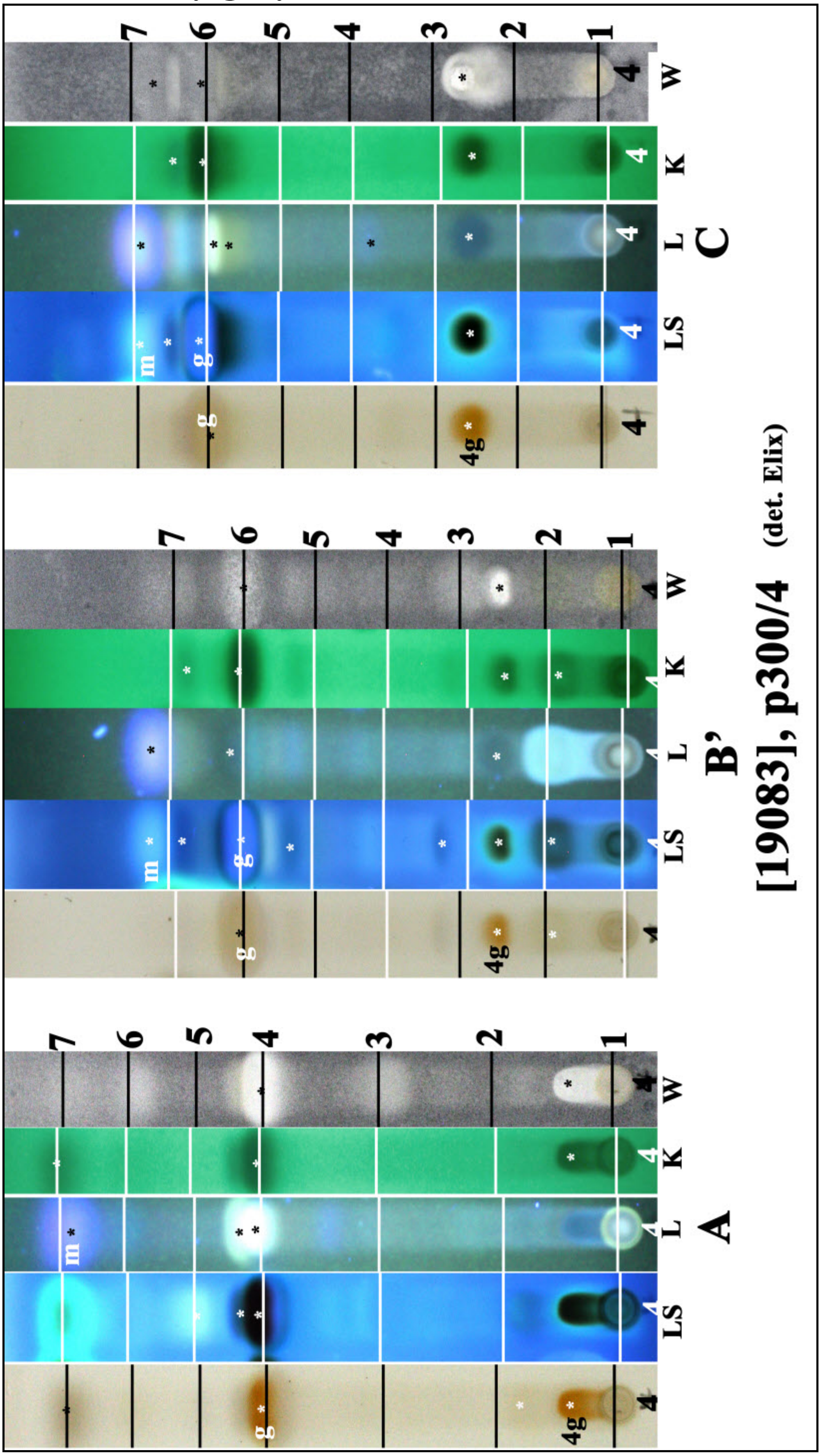
4-*O*-demethylgrayanic acid



1: fumarprotocetraric acid, 1: protocetraric acid, 3: grayanic acid, **4: 4-*O*-demethylgrayanic acid**, 5: congrayanic acid, 6: unknown, conf. J.A. Elix

Cladonia grayi, [9797], Germany, Baden-Württemberg, Kreis Calw, Wildbad, im kleinen Enztal an der Straße nach Calmbach, TK 7217. Leg. Erich Putzler 15.04.1949, det. F. Schumm.

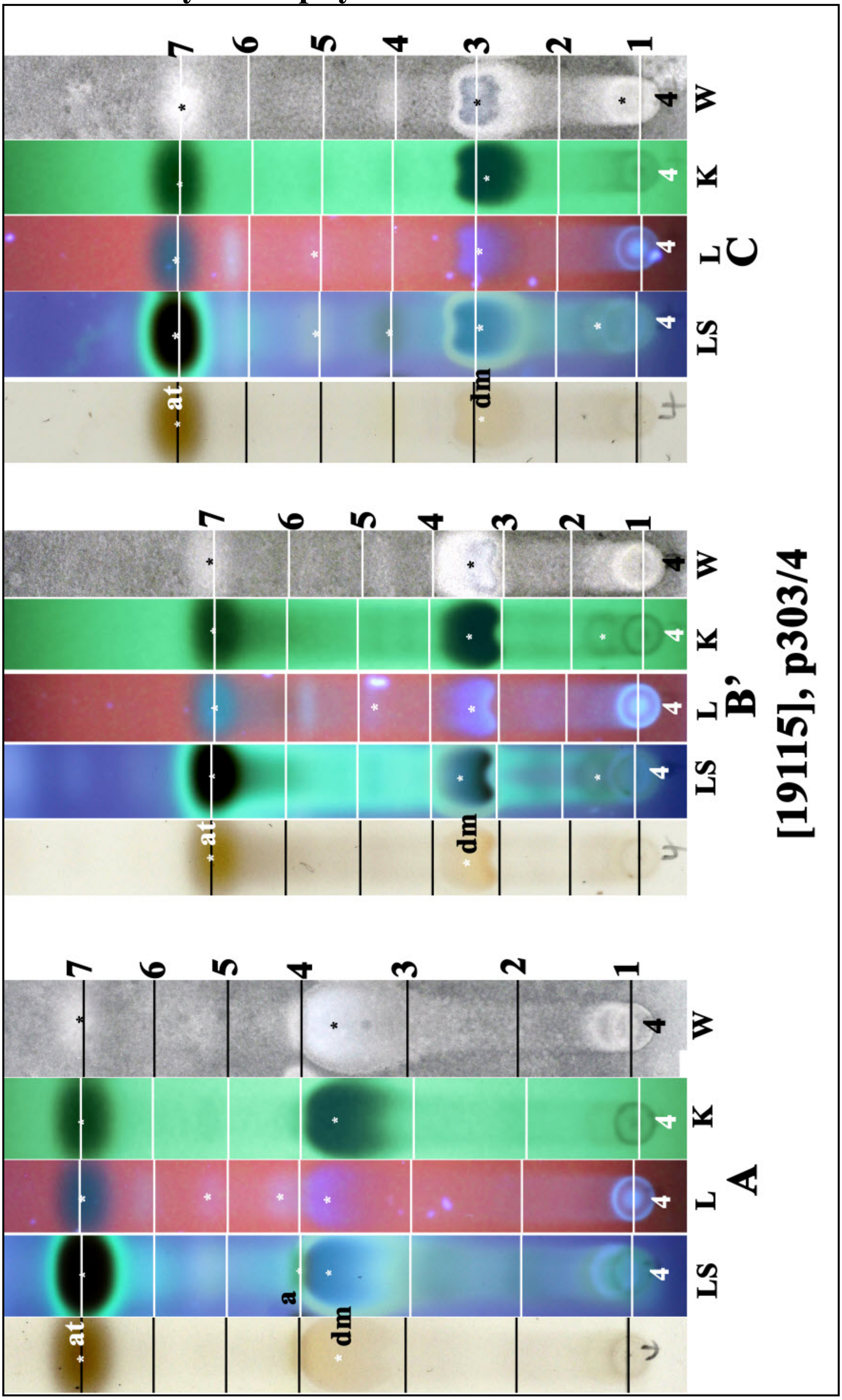
4-*O*-demethylgrayanic acid



g: grayanic acid, **4g: 4-*O*-demethylgrayanic acid**, m: melacarpic acid

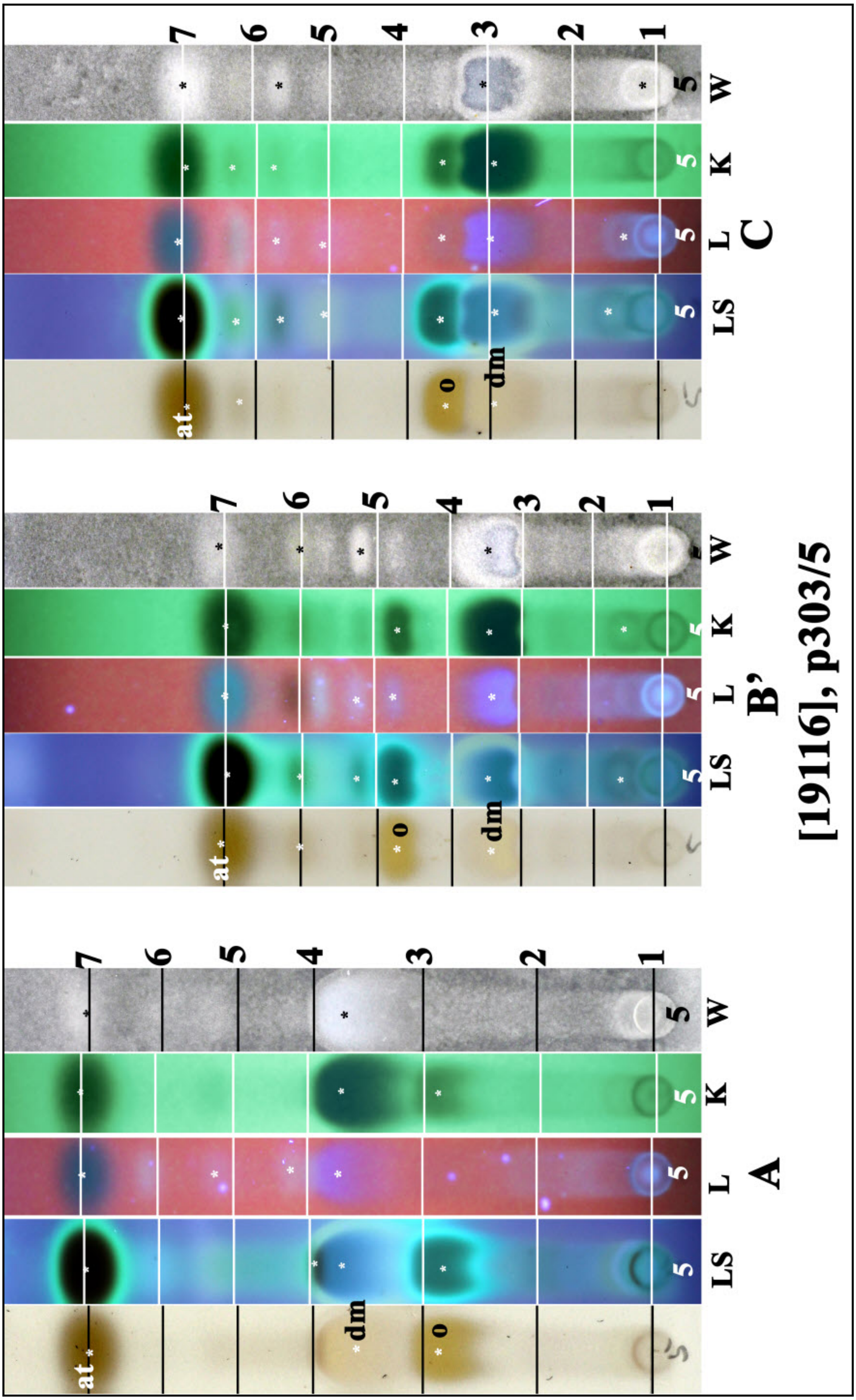
Neophyllis melacarpa, [19083], Australia, New South Wales, Great dividing Range, 6 km east of Captains Flat, 2 km north of Parkers Gap.

4-*O*-demethylmicrophyllinic acid



Parmotrema demethylmicrophyllinicum, [19115], Australia, Queensland, hanging Pinnacle (Dempseys Peak), 7 km east of Mt. Garnet.

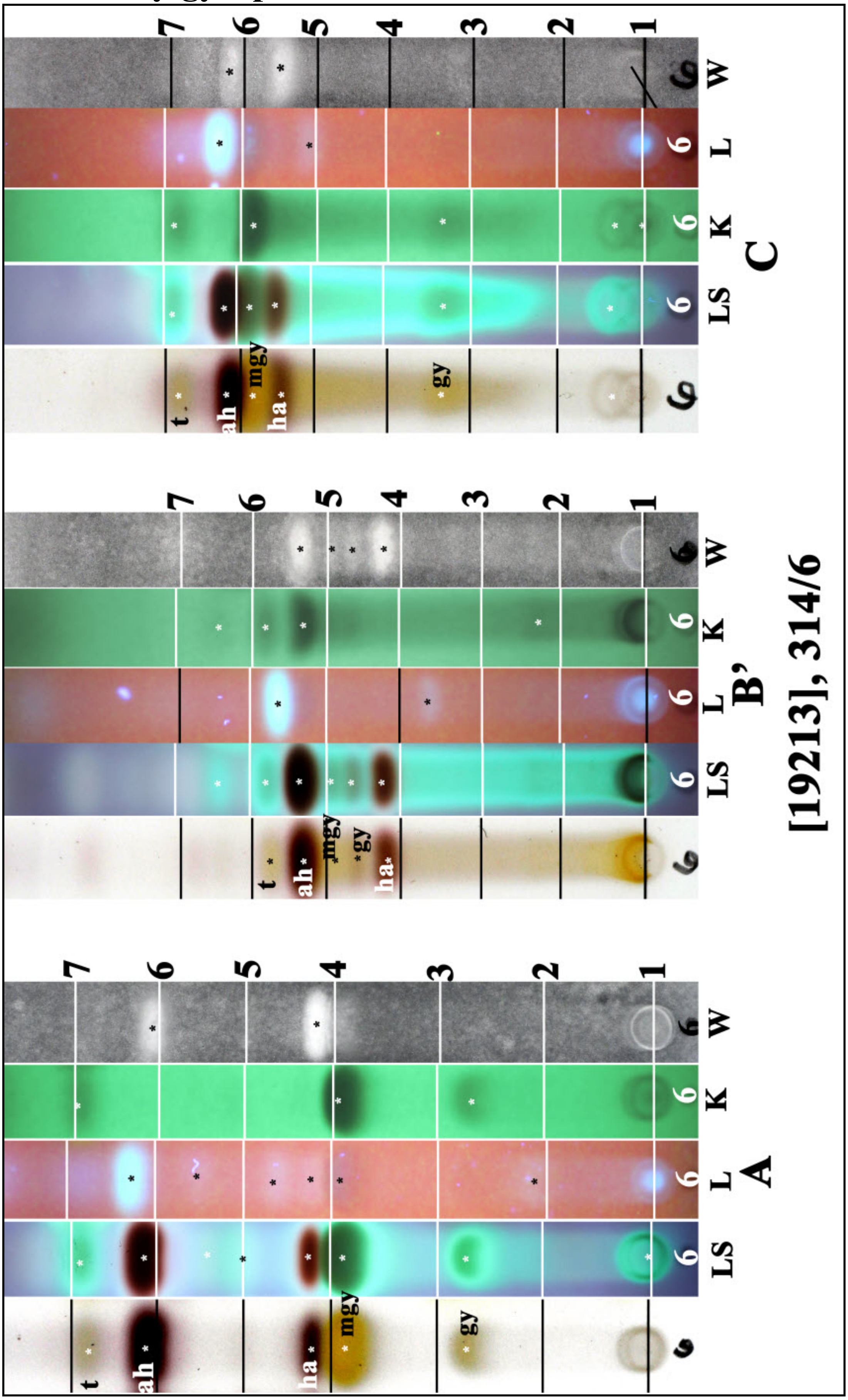
4-*O*-demethylmicrophyllinic acid



at: atranorin, **dm: 4-*O*-demethylmicrophyllinic acid**, o: olivetoric acid

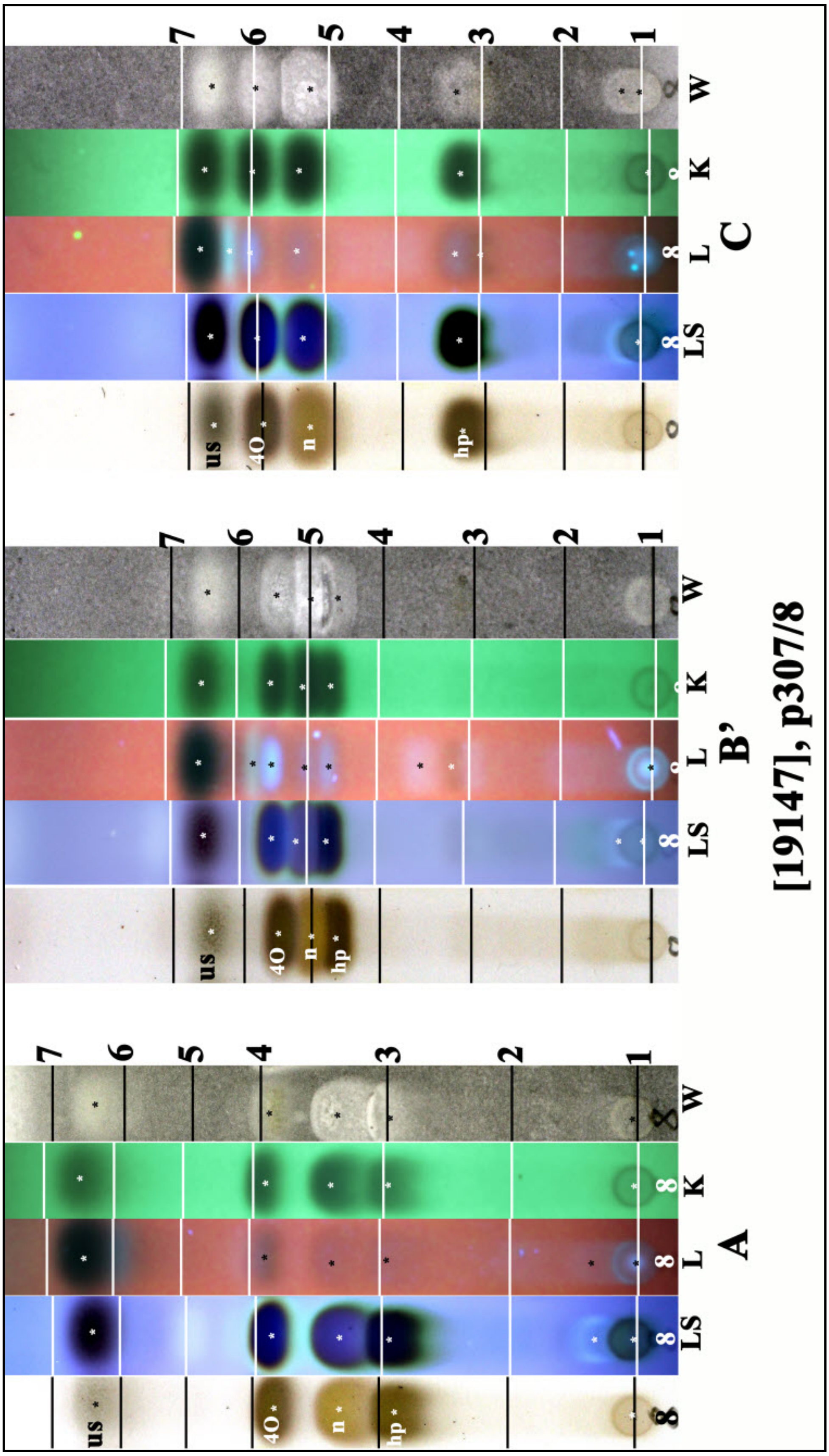
Parmotrema demethylmicrophyllinicum, [19116], Australia, Queensland, Mt. Windsor Tableland, 37 km north-west of Mossman.

4-*O*-methylgyrophoric acid



Pseudocyphellaria sulphurea, [19213], Australia, Queensland, Kirrima State Forest, Cardwell Range, 24 km west-north-west of Cardwell, 18°12' S, 145°48' E, 750 m.

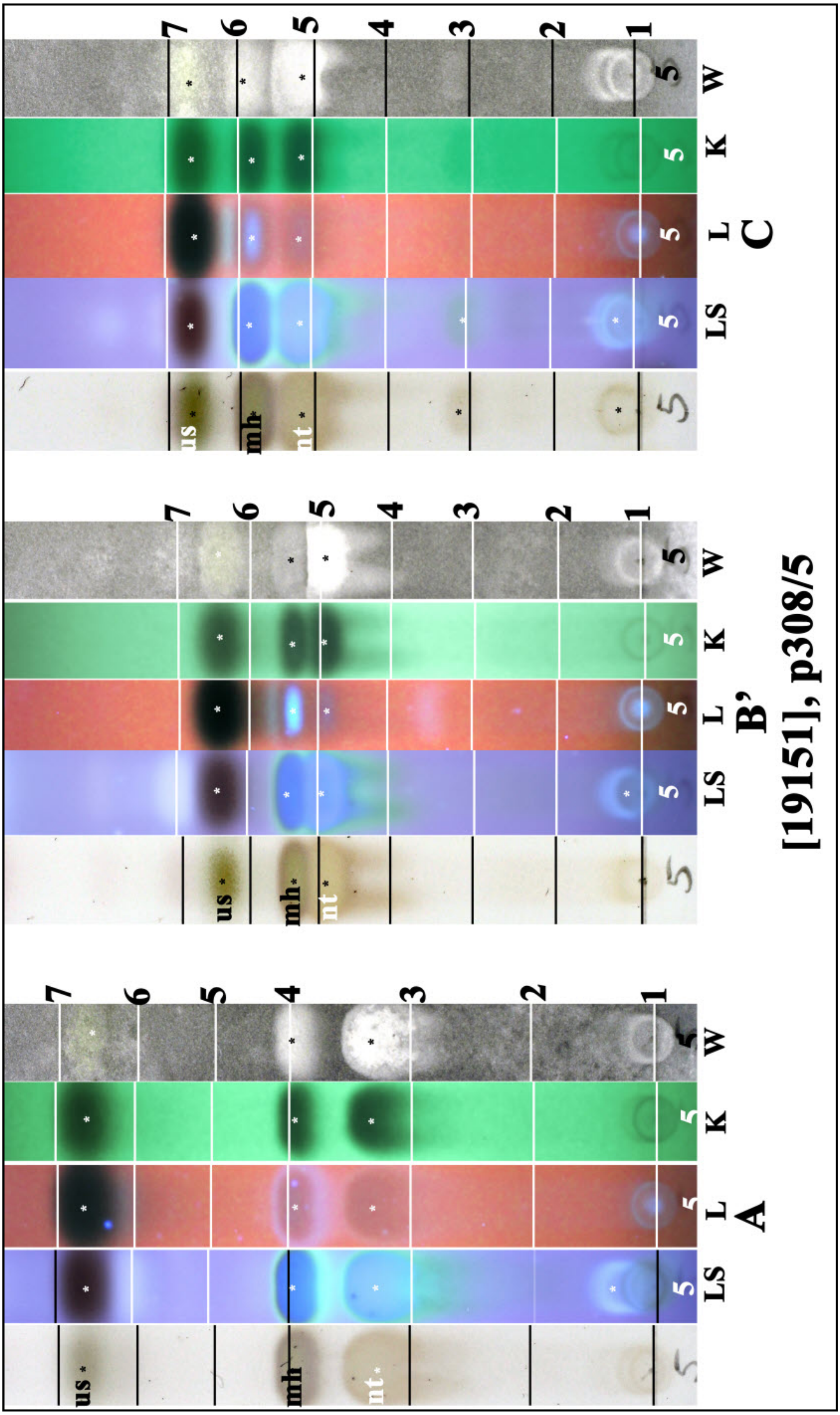
4-*O*-methylhypoprotocetraric acid



us: usnic acid, **4O: 4-*O*-methylhypoprotocetraric acid** (3,8/5,5/6), n: notatic acid (3,3/5/5,3), hp: hypoprotocetraric acid (2,9/4,6/3,25)

Xanthoparmelia hypoprotocetrarica, [19147], Australia, Australian Capital Territory, 4.5 km south of Tharwa, 35°34' S, 149°04' E, 670 m, growing on exposed granite rocks in open pasture land. This collection is obviously a mix of ***Xanthoparmelia notata*** and ***Xanthoparmelia hypoprotocetrarica***.

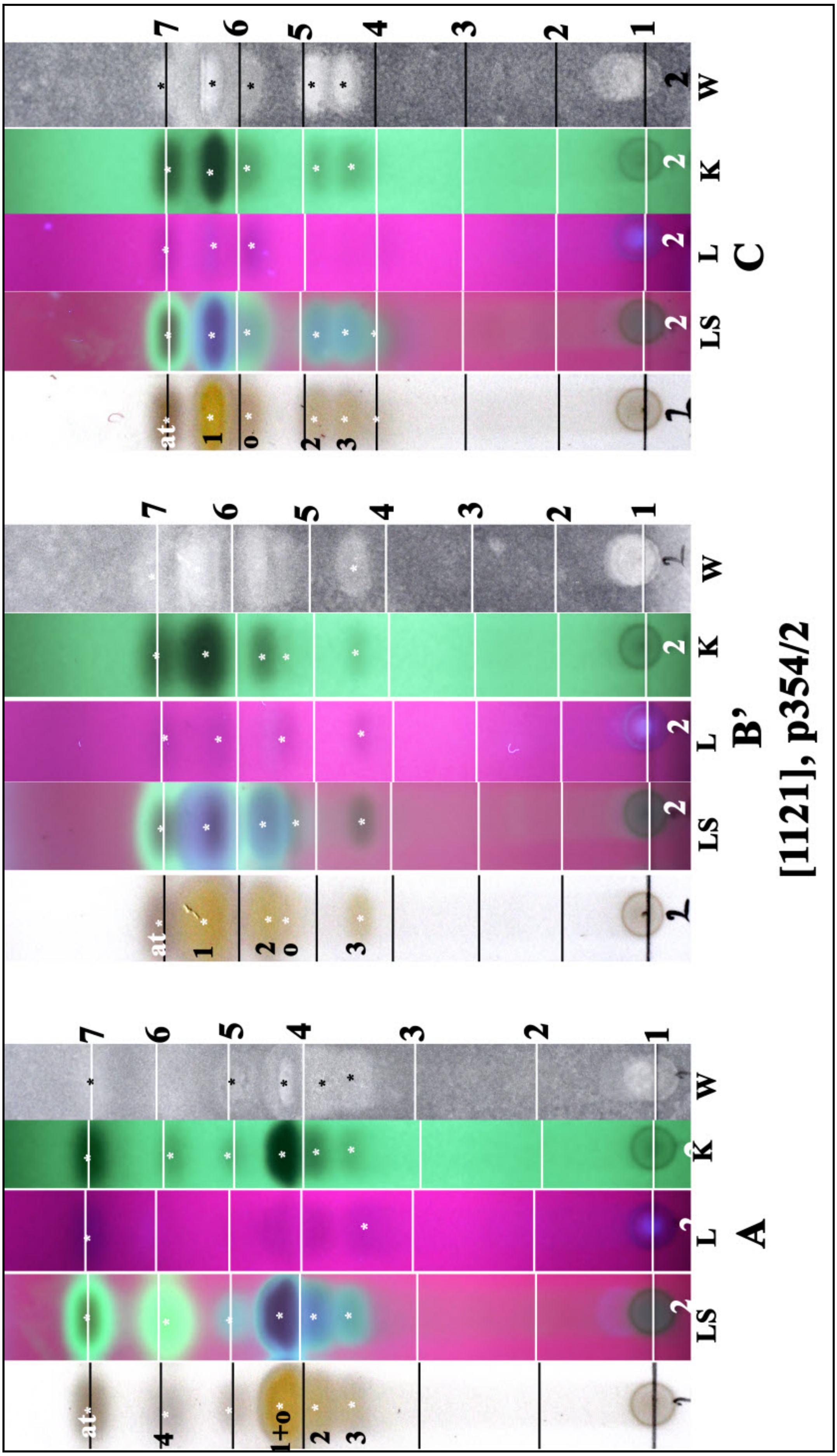
4-*O*-methylhypoprotocetraric acid



us: usnic acid, nt: notatic acid (3.33|4.98|5.18), **mh: 4-*O*-methylhypoprotocetraric acid** (3.96|5.41|5.88)

Xanthoparmelia notata, [19151], Australia, South Australia, Mt. Lofty Ranges, Borthwick road, 6.5 km east of Tungkillo, 34°50' S, 139°09'E, 470 m, growing on exposed granite rocks in pasture land.

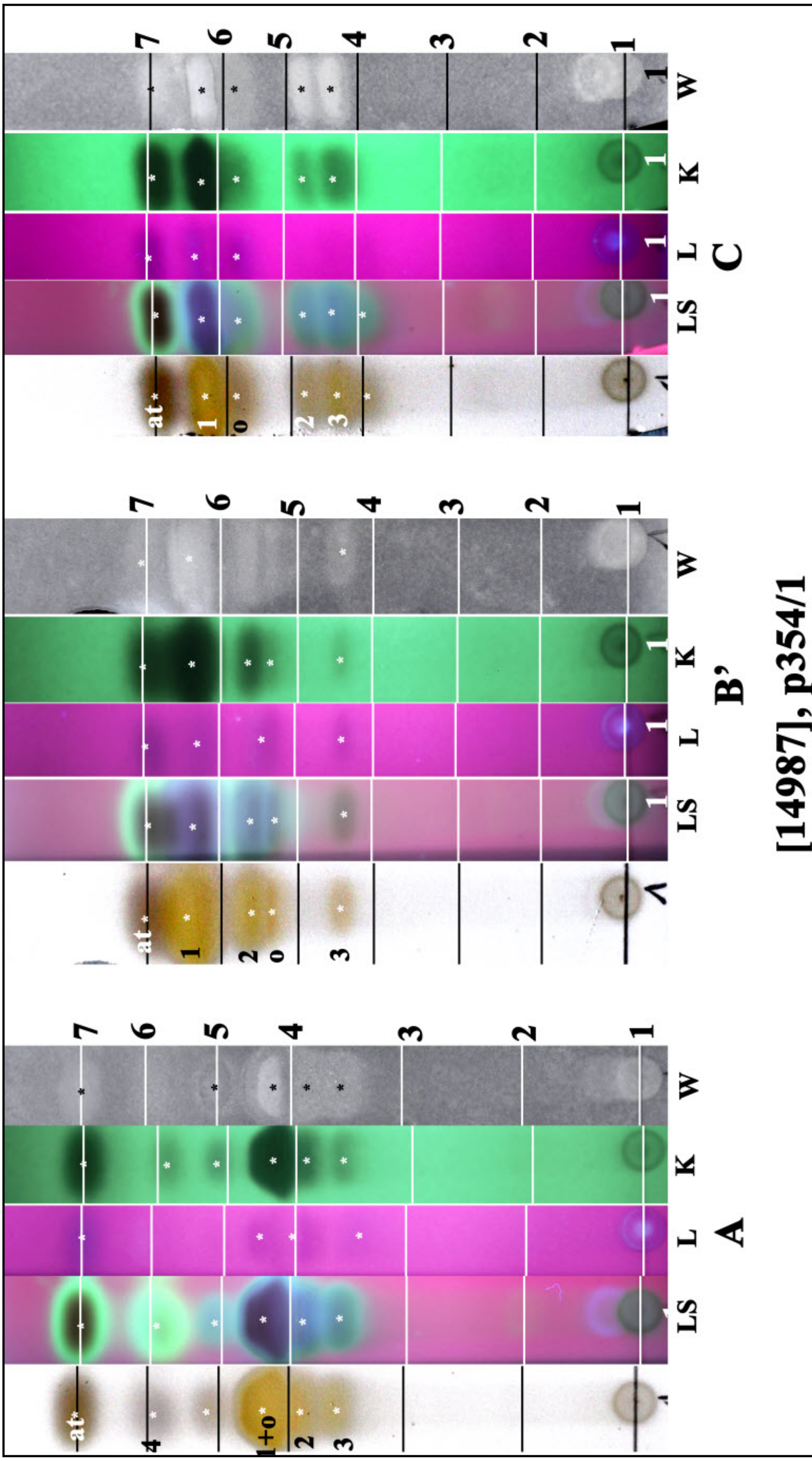
4-*O*-methylolivetoric acid



at: atranorin, 1: perlatolic acid, 2: anziaic acid, 3: olivetoric acid, 4: superlatolic acid, **o: 4-*O*-methylolivetoric acid**, conf J.A. Elix

Cetrelia cetrarioides, [1121], Germany, Baden-Württemberg, Stuttgart, Rotwildpark, an Fagus, TK: 7220/2. Leg. et det. E. Putzler 17.05.1950.

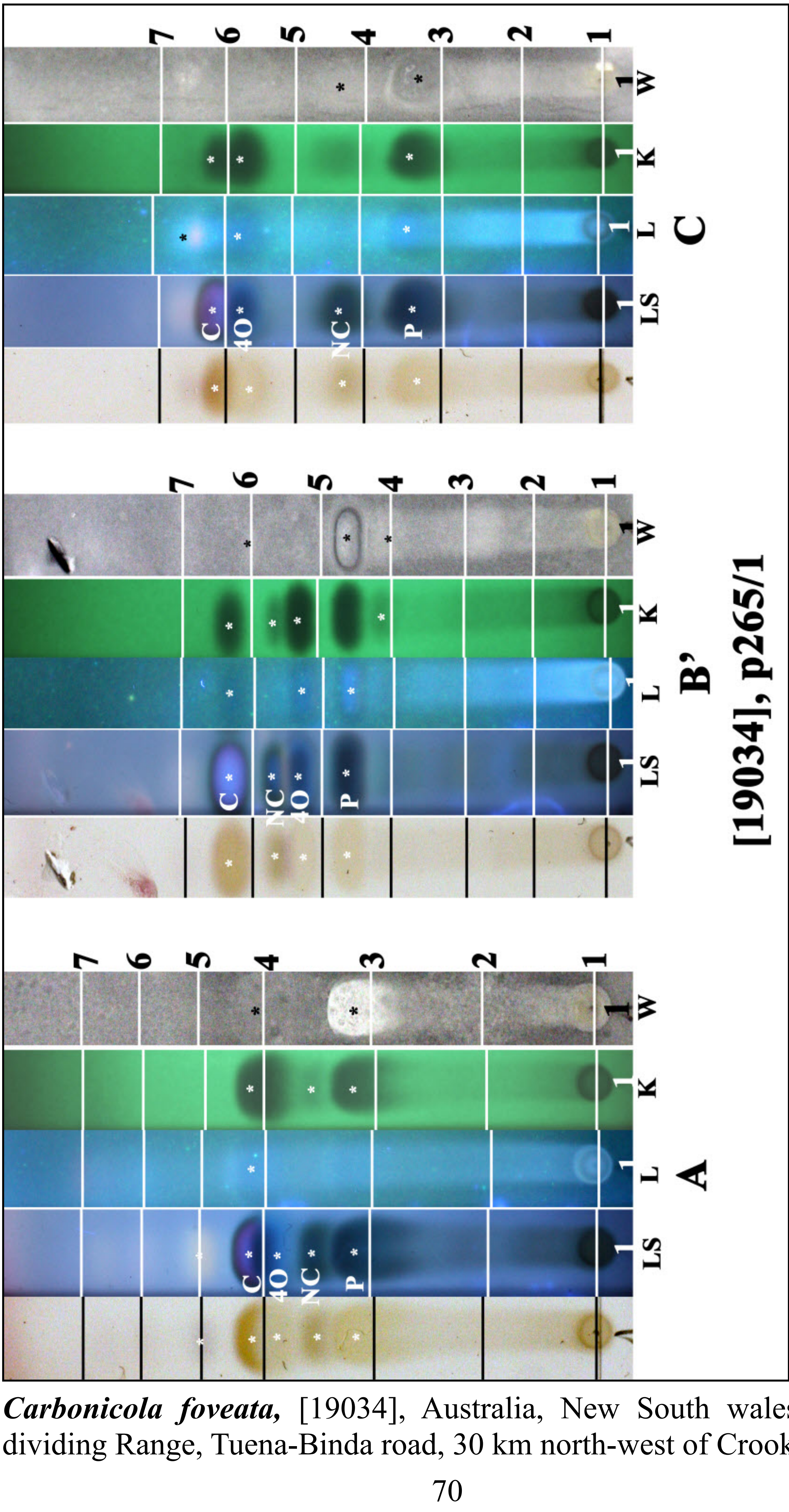
4-*O*-methylolivetoric acid



at: atranorin, 1: perlatolic acid, 2: anziaic acid, 3: olivetoric acid, 4: superlatolic acid, **o: 4-*O*-methylolivetoric acid**, conf. J.A. Elix.

Cetrelia cetrarioides, [14987], Germany, Bayern, Kreis Traunstein, Chiemgauer Alpen, Hochfelln, Weg von der Mittelstation der Seilbahn (47,76966°N, 12,57550°E, 1090 m) zur Talstation, an Fagus bei 950 m. Leg. et det. F. Schumm 27.08.2009.

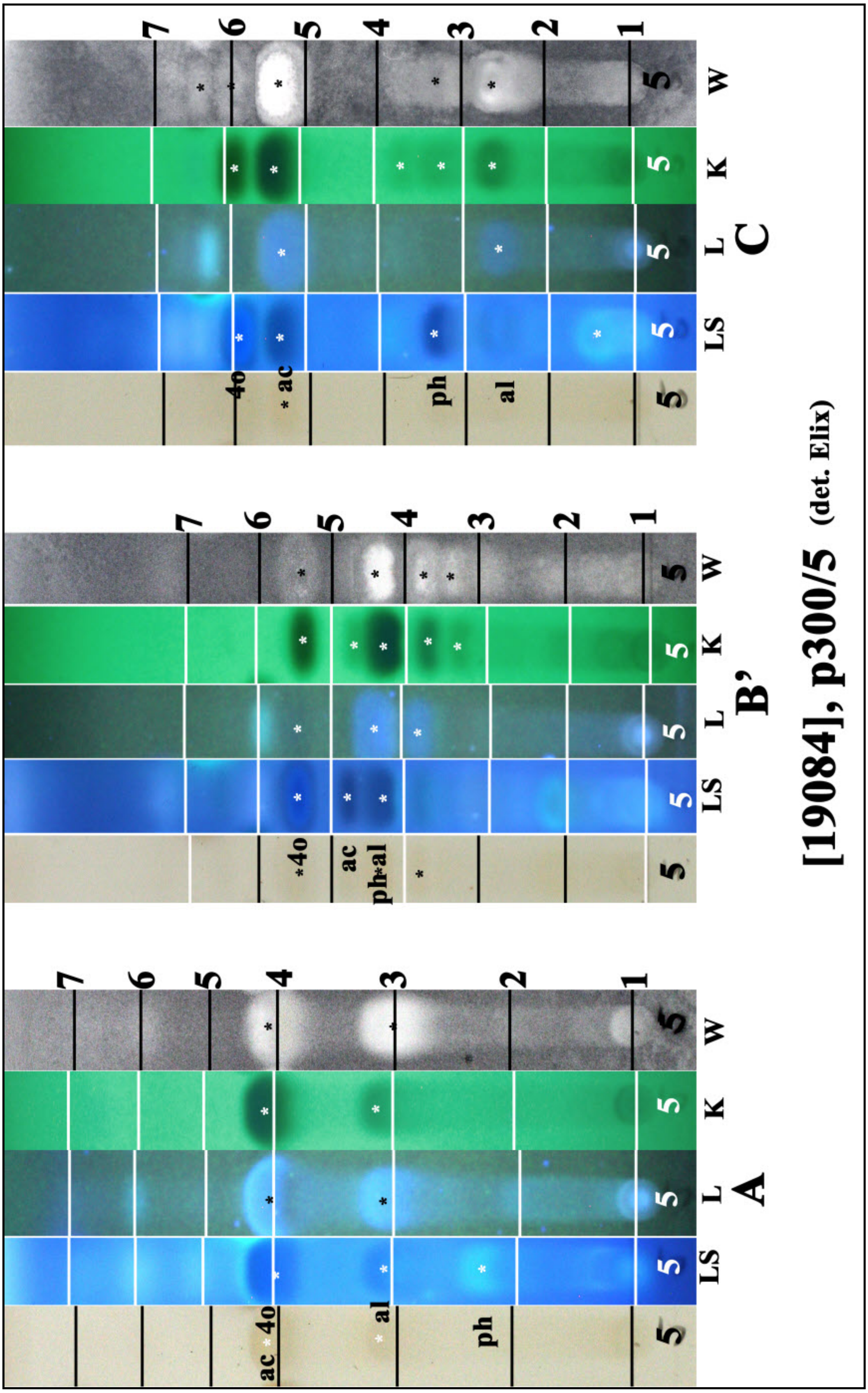
4-*O*-methylphysodic acid



C: colensoic acid, NC: norcolensoic acid, **4O: 4-*O*-methylphysodic acid**, P: physodic acid

Carbonicola foveata, [19034], Australia, New South wales, Great dividing Range, Tuena-Binda road, 30 km north-west of Crookwell

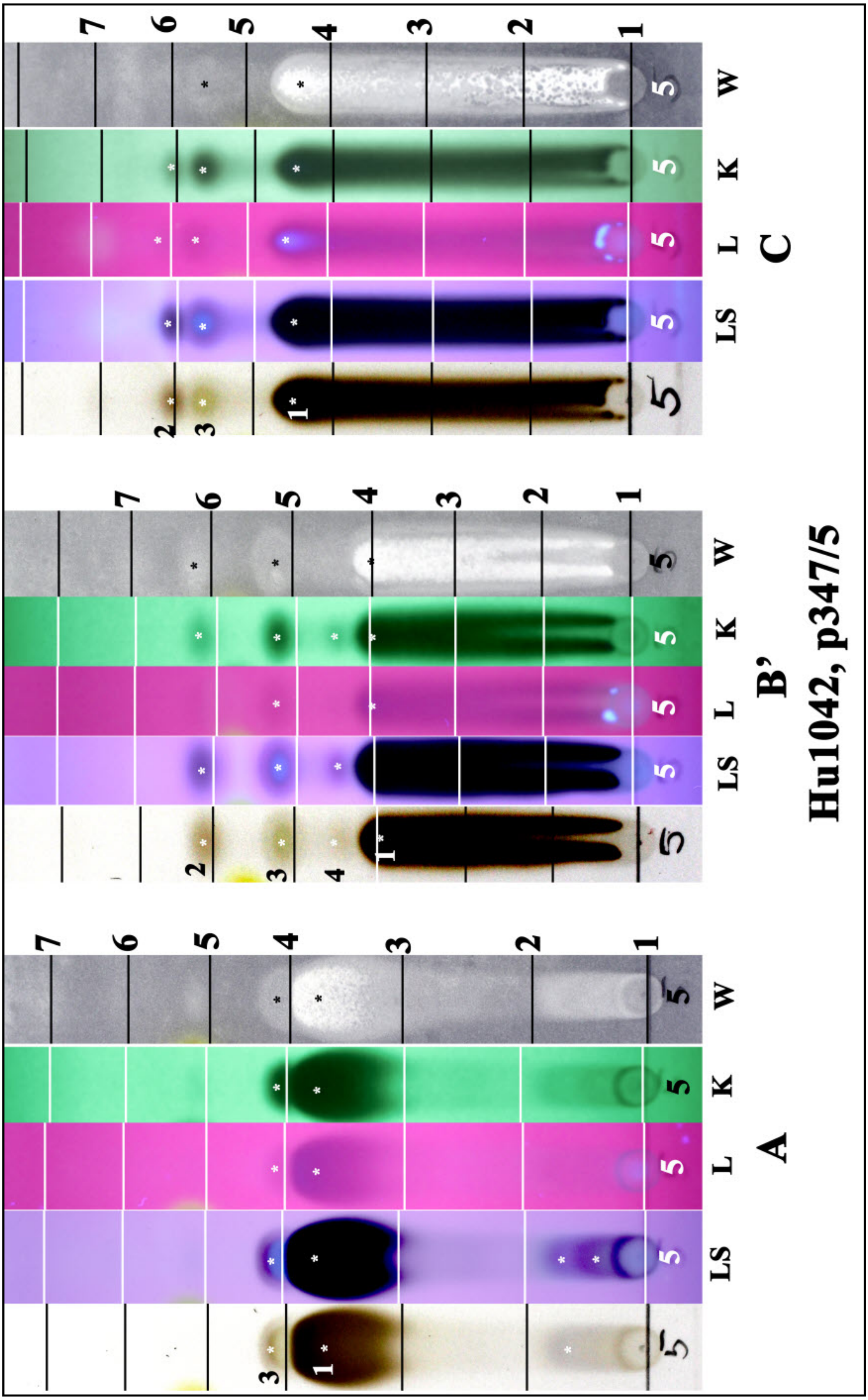
4-*O*-methylphysodic acid



ac: α-collatolic acid, al: alectoronic acid, **4o: 4-*O*-methylphysodic acid**, ph: physodic acid

Xanthoparmelia** (Neofuscelia)* ***imitatricoides, [19084], Australia, New South Wales, Morton National Park, 8 km north-east of Nerriga, 35°07' S, 150°08' E, 760 m, growing on sandstone rocks in open *Eucalyptus* woodland. TOPOTYPE. Leg. J.A. Elix

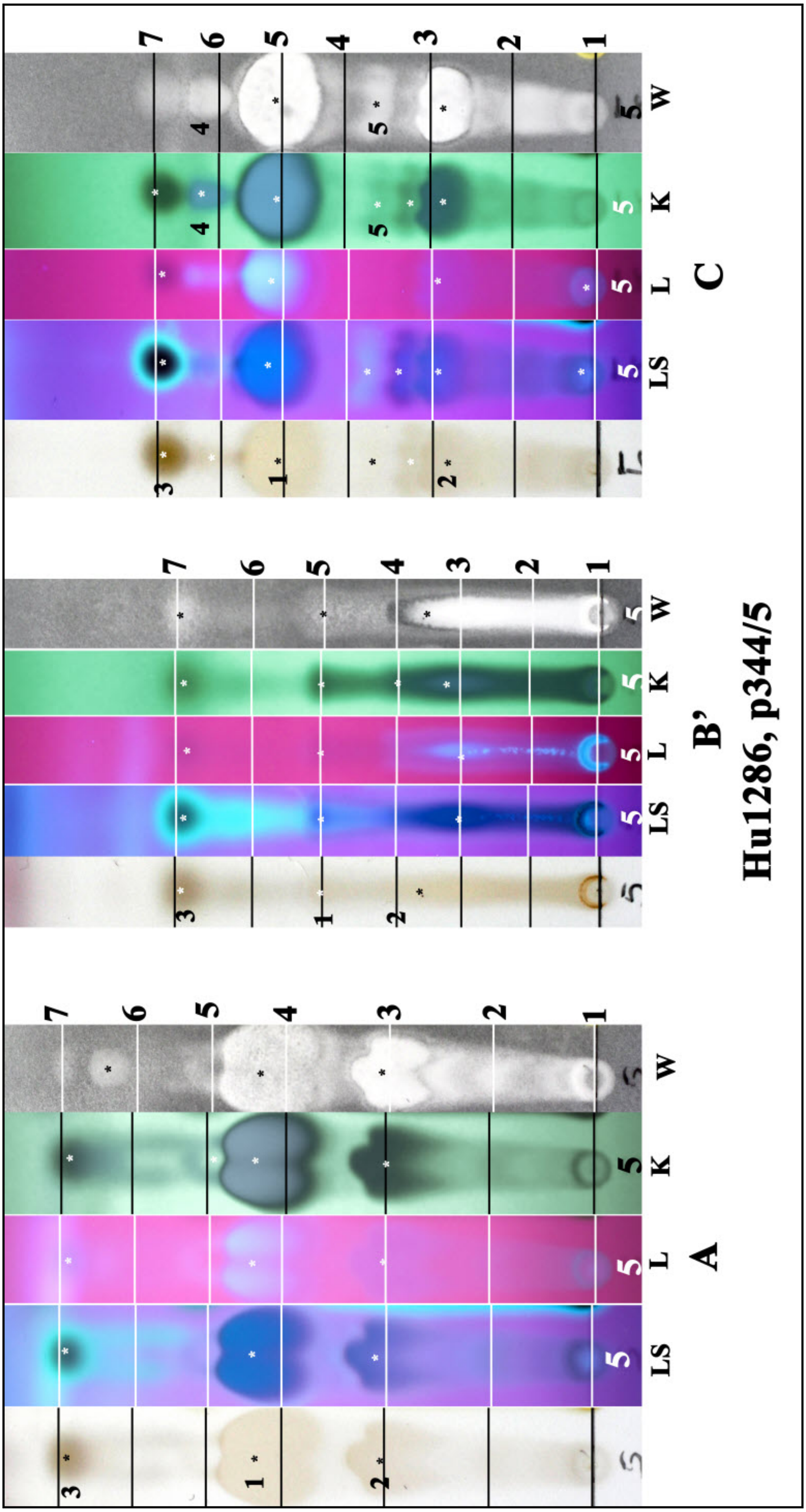
4-*O*-methylphysodic acid



1: lividic acid, 2: methoxycolensoic acid, **3: 4-*O*-methylphysodic acid**, 4: unknown

S. Huneck’s collection of lichen substances No 1042: lividic acid, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

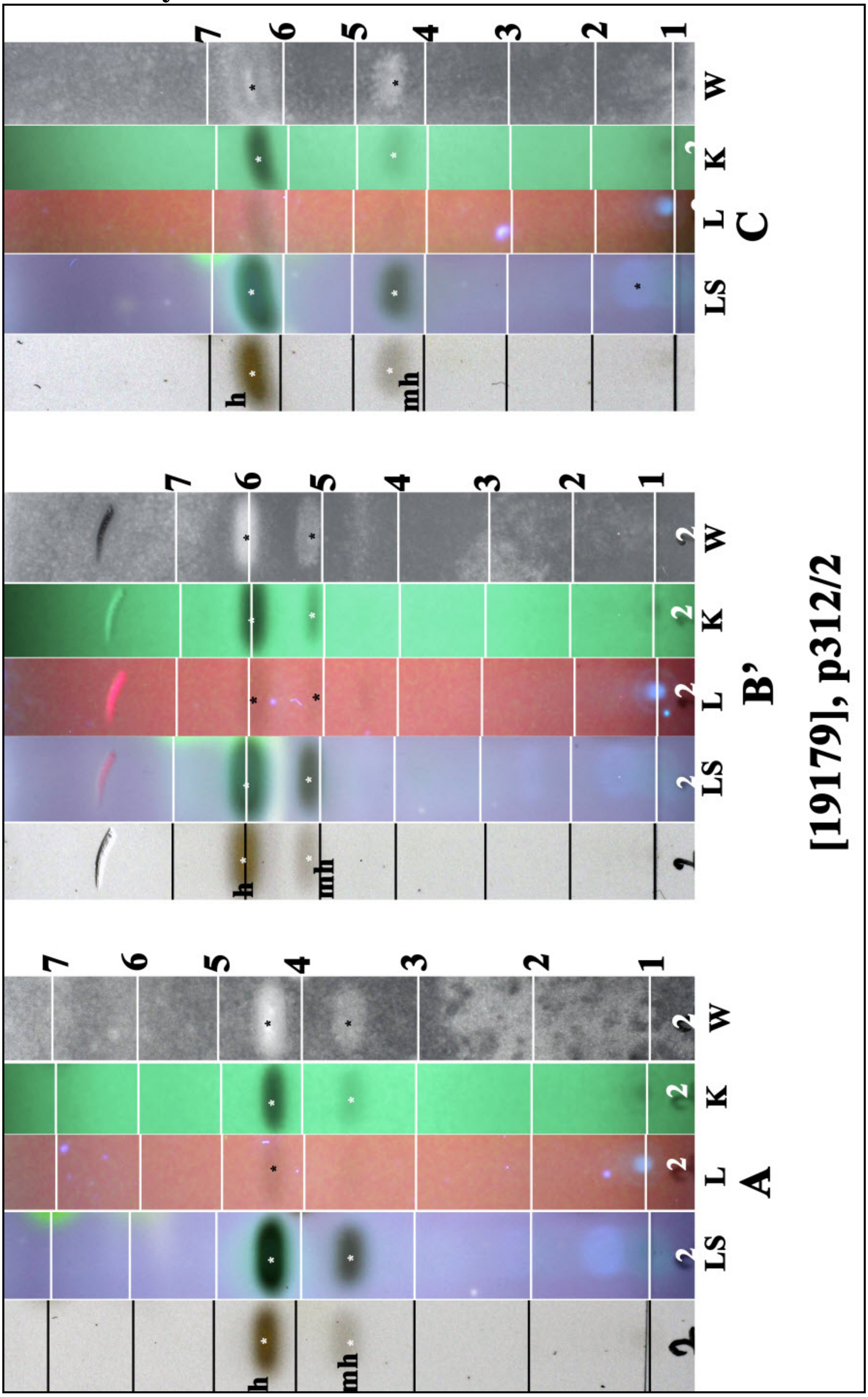
4-*O*-methylphysodic acid



1: α-collatolic acid, 2: alectoronic acid, 3: atranorin, 4: **4-*O*-methylphysodic acid**, 5: physodic acid, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 1286: α-collatolic acid
Botanisches Museum Berlin-Dahlem

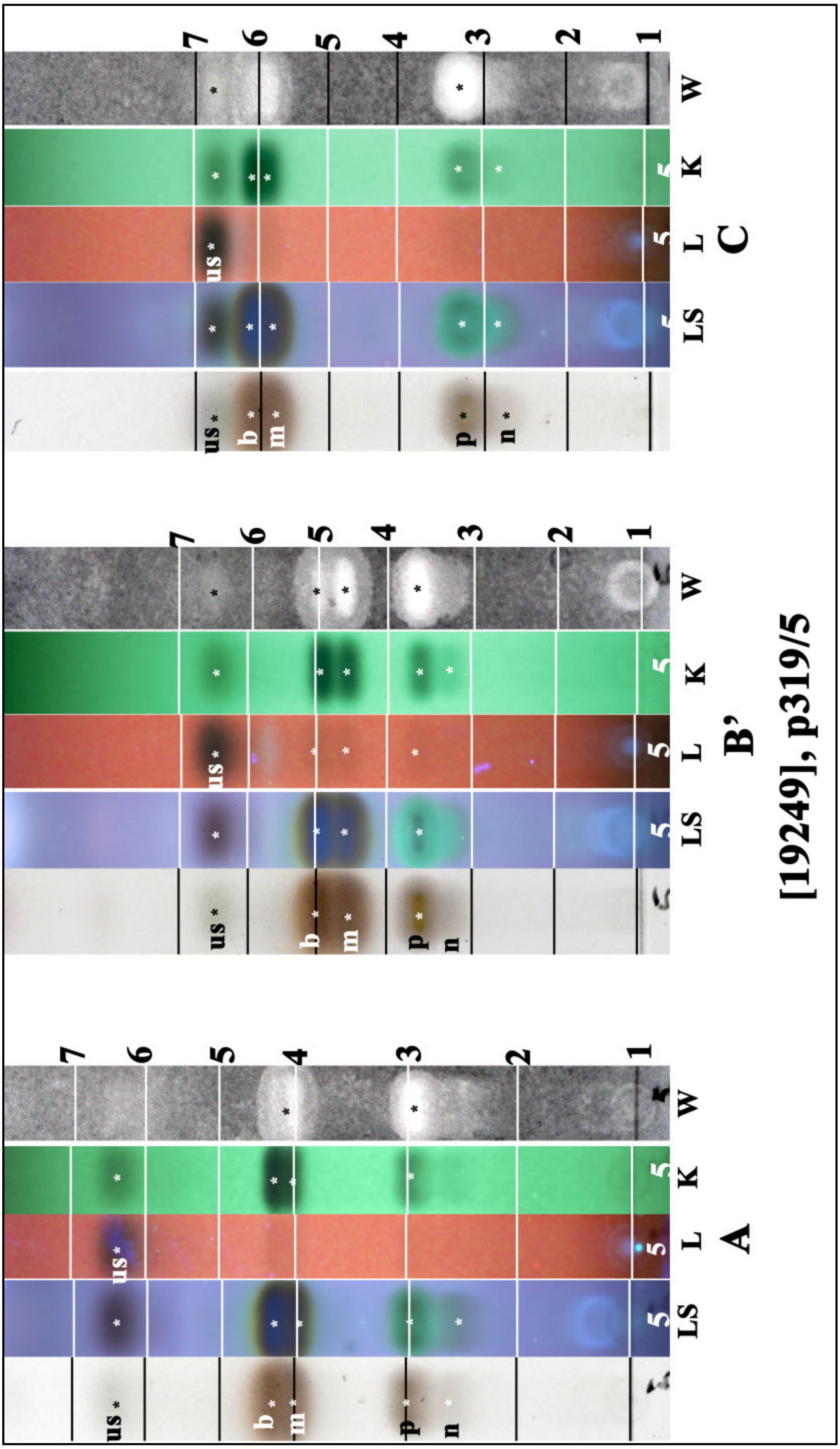
4’-*O*-methylnorhomosekikaic acid



h: homosekikaic acid, mh: **4'-*O*-methylnorhomosekikaic acid**

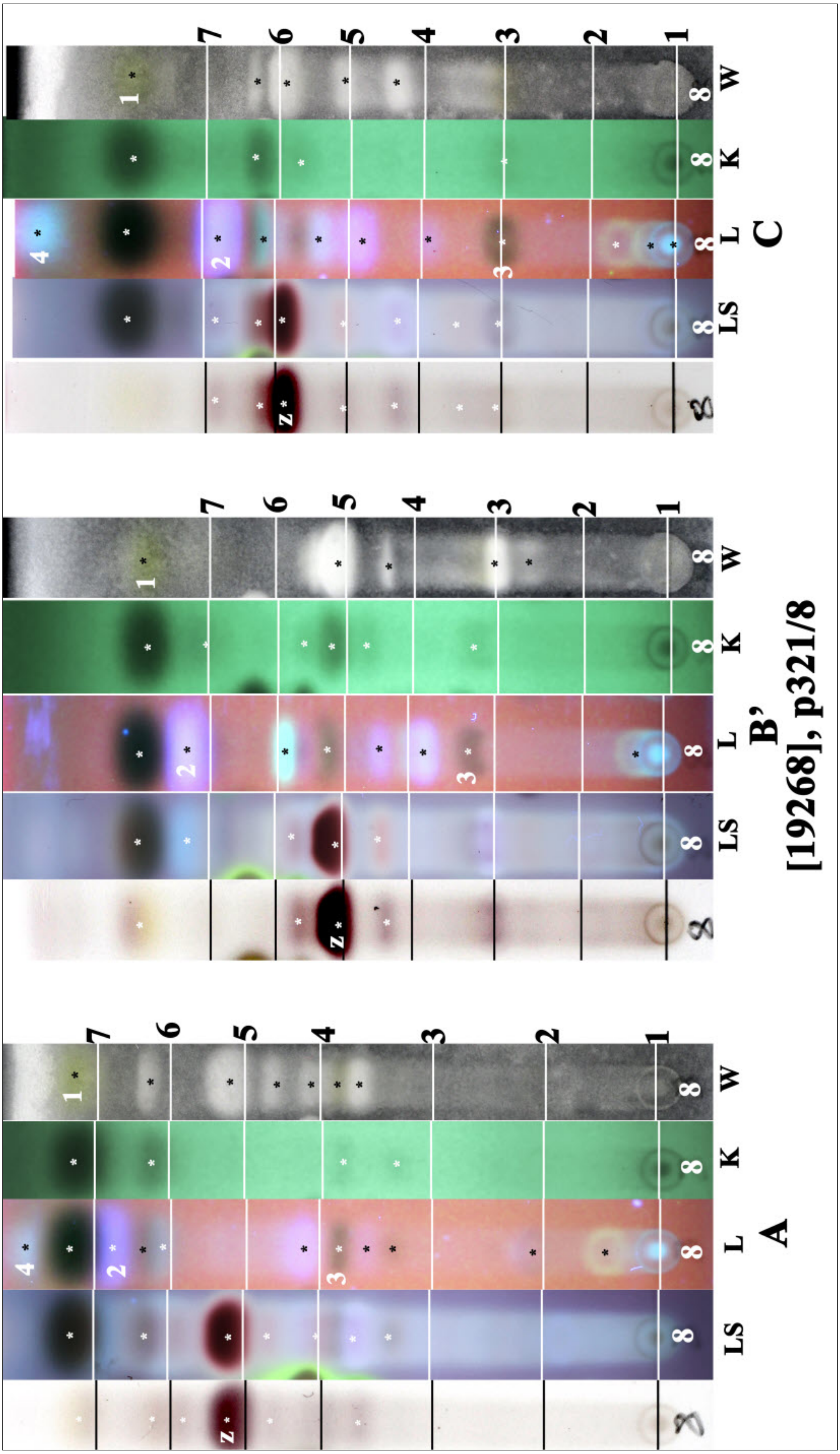
Cladia moniliformis, [19179], Australia, Tasmania, Scotts Peak Road near airstrip, 43°02' S, 146°19' E, 340 m.

4’-*O*-methylpaludosic acid



Ramalina leiodea, [19249], Australia, Queensland, Tin Can Inlet, Tin Can Bay, 25°54' S, 153°01' E, sea level.

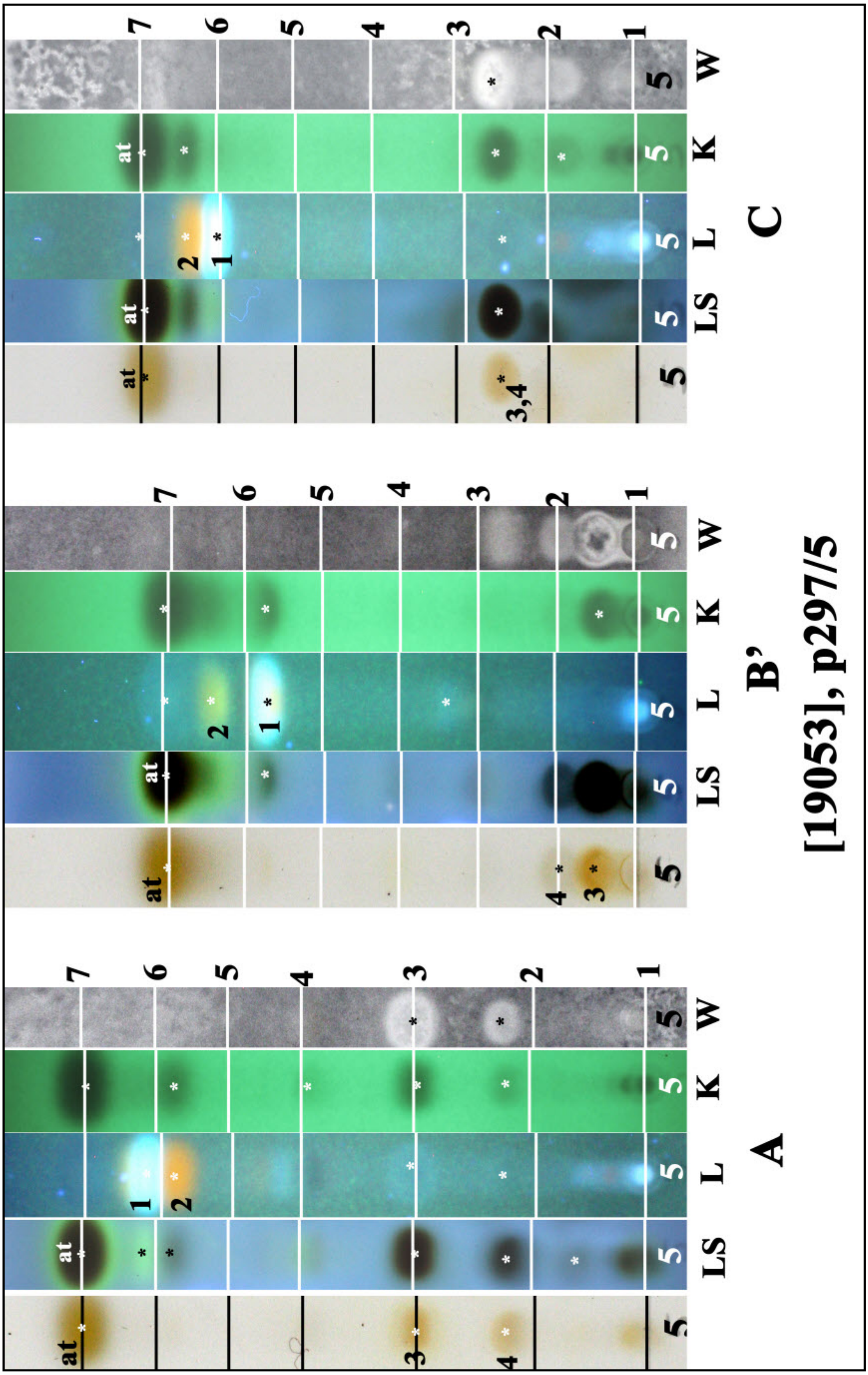
5,7-dichloro-2,8-dihydroxy-1,3-dimethylxanthone



z: zeorin, 1: thiomelin (yellow pigment), **2: 5,7-dichloro-2,8-dihydroxy-1,3-dimethylxanthone**, 3: unknown, 4: 5,7-dichloro-8-hydroxy-2-methoxy-1,3-dimethylxanthone

Rinodina thiomela, [19268], Australia, Australian Capital Territory, Mongolo Gorge Reserve, 15 km east of Canberra, 35°16' S, 149° 16' E, 650 m.

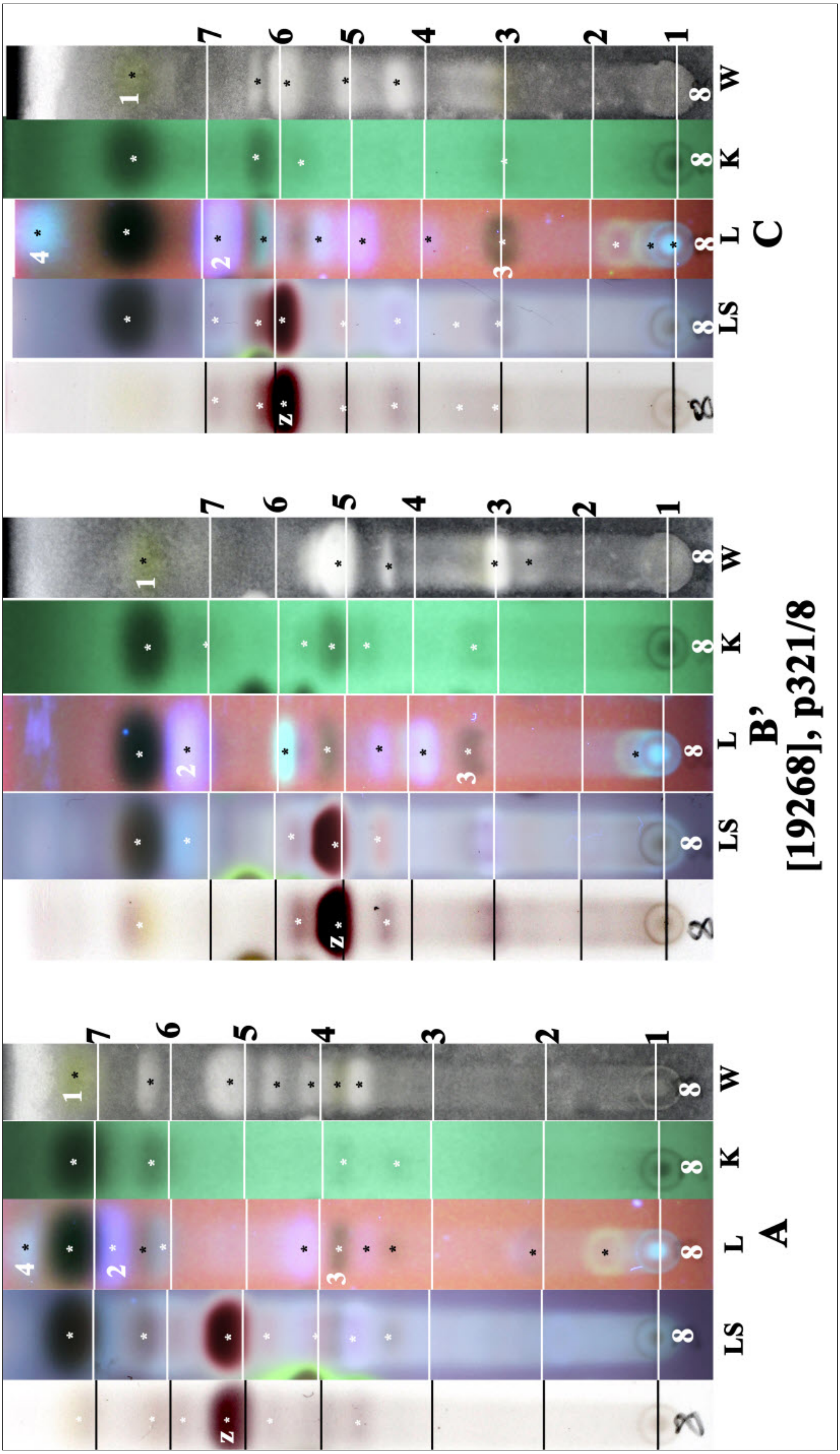
5,7-dichloro-3-*O*-methylnorlichexanthone



1: 2,5,7-trichloro-3-*O*-methylnorlichexanthone, 2: 5,7-dichloro-3-*O*-methylnorlichexanthone,
3,4: unknown, conf. J.A. Elix

Lecanora epibryon subsp. ***xanthophora*** [19053], Australia, New South Wales, Buckenbowra River Estuary, 7.5 km west of Batemans Bay, 35°42' S, 150°06' E, 5 m, growing on *Casuarina glauca* tidal stream

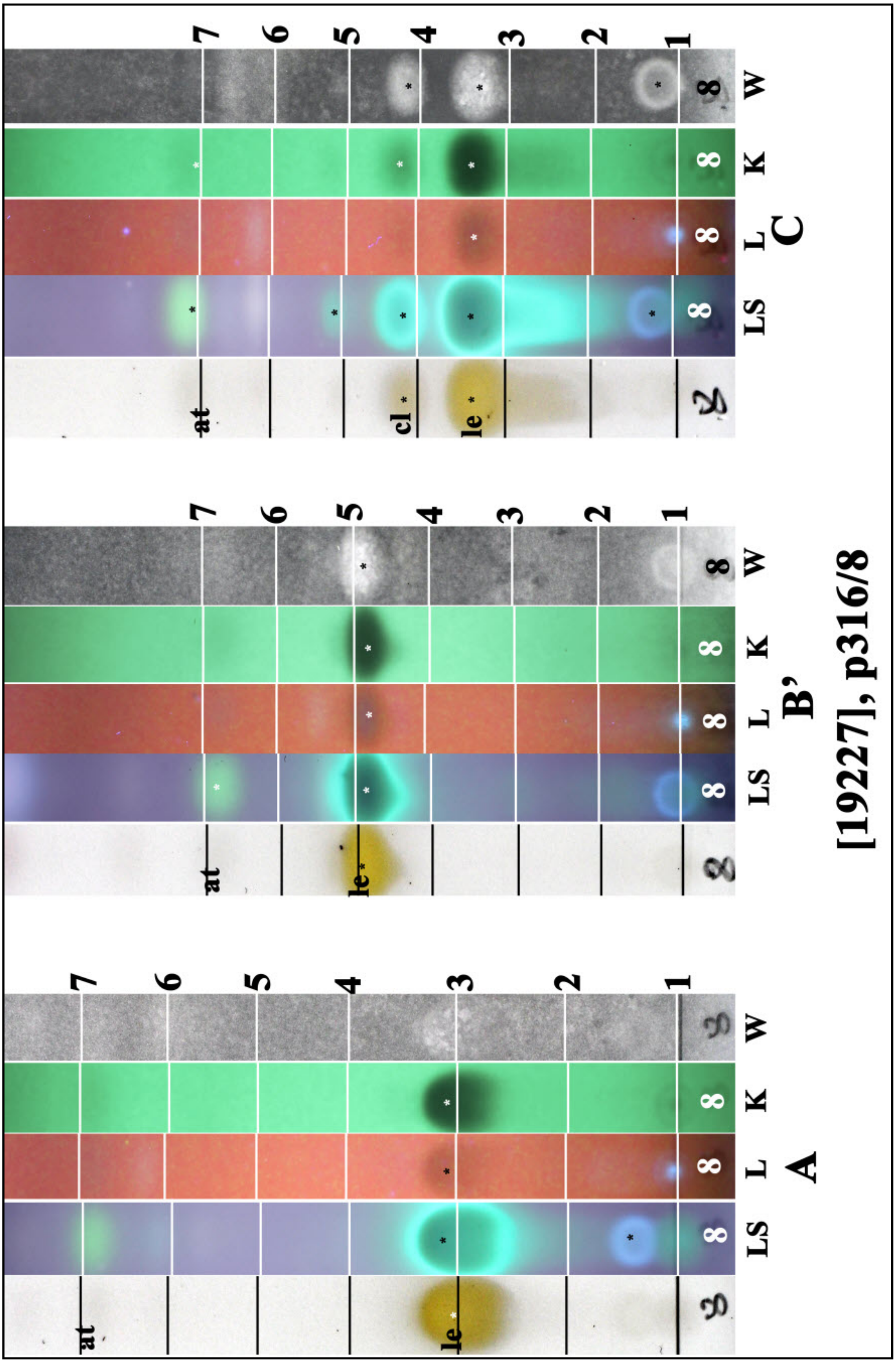
5,7-dichloro-8-hydroxy-2-methoxy-1,3-dimethylxanthone



z: zeorin, 1: thiomelin (yellow pigment), 2: 5,7-dichloro-2,8-dihydroxy-1,3-dimethylxanthone, 3: unknown, **4: 5,7-dichloro-8-hydroxy-2-methoxy-1,3-dimethylxanthone**

Rinodina thiomela, [19268], Australia, Australian Capital Territory, Mongolo Gorge Reserve, 15 km east of Canberra, 35°16' S, 149° 16' E, 650 m.

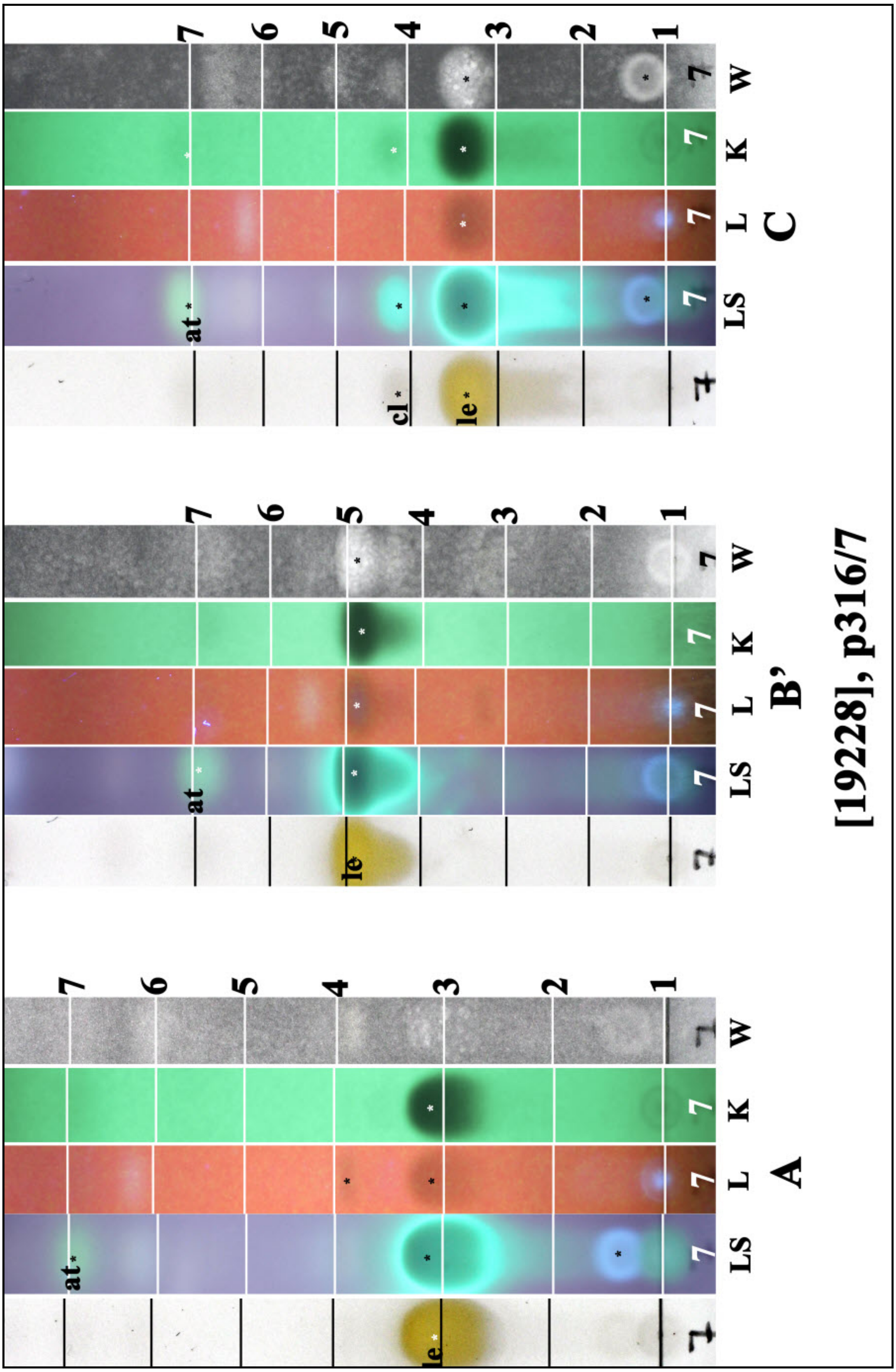
5-chlorolecanoric acid



at: atranorin, le: lecanoric acid, **cl: 5-chlorolecanoric acid**

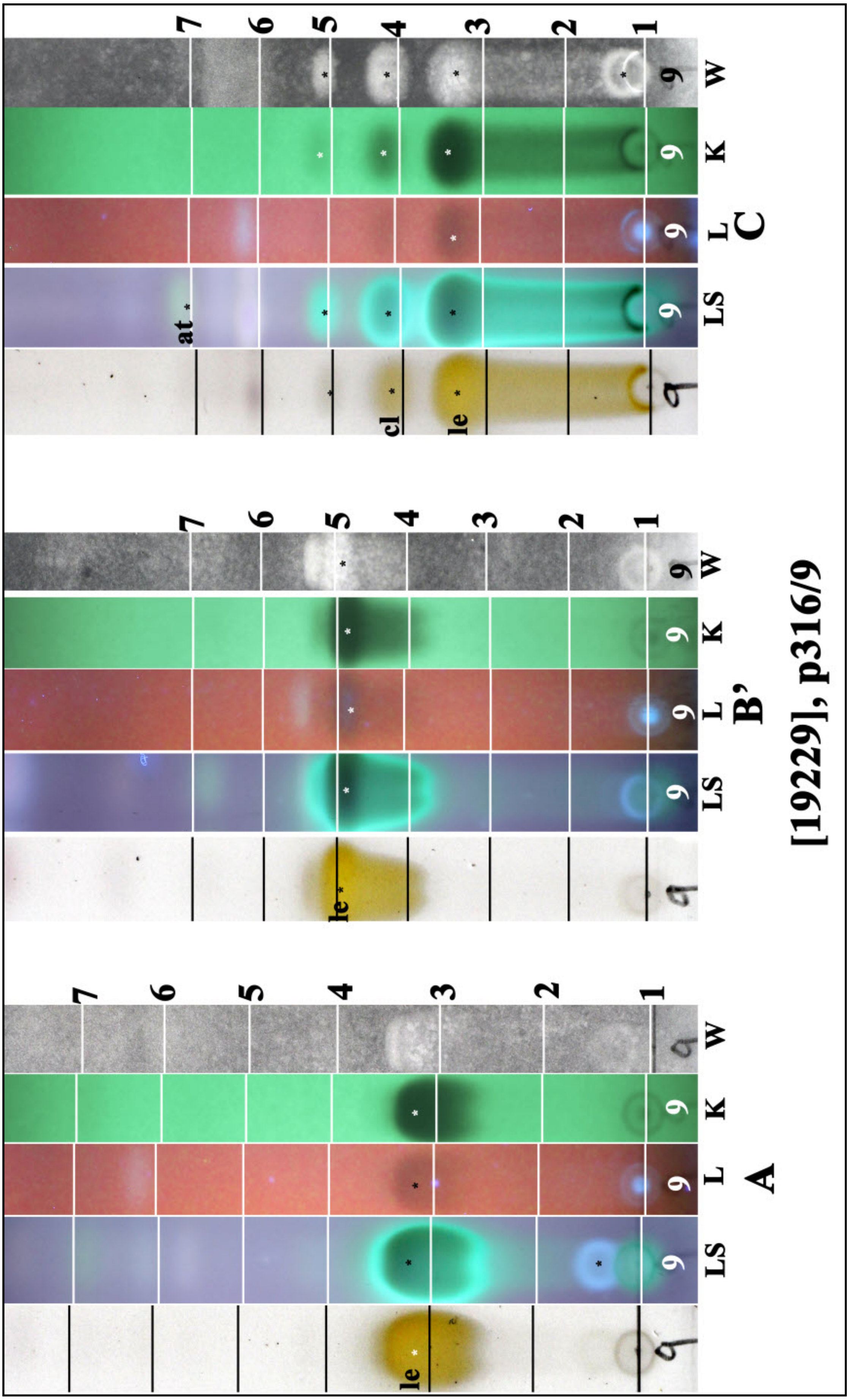
Punctelia pseudocoralloidea, [19227], Australia, Australian Capital Territory, 2.5 km north of Mt. Rob Roy, 21 km south of Canberra, 35°28' S, 149°07' E, 880 m.

5-chlorolecanoric acid



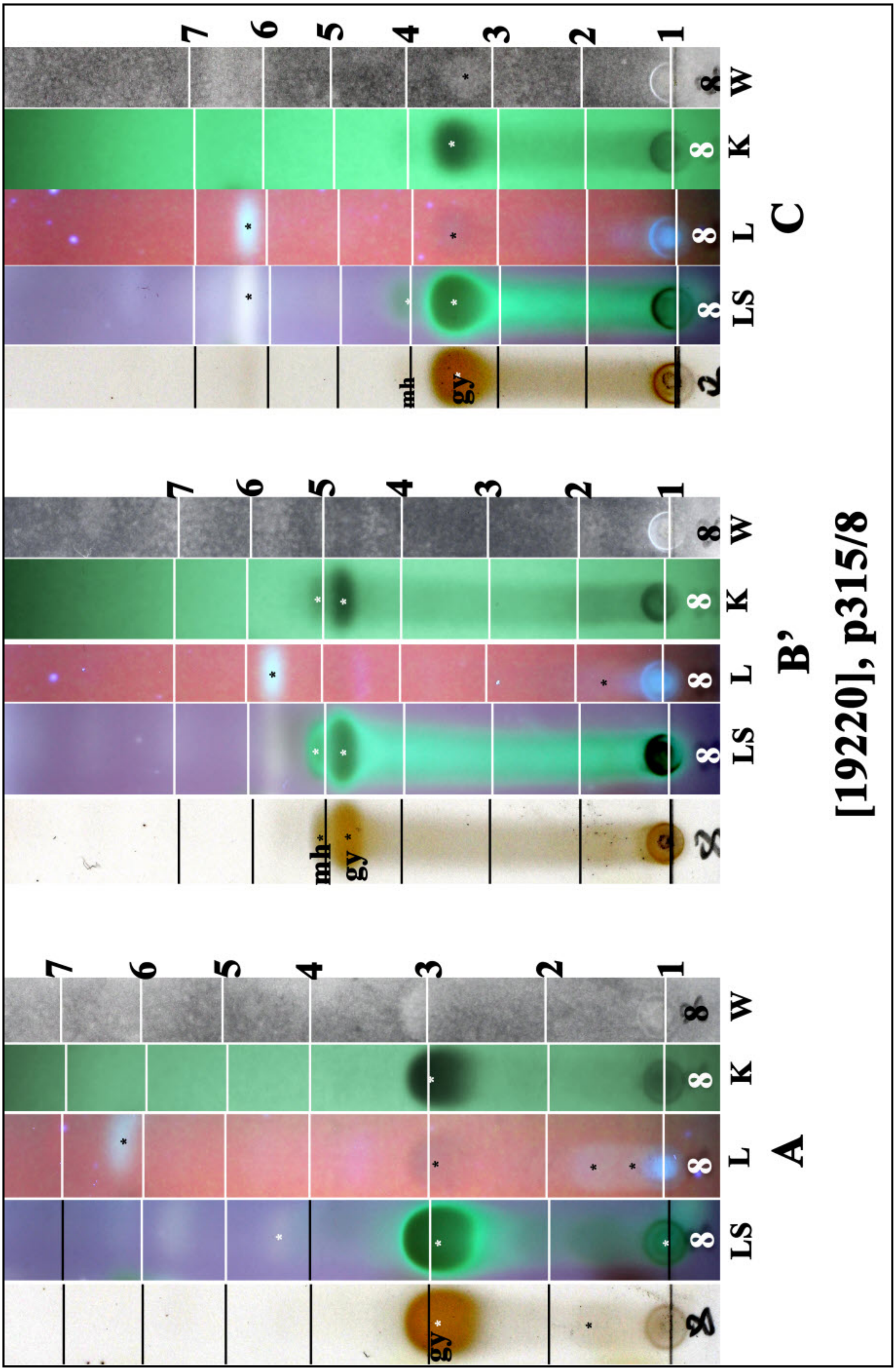
Punctelia subalbicans, [19228], Australia, New South Wales, Weddin State Forest, 14 km south-west of Greenfell, 33°00' S, 148°01'E, 340 m.

5-chlorolecanoric acid



Punctelia pseudocoralloidea, [19229], Australia, South Australia, Mt. Crawford Pine Plantation, along the Para River just south of Mt. Crawford, 34°42' S, 138°58'E, 430 m.

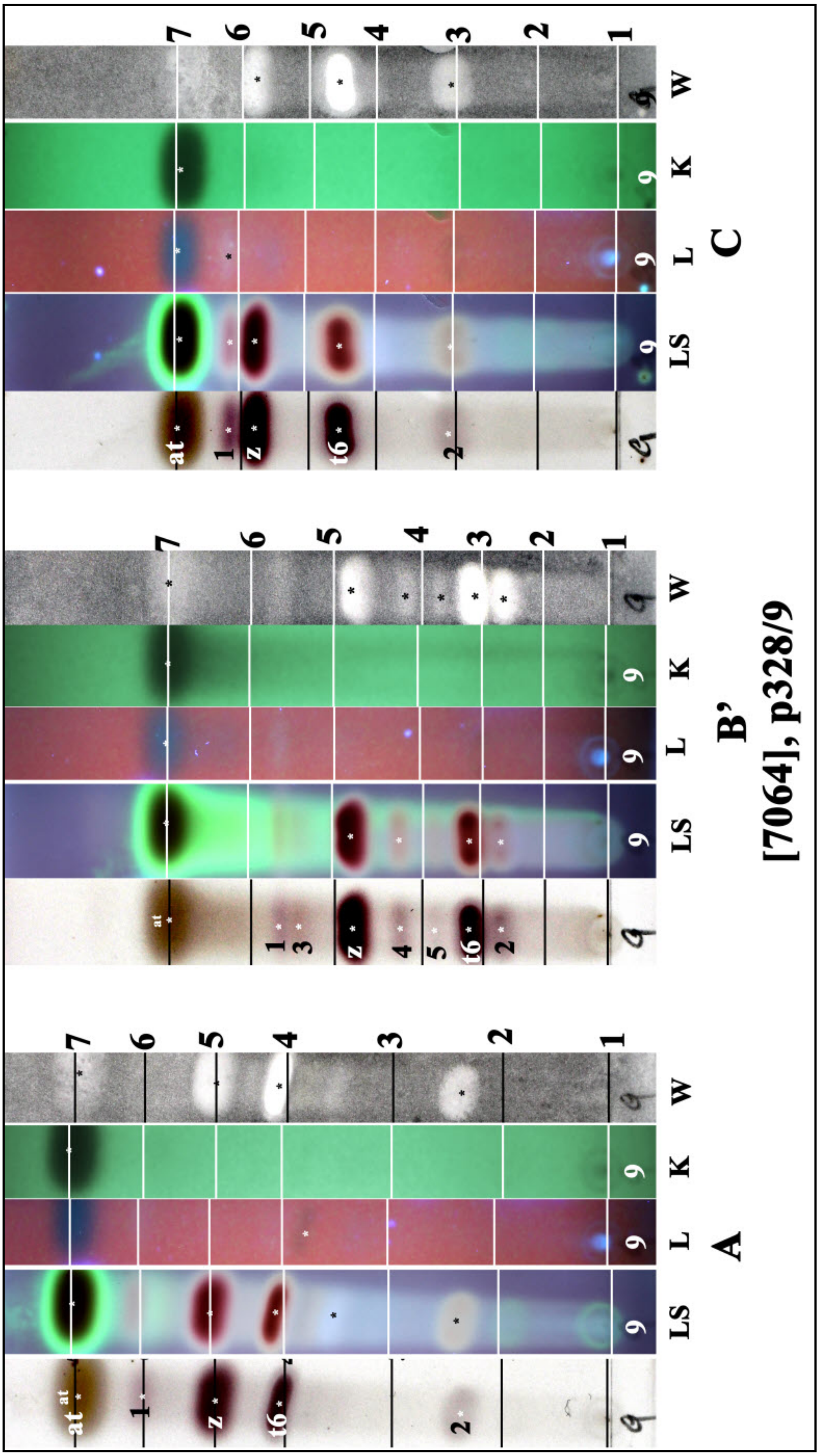
5-*O*-methylhiascic acid



gy: gyrophoric acid, **mh: 5-*O*-methylhiascic acid**

Placopsis gelida, [19220], Australia, Victoria, Errinundra Road, 24 km south of Bendoc, 37°22' S, 148°53' E, 800 m.

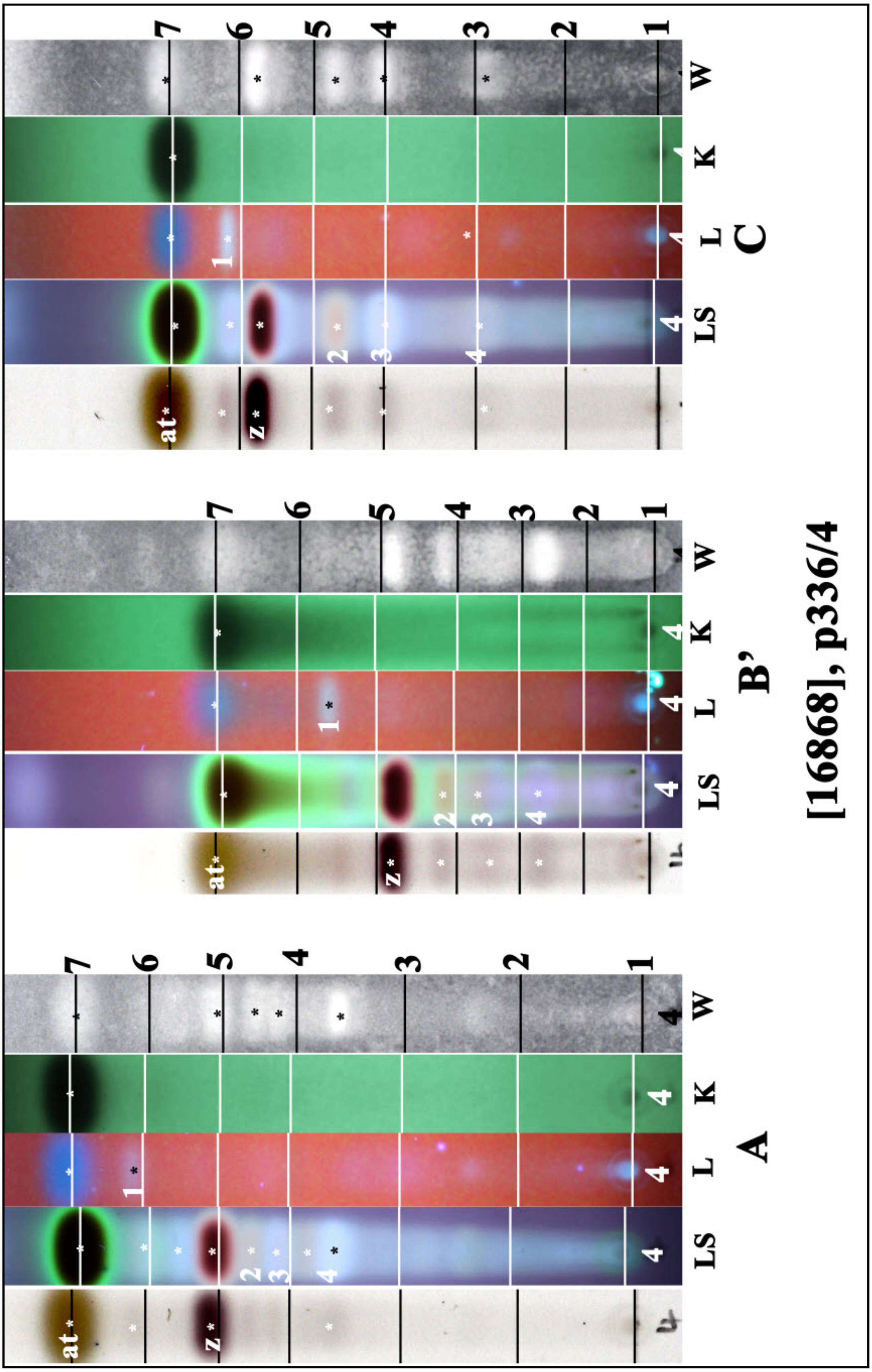
6α,16β-diacetoxyhopane-22-ol



at: atranorin, z: zeorin, t6: 16β-acetoxyhopane-6α,22-diol,
1: 16β-acetoxyhopane-22-ol, 2: leucotylin,
3: 6α-acetoxy-22-hydroxyhopane-25-oic acid,
4: **6α,16β-diacetoxyhopane-22-ol**, 5: 6α-acetoxyhopane-16β,22-diol.

Heterodermia isidiophora, [7064], Indonesien, Bali, valley of the kings graves (Tal der Königsgräber), growing on rocks. Leg. D. & F. Schumm, 30.12.1985.

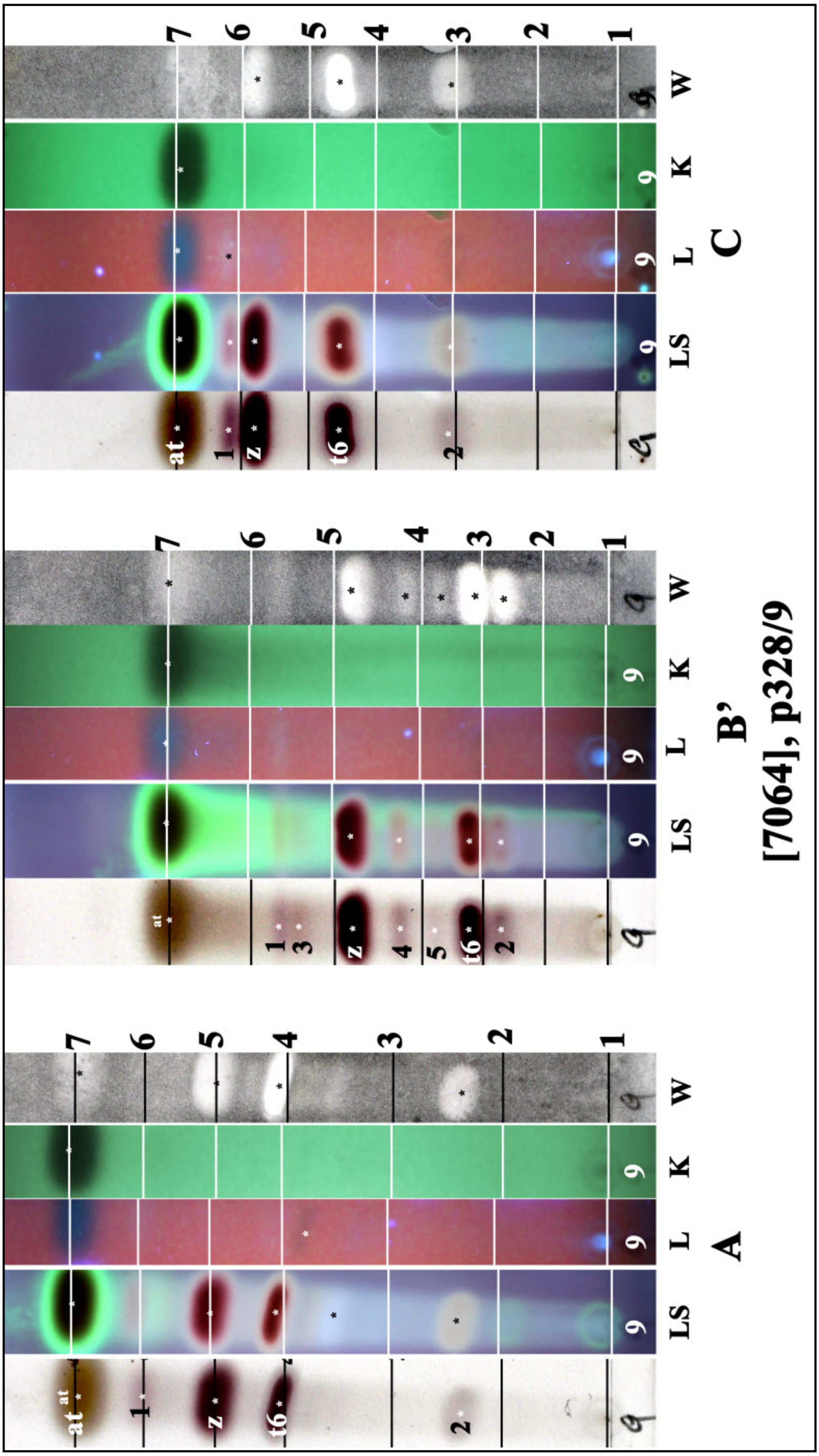
6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid



at: atranorin, z: zeorin, 1: 6α-acetoxy-22-hydroxyhopane-25-oic acid, 2: 6α-acetoxyhopane-16β,22-diol, **3: 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid**, 4: leucotylin, conf. J.A. Elix

Physcia atrostriata, [16868], USA, Hawaii, Oahu, NE-Küste, Heeia State Park north of Kaneohe, 21,43486° N, 157,81089° W, 27 m. Leg. F. Schumm & J.-P. Frahm 10.02.2011

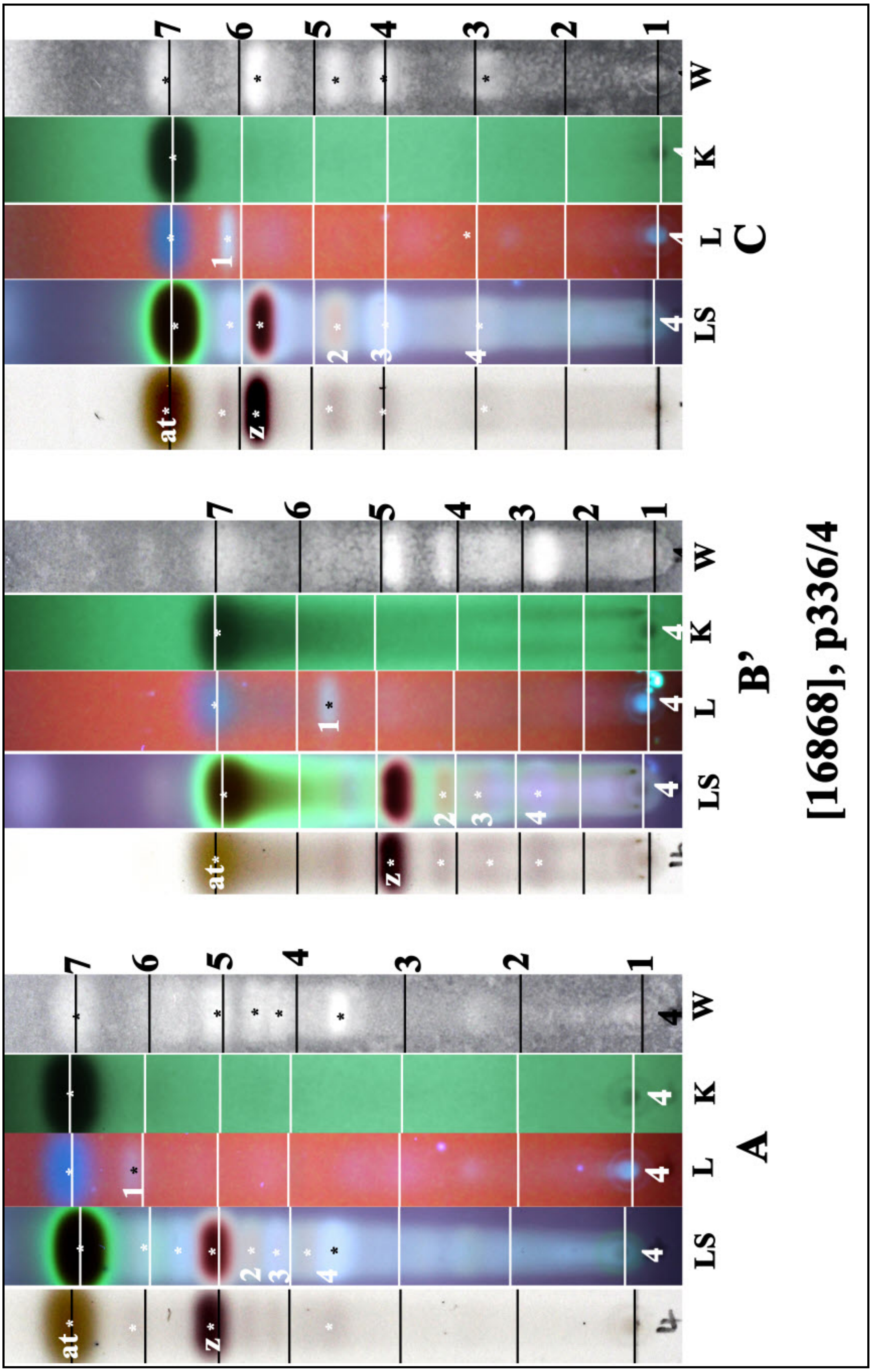
6α-acetoxy-22-hydroxyhopane-25-oic acid



at: atranorin, z: zeorin, t6: 16β-acetoxyhopane-6α,22-diol,
1: 16β-acetoxyhopane-22-ol, 2: leucotylin,
3: 6α-acetoxy-22-hydroxyhopane-25-oic acid,
4: 6α,16β-diacetoxyhopane-22-ol, 5: 6α-acetoxyhopane-16β,22-diol, conf. J.A. Elix

Heterodermia isidiophora, [7064], Indonesien, Bali, valley of the kings graves (Tal der Königsgräber), growing on rocks. Leg. D. & F. Schumm, 30.12.1985.

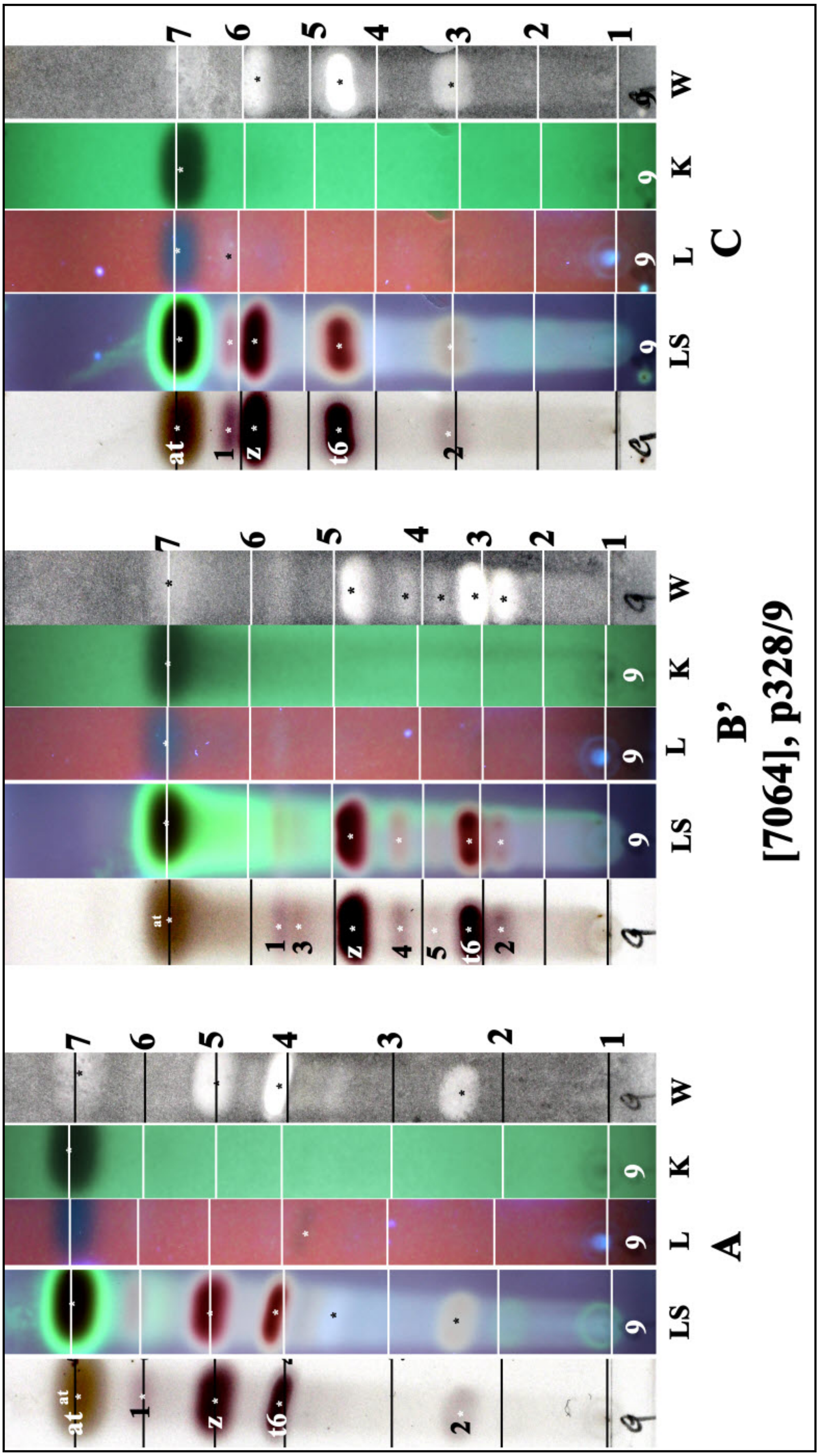
6α-acetoxy-22-hydroxyhopane-25-oic acid



at: atranorin, z: zeorin, 1: **6α-acetoxy-22-hydroxyhopane-25-oic acid**, 2: 6α-acetoxyhopane-16β,22-diol, 3: 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid, 4: leucotylin, conf. J.A. Elix

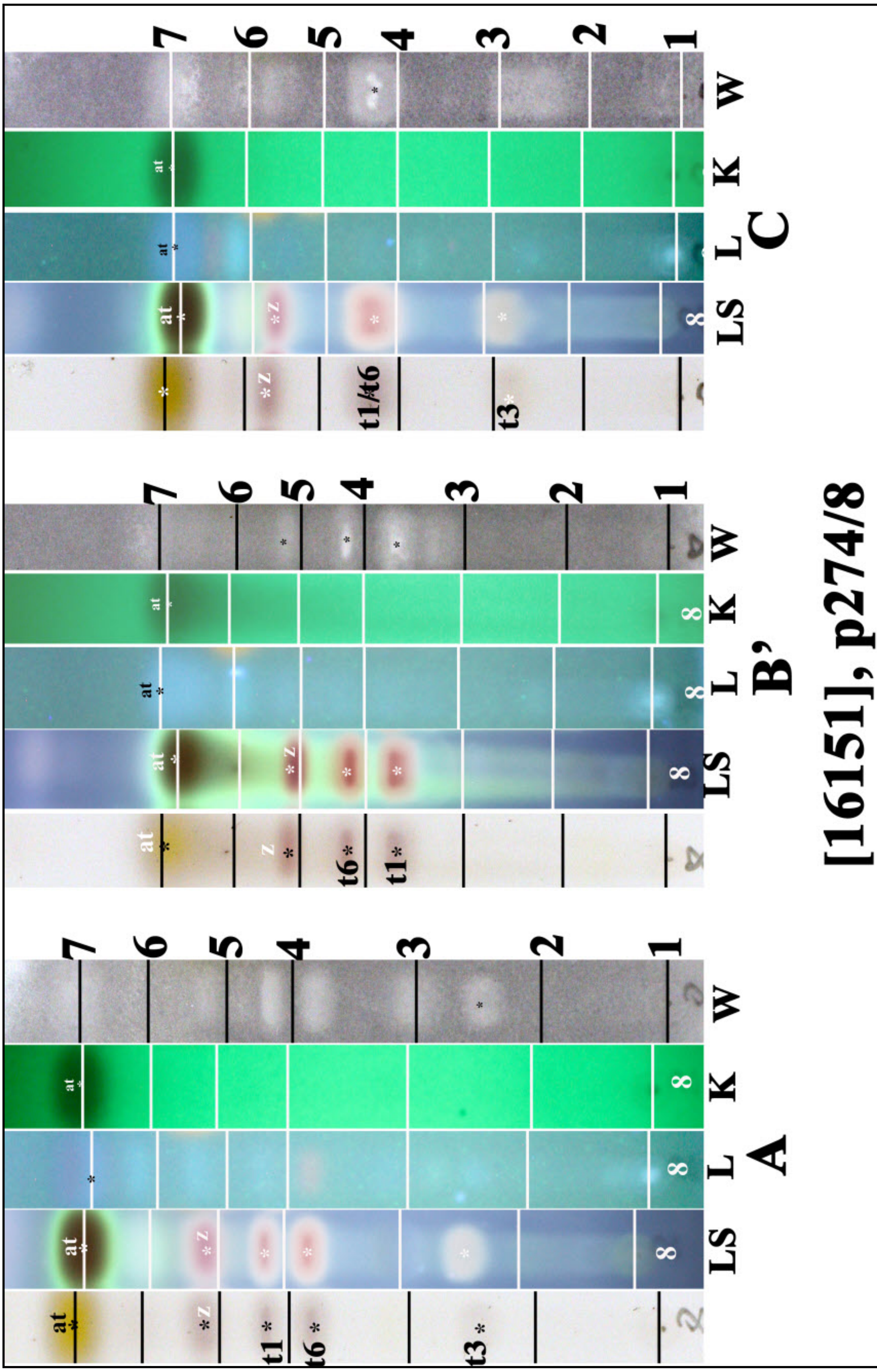
Physcia atrostriata, [16868], USA, Hawaii, Oahu, NE-Küste, Heeia State Park north of Kaneohe, 21,43486° N, 157,81089° W, 27 m. Leg. F. Schumm & J.-P. Frahm 10.02.2011

6α-acetoxyhopane-16β,22-diol



Heterodermia isidiophora, [7064], Indonesien, Bali, valley of the kings graves (Tal der Königsgräber), growing on rocks. Leg. D. & F. Schumm, 30.12.1985.

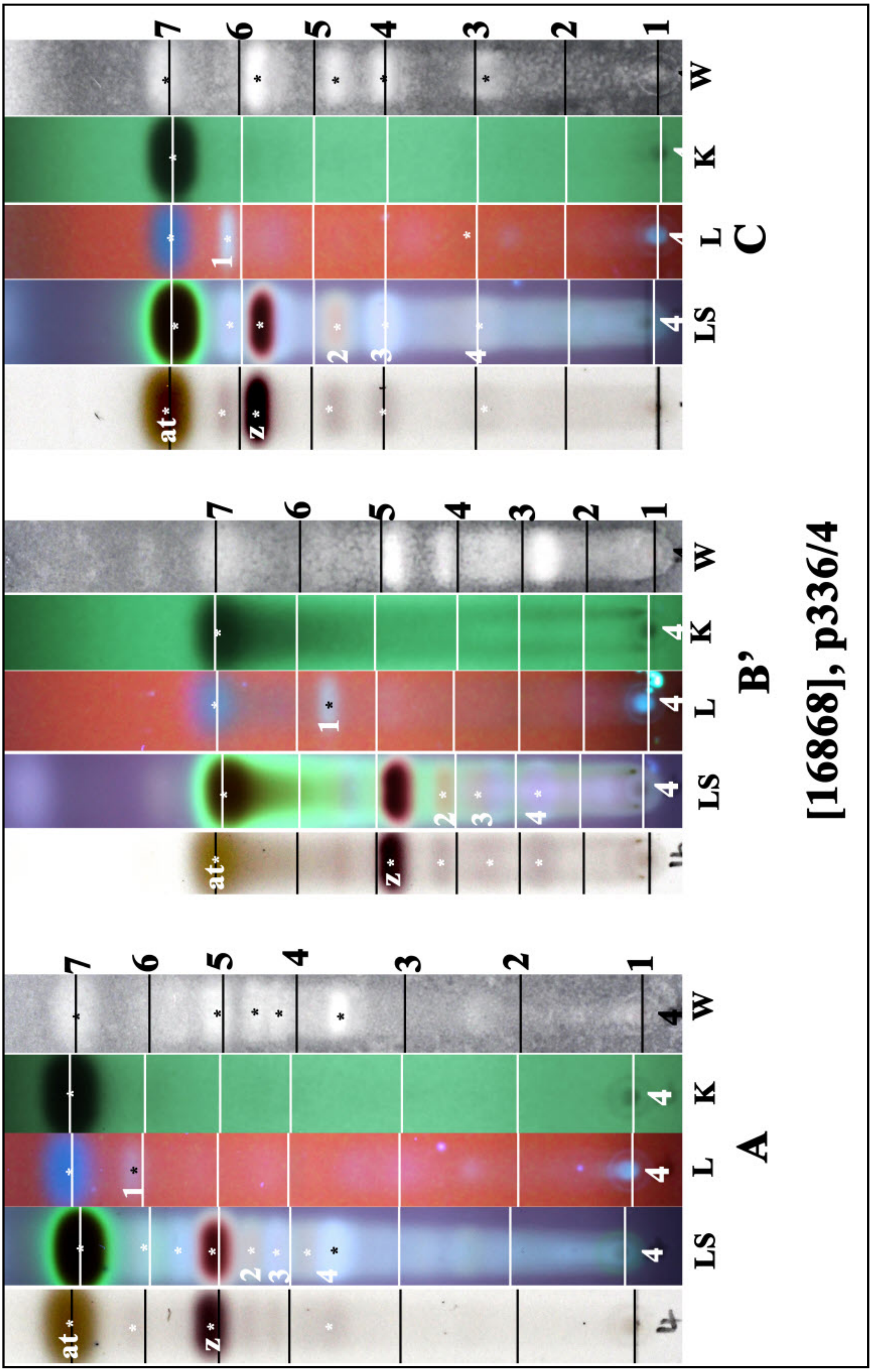
6α-acetoxyhopane-16β,22-diol



at: atranorin, z: zeorin, t1: 16β-acetoxyhopane-6α, 22-diol,
t6: 6α-acetoxyhopane-16β,22-diol, t3: leucotylin

Heterodermia tremulans, [16151], Australia (SE), Burrewarra Point near Tomakin, Guerilla Bay, Banksia Walk, 35.831° S, 150,229° E, 36 m. Leg. F. Schumm & E. Stocker-Wörgötter, 10.11.2009.

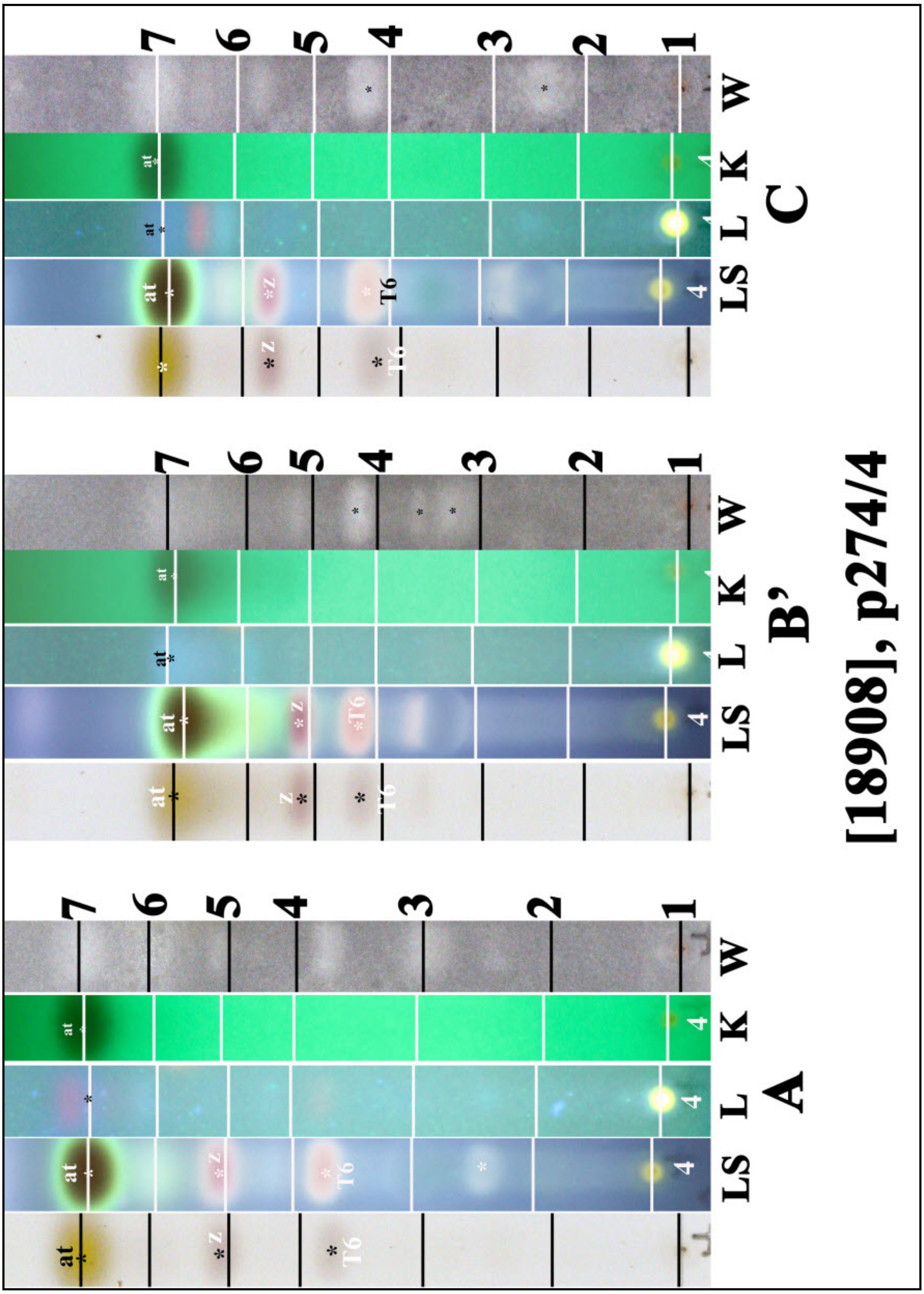
6α-acetoxyhopane-16β,22-diol



at: atranorin, z: zeorin, 1: 6α-acetoxy-22-hydroxyhopane-25-oic acid, **2: 6α-acetoxyhopane-16β,22-diol**, 3: 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid, 4: leucotylin, conf. J.A. Elix

Physcia atrostriata, [16868], USA, Hawaii, Oahu, NE-Küste, Heeia State Park north of Kaneohe, 21,43486° N, 157,81089° W, 27 m. Leg. F. Schumm & J.-P. Frahm 10.02.2011

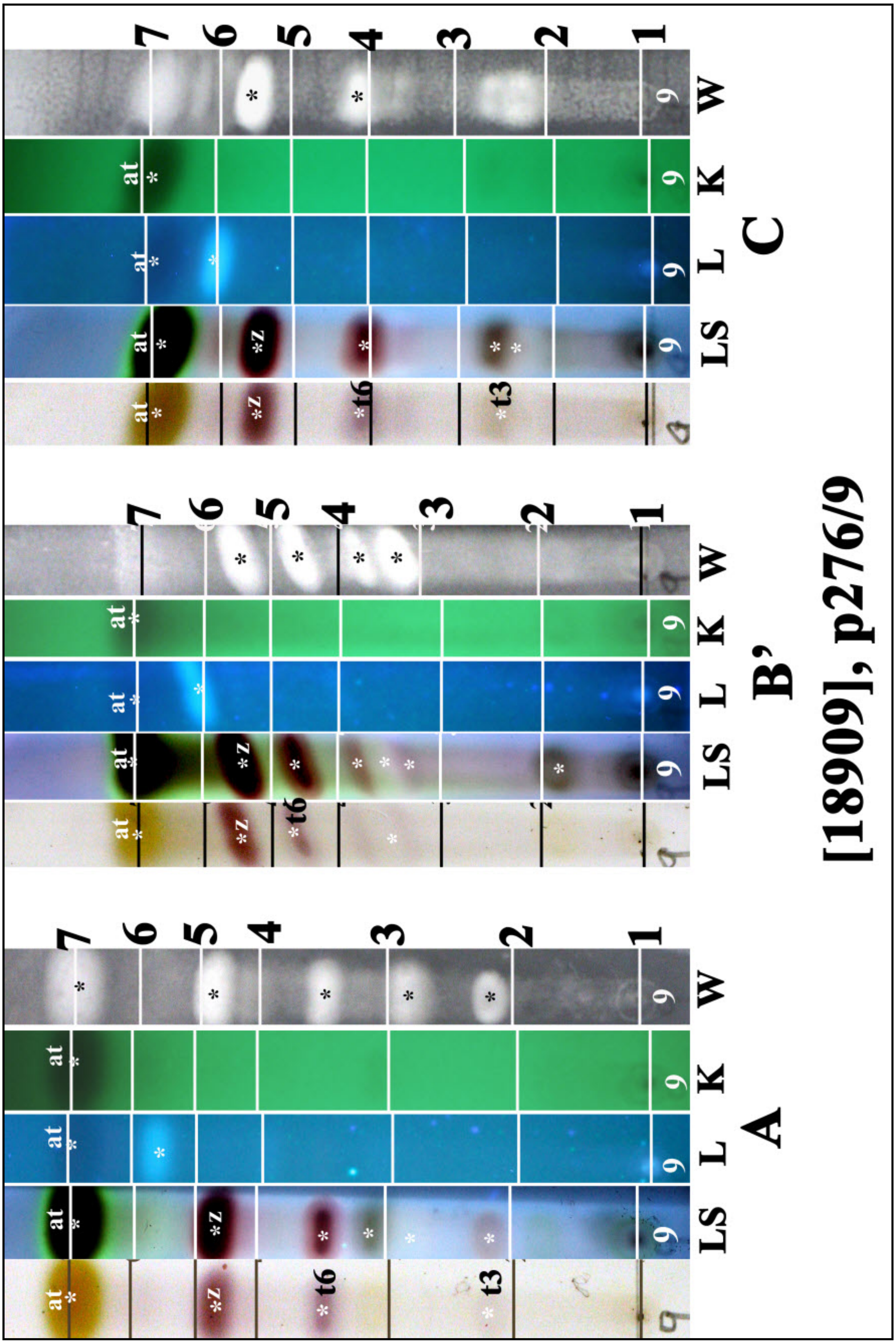
6α-acetoxyhopane-16β,22-diol



at: atranorin, z: zeorin, T6: 6α-acetoxyhopane-16β,22-diol

Physcia nubila, [18908], Australia, New South Wales, Golden Highway, 12 km south-west of Dunedoo, 32°03'18" S, 149°17'02" E, 350 m, remnant *Eucalyptus*-*Callitris* woodland, growing on dead wood. Leg. et det. J.A. Elix 5.08.2008.

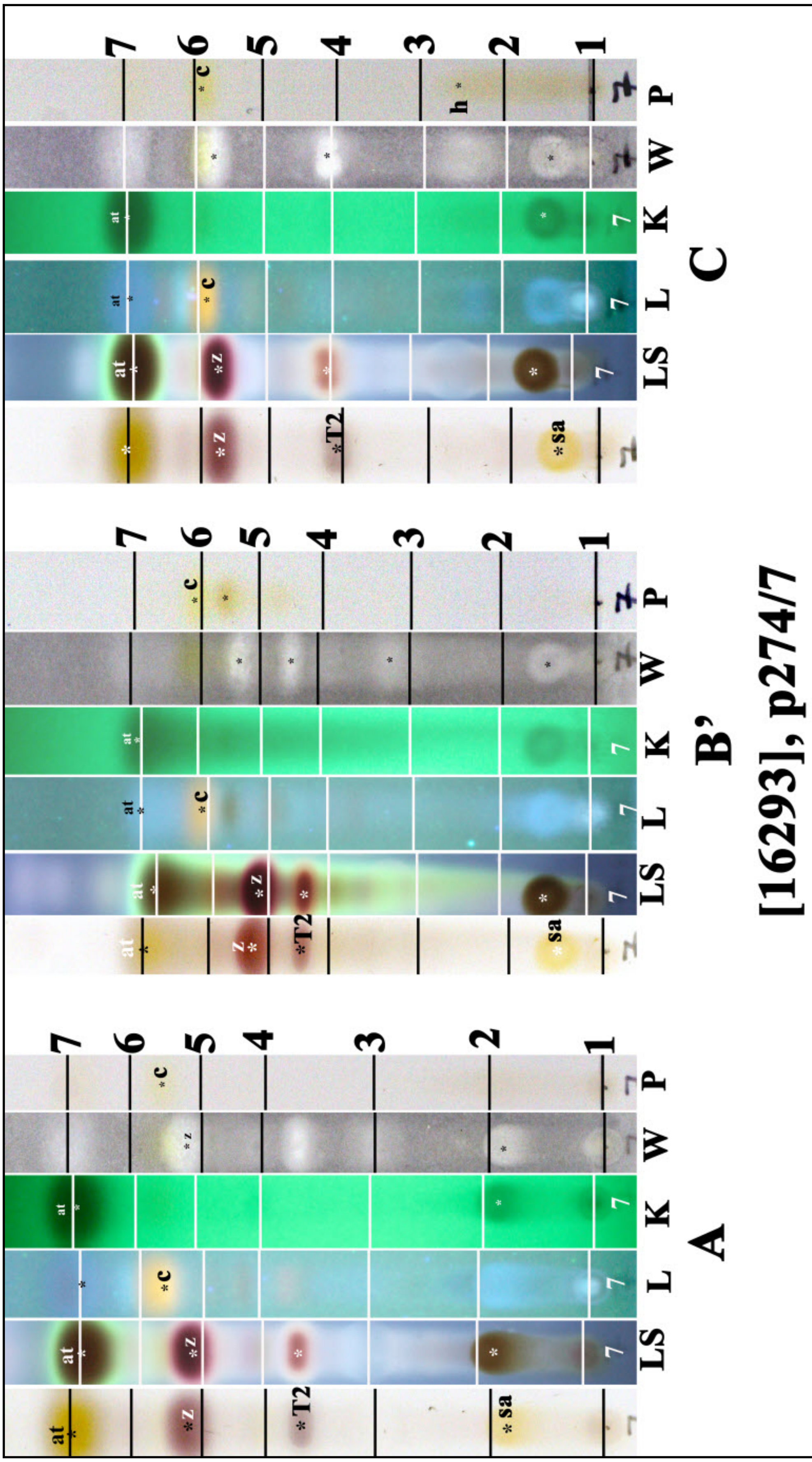
6α-acetoxyhopane-16β,22-diol



at: atranorin, z: zeorin, **t6: 6α-acetoxyhopane-16β,22-diol**, t3: leucotylin

Heterodermia subcomosa, [18909], Australia, Norfolk Island, Mt. Pitt Reserve, summit trail below Mt. Bates, 29°00'30" S, 167°56'30" E, 300 m, growing on *Citrus limonia* in dense subtropical rainforest. Leg. J.A. Elix & H. Streimann, 6.12.1984, det. P.W. James. LICHENES AUSTRALASICI EXSICCATi No. 080.

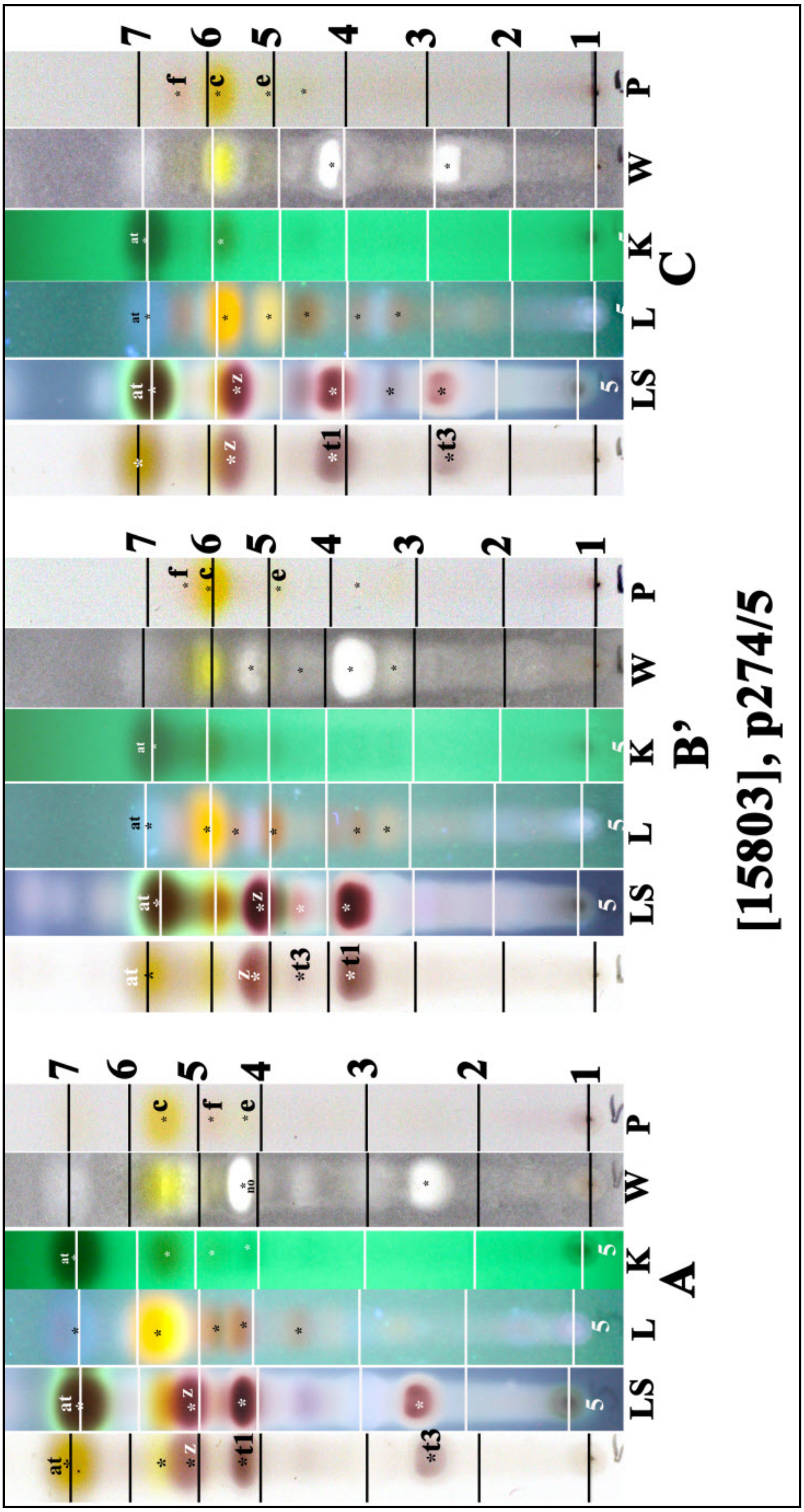
7-chloroemodin



at: atranorin, z: zeorin, T2: japonin, sa: salazinic acid, **c: 7-chloroemodin**, h: hybocarpone

Heterodermia hypocaesia [16239], Australia, New South Wales, between Bermagui and Tathra, on way from Aragunnu Beach to the Mimosa Rocks, 36.585° S, 150,056° E, 10 m. Leg. F. Schumm & E. Stocker-Wörgötter, 12.11.2009.

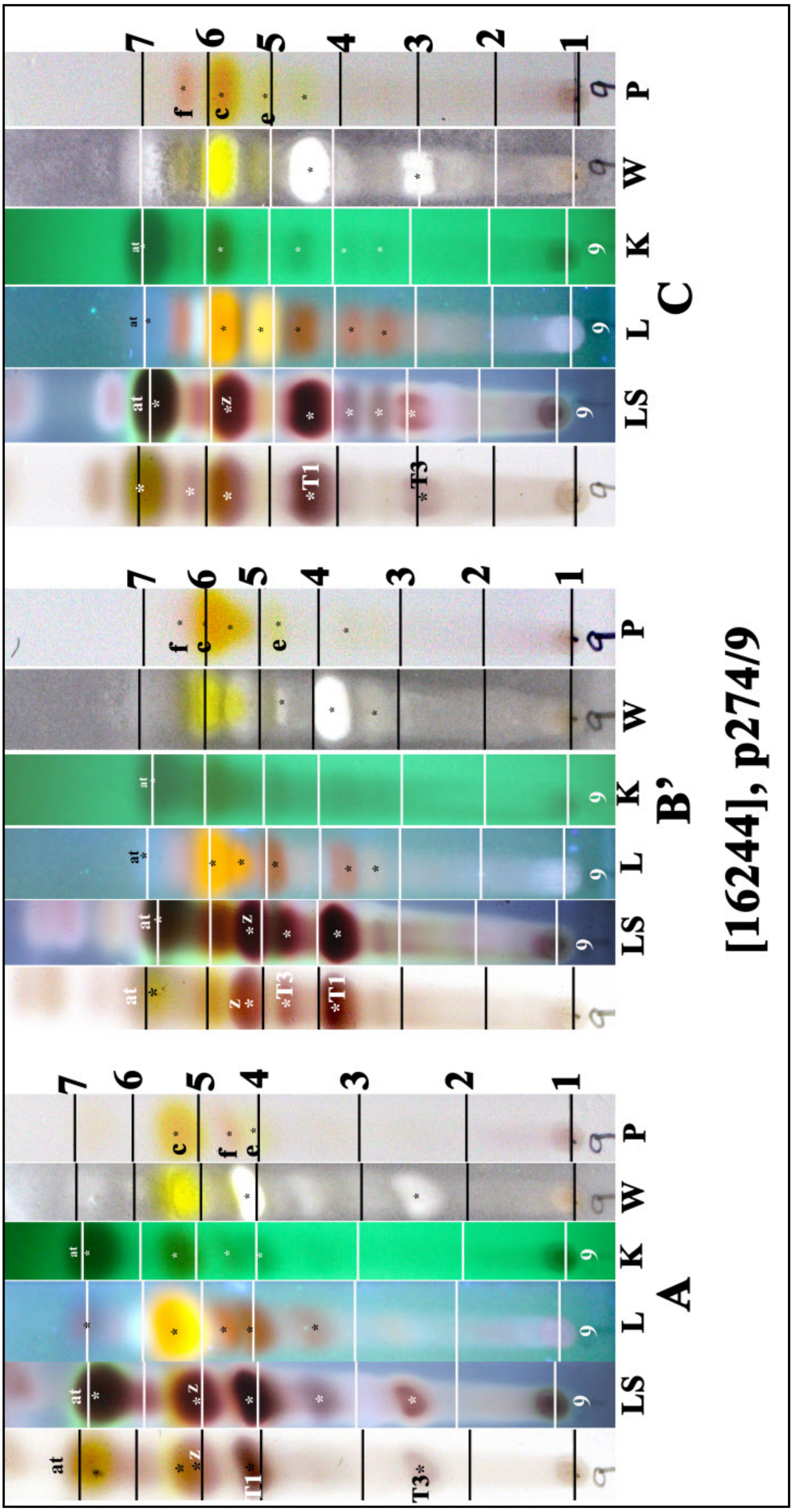
7-chloroemodin



at: atranorin, z: zeorin, t1: 16β-acetoxyhopane-6α,22-diol, t3: leucotylin, **c: 7-chloroemodin**, e: emodin, f: flavoobscurins

Heterodermia obscurata, [15803], Australia, Western Australia, 75 km south of Mt. Chudalup, wetland with *Agonis junipera* and *Eucalyptus marginata,* 34.734° S, 116,088° E, 75 m. Leg. F. Schumm & E. Stocker-Wörgötter, 24.10.2009.

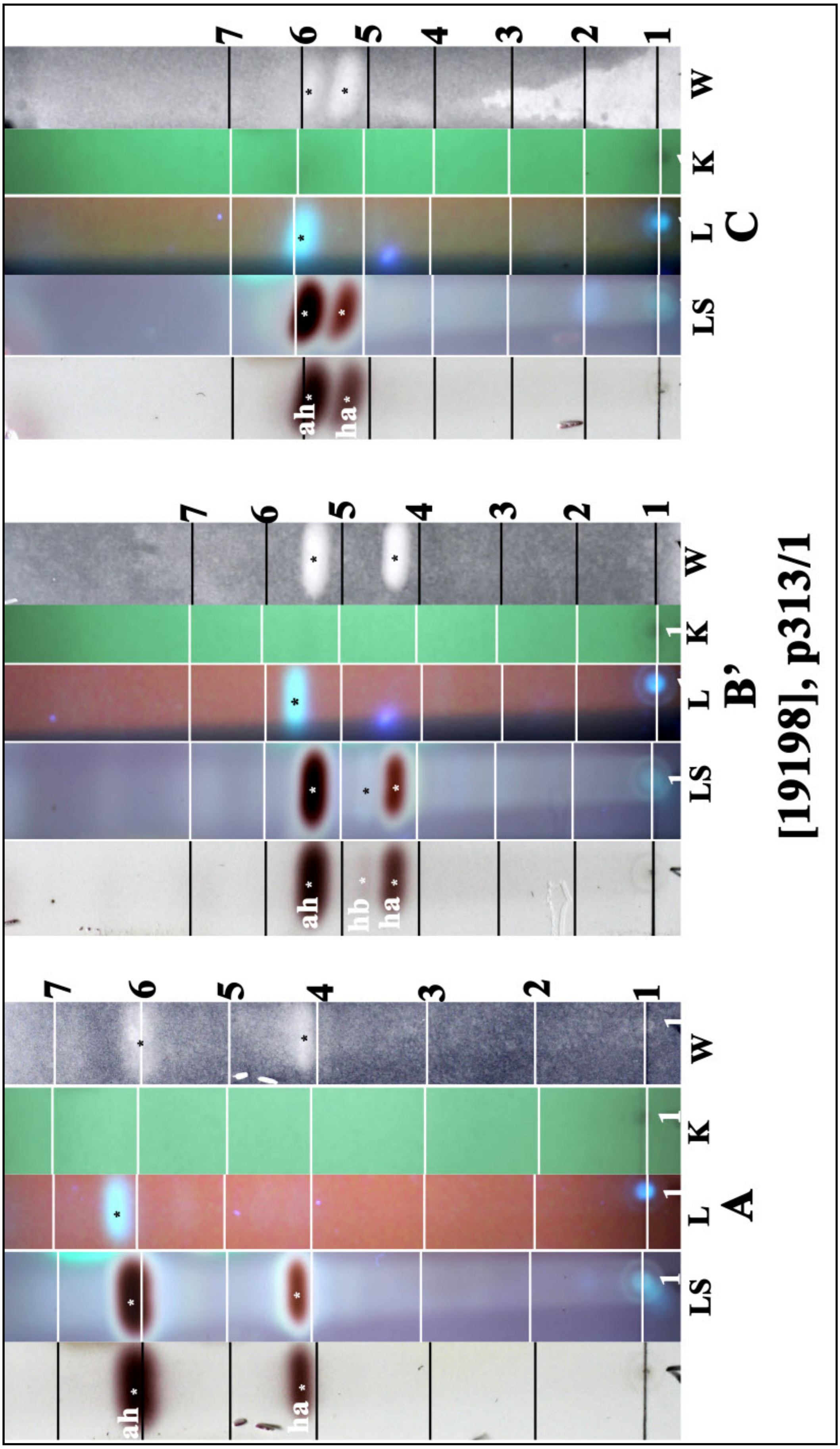
7-chloroemodin



at: atranorin, z: zeorin, T1: 16β-acetoxyhopane-6α,22-diol, T3: leucotylin, **c: 7-chloroemodin**, e: emodin, f: flavoobscurins

Heterodermia obscurata, [16244], Australia, New South Wales, between Bermagui and Tathra, on way from Aragunnu Beach to the Mimosa Rocks, 36.585° S, 150.056° E, 10 m, growing on rocks. Leg. F. Schumm & E. Stocker-Wörgötter, 12.11.2009.

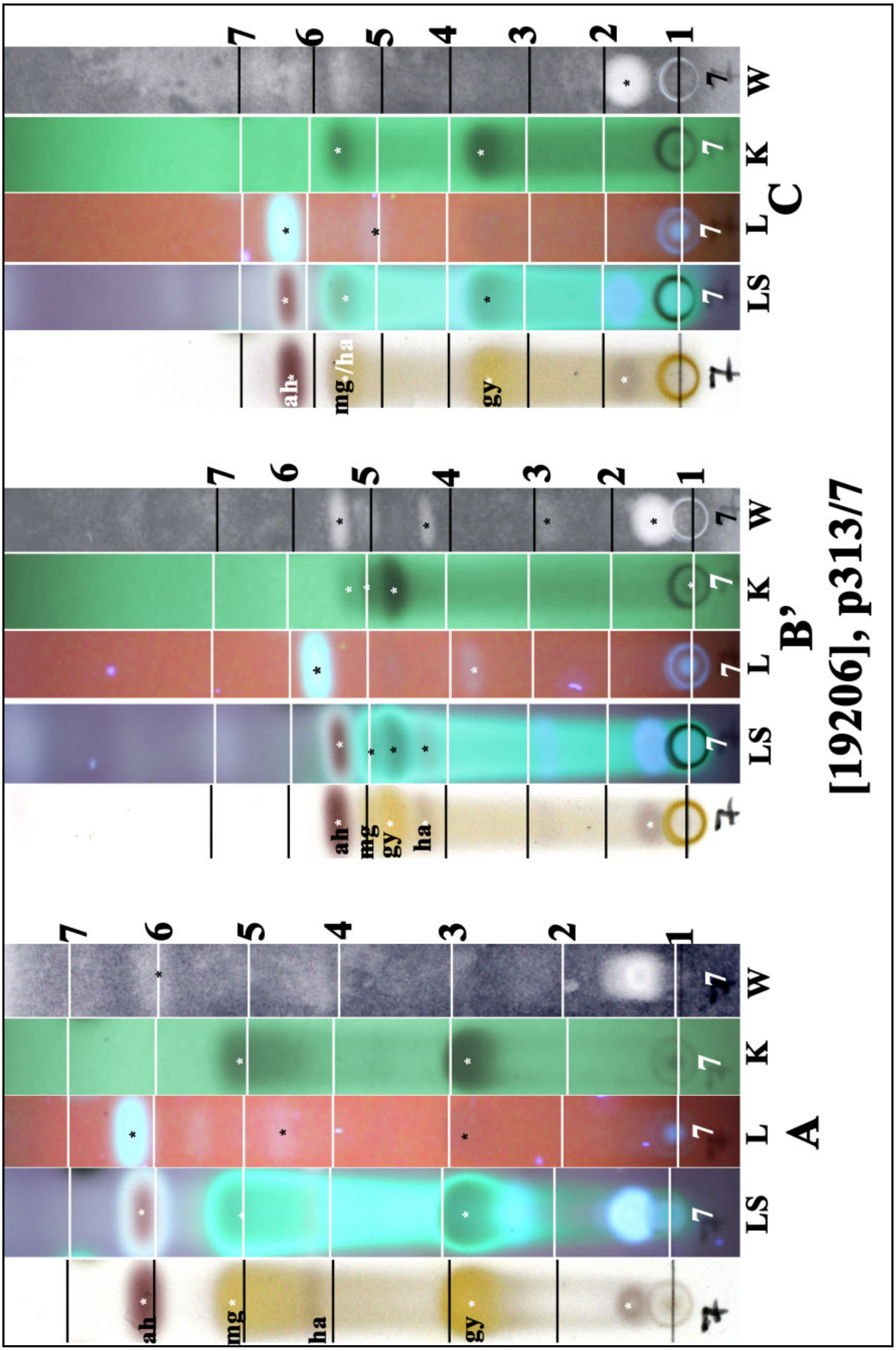
7β,15α-diacetoxyhopane-22-ol



ah: 7β-acetoxyhopane-22-ol, ha: hopane-15α,22-diol, **hb: 7β,15α-diacetoxyhopane-22-ol**

Pseudocyphellaria rufovirescens, [19198], New Zealand, South Island, Canterbury, Otepatotu Scenic Reserve, summit road, Banks Peninsula.

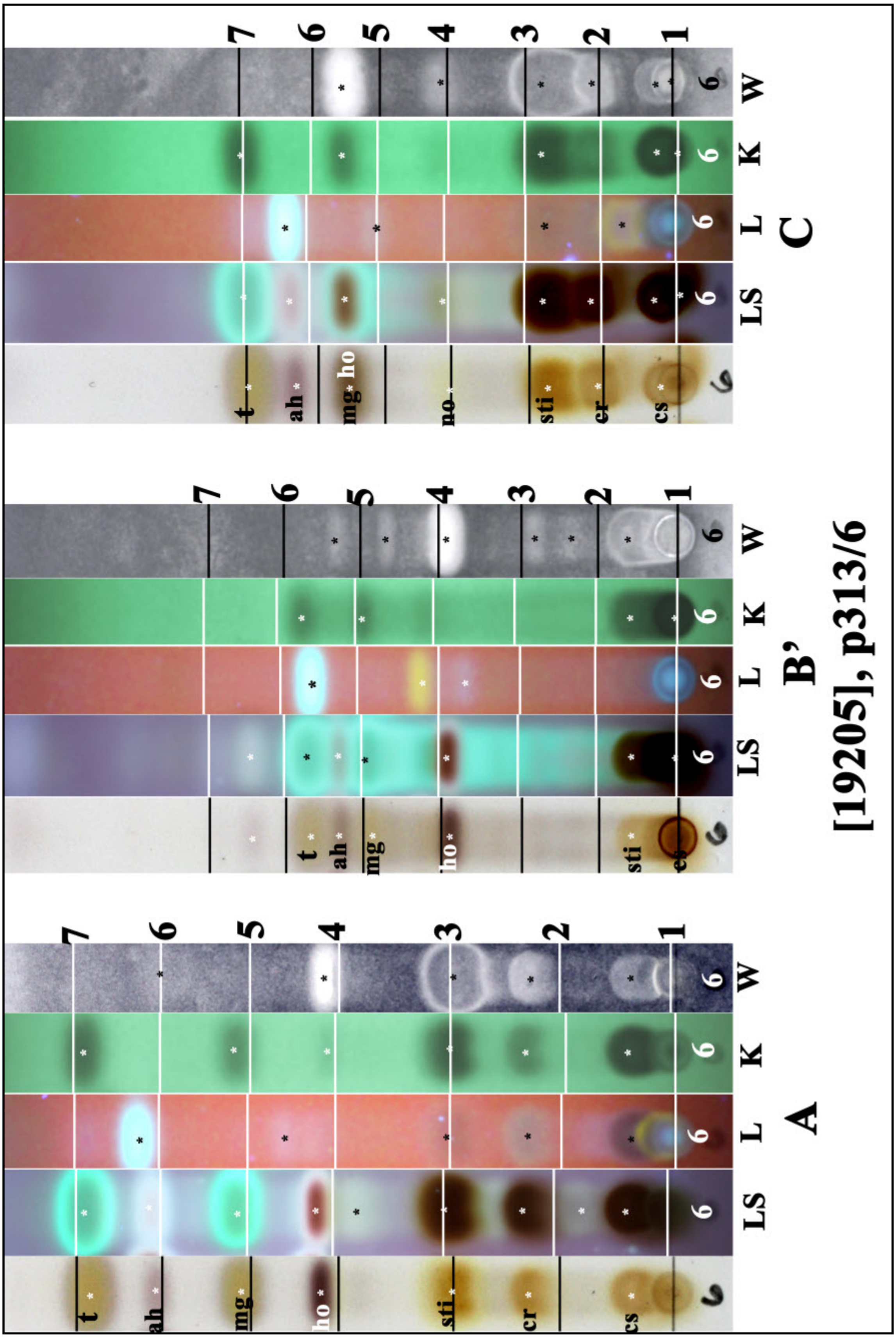
7β-acetoxyhopane-22-ol



ah: 7β-acetoxyhopane-22-ol, mg: methyl gyrophorate, ha: hopane-15α,22-diol, gy: gyrophoric

Pseudocyphellaria dissimilis,[19206], Australia, New South Wales, Moppy Lookout, Barrington Tops State Forest, 40 km west-north-west of Gloucester, 31°53' S, 151°32' E, 1200 m.

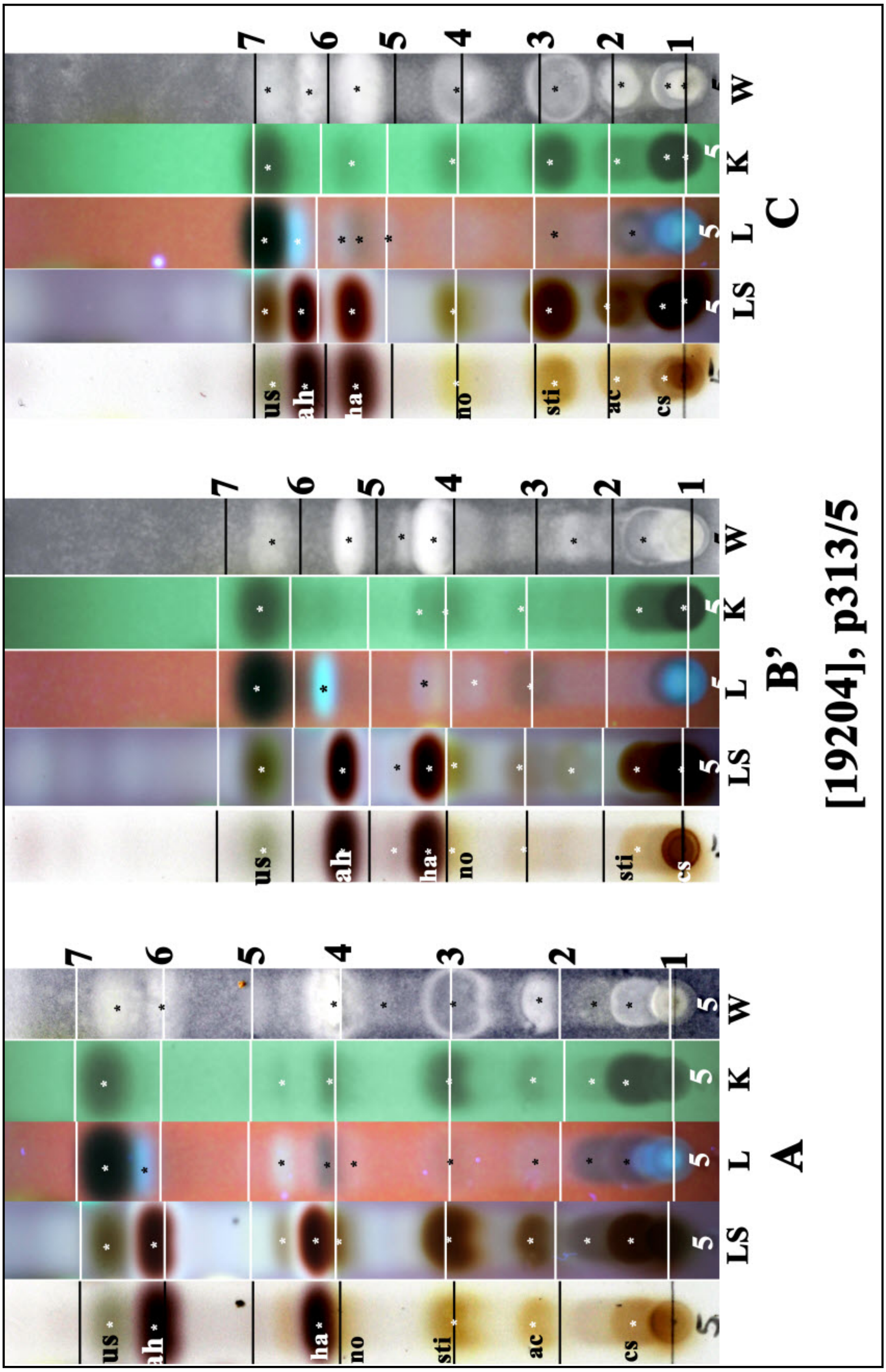
7β-acetoxyhopane-22-ol



t: tenuiorin, **ah: 7β-acetoxyhopane-22-ol**, mg: methyl gyrophorate,
ho: hopane-6α,7β,22-triol, no: norstictic acid,
sti: stictic acid, cs:constictic acid, cr: cryptostictic acid

Pseudocyphellaria desfontainii, [19205], Australien, Queensland, Vine Creek, 6 km south east of Ravenshoe, 17°39' S, 145°30' E, 900 m.

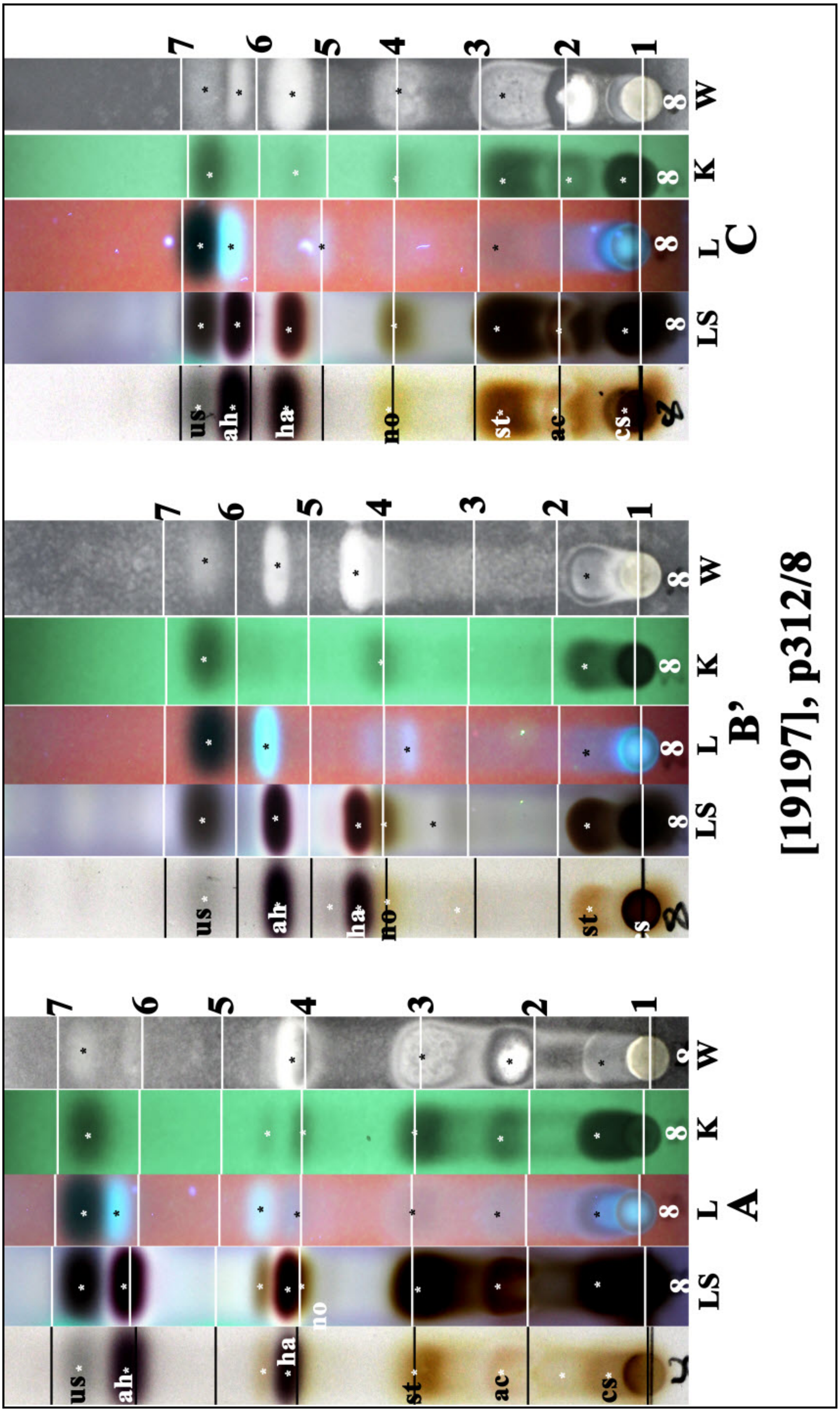
7β-acetoxyhopane-22-ol



us: usnic acid, no: norstictic acid, sti: stictic acid, cs: constictic acid,
ah: 7β-acetoxyhopane-22-ol, ha: hopane-15α,22-diol, ac: 9α-acetoxyconstictic acid

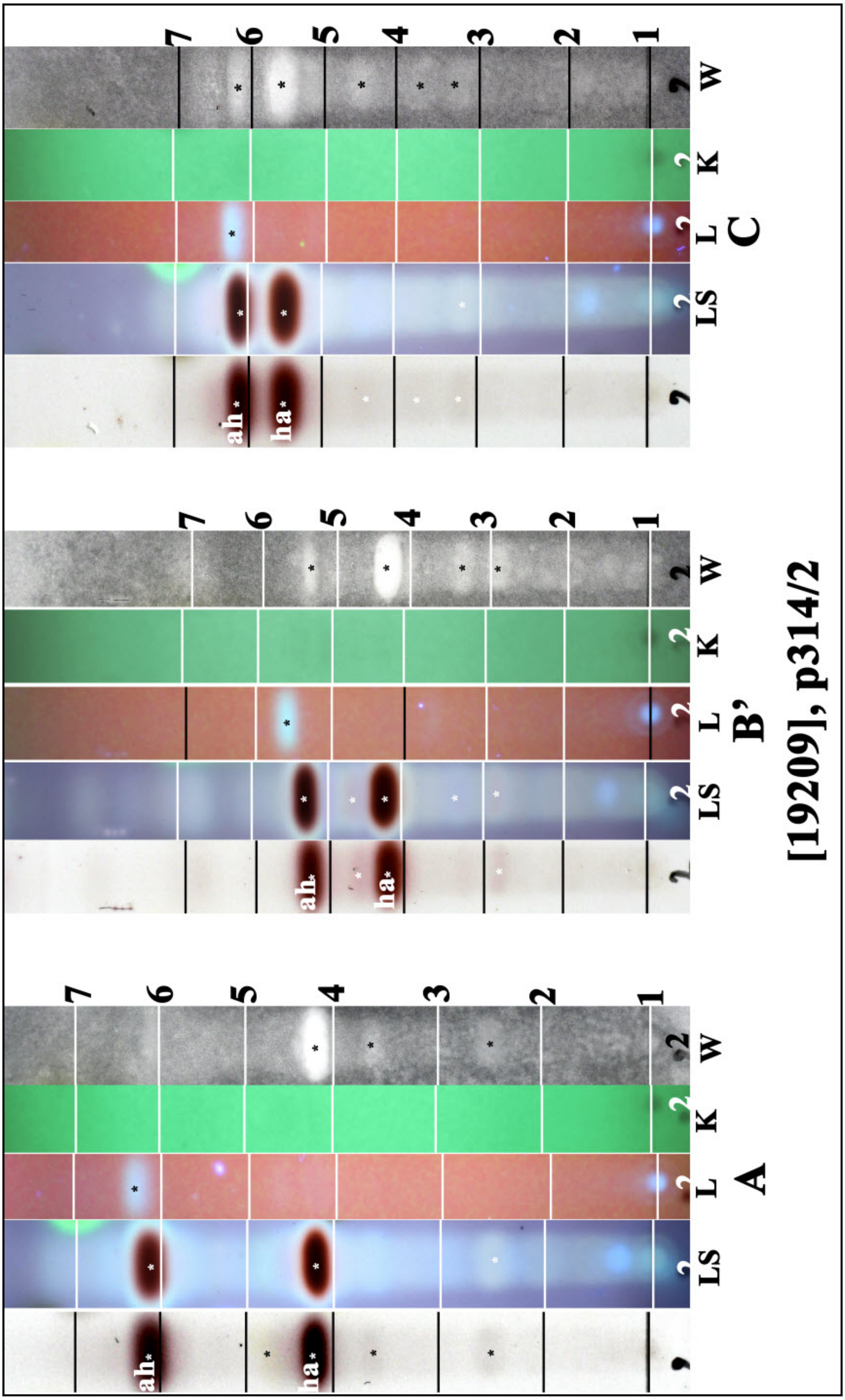
Pseudocyphellaria glabra, [19204], Australia, Victoria, Donna Buang - Healesville road, 6 km north-west of Warburton, 37°42' S, 145°39' E, 1040 m.

7β-acetoxyhopane-22-ol



Pseudocyphellaria glabra ,[19197], New Zealand, South Island, Canterbury, 3 km east of Te Oka Peak, Banks Peninsula.

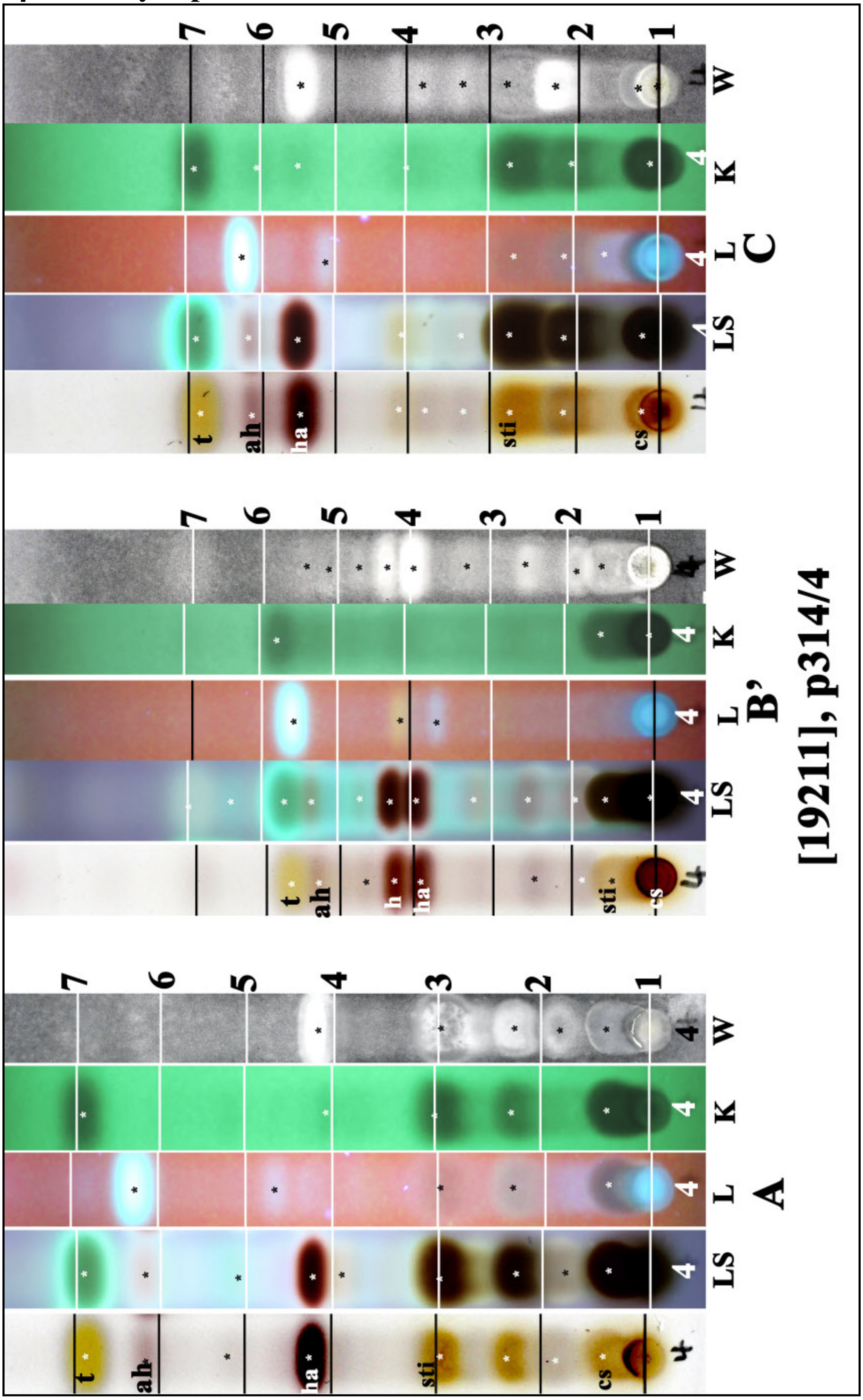
7β-acetoxyhopane-22-ol



ah: 7β-acetoxyhopane-22-ol, ha: hopane-15α,22-diol

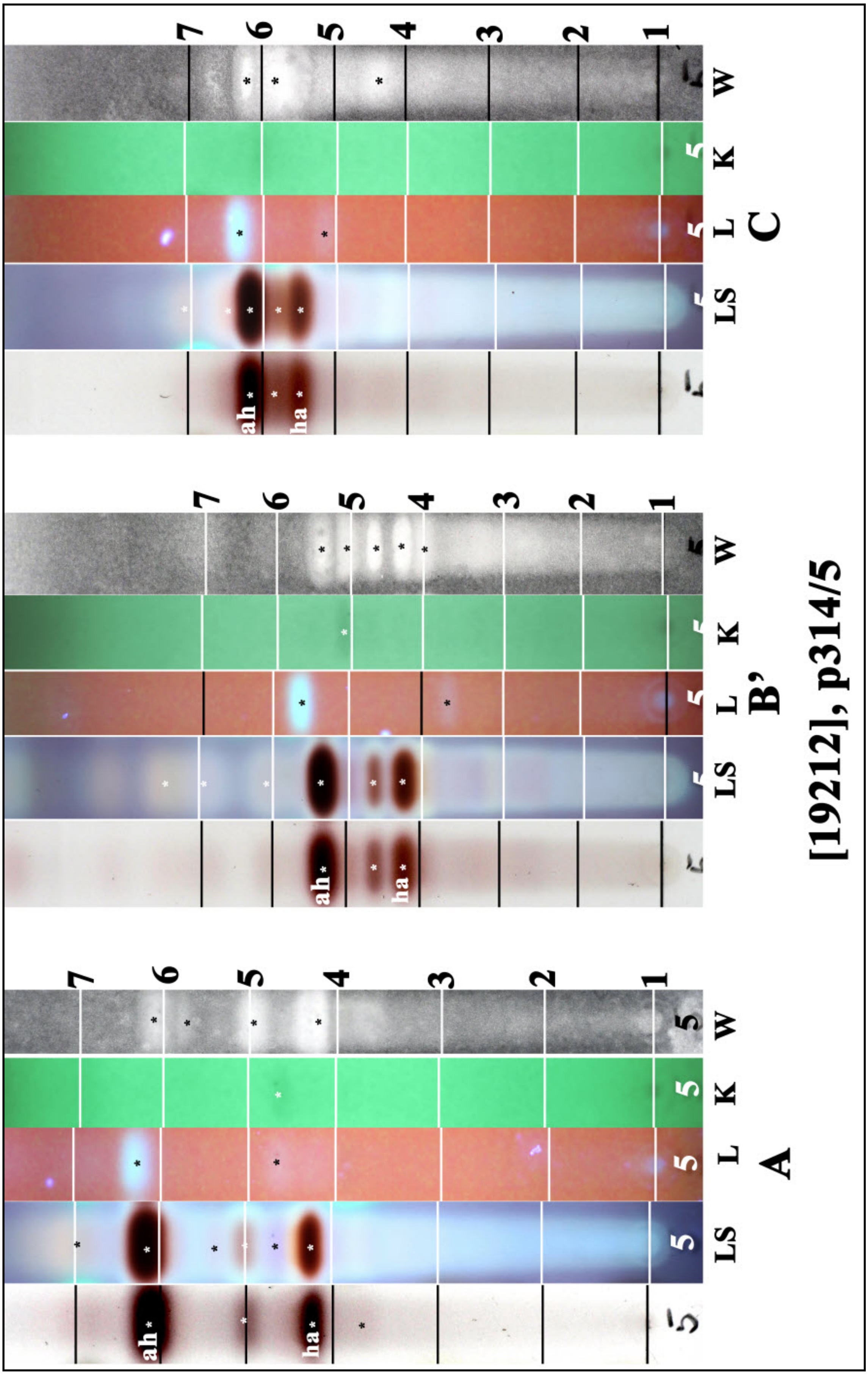
Pseudocyphellaria multifida, [19209], New Zealand, South Island, Canterbury, 1 km south-east of Mount Bossu, Banks Peninsula, 640 m.

7β-acetoxyhopane-22-ol



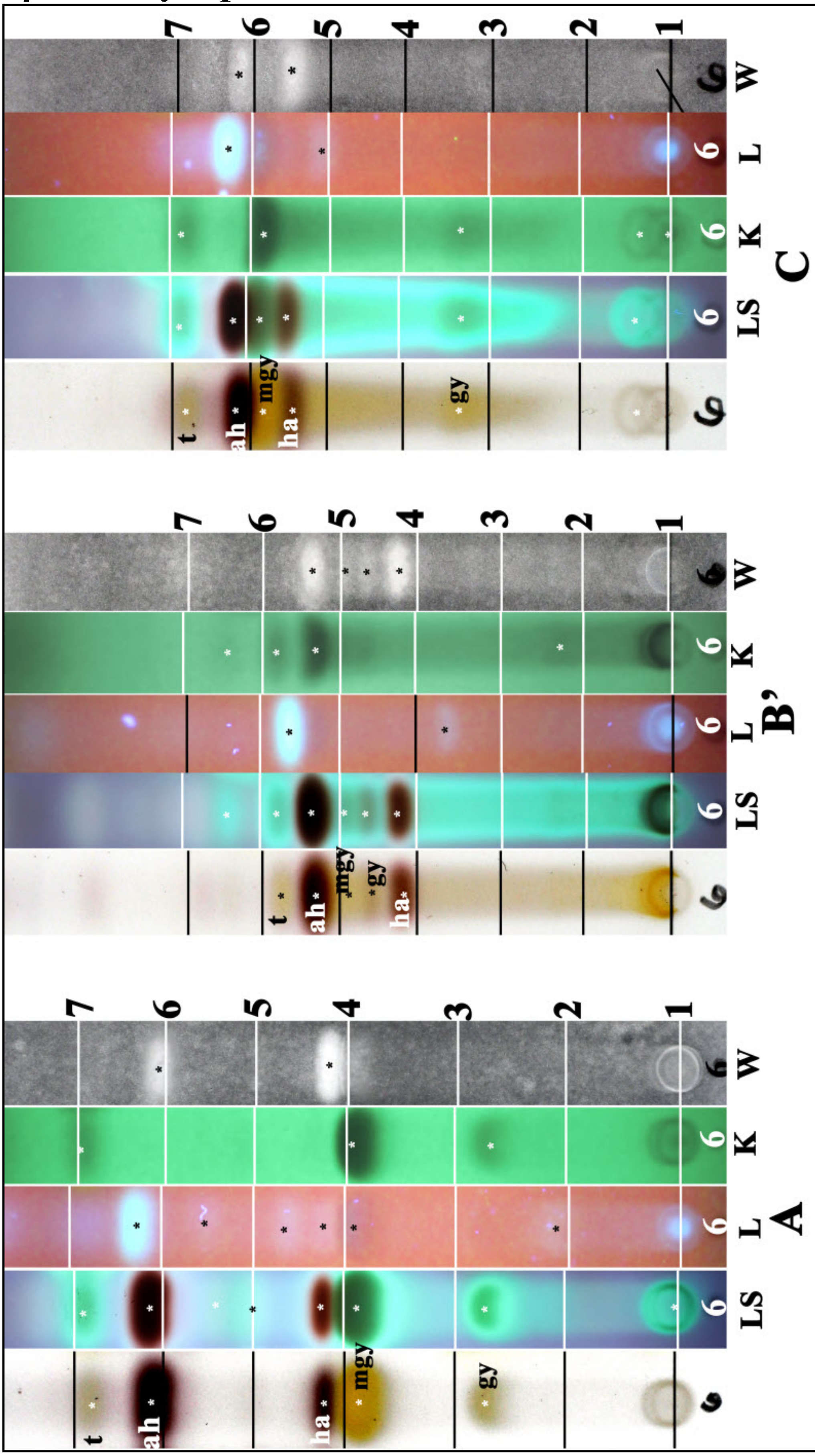
Pseudocyphellaria pubescens, [19211], New Zealand, South Island, Canterbury, eastern entrance to Arthurs Pass National Park, 670 m.

7β-acetoxyhopane-22-ol



Pseudocyphellaria punctillaris, [19212], Australia, Queensland, Hugh Nelson Range, along Plath Road, 15 km south of Atherton, 17°25' S, 145°26' E, 1080 m.

7β-acetoxyhopane-22-ol

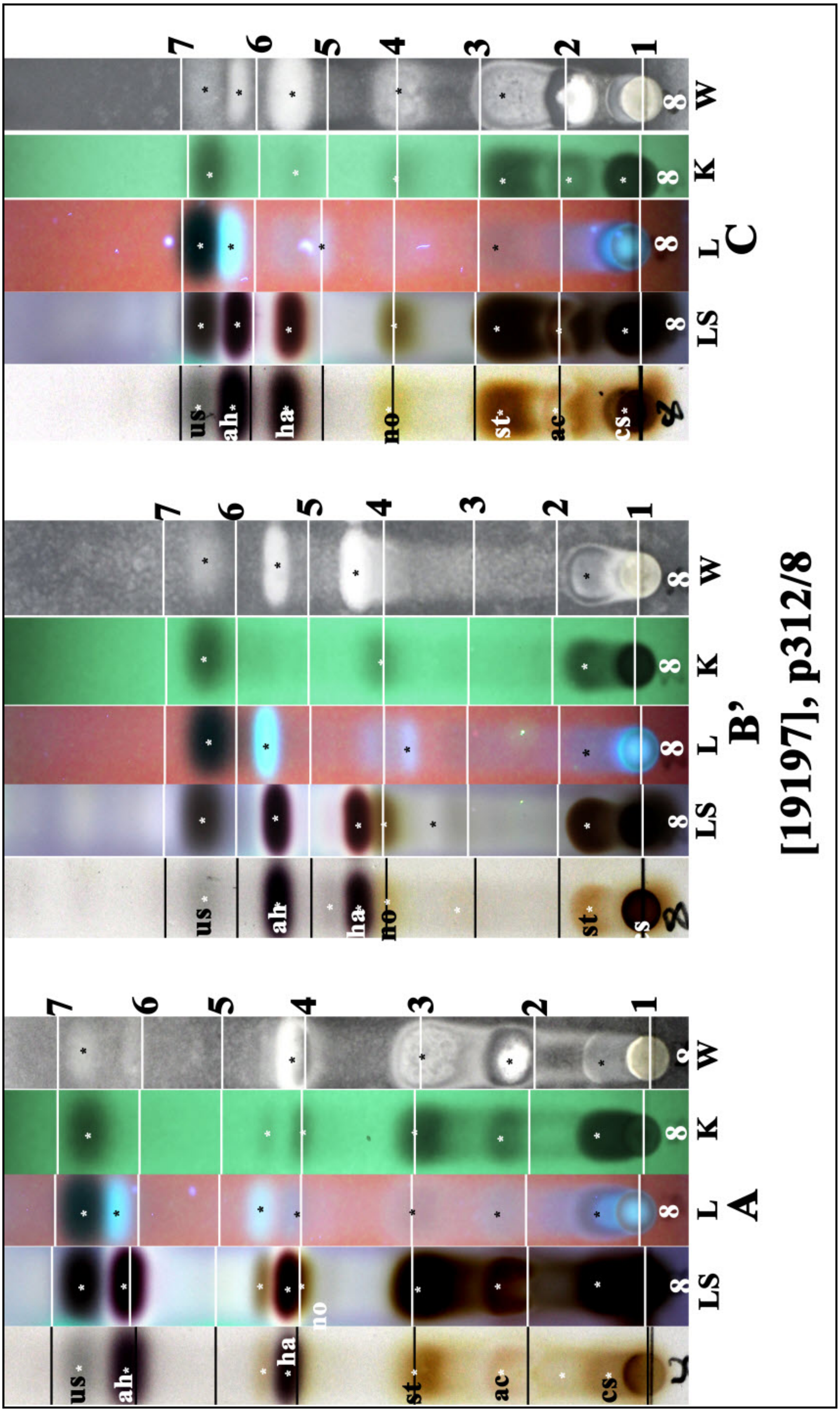


[19213], 314/6

t: tenuiorin, **ah: 7β-acetoxyhopane-22-ol**, ha: hopane-15α,22-diol, mgy: 4-O-methylgyrophoric acid (major), gy: gyrophoric acid.

Pseudocyphellaria sulphurea, [19213], Australia, Queensland, Kirrima State Forest, Cardwell Range, 24 km west-north-west of Cardwell, 18°12' S, 145°48' E, 750 m.

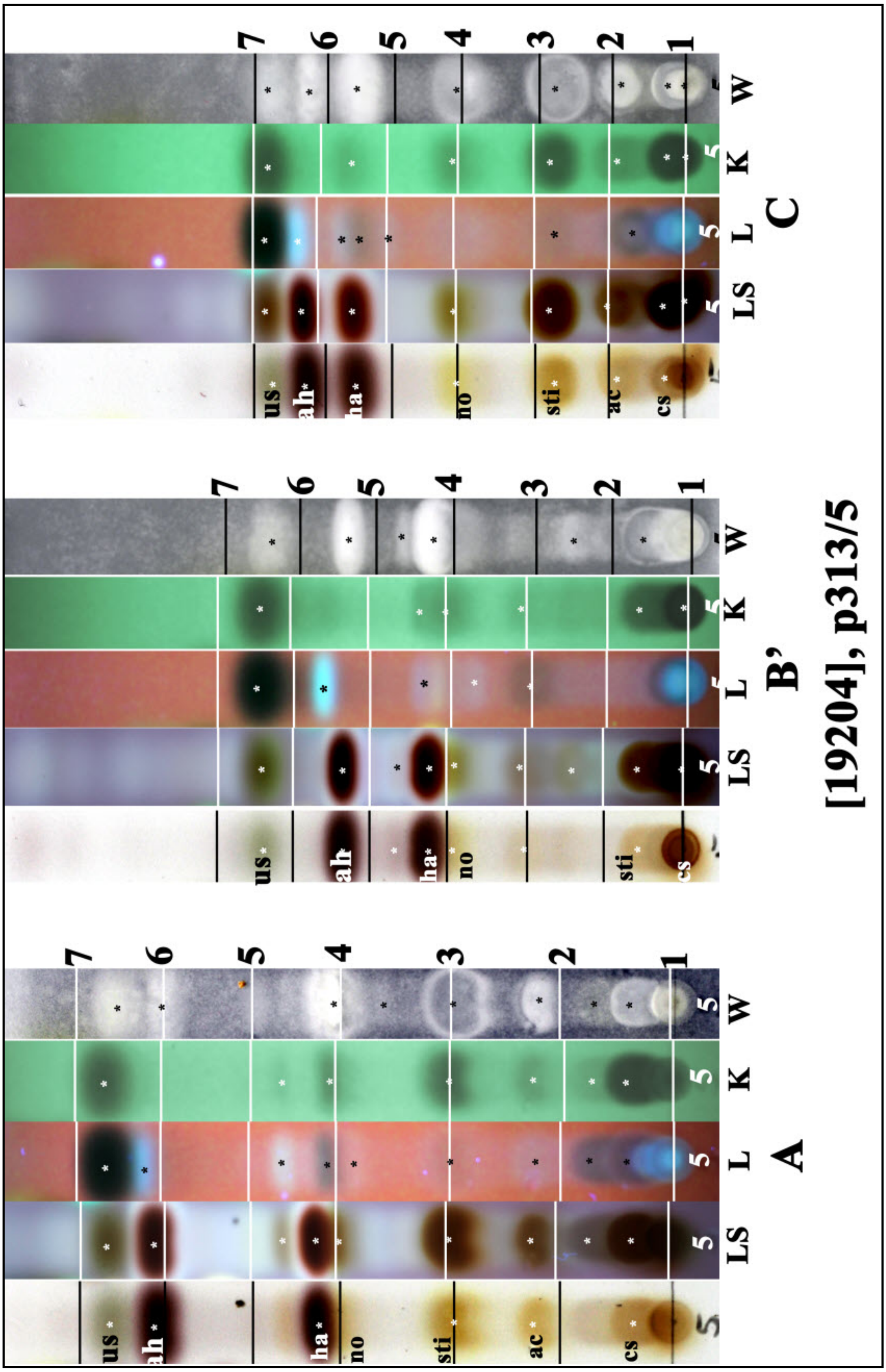
9α-acetoxyconstictic acid



us: usnic acid, st: stictic acid, no: norstictic acid, cs: constictic acid,
ah: 7β-acetoxyhopane-22-ol, ha: hopane-15α,22-diol, **ac: 9α-acetoxyconstictic acid**

Pseudocyphellaria glabra ,[19197], New Zealand, South Island, Canterbury, 3 km east of Te Oka Peak, Banks Peninsula.

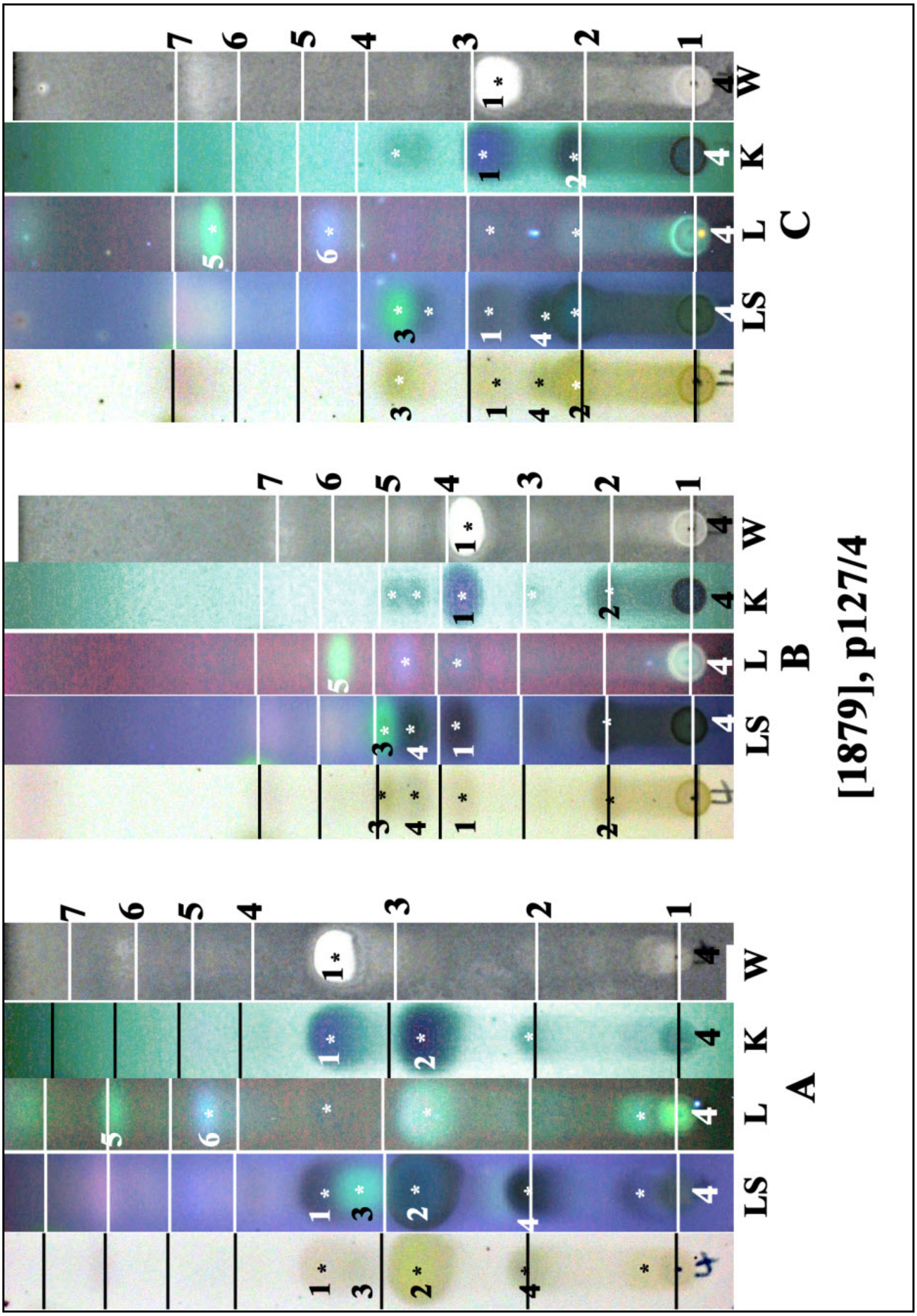
9α-acetoxyconstictic acid



us: usnic acid, no: norstictic acid, sti: stictic acid, cs: constictic acid, ah: 7β-acetoxyhopane-22-ol, ha: hopane-15α,22-diol, **ac: 9α-acetoxyconstictic acid**

Pseudocyphellaria glabra, [19204], Australia, Victoria, Donna Buang - Healesville road, 6 km north-west of Warburton, 37°42' S, 145°39' E, 1040 m.

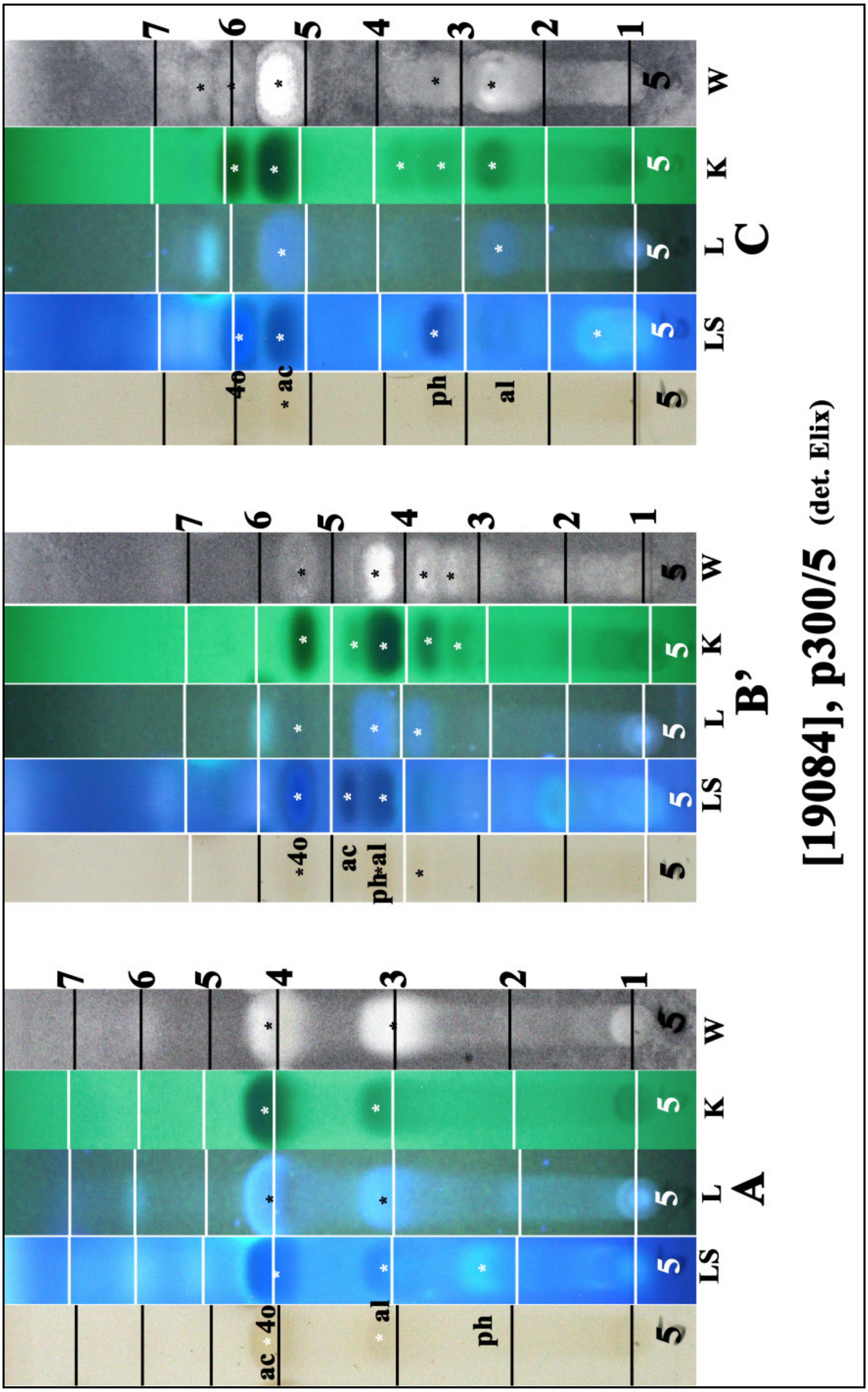
alectoronic acid



1: alectoronic acid, 2: variolaric acid, 3: gyrophoric acid, 4,5,6: unknown, conf. J.A. Elix

Ochrolechia parella, [1879], Frankreich, Bretagne, Pointe de Saint Mathieu, westlich von Brest, auf Feldmäuerchen aus Urgestein. Leg. F. Schumm & Claude Comte, 22.08.1971

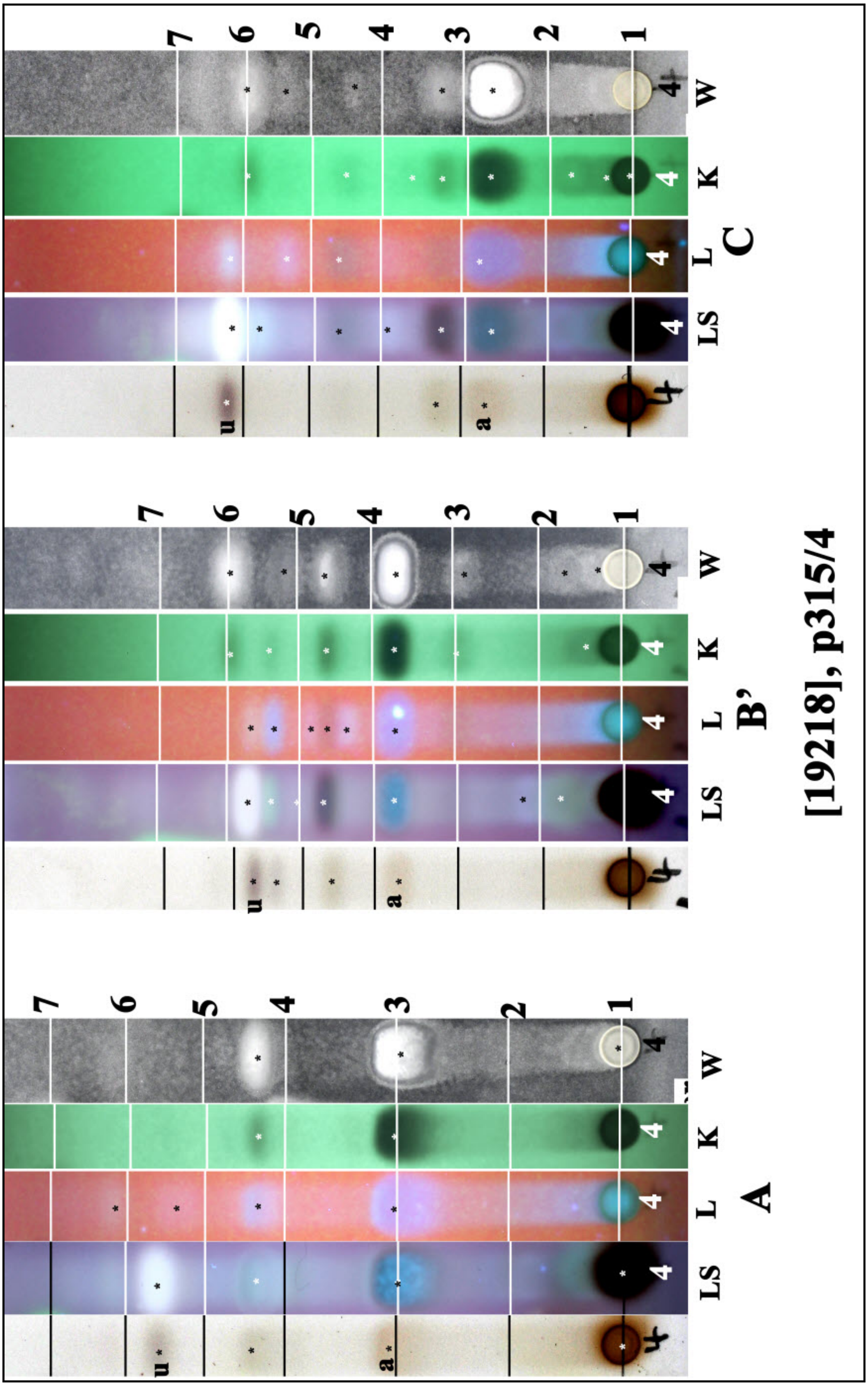
alectoronic acid



ac: α-collatolic acid, **al: alectoronic acid**, 4o: 4-O-methylphysodic acid, ph: physodic acid

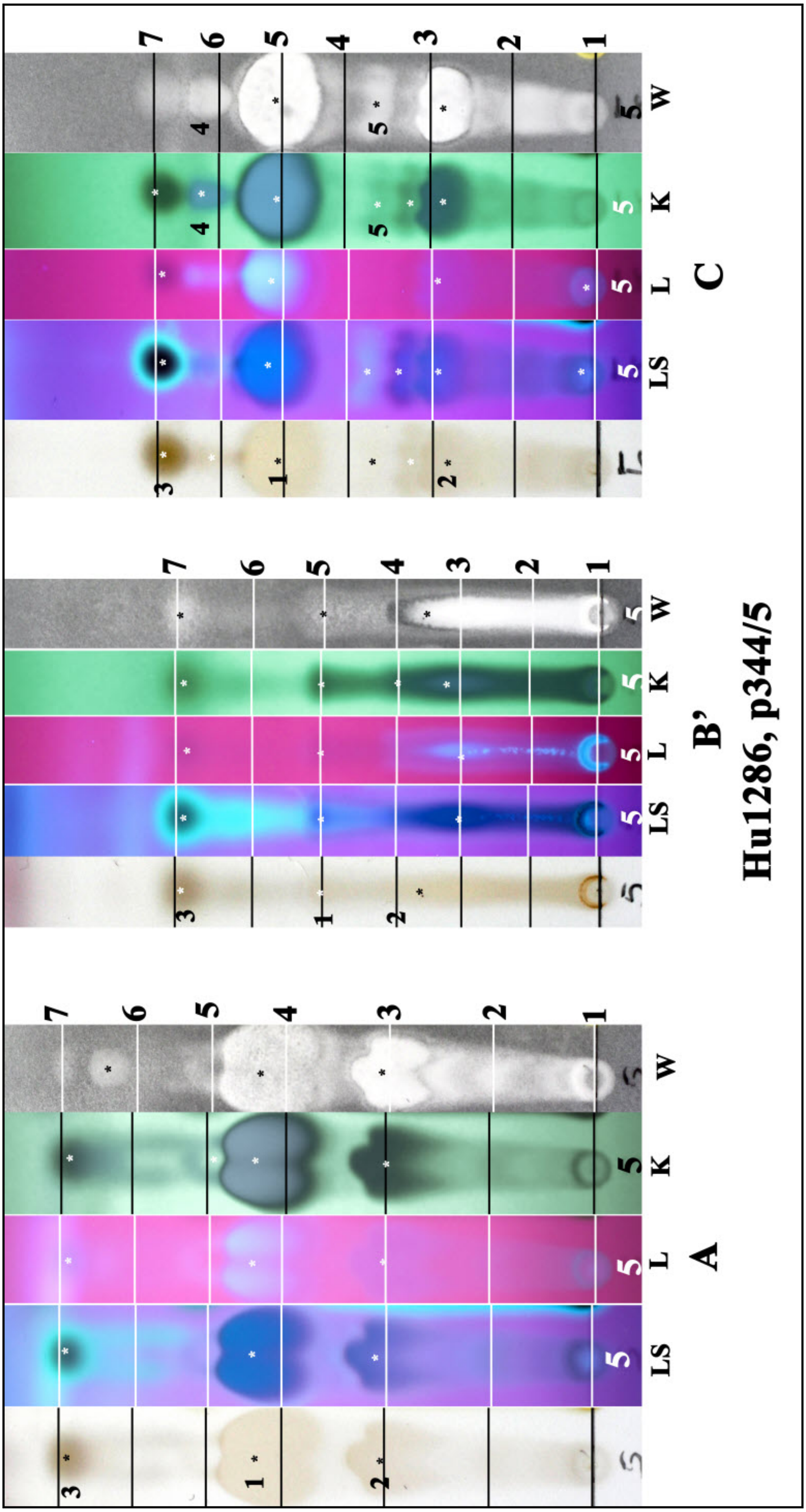
Xanthoparmelia** (Neofuscelia)* ***imitatricoides, [19084], Australia, New South Wales, Morton National Park, 8 km north-east of Nerriga.

alectoronic acid



Ochrolechia xanthostoma, [19218], New Zealand, South Island, Canterbury, Porters Pass, south-west slopes of Foggy Peak, Torlesse Range.

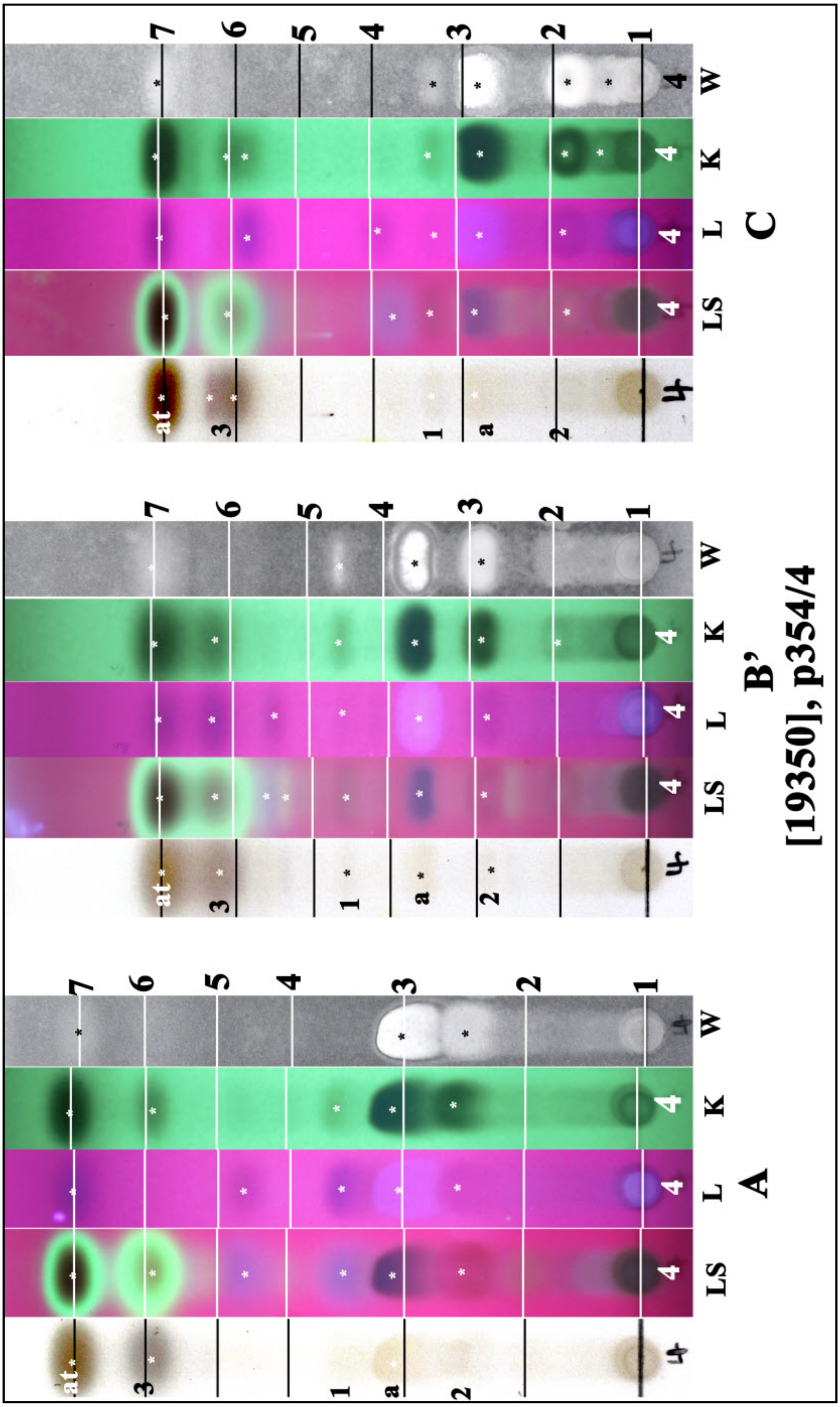
alectoronic acid



1: α-collatolic acid, **2: alectoronic acid**, 3: atranorin, 4: 4-*O*-methylphysodic acid, 5: physodic acid, conf. J.A. Elix

S. Huneck's collection of lichen substances No 1286: α-collatolic acid
Botanisches Museum Berlin-Dahlem

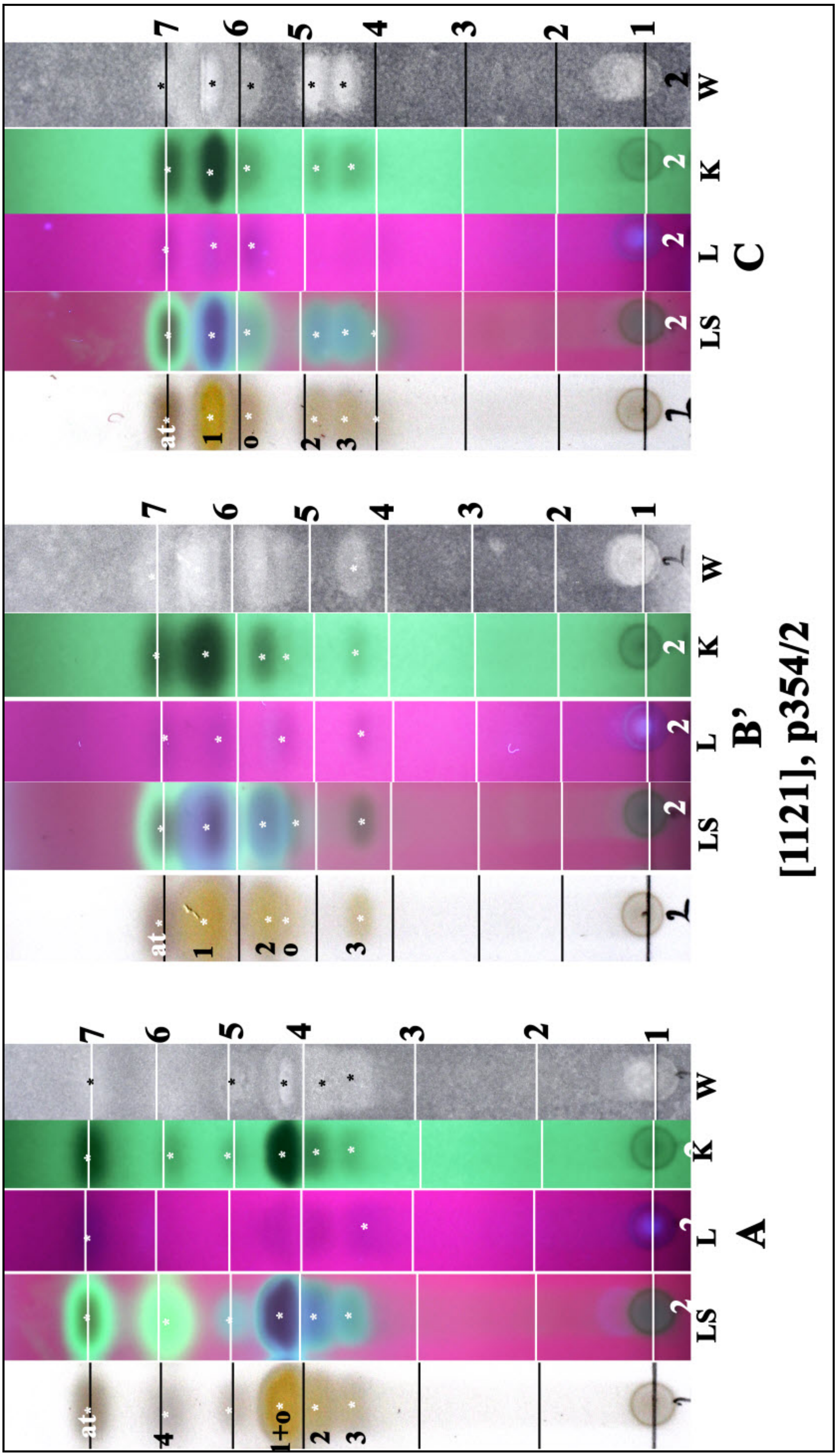
alectoronic acid



at: atranorin, **a: alectoronic acid**, 1: physodic acid, 2: vittatolic acid, 3: colensoic acid ,conf. J.A. Elix.

Tephromela aff. ***alectoronica*** [19350], Australia, Queensland, Kennedy Highway c. 12 km SSE of Kuranda, on roadside trees at the edge of a disturbed tropical rainforest, 420 m, 16°54'40" S, 145°36'04"E. Leg. K. & D. Kalb, 21.08.2015 (Nr. 40535).

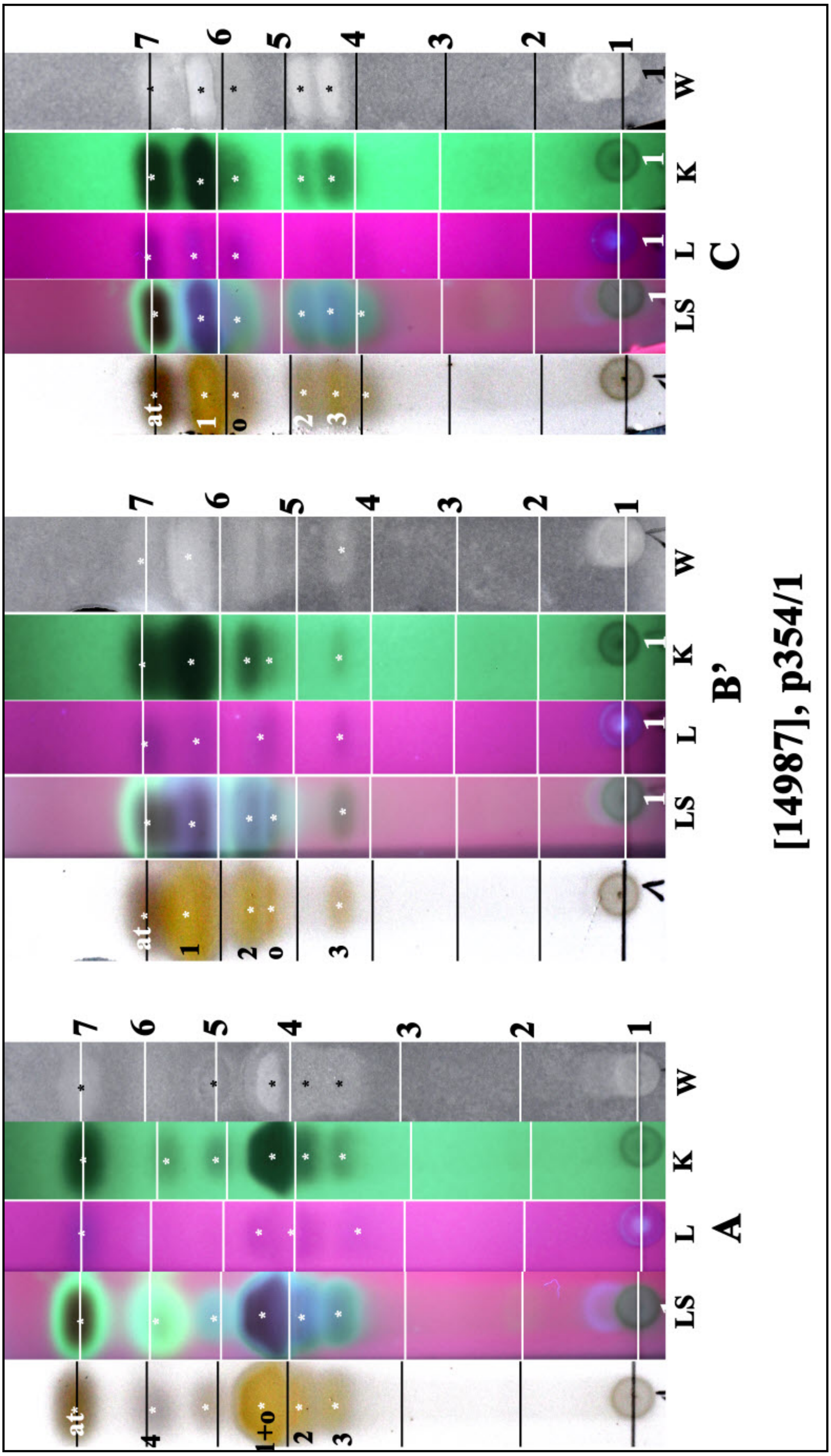
anziaic acid



at: atranorin, 1: perlatolic acid, **2: anziaic acid**, 3: olivetoric acid, 4: superlatolic acid, o: 4-*O*-methylolivetoric acid, conf J.A. Elix

Cetrelia cetrarioides, [1121], Germany, Baden-Württemberg, Stuttgart, Rotwildpark, an Fagus, TK: 7220/2. Leg. et det. E. Putzler 17.05.1950.

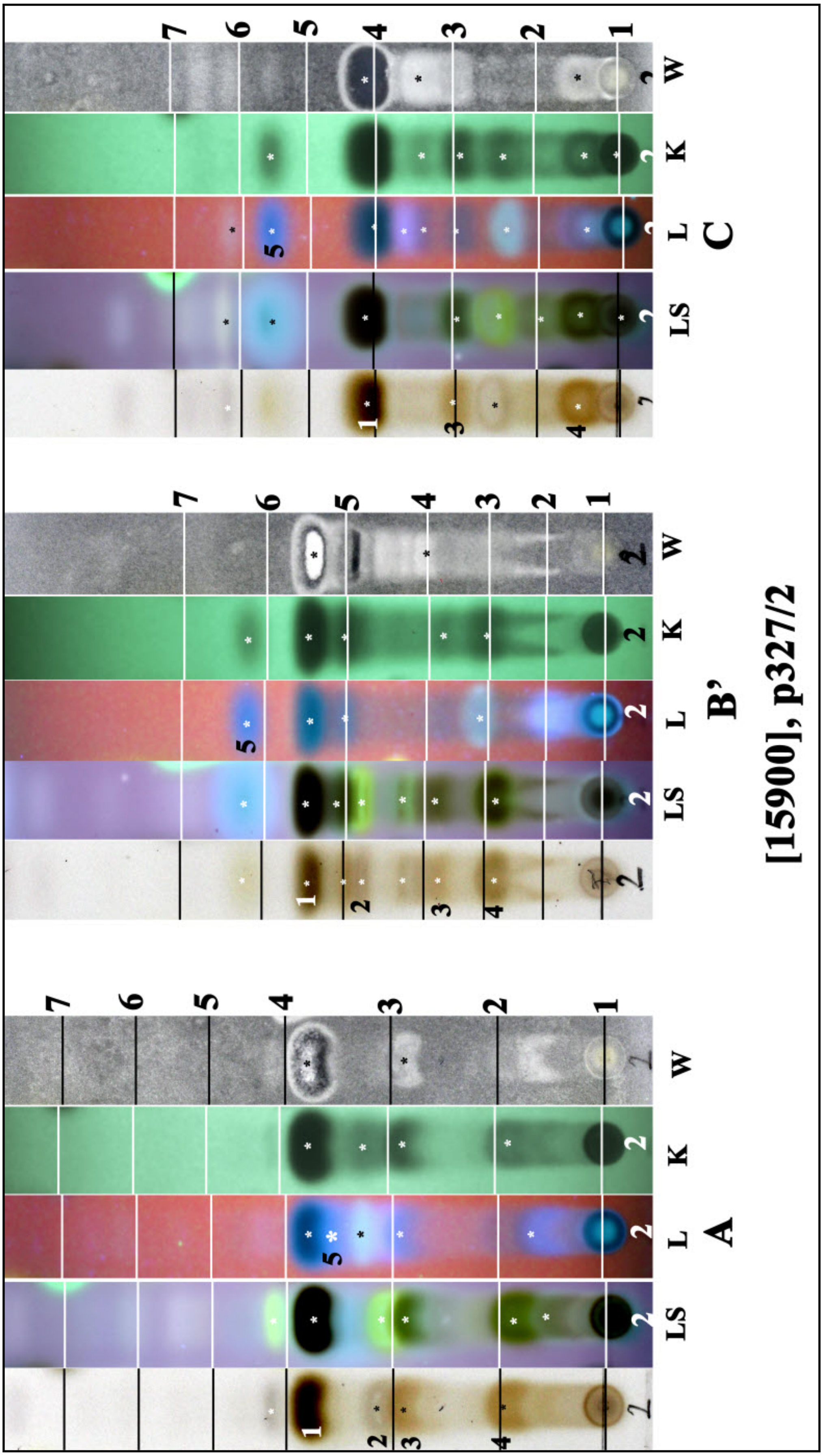
anziaic acid



at: atranorin, 1: perlatolic acid, **2: anziaic acid**, 3: olivetoric acid, 4:superlatolic acid, o: 4-*O*-methylolivetoric acid, conf. J.A. Elix.

Cetrelia cetrarioides, [14987], Germany, Bayern, Kreis Traunstein, Chiemgauer Alpen, Hochfelln, Weg von der Mittelstation der Seilbahn (47,76966°N, 12,57550°E, 1090 m) zur Talstation, an Fagus bei 950 m. Leg. et det. F. Schumm 27.08.2009.

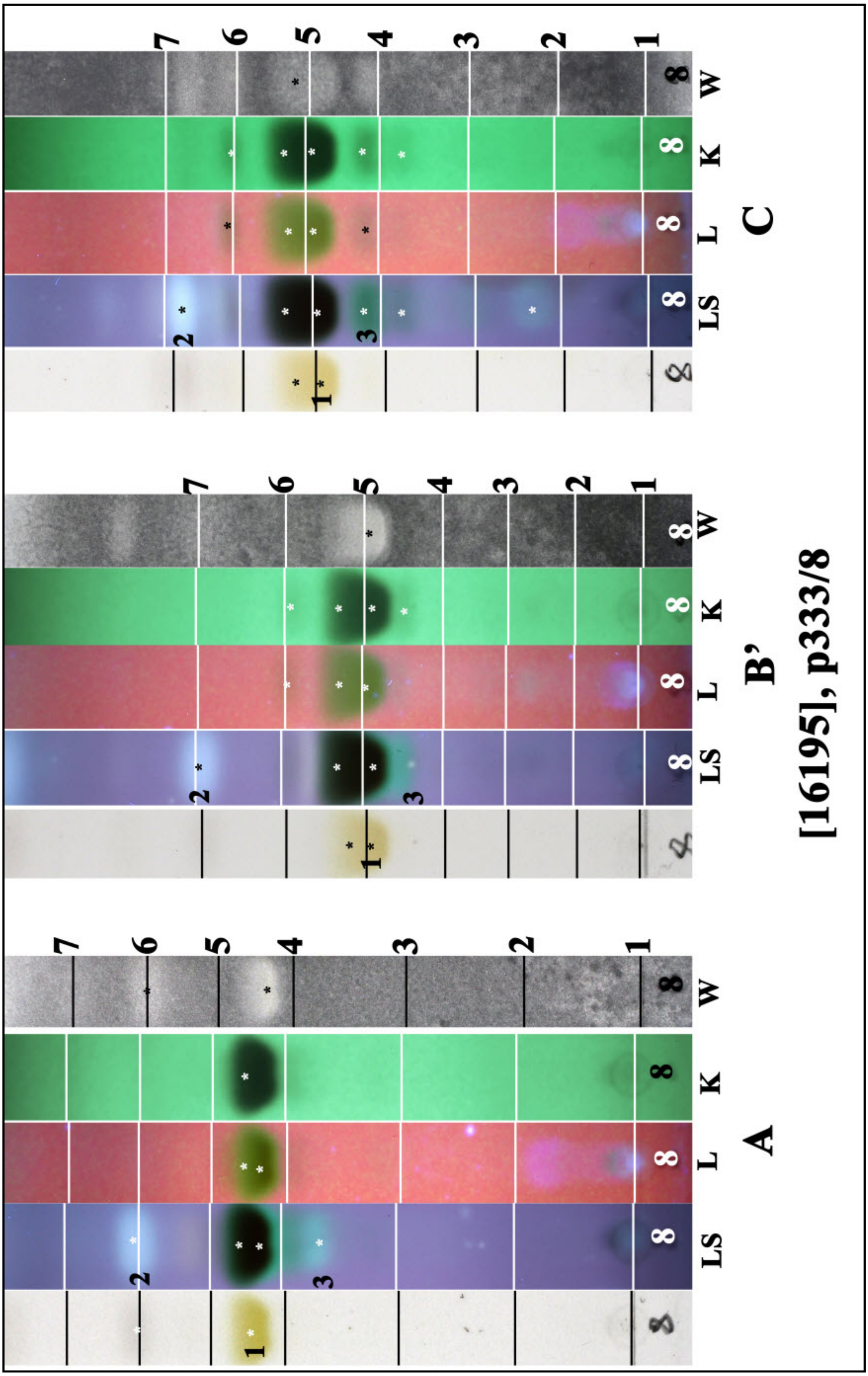
arthothelin



1: arthothelin, 3: 4,5-dichloronorlichexanthone, 5: thiophanic acid, 2,4: unknown.

Calicium tricolor, [15900], Australia, Western Australia, north of Nornalup, Valley of the Giants, 34.970° S, 116.894° E, 177 m, growing on bark of *Eucalyptus*. Leg. F. Schumm & E. Stocker-Wörgötter, 26.10.2009.

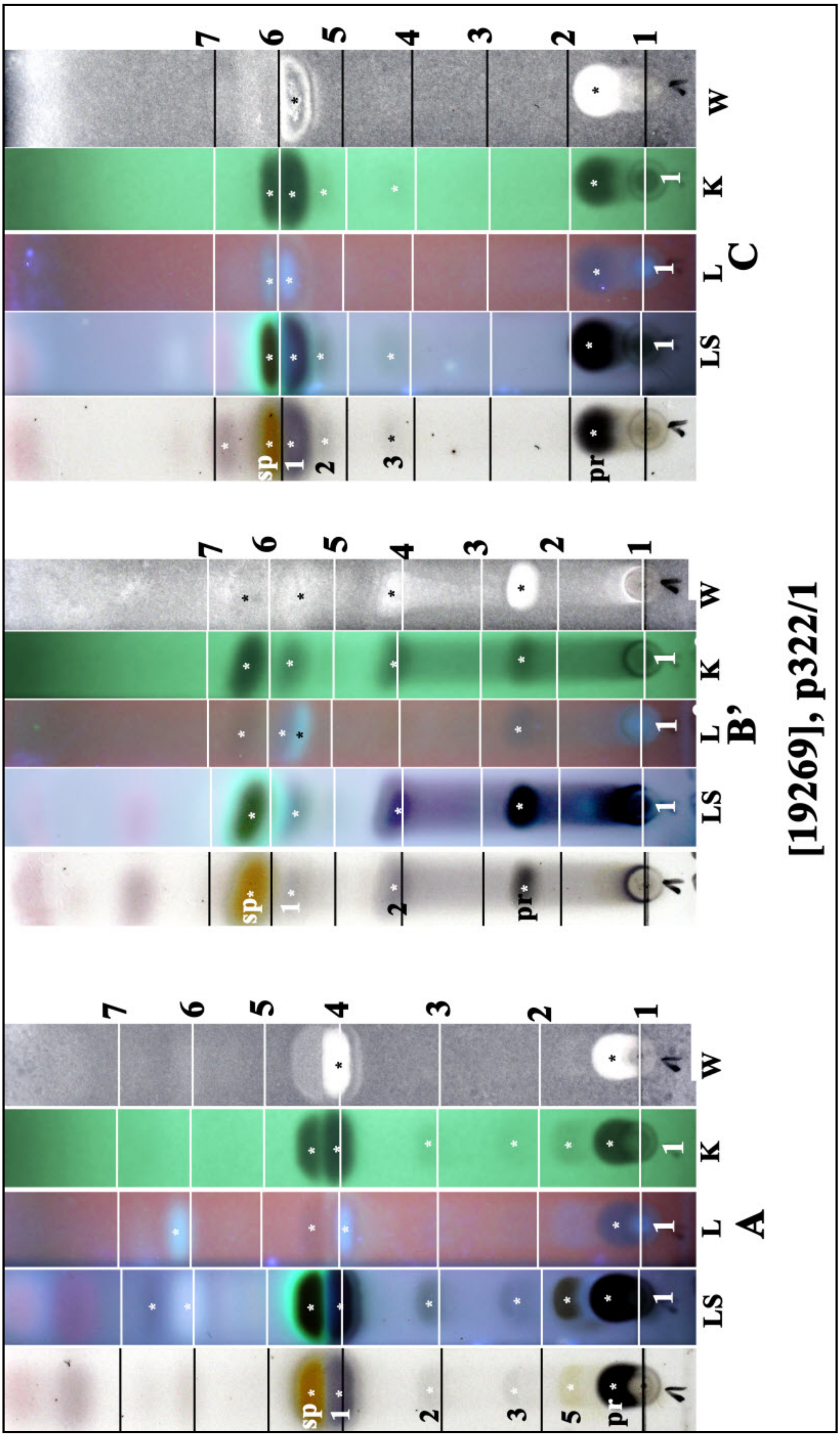
arthothelin



1: **isoarthothelin and arthothelin**, 2: lichexanthone, 3: 2,5-dichloronorlichexanthone

Buellia aeruginosa [16195], Australia, New South Wales, Mystery Bay south of Narooma, Pool Beach, 36.305° S, 150.136° E, 0 m. Leg. F. Schumm & E. Stocker-Wörgötter, 11.11.2009, det. F. Schumm, conf. J.A. Elix.

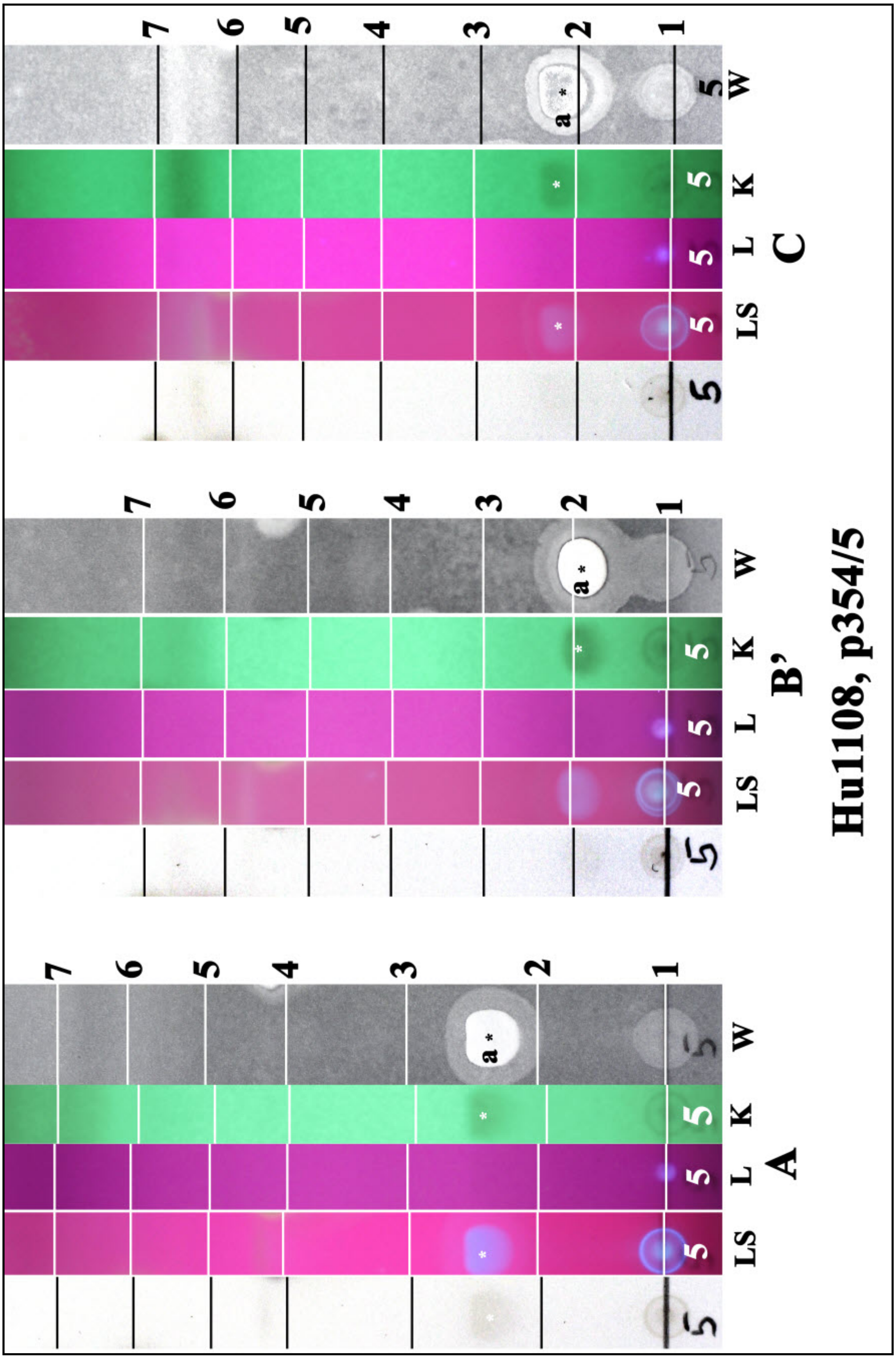
ascomatic acid



sp: sphaerophorin, pr: protocetraric acid, **1: ascomatic acid**, 2,3,4: unknowns

Bunodophoron insigne , [19269], Australia, Victoria, Junction of Coast Range Road and Cabon Road, Errinundra Plateau, 18.5 km south-south-east of Bendoc, 37°18' S, 148°51' E, 980 m, growing on dead log in *Eucalyptus* forest.

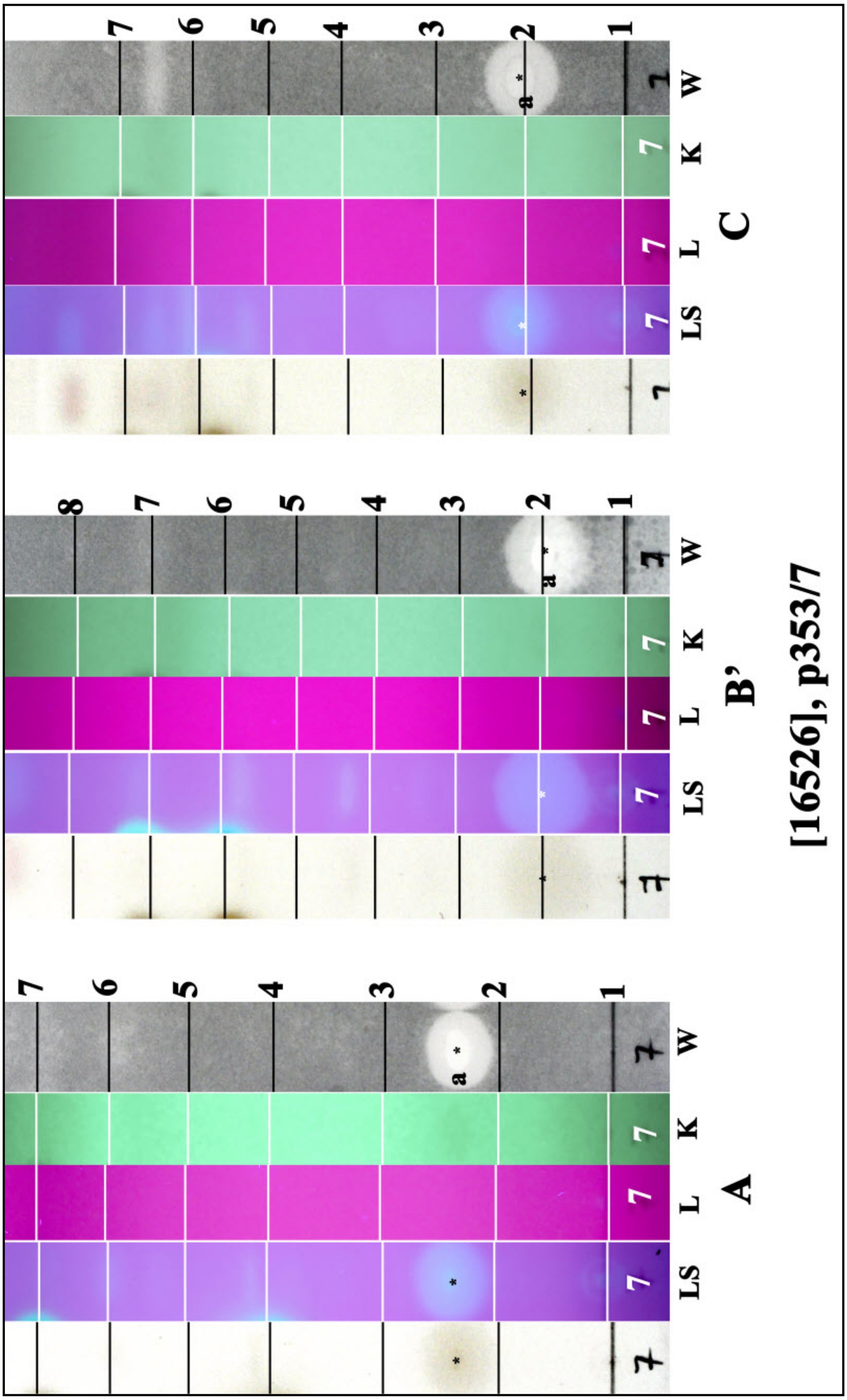
aspicilin



a: aspicilin, conf. A.J. Elix

S. Huneck's collection of lichen substances No 1108: aspicilin.
Botanisches Museum Berlin-Dahlem

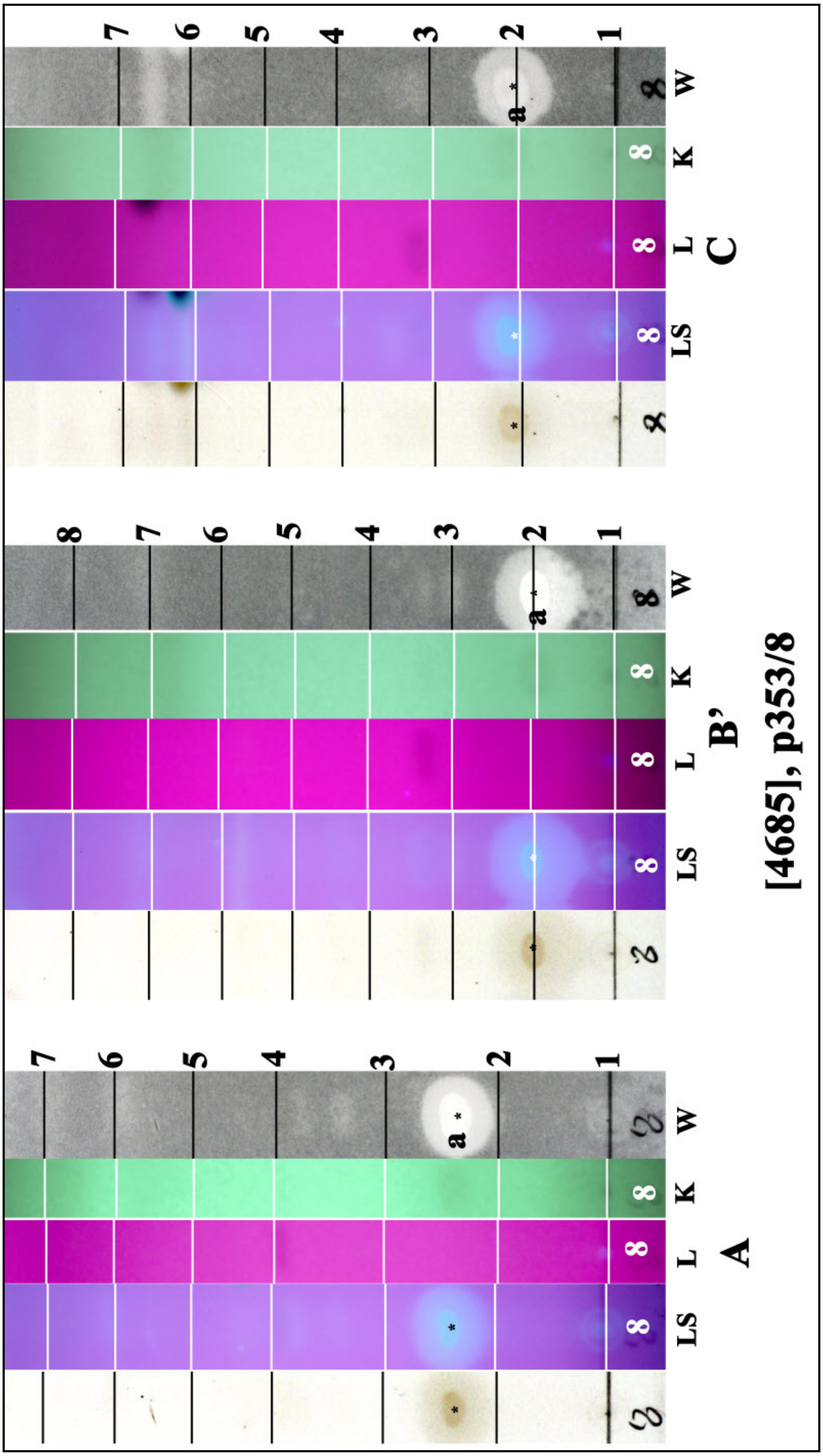
aspicilin



a: aspicilin, conf. J.A. Elix

Aspicilia caesiocinerea (Nyl. ex Malbr.) Arnold, [16526], Germany, Baden-Württemberg, Schwarzwald-Baar-Kreis, an der Straße von Hornberg nach Schramberg bei der Abbiegung zum Käppelehof. 48,22853° N, 8,312805° E, 670 m, an Granitfelsen. Leg. et det. F. Schumm 07.07.2010.

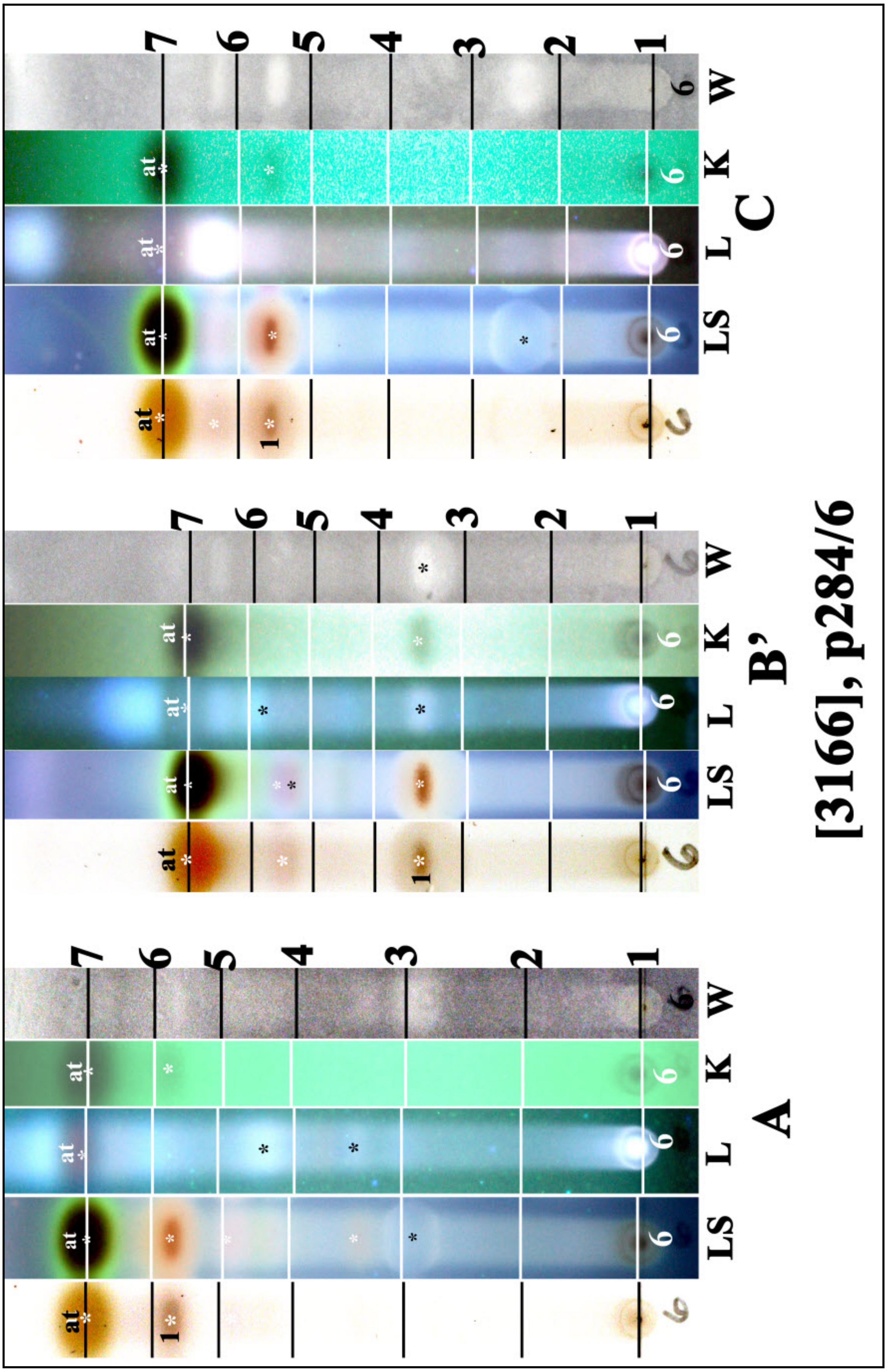
aspicilin



a: aspicilin, conf. J.A. Elix

Aspicilia caesiocinerea, [4685], Schweiz, Wallis, südlich von Martigny, Dranse-Tal, Bovernier, auf Weinbergsmauern, Gneis/Granit, ca. 620 m. Leg. et det. F. Schumm 24.08.1996.

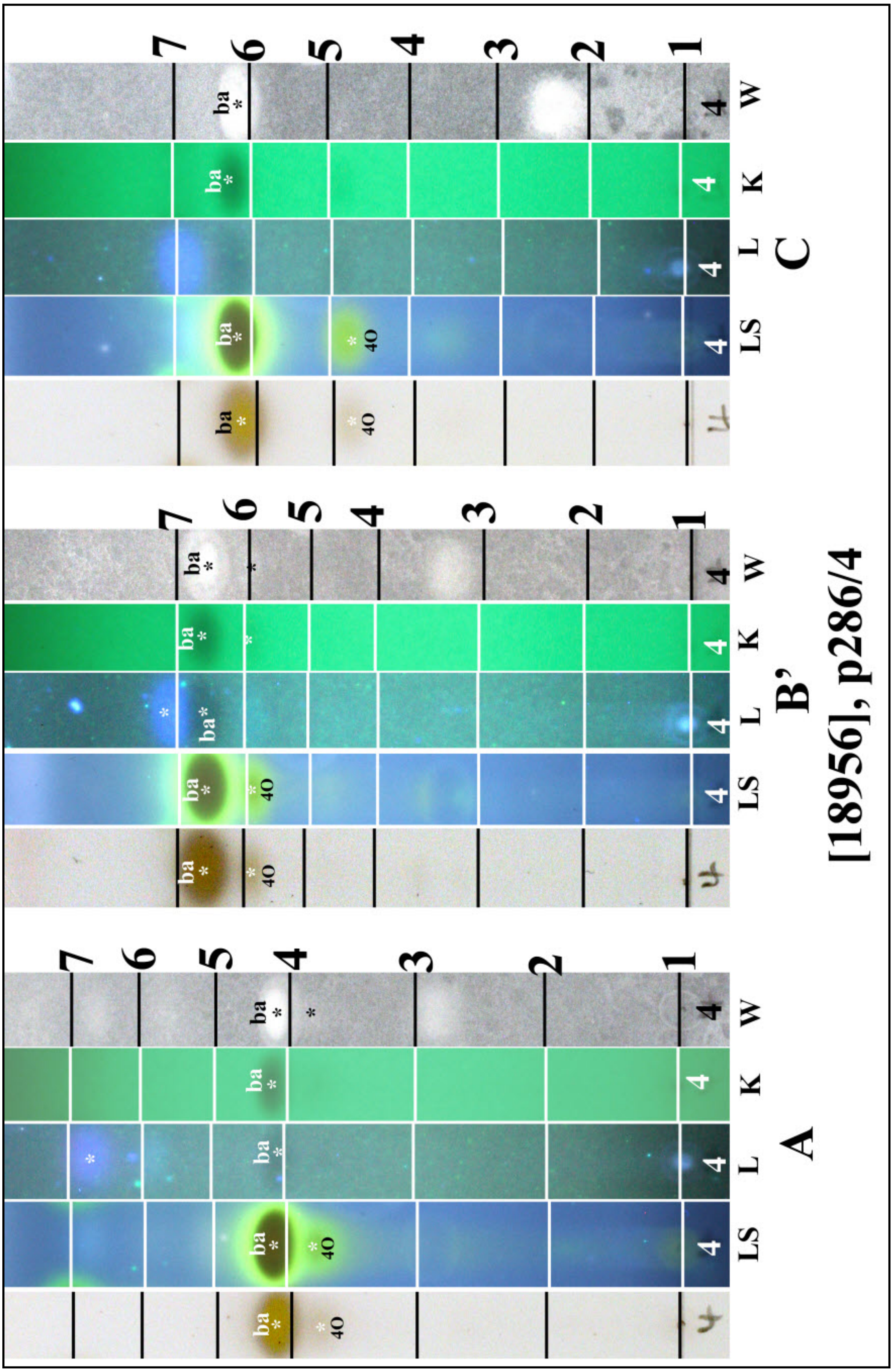
atranorin



at: atranorin, 1: unknown terpene

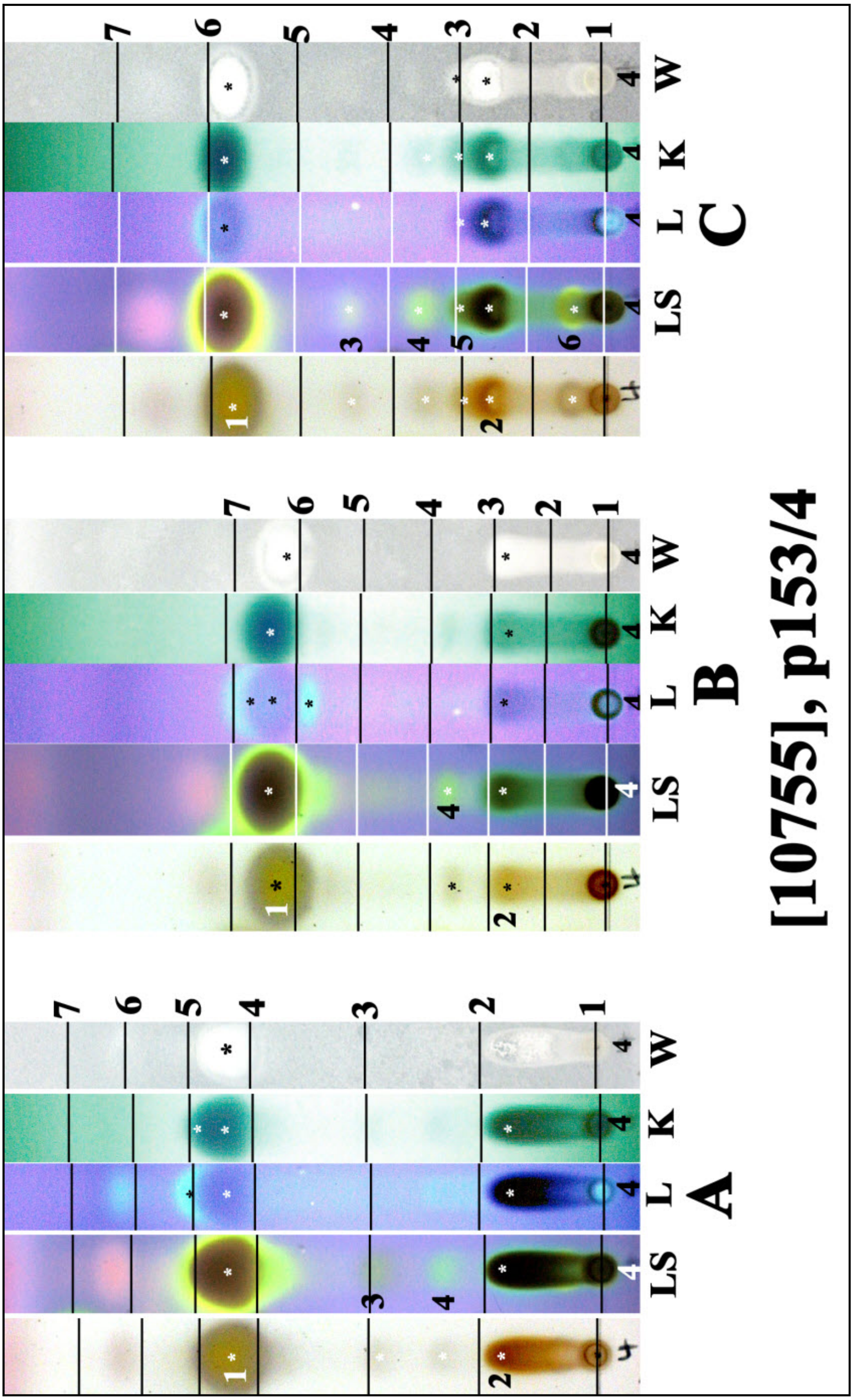
Lecanora campestris [3166], Germany, Baden-Württemberg, Schwäbische Alb, Kreis Heidenheim, westlich von Böhmenkirch an Straßensteinen der Bundesstraße 466, ca. 700 m, TK 7225. Leg. et det. F. Schumm 10.10.1970.

barbatic acid



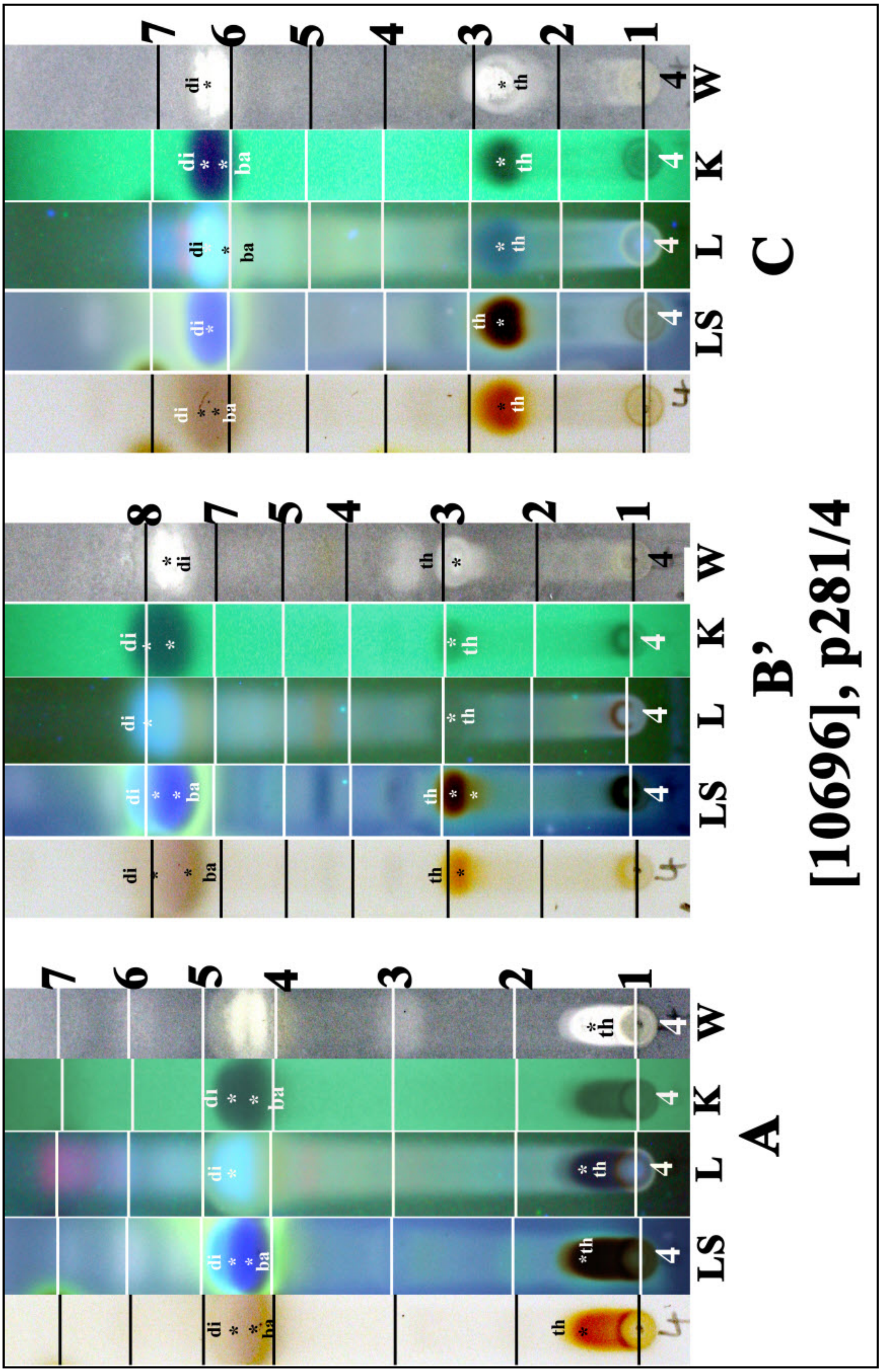
Cladia aggregata, [18956], New Zealand, South Island, Fiordland, Southern Lake.

barbatic acid



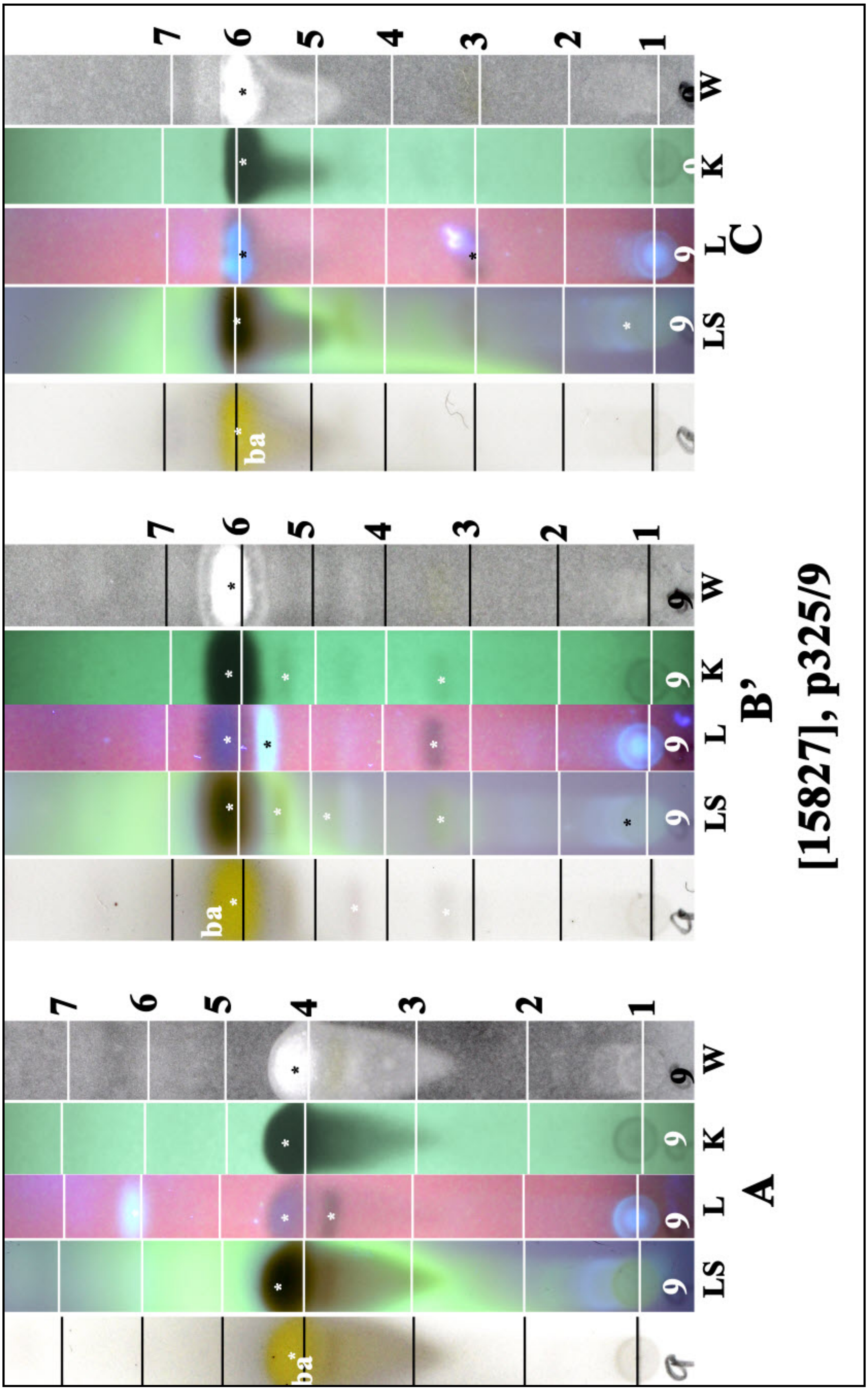
Cladonia parasitica, [10755], Germany, Baden-Württemberg, Kreis Göppingen, Rechberghausen, an Wegrändern im Ödach, Stubensandsteingebiet, Nadelwald, ca. 400 m, TK 7223. Leg. F. Schumm 13.03.1971.

barbatic acid



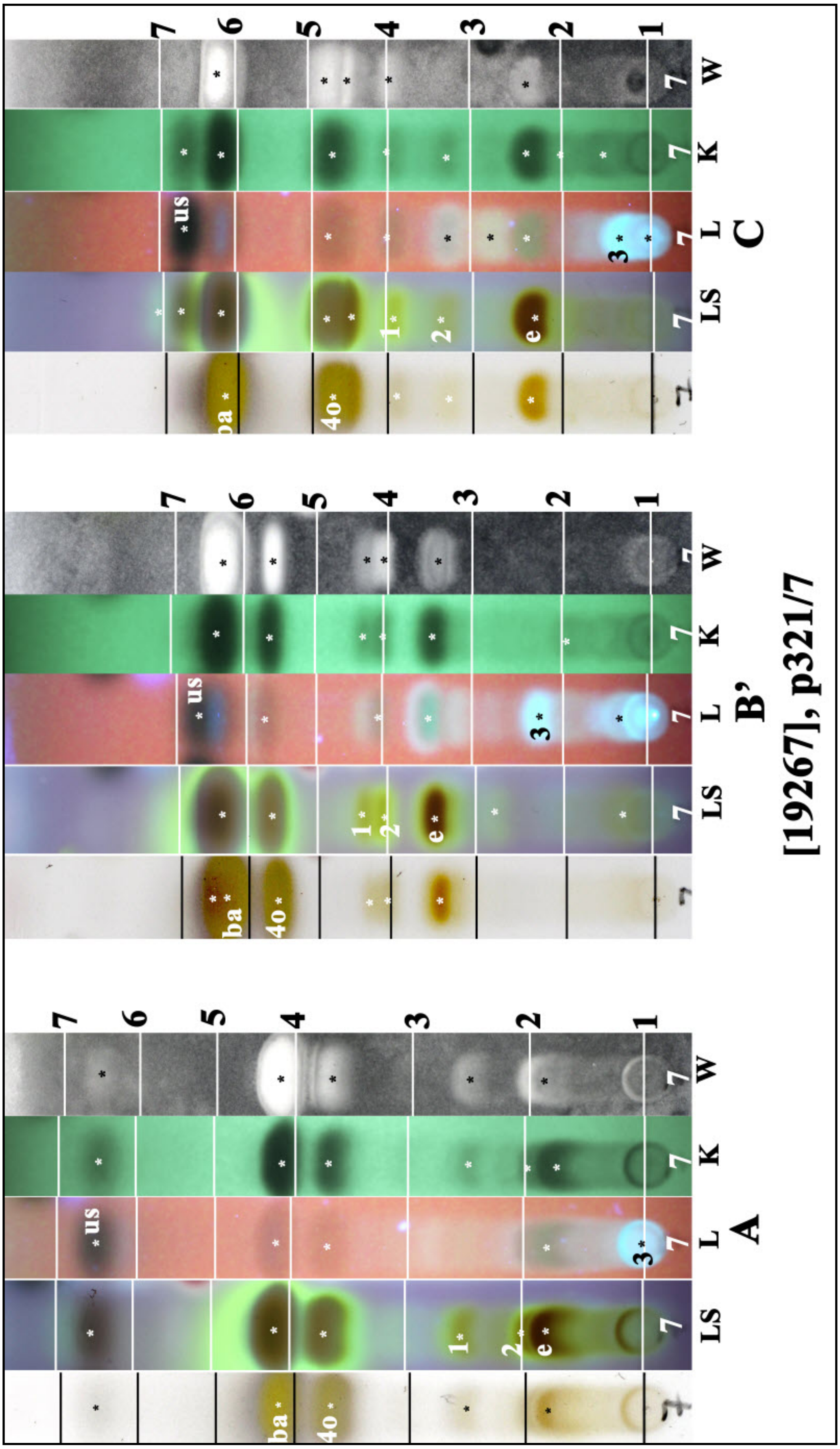
Cladonia didyma, [10696], Portugal, Azoren, Sao Miguel, an der Straße SW von Lagoa das Fumas beim Parkplatz Reservada Florestal de Recreiro do Cerrado Bezerros, 37°44.632' N, 25°21.939' W, 430 m, an Laubbaumrinde. Leg. F. Schumm 03.06.2003, det. A. Aptroot 2009. Chemistry: K+ yellow, C-, KC-, P+ orange, UV+ blue-white.

barbatic acid



Siphula coriacea, [15827], Australia, Western Australia, North Boundary Rock, c. 20 km NNE of Manjimup off North Boundary Road, granite outcrop, associated with *Allocasuarina huegeliana* and *Corymbia calophylla;* 34.072° S, 116.325° E, 320 m. Leg. F. Schumm & E. Stocker-Wörgötter, 25.10.2009, det. J.A. Elix.

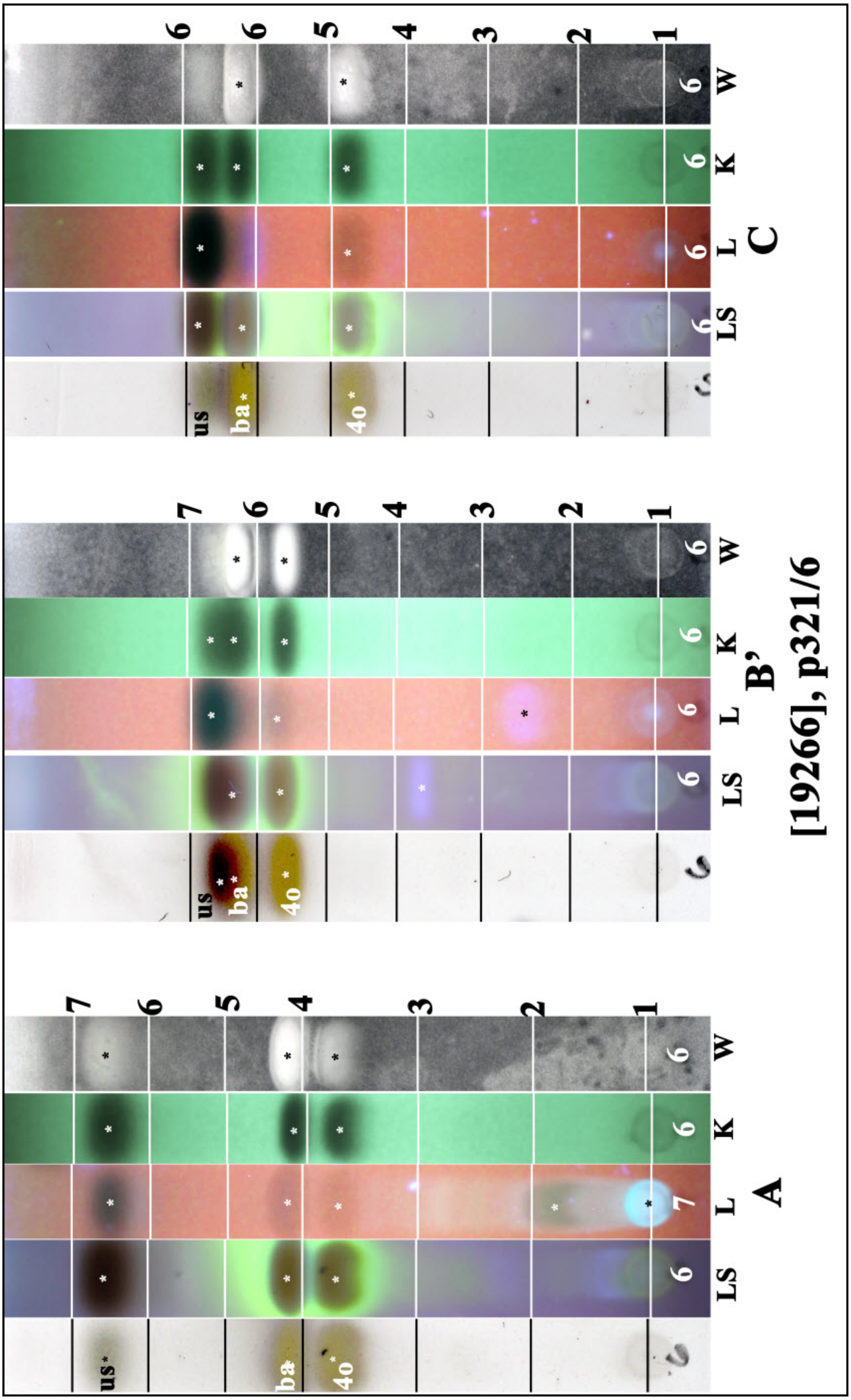
barbatic acid



us: usnic acid, **ba: barbatic acid**, 4o: 4-*O*-demethylbarbatic acid, e: echinocarpic acid,
1: conechinocarpic acid, 2: subechinocarpic acid, 3: unknown

Relicinopsis rahengensis, [19267], Australia, Queensland, Conway State Forest, 18 km east-north-east of Proserpine, 20°21' S, 148°45' E, 180 m

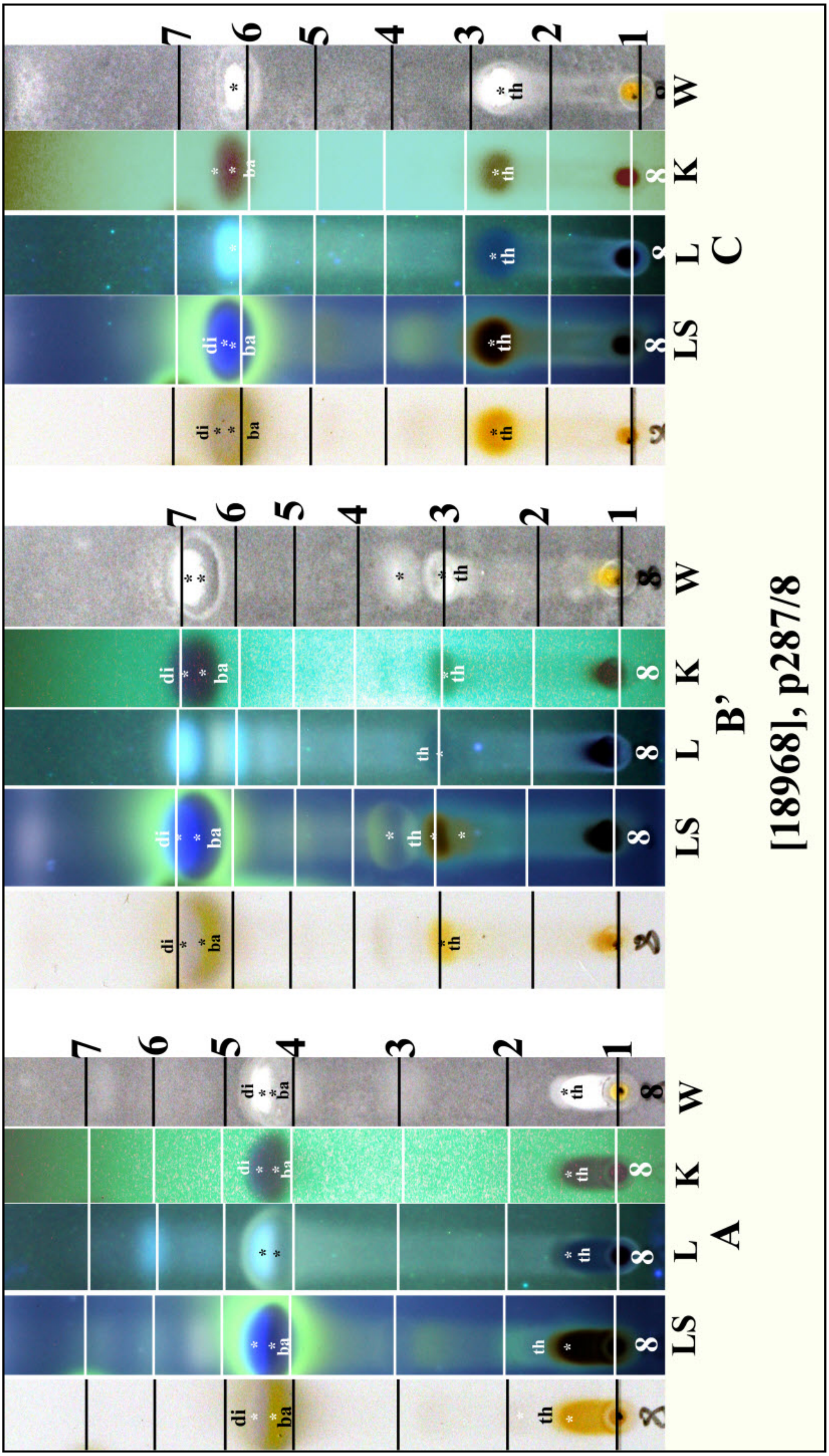
barbatic acid



us: usnic acid, **ba: barbatic acid**, 4o: 4-*O*-demethylbarbatic acid

Relicinopsis rahengensis, [19266], Australia, Northern Territory, Wangi Falls, Litchfield Park, 40 km south-west of Batchelor, 13°10' S, 130°41' E, 180 m.

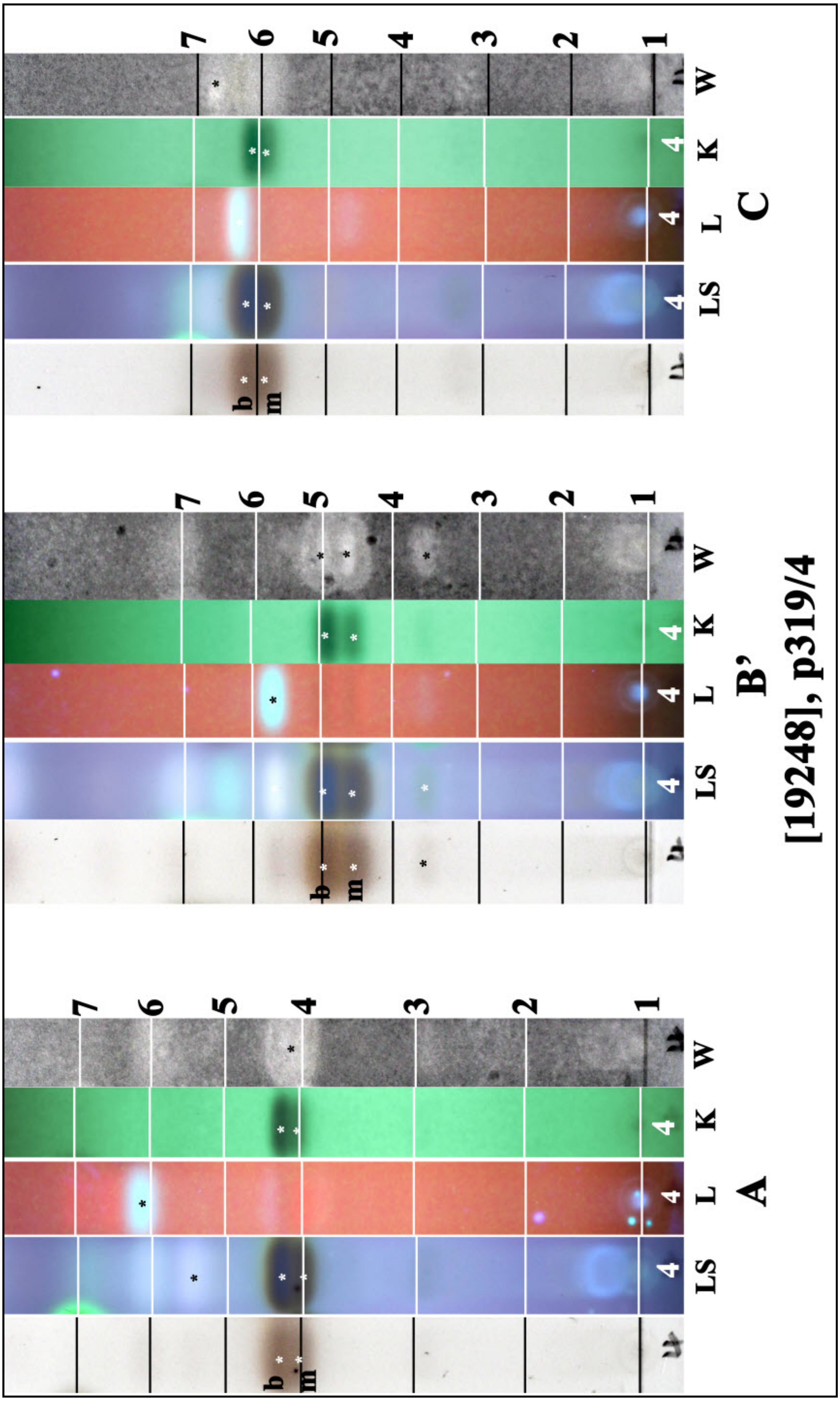
barbatic acid



di: didymic acid, ba: barbatic acid, th: thamnolic acid

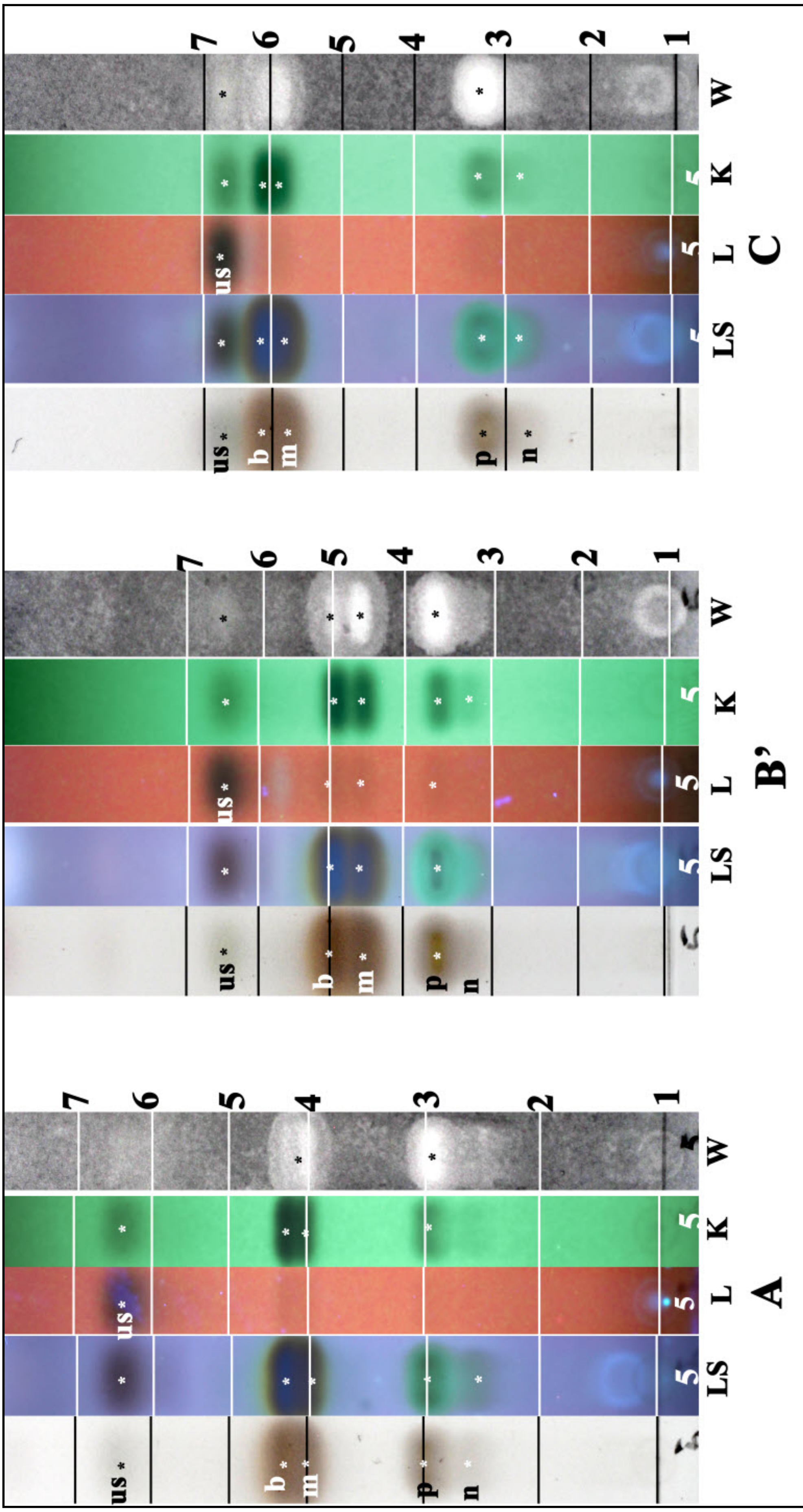
Cladonia macilenta [18968], Australia, Queensland, Crediton State Forest, 16 km south-west of Finch Hatton.

boninic acid



Ramalina leiodea,[19248], Norfolk Island, Rocky Point Reserve, 29°03' S, 167°55' E, 40 m.

boninic acid

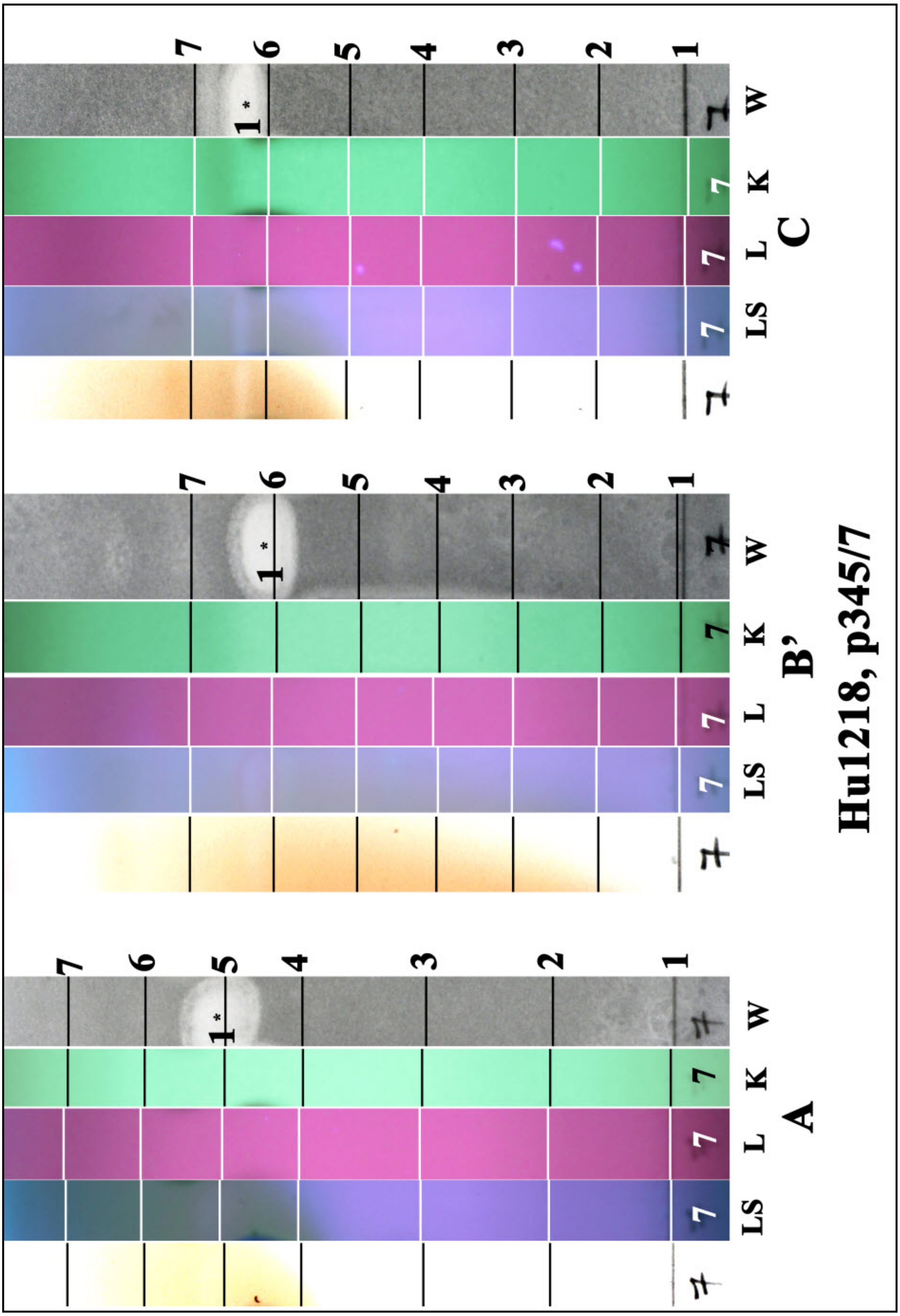


[19249], p319/5

us: usnic acid, **b: boninic acid**, m: 2-*O*-methylsekikaic acid,
p: 4'-*O*-methylpaludosic acid, n: 2,4'-di-*O*-methylnorsekikaic acid

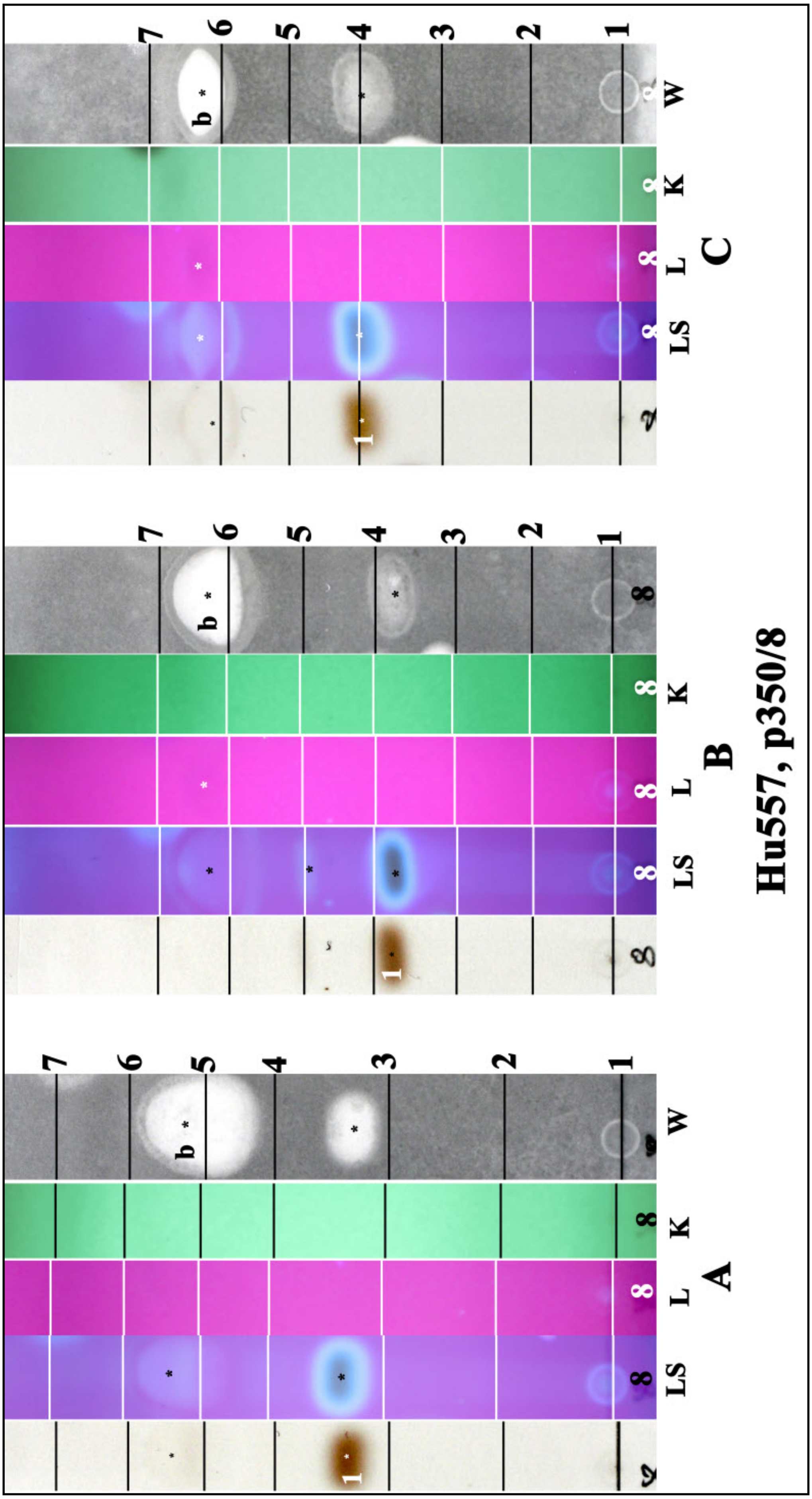
Ramalina leiodea, [19249], Australia, Queensland, Tin Can Inlet, Tin Can Bay, 25°54' S, 153°01' E, sea level.

bourgeanic acid



1: bourgeanic acid, conf. J.A. Elix
S. Huneck’s collection of lichen substances No 1218: bourgeanic acid
Botanisches Museum Berlin-Dahlem

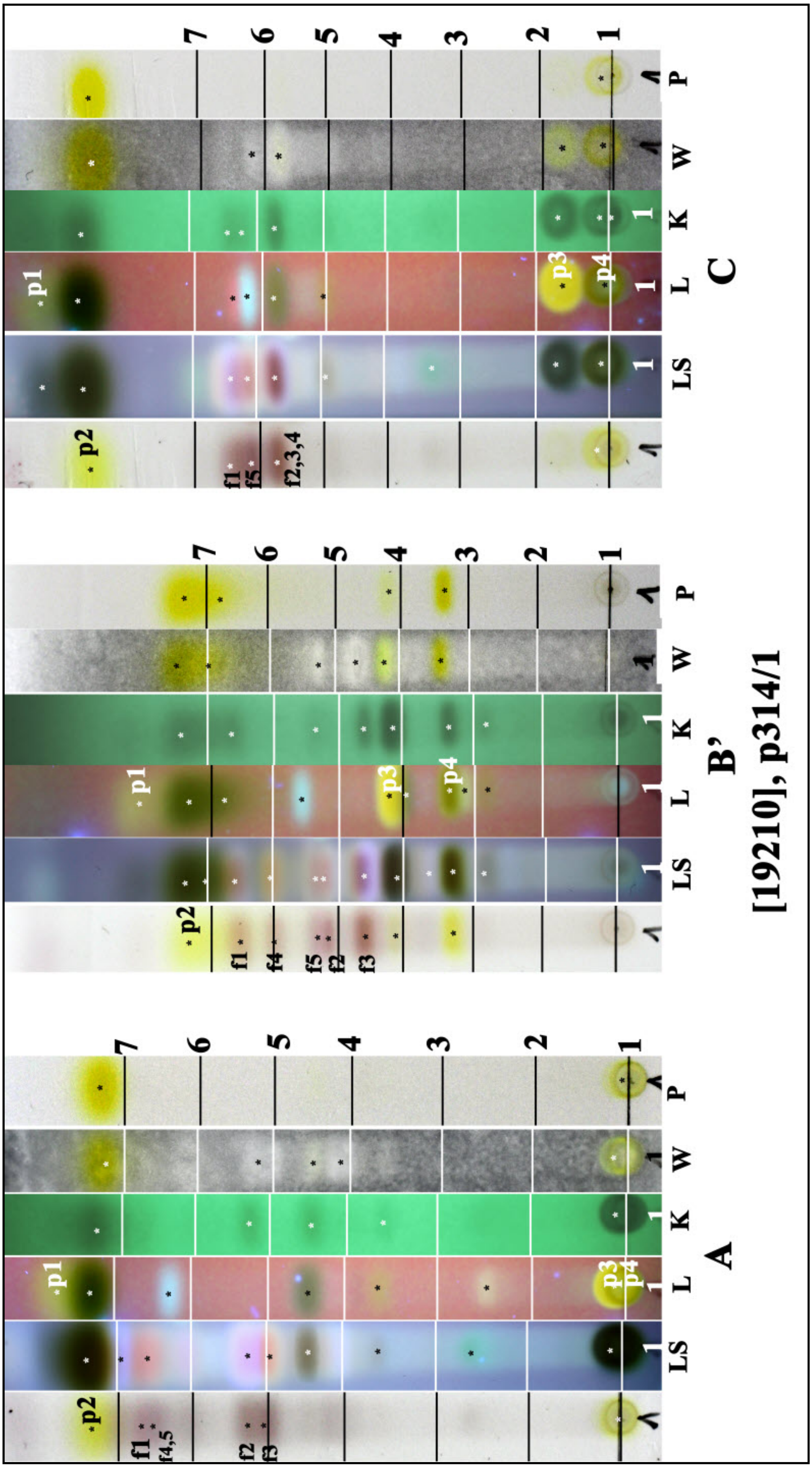
bourgeanic acid



b: bourgeanic acid, 1: unknown, conf. J.A. Elix

S. Huneck's collection of lichen substances No 557: bourgeanic acid
Botanisches Museum Berlin-Dahlem

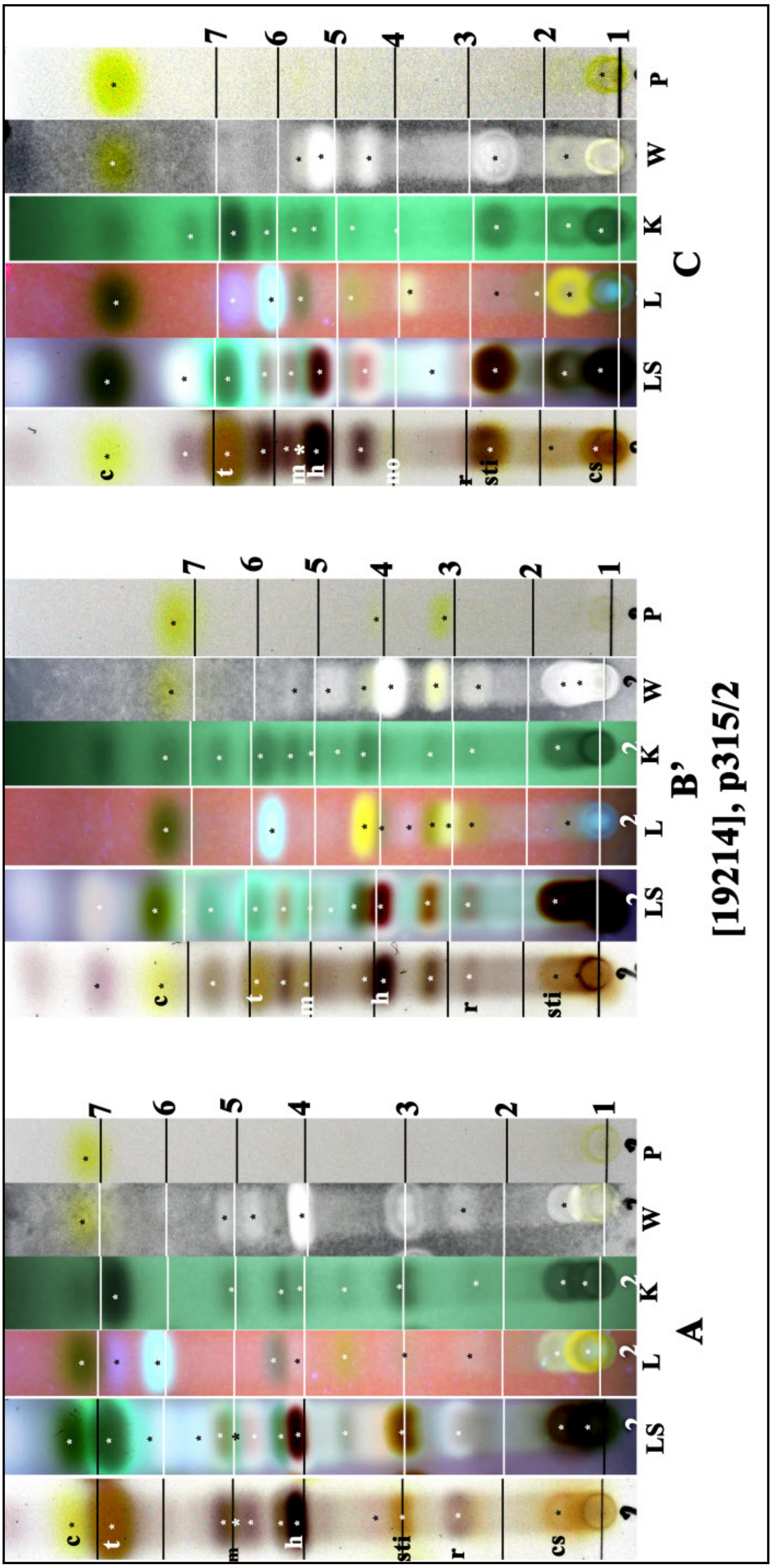
calycin



p1: pulvinic dilactone, **p2: calycin**, p3: pulvinic acid, p4: unknown, f1: 3β-acetoxyfern-9(11)-en-12-one, f2: 3β-hydroxyfern-9(11)-en-12-one, f3: fern-9(11)-en-3β,12β-diol, f4: 3β-acetoxyfern-9(11)-en-12β-ol, f5: 3β-acetoxyfern-9(11)-en-19β-ol.

Crocodia poculifera, (= ***Pseudocyphellaria poculifera***)**,** **[**19210], Norfolk Island. Mt. Pitt Reserve, in the vicinity of Broken Pine, 29°00'30" S, 167°56'30" E, 320 m.

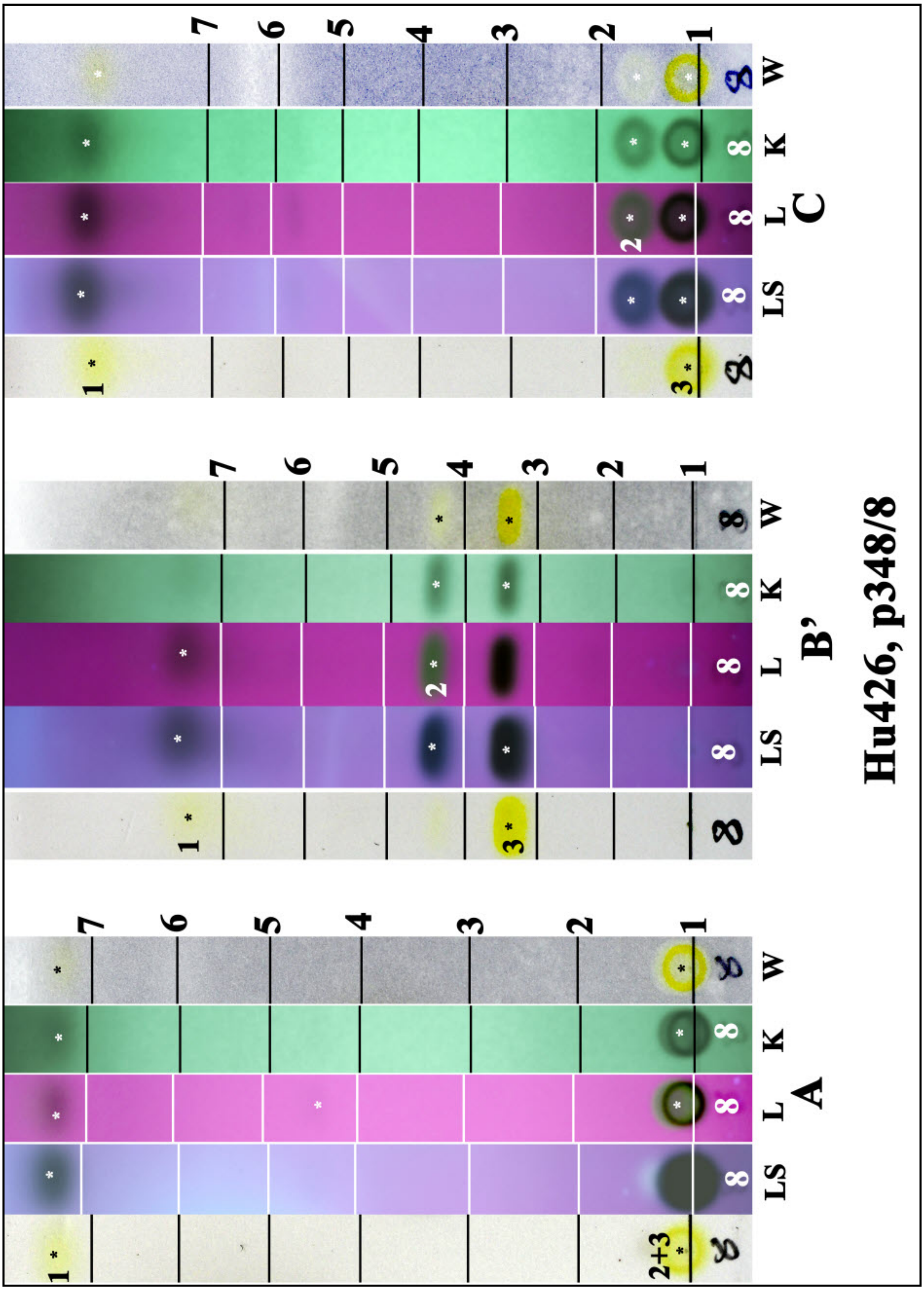
calycin



c: calycin, t: tenuiorin, h: hopane-6α,7β,22-triol, sti: stictic acid, r: retigeranic acid, cs: constictic acid, no: norstictic acid, m: methyl gyrophorate

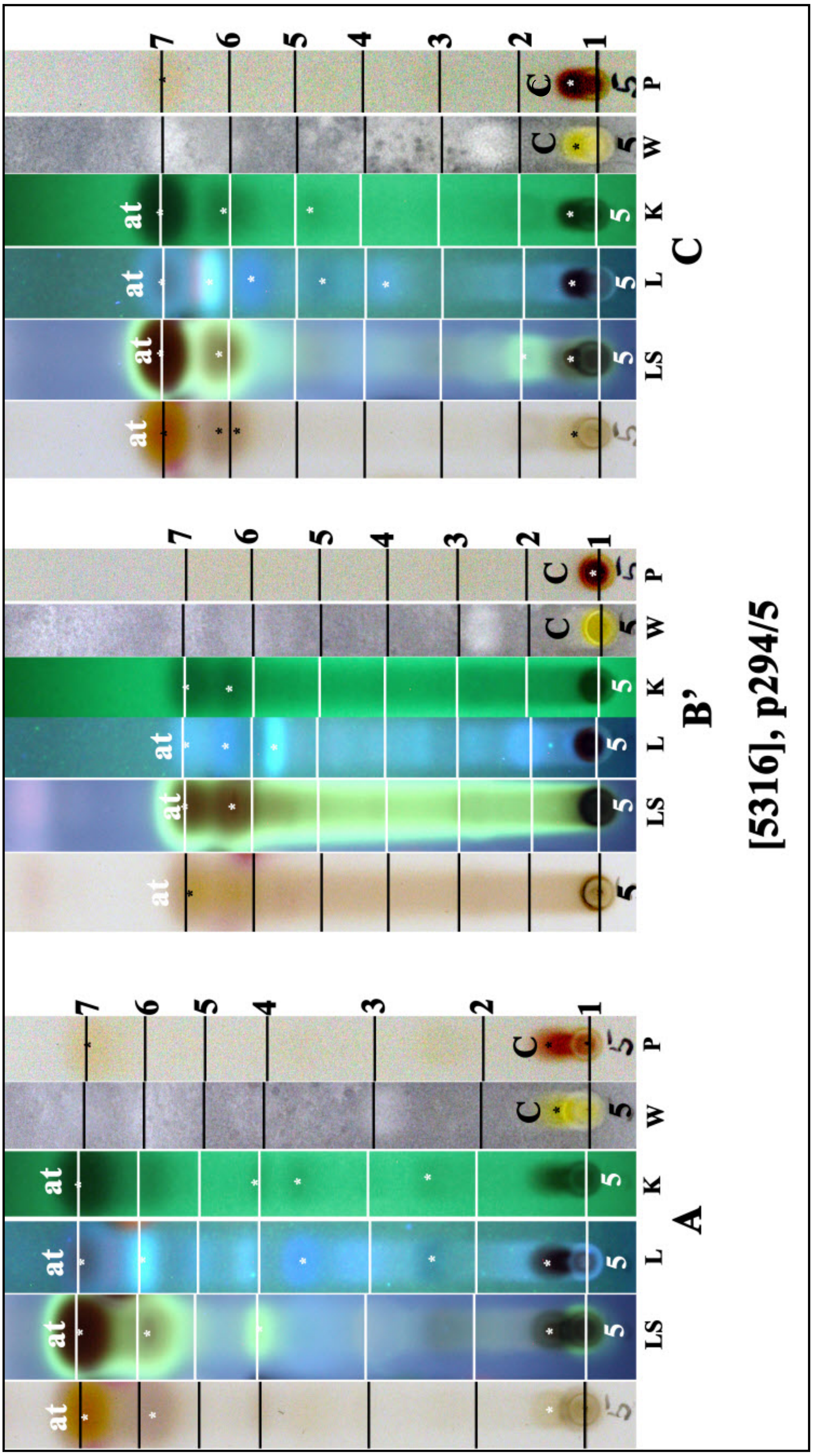
Pseudocyphellaria neglecta,[19214], Australia, New South Wales, Great Dividing Range, 6 km east of Captains Flat, 2 km north of Parkers Gap, 35°37' S, 149°30' E, 1260

calycin



1: calycin, 2: pulvinic acid, 3: unknown, conf. J.A. Elix
S. Huneck's collection of lichen substances No 426 Calycin, roh aus *Pseudocyphellaria endochrocea*
Botanisches Museum Berlin-Dahlem

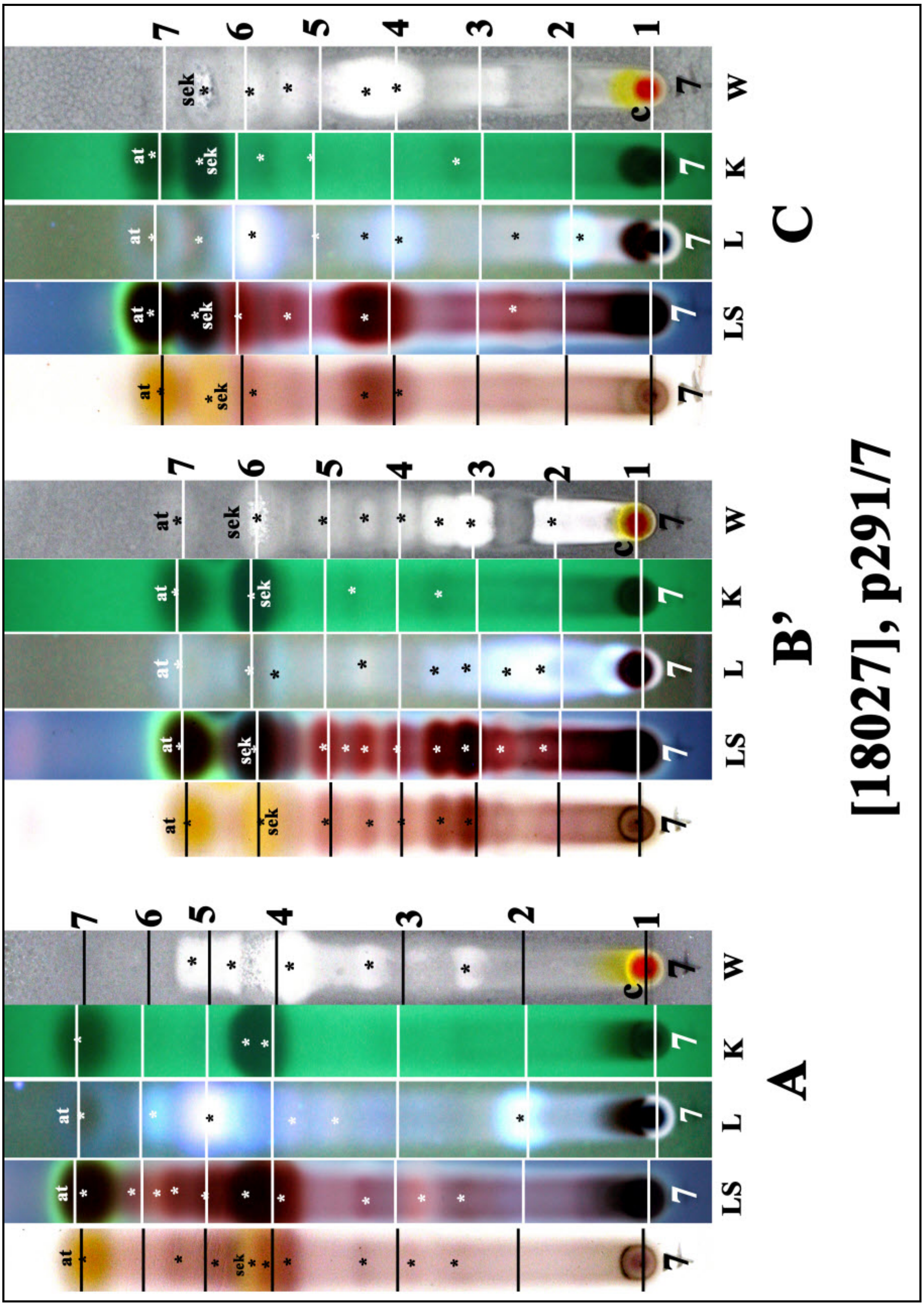
canarione



at: atranorin, c: canarione

Lethariella canariensis [5316], Spanien, Gran Canaria, Straße zwischen Fontanale und Pinos de Galdar ca. 8 km westlich Teror; äußerer Rand eines kleinen Vulkankraters, Lavanebelhang mit *Stereocaulon, Teloschistes und Usnea,* 28°02.595’ N, 15°37.093’ W. Leg. F. Schumm & U. Schwarz 28.12.1998, det. F. Schumm.

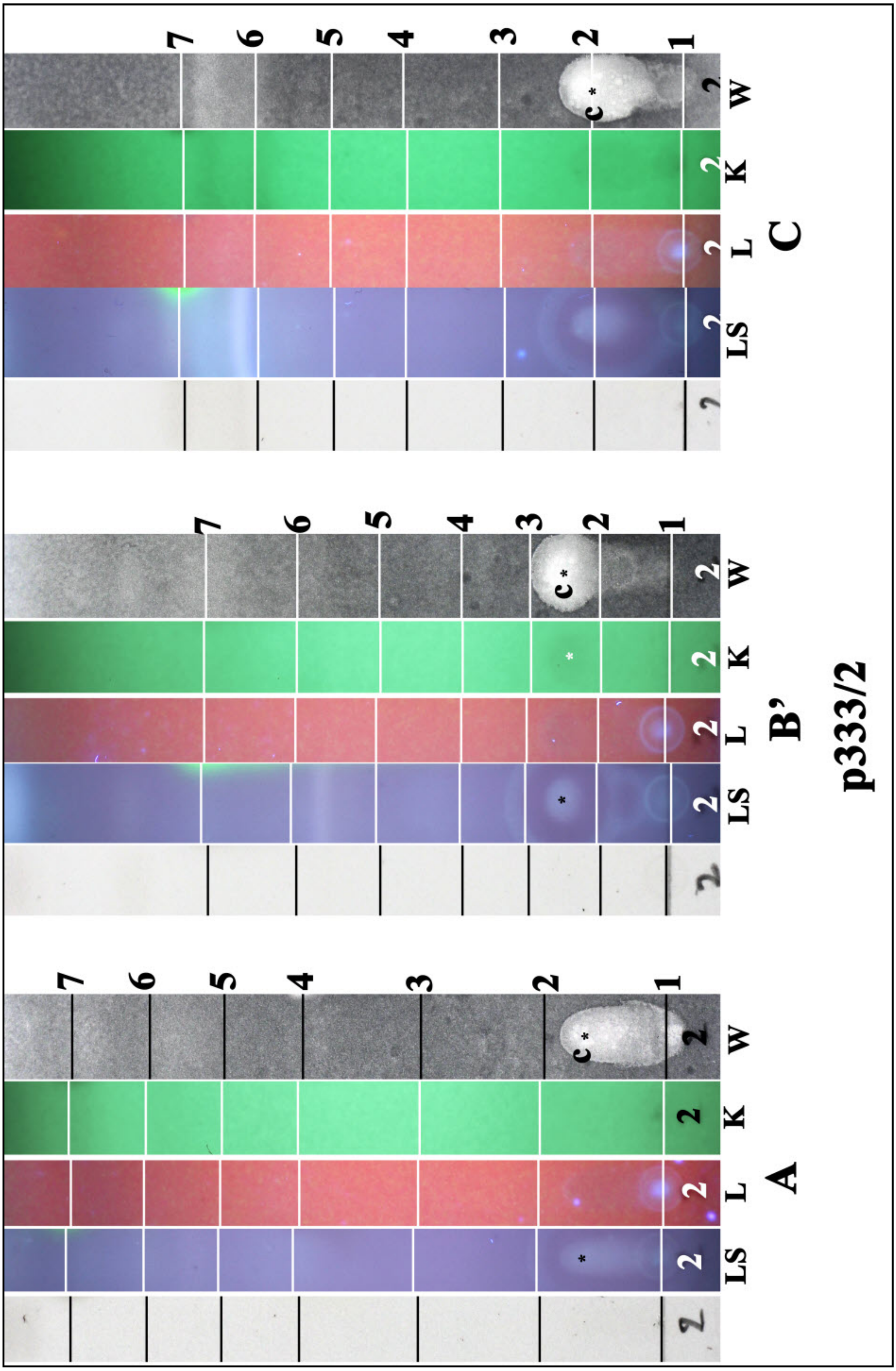
canarione



at: atranorin, sek: sekikaic acid,
3b:3β-acetoxyhopane-1β,22-diol, **c: canarione**

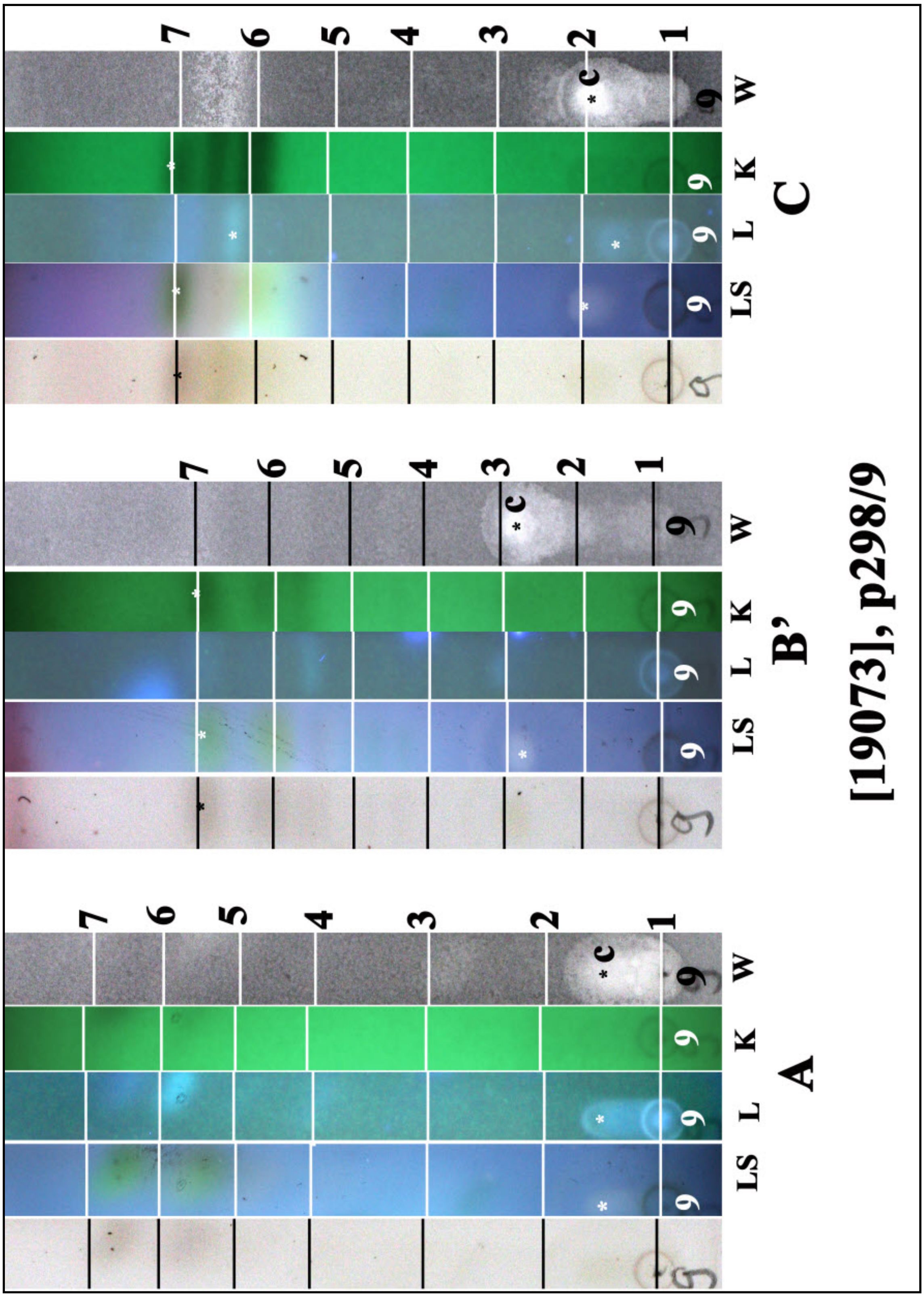
Dirinaria leopoldii, [18027], Brasilien/ Bahia. Zwischen Feira de Santana und Milagres, etwa 10 km vor Milagres, in einer lichten Castinga an dünnen Ästen. 200 m. Leg. K. Kalb & M. Marcelli 21.07.1980, det. K. Kalb. Lichenes Neotropici 62.

caperatic acid



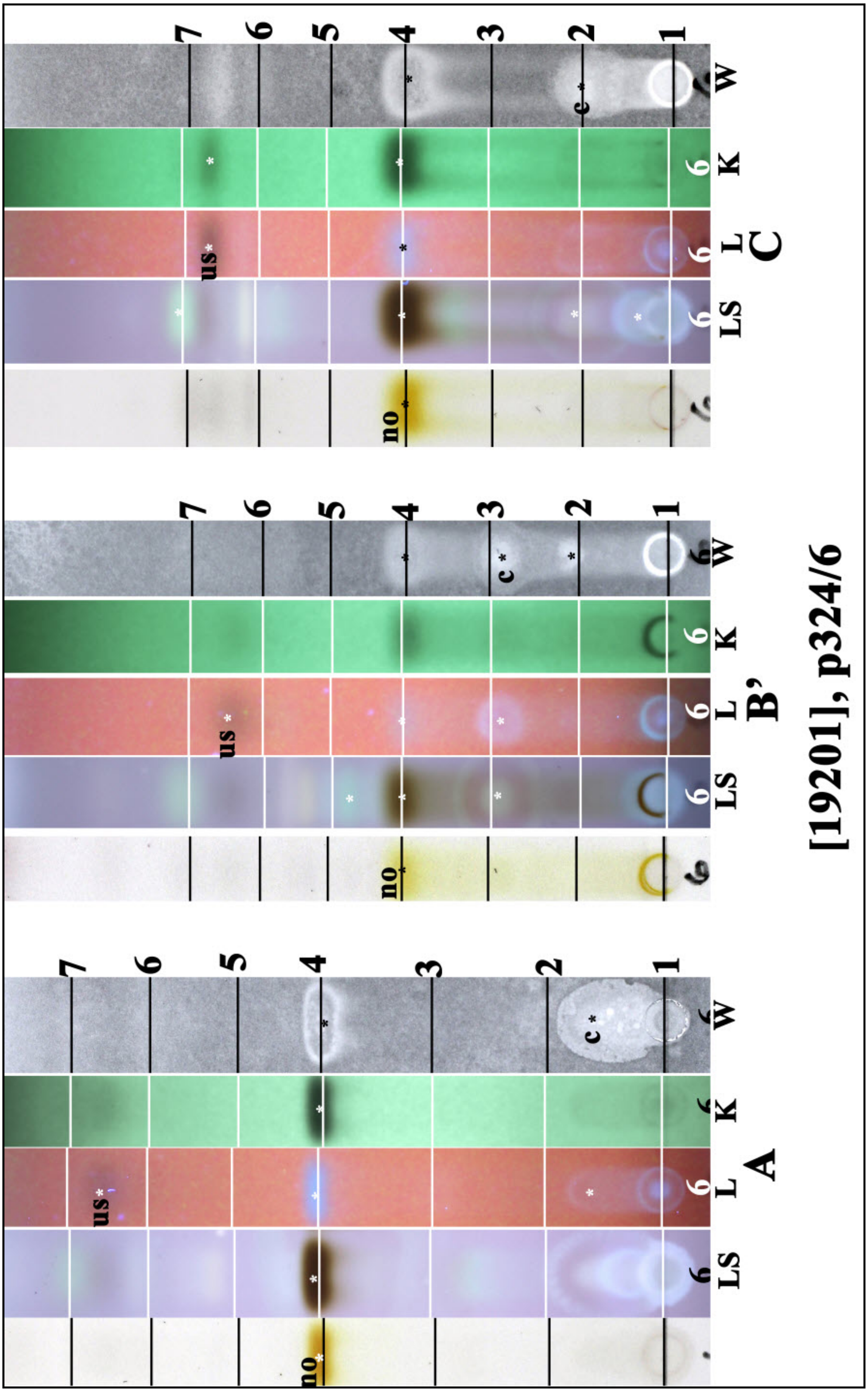
c: **caperatic acid**, pure, received from Klaus Kalb

caperatic acid



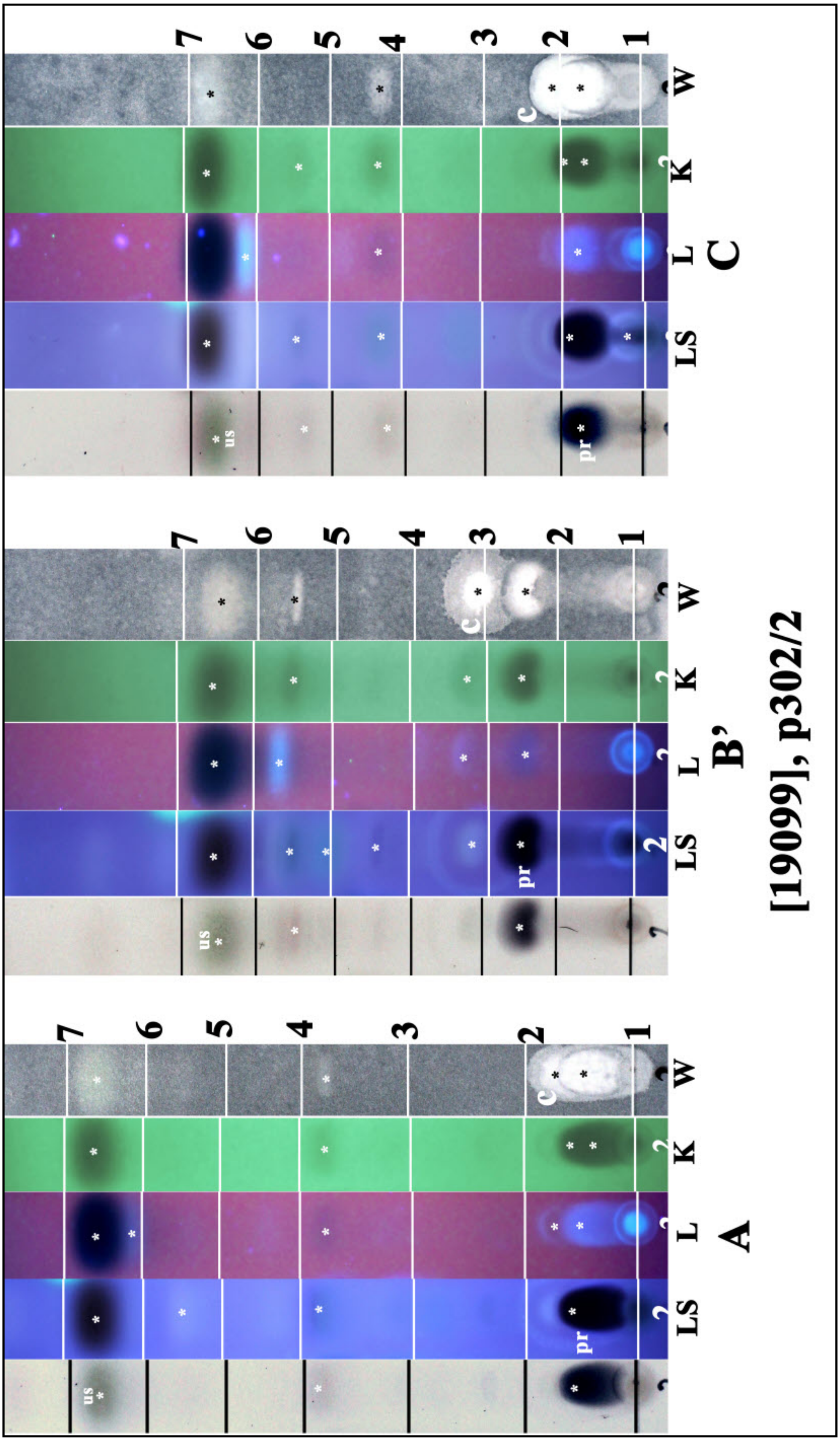
Menegazzia confusa, [19073], Australia, Victoria, Goomirk Rocks, Errinundra Flora Reserve, 14 km south of Bendoc.

caperatic acid



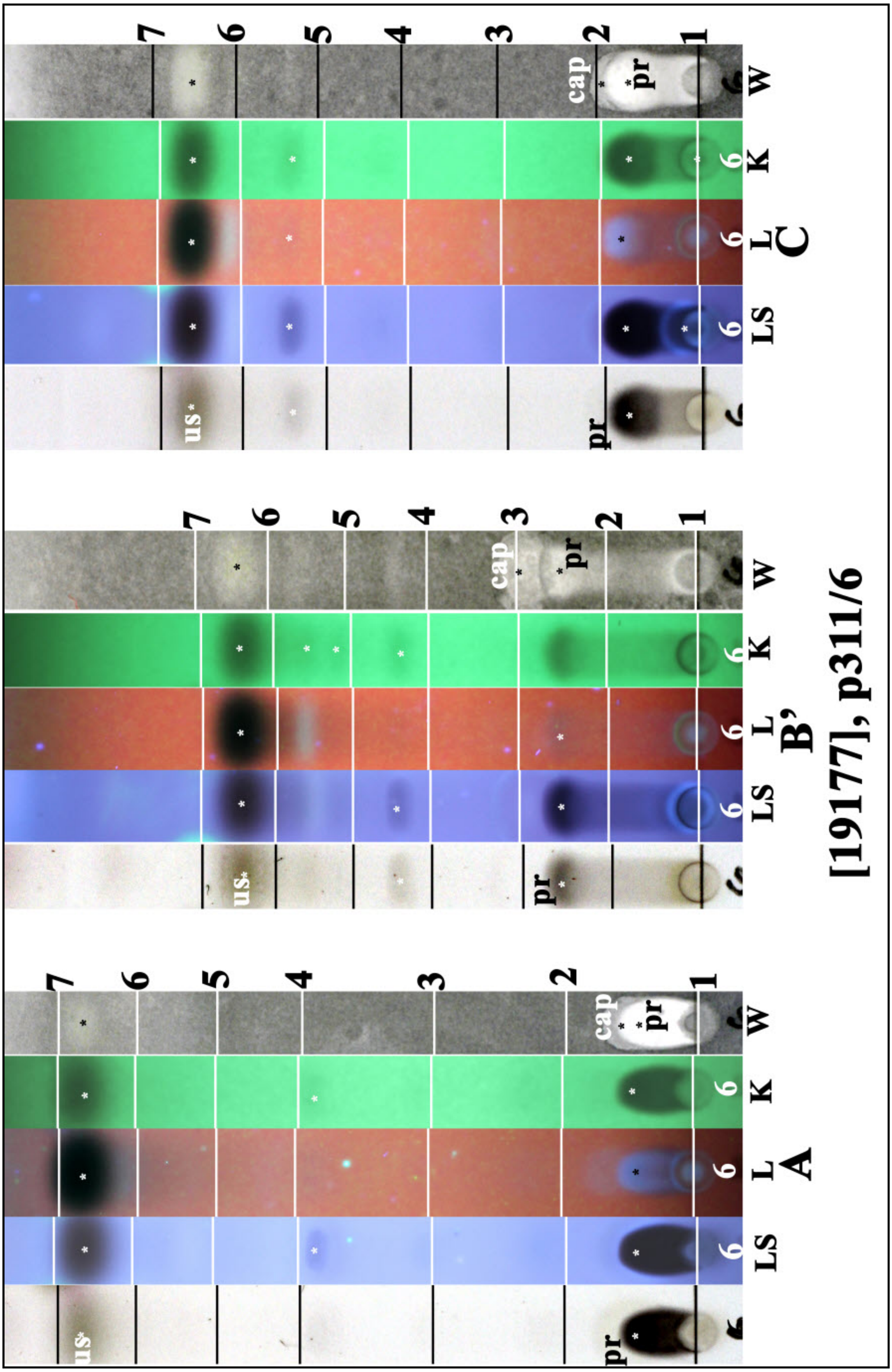
Usnea angulata [19201], Australia, Victoria, Fairy Dell, 7 km north-west of Bruthen, 37°41' S, 147°45' E, 180 m.

caperatic acid



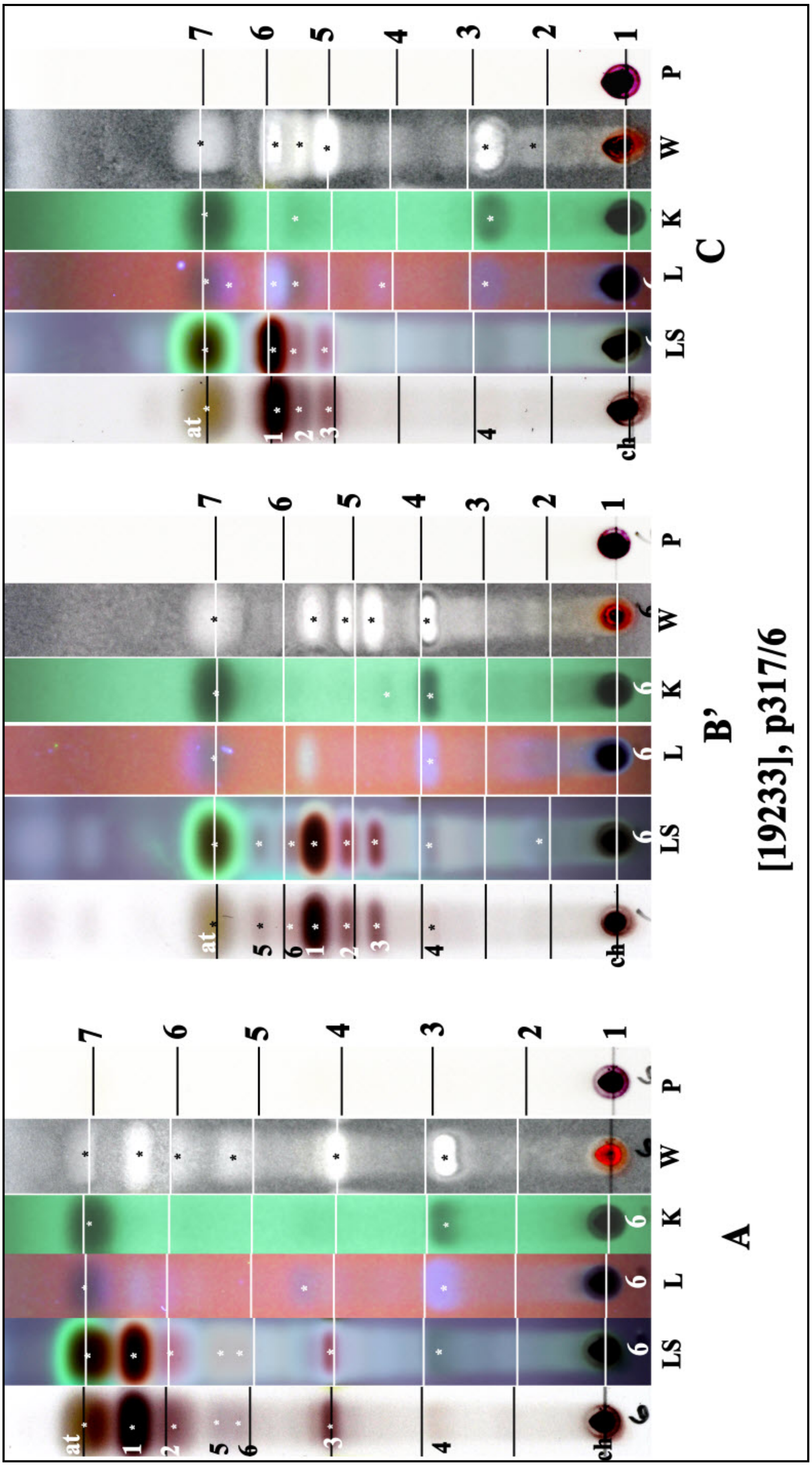
Flavoparmelia haysomii, [19099], Australien, Australian Capital Territory, Gudgenby River Gorge, 4.5 km south of Tharwa, 35°34' S, 149°04' E, 620 m.

caperatic acid



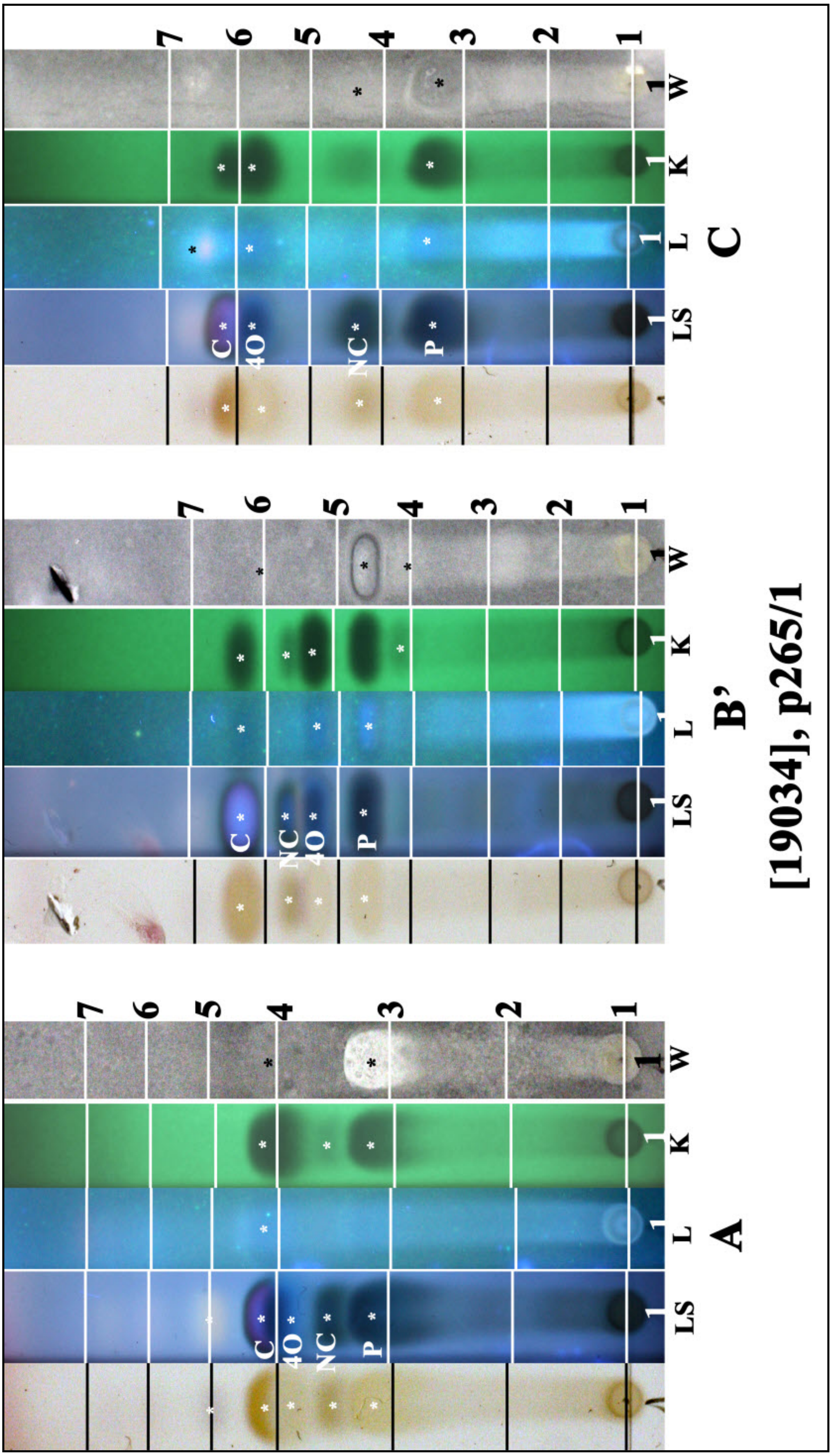
Flavoparmelia rutidota, [19177], Australia, Australian Capital Territory, Mount Stomlo Pine Plantation, 12 km west of Canberra, 35°20' S, 149°00' E, 700 m.

chiodectonic acid



Pyxine coccifera **,** [19233], Australia, Northern Territory, Tabletop Range, Litchfield Park, 25 km south-west of Batchelor, 15°11' S, 130°50' E, 180 m.

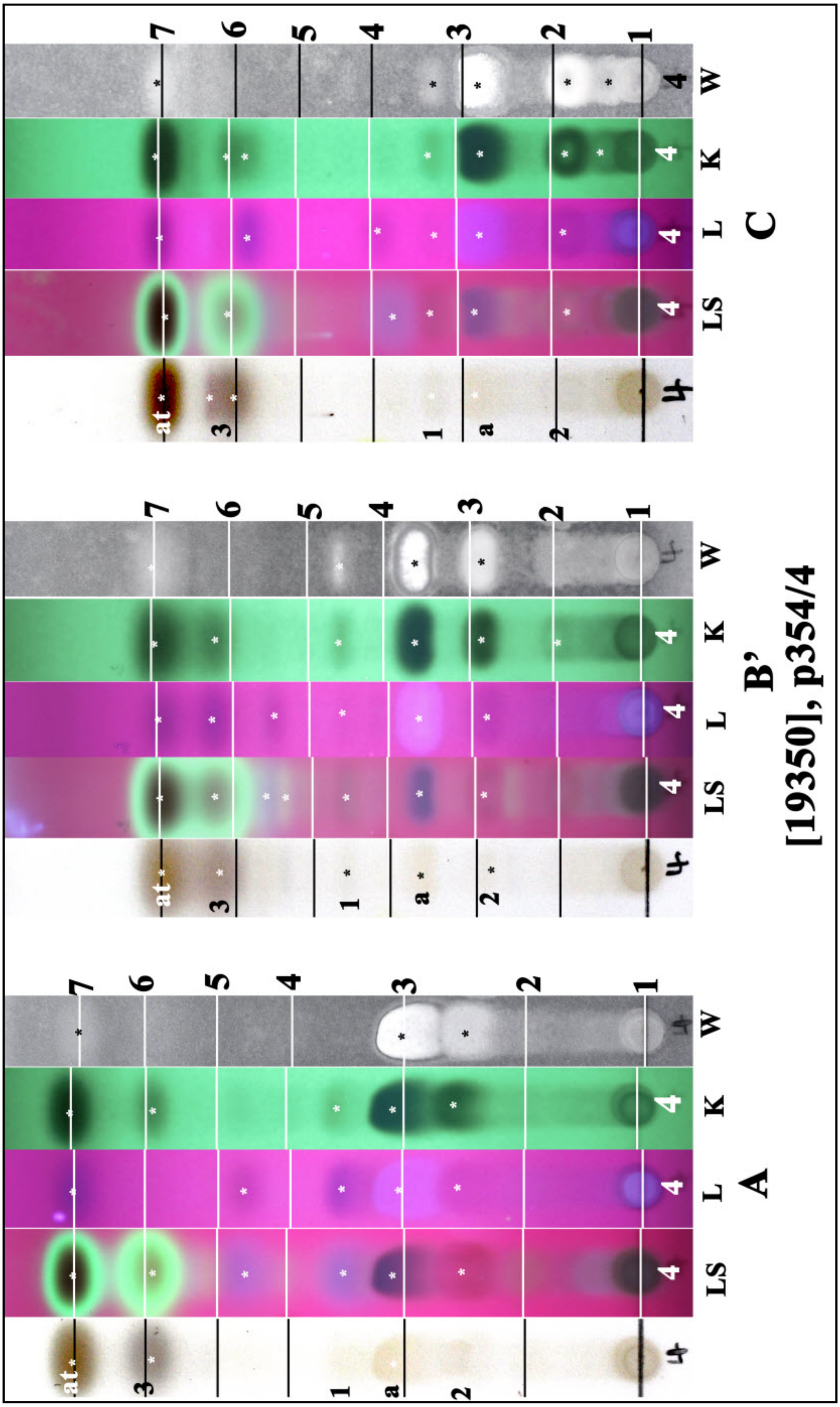
colensoic acid



C: colensoic acid, NC: norcolensoic acid, 4O: 4-O-methylphysodic acid, P: physodic acid

Carbonicola foveata, [19034], Australia, New South wales, Great dividing Range, Tuena-Binda road, 30 km north-west of Crookwell

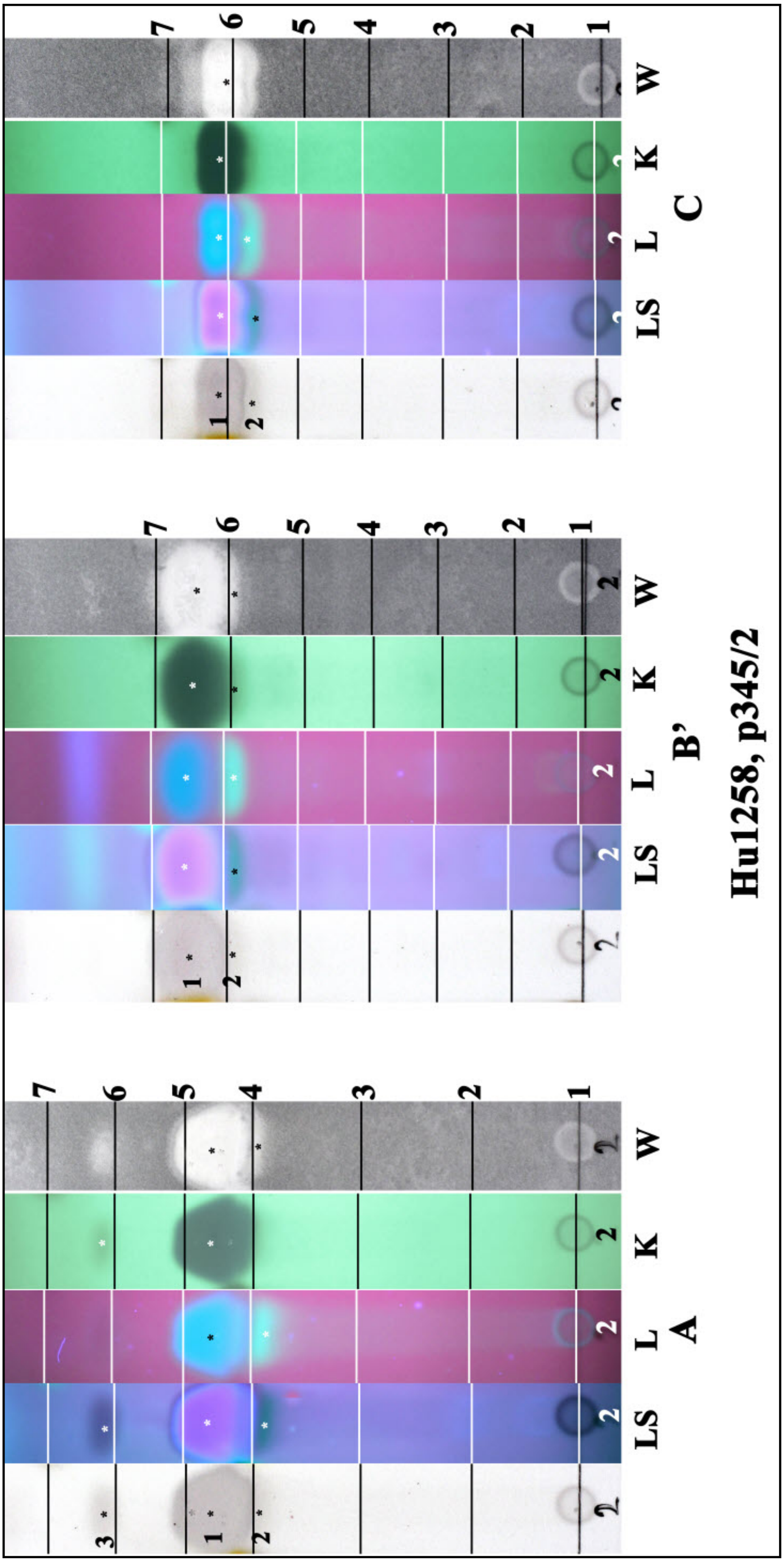
colensoic acid



at: atranorin, a: alectoronic acid, 1: physodic acid, 2: vittatolic acid, **3: colensoic acid** ,conf. J.A. Elix.

Tephromela aff. ***alectoronica*** [19350], Australia, Queensland, Kennedy Highway c. 12 km SSE of Kuranda, on roadside trees at the edge of a disturbed tropical rainforest, 420 m, 16°54'40" S, 145°36'04"E. Leg. K. & D. Kalb, 21.08.2015 (Nr. 40535).

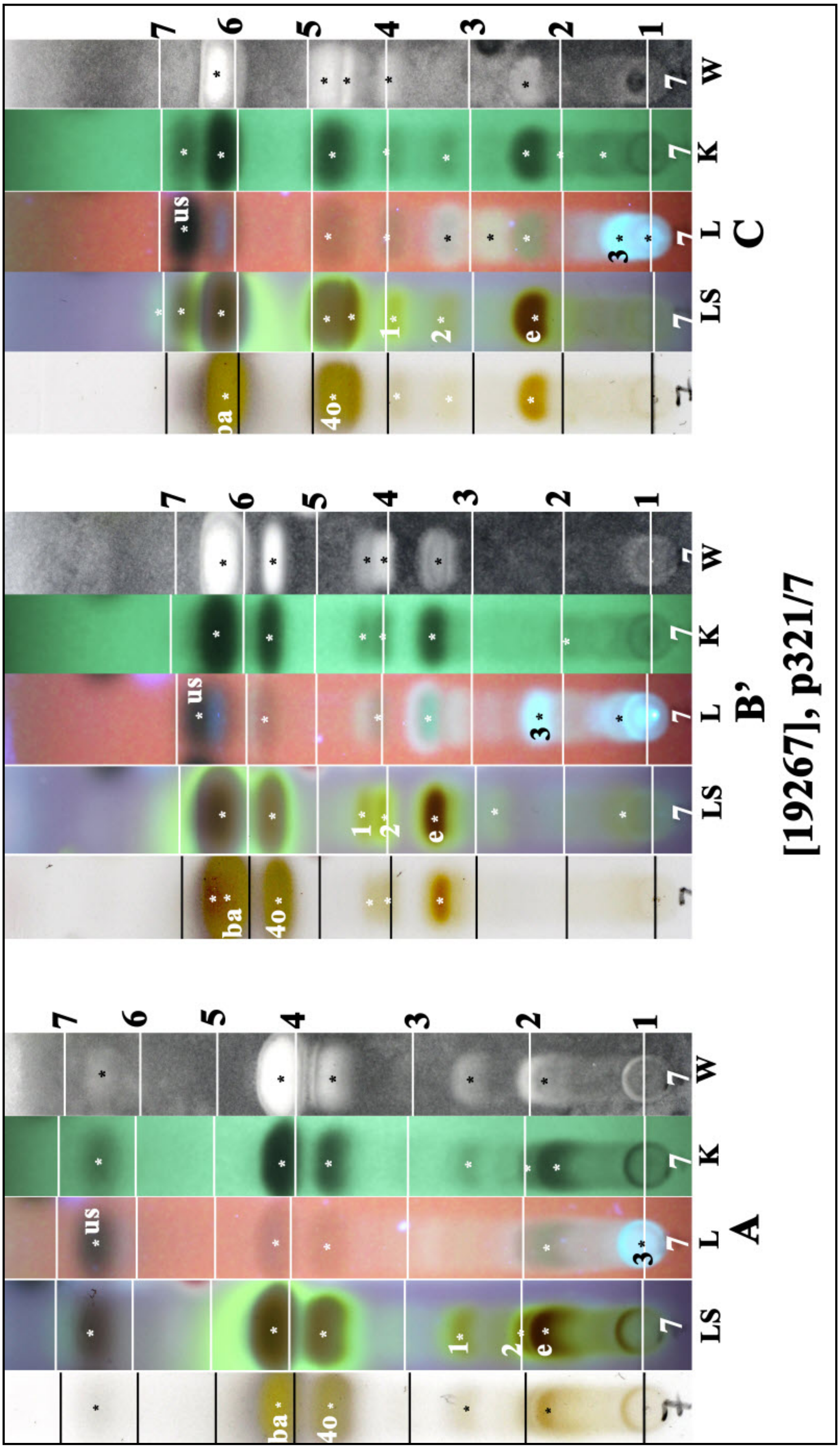
condidymic acid



1: didymic acid, 2: subdidymic acid, 3: **condidymic acid**, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 1258: didymic acid
Botanisches Museum Berlin-Dahlem

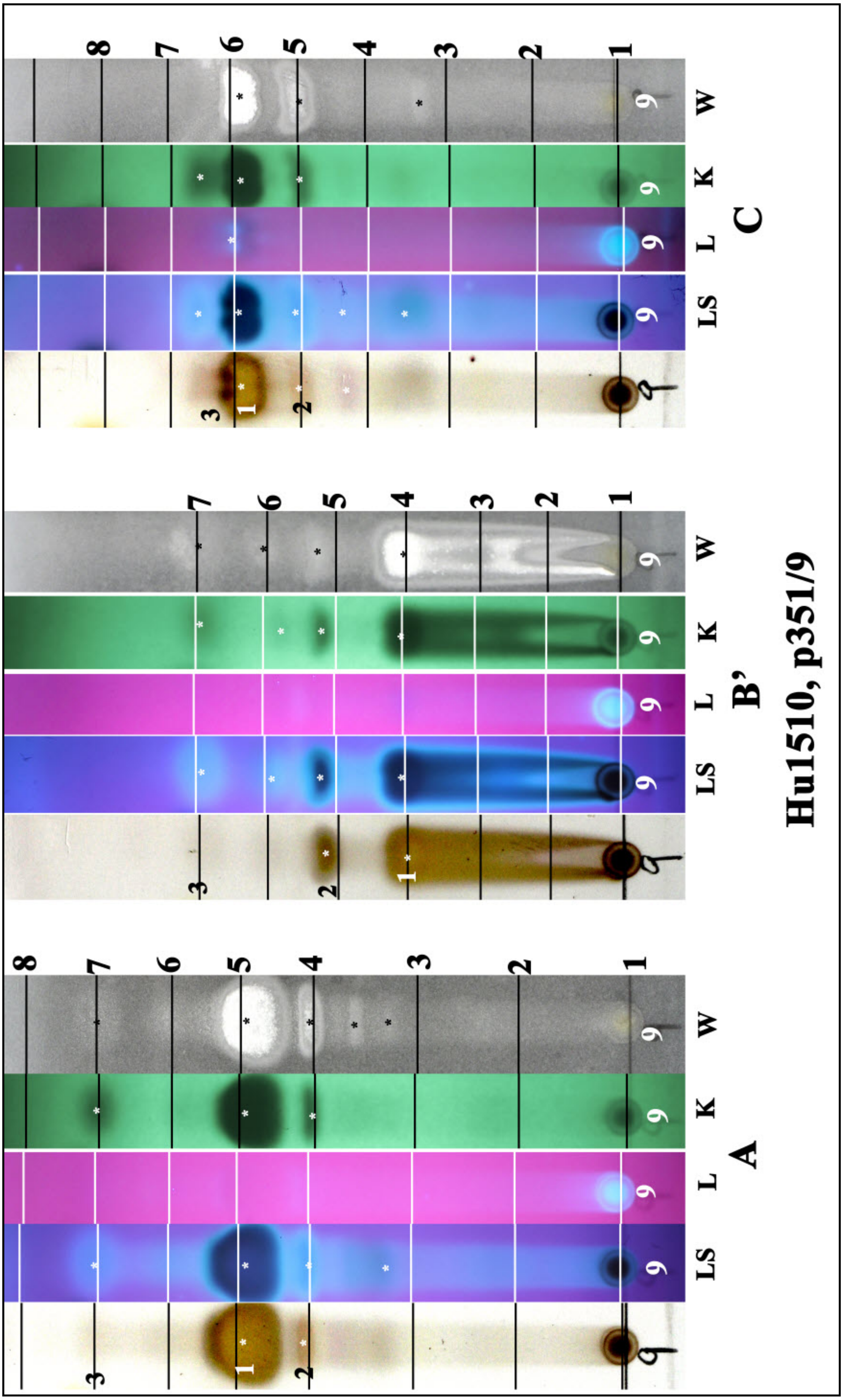
conechinocarpic acid



us: usnic acid, ba: barbatic acid, 4o: 4-*O*-demethylbarbatic acid, e: echinocarpic acid, **1: conechinocarpic acid**, 2: subechinocarpic acid, 3: unknown

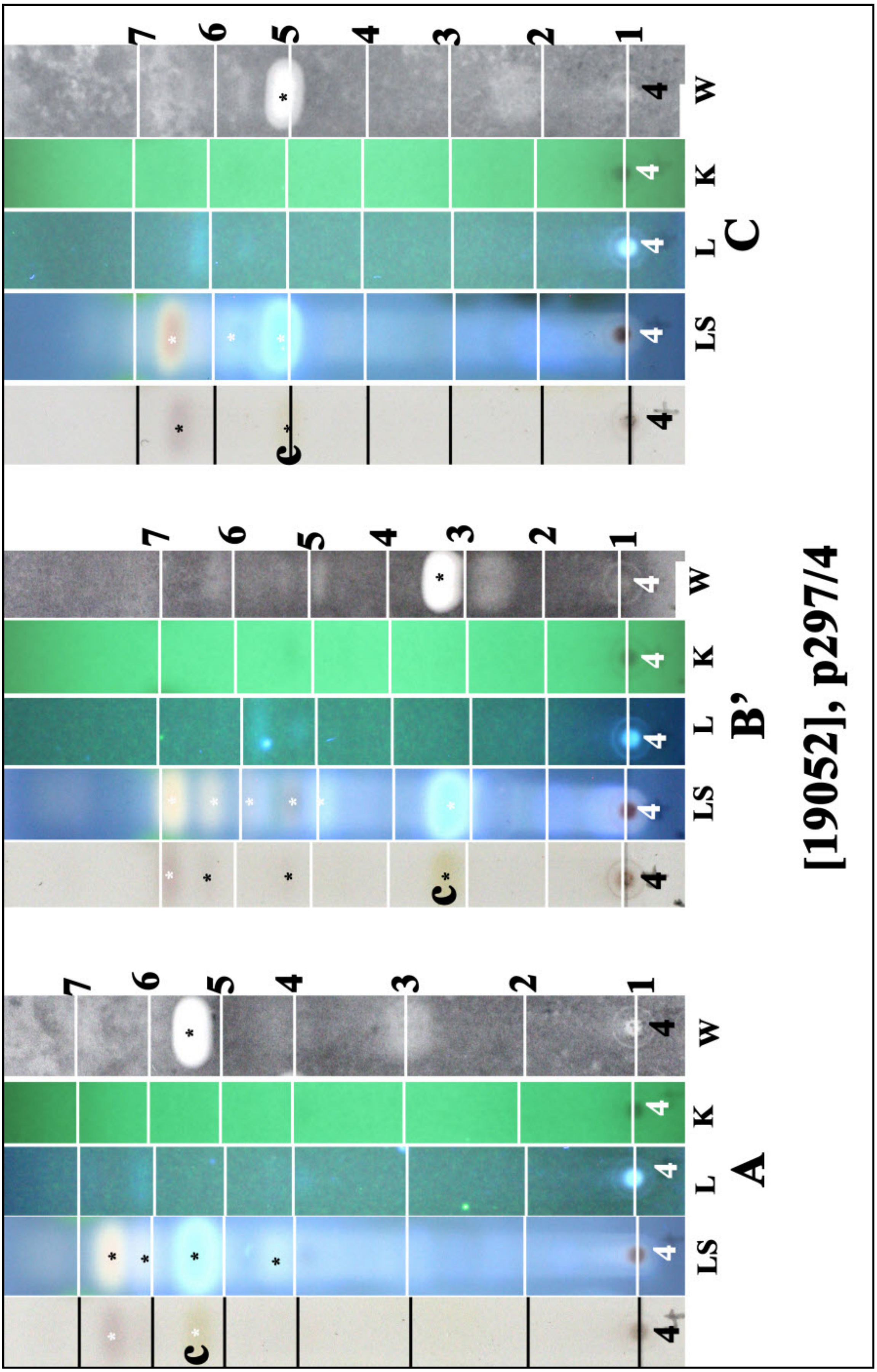
Relicinopsis rahengensis, [19267], Australia, Queensland, Conway State Forest, 18 km east-north-east of Proserpine, 20°21' S, 148°45' E, 180 m

confluentic acid



S. Huneck’s collection of lichen substances No 1510: confluentic acid
Botanisches Museum Berlin-Dahlem

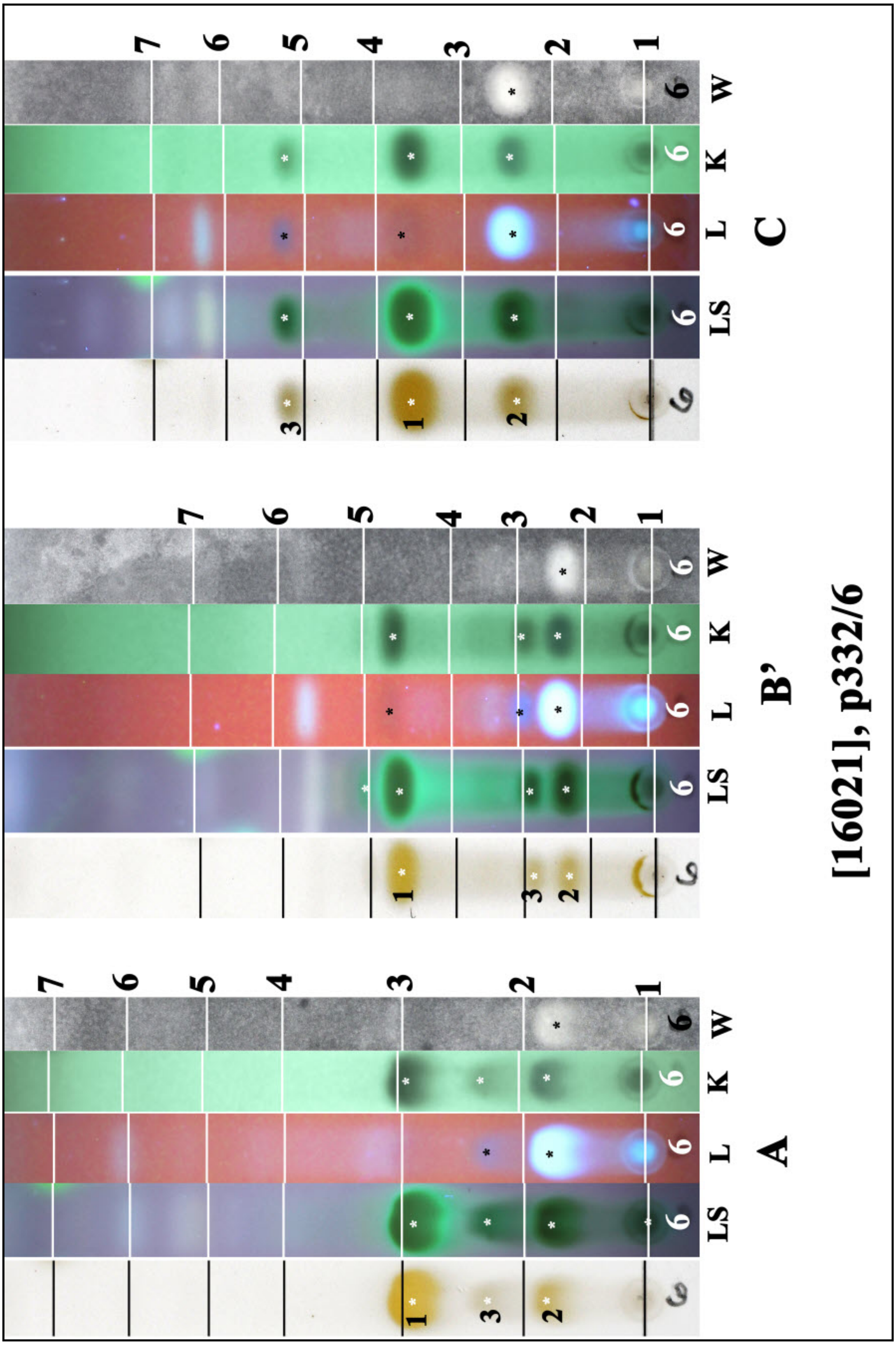
confluentic acid



c: confluentic acid, conf. J.A. Elix

Lecanographa microcarpella (Müll.Arg.) Egea & Torrente (= ***Lecanactis microcarpella***) [19052], Australia, New South Wales, Buckenbowra River Estuary.

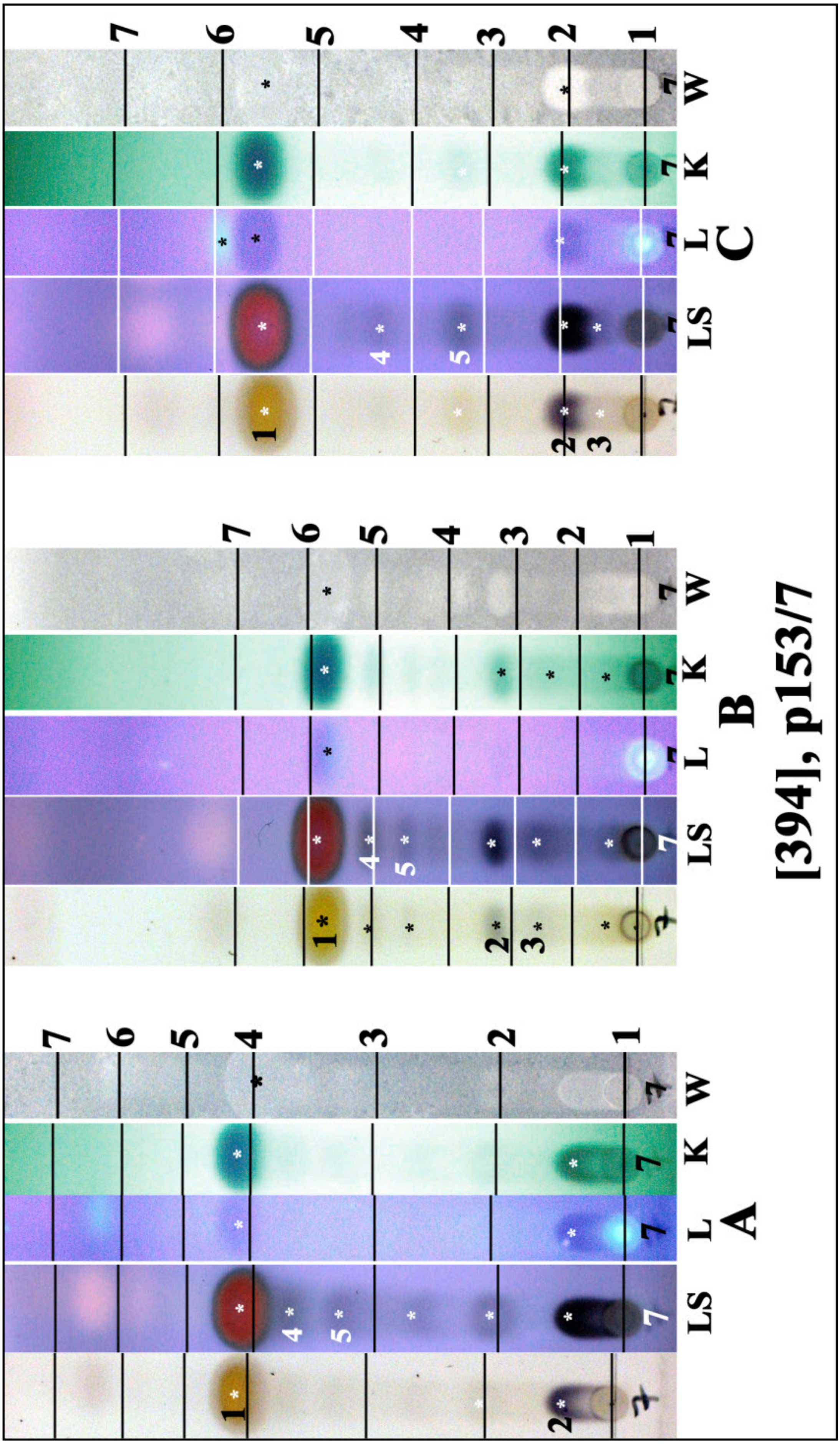
confriesiic acid



1: gyrophoric acid, **2: confriesiic acid** , 3: friesiic acid C

Trapeliopsis granulosa var. ***australis,*** [16021], Australia, Australian Capital Territory, Canberra, Black Mountains Reserve, 35.276° S, 149,094° E, 760 m. Leg. J.A. Elix, F. Schumm & E. Stocker-Wörgötter, 07.11.2009, det. J.A. Elix. Chemistry by HPTLC, anal. F. Schumm, det. J.A. Elix.

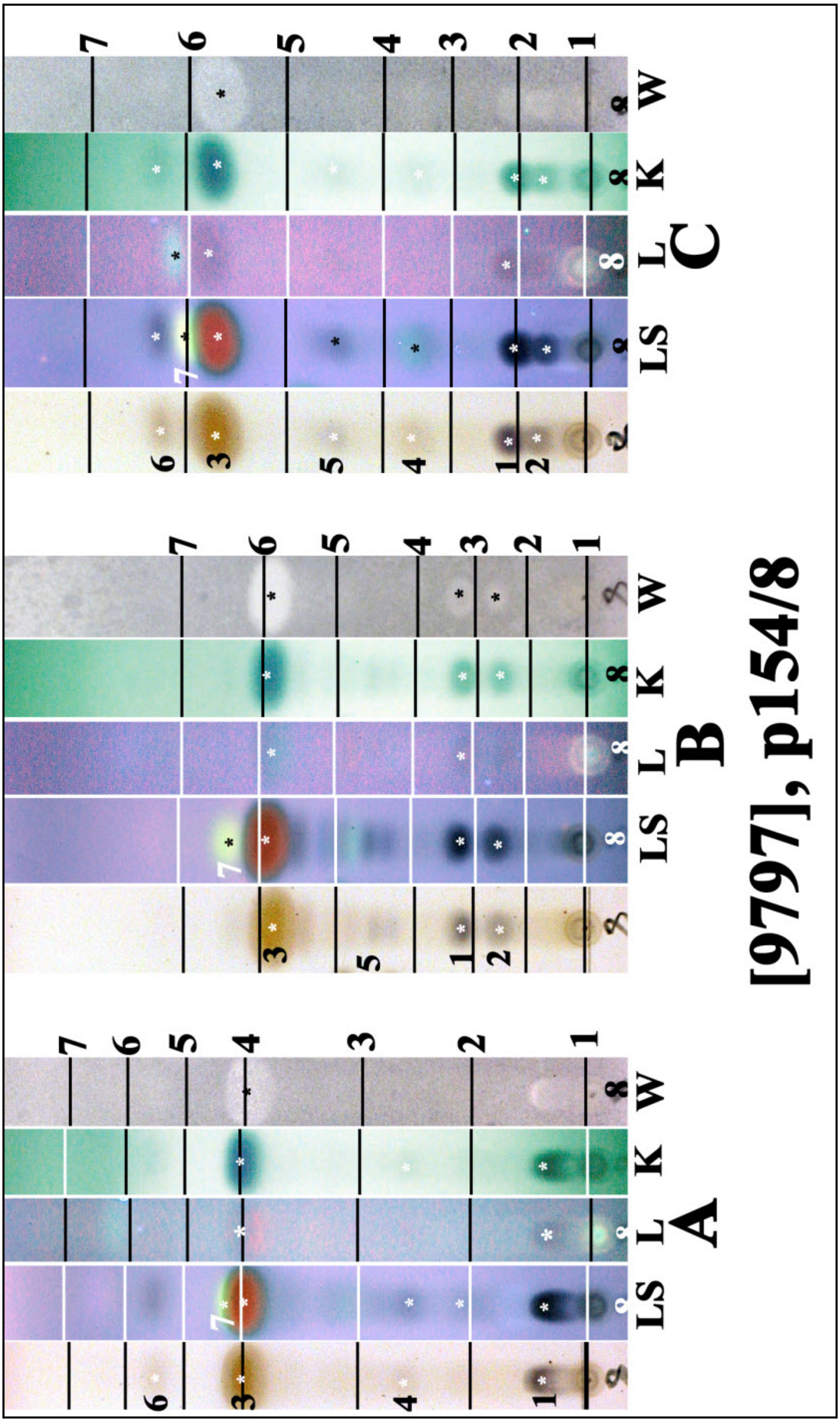
congrayanic acid



1: grayanic acid, 2: fumarprotocetraric acid, 3: protocetraric acid,
4: congrayanic acid ,5: 4-*O*-demethylgrayanic acid, conf. J.A. Elix

Cladonia grayi, [394], Germany, Baden-Württemberg, Schwarzwald, Freudenstadt, TK 7516. Leg. F. Schumm, 4.05.1967.

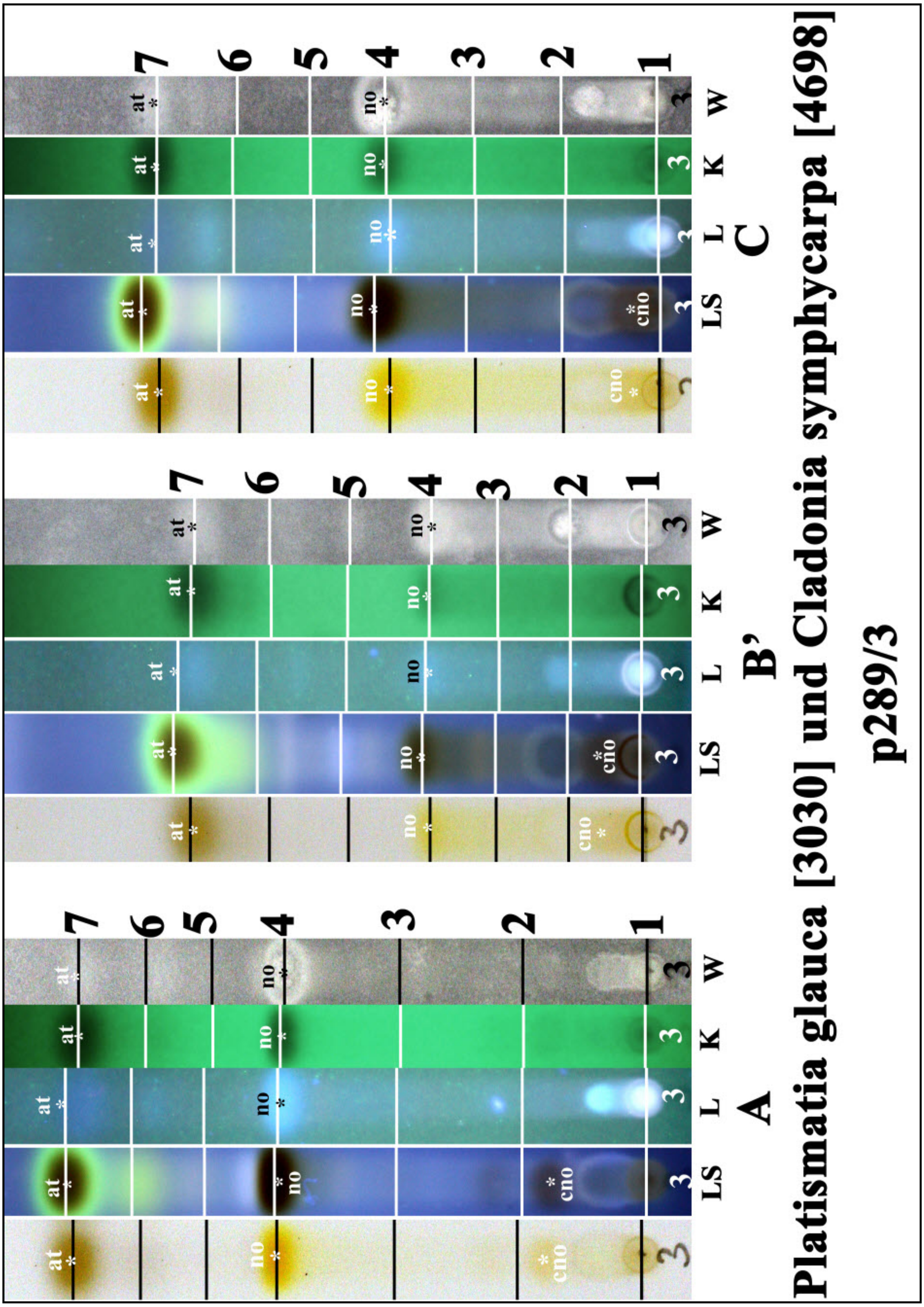
congrayanic acid



1: fumarprotocetraric acid, 1: protocetraric acid, 3: grayanic acid, 4: 4-*O*-demethylgrayanic acid, **5: congrayanic acid**, 6: unknown, conf. J.A. Elix

Cladonia grayi, [9797], Germany, Baden-Württemberg, Kreis Calw, Wildbad, im kleinen Enztal an der Straße nach Calmbach, TK 7217. Leg. Erich Putzler 15.04.1949, det. F. Schumm.

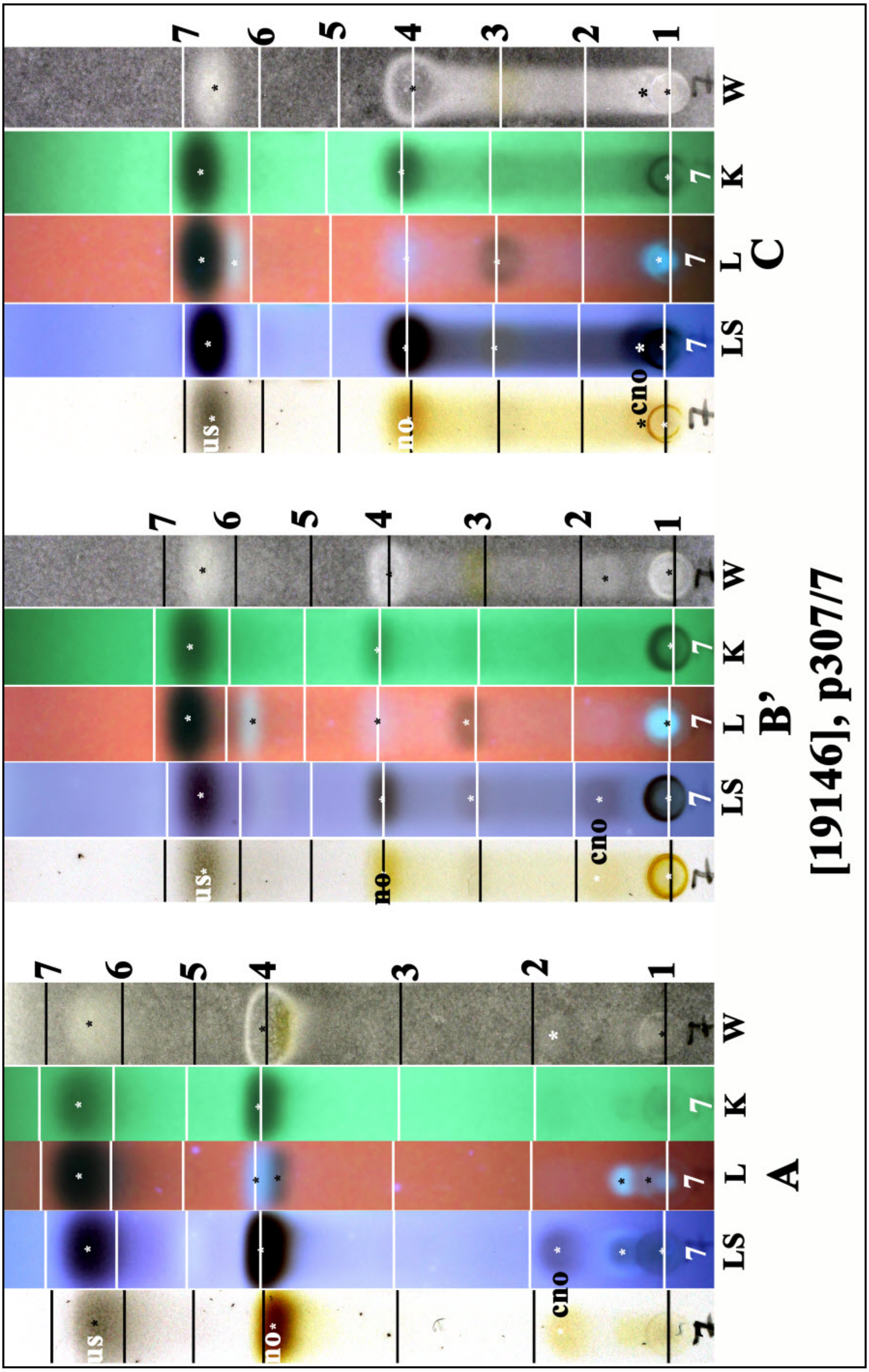
connorstictic acid



at: atranorin, no: norstictic acid, cno: connorstictic acid

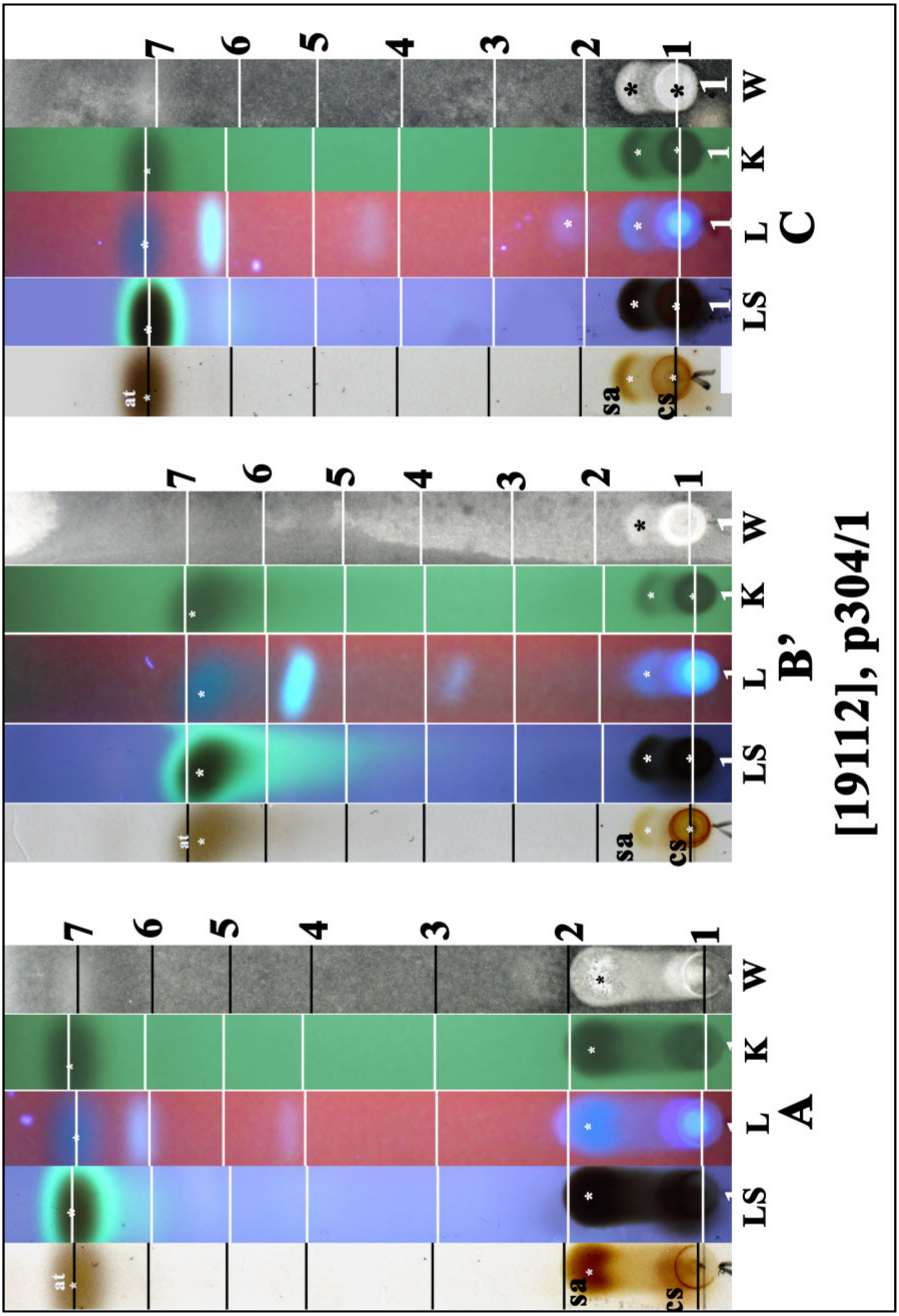
mixture from
Platismatia glauca [3030] and ***Cladonia symphycarpa*** [4698]

connorstictic acid



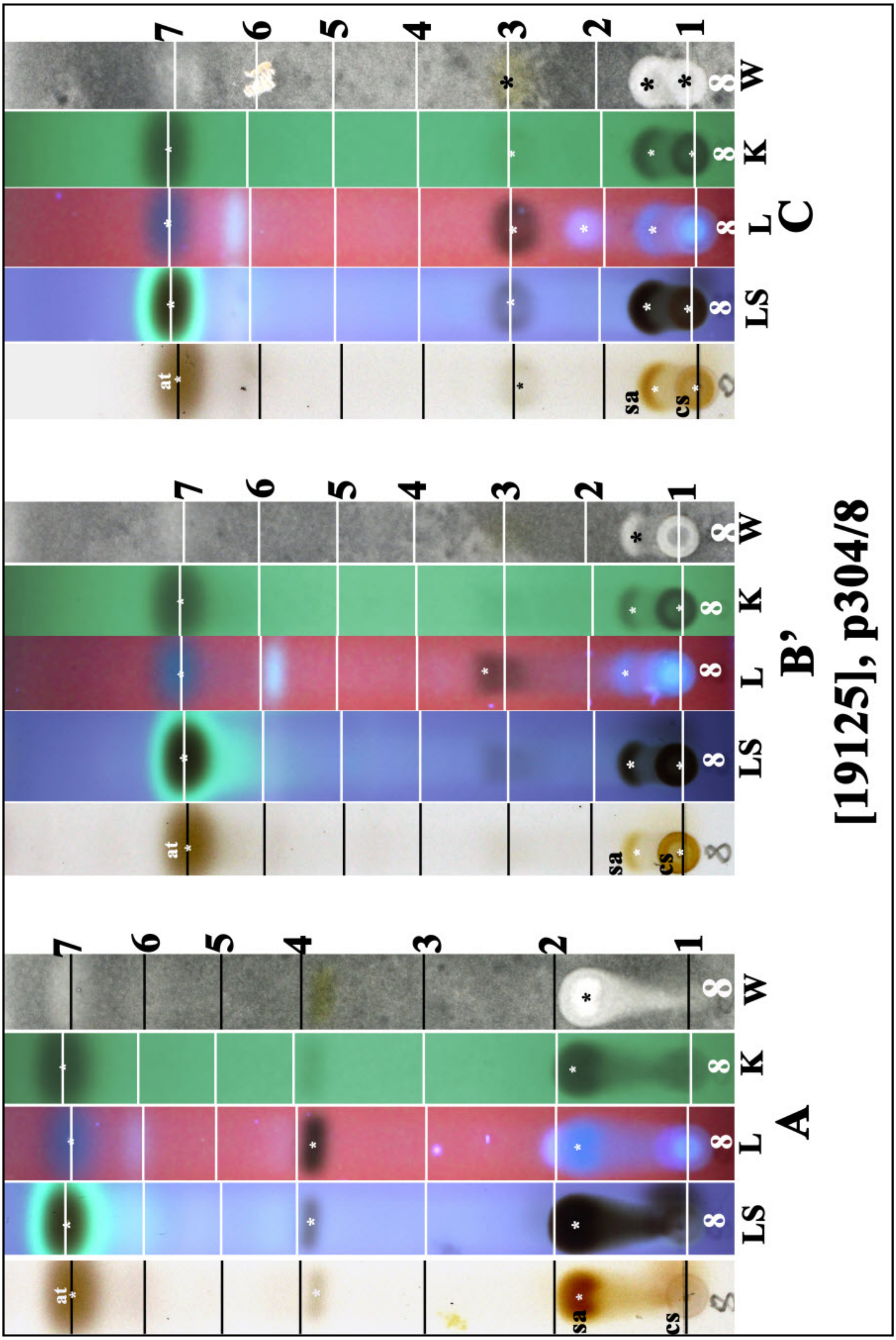
Xanthoparmelia heinarii, [19146], Australia, New South Wales, Wauchope Trig, Broken Bago Range, Broken Bago State Forest, 6 km south of Wauchope.

consalazinic acid



Parmotrema austrocetratum, [19112], New Zealand, North Island, North Auckland, c. 2.5 km south of Kaweka on road to Thames.

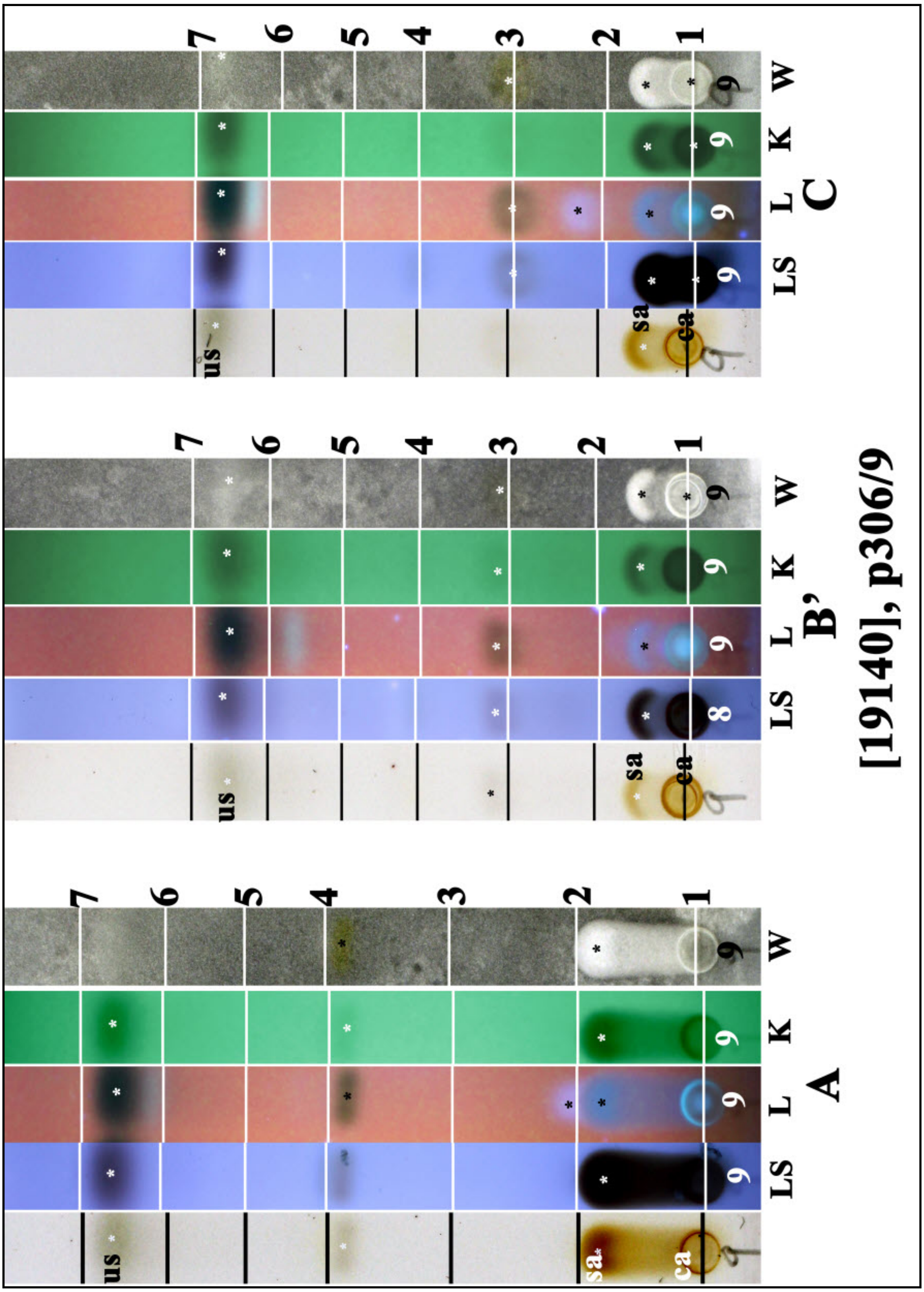
consalazinic acid



at: atranorin, sa: salazinic acid, cs: consalazinic acid

Parmotrema reticulatum, [19125], Norfolk Island, Bumboras Reserve.

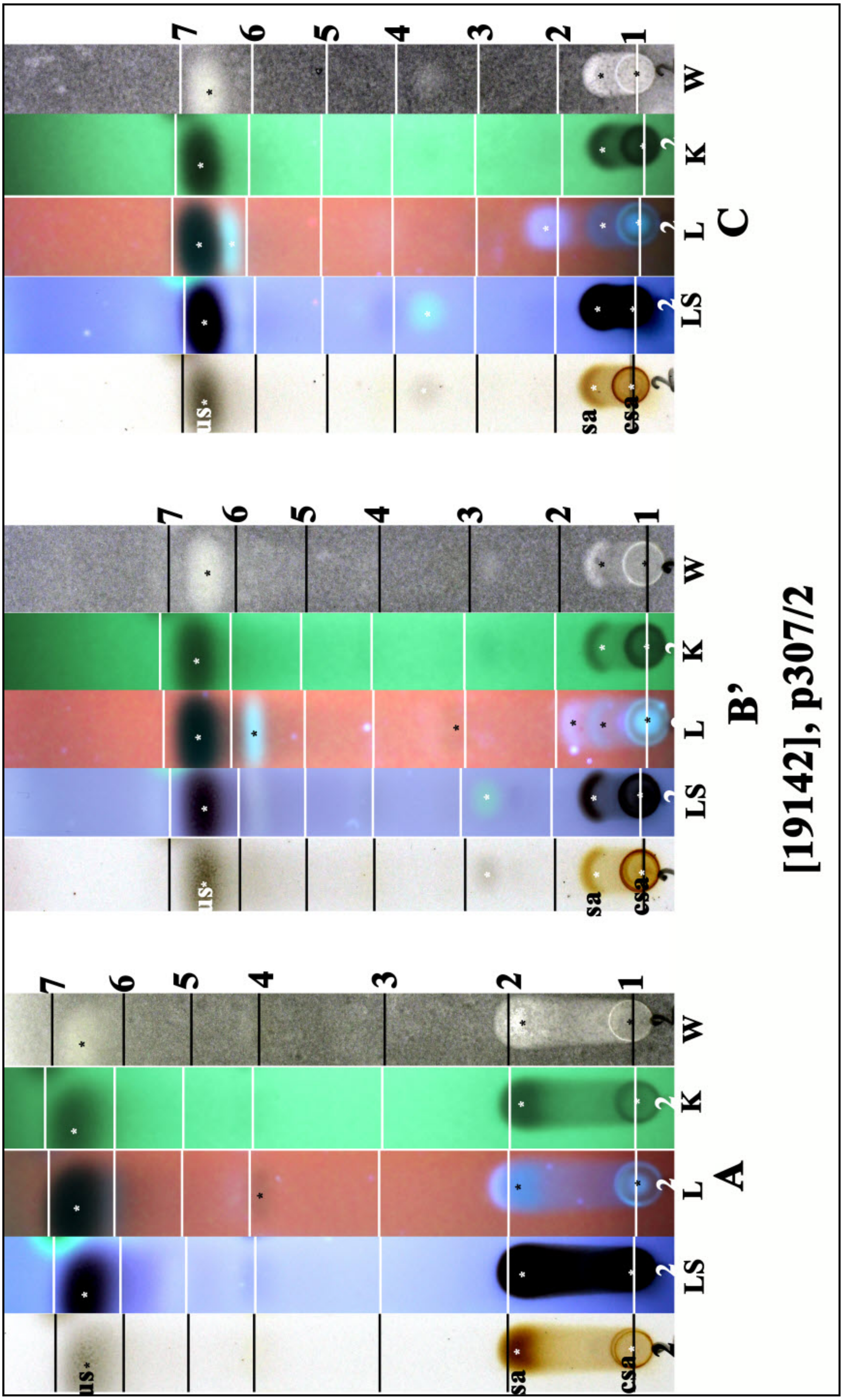
consalazinic acid



us: usnic acid, sa: salazinic acid, ca: consalazinic acid

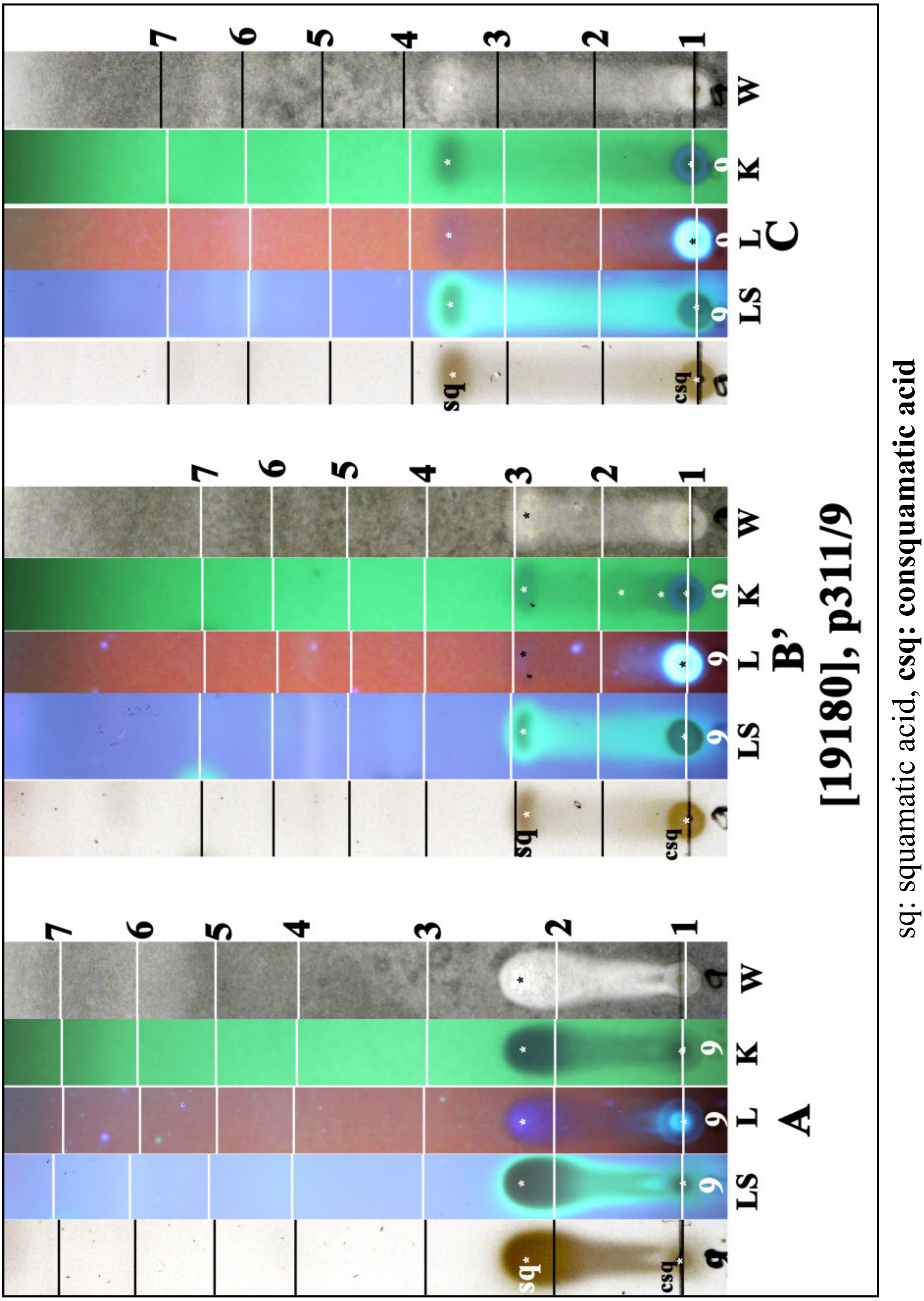
Xanthoparmelia antleriformis, [19140], Australia, New South Wales, Morton National Park, 8 km north-east of Nerriga.

consalazinic acid



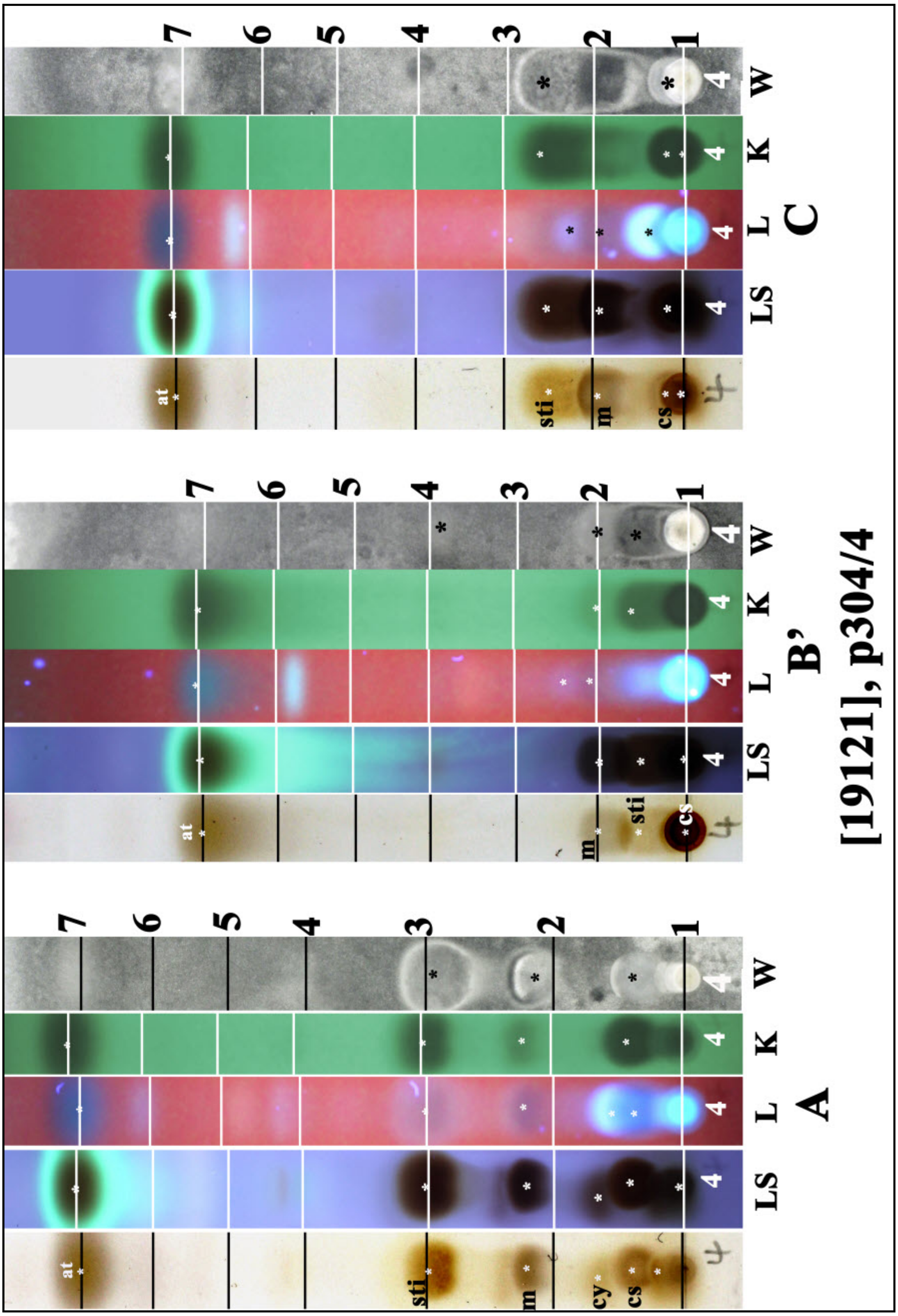
Xanthoparmelia australasica ,[19142], Australia, Australian Capital Territory, 0.8 km west of Coppins Crossing, 8 km west of Canberra.

consquamatic acid



Cladonia pertricosa, [19180], Australia, New South Wales, Barrington Tops State Forest, Dilgry Circle Road, 40 km north-west of Gloucester, 31°52' S, 151°31' E, 1260 m

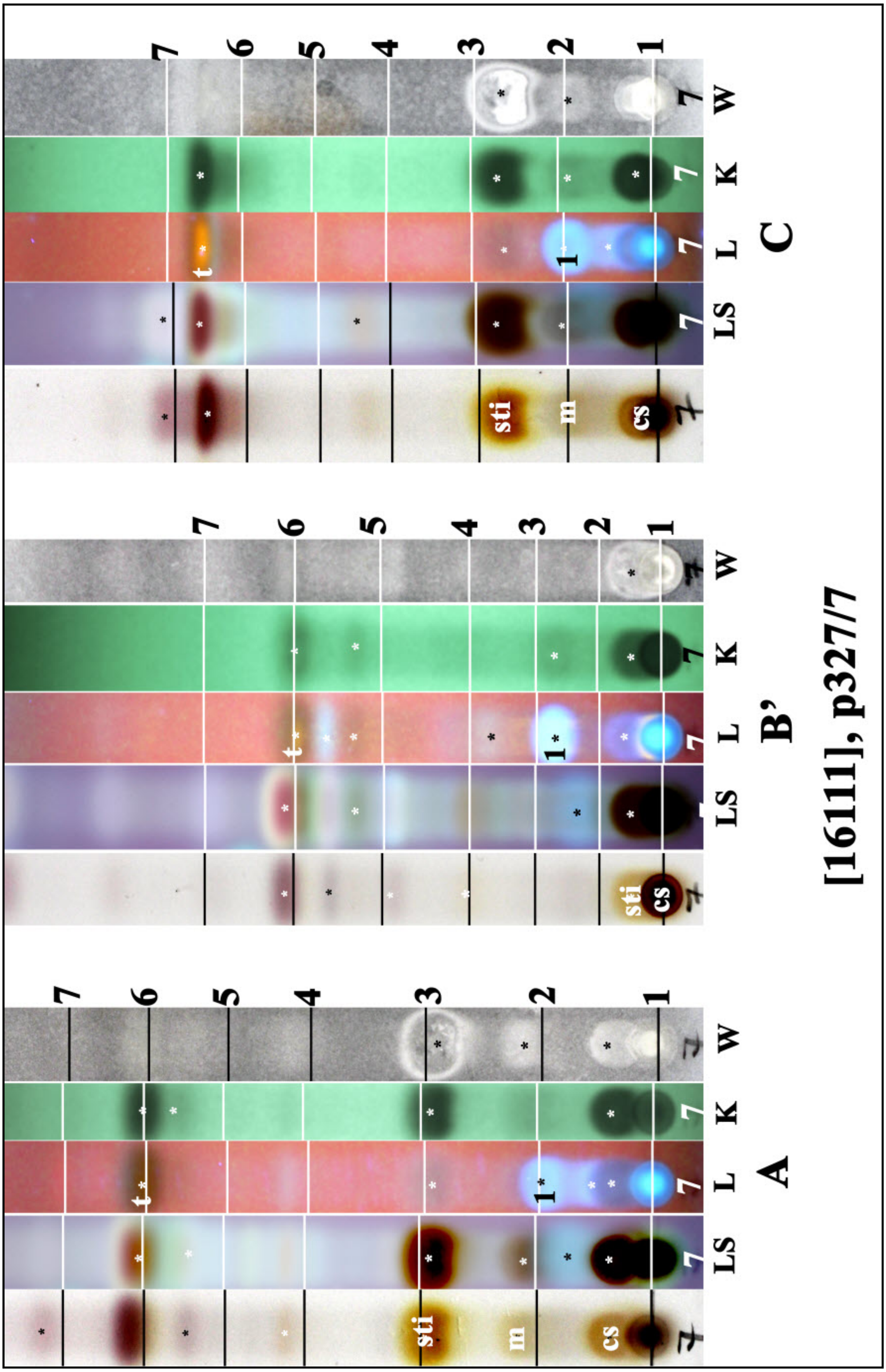
constictic acid



at: atranorin, sti: stictic acid, m: menegazzaic acid, cs: constictic acid, cy: cryptostictic acid

Parmotrema perlatum, [19121], New Zealand, North Island, South Auckland, adjacent to scenic reserve overlooking Lake Taupo, 1 km south of Wharewaka.

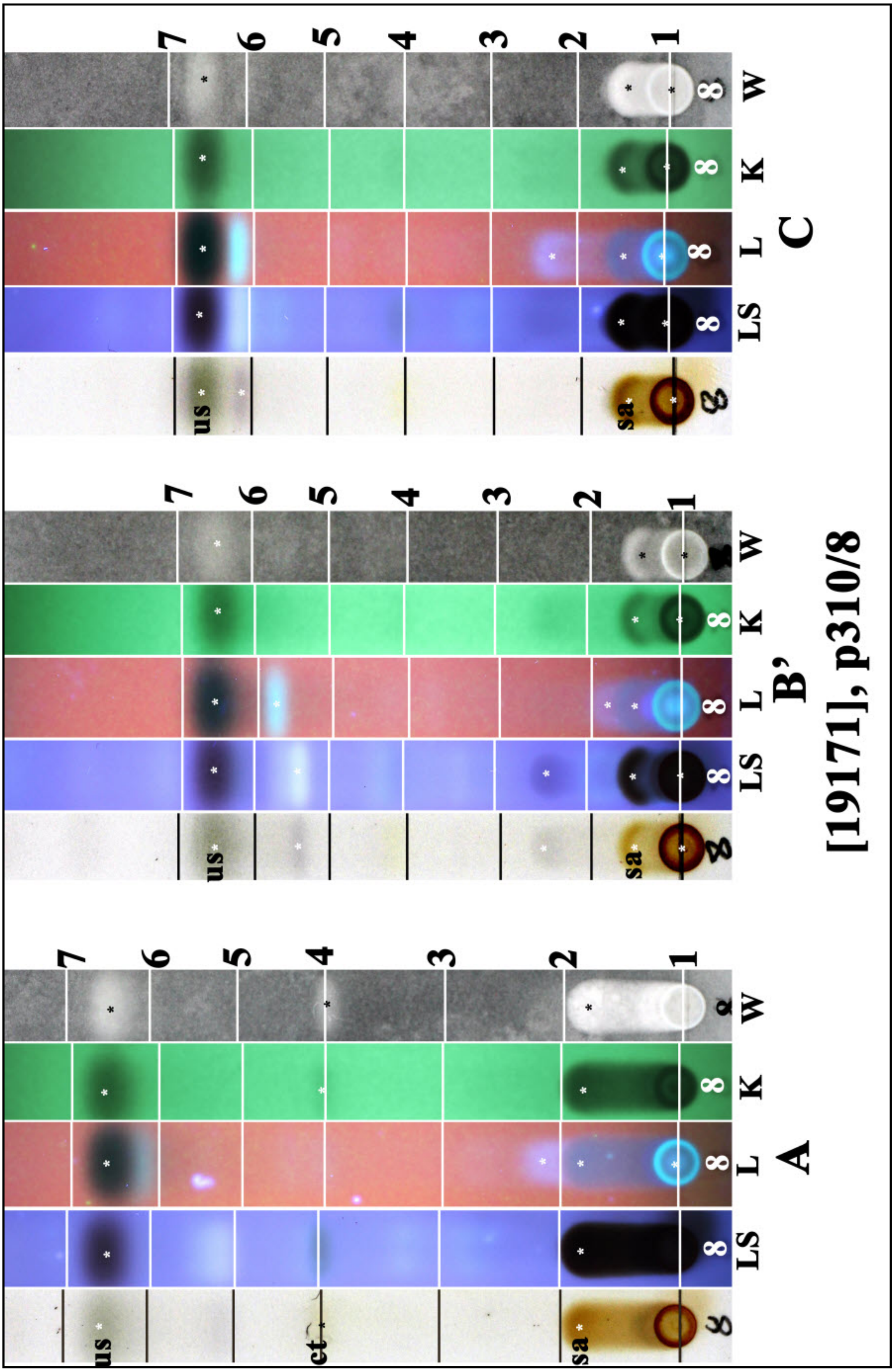
constictic acid



sti: stictic acid, **cs: constictic acid**, m: menegazziaic acid, t: thiophaninic acid, 1: unknown, conf. J.A. Elix

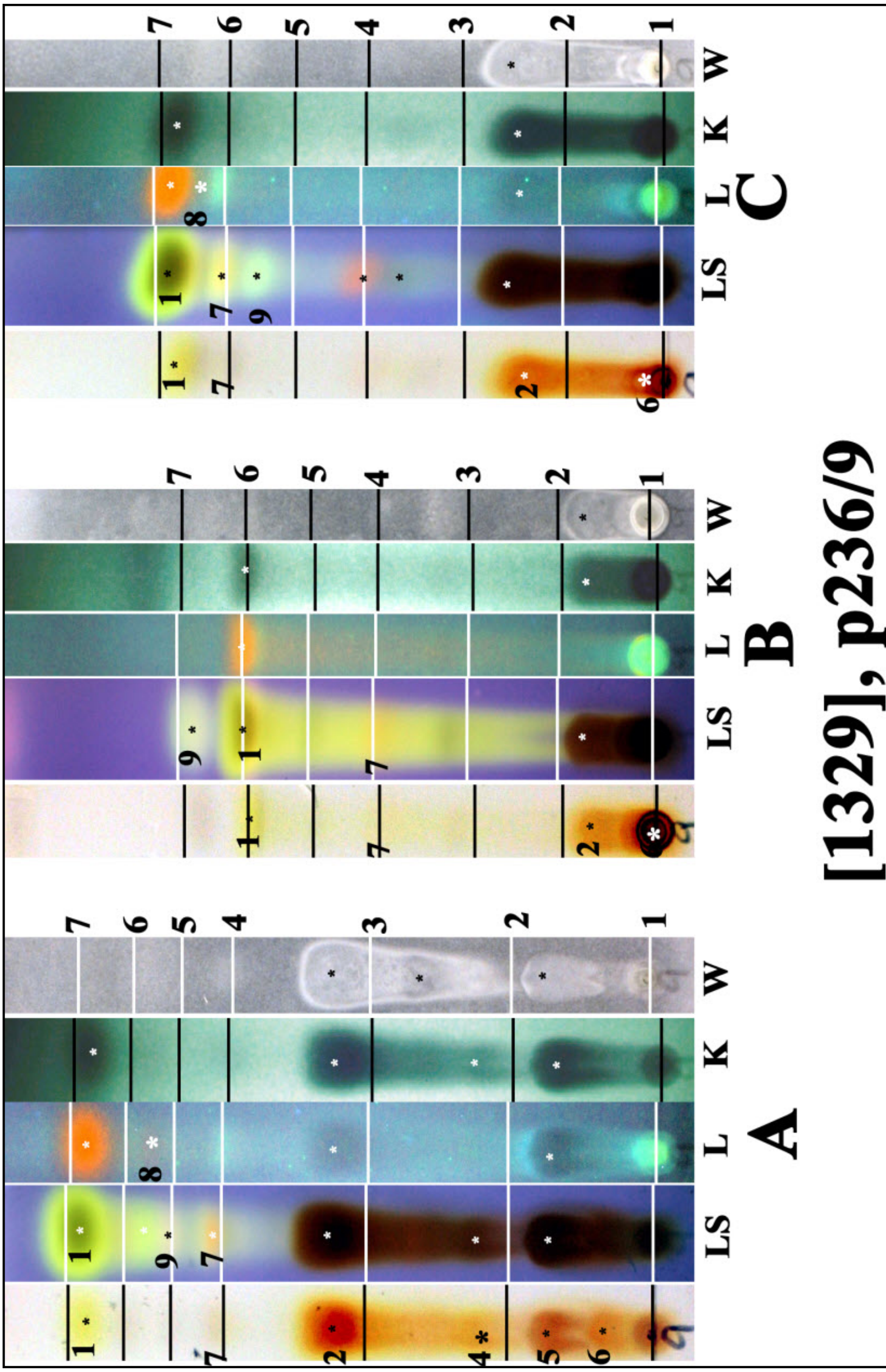
Pertusaria thiospoda, [16111], Australia, New South Wales, north of Batemans Bay, Cullendulla Creek Nature Reserve, on *Avicennia marina*, 35.701° S, 150.199° E, 3 m. F. Schumm & E. Stocker-Wörgötter, 10.11.2009.

constipatic acid



Xanthoparmelia rimalis, [19171], Australia, Australian Capital Territory, Black Mountain Reserve, Bruce, Canberra, 35°15' S, 149°05' E, 640 m.

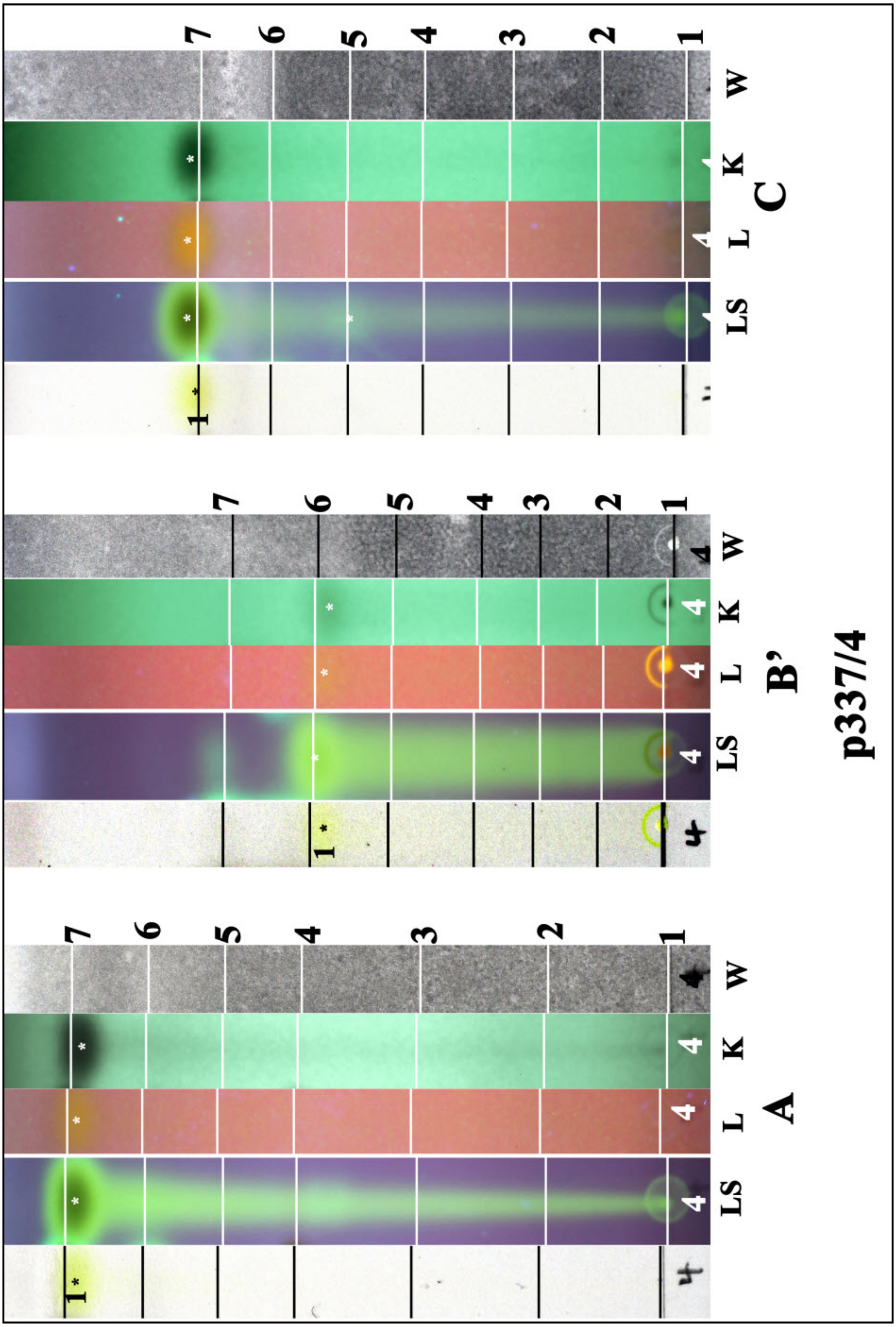
coronatone
(= 4,5-dichlorolichexanthone)



1: coronatone (= 4,5-dichlorolichexanthone), 2: stictic acid, 4: connorstictic acid, 5: cryptostictic acid, 6: constictic acid, 3,7,8,9: unknown, conf. J.A. Elix

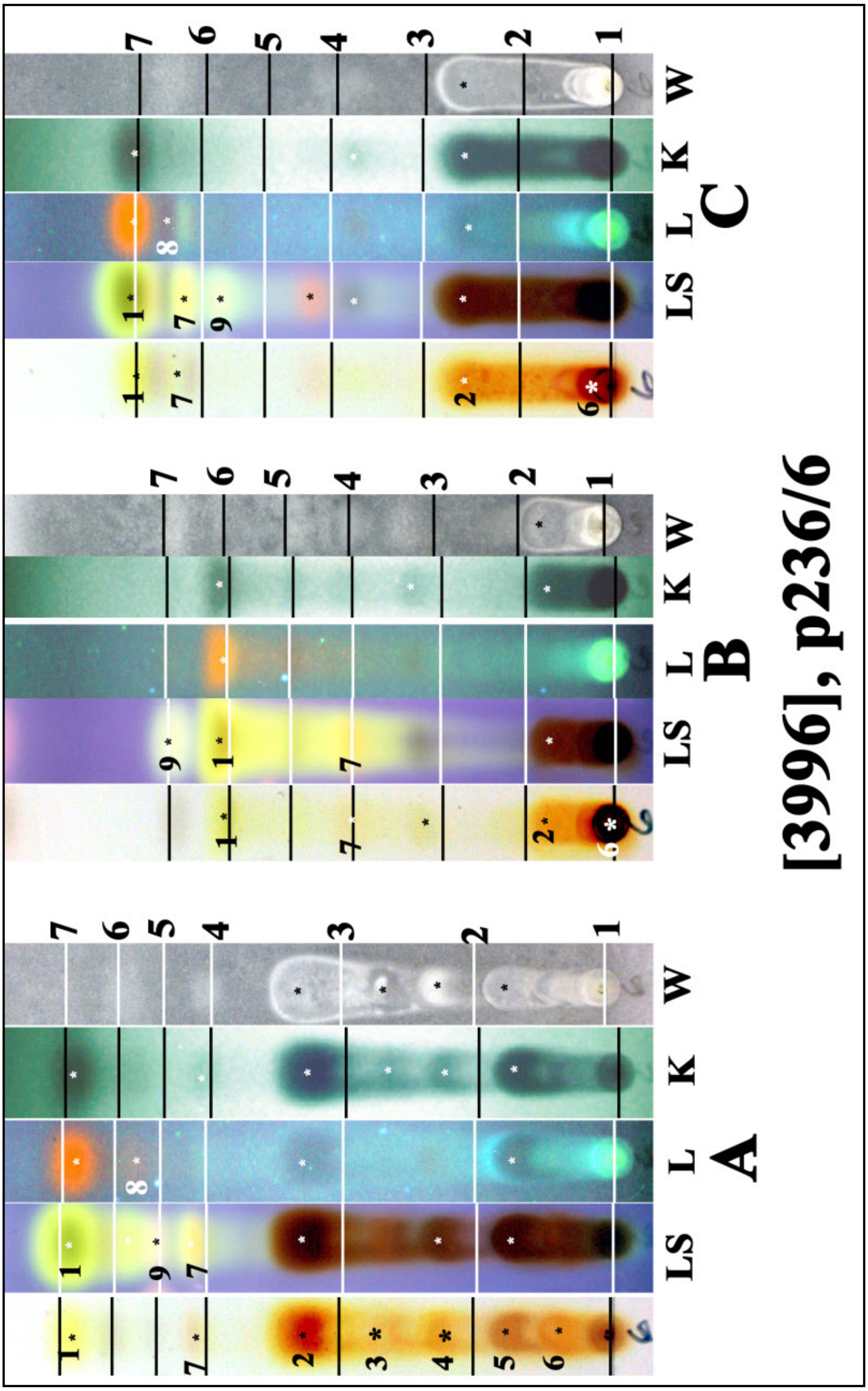
Pertusaria coronata, [1329], Germany, Baden-Württemberg, Kreis Göppingen, Göppingen, im "Oberholz" am Dreikönigsweg zwischen dem früheren Altersheim und dem Waldheim, an Laubbaum, ca. 380 m, TK 7223. Leg.Schumm 02.04.1970, det. V. Wirth.

coronatone (= 4,5-dichlorolichexanthone)



4,5-dichlorolichexanthone
pure substance received from J.A. Elix

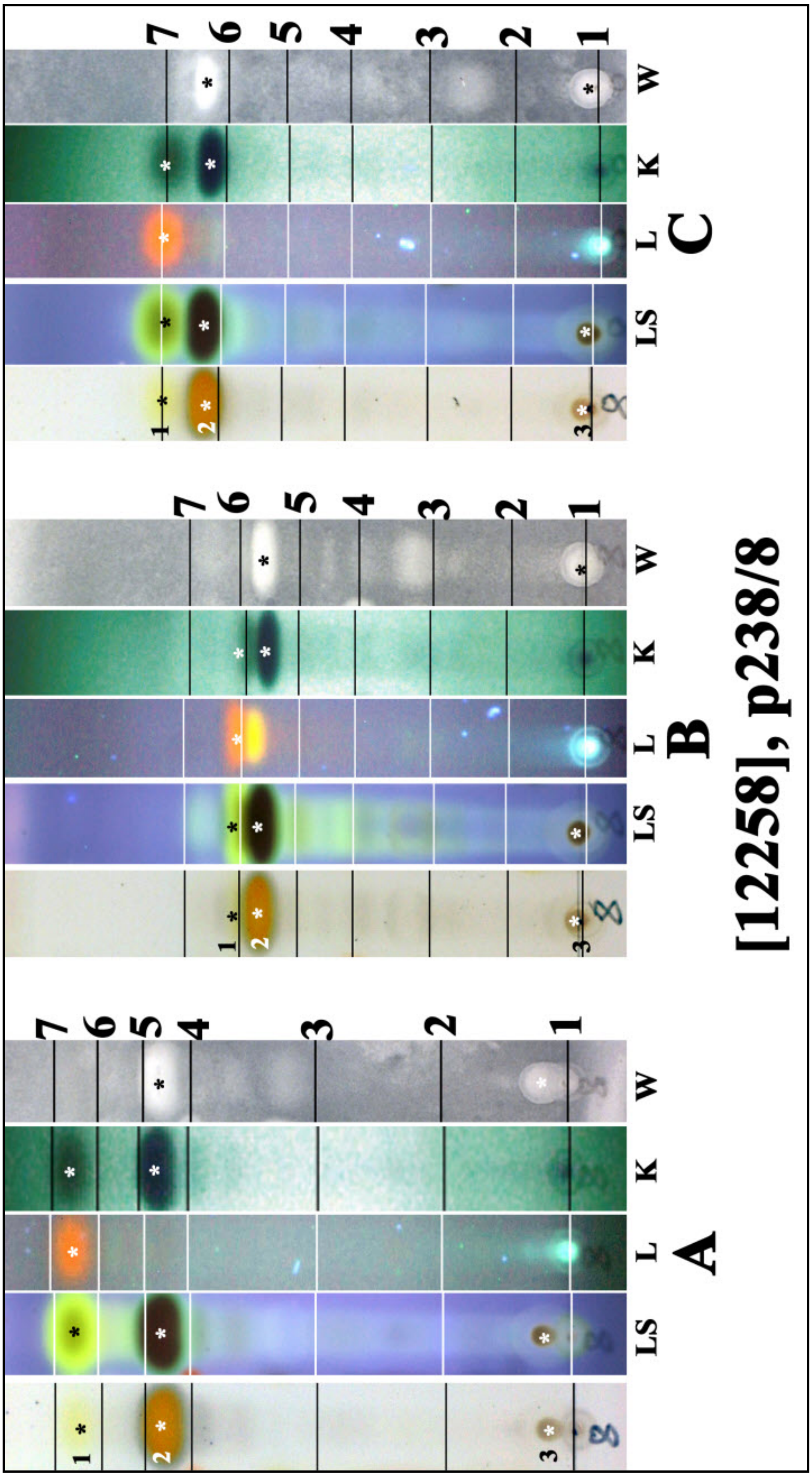
coronatone
(= 4,5-dichlorolichexanthone)



1: **coronatone (= 4,5-dichlorolichexanthone)**, 2: stictic acid, 4: connorstictic acid, 5: cryptostictic acid, 6: constictic acid, 3,7,8,8: unknown, conf. J.A. Elix

Pertusaria coronata, [3996], Germany, Baden-Württemberg, NO von Hartmannsweiler Gemeinde Winnenden, Weinbergshang "Himmelreich" des Hörnle, an *Quercus* auf der Kuppe nahe dem Polypodiumvorkommen, ca. 370 m, TK 7122. Leg. et det. F. Schumm 14.06.1990.

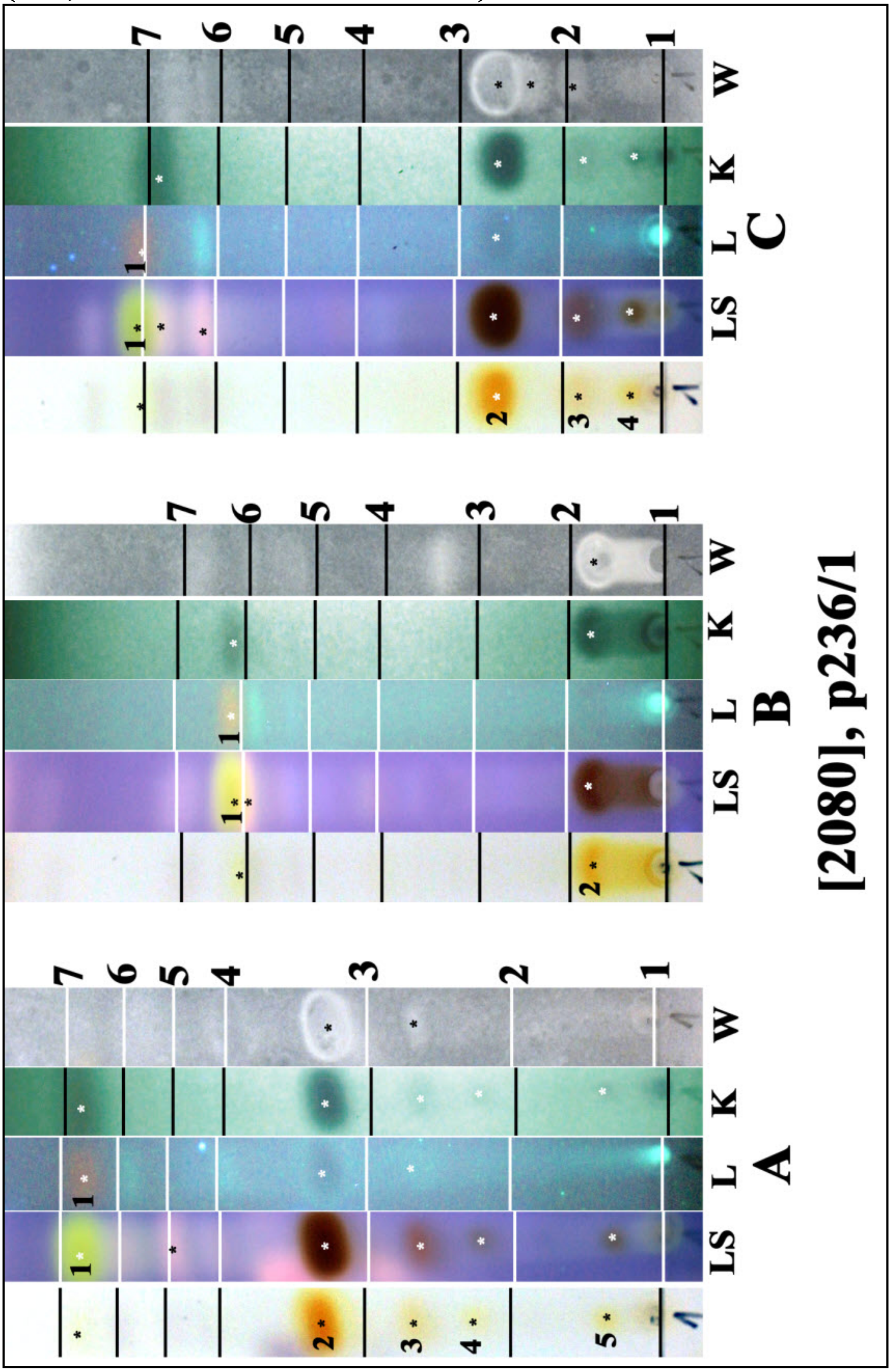
coronatone
(= 4,5-dichlorolichexanthone))



1: **coronatone** (= **4,5-dichlorolichexanthone**), 2: 2'-*O*-methylperlatolic acid,
3: decomposition or hydrolysis product, conf. J.A.Elix

Pertusaria mesotropa, [12258], USA, Mexico, Sonora, 12 km W of Yecora on road to La Mesa del Campanero, local name -"El puerto de los Huesos", 28°16'0" N, 109°1'0' W, 1790 m; oak woodland, on *Quercus arizonica.* Leg. T,H. Nash III 30. May 1975 (# 10859), det. H.T. Lumbsch & M.I. Messuti 1998.

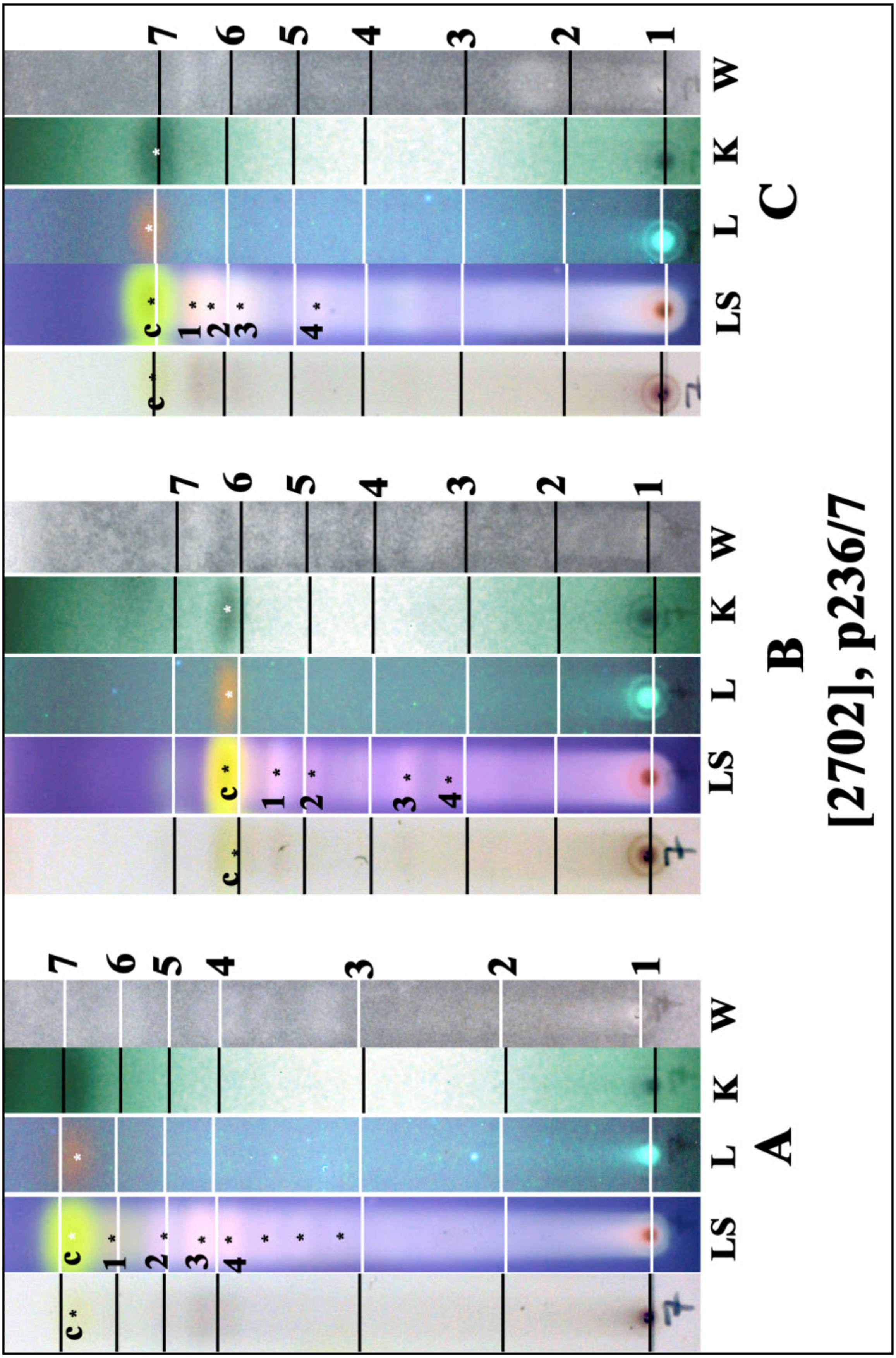
coronatone
(= 4,5-dichlorolichexanthone)



1: coronatone (= 4,5-dichlorolichexanthone), 2: stictic acid, 3: cryptostictic acid, 4: connorstictic acid, 5 constictic acid, conf. J.A. Elix

Pertusaria alpina, [2080], Schweiz (OW), Kanton Luzern, Merliwald östlich von Sörenberg, nördlich des Giswiler Stocks (651/187) ca. 1350 m, an Acer pseudoplatanus (63 cm Umfang). Leg. et det. F. Schumm, 06.09.1972.

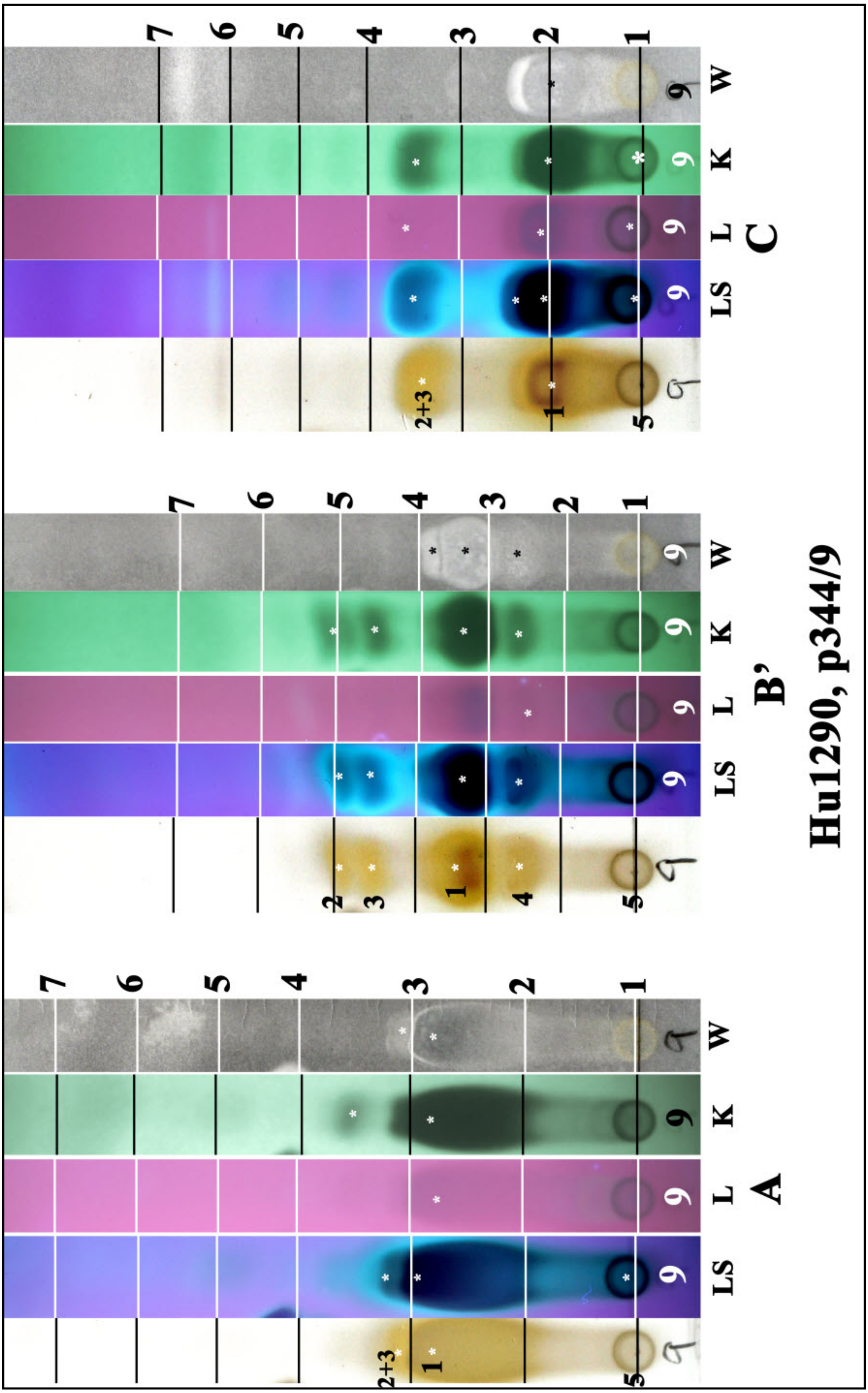
coronatone
(= 4,5-dichlorolichexanthone)



c: coronatone (= 4,5-dichlorolichexanthone), 1,2,3,4: terpenes from the bark, conf. J.A. Elix

Pertusaria constricta **,** [2702], Schweiz (OW), Kanton Luzern, Merliwald östlich von Sörenberg, nördlich des Giswiler Stocks (61/187) ca. 1300 m. Leg. et det. F. Schumm 13.09.1971

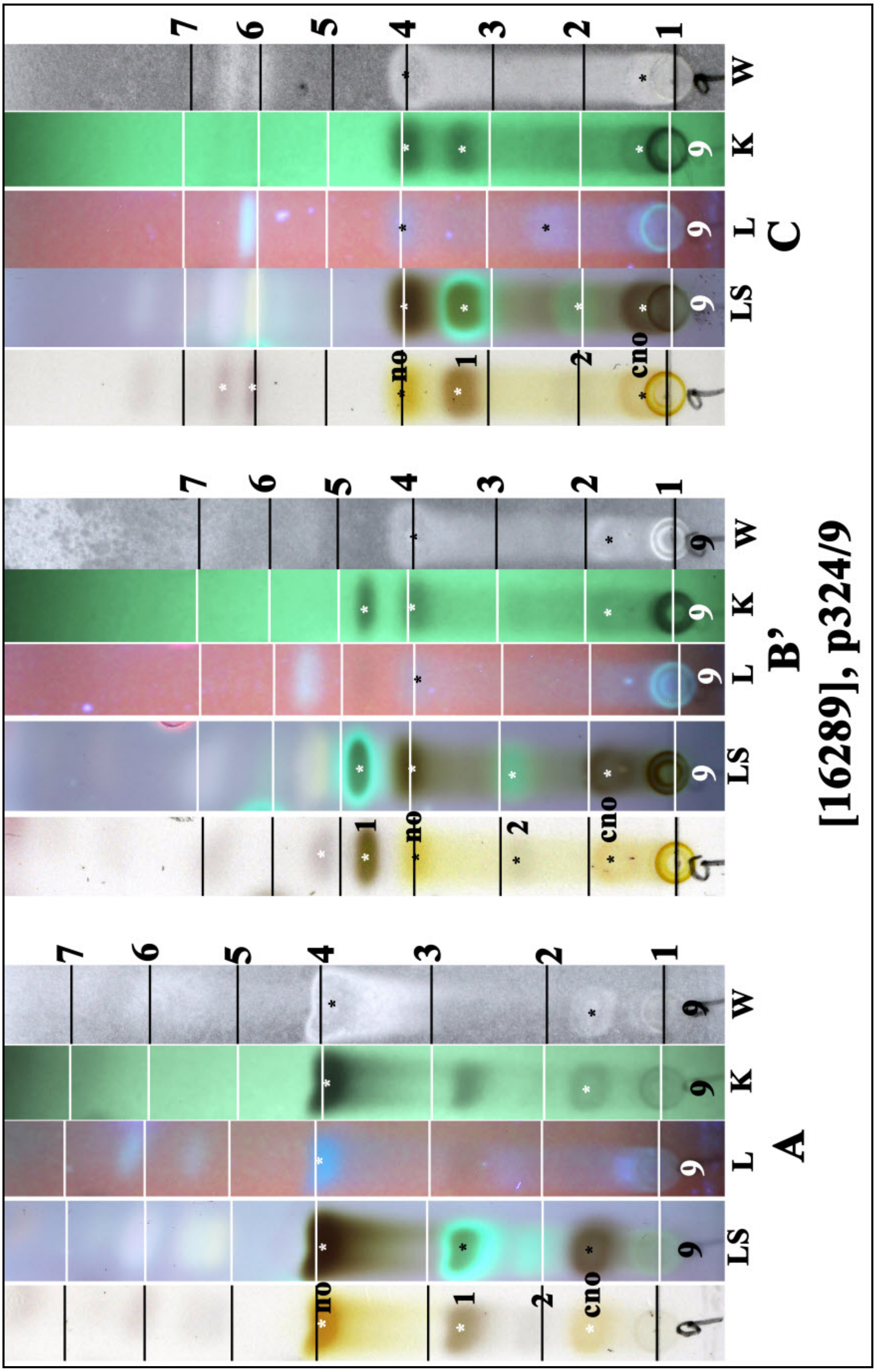
crustinic acid



1: crustinic acid, 2:lecanoric acid, 3: gyrophoric acid, 4,5: unknowns, conf. J.A. Elix

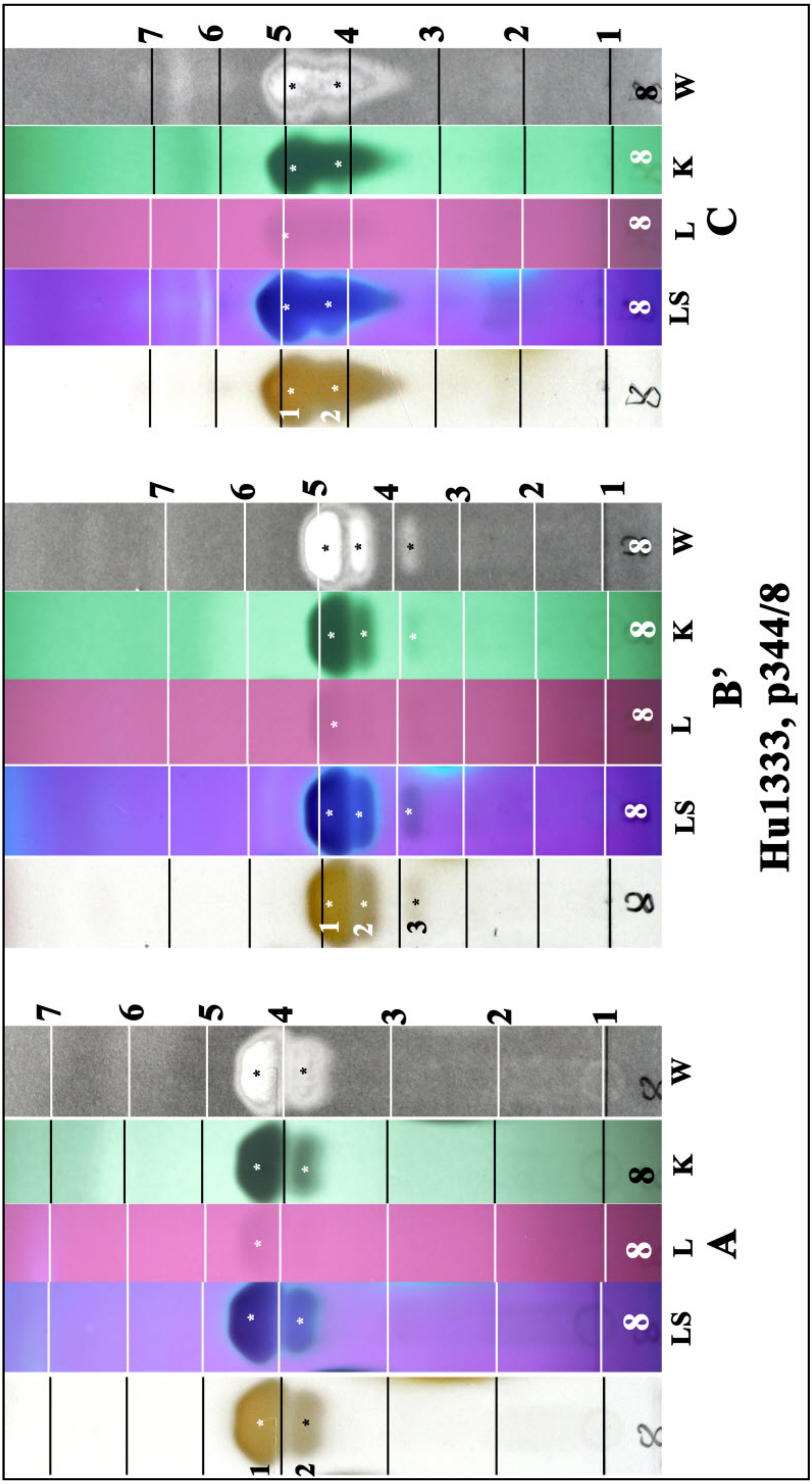
S. Huneck's collection of lichen substances No 1290: crustinic acid
Botanisches Museum Berlin-Dahlem

crustinic acid



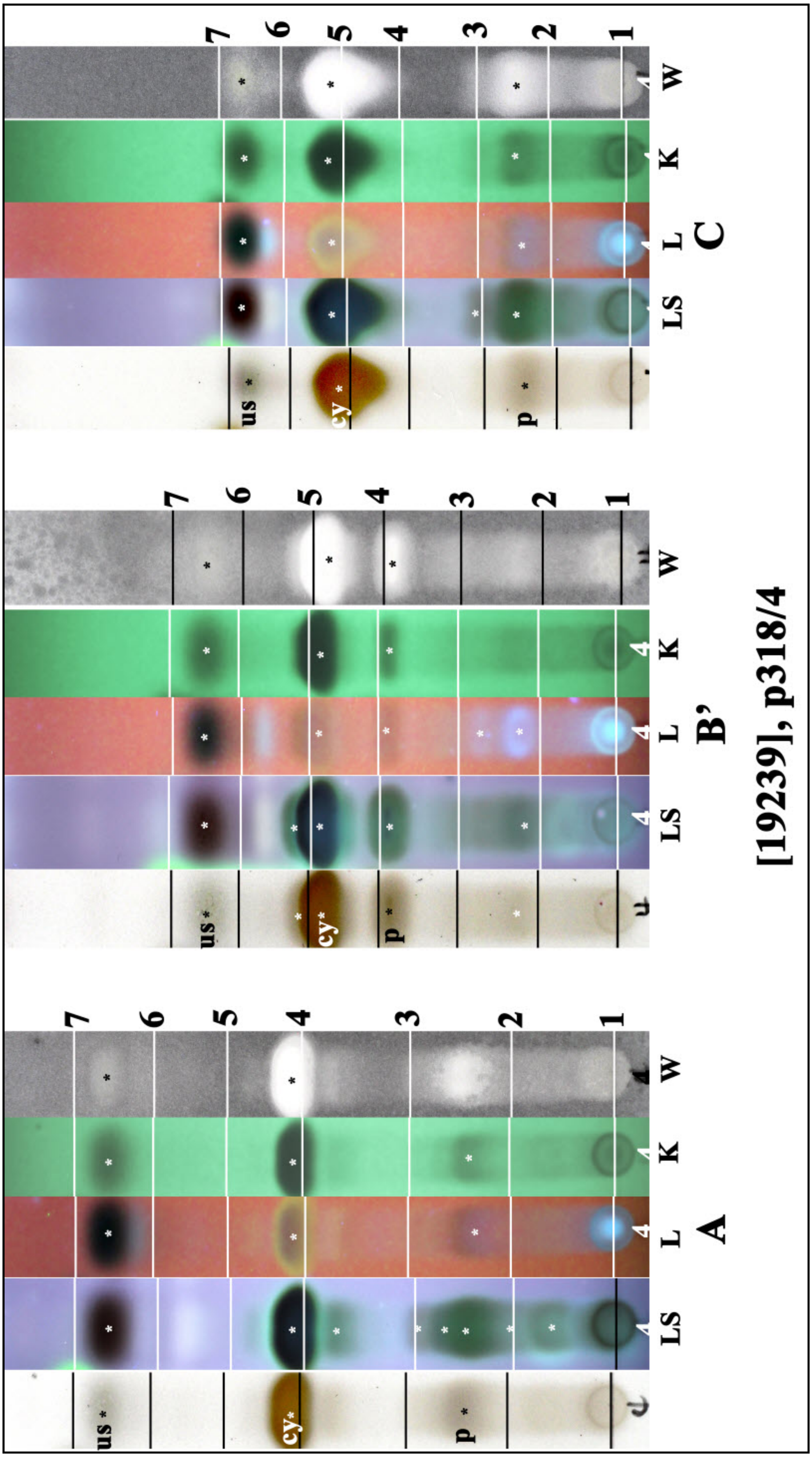
Baeomyces heteromorphus, [16289], Australia, New South Wales, Brown Mountain near Cooma, Fred Piper Memorial Lookout, 36°34' S, 149°27' E, 910 m.

cryptochlorophaeic acid



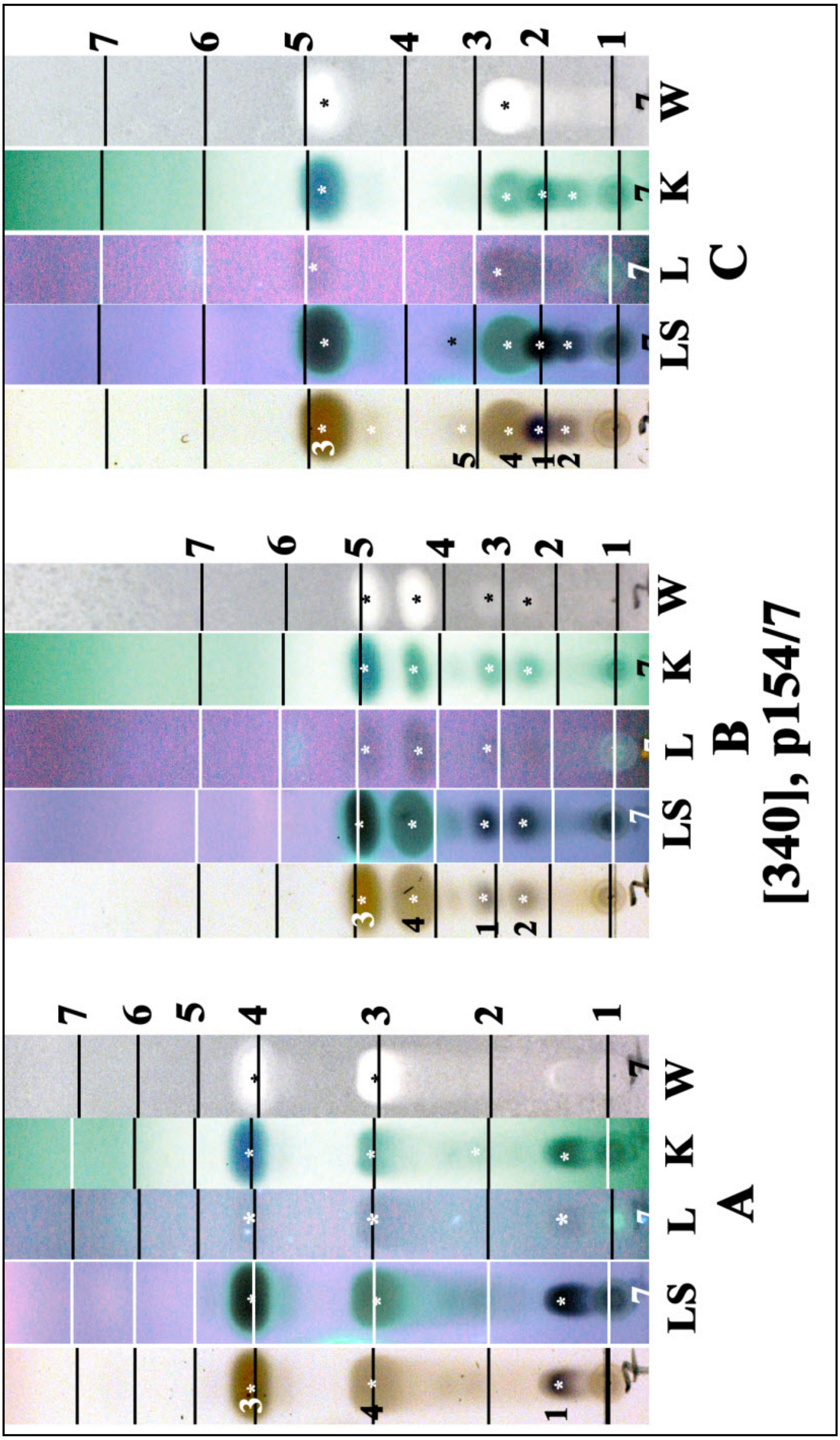
S. Huneck's collection of lichen substances No 1333: cryptochlorophaeic acid. Botanisches Museum Berlin-Dahlem

cryptochlorophaeic acid



Ramalina confirmata, [19239], Australia, Queensland, Tin Can Inlet, Tin Can Bay, 25°54' S, 153°01' E, sea level.

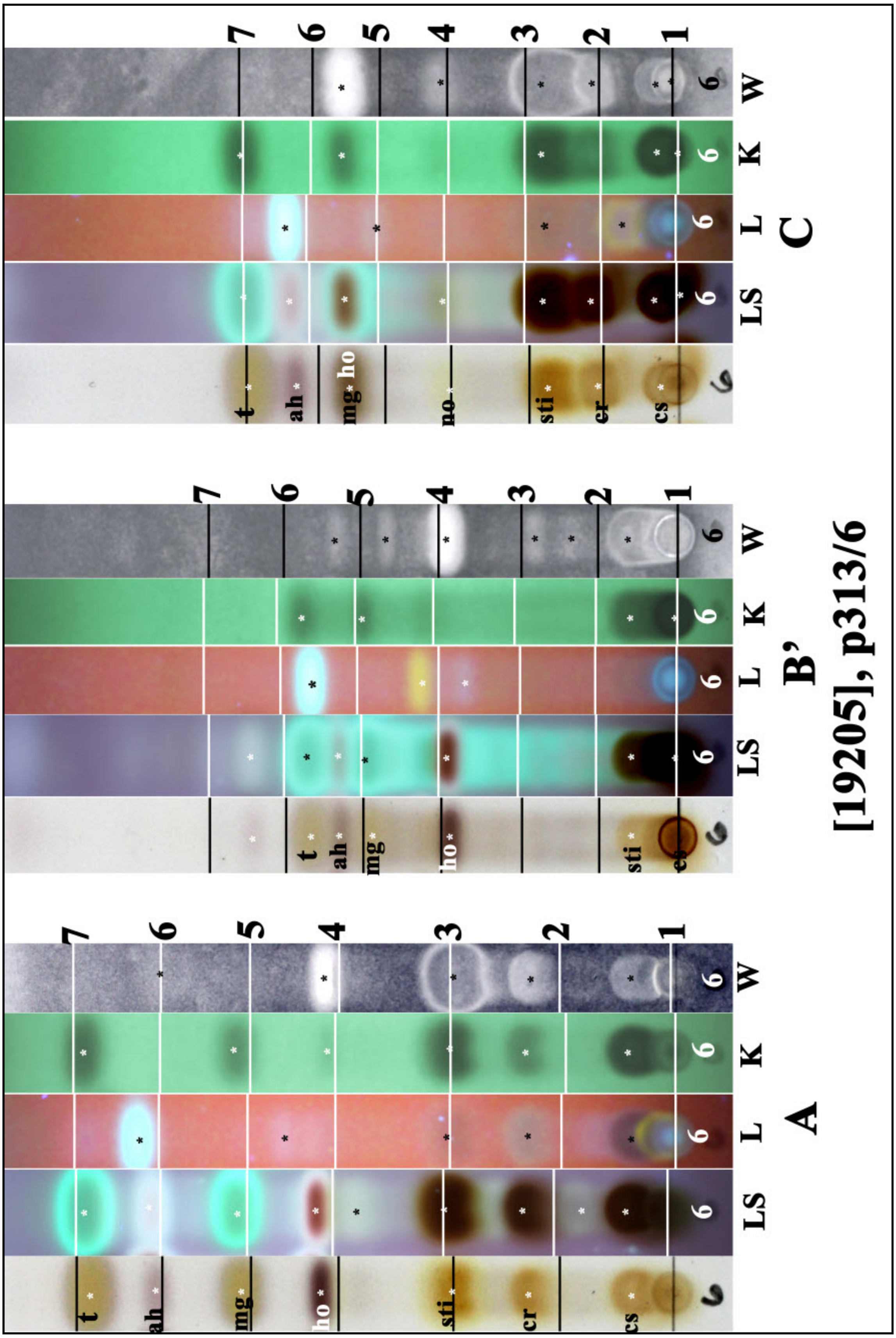
cryptochlorophaeic acid



1: fumarprotocetraric acid, 2: protocetraric acid, **3: cryptochlorophaeic acid,**
4: paludosic acid, 5: unknown, conf. J.A. Elix

Cladonia chlorophaea , [340], Germany, Baden-Württemberg, Schwarzwald, Mitteltal, auf einem Laubbaum über Moosen. Leg. Eisele 17.03.1947, det. J. Poelt

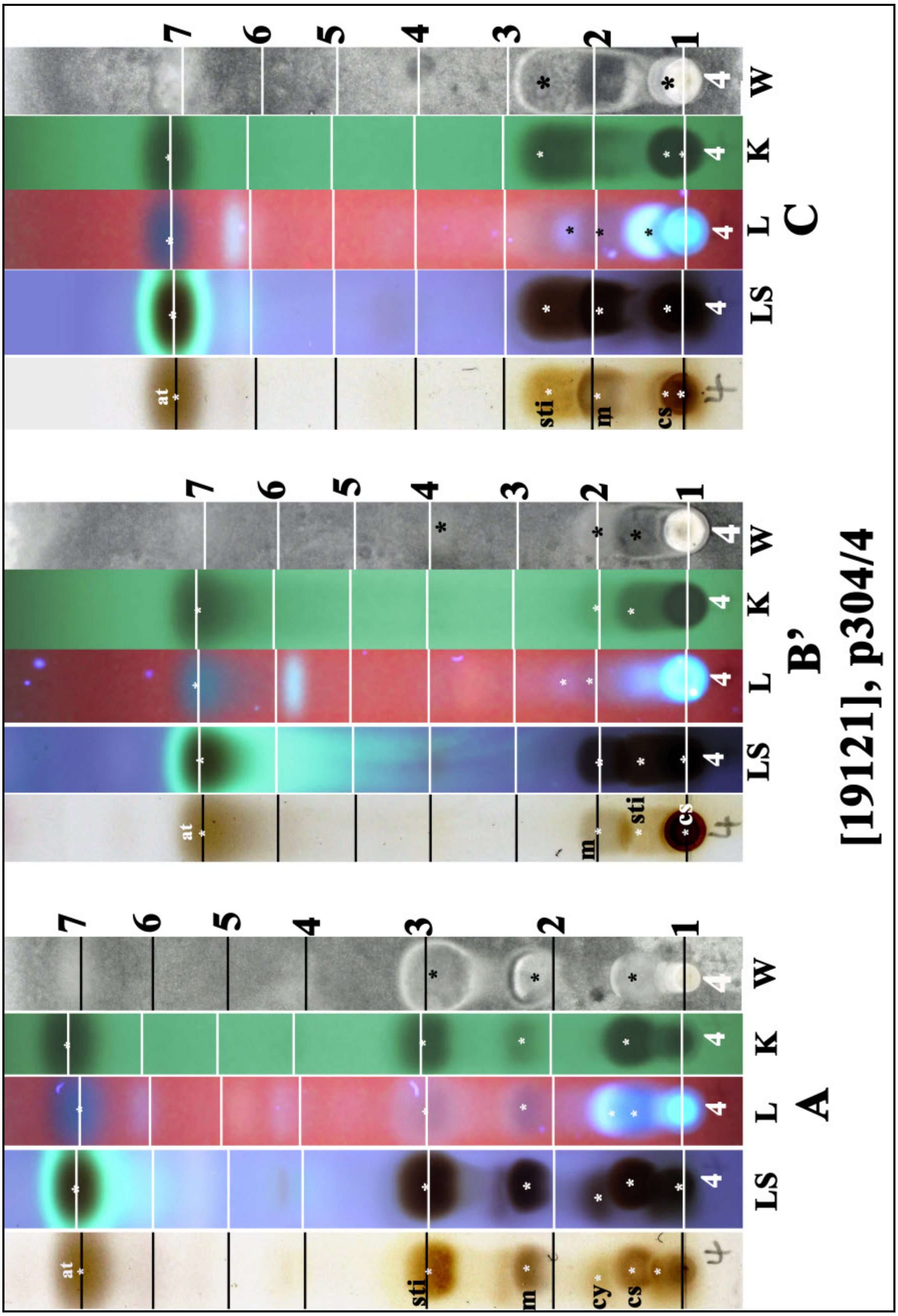
cryptostictic acid



t: tenuiorin, ah: 7β-acetoxyhopane-22-ol, mg: methyl gyrophorate, ho: hopane-6α,7β,22-triol, no: norstictic acid,
sti: stictic acid, cs:constictic acid, **cr: cryptostictic acid**

Pseudocyphellaria desfontainii, [19205], Australien, Queensland, Vine Creek, 6 km south east of Ravenshoe, 17°39' S, 145°30' E, 900 m.

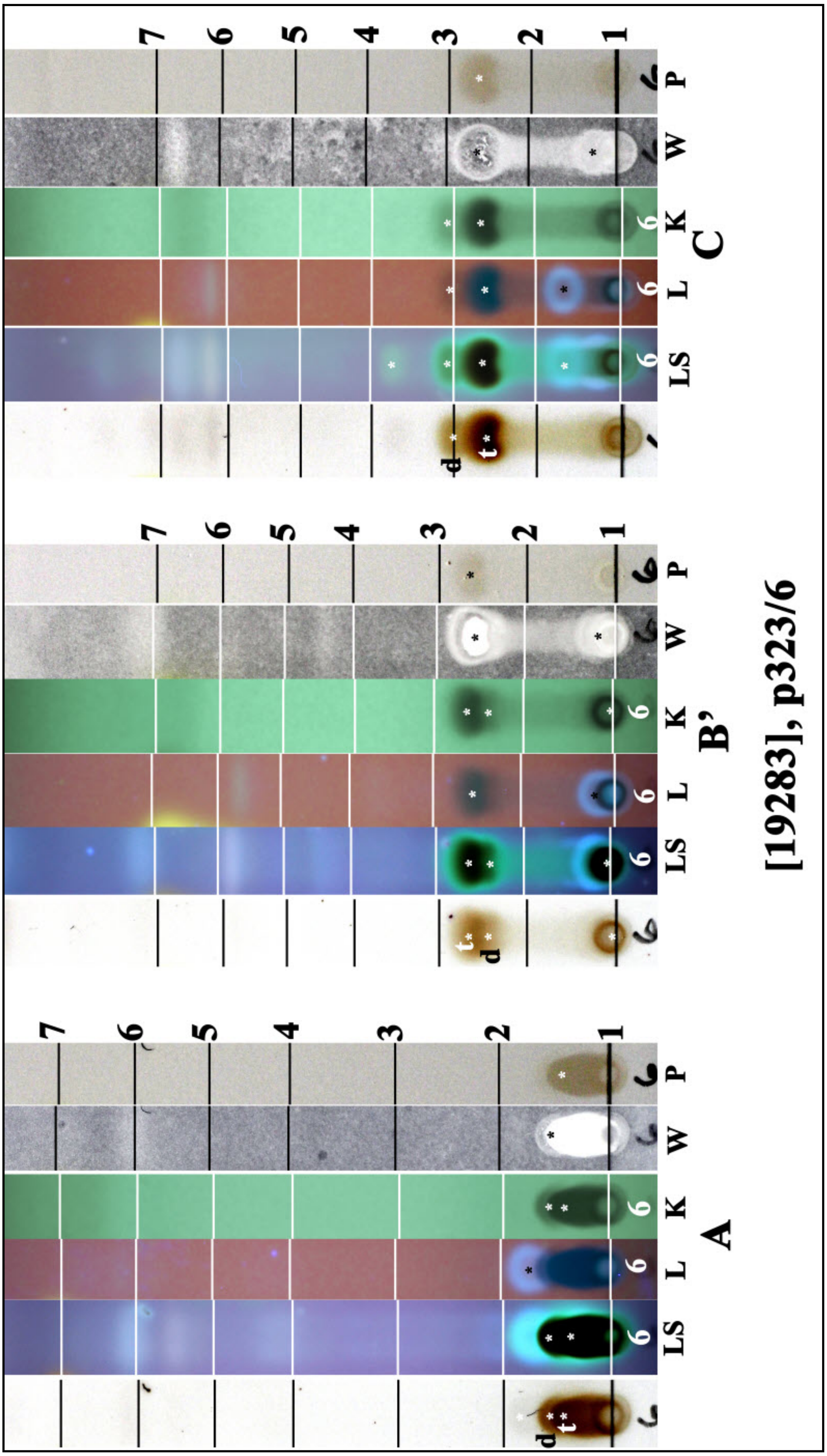
cryptostictic acid



at: atranorin, sti: stictic acid, m: menegazzaic acid, cs: constictic acid, **cy: cryptostictic acid**

Parmotrema perlatum, [19121], New Zealand, North Island, South Auckland, adjacent to scenic reserve overlooking Lake Taupo, 1 km south of Wharewaka.

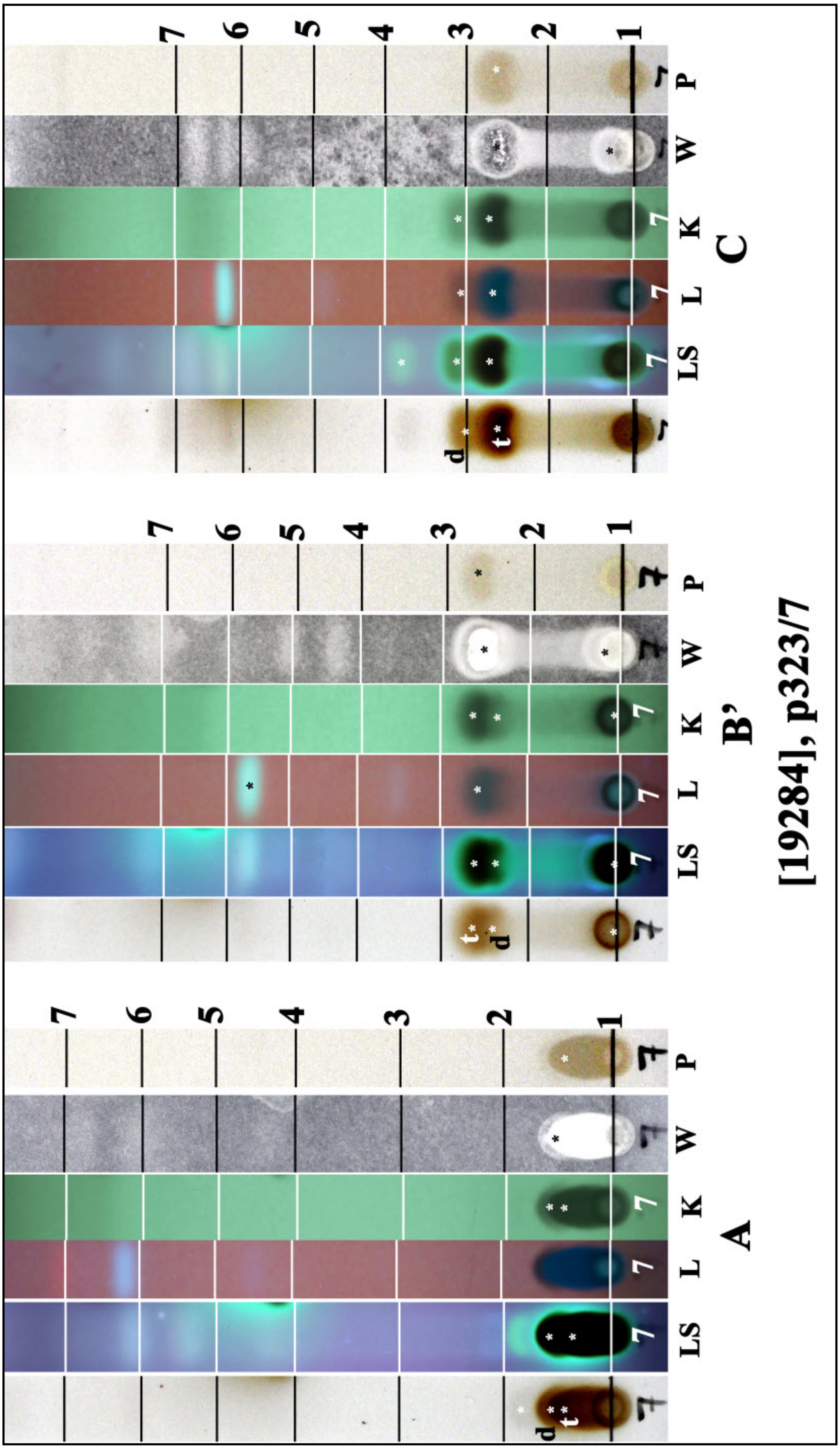
decarboxythamnolic acid



t: thamnolic acid, **d: decarboxythamnolic acid**

Thamnolia vermicularis, [19283], Australia, Victoria, Basalt Hill, Alpine National Park, Bogong High Plains, 20 km south-east of Mt. Beauty, 36°53' S, 147°18' E, 1650 m.

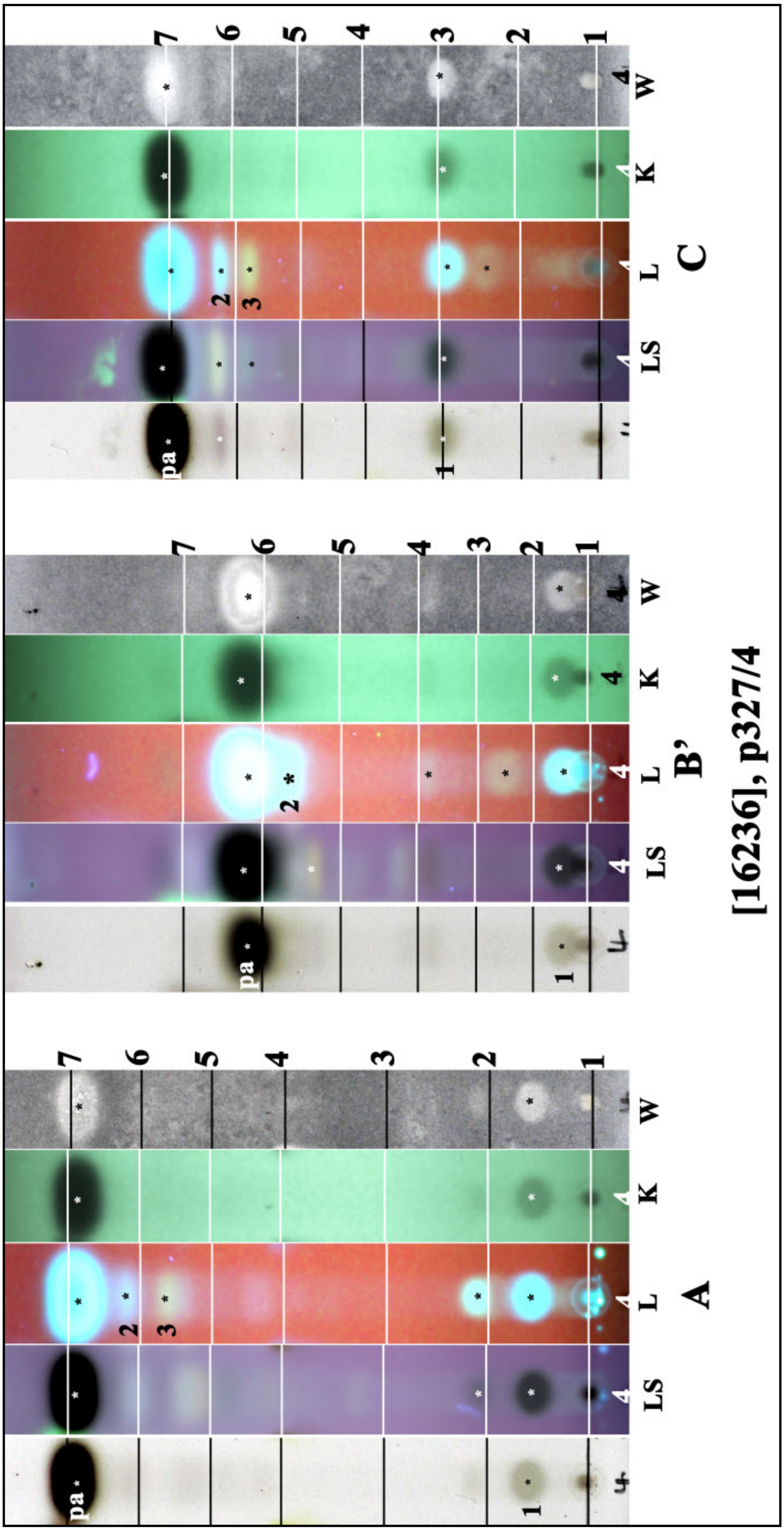
decarboxythamnolic acid



t: thamnolic acid, d: decarboxythamnolic acid

Thamnolia vermicularis, [19284], Australia, Australian Capital Territory, Brindabella Range, summit of Mount Aggie, 43 km west-south-west of Canberra, 35°28' S, 148°46' E, 1485 m.

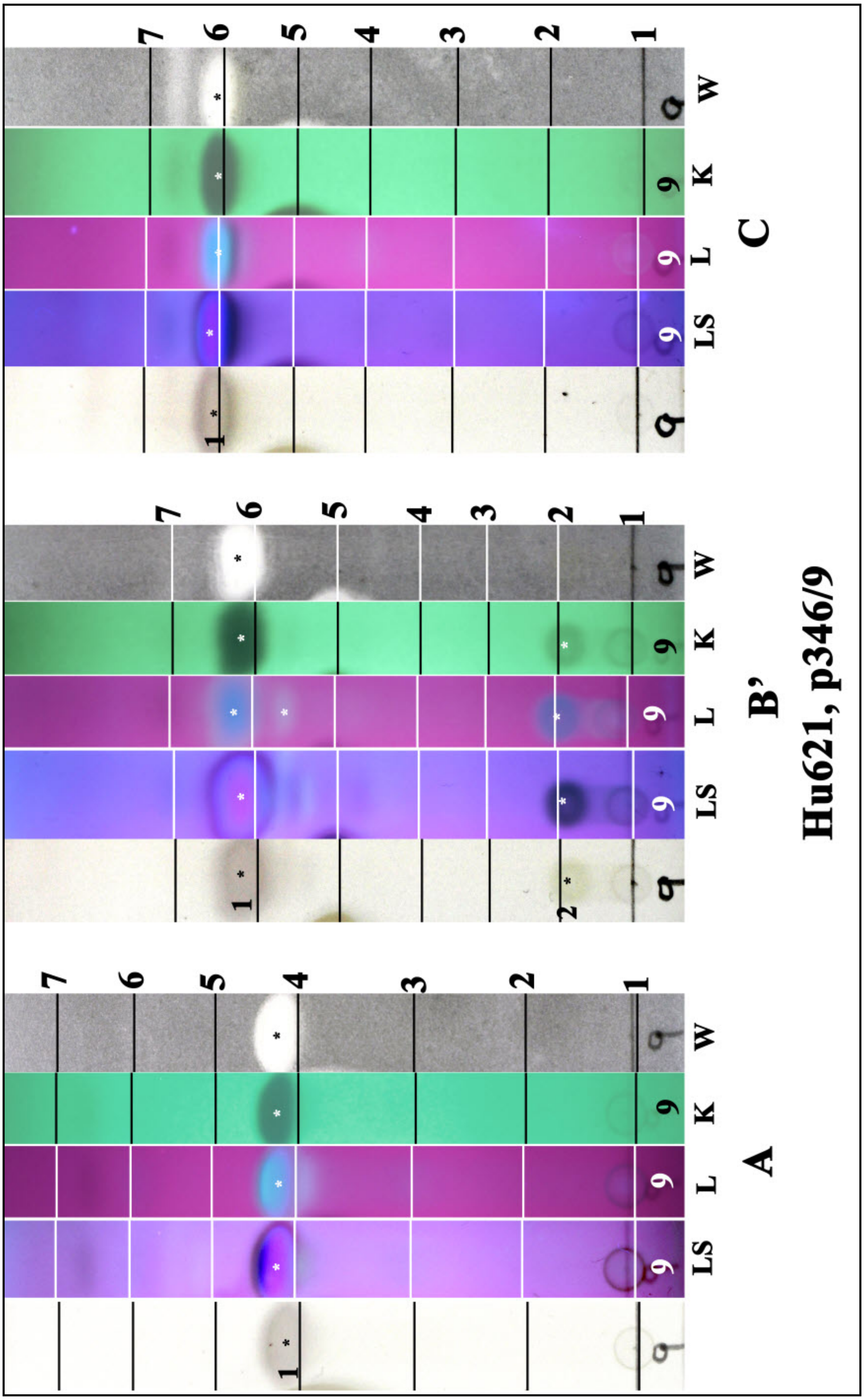
dechloropannarin



pa: pannarin, 1: norpannarin, **2: dechloropannarin**, 3: unknown

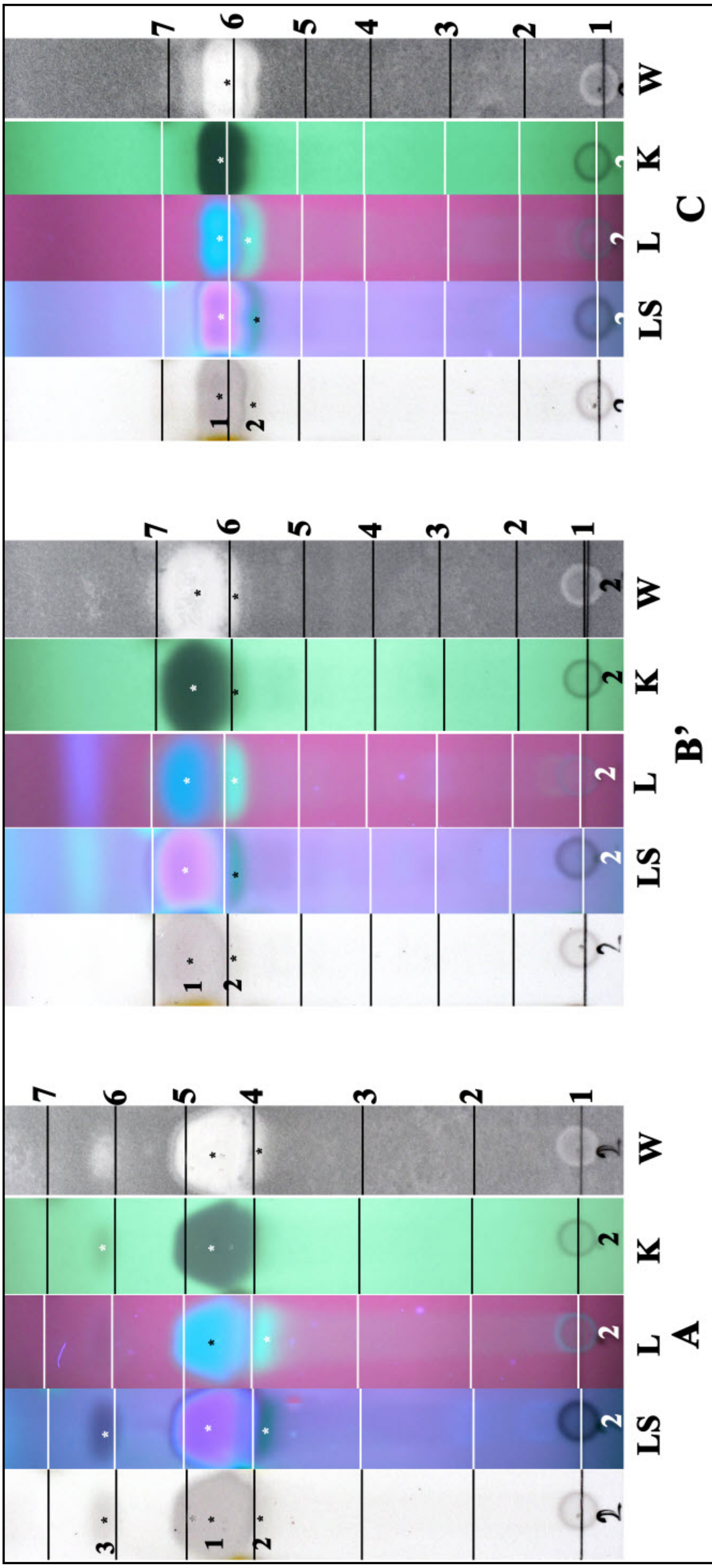
Pannaria fulvescens, [16236], Australia, New South Wales, between Bermagui and Tathra, trail from Aragunnu Beach to Mimosa Rocks, 36.585° S, 150.056° E, 10 m, growing on bark. Leg. F. Schumm & E. Stocker-Wörgötter, 12.11.2009.

didymic acid



S. Huneck’s collection of lichen substances No 621: didymic acid, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

didymic acid

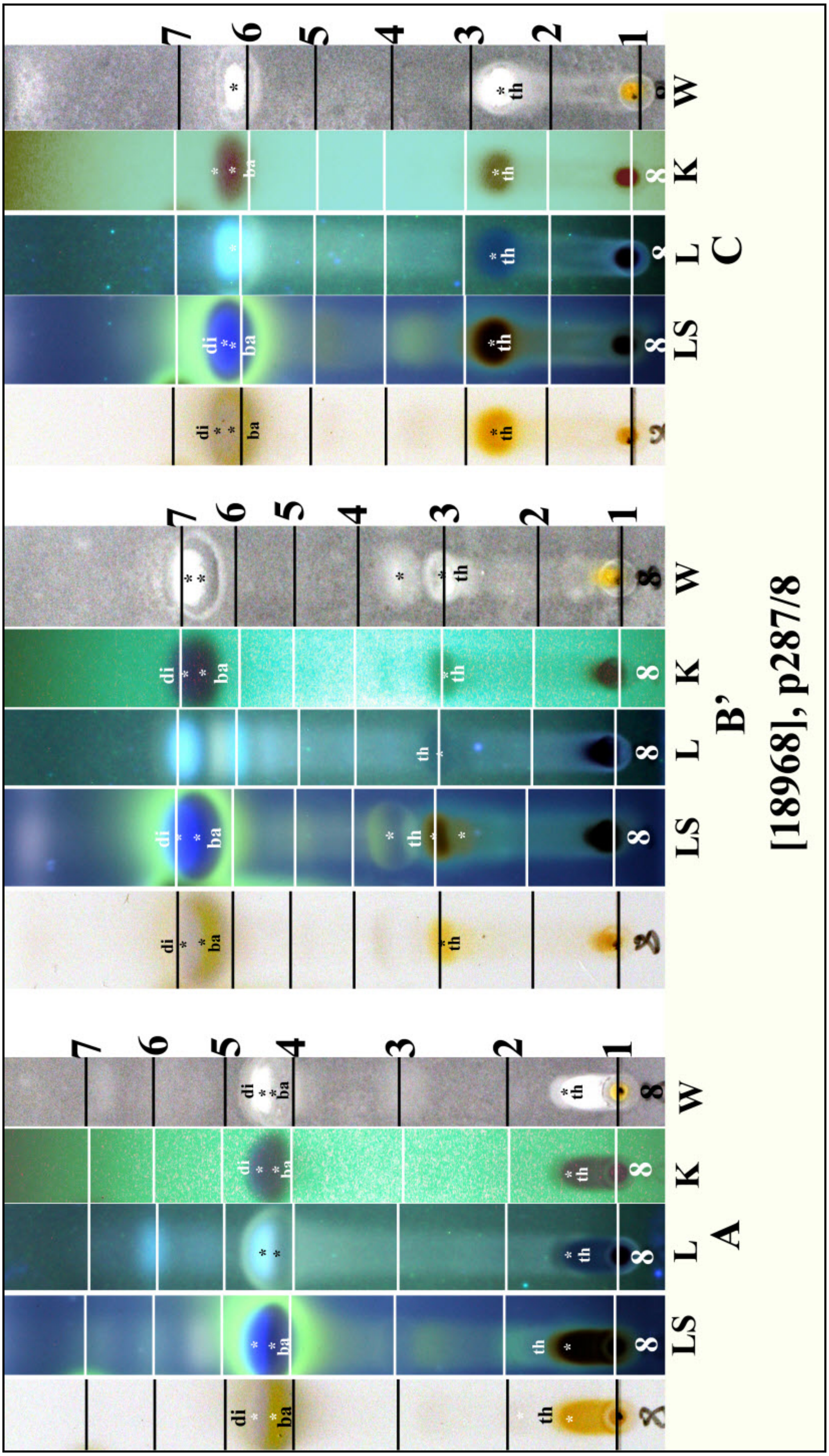


Hu1258, p345/2

1: didymic acid, 2: subdidymic acid, 3: condidymic acid, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 1258: didymic acid
Botanisches Museum Berlin-Dahlem

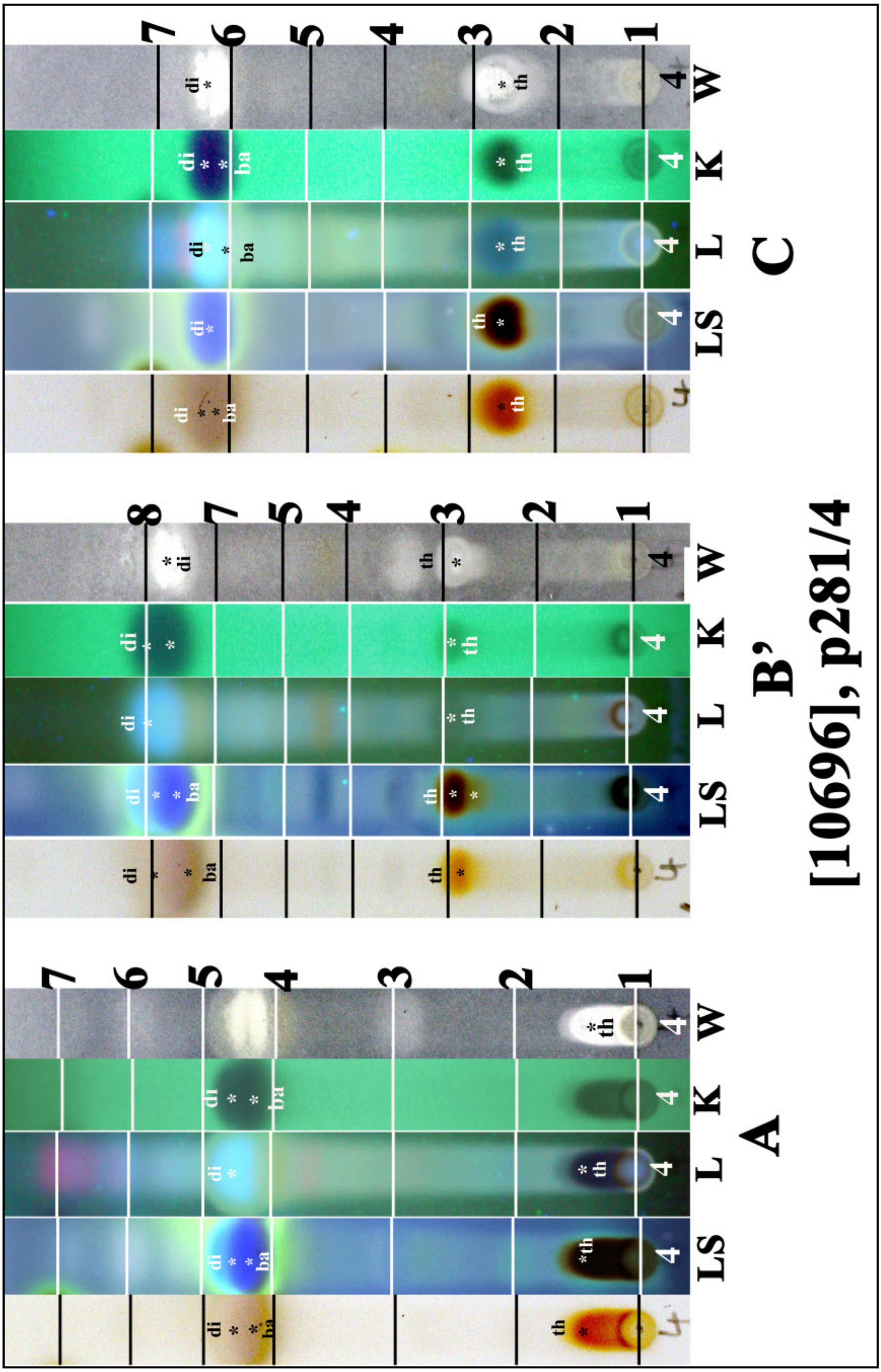
didymic acid



di: didymic acid, ba: barbatic acid, th: thamnolic acid

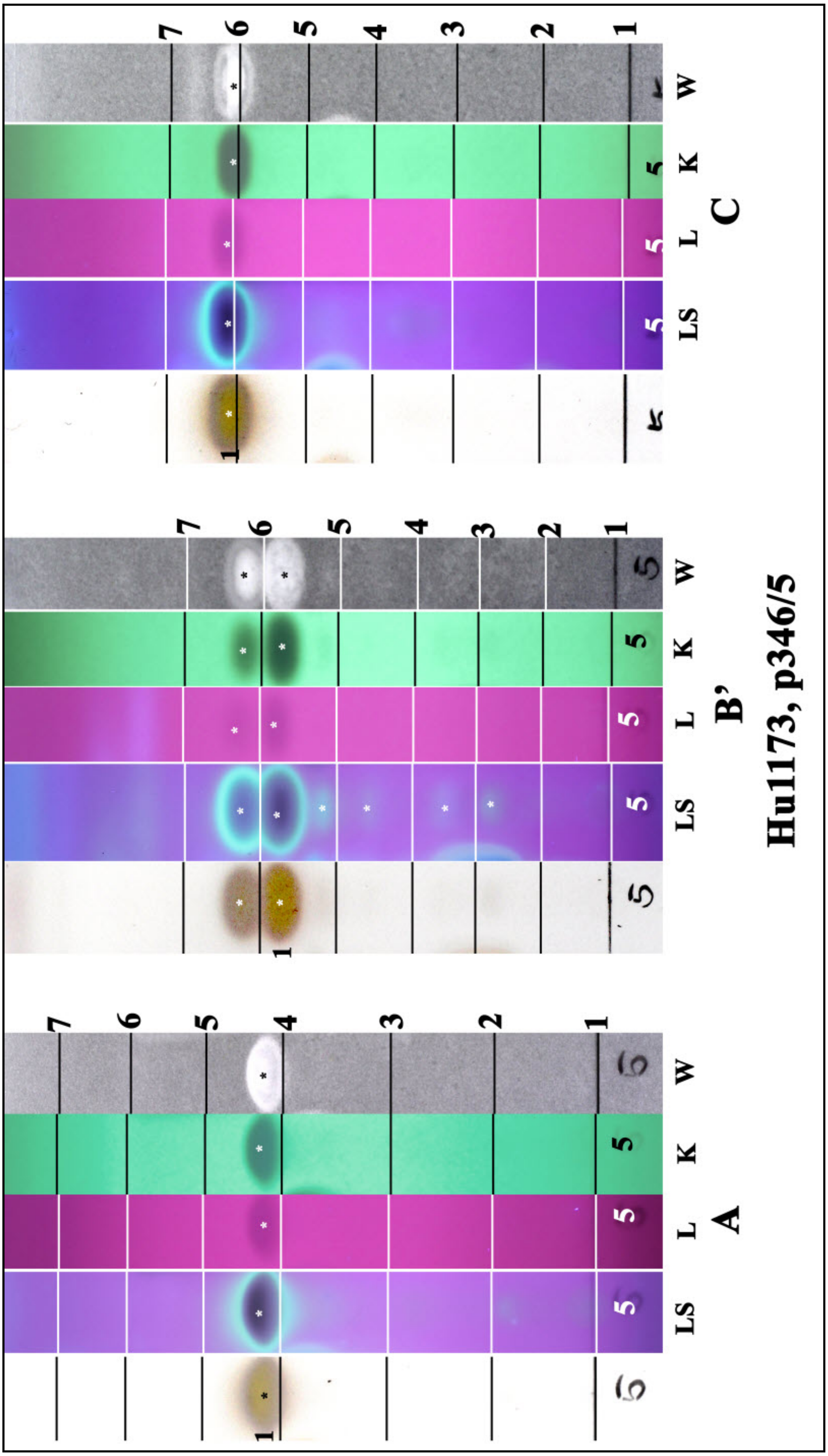
Cladonia macilenta [18968], Australia, Queensland, Crediton State Forest, 16 km south-west of Finch Hatton.

didymic acid



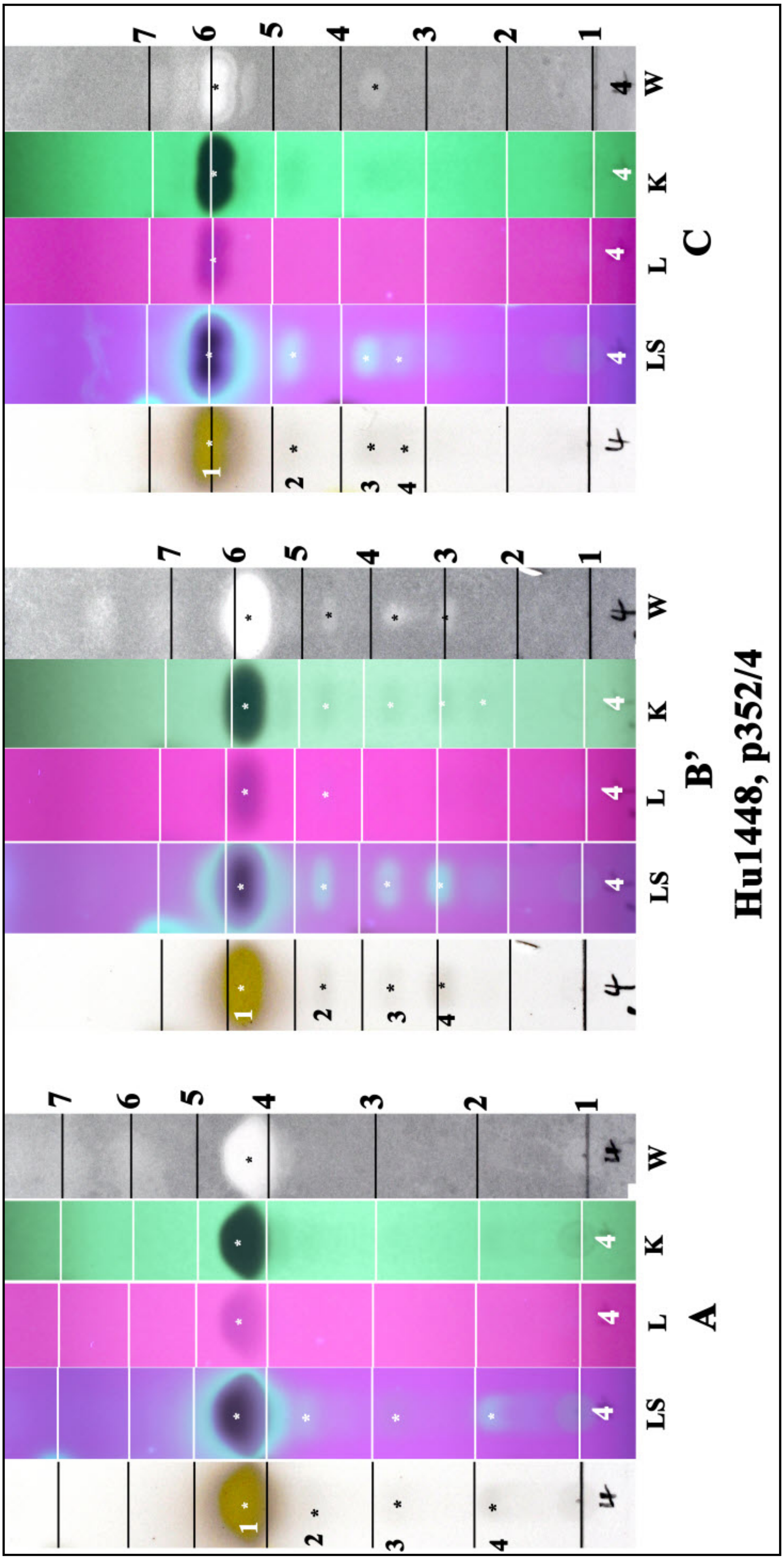
Cladonia didyma, [10696], Portugal, Azoren, Sao Miguel, an der Straße SW von Lagoa das Fumas beim Parkplatz Reservada Florestal de Recreiro do Cerrado Bezerros, 37°44.632' N, 25°21.939' W, 430 m, an Laubbaumrinde. Leg. F. Schumm 03.06.2003, det. A. Aptroot 2009. Chemistry: K+ yellow, C-, KC-, P+ orange, UV+ blue-white.

diffractaic acid



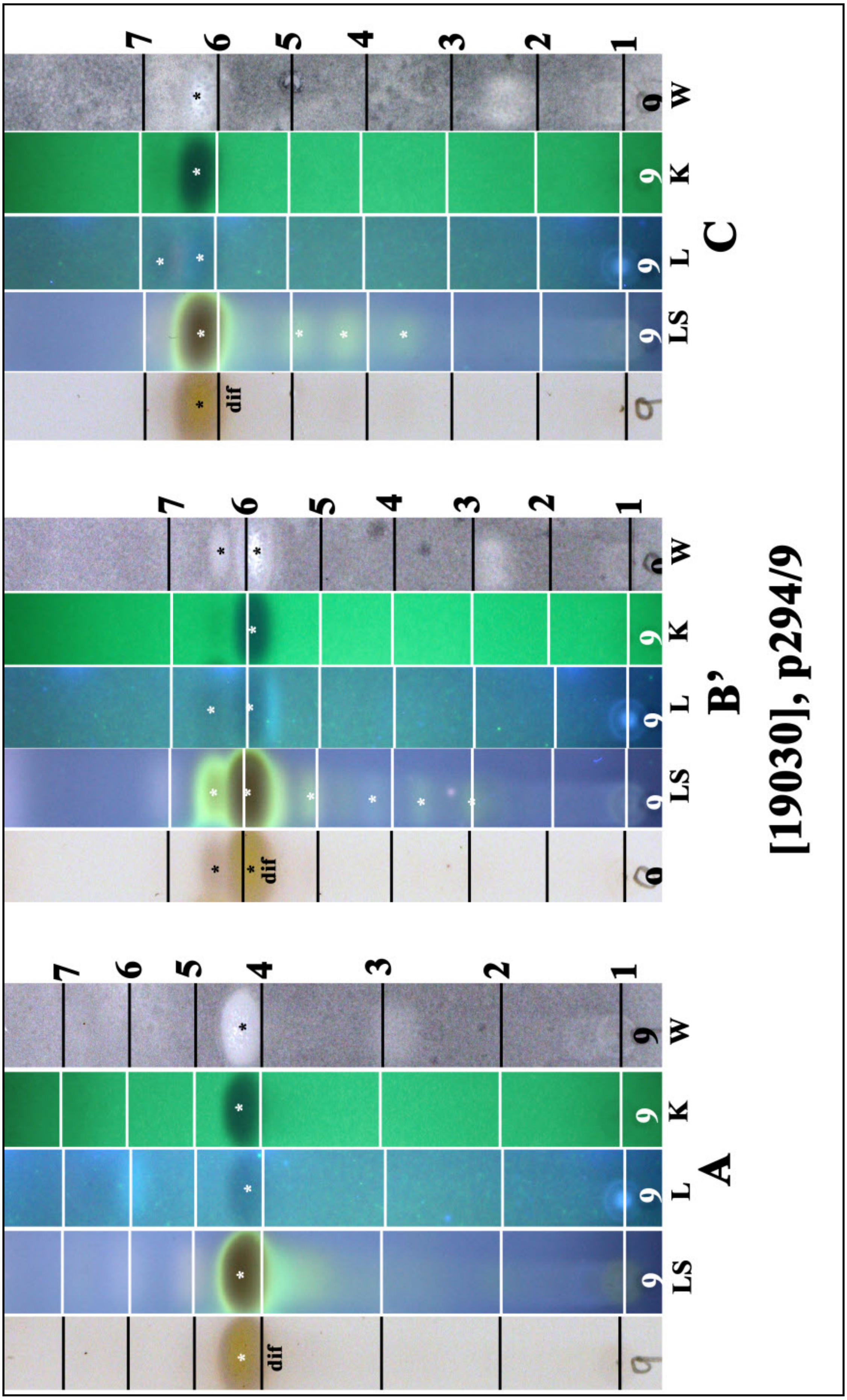
S. Huneck's collection of lichen substances No 1173: diffractaic acid, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

diffractaic acid



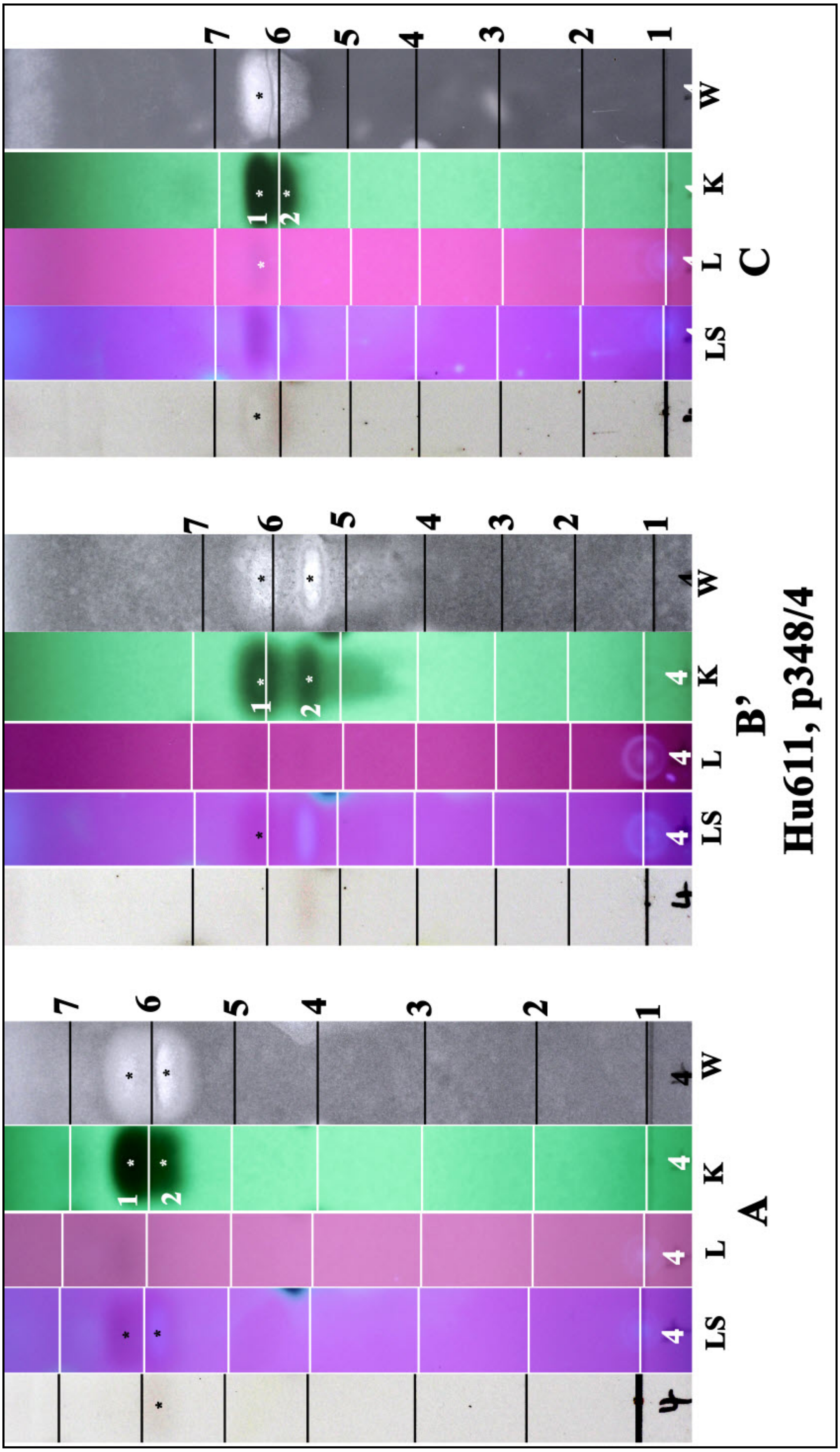
S. Huneck’s collection of lichen substances No 1448: diffractaic acid
Botanisches Museum Berlin-Dahlem

diffractaic acid



Heterodea muelleri [19030], Australia, Australian Capital Territory, Black Mountain Reserve, Aranda, Canberra

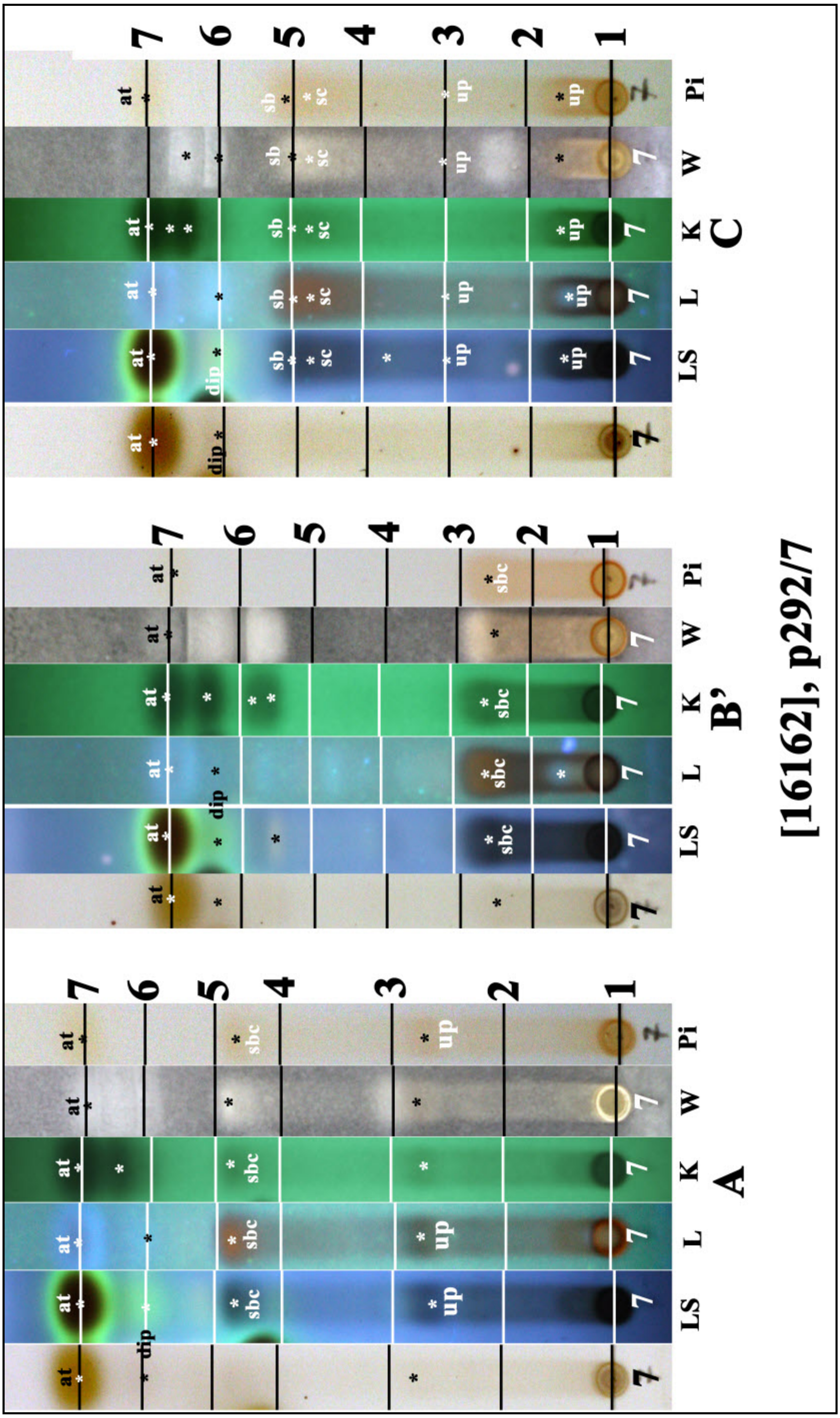
diploicin



1: diploicin, 2: isofulgidin, conf. J.A. Elix

S. Huneck's collection of lichen substances No 611: diploicin
Botanisches Museum Berlin-Dahlem

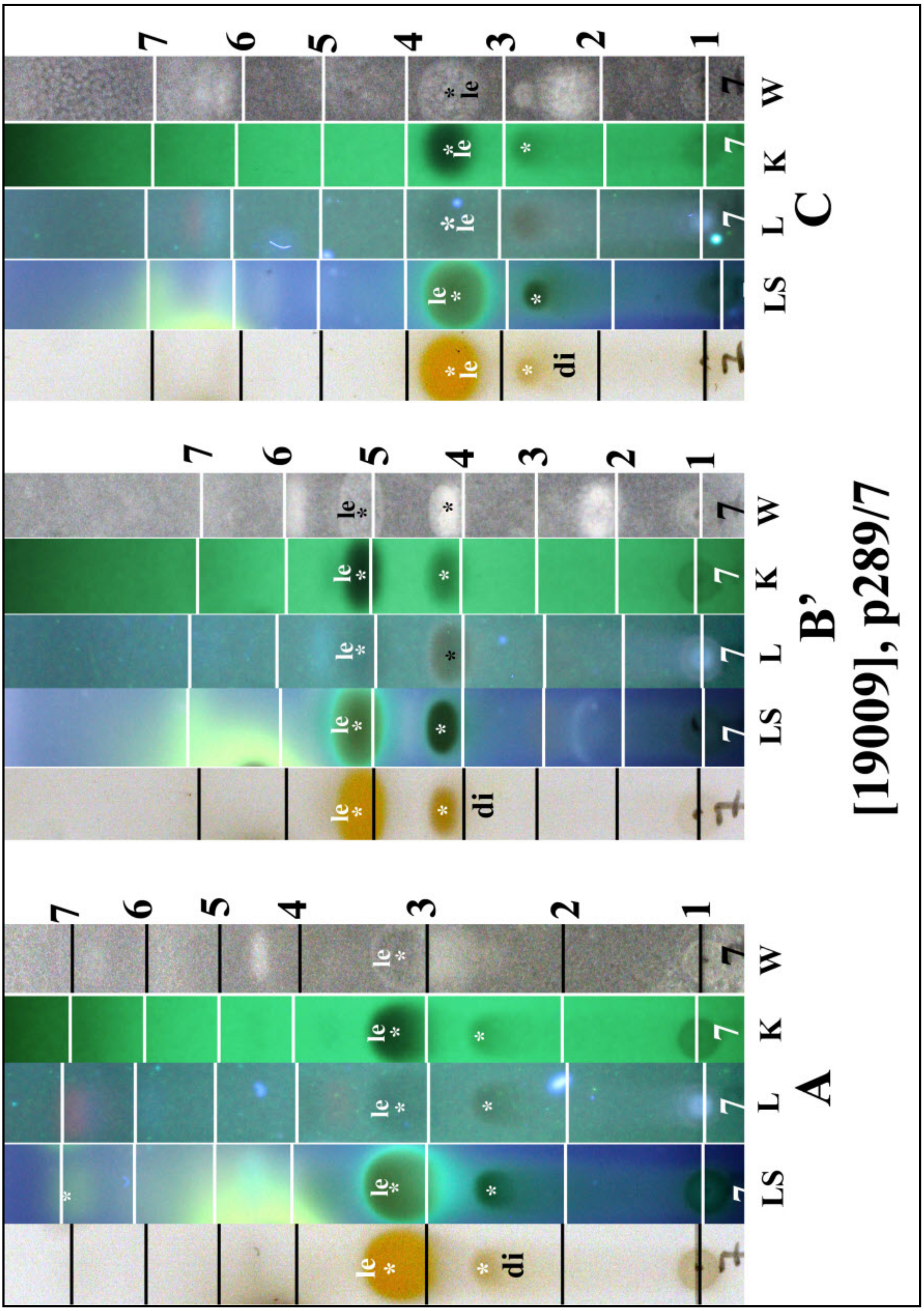
diploicin



at: atranorin, sbc: secalonic acids B+C, sb: secalonic acid B, sc: secalonic acid C, up: unknown pigments, **dip: diploicin**. Spots identified by J.A. Elix 12.2013.

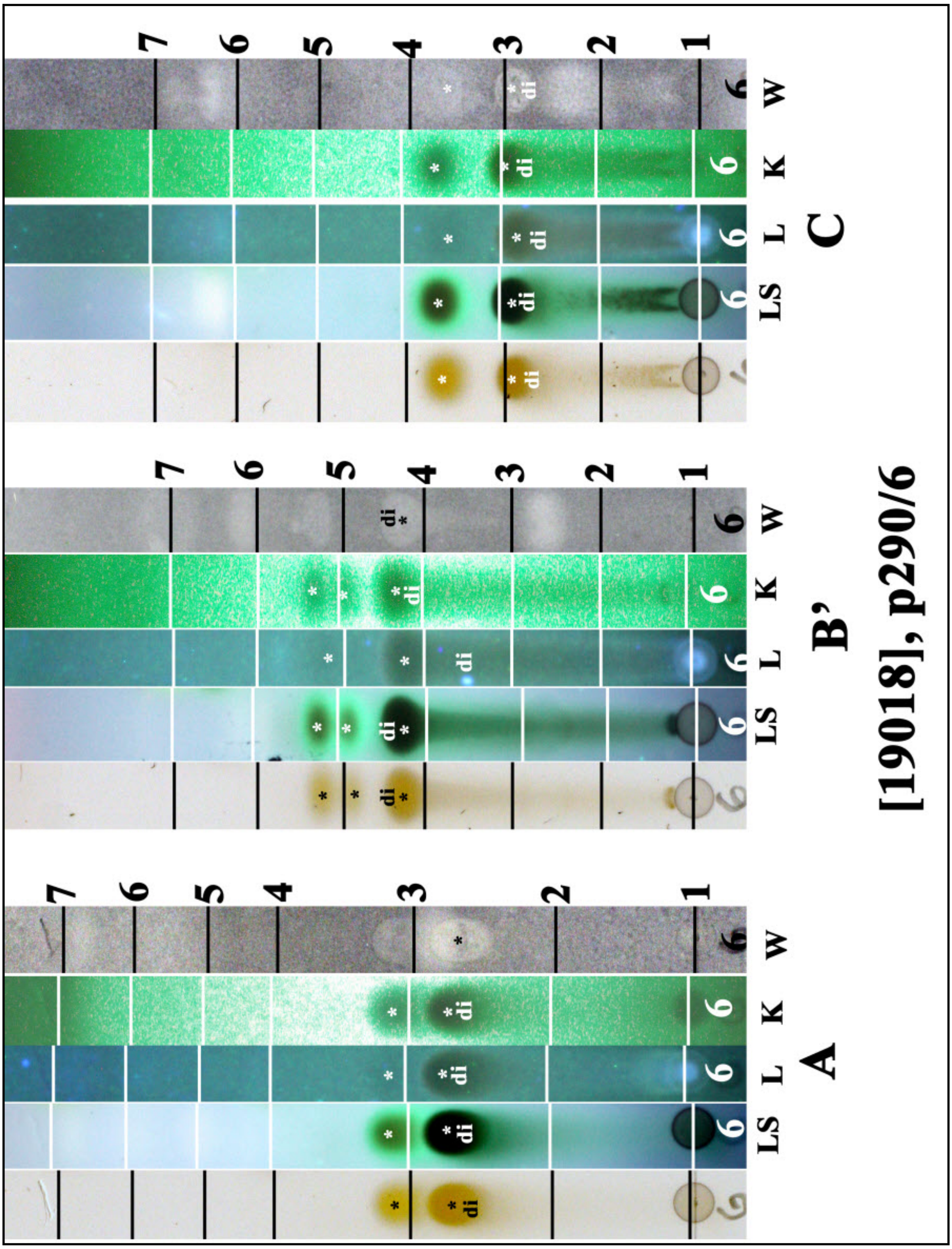
Diploicia canescens ssp. ***australasica*** [16162], SE-Australia, Küstenfelsen Tomakin

diploschistesic acid



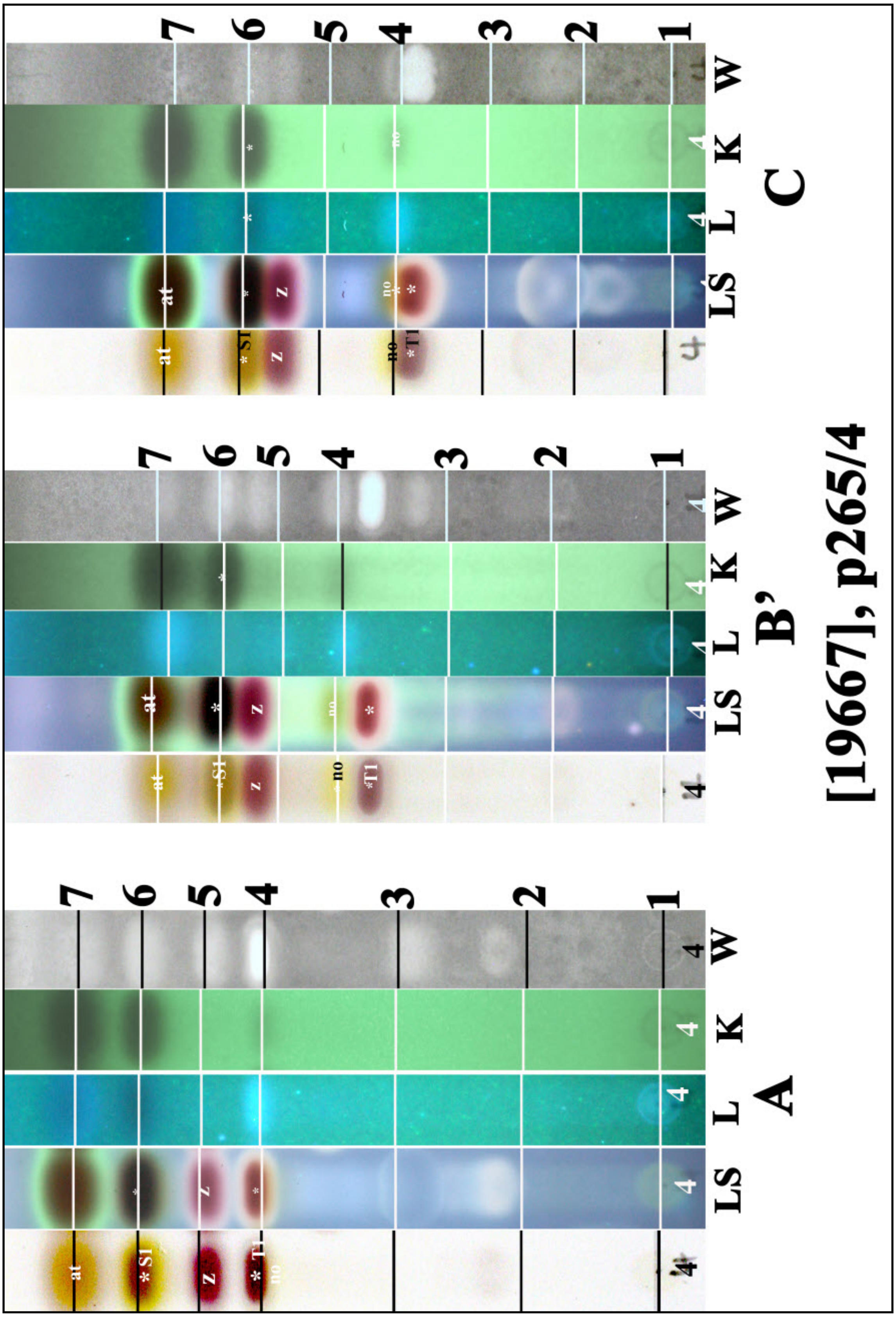
Diploschistes actinostomus (Pers. ex Ach.) Zahlbr. [19009], Australia, Queensland

diploschistesic acid



Diploschistes thunbergianus [19018], Australia, Western Australia, "Box Gorge", between Northhampton and Port Gregory

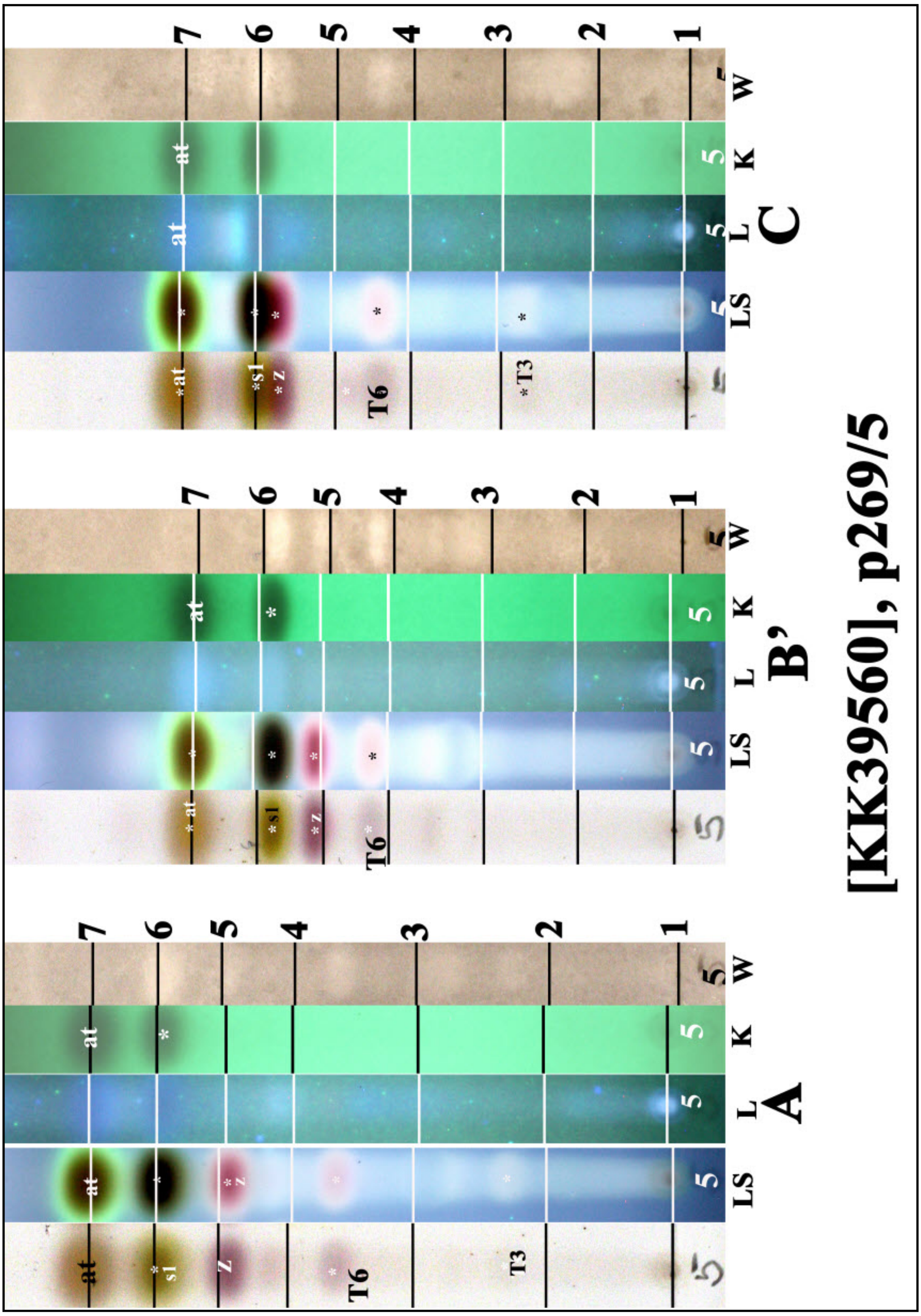
dissectic acid



at: atranorin, z: zeorin, **si: dissectic acid**, no: norstictic acid, T1: 16β-acetoxyhopane-6α,22-diol

Heterodermia dissecta, [18667], Indien, Western Ghats, Prov. Karnataka, Distr. Coorg (Madikeri), Area Kabbinakad, westl. von Virajpet, oberhalb des Kabbe Holyday Resort eim Paß zum Kabbe Motte; 12.19261° N, 75.66484° E, bei ca. 1200 m. Leg. Schumm & Frahm 03.11.2012, det. Schumm 2012.

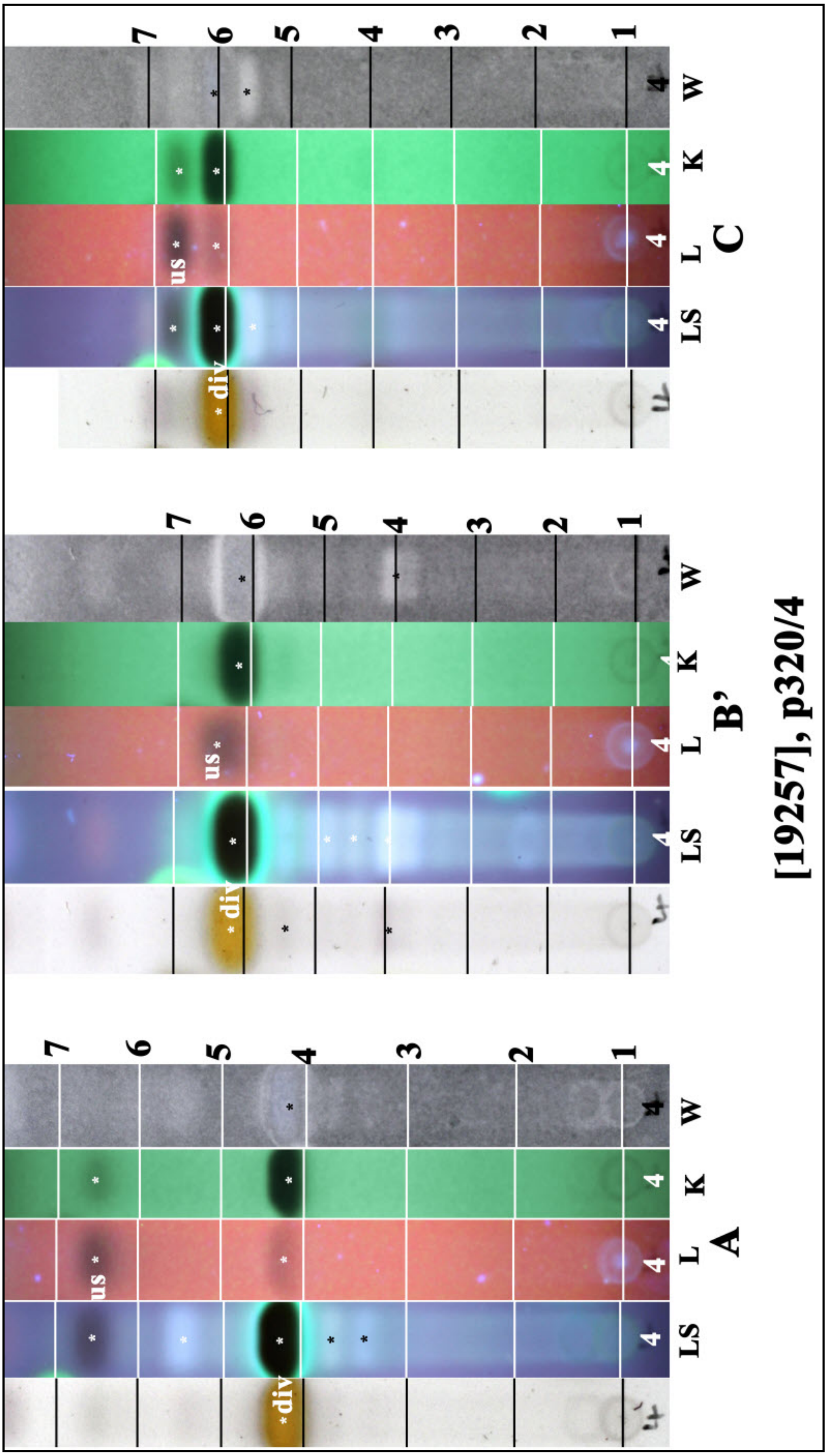
dissectic acid



at: tranorin (major), z: zeorin (major), **si: dissectic acid,**
T6: 6α-acetoxyhopane-16β,22-diol, T3: leucotylin

Heterodermia verdonii, [KK39560], Philippinen/ Nord Luzon, Prov. Benguet, Straße von Baguio zum Mt. Data, an Alnus spec., in einem lichten Regenwald, 1500 m. Leg. K. Kalb & A. Schrögl, 10.08.1983.Lit.: Elix (2011, Australasian Lichenology 68: 18)

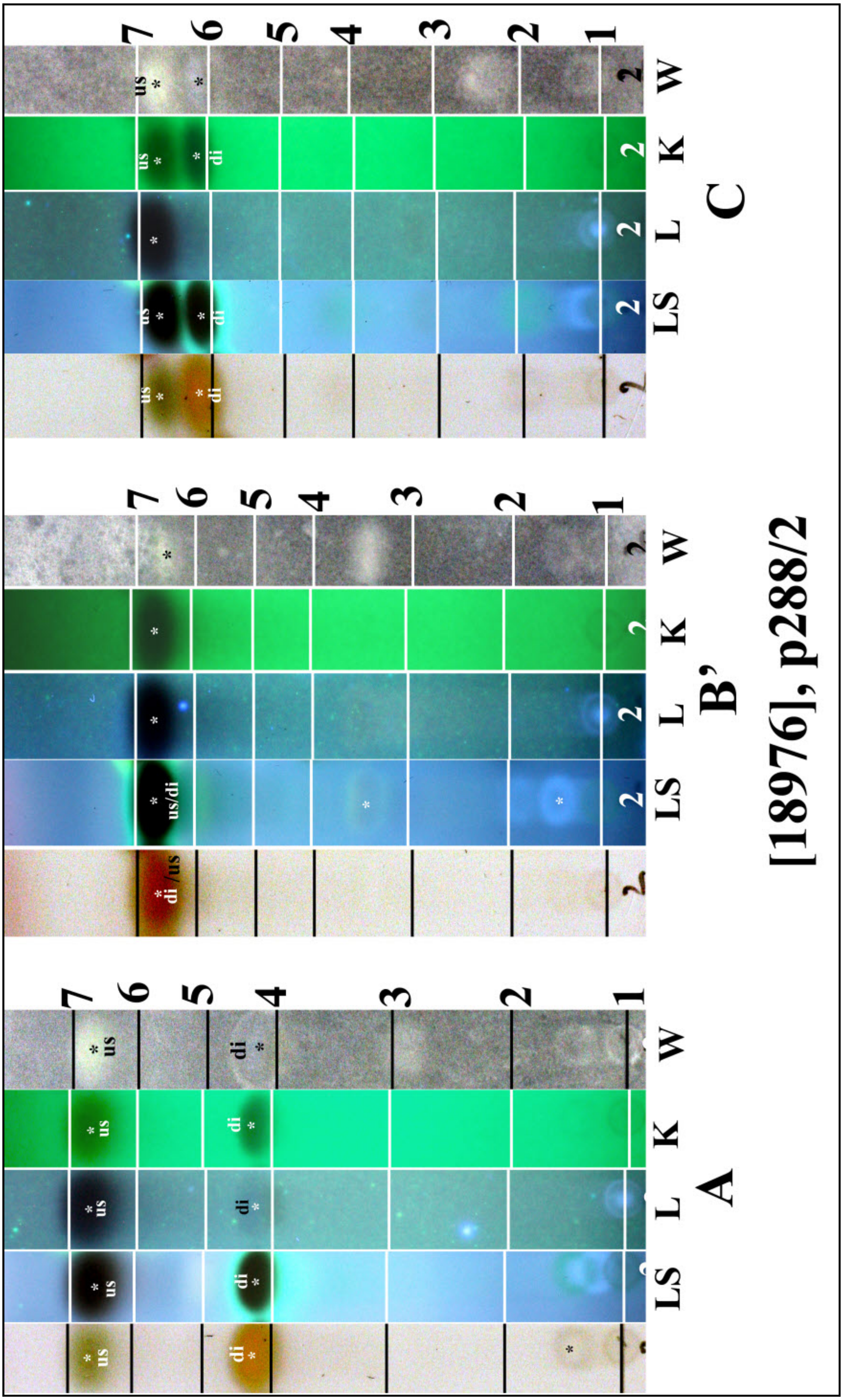
divaricatic acid



us: usnic acid, div: divaricatic acid

Ramalina stevensiae, [19257], Norfolk Island. Summit trail to Mt. Bates, 29°00'30" S, 167°56'30" E, 300 m. growing on *Citrus limon* in subtropical rainforest. ISOTYPE.

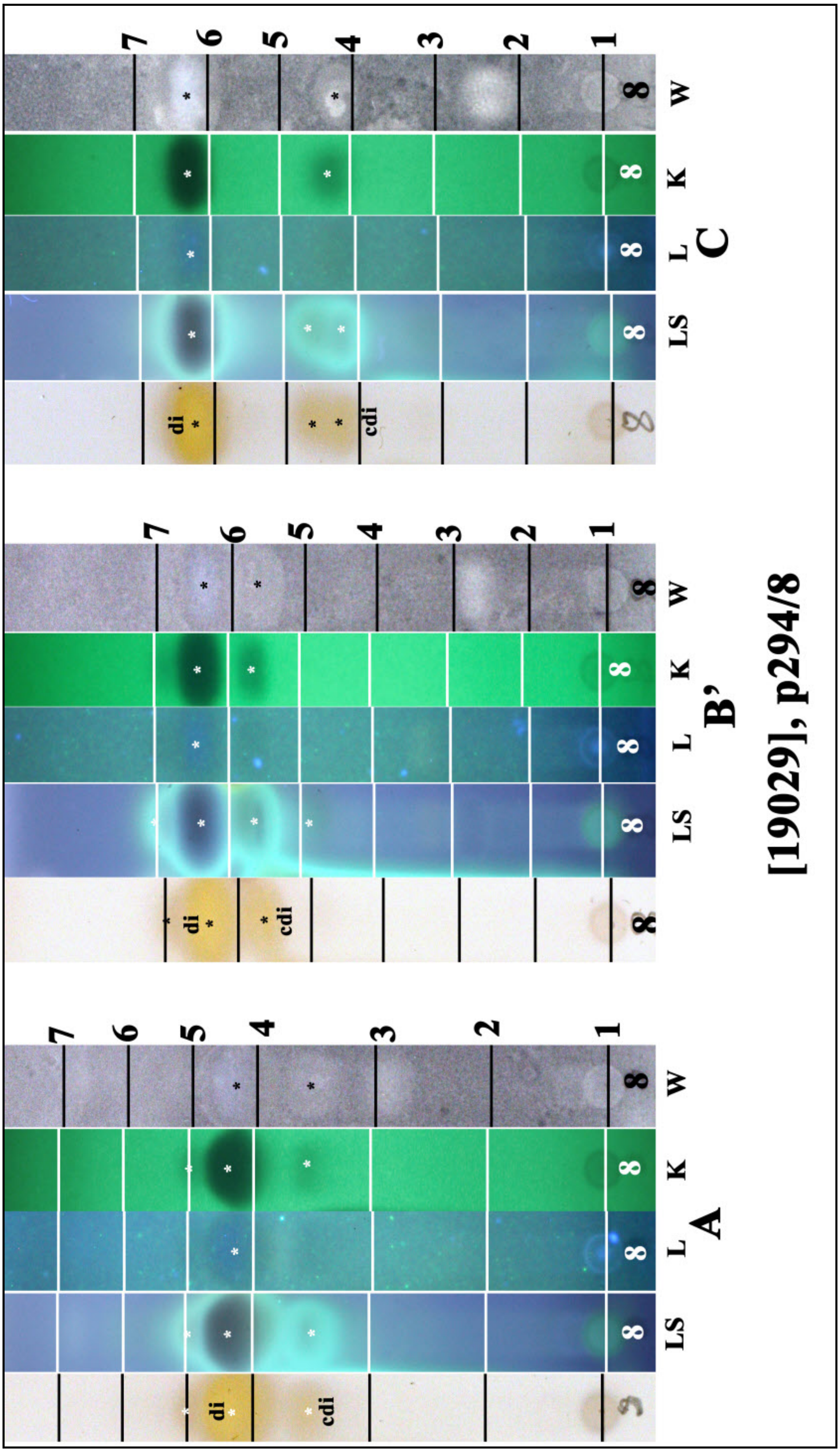
divaricatic acid



us: usnic acid, di: divaricatic acid

Cladia sullivanii, [18976], Australia, New South Wales, Morton National Park.

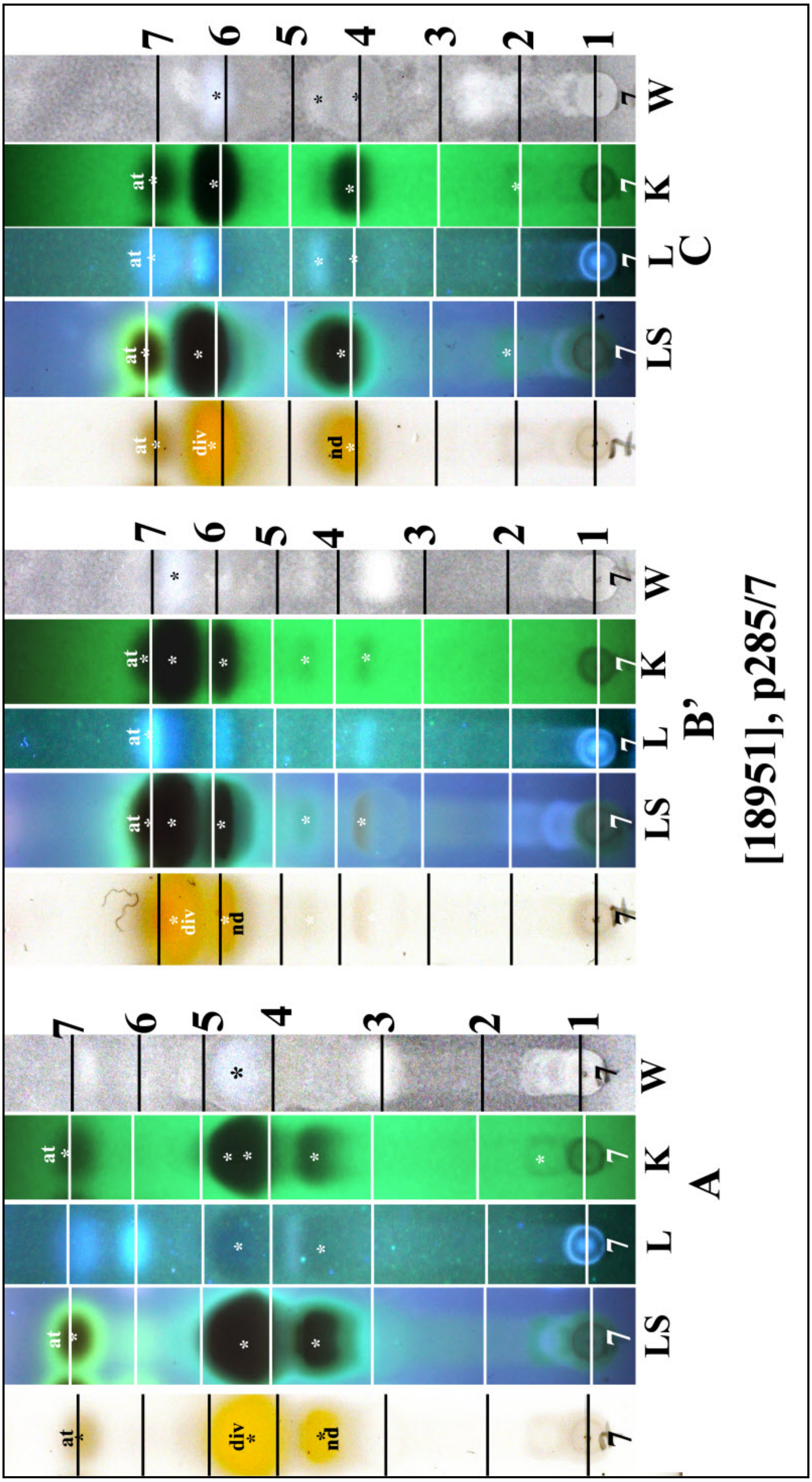
divaricatic acid



di: divaricatic acid, cdi: condivaricatic acid (= nordivaricatic acid)

Heterodea beaugleholei [19029], Australia, New South Wales, Jerrabomberra Hill, 2 km south-west of Qeanbeyan

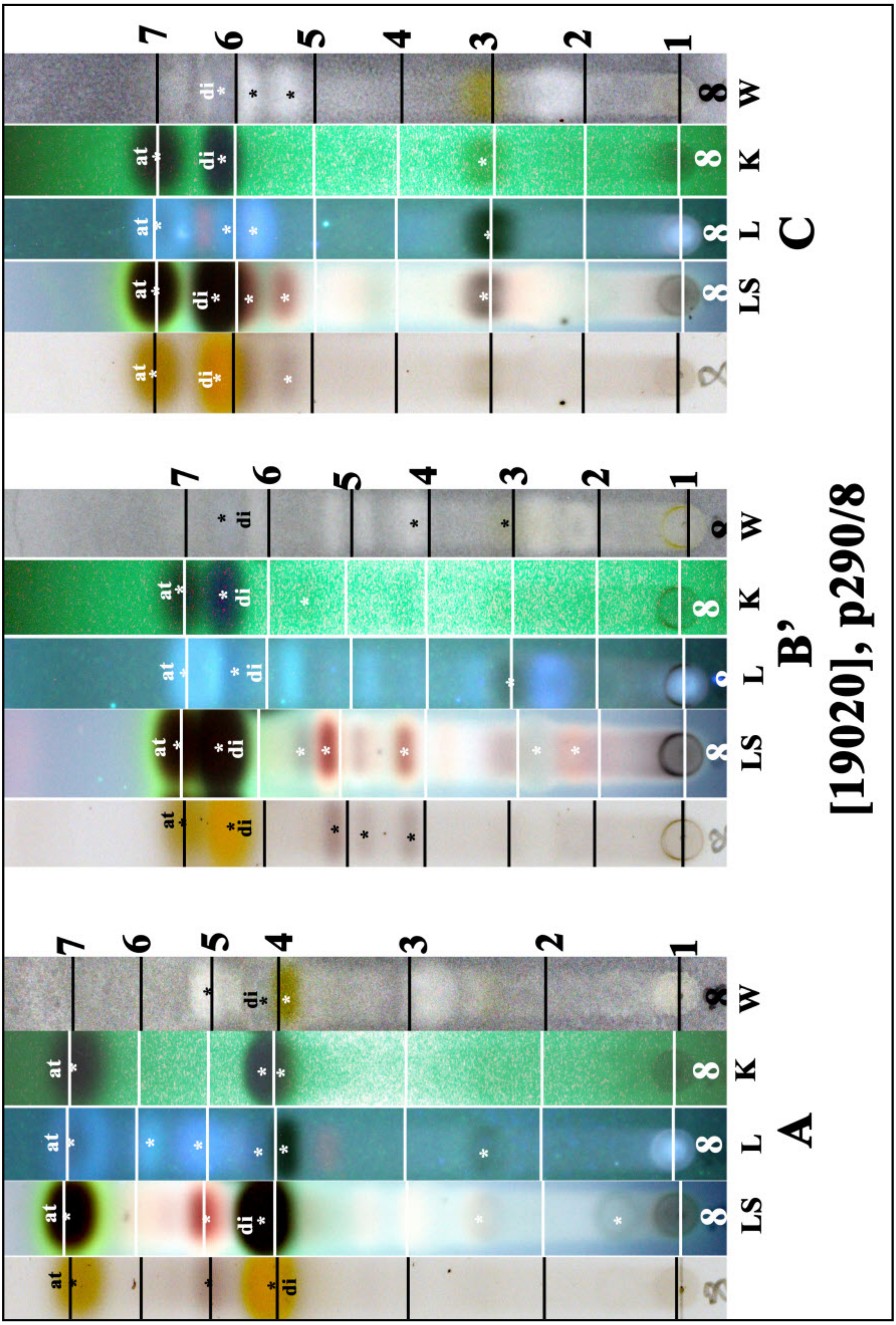
divaricatic acid



at: atranorin, **div: divaricatic acid**, nd: nordivaricatic acid

Canoparmelia texana, [18951], Australia, Queensland, Kelvin Grove, Brisbane.

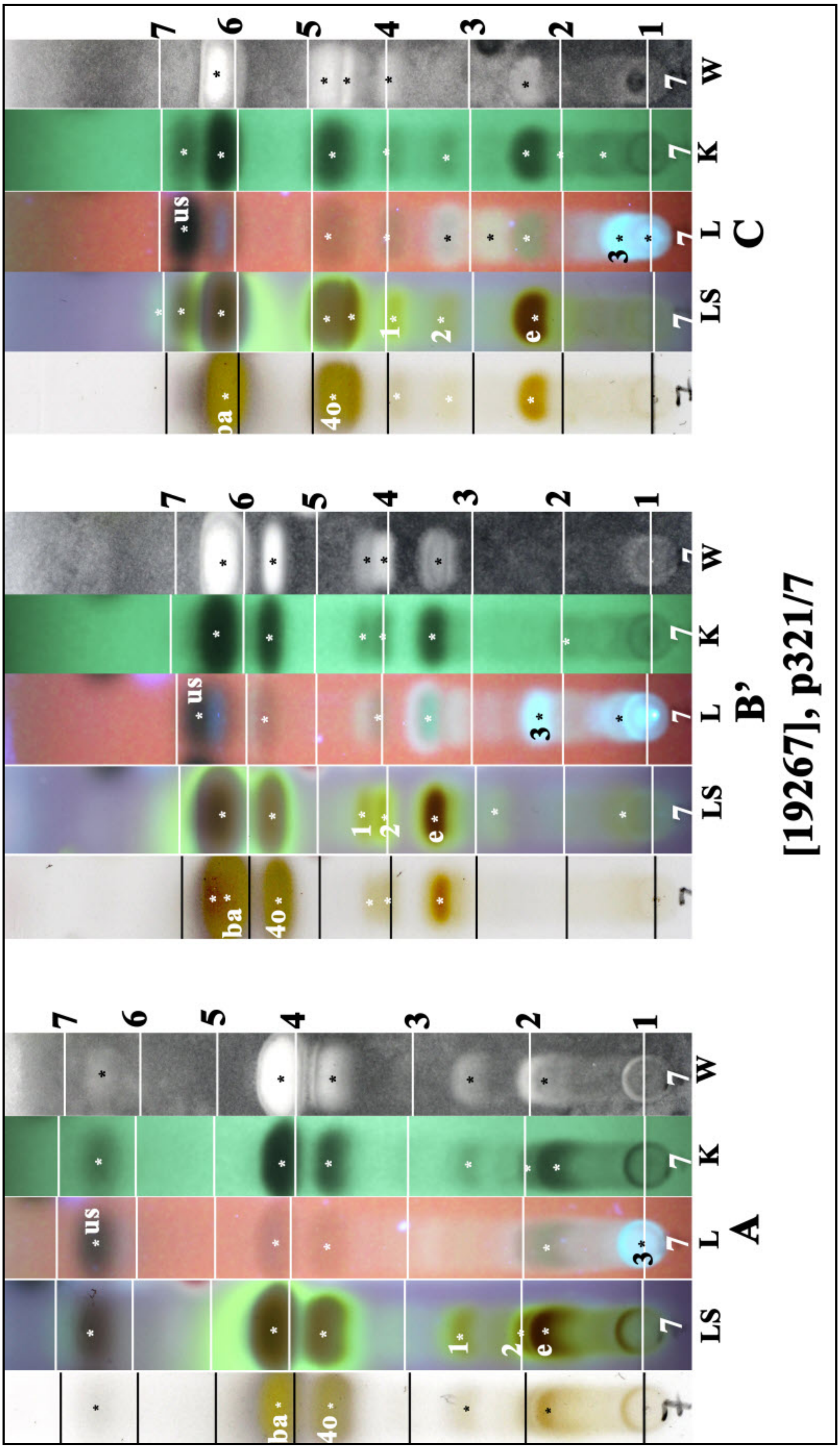
divaricatic acid



at: atranorin, di: divaricatic acid

Dirinaria batavica [19020], Australia, Western Australia, Erskine Range.

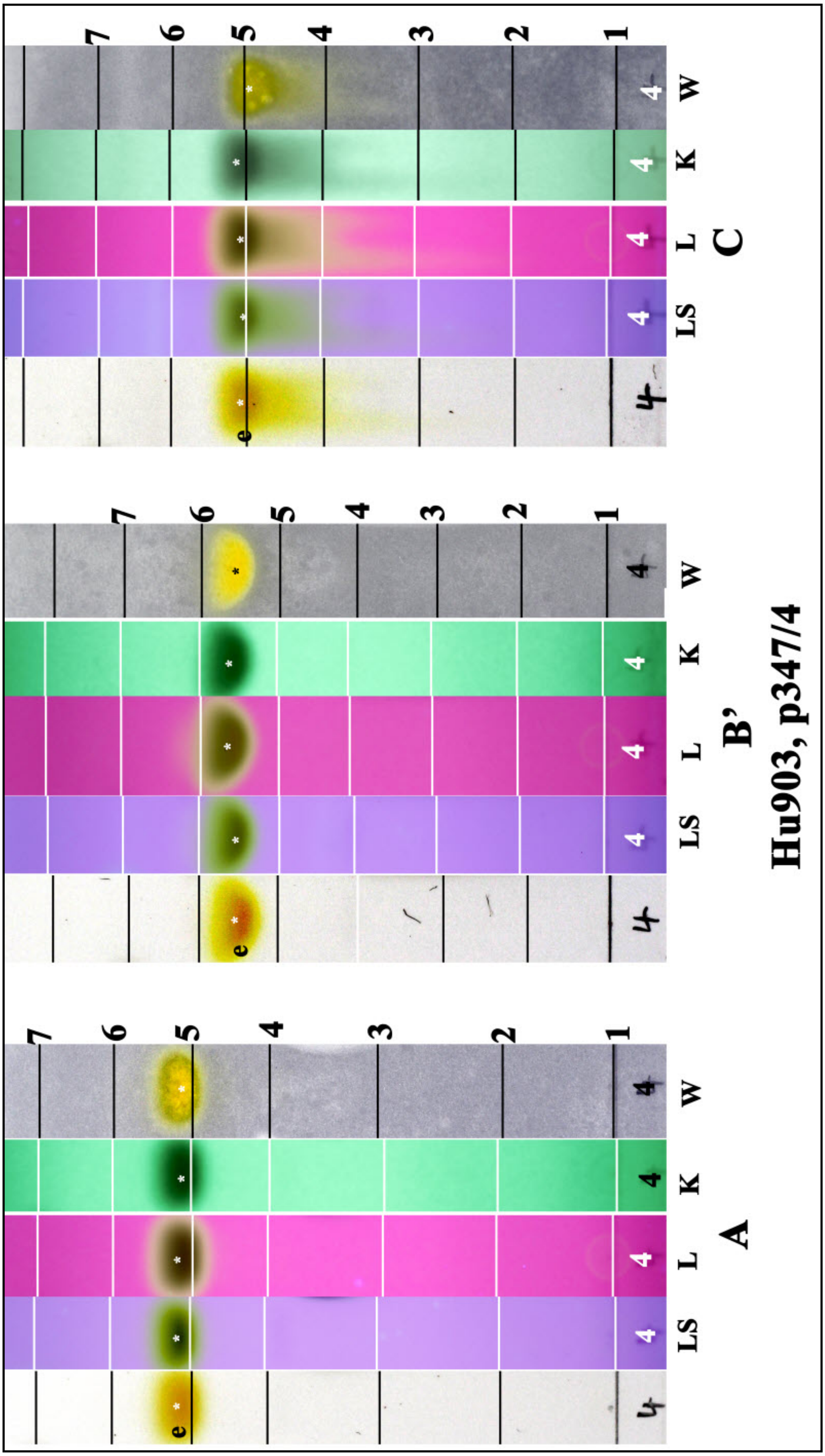
echinocarpic acid



us: usnic acid, ba: barbatic acid, 4o: 4-*O*-demethylbarbatic acid, **e: echinocarpic acid**,
1: conechinocarpic acid, 2: subechinocarpic acid, 3: unknown

Relicinopsis rahengensis, [19267], Australia, Queensland, Conway State Forest, 18 km east-north-east of Proserpine, 20°21' S, 148°45' E, 180 m

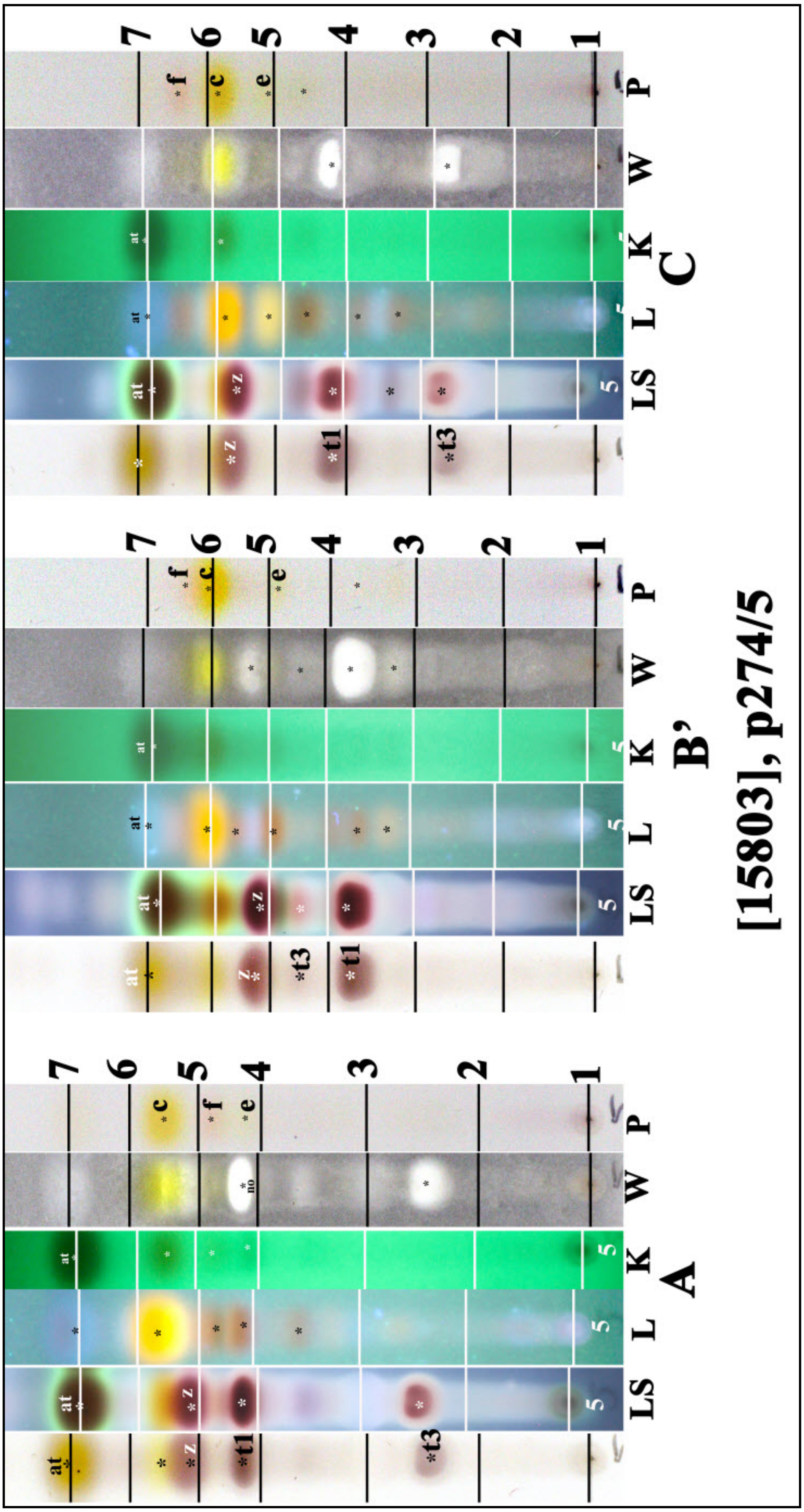
emodin



e: emodin

S. Huneck’s collection of lichen substances No 907: emodin, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

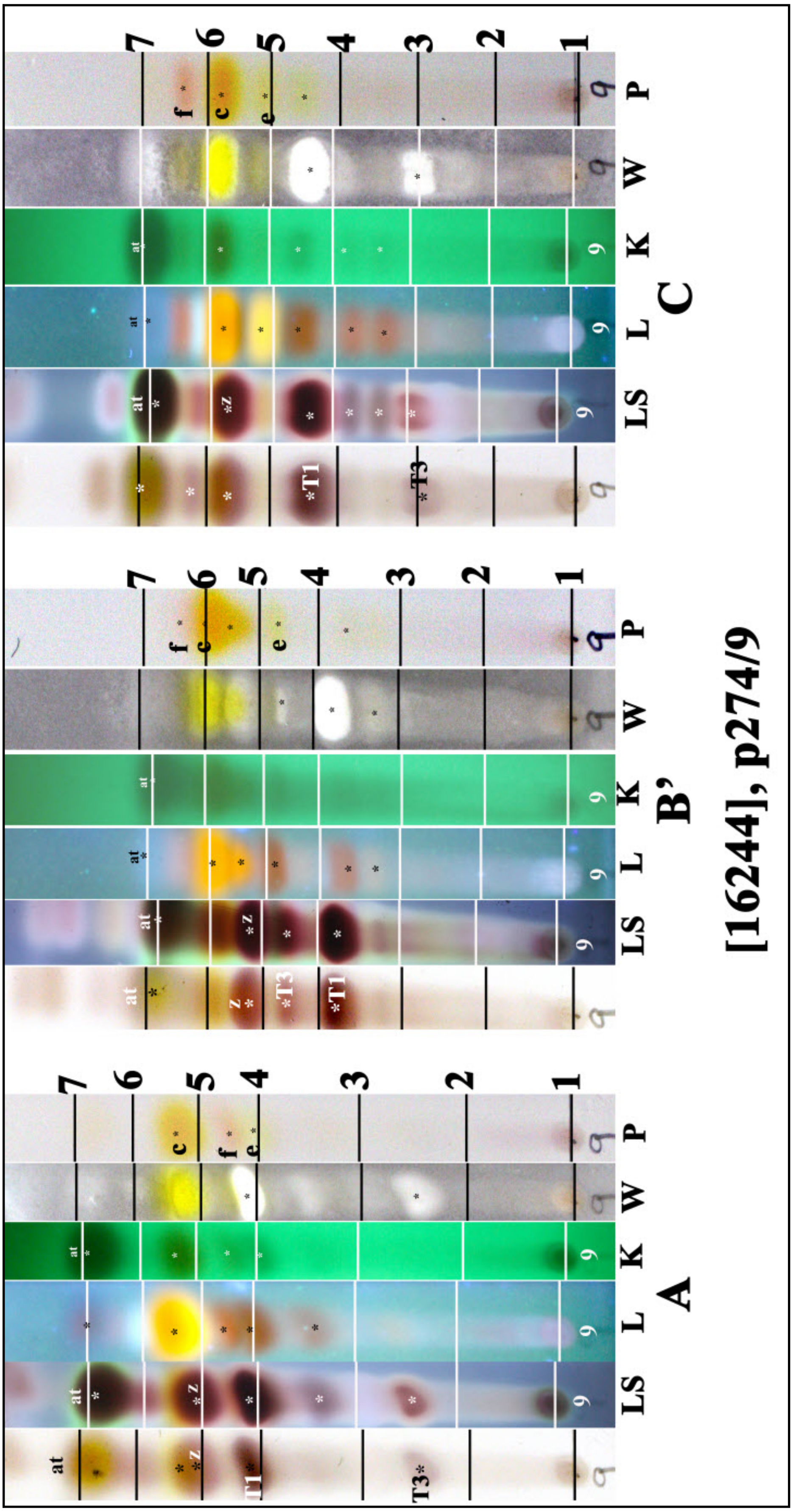
emodin



at: atranorin, z: zeorin, t1: 16β-acetoxyhopane-6α,22-diol, t3: leucotylin, c: 7-chloroemodin, **e: emodin**, f: flavoobscurins

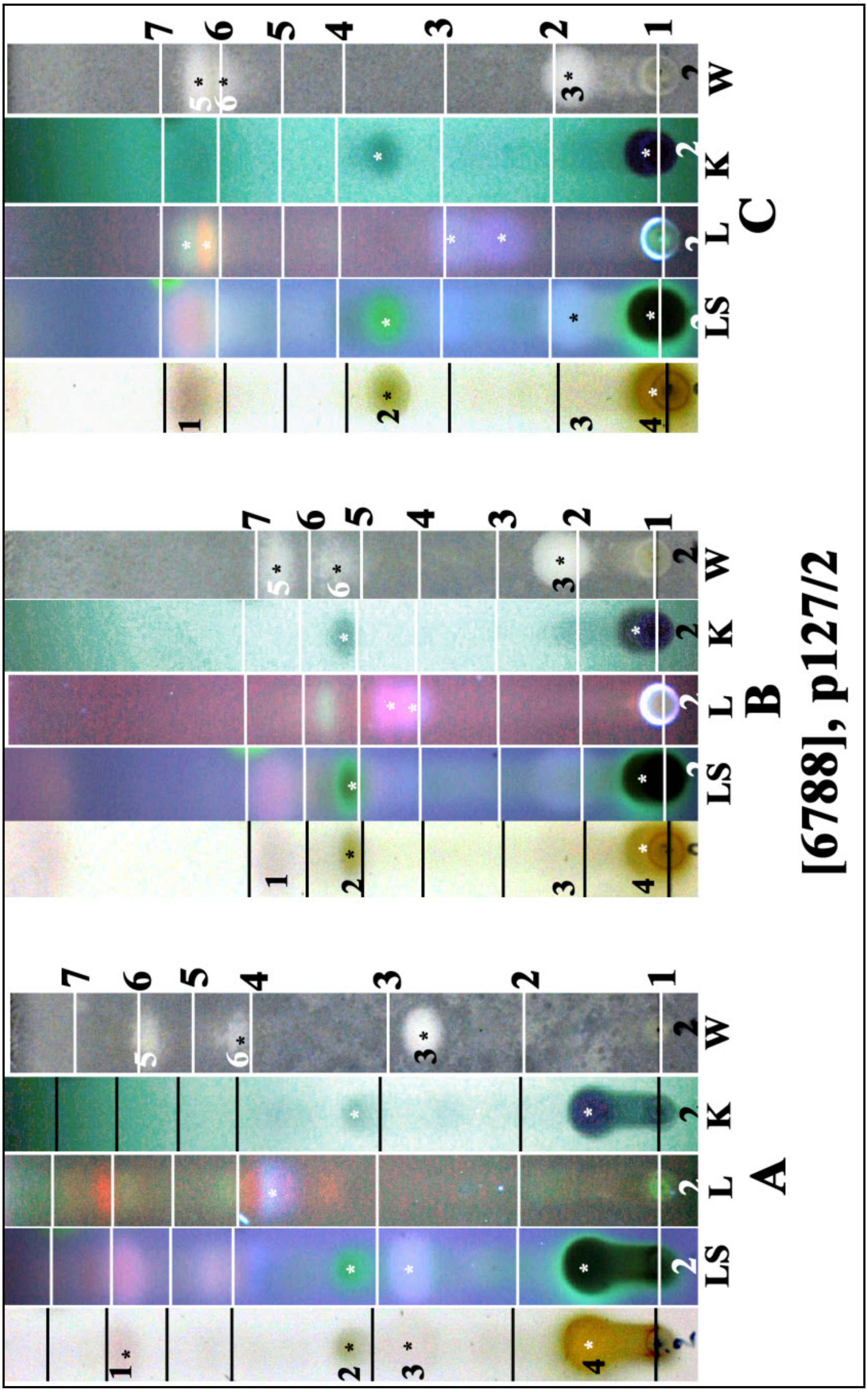
Heterodermia obscurata, [15803], Australia, Western Australia, 75 km south of Mt. Chudalup, wetland with *Agonis junipera* and *Eucalyptus marginata,* 34.734° S, 116,088° E, 75 m. Leg. F. Schumm & E. Stocker-Wörgötter, 24.10.2009.

emodin



Heterodermia obscurata, [16244], Australia, New South Wales, between Bermagui and Tathra, on way from Aragunnu Beach to the Mimosa Rocks, 36.585° S, 150.056° E, 10 m, growing on rocks. Leg. F. Schumm & E. Stocker-Wörgötter, 12.11.2009.

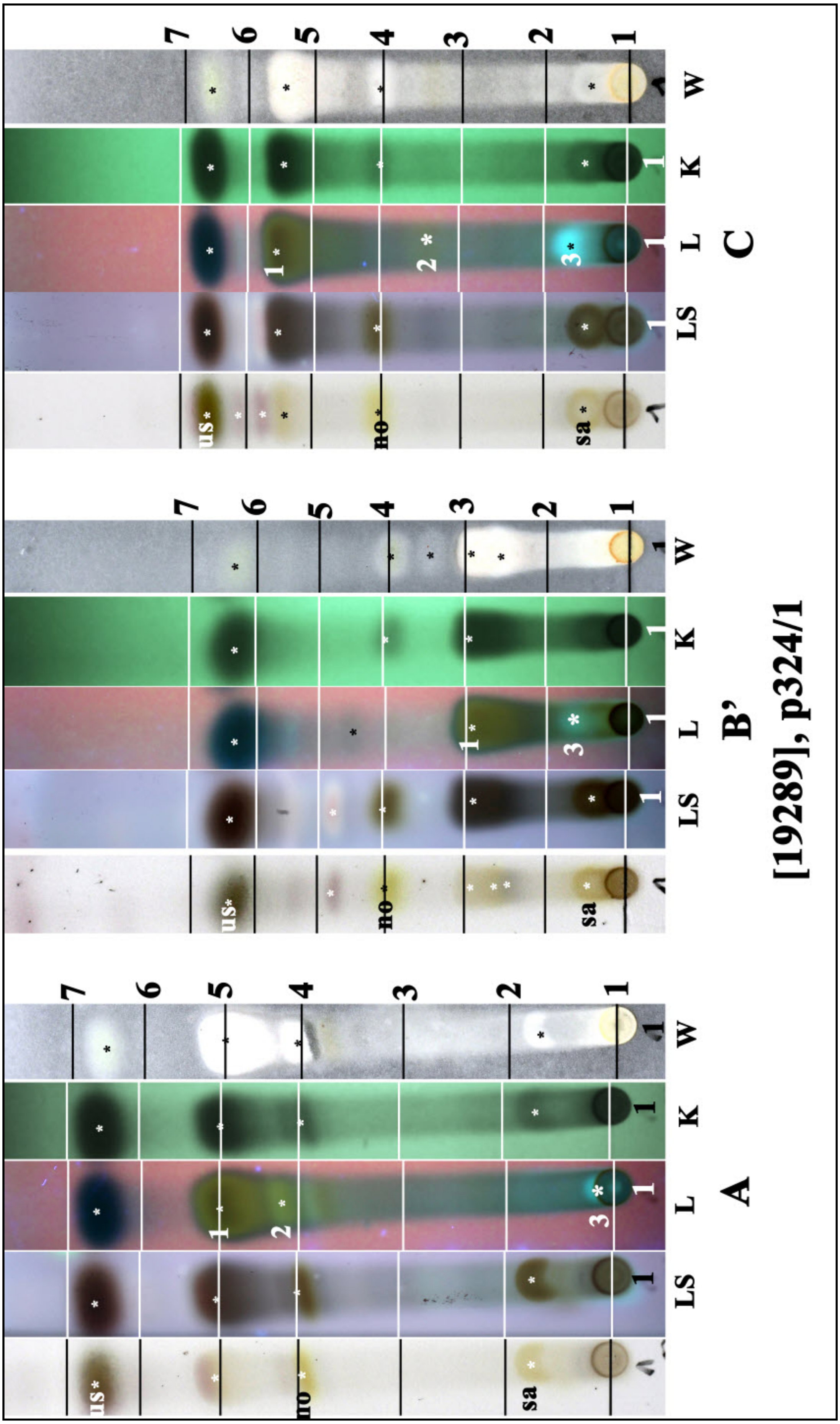
erythrin



2: lecanoric acid, **4: erythrin**, 6: roccellic acid, 1,3,5: unknowns, conf. J.A. Elix

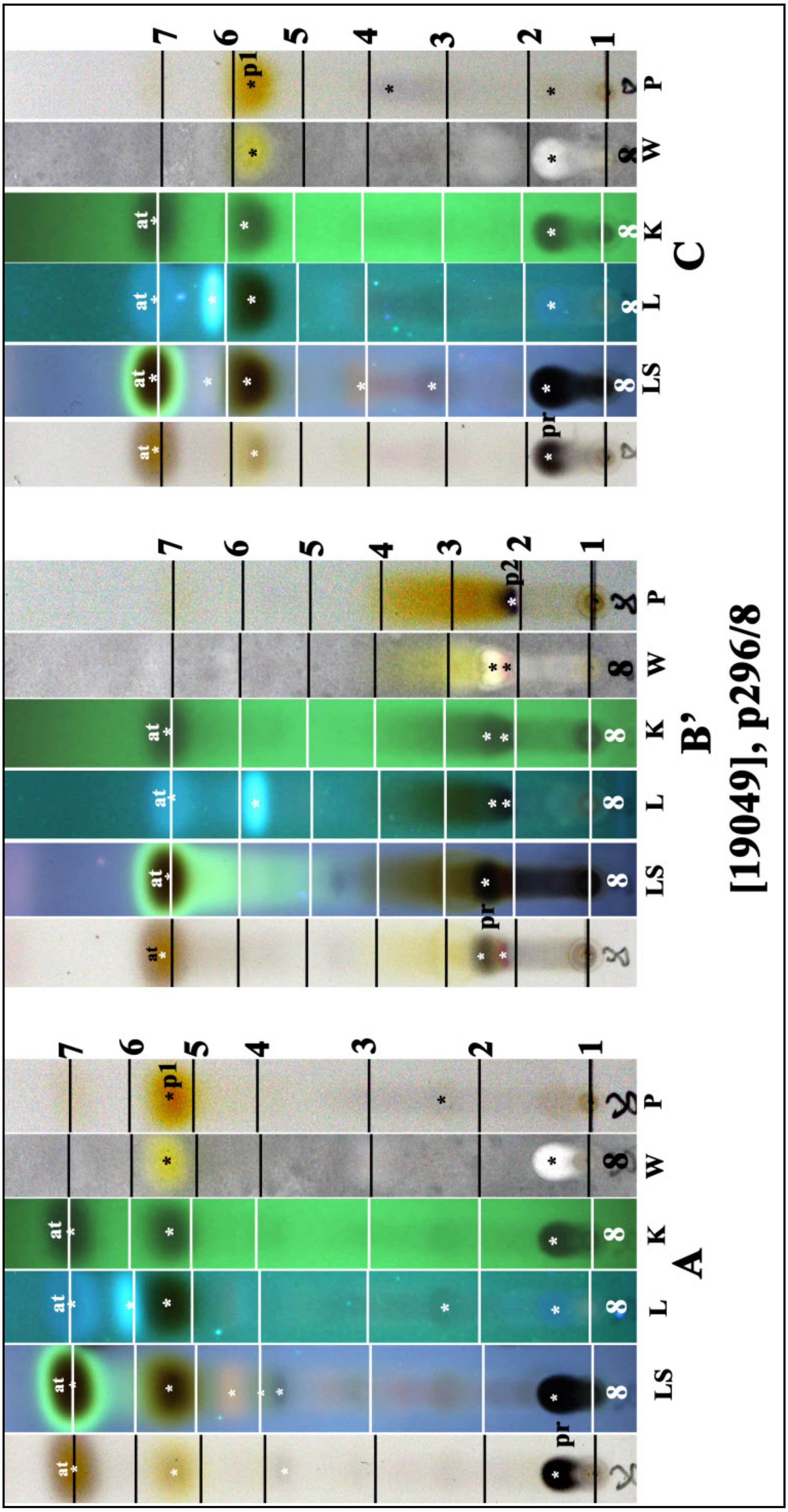
Roccella phycopsis, [6788], Spanien, Kanarische Inseln, Gran Canaria; schroffe, nord-west exponierte, reich mit Roccella und Ramalina bewachsene Felswände an der Straße von San Nicolas nach Agaete; 28°01.140' N, 15°47.130' W, 360 m, an Felsen. Leg. F. Schumm & U. Schwarz, 02.01.2000.

eumitrin A



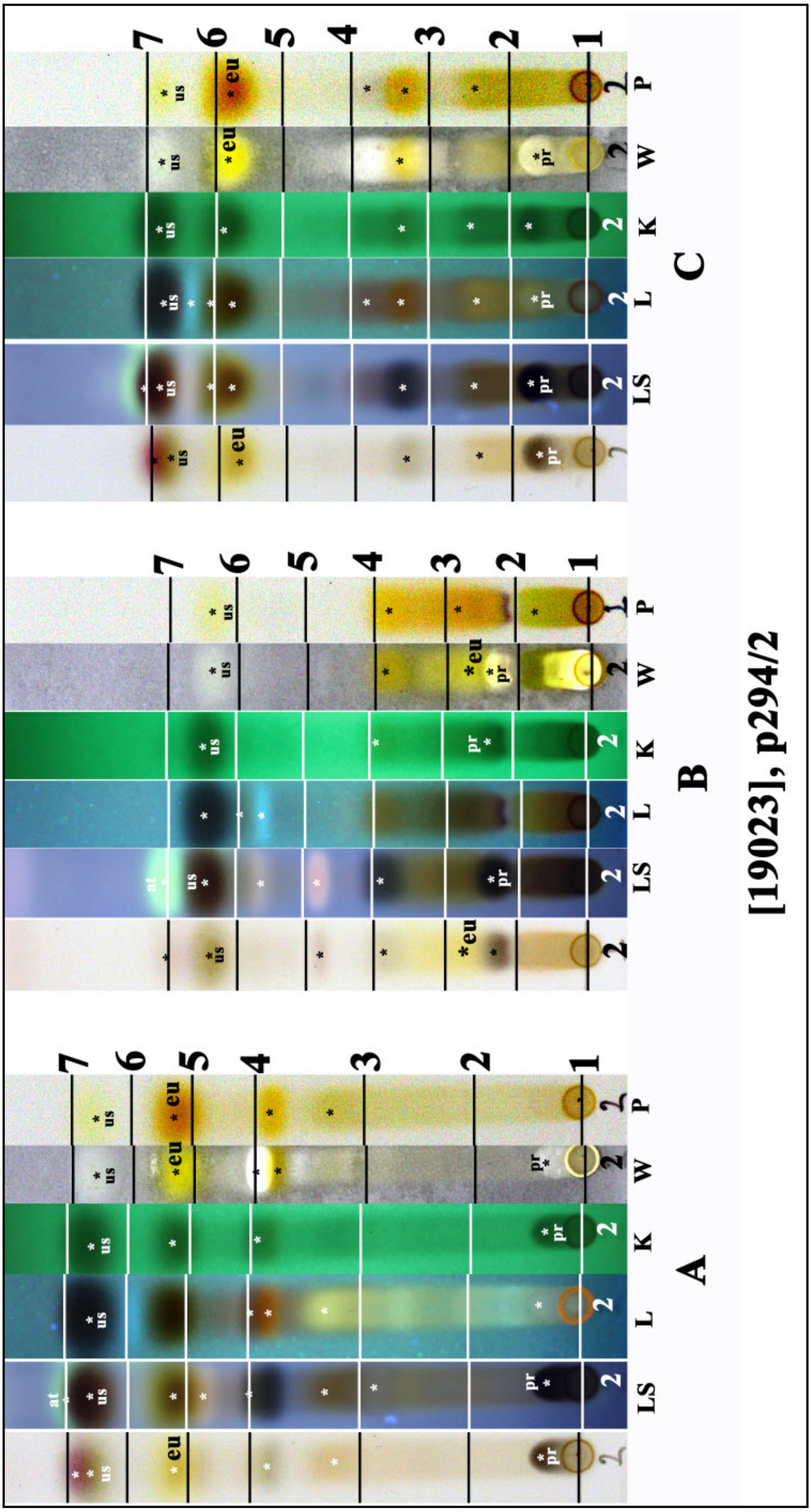
Usnea baileyi, [19289], Australia, Queensland, Crediton State Forest, 16 km south-west of Finch Hatton, 21°15' S, 148°31' E, 700 m.

euplectin



Hypotrachyna heterochroa ,[19049], Australia, Queensland, Mt. Mee State Forest

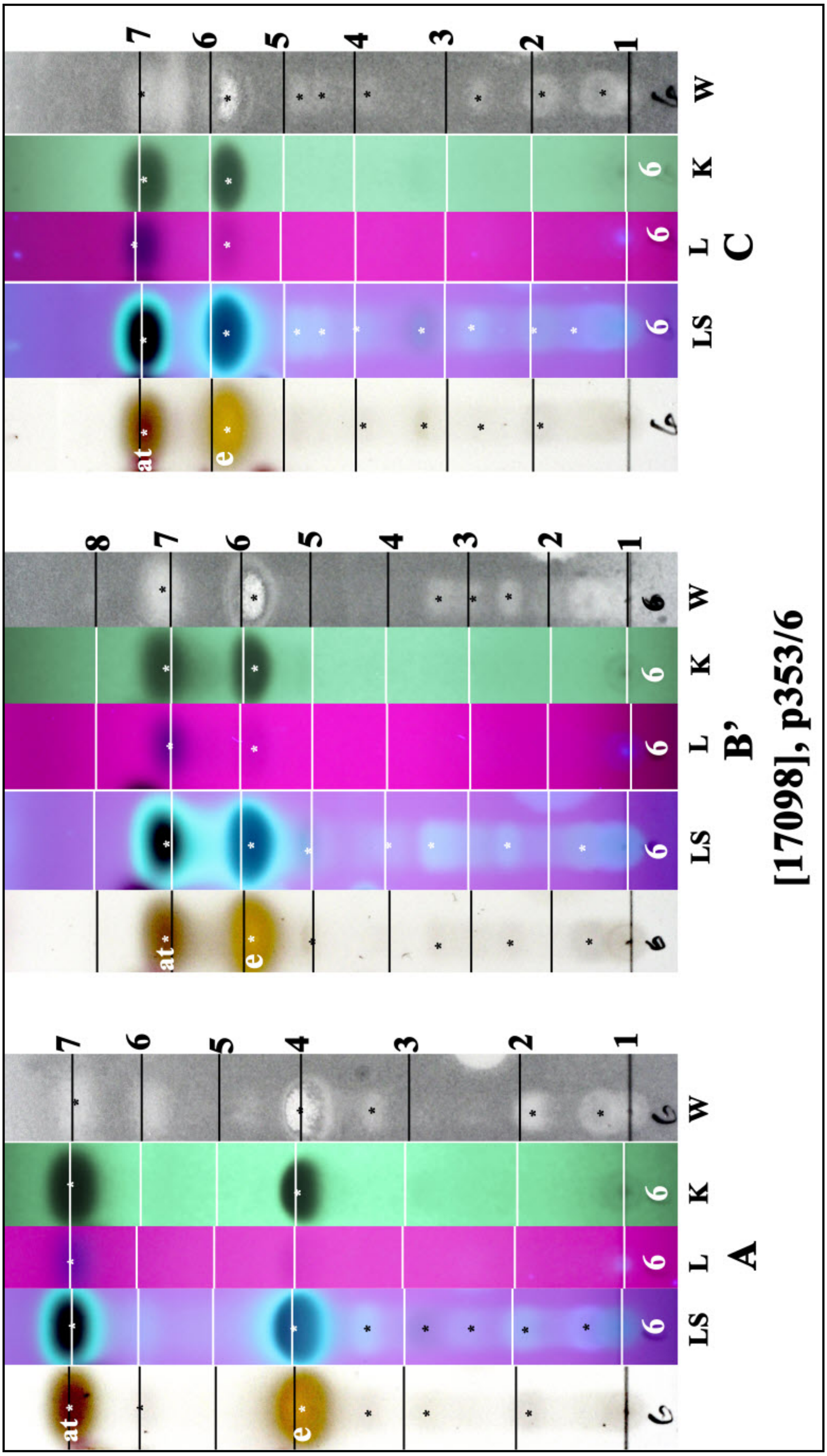
euplectin
(gelber Farbstoff im Mark, K+ rot)



at: atranorin, us:usnic acid, pr: protocetraric acid, **eu: euplectin**

Flavoparmelia euplecta [19023], Australia, New South Wales, 1 km north of Kioloa

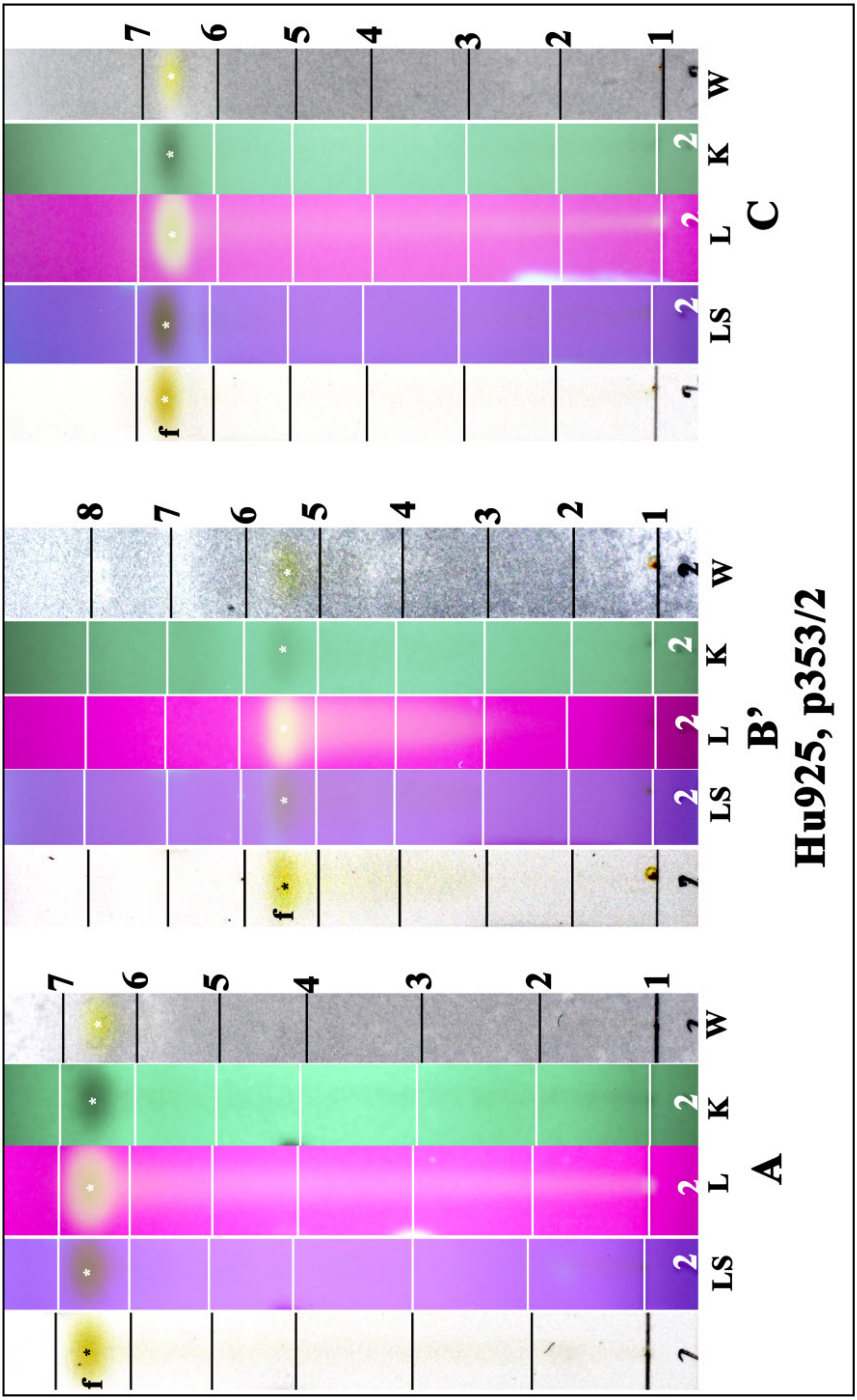
evernic acid



at: atranorin, **e: evernic acid**, conf. J.A. Elix

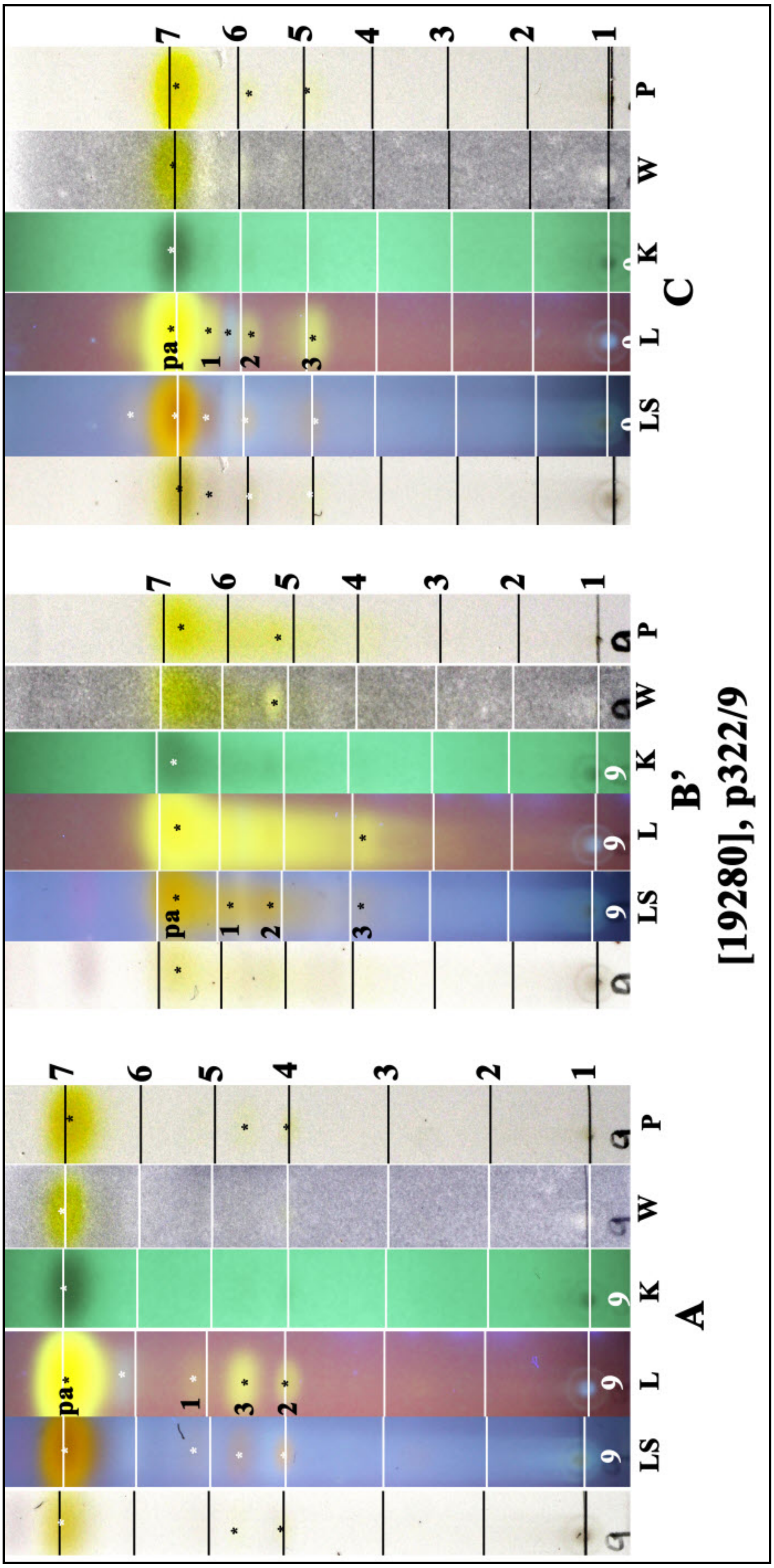
Evernia prunastri f. henrinii (P.A.Duvign.) D.Hawksw., [17098], Germany, Baden-Württemberg, Kreis Göppingen,Degenfeld, auf Obstbäumen am Weg zu Glasklinge, 48.72736° N, 9.88776° E, 542 m. Leg. et det. F. Schumm 5.4.2011.

fallacinal



S. Huneck's collection of lichen substances No 925: fallacinal
Botanisches Museum Berlin-Dahlem

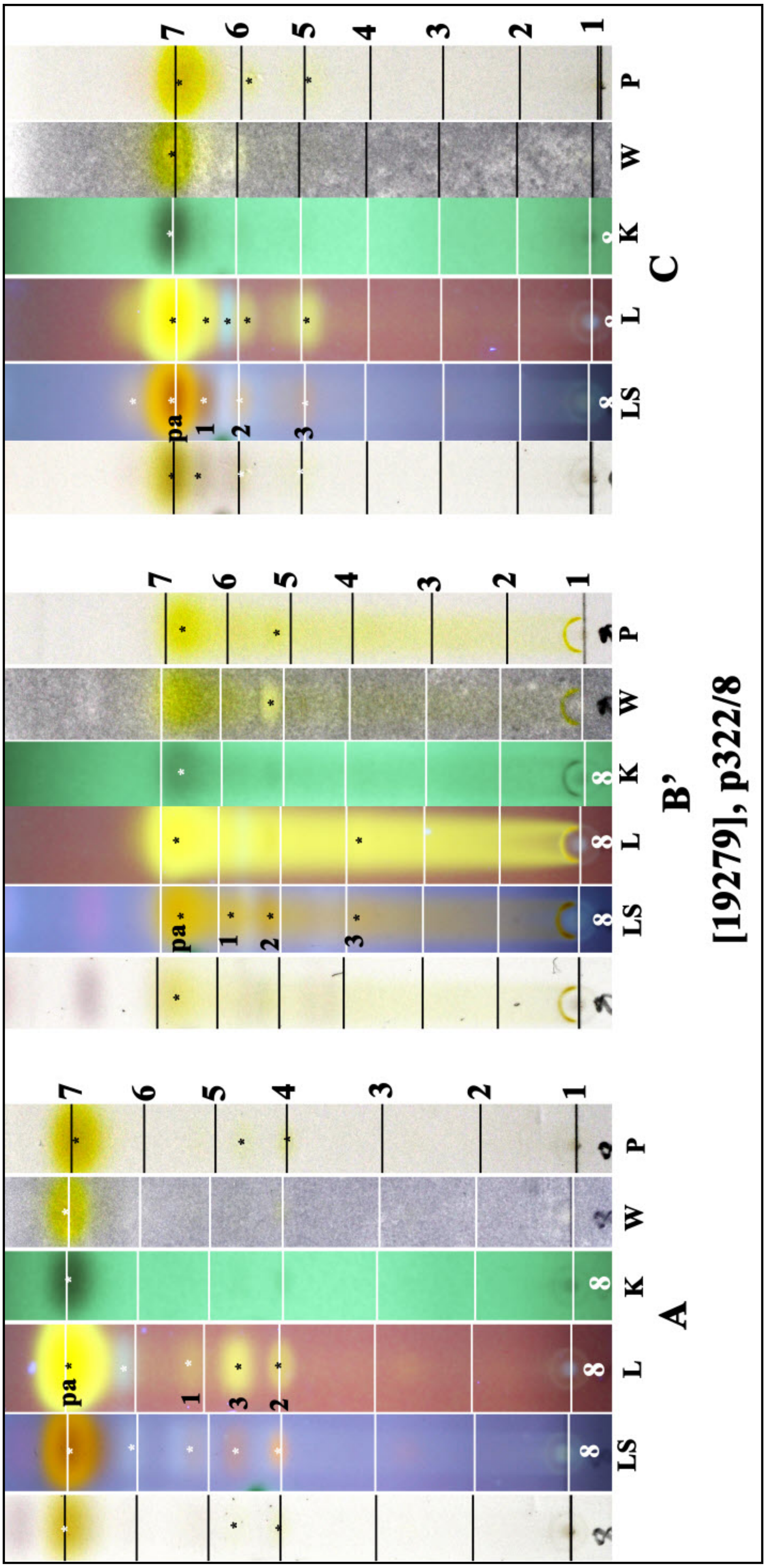
fallacinal



pa: parietin, **1: fallacinal**, 2: parietinic acid, 3: teloschistin

Teloschistes chrysophthalmus, [19280], Australia, South Australia, Kangaroo Island, Playford Highway, 1 km west of Kingscote Airport, 35°43' S, 137°31' E, 15 m.

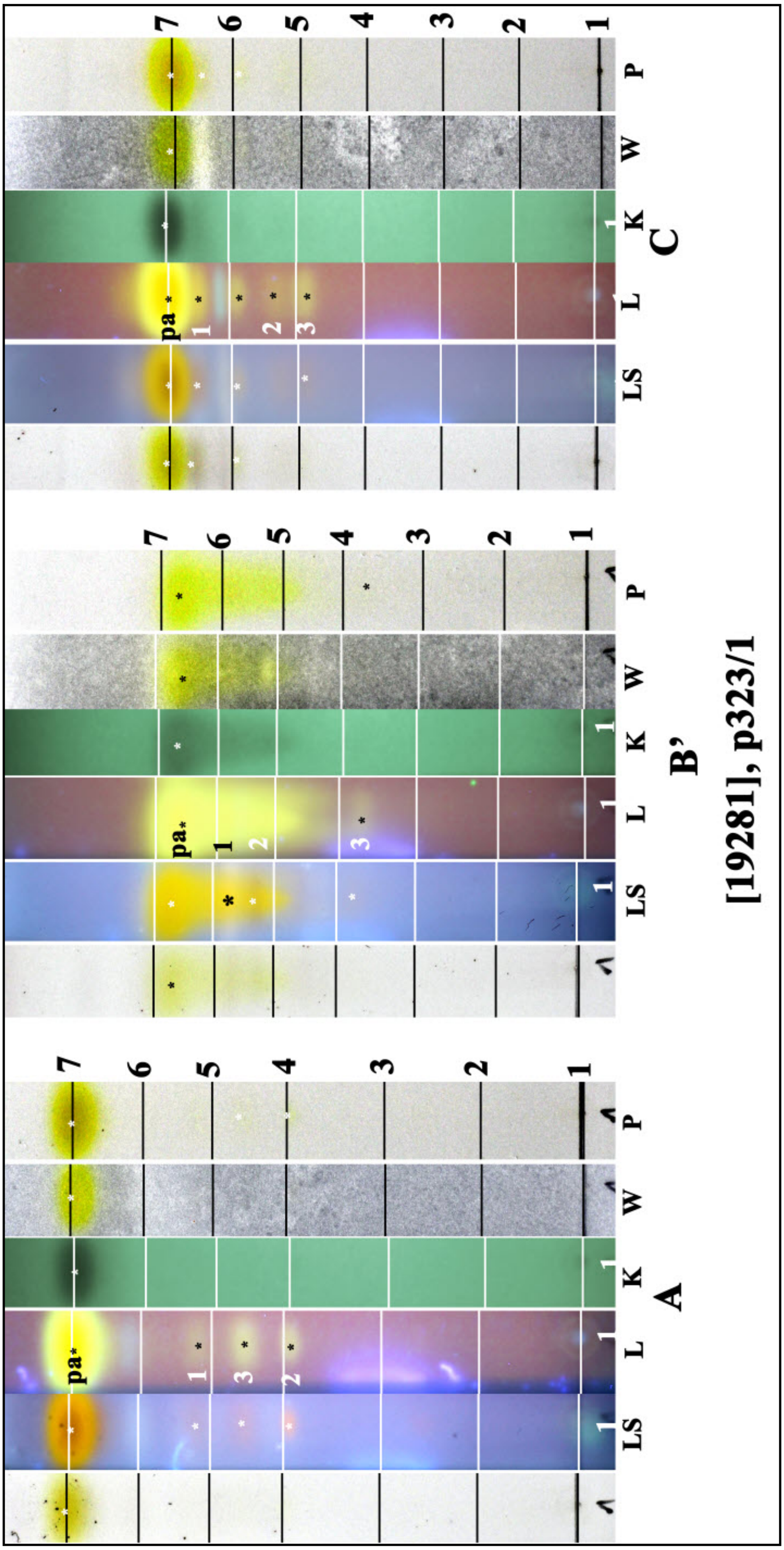
fallacinal



pa: parietin, **1: fallacinal**, 2: parietinic acid, 3: teloschistin

Teloschistes chrysophthalmus, [19279], Australia, South Australia, Kangaroo Island, King George Beach, 35°40' S, 137°04' E, 2 m.

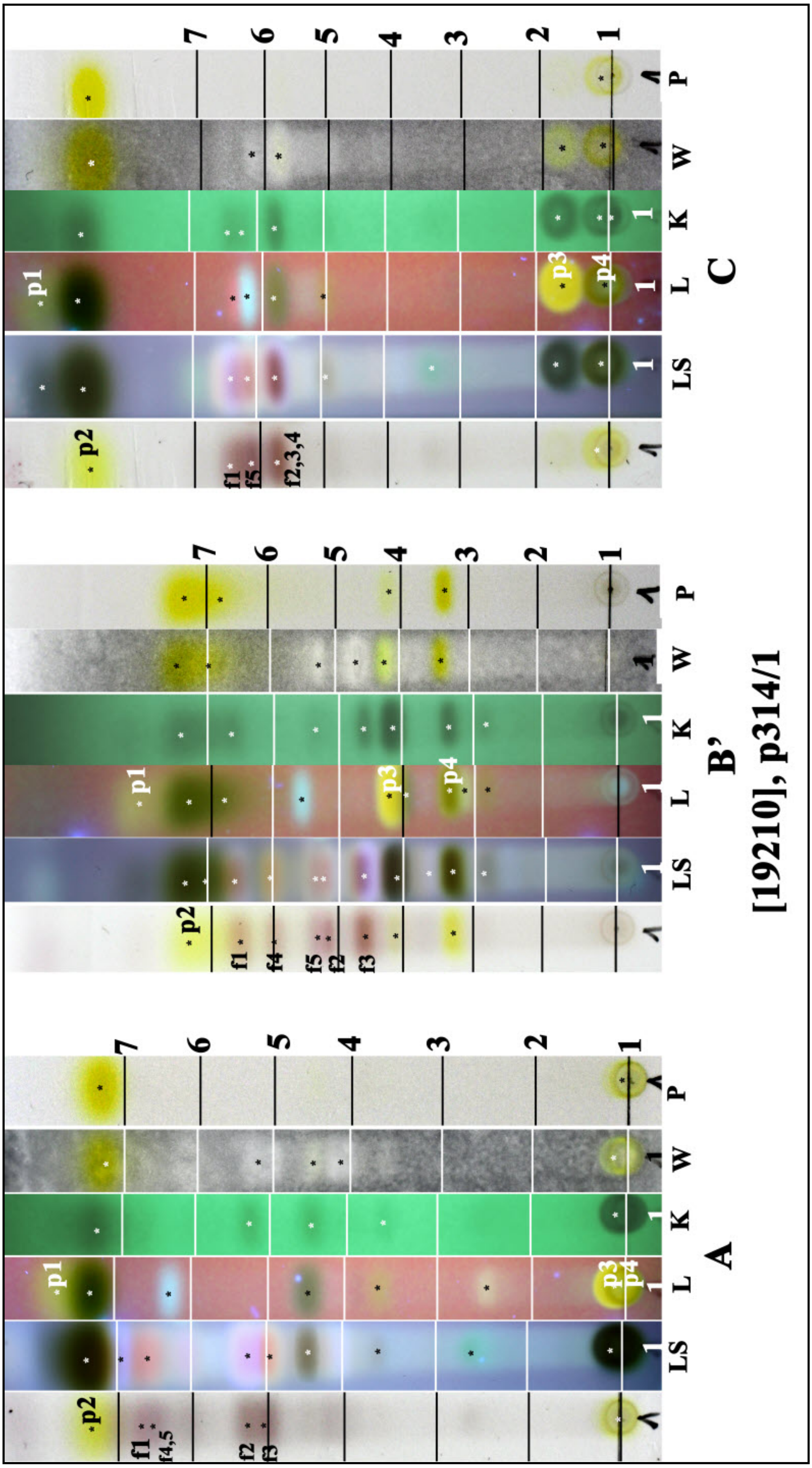
fallacinal



pa: parietin, **1: fallacinal**, 2: parietinic acid, 3: teloschistin

Teloschistes fasciculatus , [19281], Australia, Victoria, Basalt Hill, Alpine National Park, Bogong High Plains, 20 km south-east of Mt. Beauty, 36°53' S, 147°18' E, 1650 m.

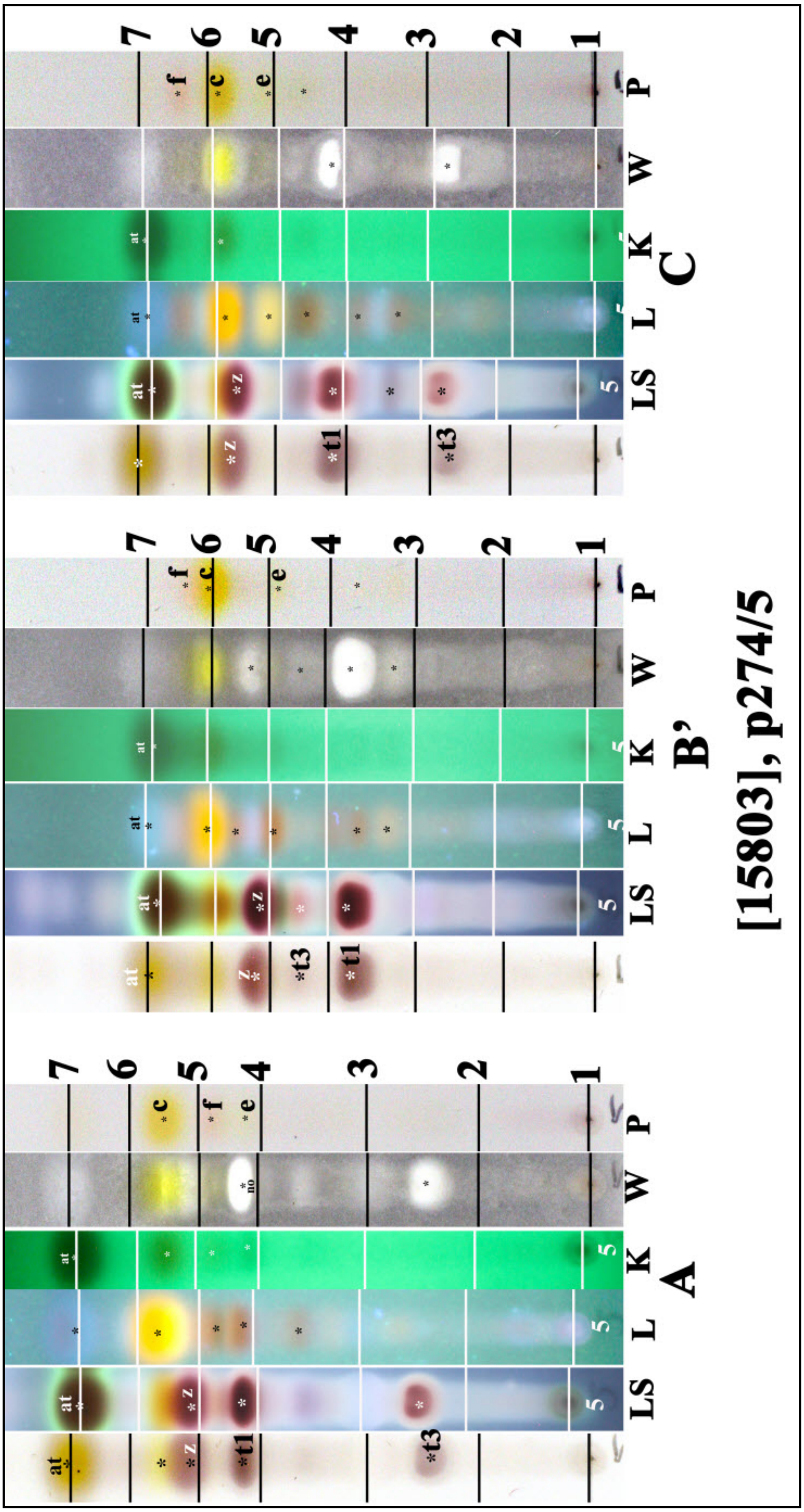
fern-9(11)-en-3β,12β-diol



p1: pulvinic dilactone, p2: calycin, p3: pulvinic acid, p4: unknown, f1: 3β-acetoxyfern-9(11)-en-12-one, f2: 3β-hydroxyfern-9(11)-en-12-one, **f3: fern-9(11)-en-3β,12β-diol**, f4: 3β-acetoxyfern-9(11)-en-12β-ol, f5: 3β-acetoxyfern-9(11)-en-19β-ol.

Crocodia poculifera, (= ***Pseudocyphellaria poculifera***), **[**19210], Norfolk Island. Mt. Pitt Reserve, in the vicinity of Broken Pine, 29°00'30" S, 167°56'30" E, 320 m.

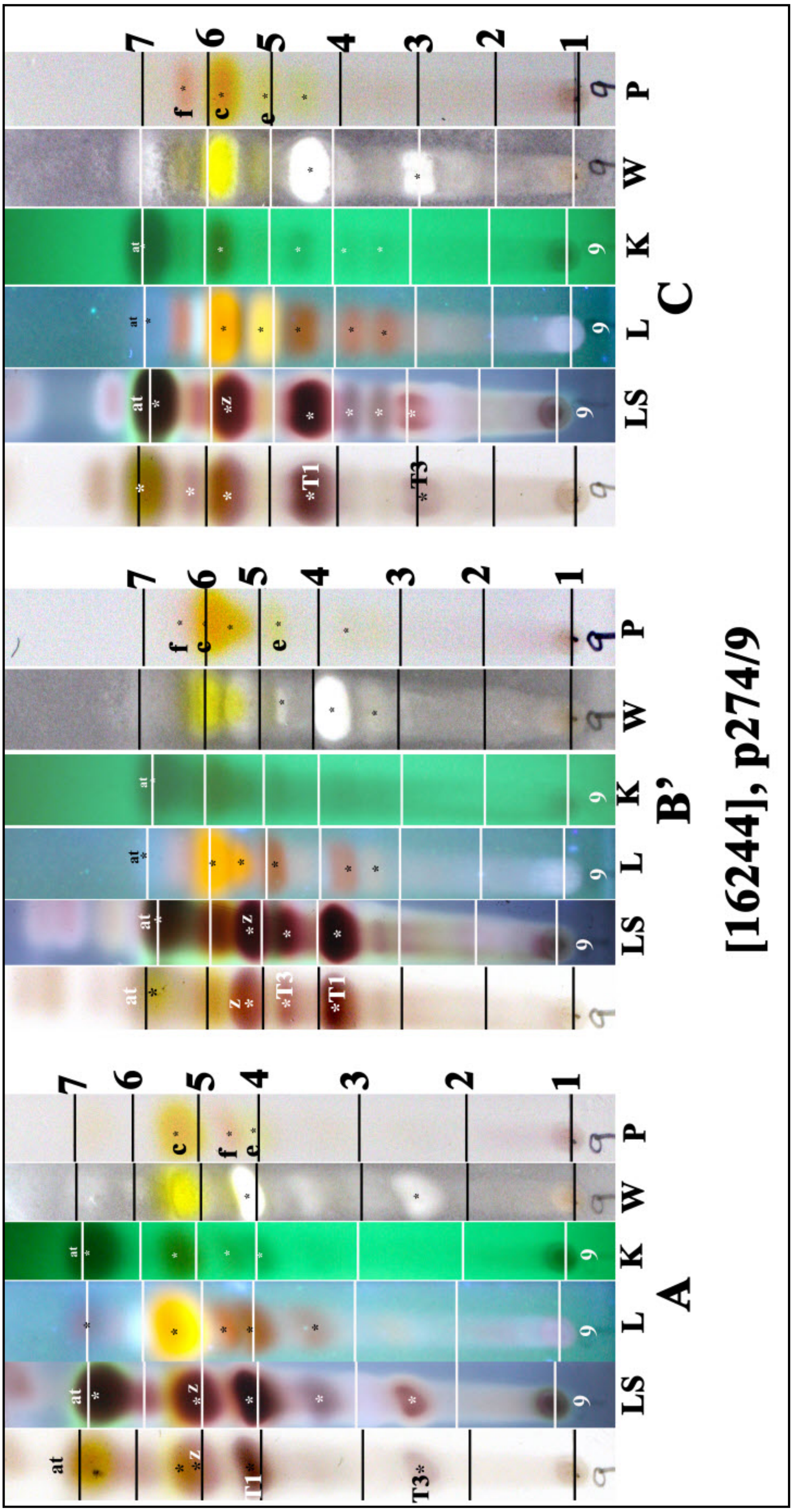
flavoobscurins



at: atranorin, z: zeorin, t1: 16β-acetoxyhopane-6α,22-diol, t3: leucotylin, c: 7-chloroemodin, e: emodin, **f: flavoobscurins**

Heterodermia obscurata, [15803], Australia, Western Australia, 75 km south of Mt. Chudalup, wetland with *Agonis junipera* and *Eucalyptus marginata,* 34.734° S, 116,088° E, 75 m. Leg. F. Schumm & E. Stocker-Wörgötter, 24.10.2009.

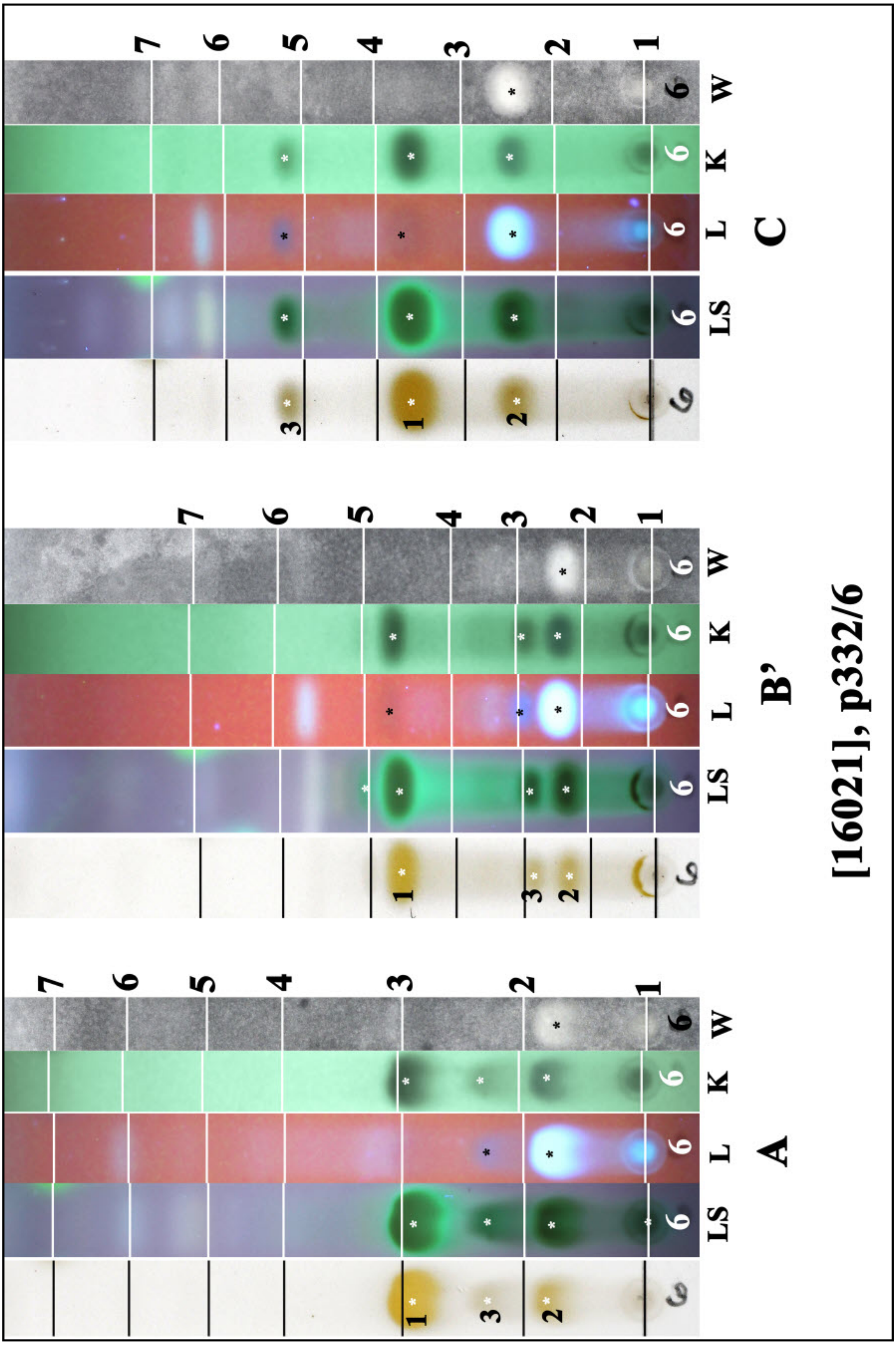
flavoobscurins



at: atranorin, z: zeorin, T1: 16β-acetoxyhopane-6α,22-diol, T3: leucotylin, c: 7-chloroemodin, e: emodin, **f: flavoobscurins**

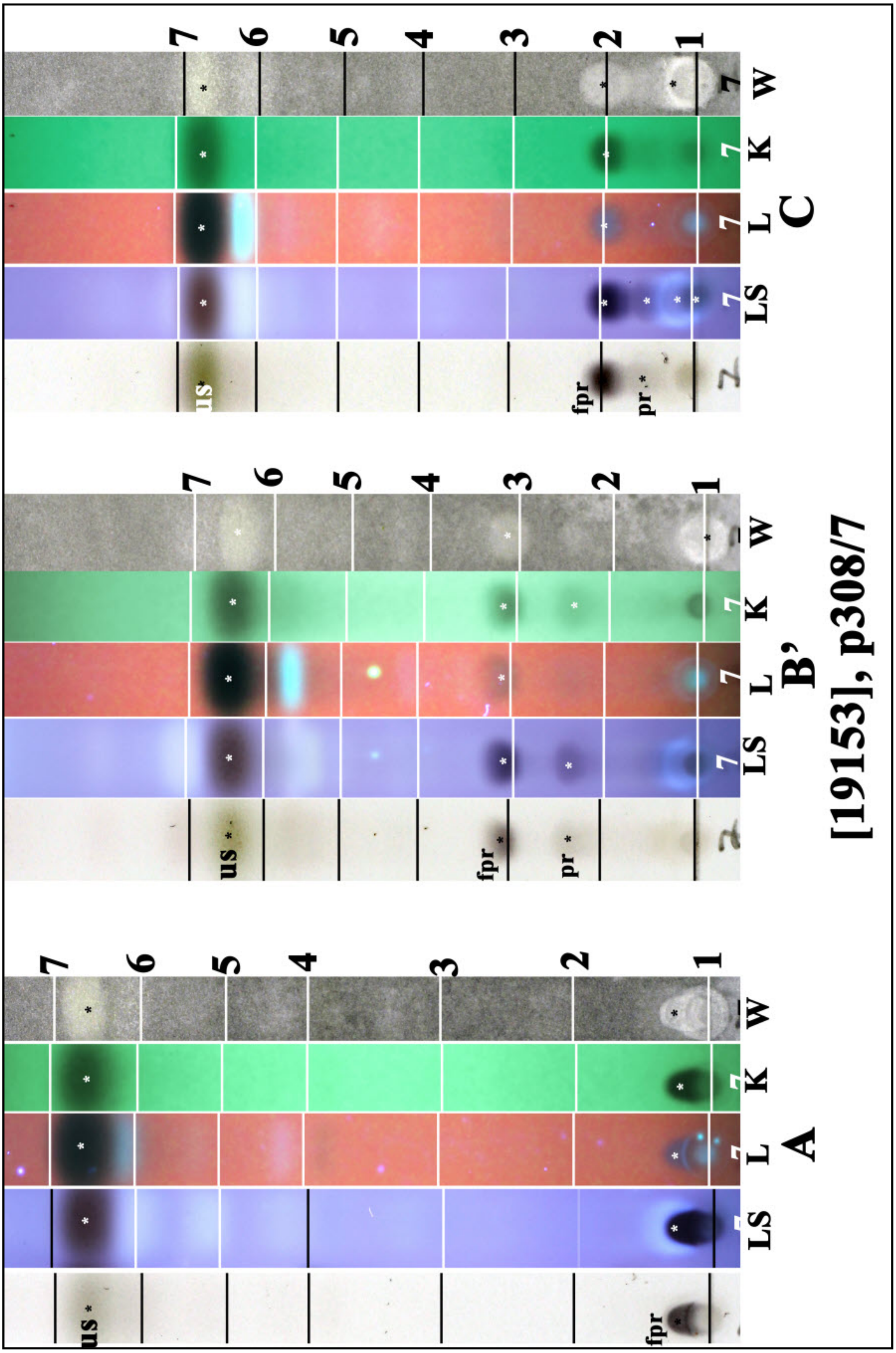
Heterodermia obscurata, [16244], Australia, New South Wales, between Bermagui and Tathra, on way from Aragunnu Beach to the Mimosa Rocks, 36.585° S, 150.056° E, 10 m, growing on rocks. Leg. F. Schumm & E. Stocker-Wörgötter, 12.11.2009.

friesiic acid C



Trapeliopsis granulosa var. ***australis,*** [16021], Australia, Australian Capital Territory, Canberra, Black Mountains Reserve, 35.276° S, 149,094° E, 760 m. Leg. J.A. Elix, F. Schumm & E. Stocker-Wörgötter, 07.11.2009, det. J.A. Elix. Chemistry by HPTLC, anal. F. Schumm, det. J.A. Elix.

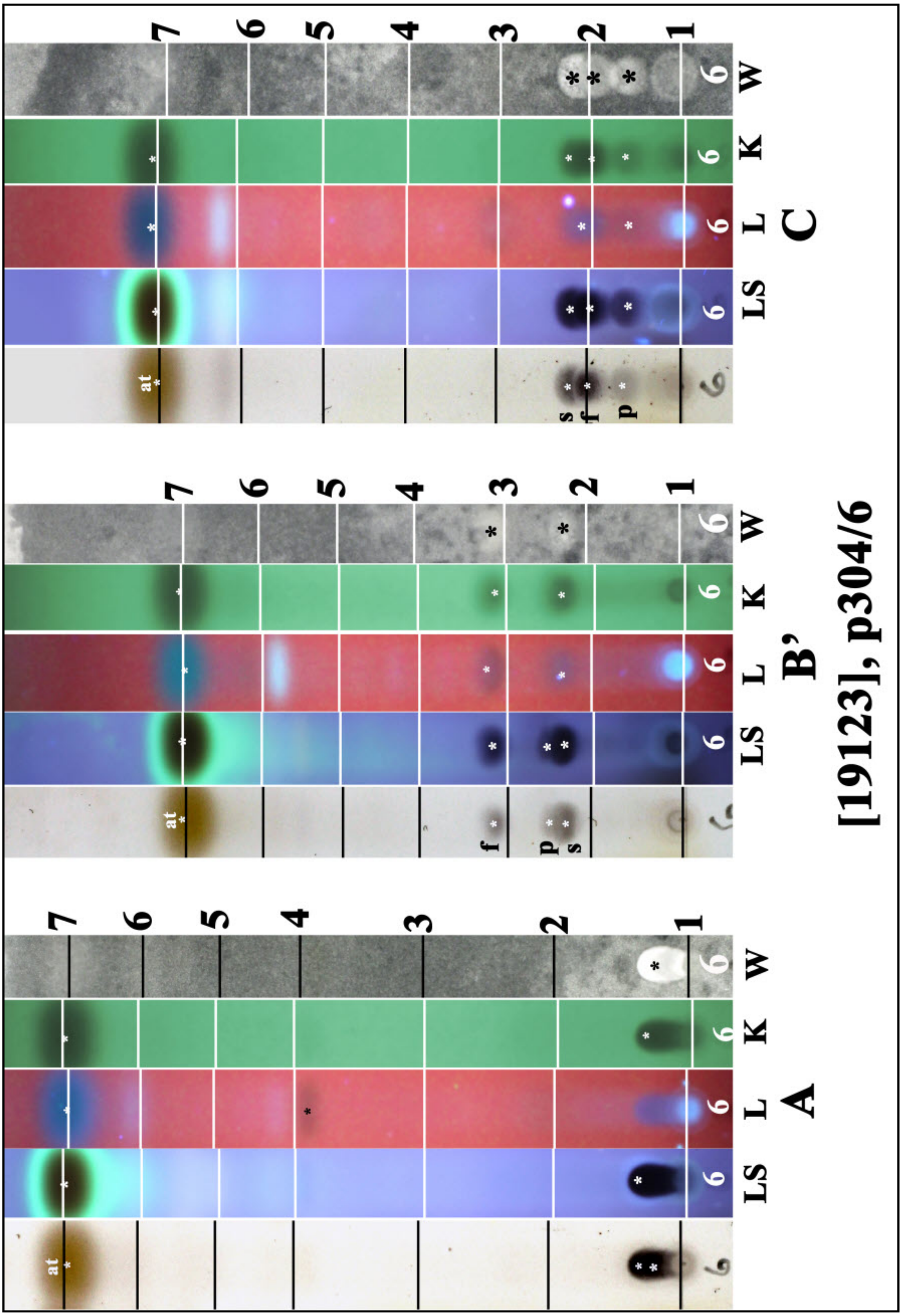
fumarprotocetraric acid



us: usnic acid, **fpr: fumarprotocetraric acid**, pr: protocetraric acid.

Xanthoparmelia pseudohypoleia , [19153], Australia, Victoria, Bullock Creek, 16 km south of Bendigo along Calder Highway, 37°52' S, 144°13'E, 270 m.

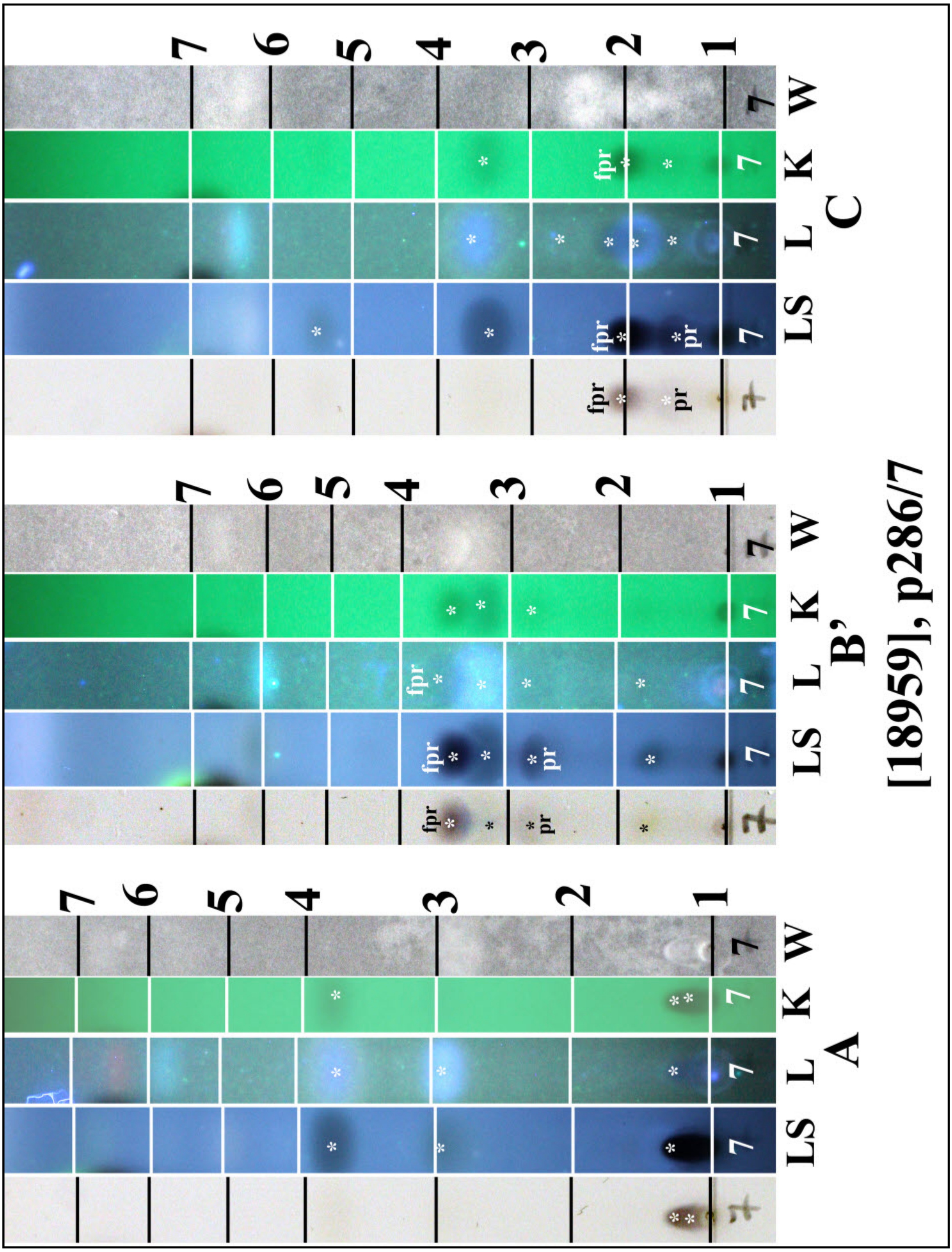
fumarprotocetraric acid



at: atranorin, p: protocetraric acid, **f: fumarprotocetraric acid**, s: succinprotocetraric acid

Parmotrema queenslandense, [19123], Australia, Queensland, Mt. Catharina, 10 km north-east of Ingham.

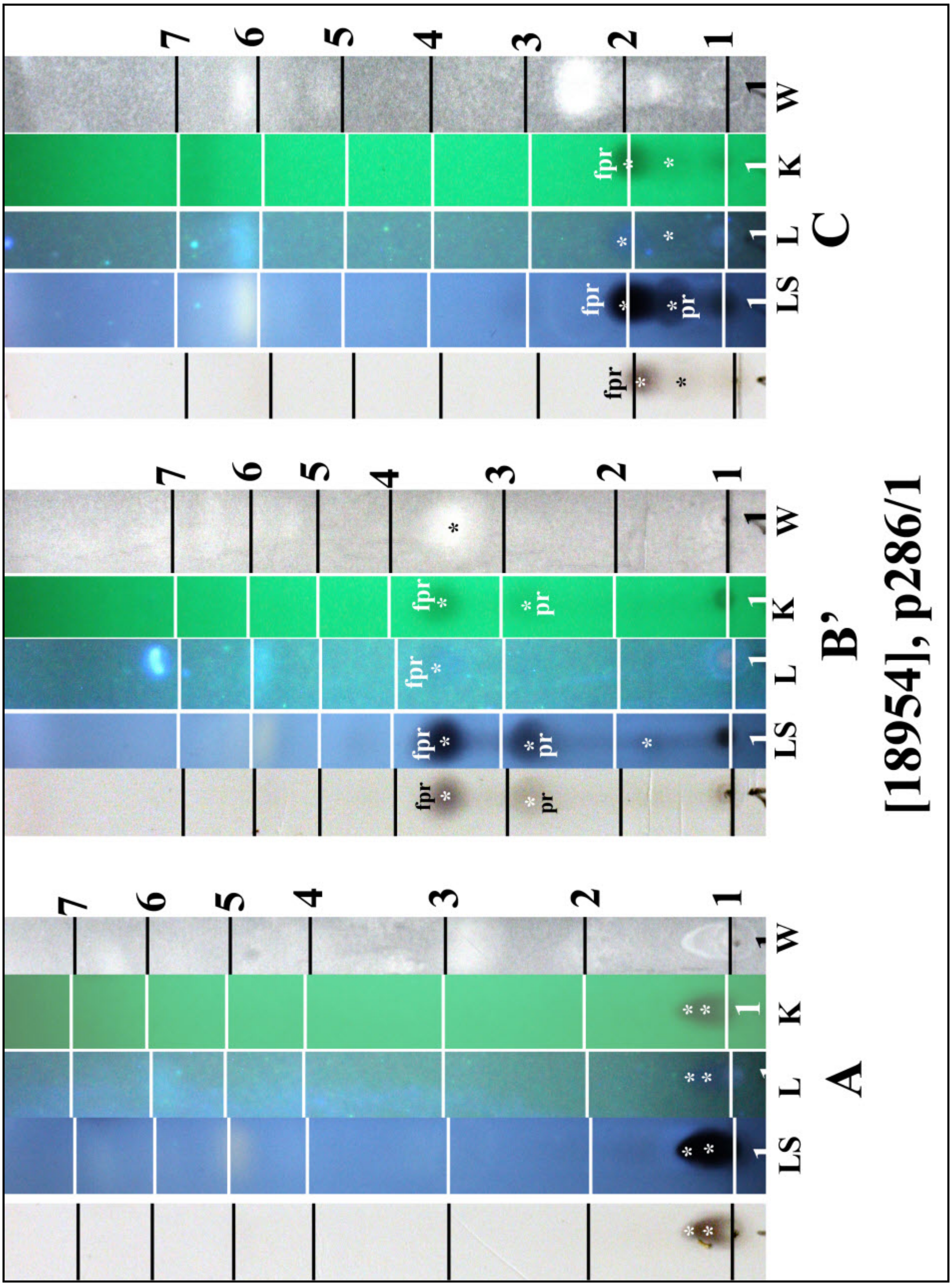
fumarprotocetraric acid



fpr: fumarprotocetraric acid, pf: protocetraric acid

Cladia inflata, [18959], Australia, New South Wales, Morton National Park.

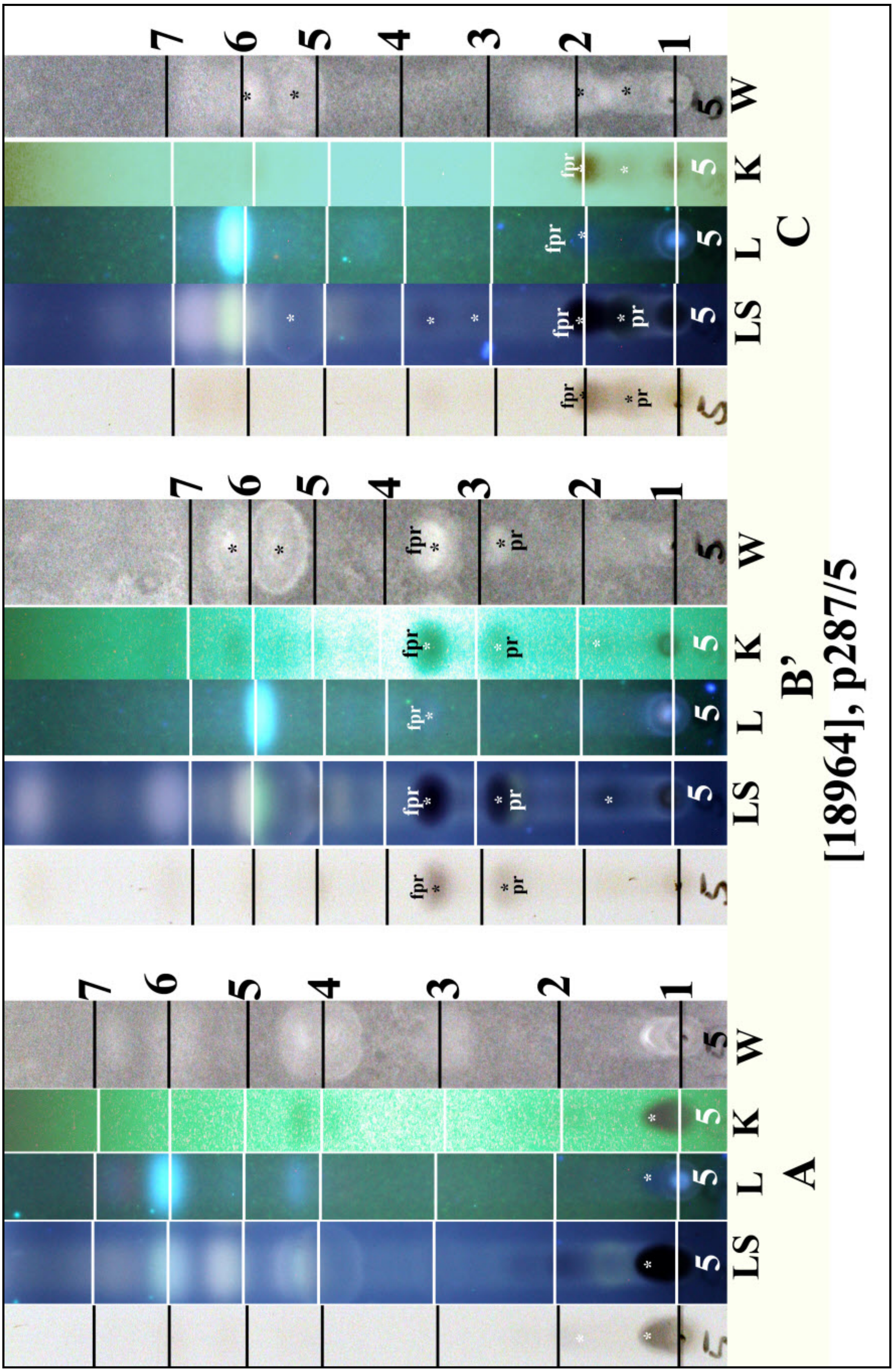
fumarprotocetraric acid



fpr: fumarprotocetraric acid, pr: protocetraric acid

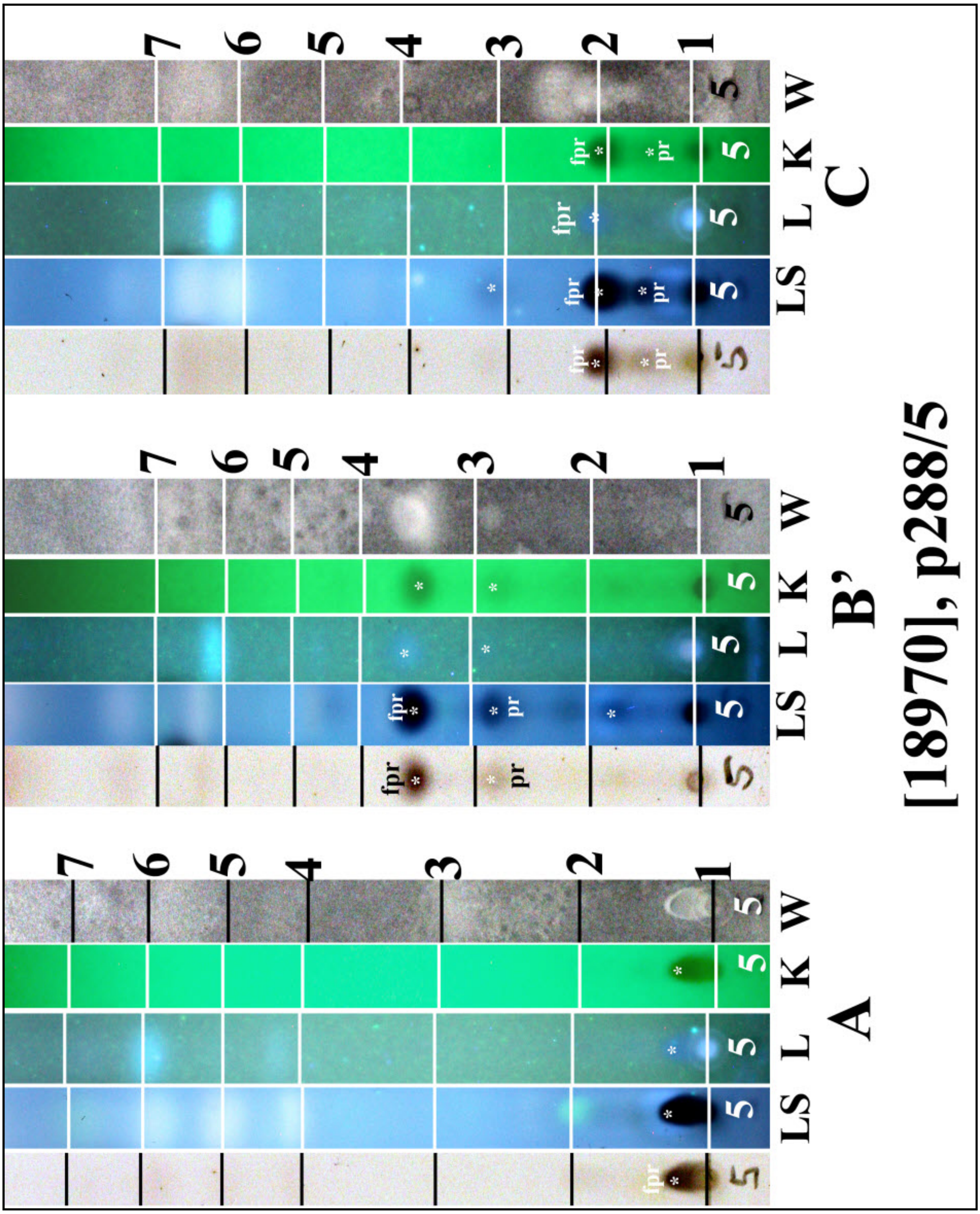
Cetraria islandica ssp. ***antarctica***,[18954] Australia, New South Wales, Koszciusko National Park.

fumarprotocetraric acid



Cladonia fruticulosa, [18964], Australia, Queensland, Main Coast Range, Windmill Creek, 14 km north-north-west of Mt. Molloy.

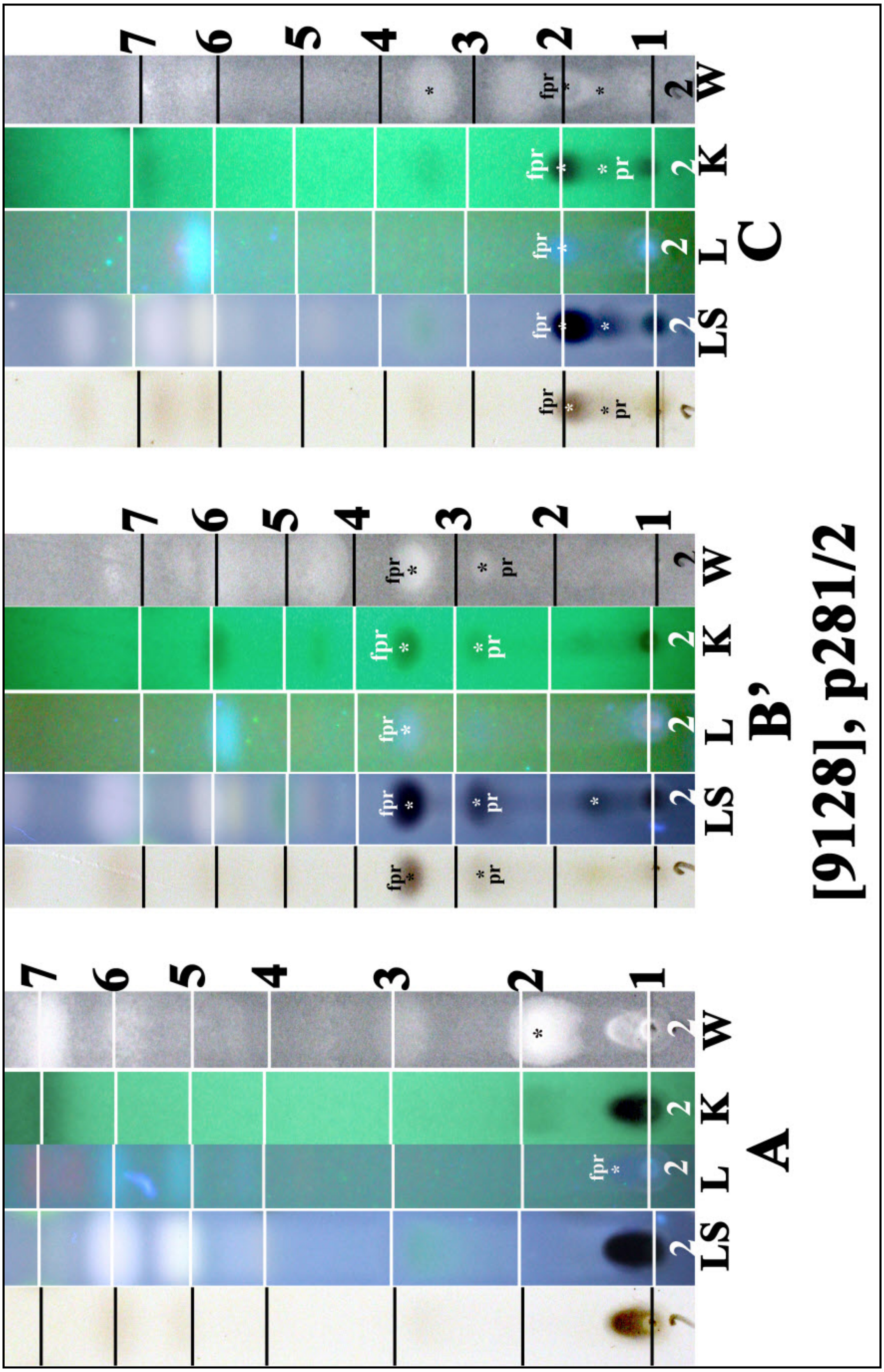
fumarprotocetraric acid



fpr: fumarprotocetraric acid, pr: protocetraric acid

Cladonia ochrochlora, [18970], New Zealand, South Island, Westland, Waiatoto State Forest.

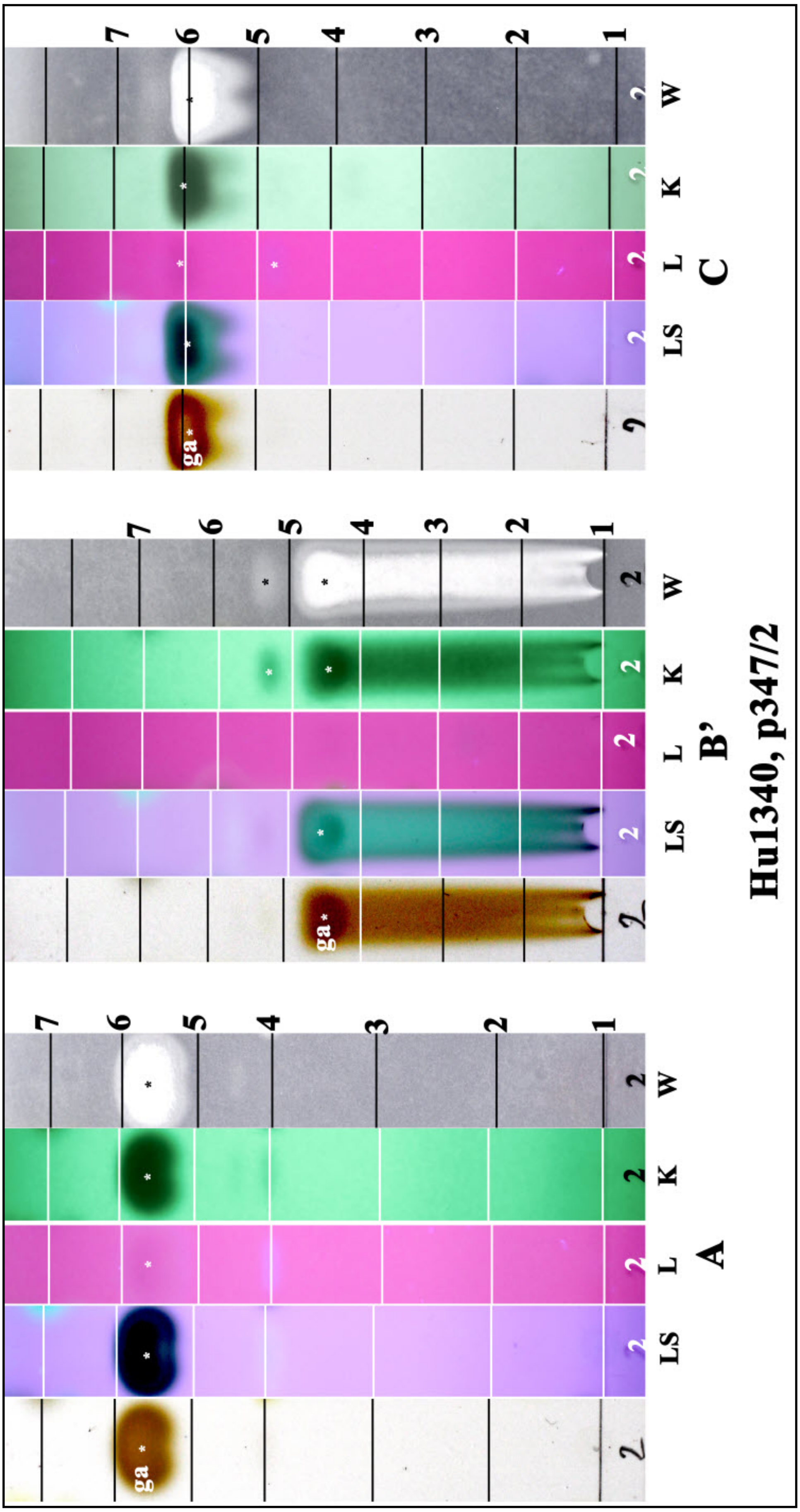
fumarprotocetraric acid



pr: protocetraric acid, fpr: fumarprotocetraric acid

Cladonia cervicornis, [9128], Spanien, Kanarische Inseln, La Gomera, beim Mirador de Alojera (Piedras Hincadas) nördlich von Arure im Lorbeer-Erica Wald, 28°08.995' N, 17°18.483 W, 1000 m. Leg. F. Schumm 10.02.2002, det. T. Ahti 2010.

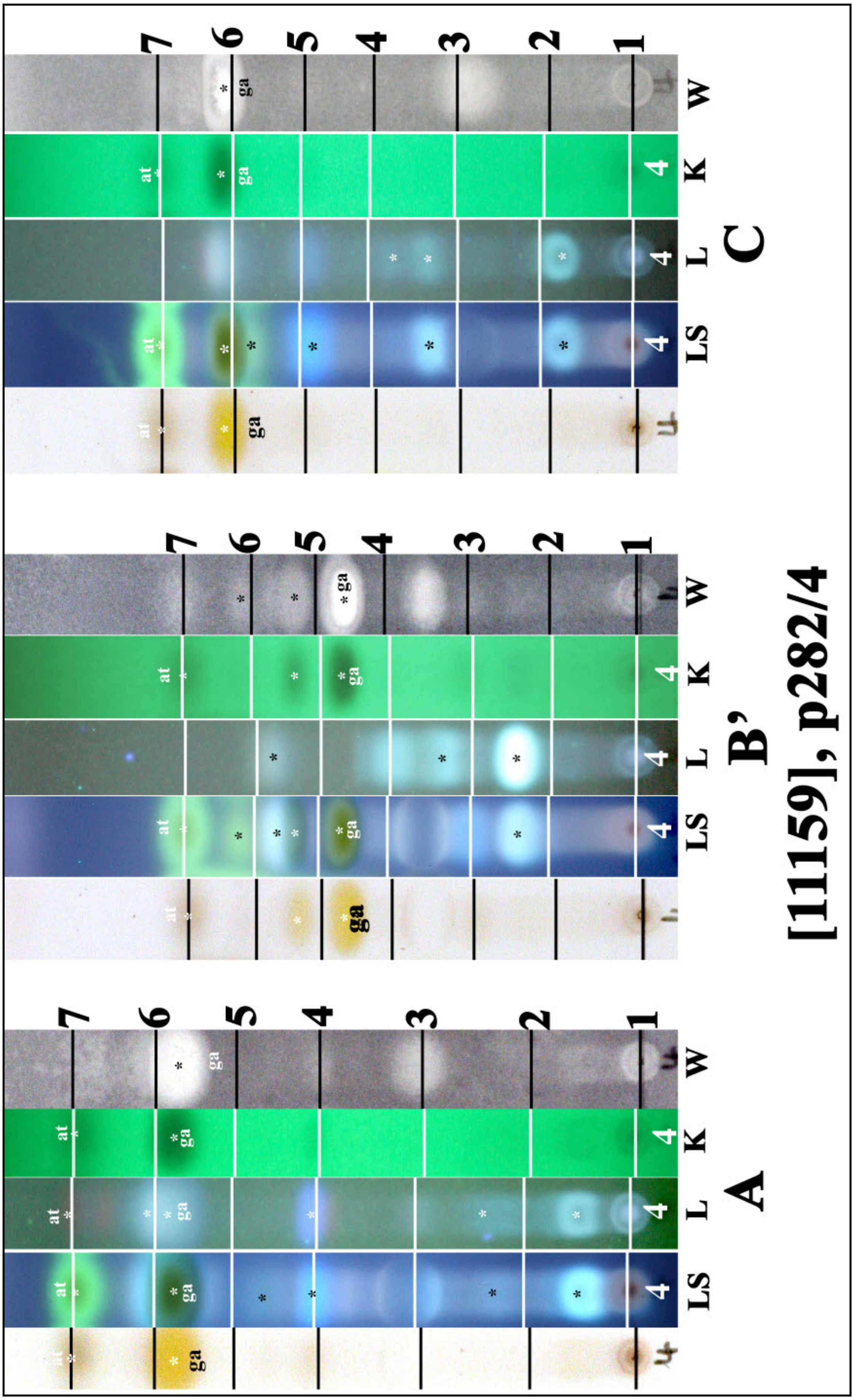
gangaleoidin



ga: gangaleoidin

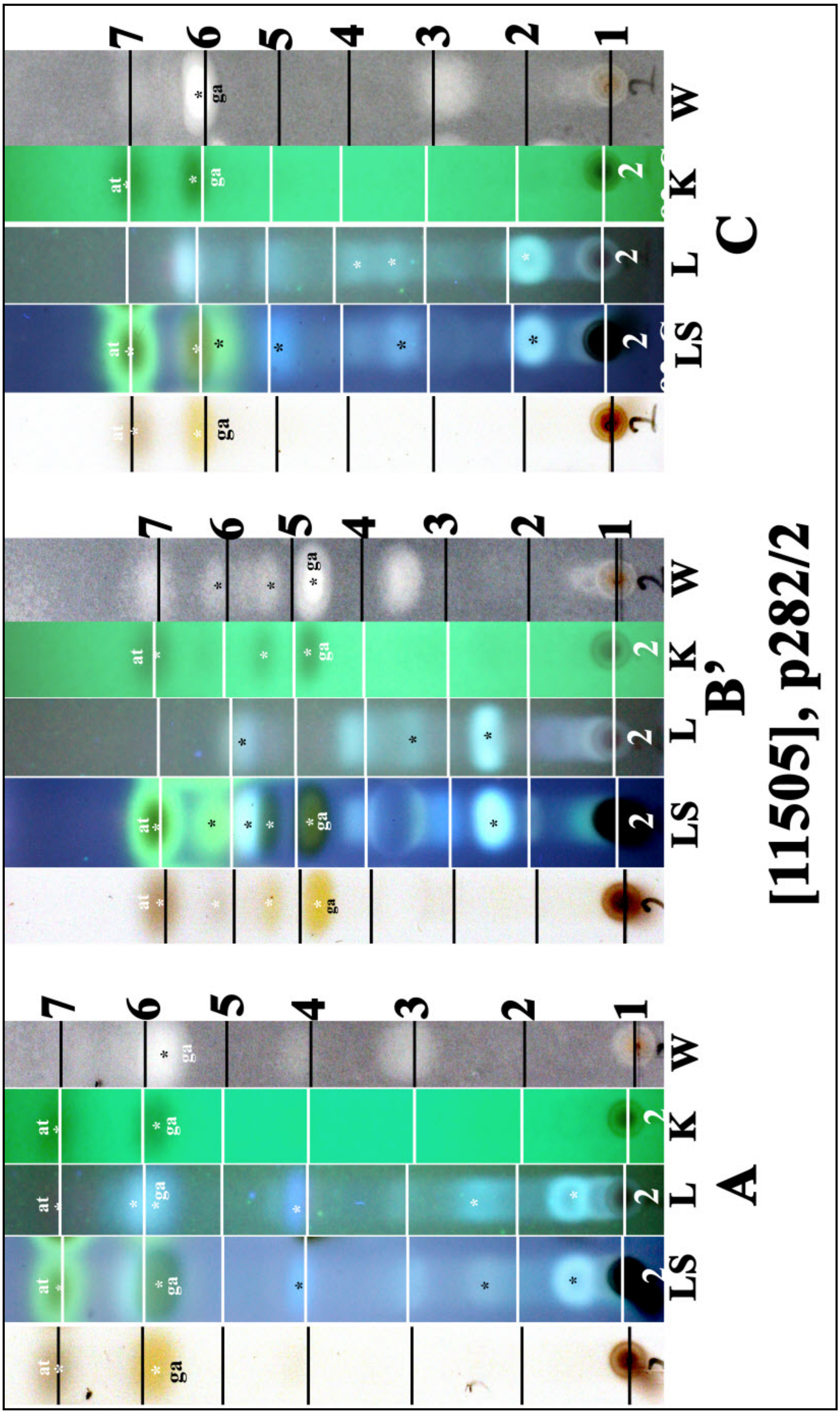
S. Huneck’s collection of lichen substances No 1340: gangaleoidin, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

gangaleoidin



Lecanora argentata [11159], Portugal, Azoren, Sao Miguel, zwischen Achadinha und Achada, 37°50.794' N, 25°16.686' W, am Straßenrand auf Quercus. Leg. et det. F. Schumm 05.06.2003, conf. A. Aptroot 2010.

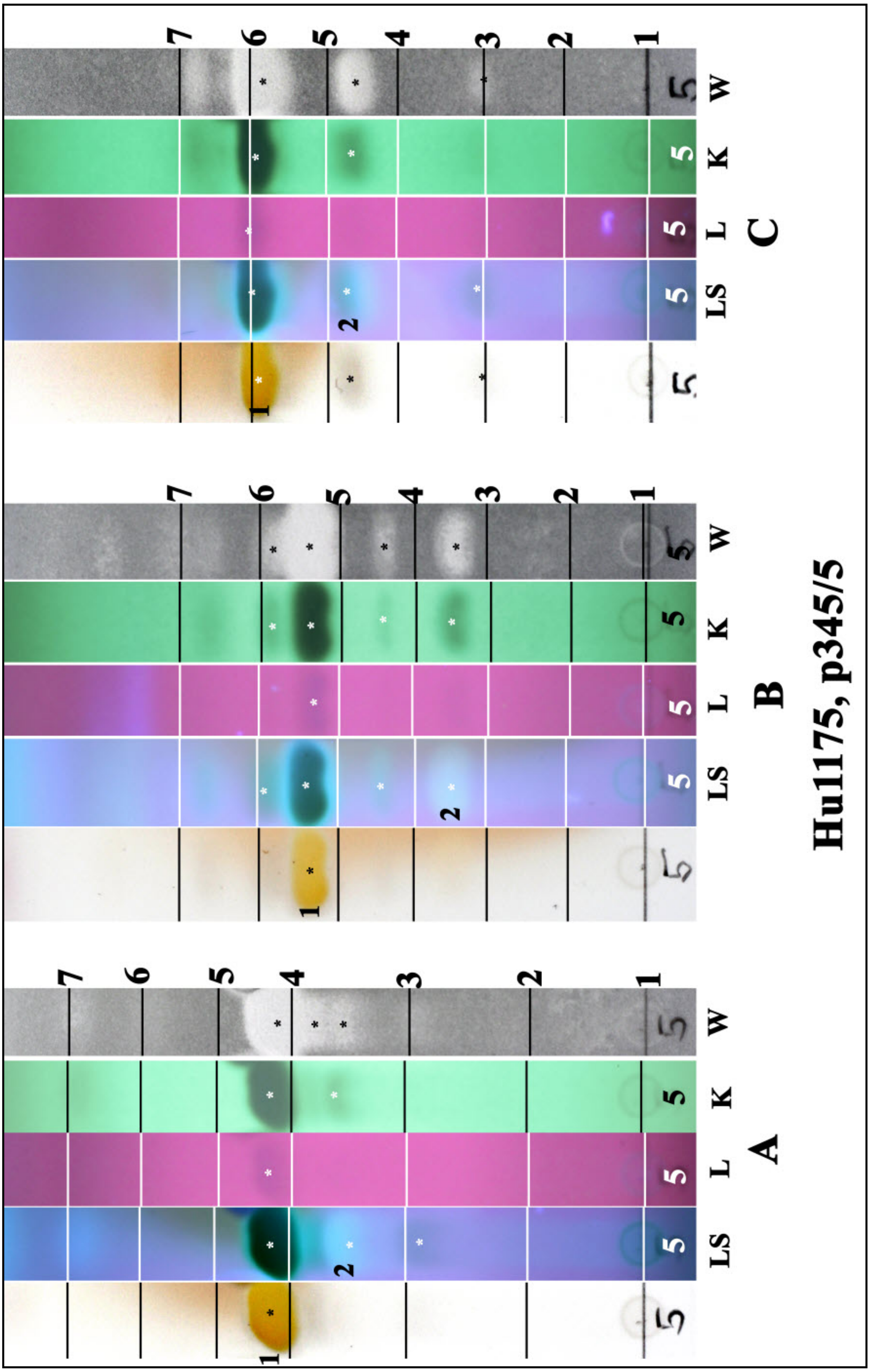
gangaleoidin



at: atranorin, **ga: gangaleoidin**

Lecanora chlarotera [11505], Portugal, Madeira, südlich von Porto da Cruz bei Portela, im Lorbeerwald am Anfang der Levada zwischen Portela und Laceimeiros; 32°45' N, 16°50' W, 630 m. Leg. et det. F. Schumm 28.12.2003.

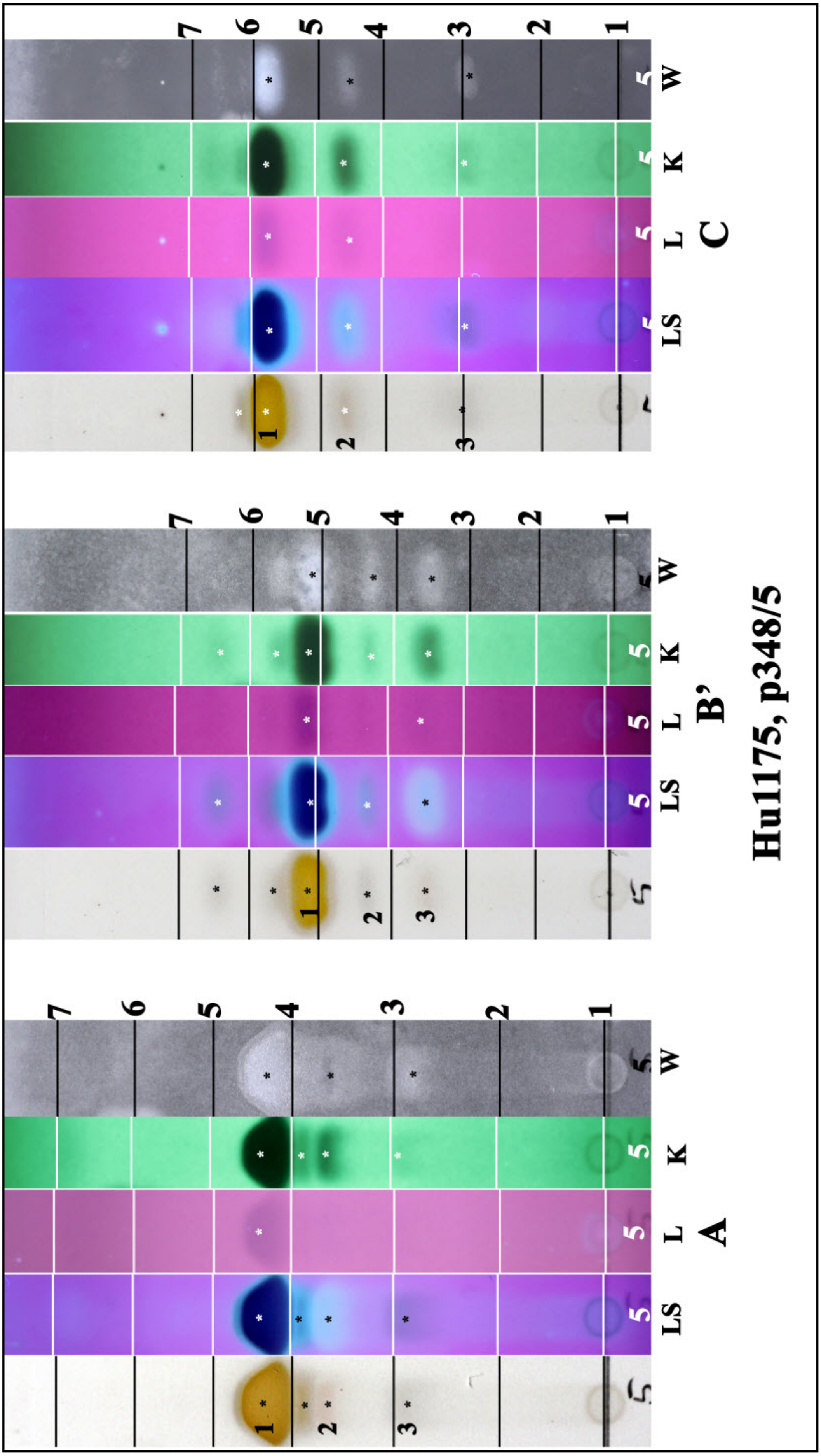
glomellic acid



1: glomelliferic acid, 2: **glomellic acid**, conf. J.A. Elix

S. Huneck's collection of lichen substances No 1175: glomelliferic acid. Botanisches Museum Berlin-Dahlem

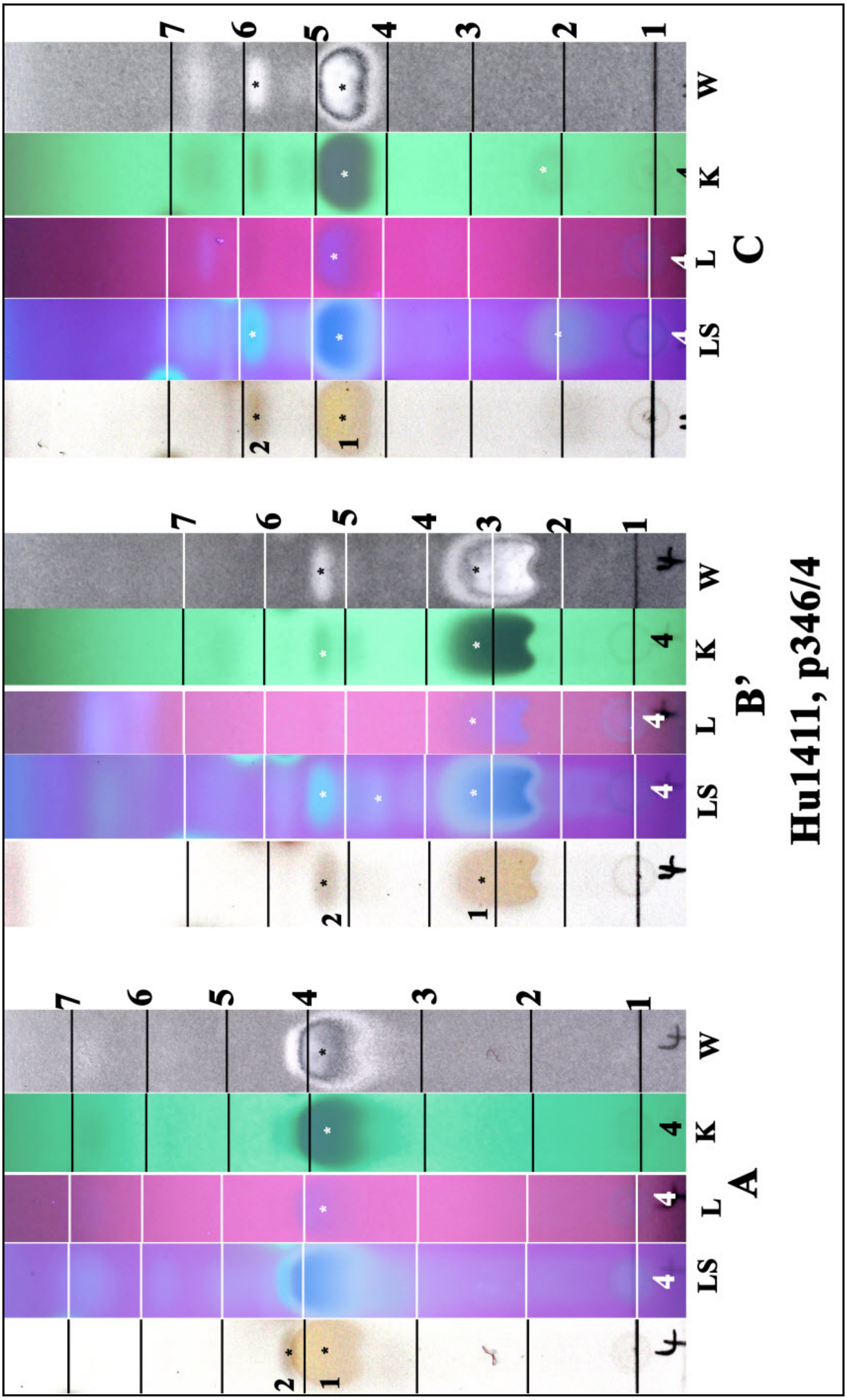
glomellic acid



1: glomelliferic acid, **2: glomellic acid**, 3: 4-O-demethylglomelliferic acid, conf. J.A. Elix

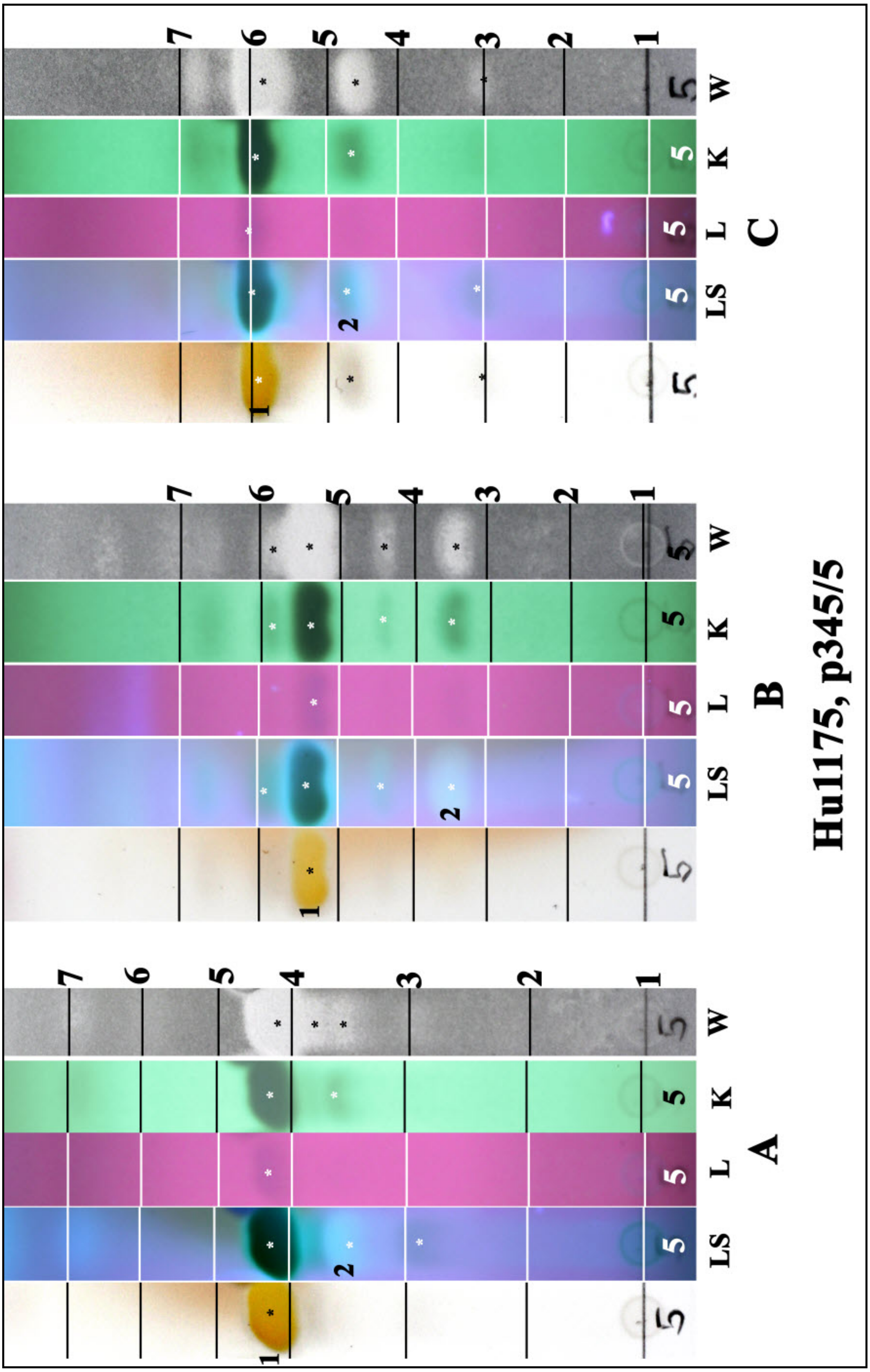
S. Huneck's collection of lichen substances No 1175b: glomelliferic acid. Botanisches Museum Berlin-Dahlem

glomellic acid



S. Huneck's collection of lichen substances No 1411: glomellic acid, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

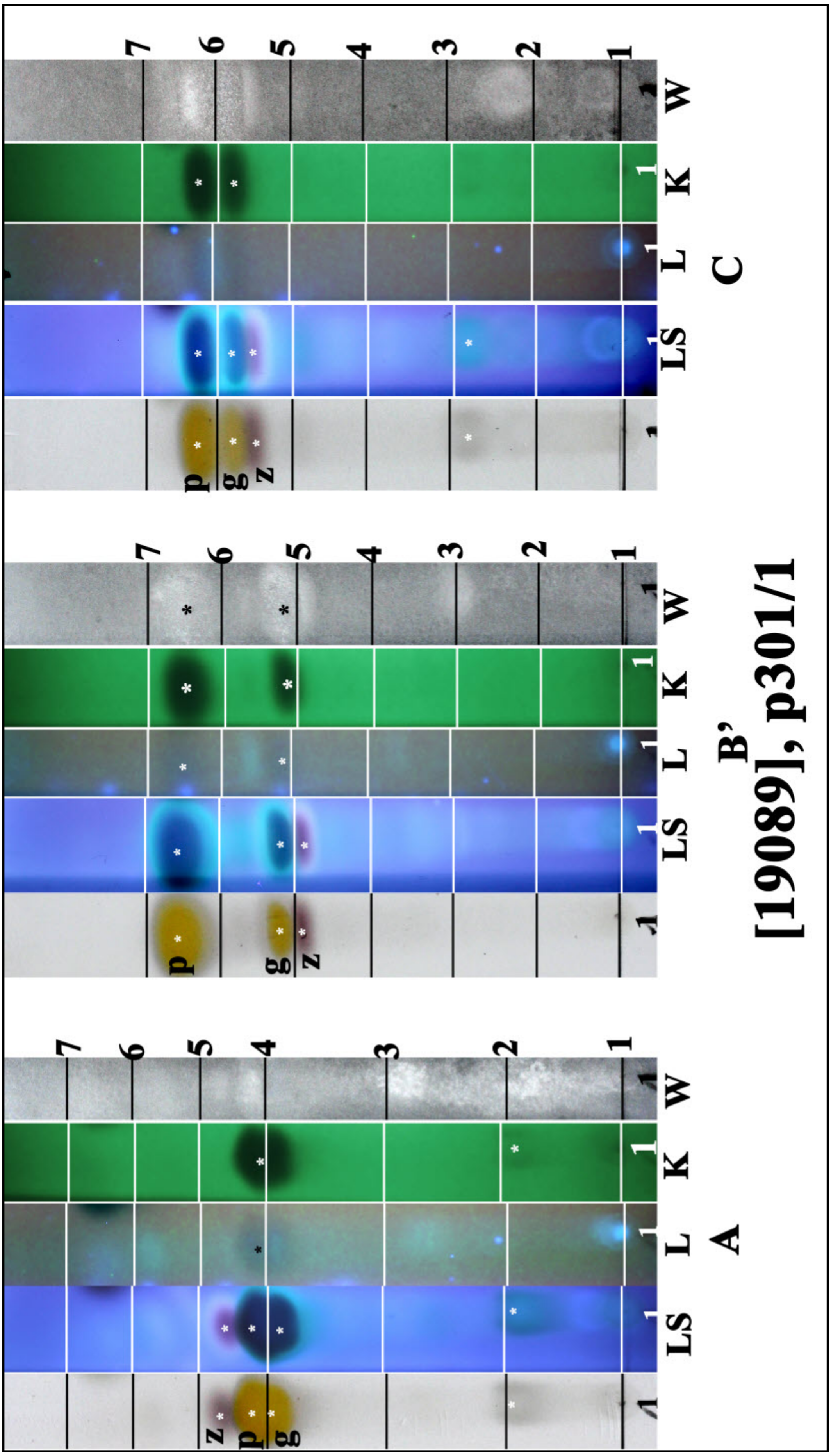
glomelliferic acid



1: glomelliferic acid, 2: glomellic acid, conf. J.A. Elix

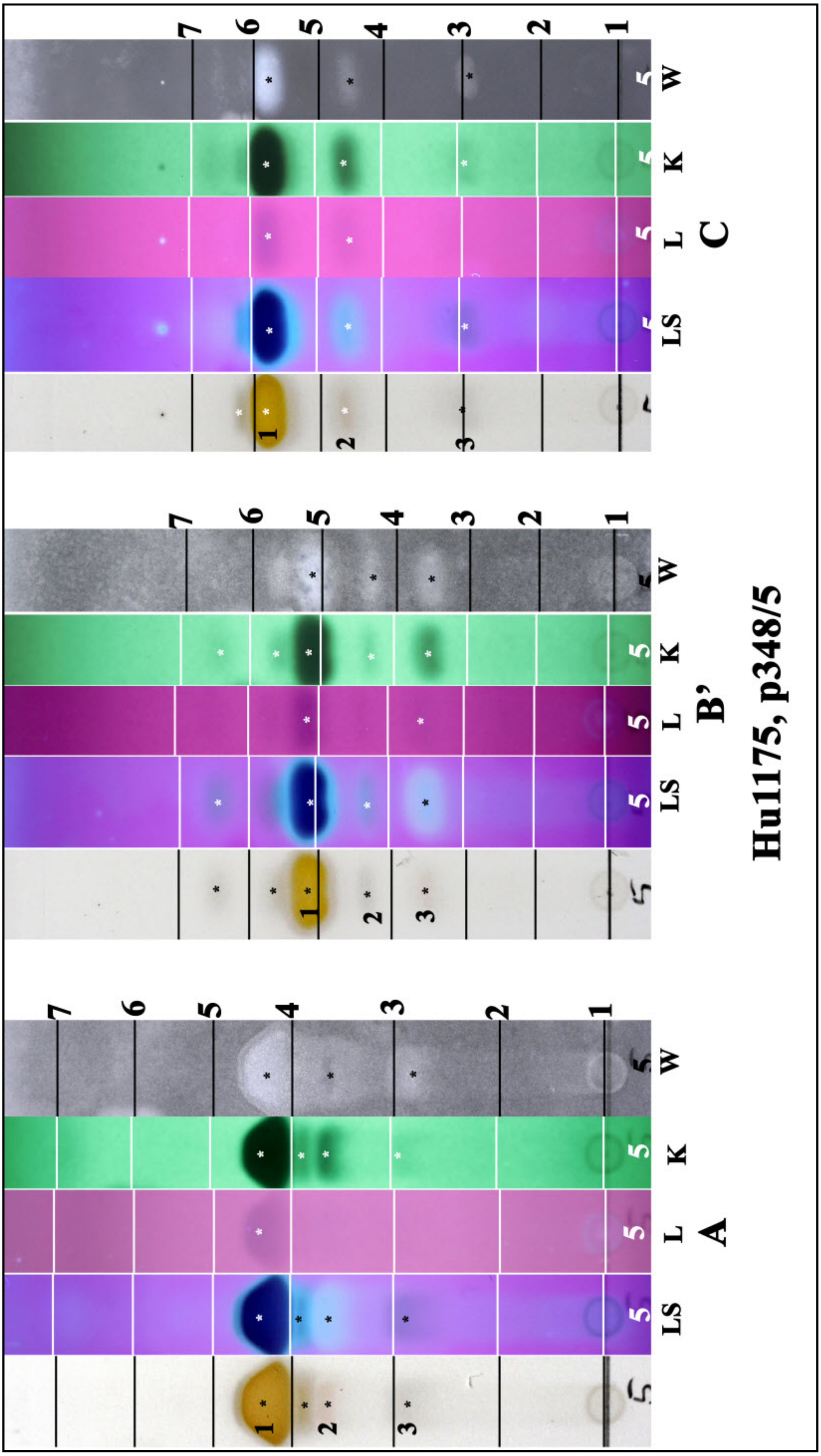
S. Huneck's collection of lichen substances No 1175: glomelliferic acid. Botanisches Museum Berlin-Dahlem

glomelliferic acid



Nephroma cellulosum, [19089], Australia, New South wales, Great dividing Range, 6 km east of Captains Flat, 2 km north of Parkers Gap

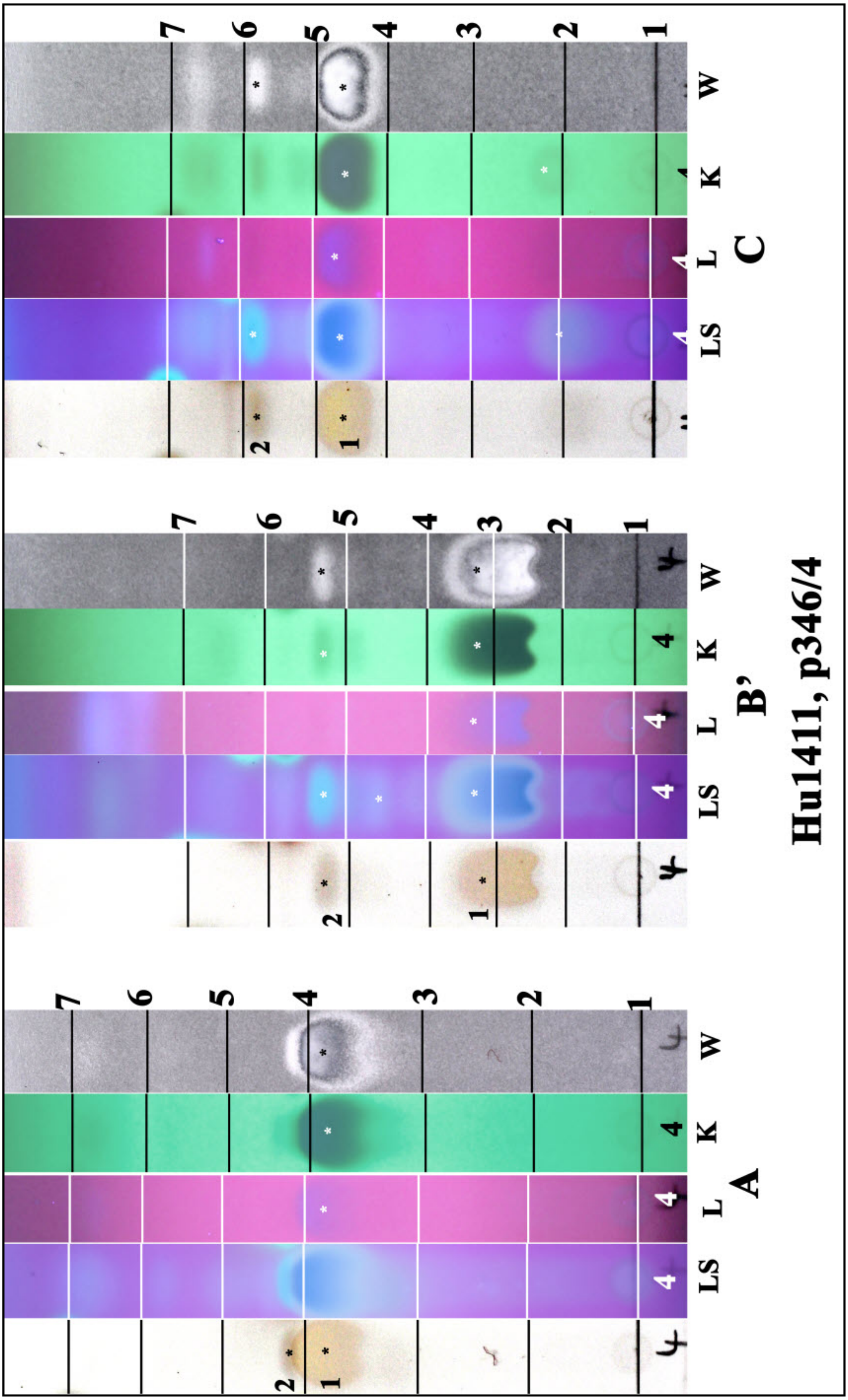
glomelliferic acid



1: glomelliferic acid, 2: glomellic acid, 3: 4-*O*-demethylglomellicferic acid, conf. J.A. Elix

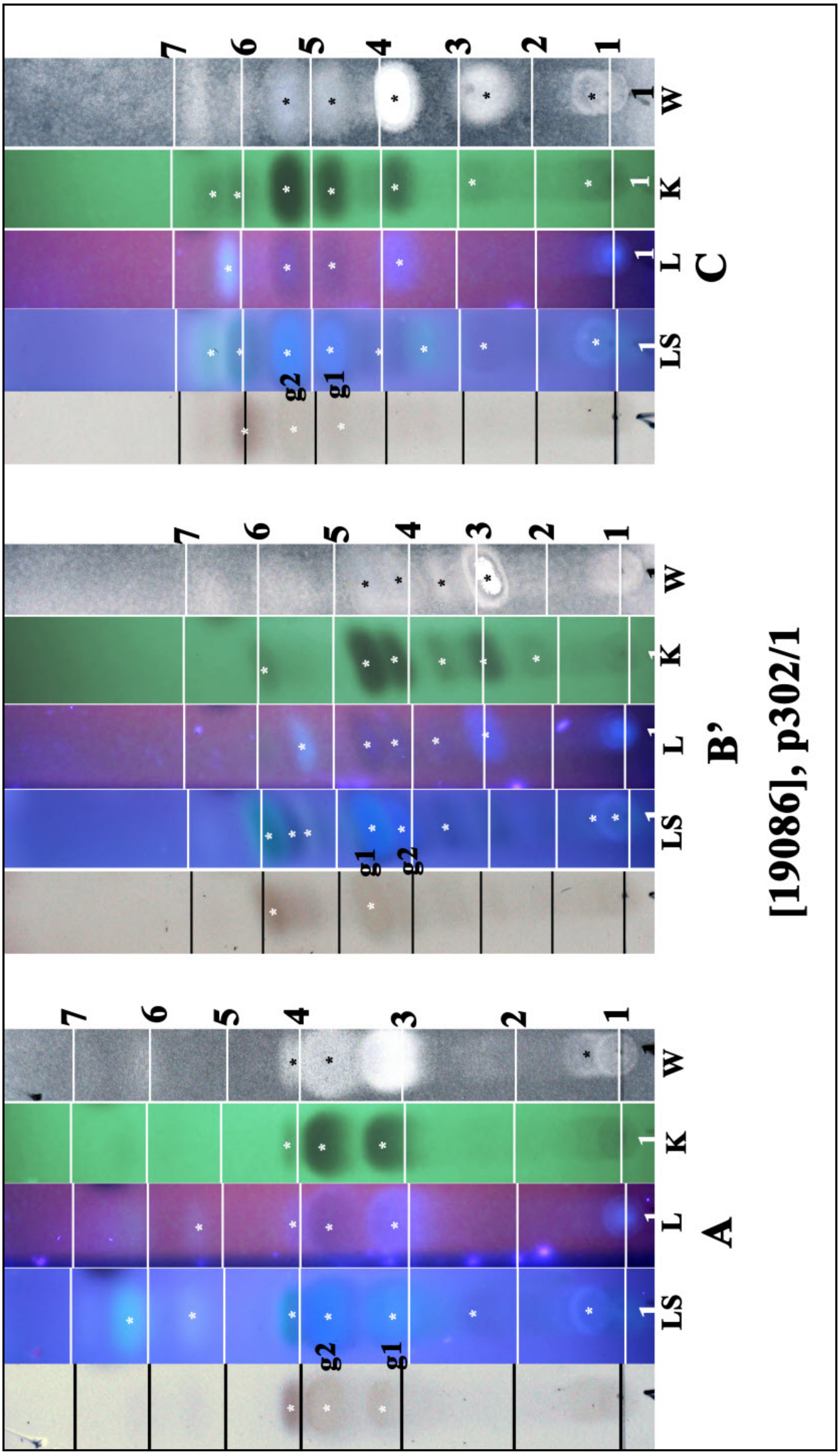
S. Huneck's collection of lichen substances No 1175b: glomelliferic acid. Botanisches Museum Berlin-Dahlem

glomelliferic acid



S. Huneck's collection of lichen substances No 1411: glomellic acid. Botanisches Museum Berlin-Dahlem

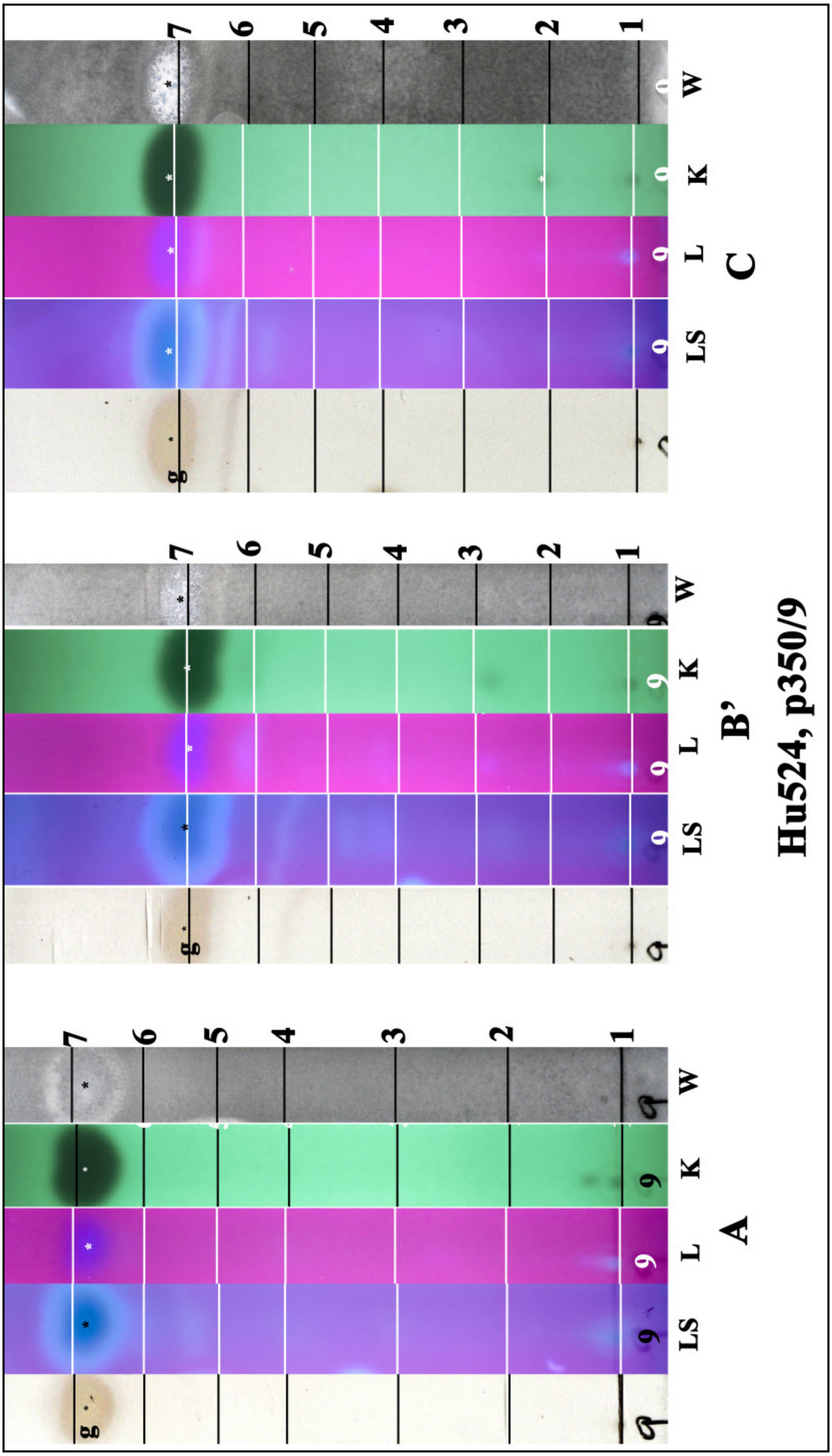
glomelliferonic acid



g1: loxodellonic acid, **g2: glomelliferonic acid**

Xanthoparmelia subincerta (Essl.) Blanco et al., [19086], Australia, Australian Capital Territory, Kowen Forest, 16 km east of Canberra.

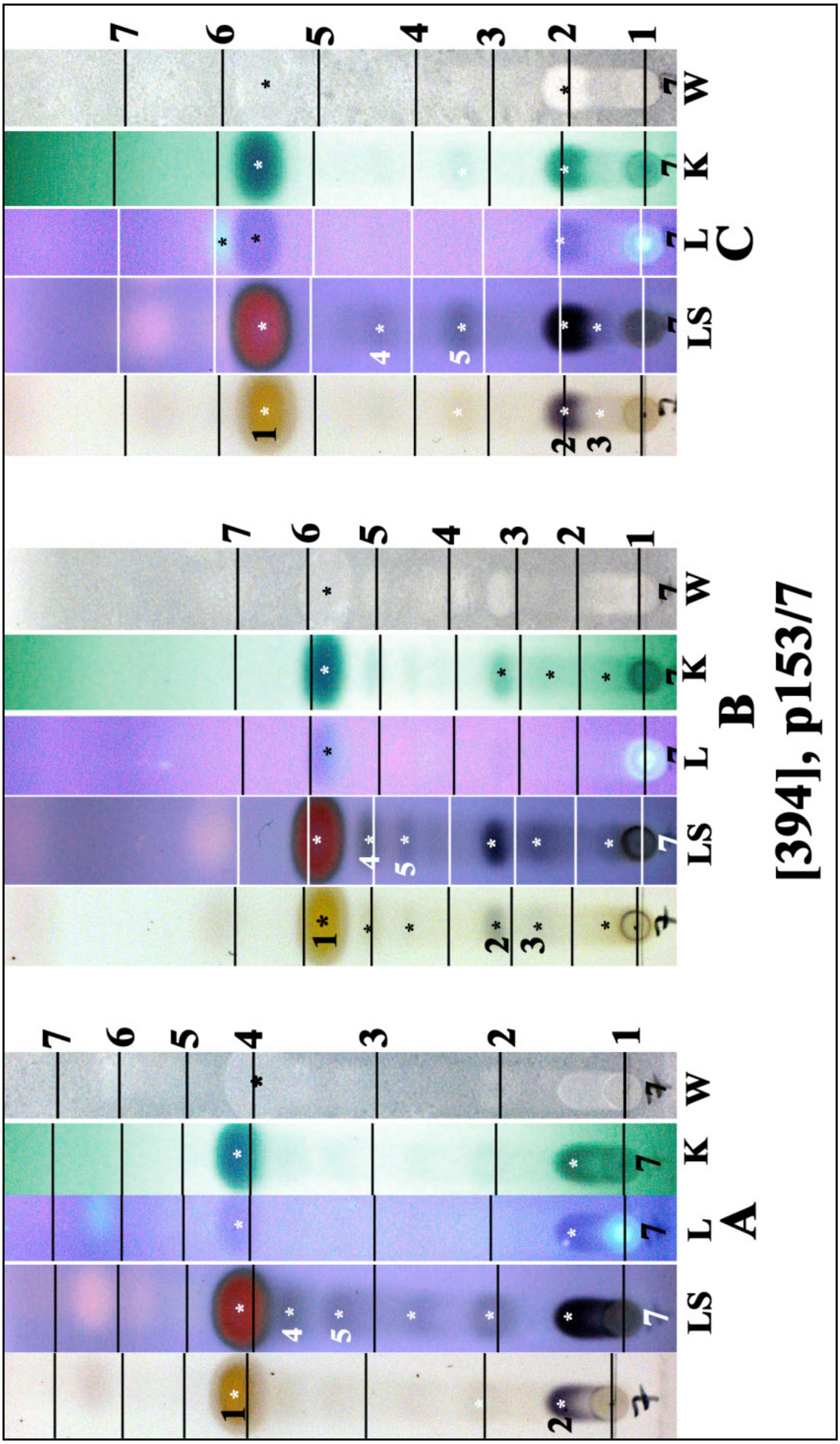
glomellin



g: glomellin, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 524: glomellin
Botanisches Museum Berlin-Dahlem

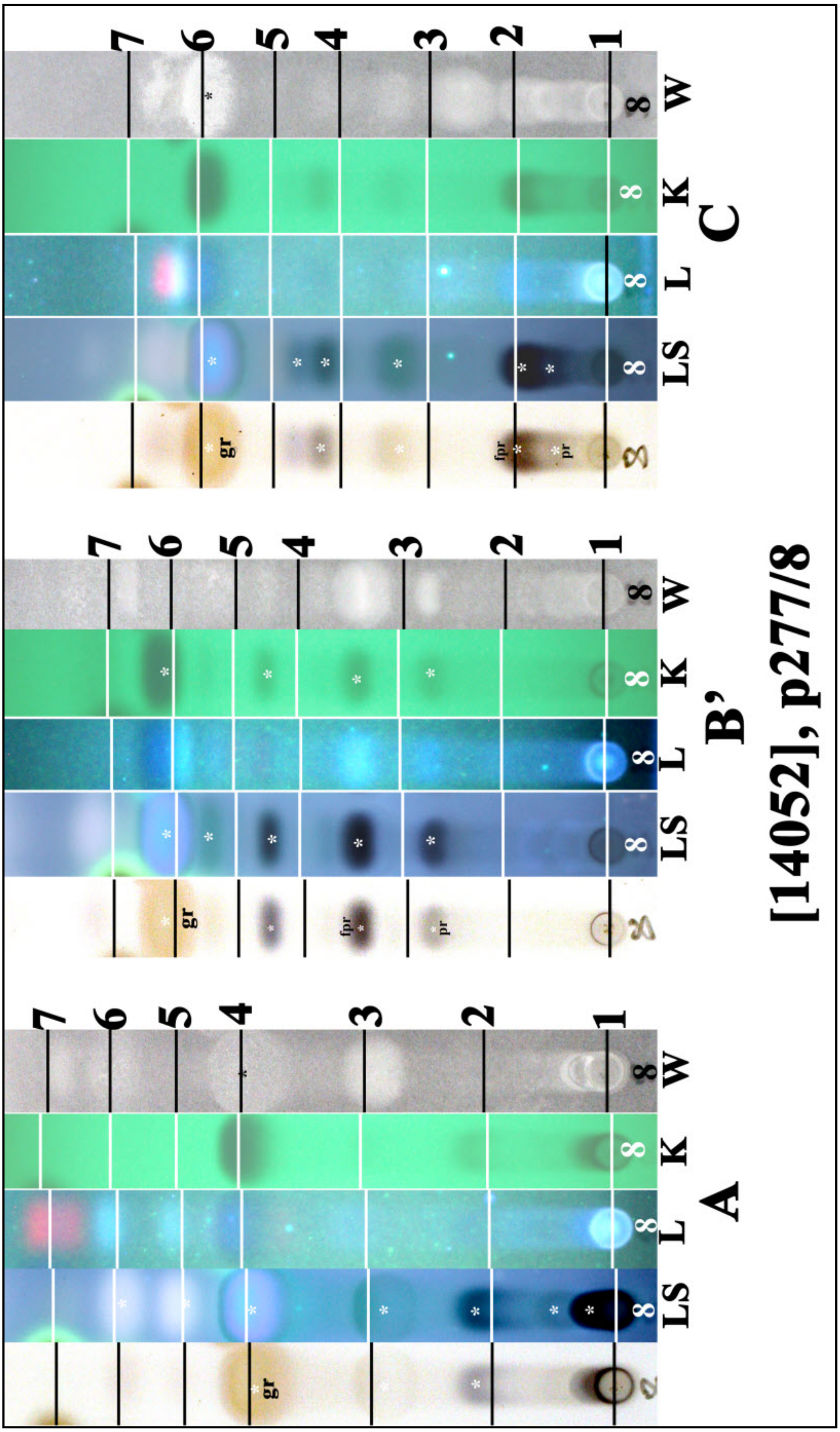
grayanic acid



1: grayanic acid, 2: fumarprotocetraric acid, 3: protocetraric acid, 4: congrayanic acid ,5: 4-*O*-demethylgrayanic acid, conf. J.A. Elix

Cladonia grayi, [394], Germany, Baden-Württemberg, Schwarzwald, Freudenstadt, TK 7516. Leg. F. Schumm, 4.05.1967.

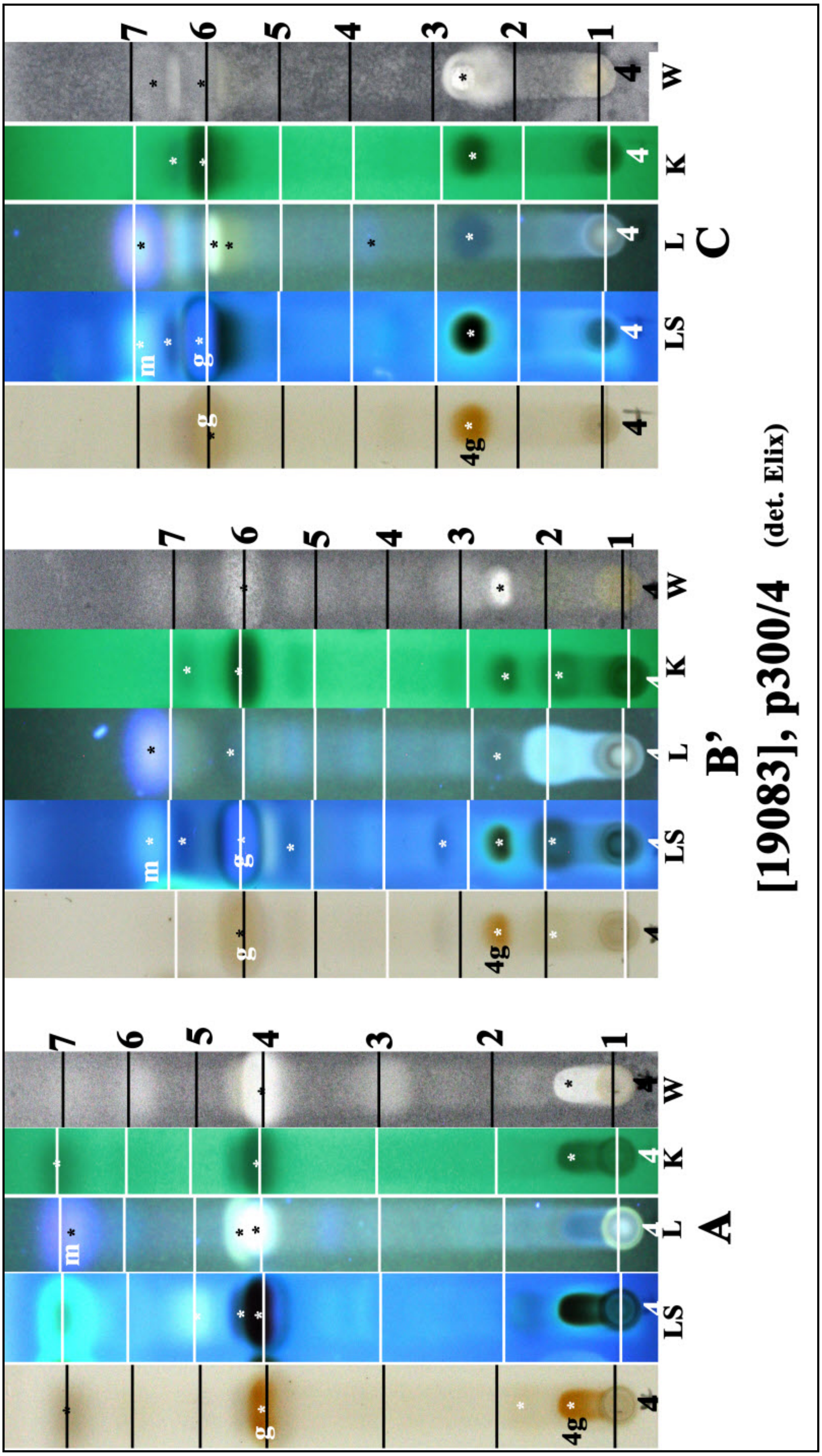
grayanic acid



gr: grayanic acid, pr: protocetraric acid, fpr: fumarprotocetraric acid

Cladonia grayi, [14052], Portugal, Azoren, Terceira, nördlich von Matela an einem Parallesträßchen zur EN3-1, 38°41.461' N, 27°14.999' W, 430 m, an bemoosten, offenstehenden Mauern. Leg. et det. F. Schumm 18.07.2008.

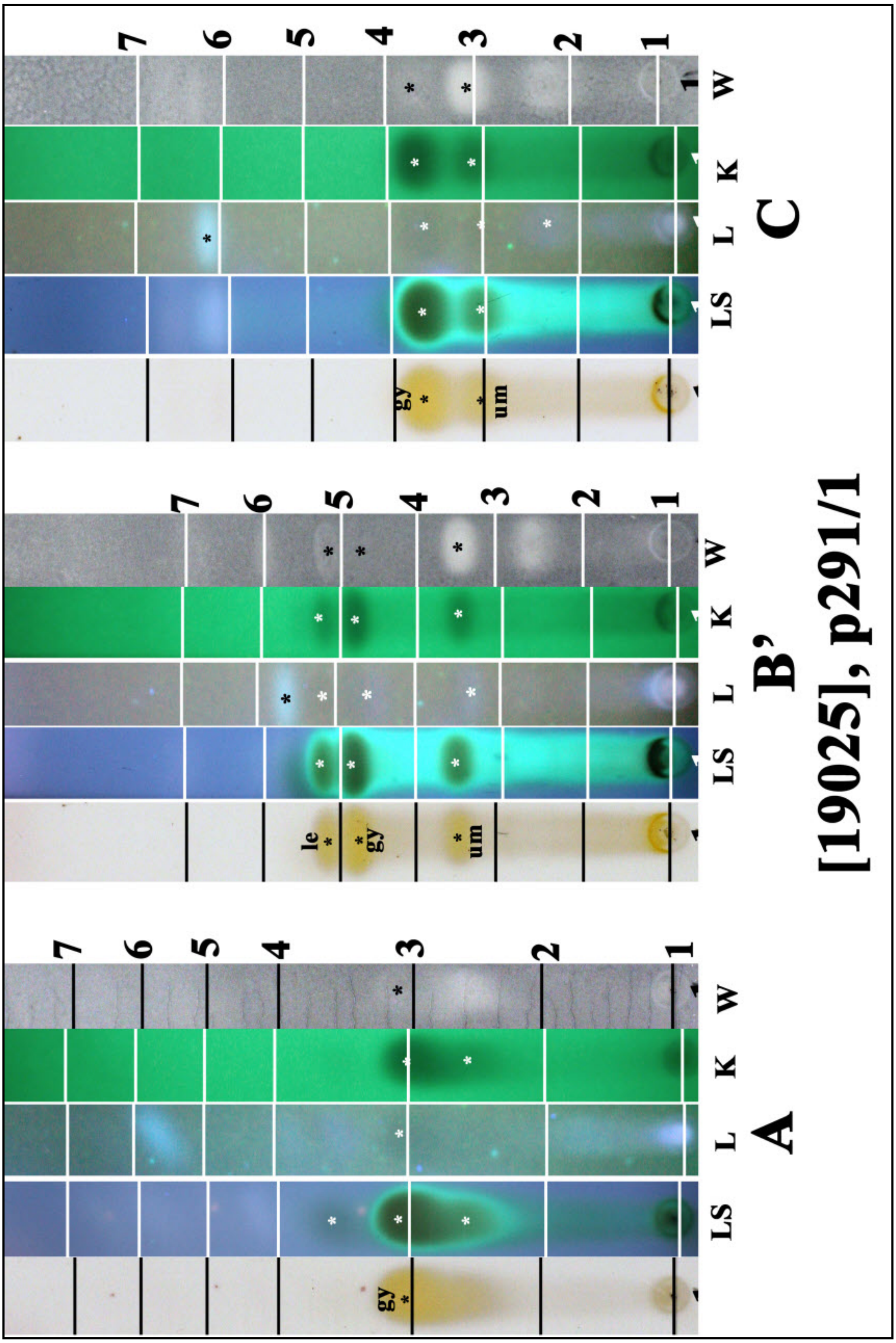
grayanic acid



g: grayanic acid

Neophyllis melacarpa, [19083], Australia, New South Wales, Great dividing Range, 6 km east of Captains Flat, 2 km north of Parkers Gap.

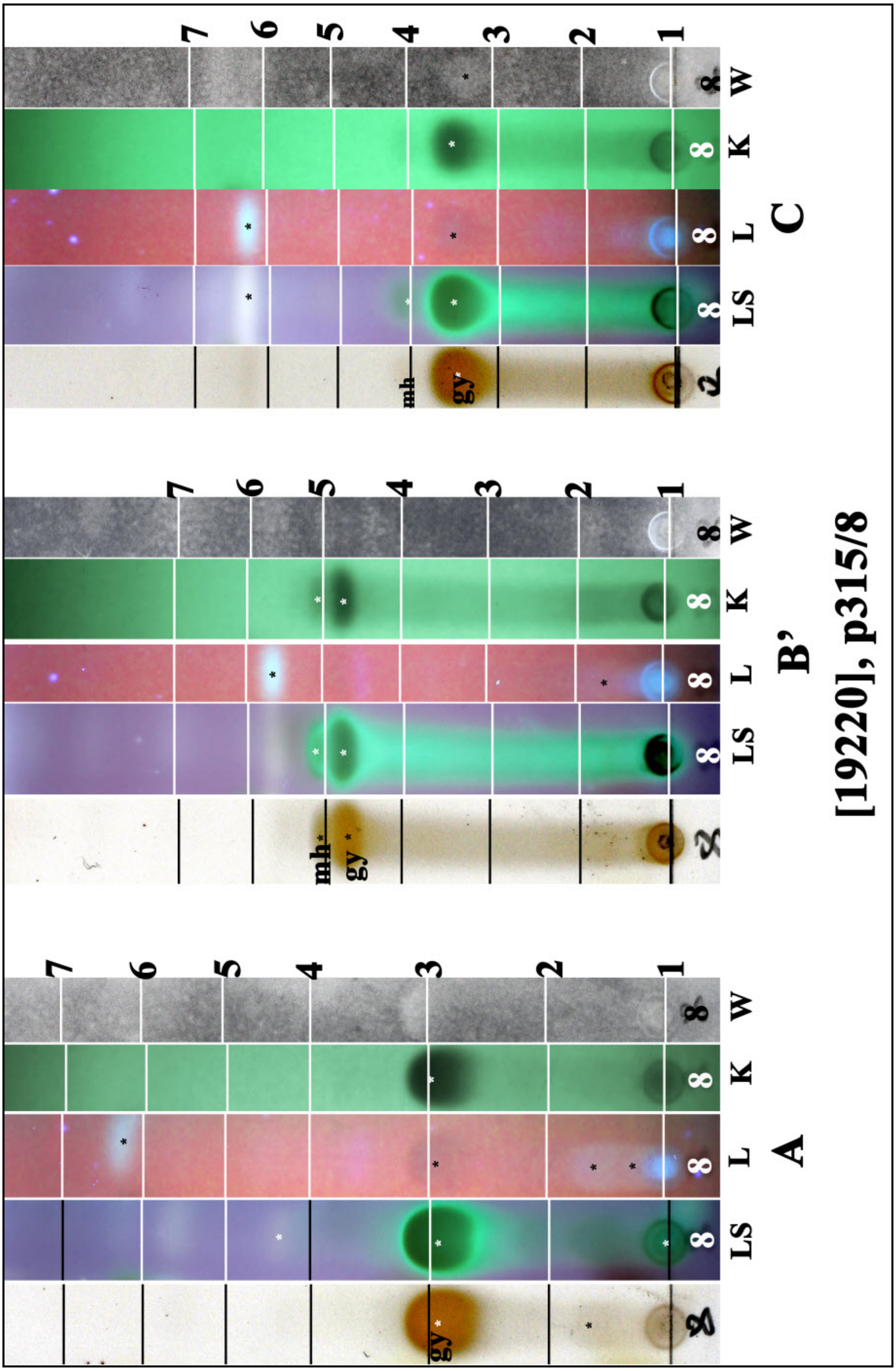
gyrophoric acid



gy: gyrophoric acid (major); um: umbilicaric acid (minor); le: lecanoric acid (minor) in A/C zusammen mit gy

Umbilicaria nylanderiana (Zahlbr.) H.Magn [19025], Deutschland, Niedersachsen, Nationalpark Harz, Gebirgskamm "Auf dem Acker", Kanapeeklippe, auf Quarzit, ca. 750 m. Leg. et det. Hans Ullrich 12.06.1960, Nr. 2145.

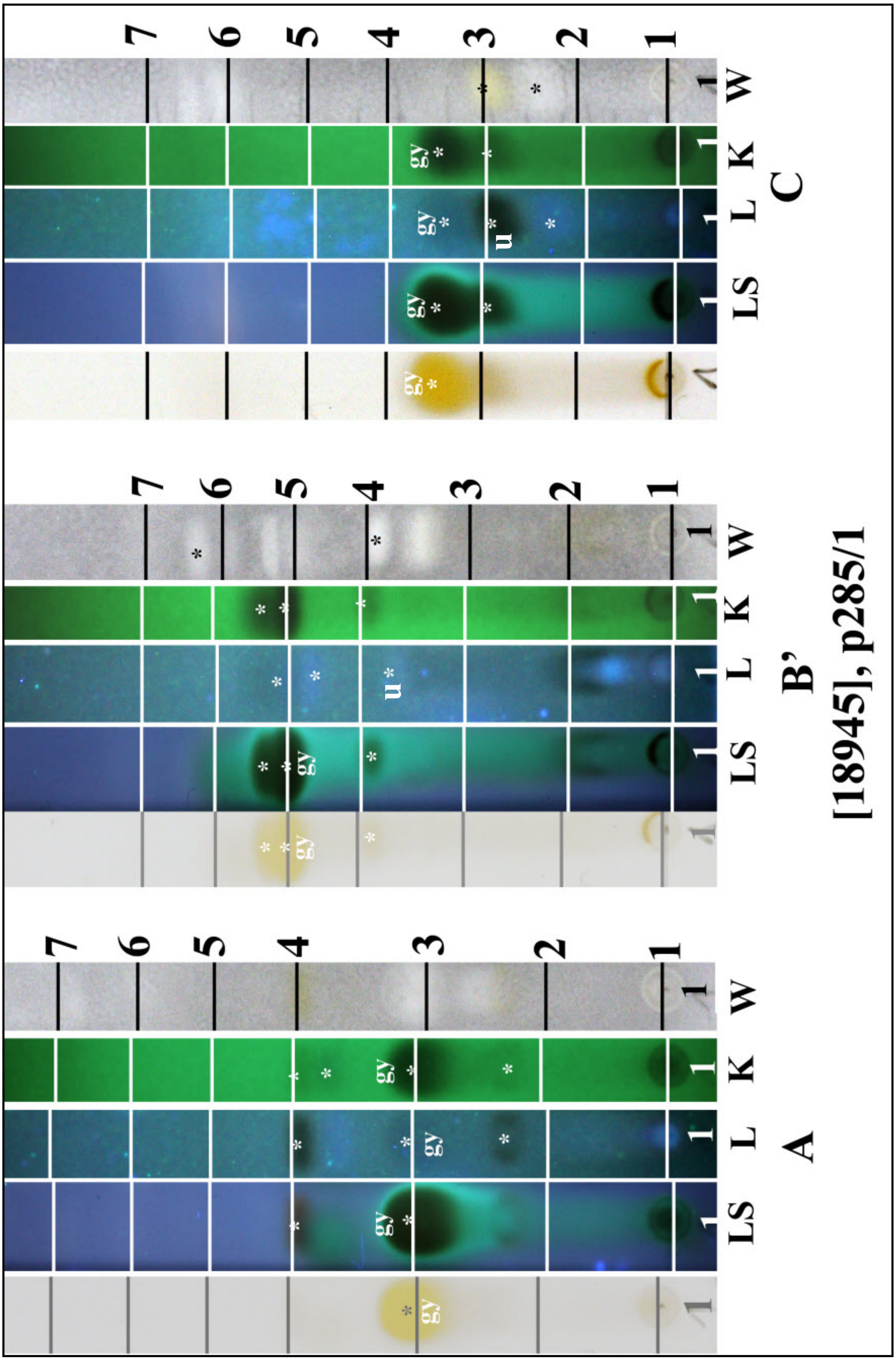
gyrophoric acid



gy: gyrophoric acid, mh: 5-O-methylhiascic acid

Placopsis gelida, [19220], Australia, Victoria, Errinundra Road, 24 km south of Bendoc, 37°22' S, 148°53' E, 800 m.

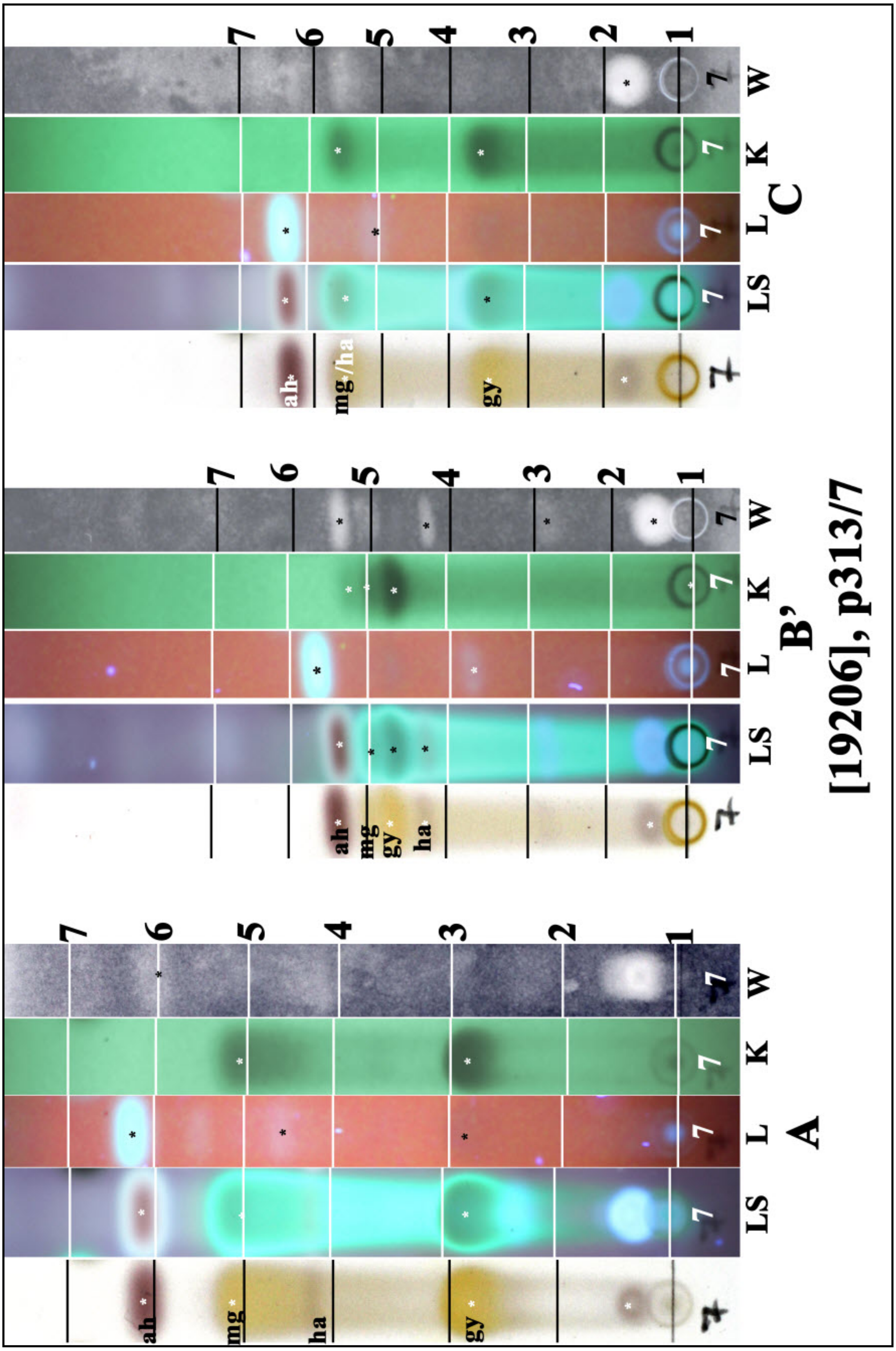
gyrophoric acid



gy: gyrophoric acid, u: umbilicaric acid

Umbilicaria subglabra [18945], Australia, Australian Capital Territory

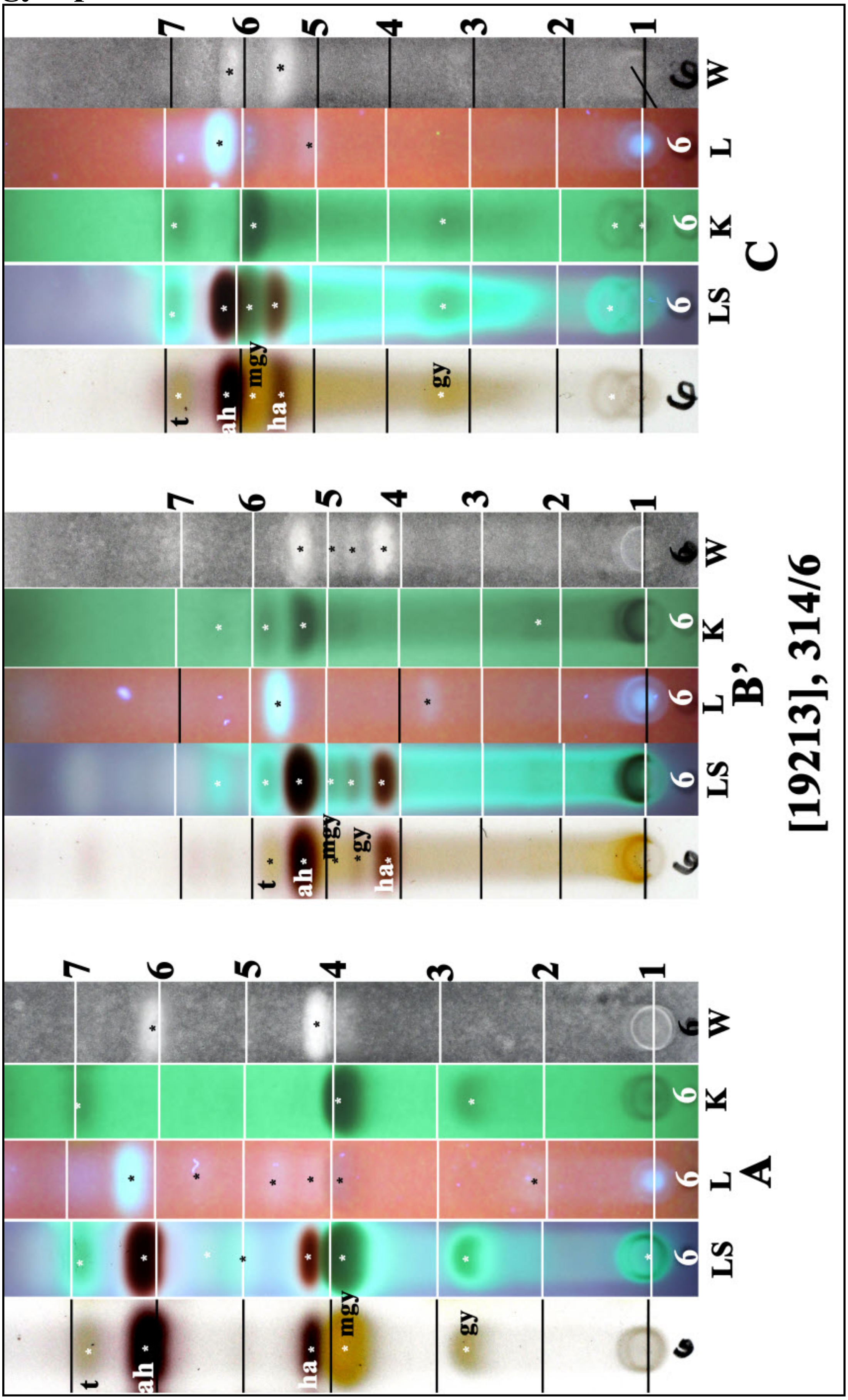
gyrophoric acid



ah: 7β-acetoxyhopane-22-ol, mg: methyl gyrophorate, ha: hopane-15α,22-diol, **gy: gyrophoric acid**

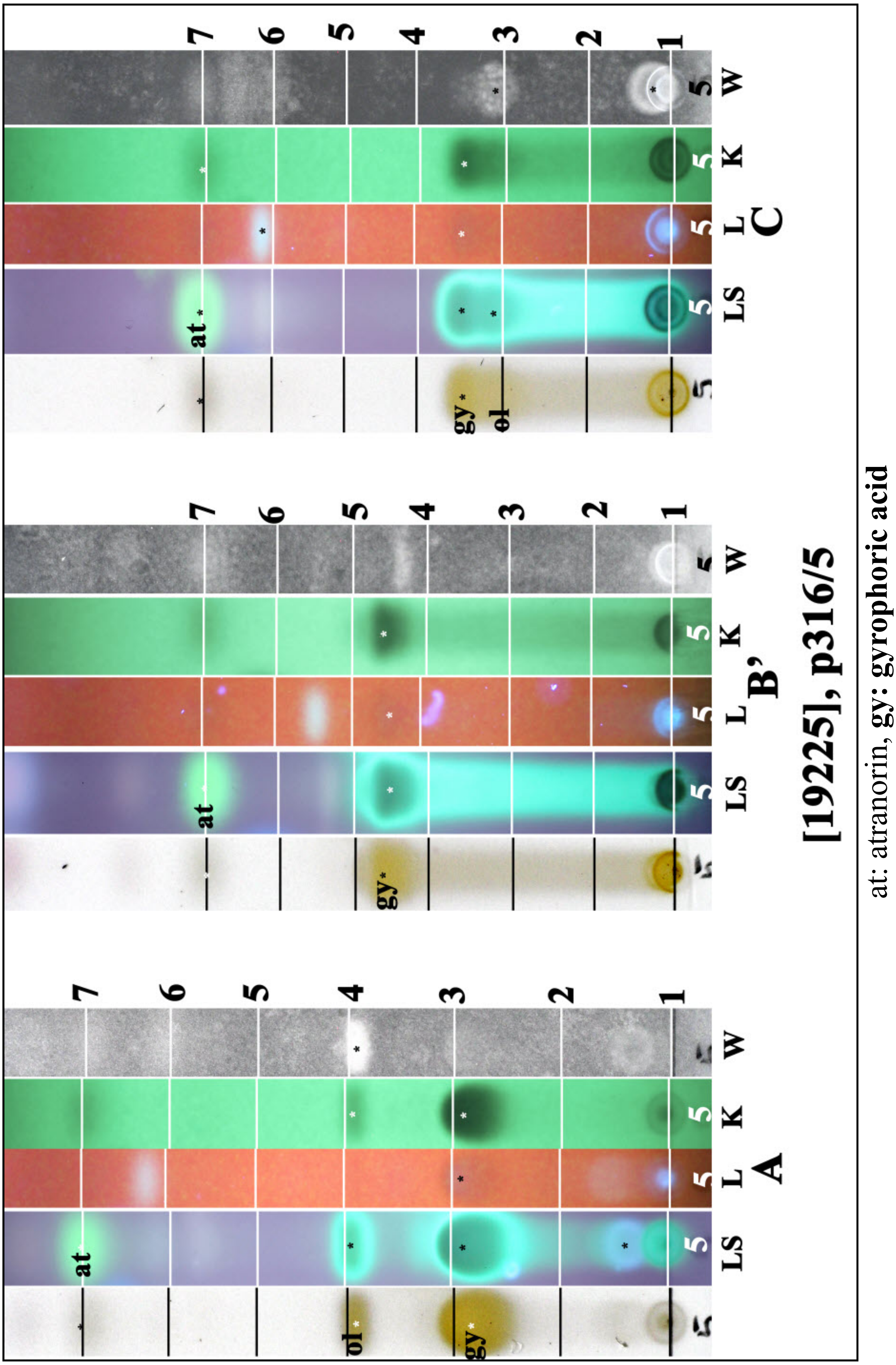
Pseudocyphellaria dissimilis,[19206], Australia, New South Wales, Moppy Lookout, Barrington Tops State Forest, 40 km west-north-west of Gloucester, 31°53' S, 151°32' E, 1200 m.

gyrophoric acid



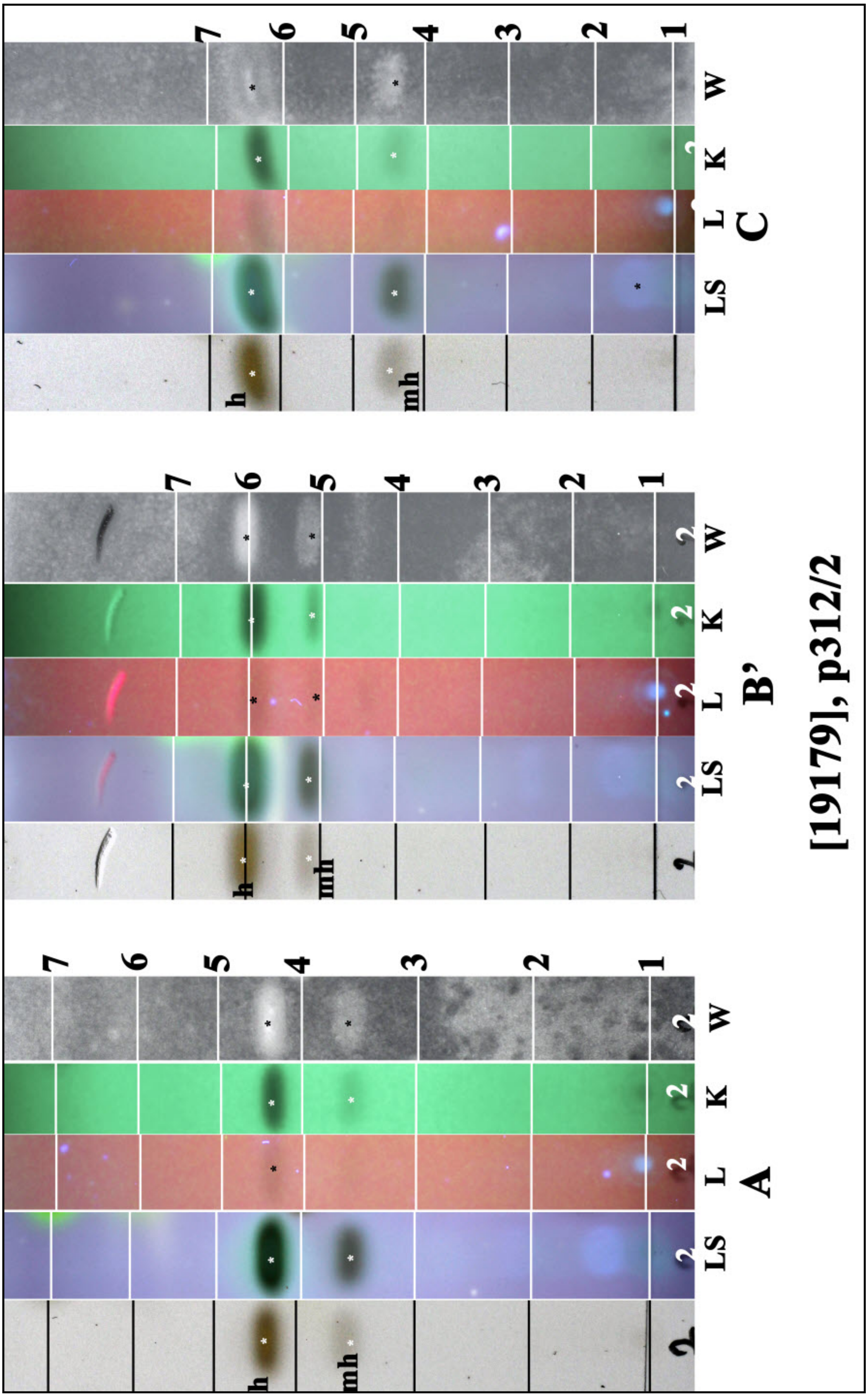
Pseudocyphellaria sulphurea, [19213], Australia, Queensland, Kirrima State Forest, Cardwell Range, 24 km west-north-west of Cardwell, 18°12' S, 145°48' E, 750 m.

gyrophoric acid



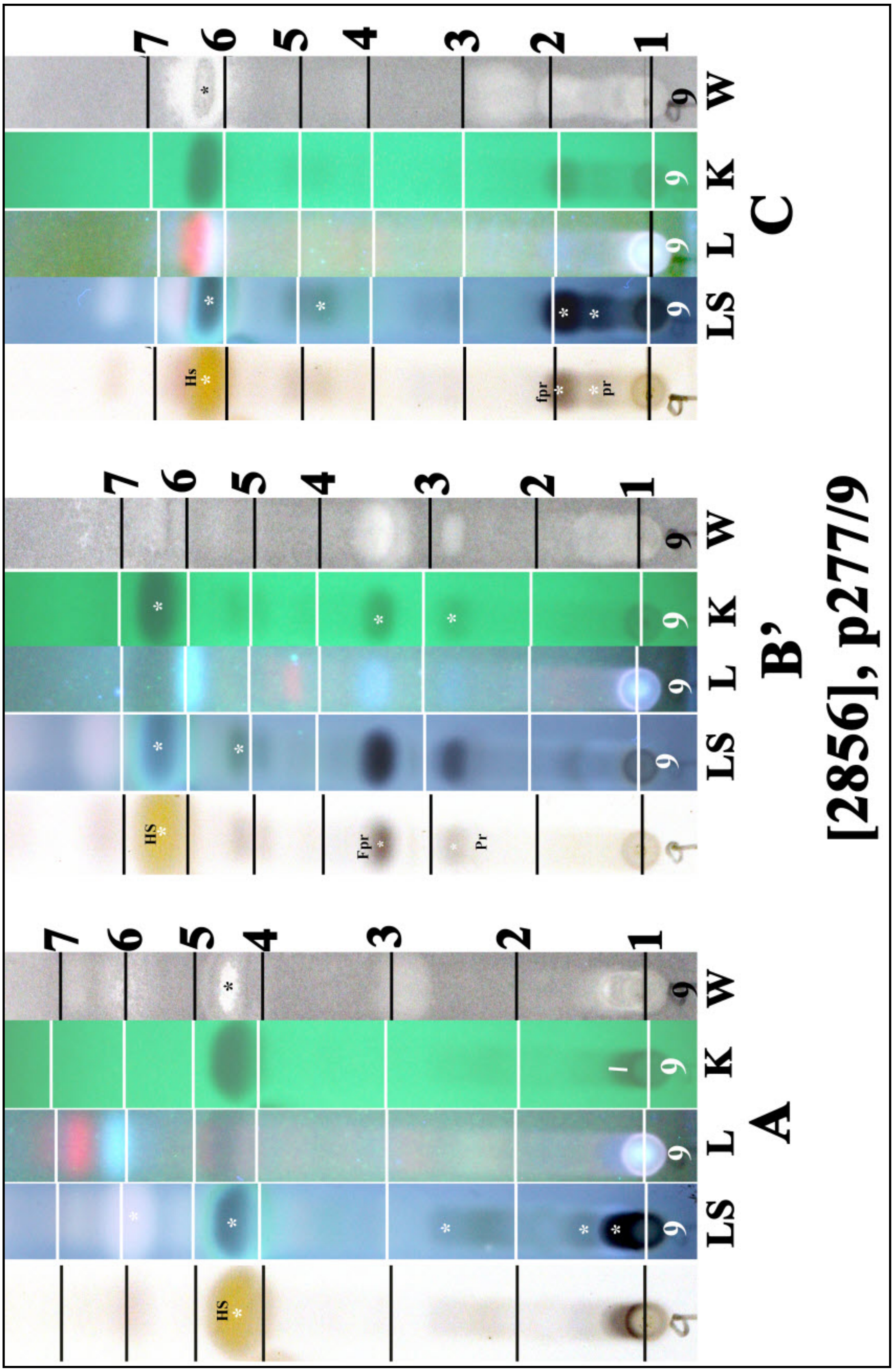
Punctelia borreri, [19225], Australia, New South Wales, 36 km east-south-east of Cooma along the Countegany-Kybean road, 36°19' S, 149°30 'E, 1000 m.

homosekikaic acid



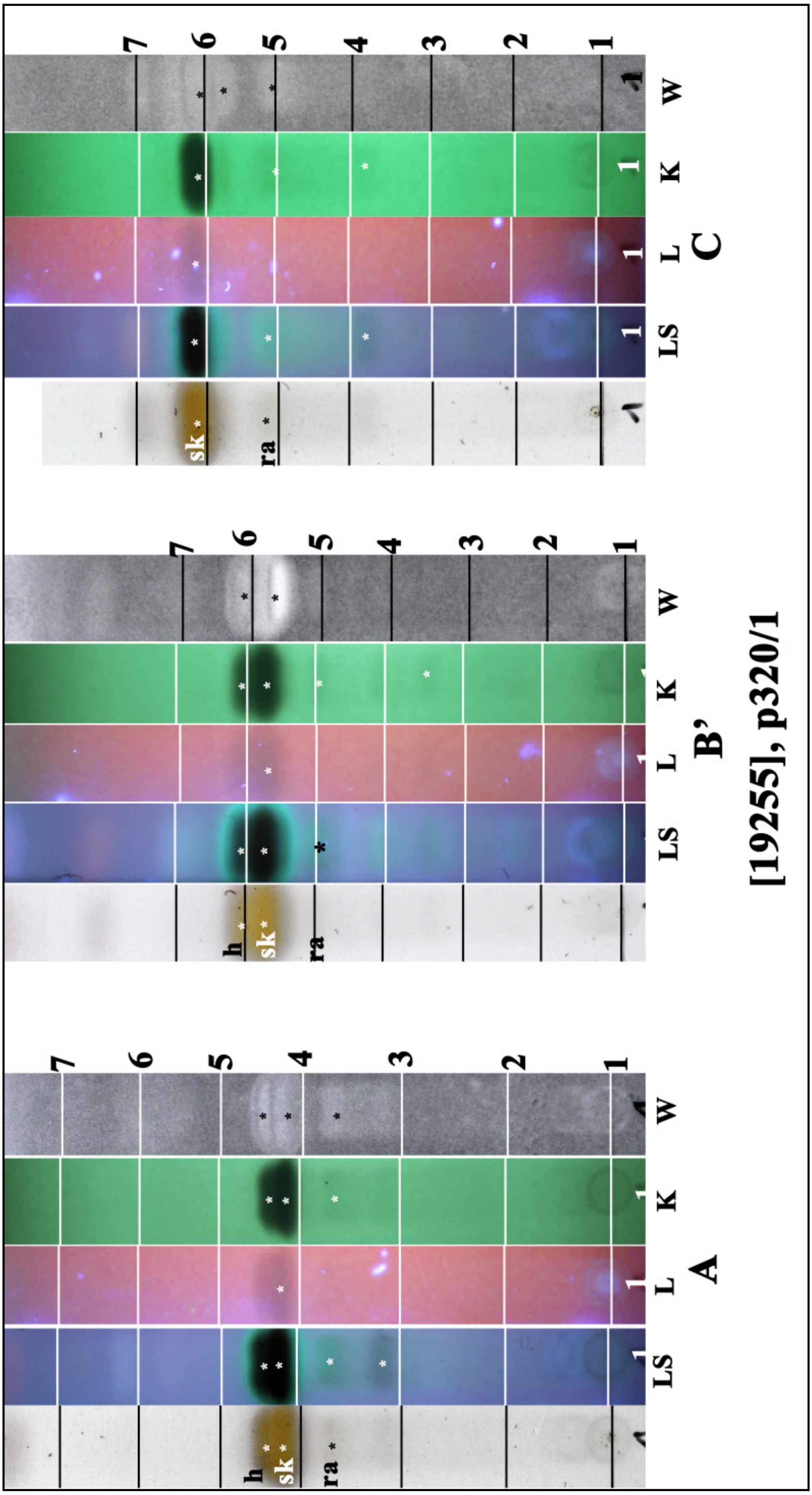
Cladia moniliformis, [19179], Australia, Tasmania, Scotts Peak Road near airstrip, 43°02' S, 146°19' E, 340 m.

homosekikaic acid



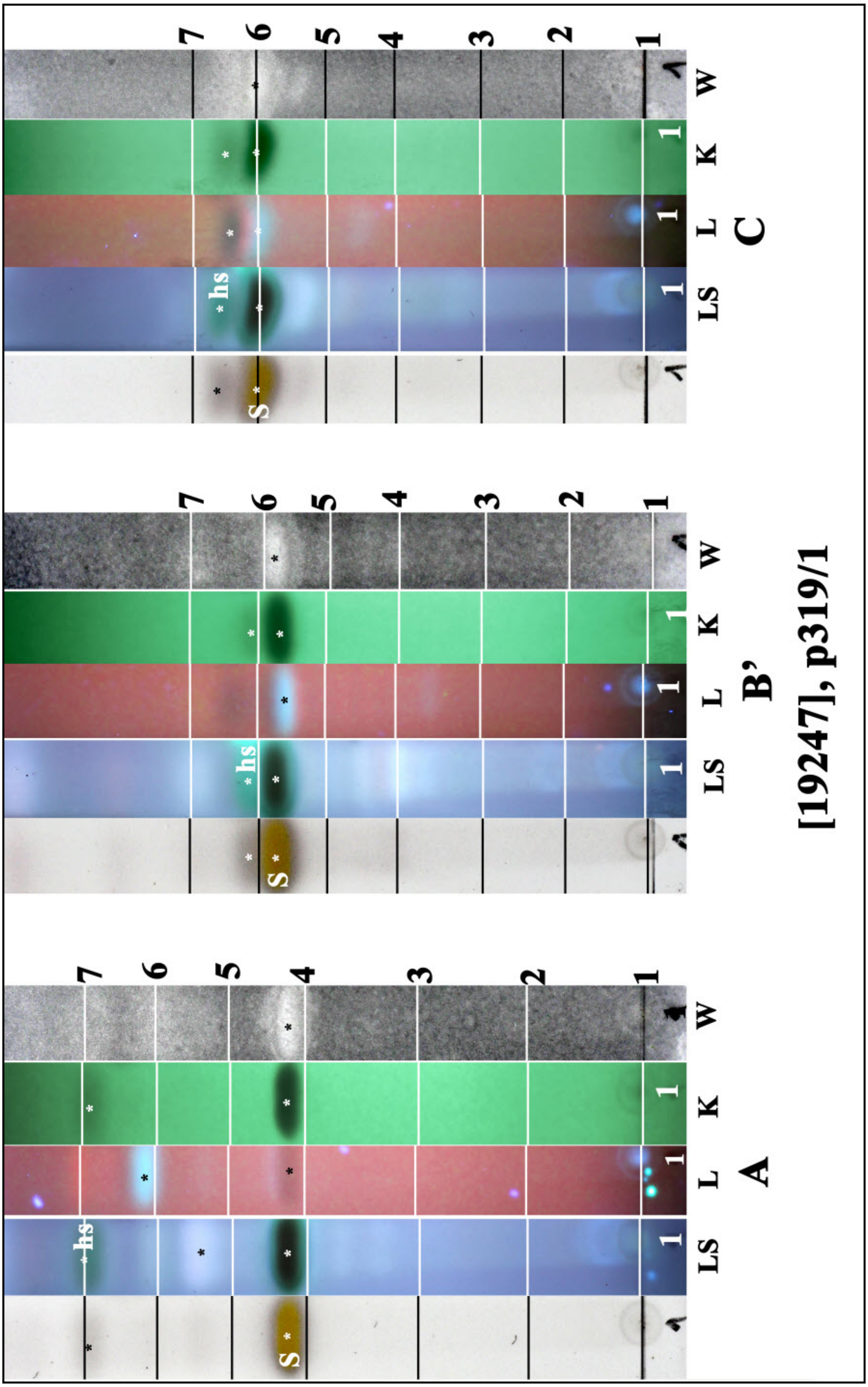
Cladonia rei, [2856], Spanien, Kanarische Inseln, Hierro: zerstreut auf humusarmen Schotterbänke und in halbschattigen Erosionsrinnen in der Kampfzone von Juniperus phoenica im Cladinietum macaronesicae, 400 m, pH 6,6, Sabinar de la Dehesa in der Sturmzone der west. Inselabdachung. Leg. G. Follmann & Hernández-Padrón März 1980, det. T. Ahti 3.1980. Lich. Exscicc. Sel. Nr. 327.

homosekikaic acid



Ramalina peruviana, [19255], Norfolk Island, Rocky Point Reserve, 29°03' S, 167°55' E, 60 m.

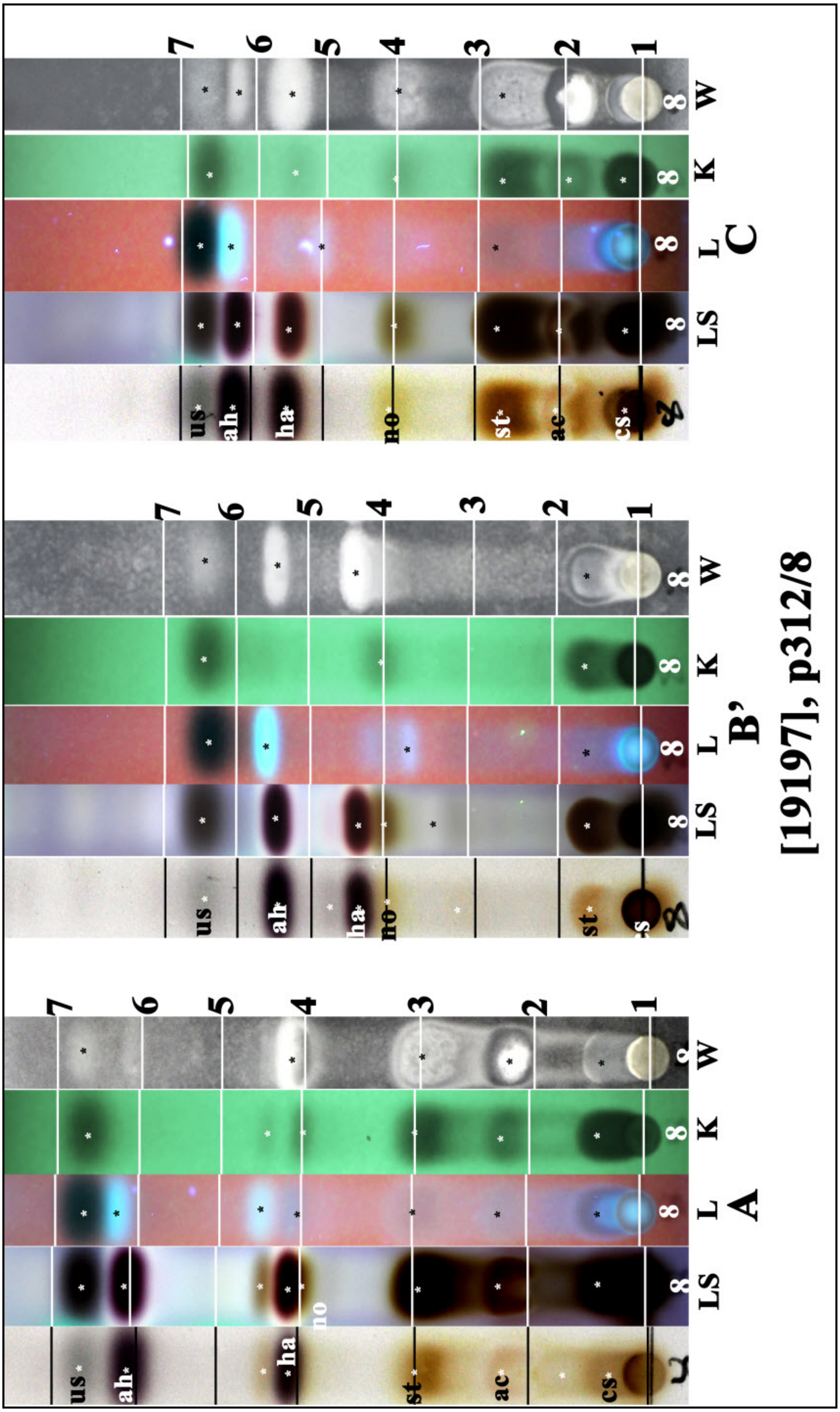
homosekikaic acid



s: sekikaic acid, hs: homosekikaic acid

Ramalina glaucescens, [19247], Australia, Victoria, Omeo, 37°06' S, 147°36' E, 720 m.

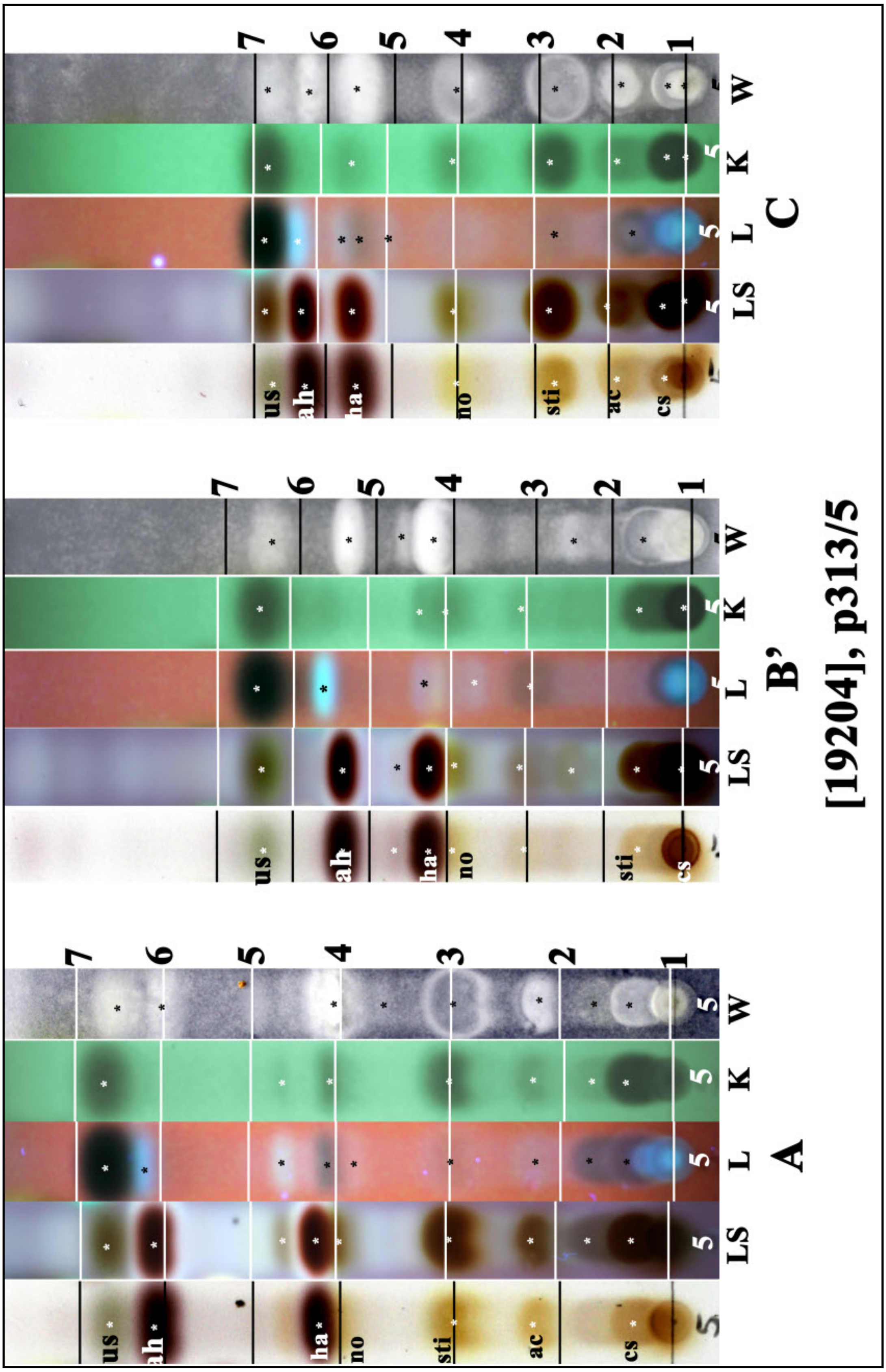
hopane-15α,22-diol



us: usnic acid, st: stictic acid, no: norstictic acid, cs: constictic acid,
ah: 7β-acetoxyhopane-22-ol, **ha: hopane-15α,22-diol**, ac: 9α-acetoxyconstictic acid

Pseudocyphellaria glabra ,[19197], New Zealand, South Island, Canterbury, 3 km east of Te Oka Peak, Banks Peninsula.

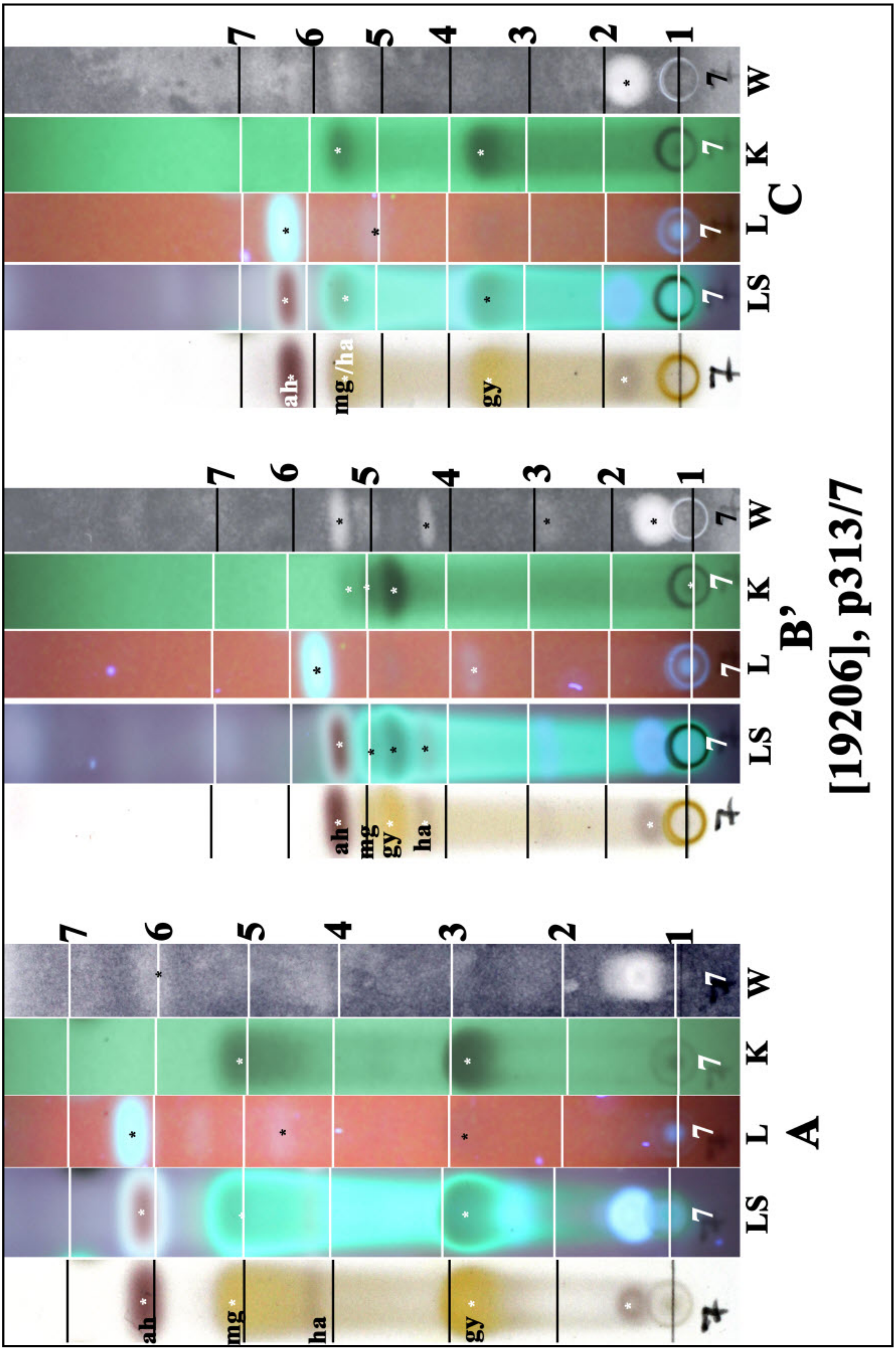
hopane-15α,22-diol



us: usnic acid, no: norstictic acid, sti: stictic acid, cs: constictic acid, ah: 7β-acetoxyhopane-22-ol, **ha: hopane-15α,22-diol**, ac: 9α-acetoxyconstictic acid

Pseudocyphellaria glabra, [19204], Australia, Victoria, Donna Buang - Healesville road, 6 km north-west of Warburton, 37°42' S, 145°39' E, 1040 m.

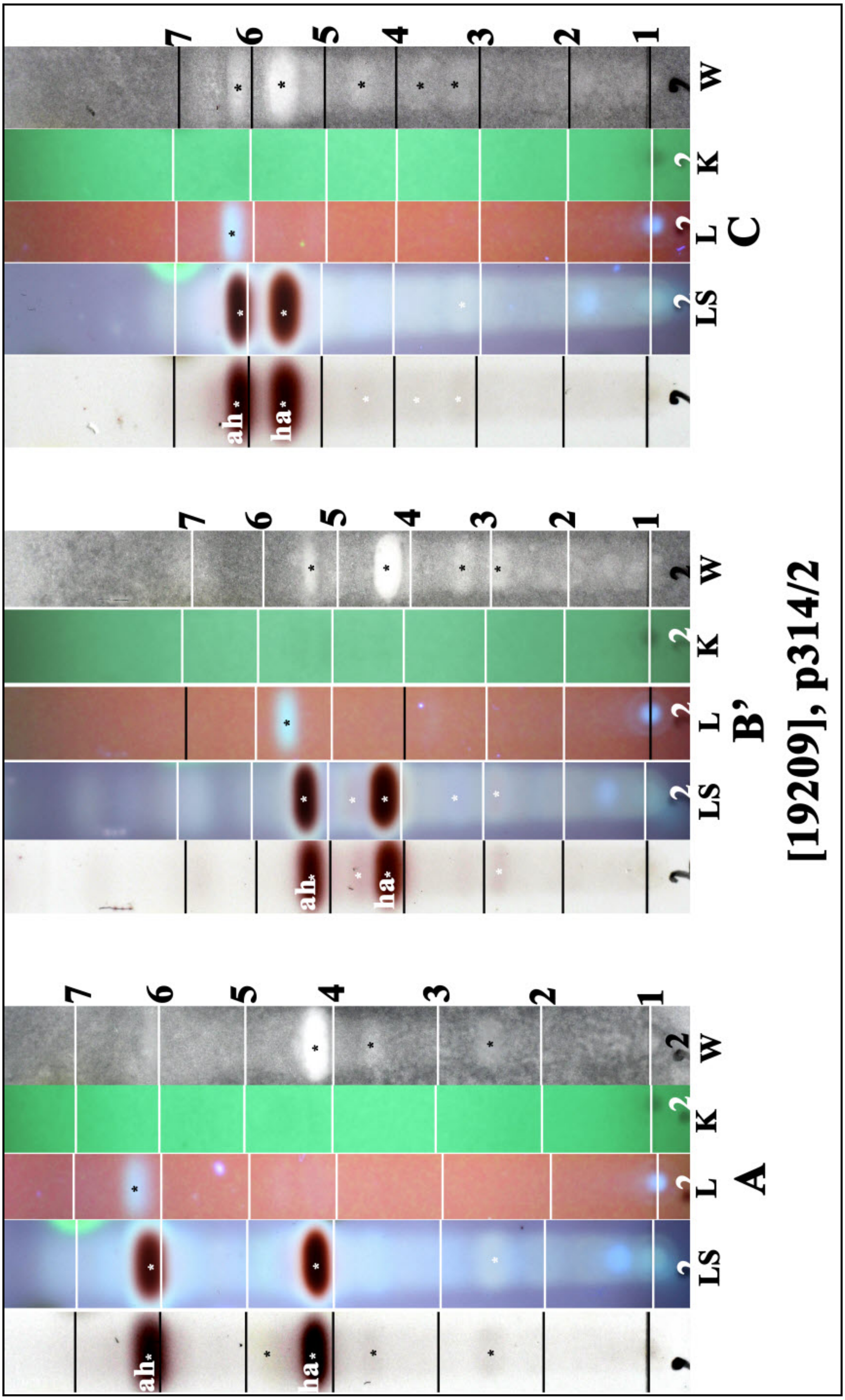
hopane-15α,22-diol



ah: 7β-acetoxyhopane-22-ol, mg: methyl gyrophorate, **ha: hopane-15α,22-diol**, gy: gyrophoric

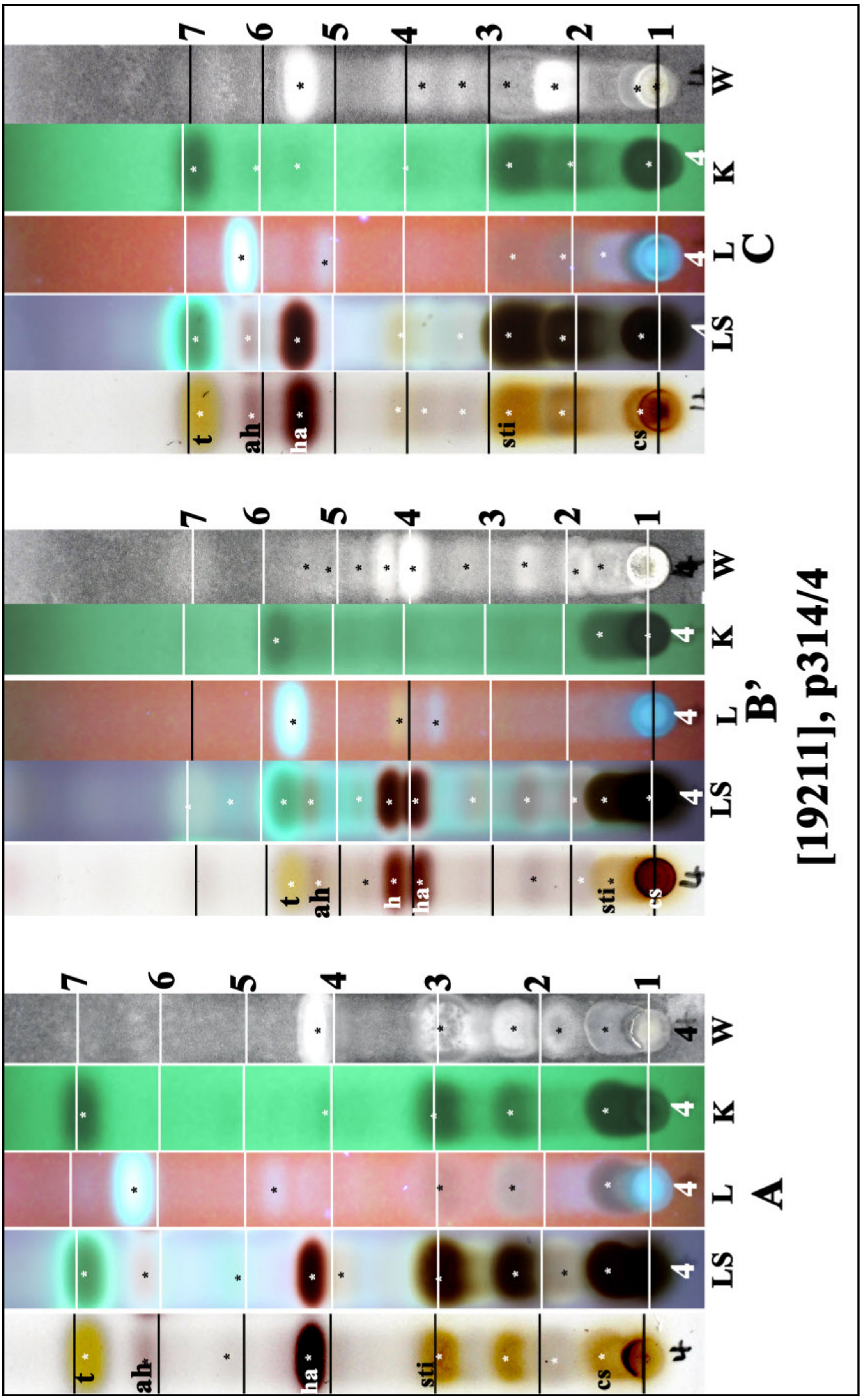
Pseudocyphellaria dissimilis,[19206], Australia, New South Wales, Moppy Lookout, Barrington Tops State Forest, 40 km west-north-west of Gloucester, 31°53' S, 151°32' E, 1200 m.

hopane-15α,22-diol



Pseudocyphellaria multifida, [19209], New Zealand, South Island, Canterbury, 1 km south-east of Mount Bossu, Banks Peninsula, 640 m.

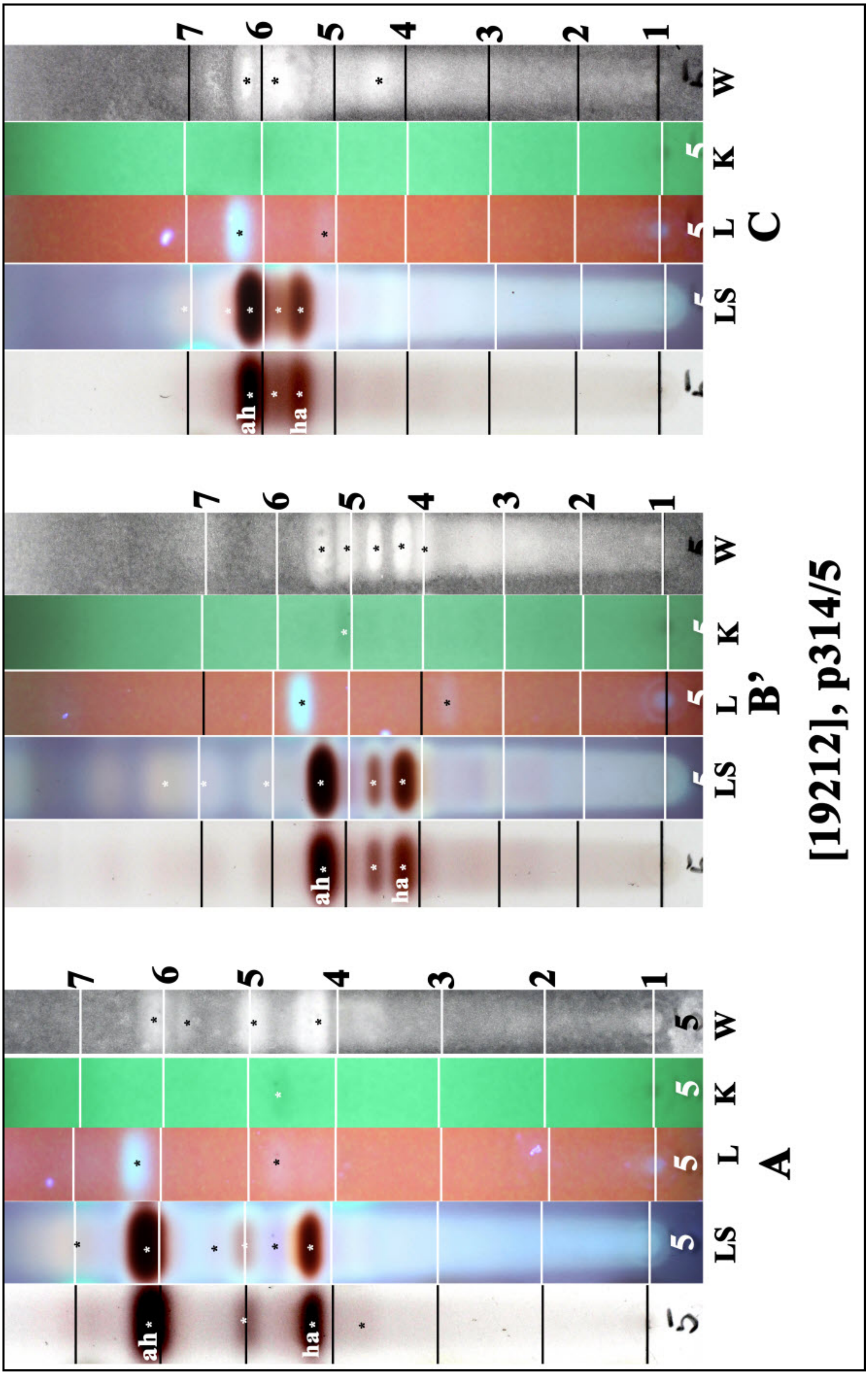
hopane-15α,22-diol



t: tenuiorin, ah: 7β-acetoxyhopane-22-ol, **ha: hopane-15α,22-diol,**
h: hopane-6α,7β,22-triol, sti: stictic acid,, cs: constictic acid.

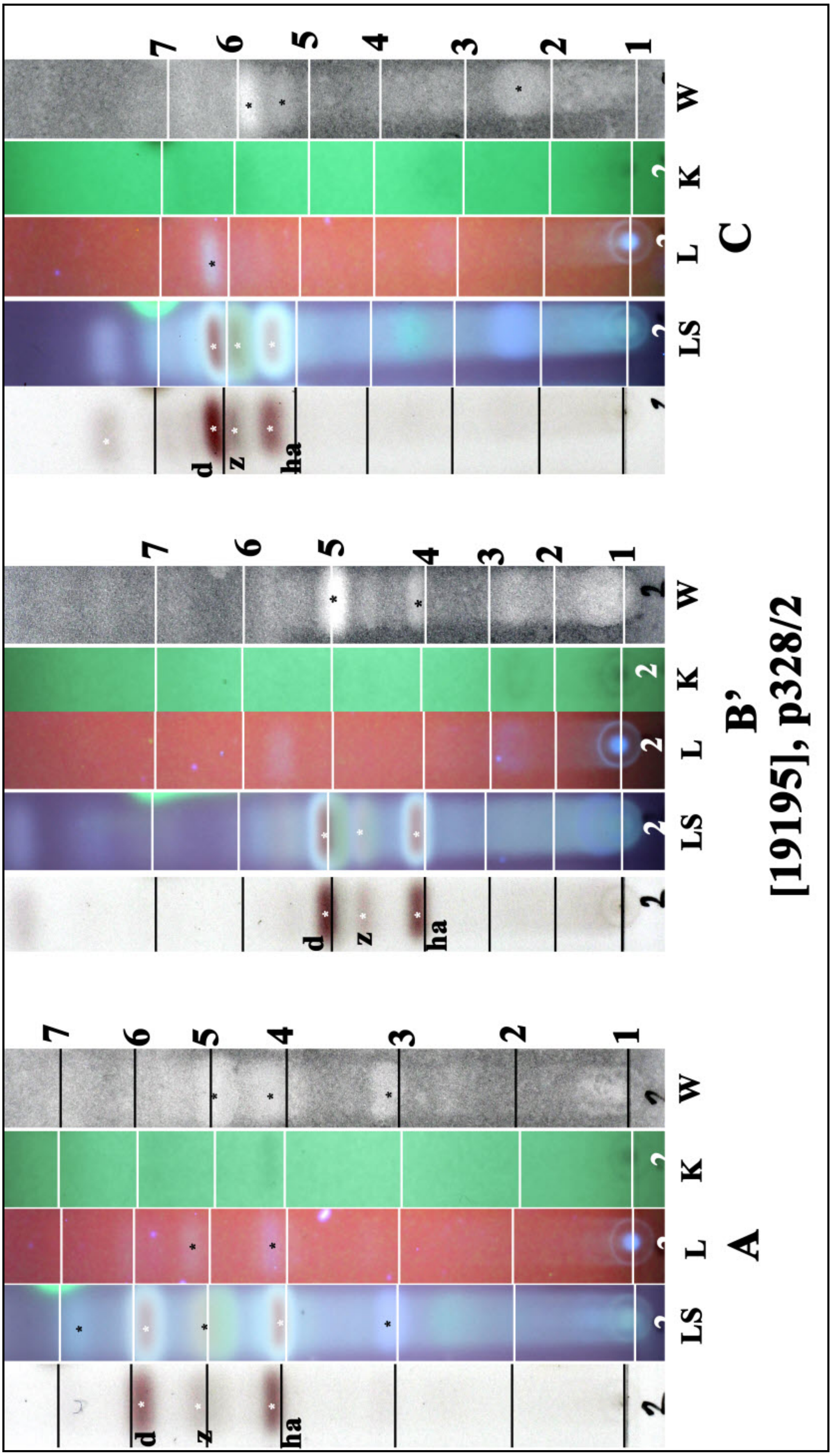
Pseudocyphellaria pubescens, [19211], New Zealand, South Island, Canterbury, eastern entrance to Arthurs Pass National Park, 670 m.

hopane-15α,22-diol



Pseudocyphellaria punctillaris, [19212], Australia, Queensland, Hugh Nelson Range, along Plath Road, 15 km south of Atherton, 17°25' S, 145°26' E, 1080 m.

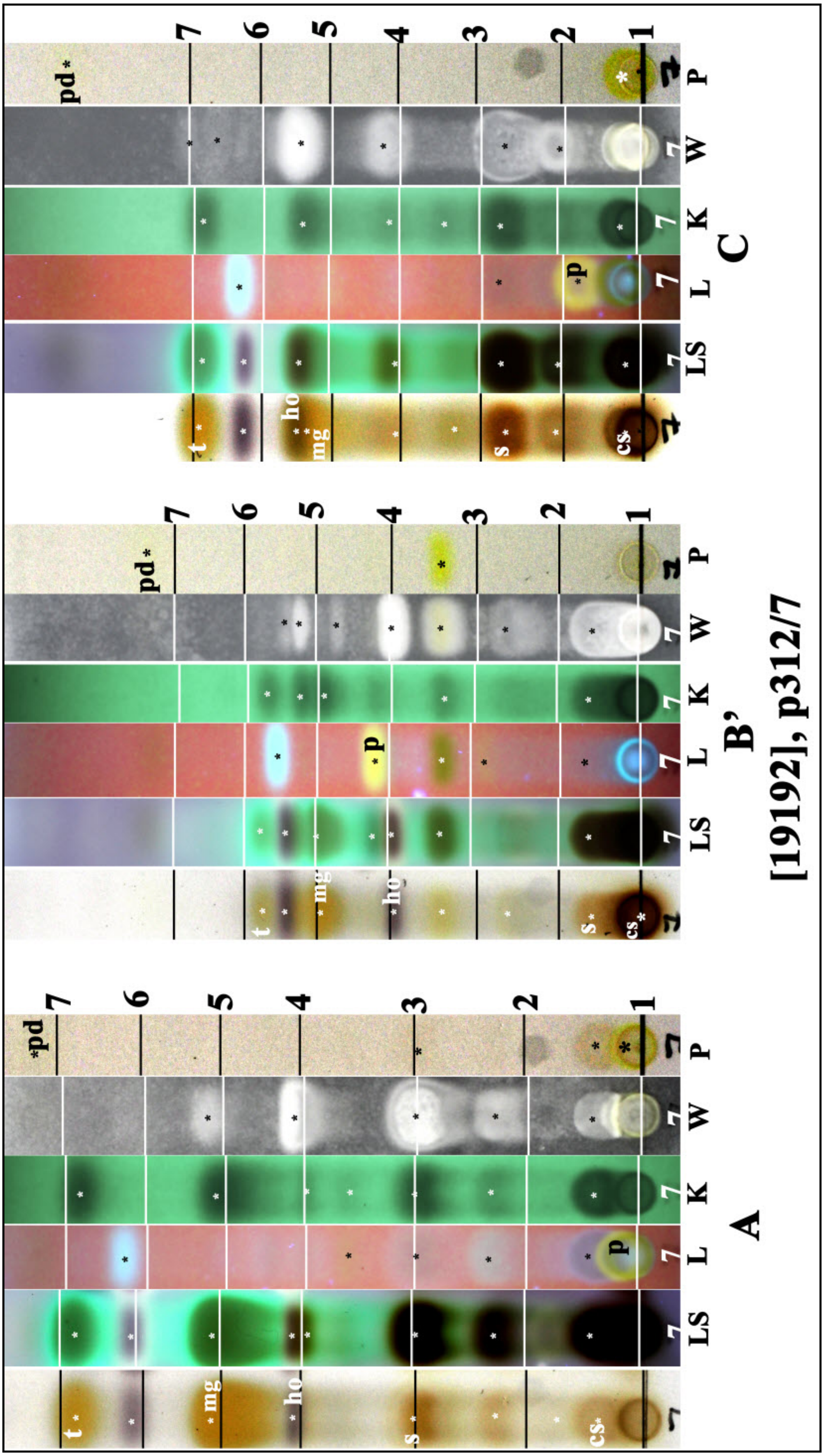
hopane-15α,22-diol



d: dolichorrhizin (= 15α-acetoxyhopane-22-ol), z: zeorin, **ha: hopane-15α,22-diol.**

Nephroma parile , [19195], Norway, Eidford, 60.469° N, 7.066° E, 40 m, growing on shady deciduous tree. Leg. F. Schumm 21.06.2014.

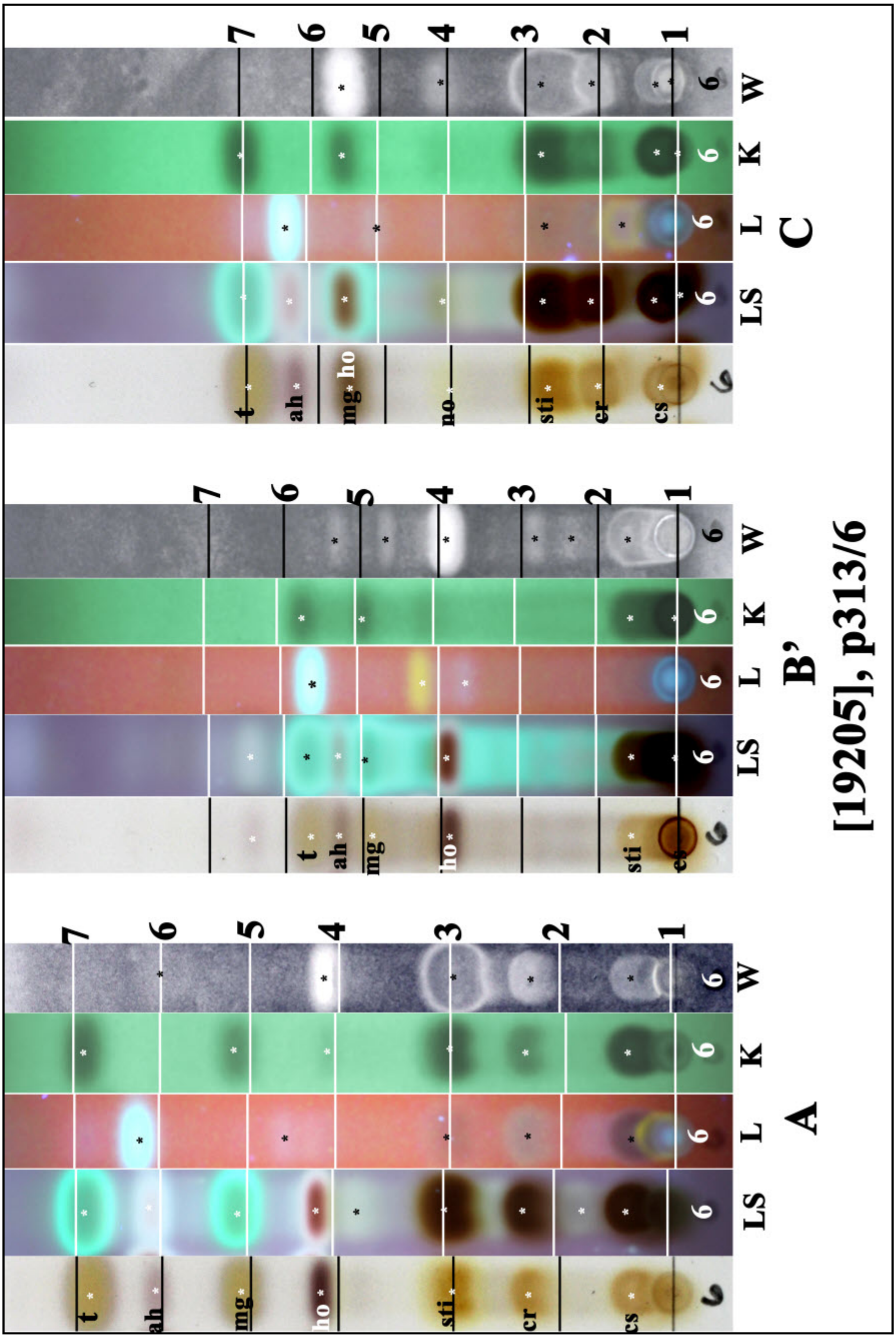
hopane-6α,7β,22-triol



pd: pulvinic dilactone + calycin, p: pulvinic acid, t: tenuiorin, mg: methyl gyrophorate, s: stictic acid, cs: constictic acid, **ho: hopane-6α,7β,22-triol**

Pseudocyphellaria crocata **,** [19192], Norfolk Island. Mt. Pitt Reserve, Selwyn Pine Track, 29°01' S, 167°56'30" E, 200 m.

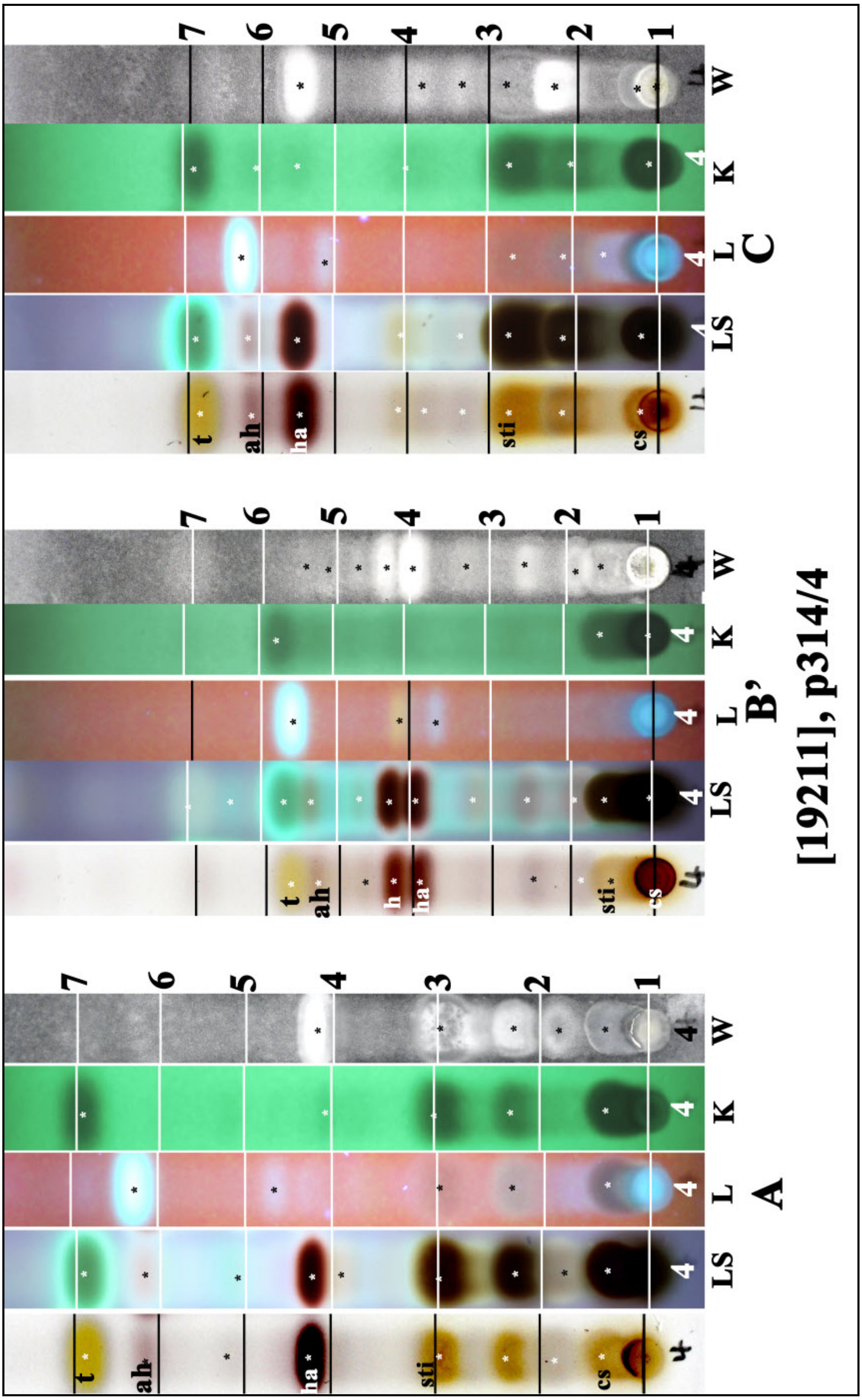
hopane-6α,7β,22-triol



t: tenuiorin, ah: 7β-acetoxyhopane-22-ol, mg: methyl gyrophorate, **ho: hopane-6α,7β,22-triol**, no: norstictic acid,
sti: stictic acid, cs:constictic acid, cr: cryptostictic acid

Pseudocyphellaria desfontainii, [19205], Australien, Queensland, Vine Creek, 6 km south east of Ravenshoe, 17°39' S, 145°30' E, 900 m.

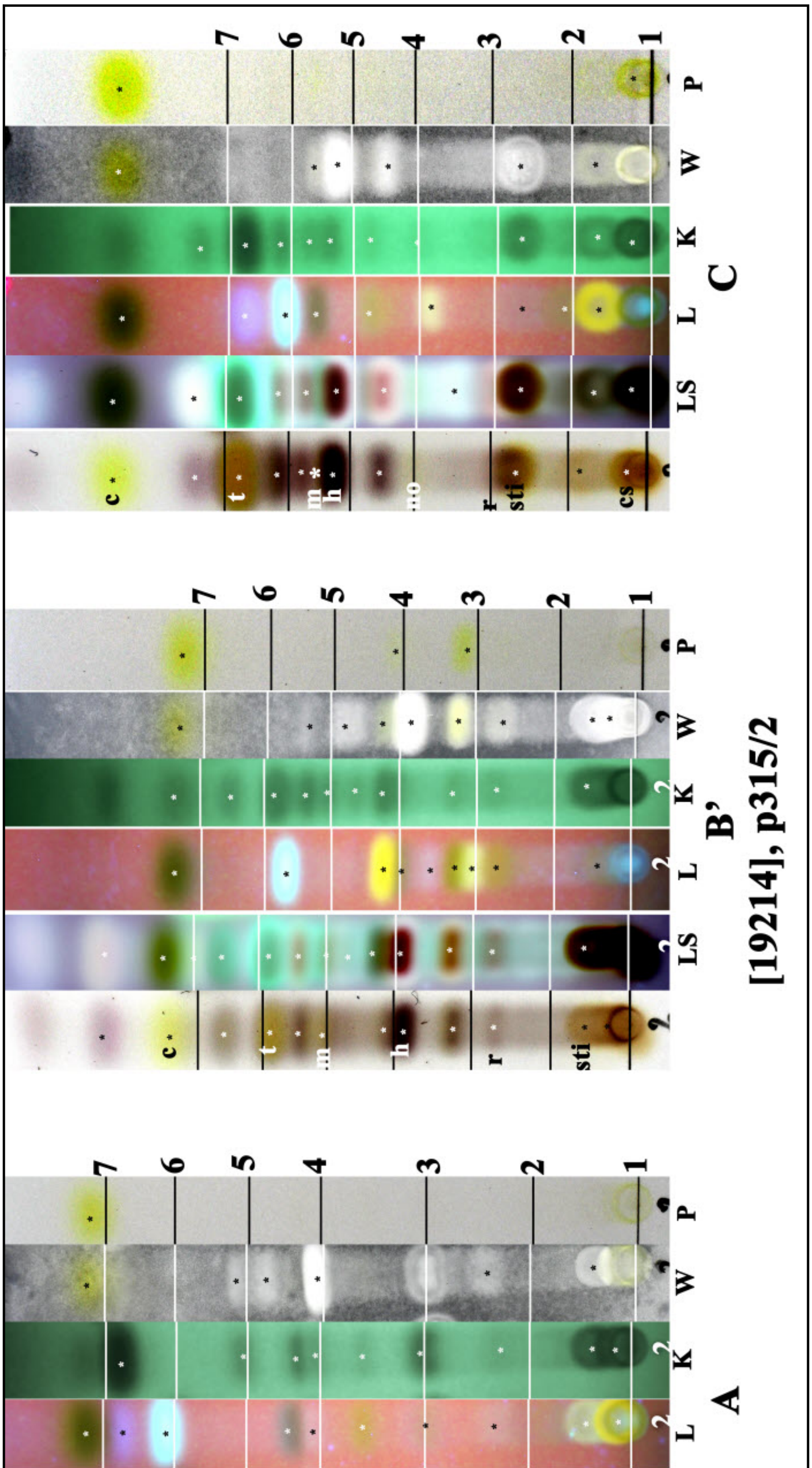
hopane-6α,7β,22-triol



t: tenuiorin, ah: 7β-acetoxyhopane-22-ol, ha: hopane-15α,22-diol,
h: hopane-6α,7β,22-triol, sti: stictic acid,, cs: constictic acid.

Pseudocyphellaria pubescens, [19211], New Zealand, South Island, Canterbury, eastern entrance to Arthurs Pass National Park, 670 m.

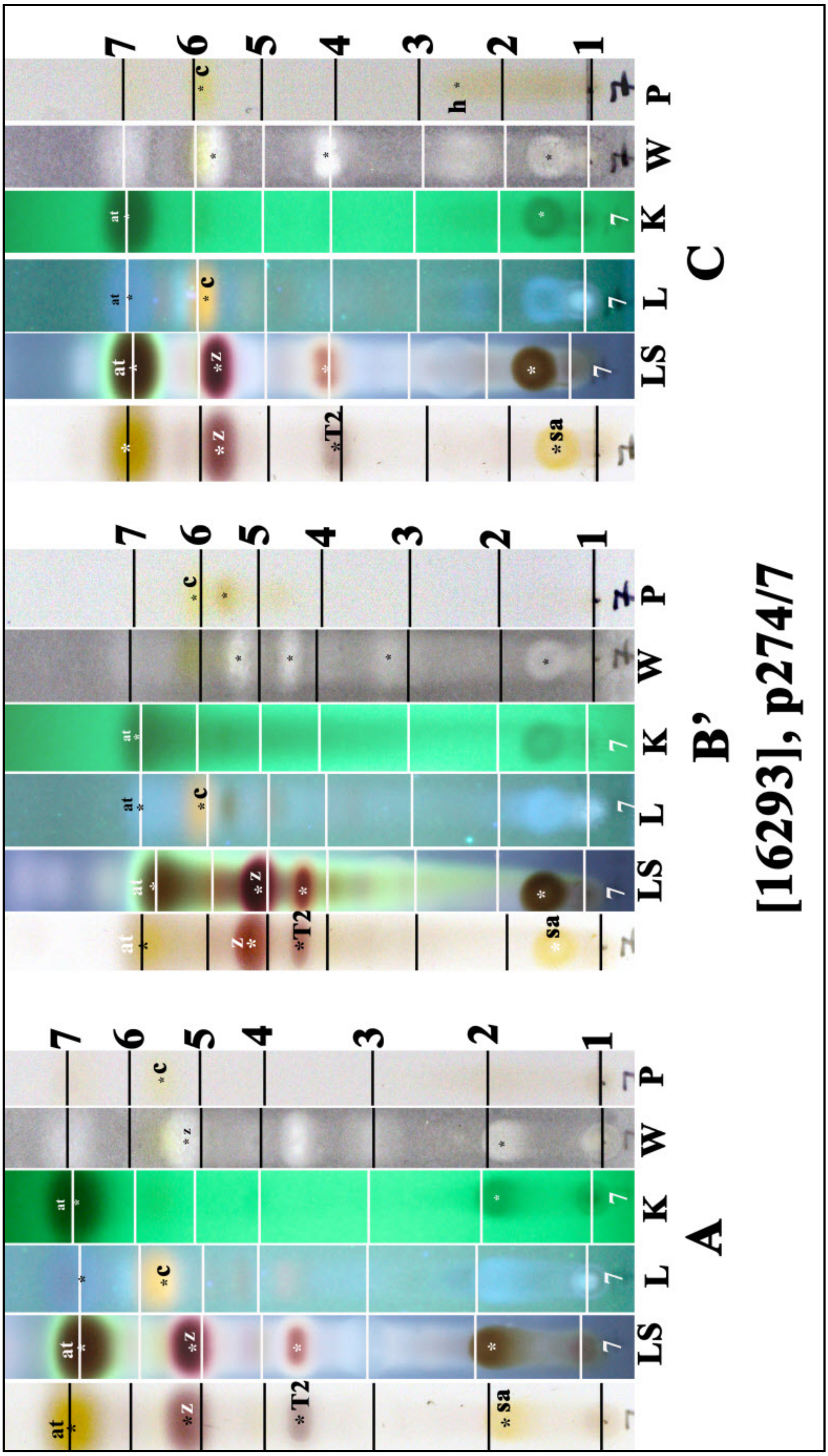
hopane-6α,7β,22-triol



c: calycin, t: tenuiorin, **h: hopane-6α,7β,22-triol**, sti: stictic acid, r: retigeranic acid, cs: constictic acid, no: norstictic acid, m: methyl gyrophorate

Pseudocyphellaria neglecta,[19214], Australia, New South Wales, Great Dividing Range, 6 km east of Captains Flat, 2 km north of Parkers Gap, 35°37' S, 149°30' E, 1260

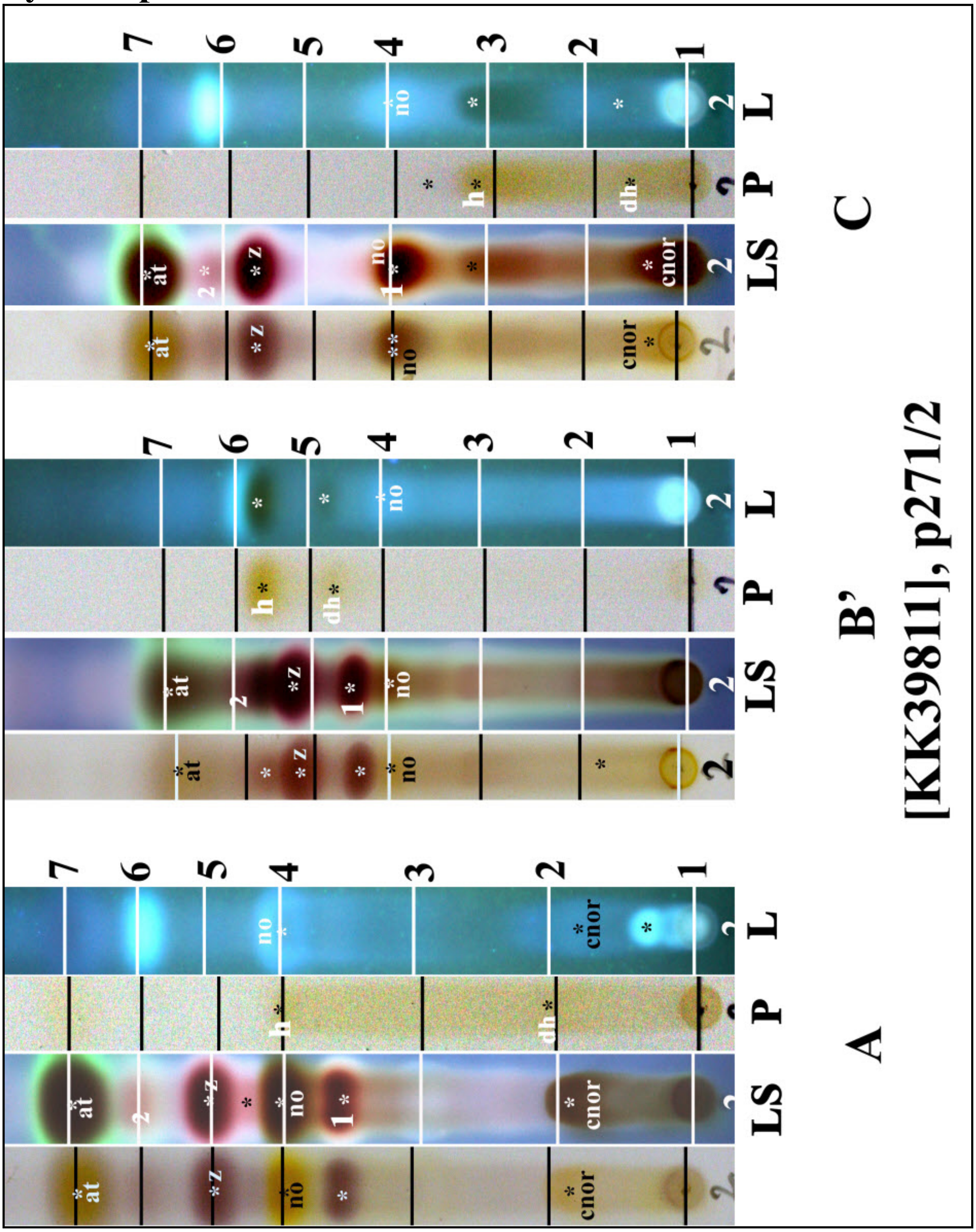
hybocarpone



at: atranorin, z: zeorin, T2: japonin, sa: salazinic acid, c: 7-chloroemodin, **h: hybocarpone**

Heterodermia hypocaesia [16239], Australia, New South Wales, between Bermagui and Tathra, on way from Aragunnu Beach to the Mimosa Rocks, 36.585° S, 150,056° E, 10 m. Leg. F. Schumm & E. Stocker-Wörgötter, 12.11.2009.

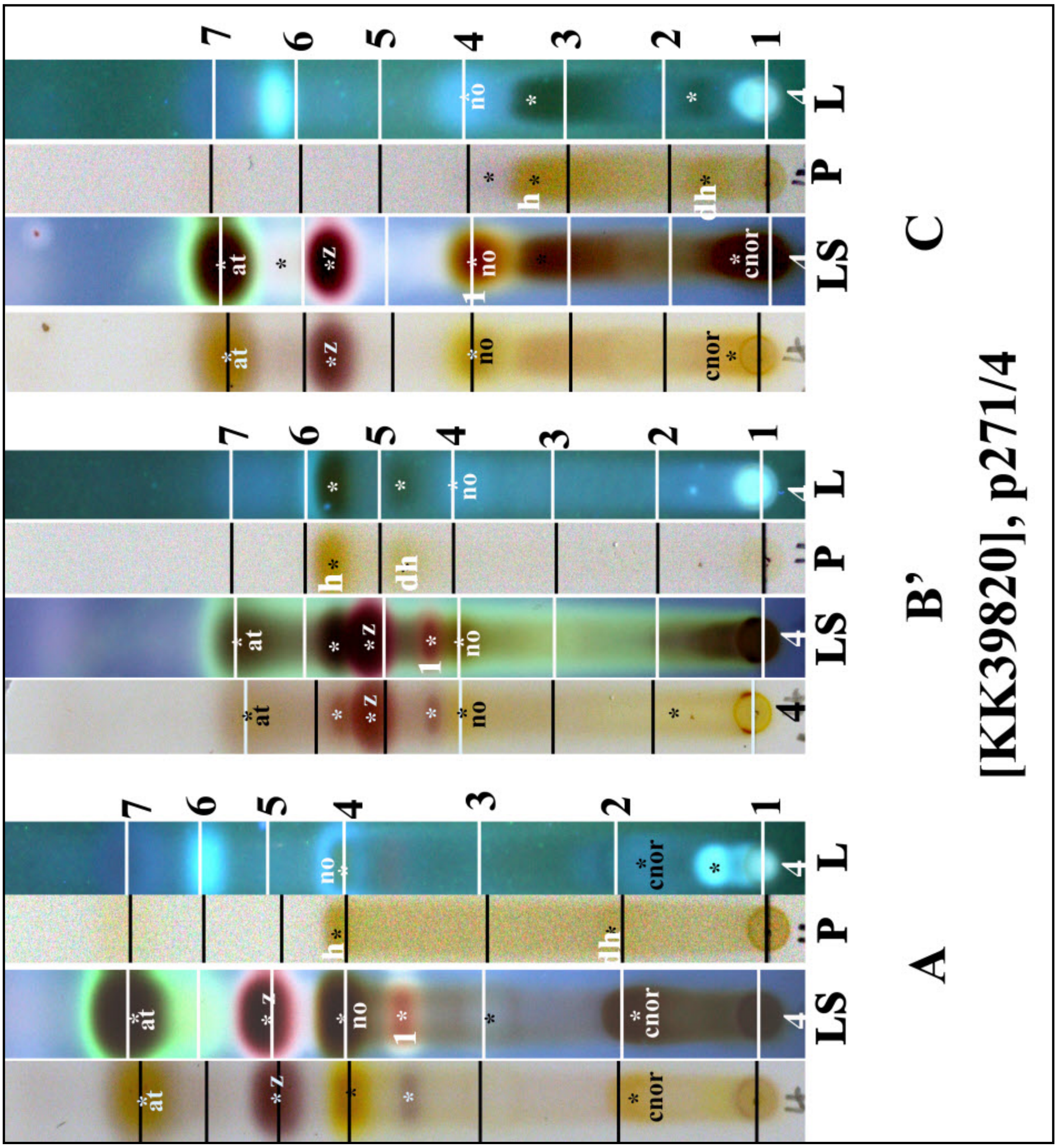
hybocarpone



at: atranorin, z: zeorin, no: norstictic acid, 1: japonene,
cno: connorstictic acid, **h: hybocarpone,**
dh: desmethylhybocarpone (norhybocarpone)

Heterodermia casarettiana, [KK39811], Brasilien, Rio de Janeiro, Serra da Mantiqueira, Itatiaia, zwischen Registro do Picú und Agulhas Negras. 2000 m, auf Felsen. Leg. K. Kalb und G. Plöbst, 23.07.1979.

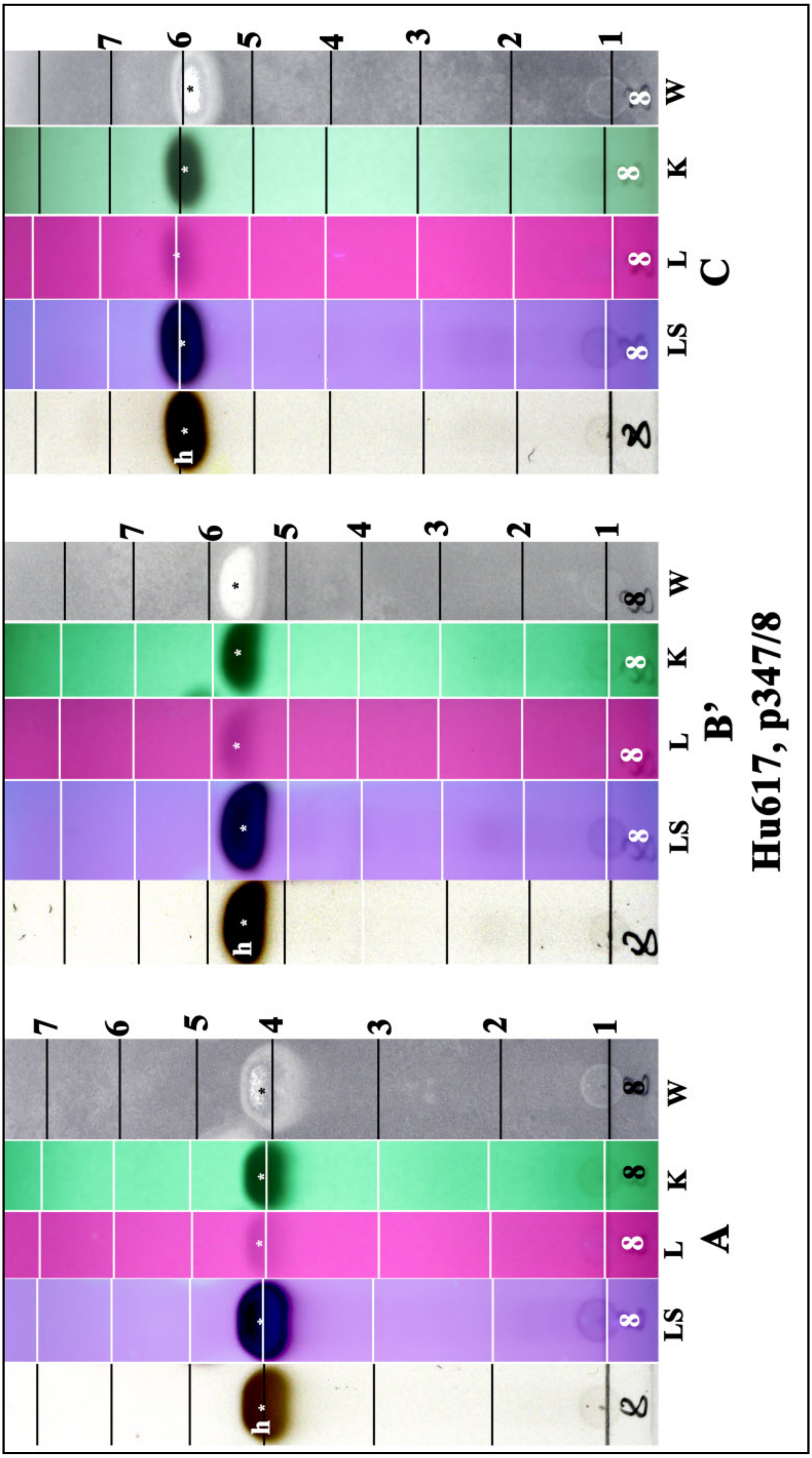
hybocarpone



at: atranorin, z: zeorin, no: norstictic acid (major), 1: japonene,
cno: connorstictic acid, **h: hybocarpone,**
dh: desmethylhybocarpone (norhybocarpone)

Heterodermia casarettiana, [KK39820], Brasilien, Rio de Janeiro, Serra da Mantiqueira, Itatiaia, zwischen Registro do Picú und Agulhas Negras. 2000 m, auf Felsen. Leg. K. Kalb und G. Plöbst, 23.07.1979.

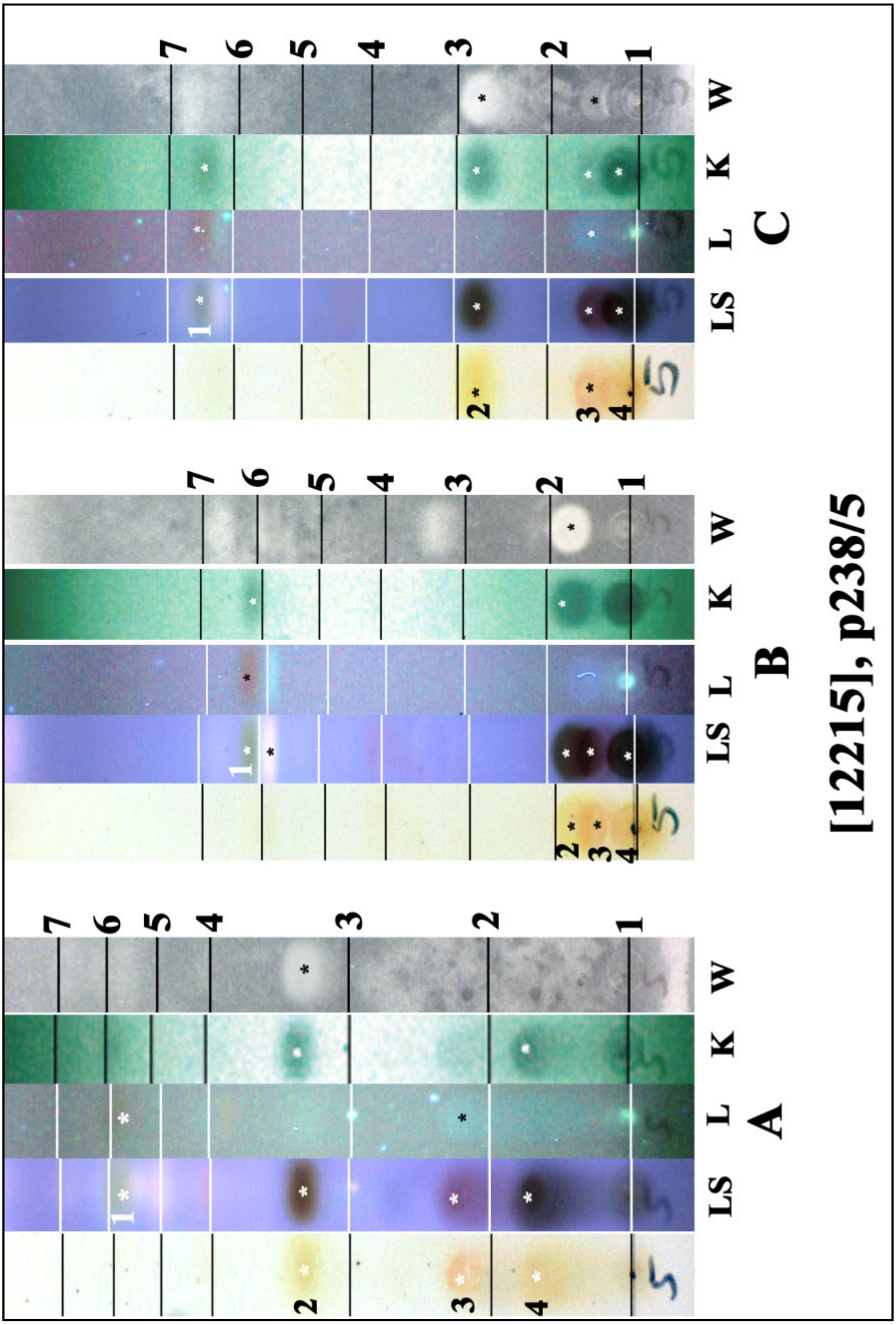
3-hydroxycolensoic acid



h: 3-hydroxycolensoic acid

S. Huneck's collection of lichen substances No 617: hydroxycolensoic acid, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

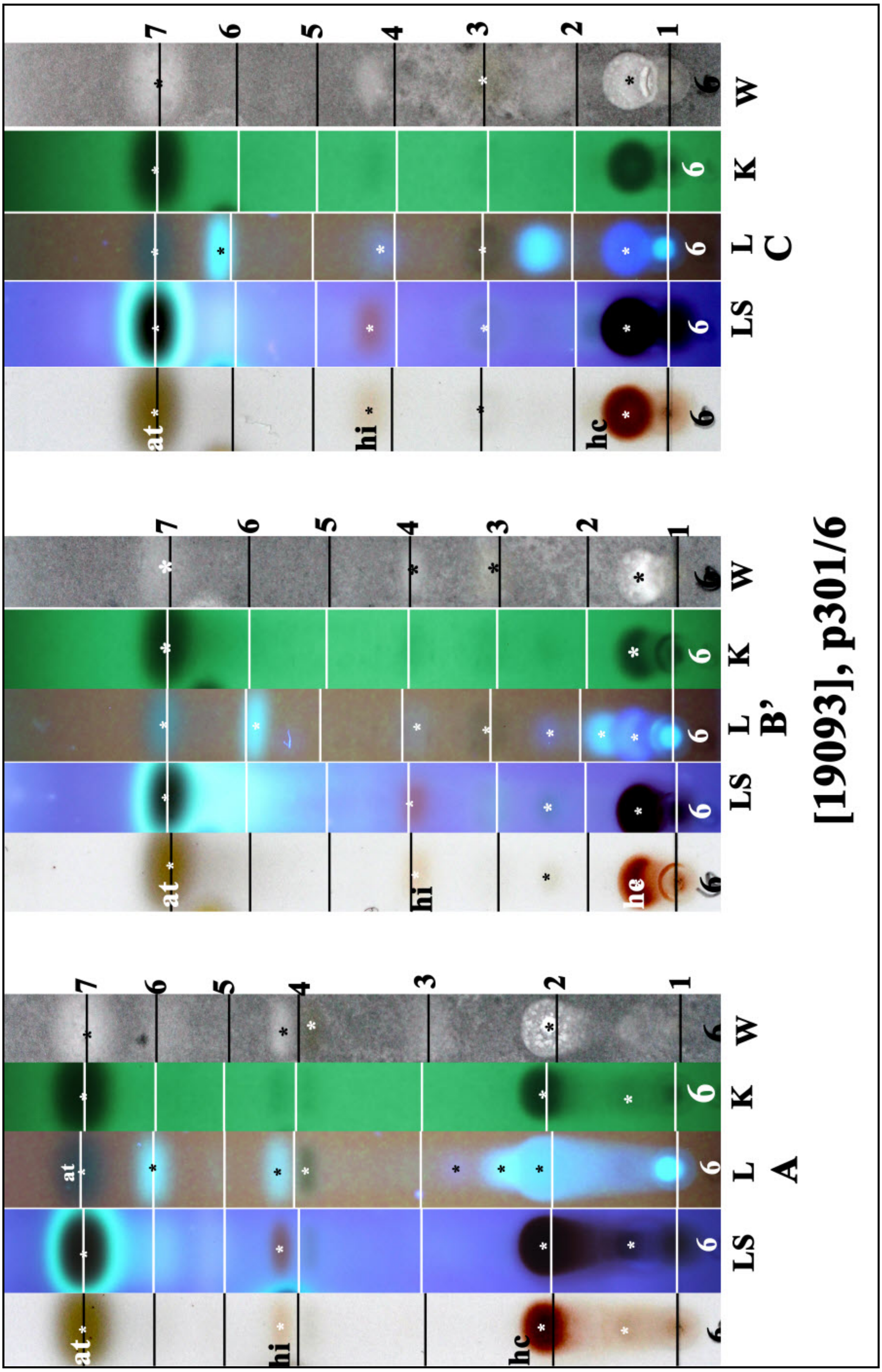
hypoconstictic acid



1: thiophaninic acid, 2: stictic acid, **3: hypoconstictic acid**, 4: constictic acid, conf. J.A. Elix.

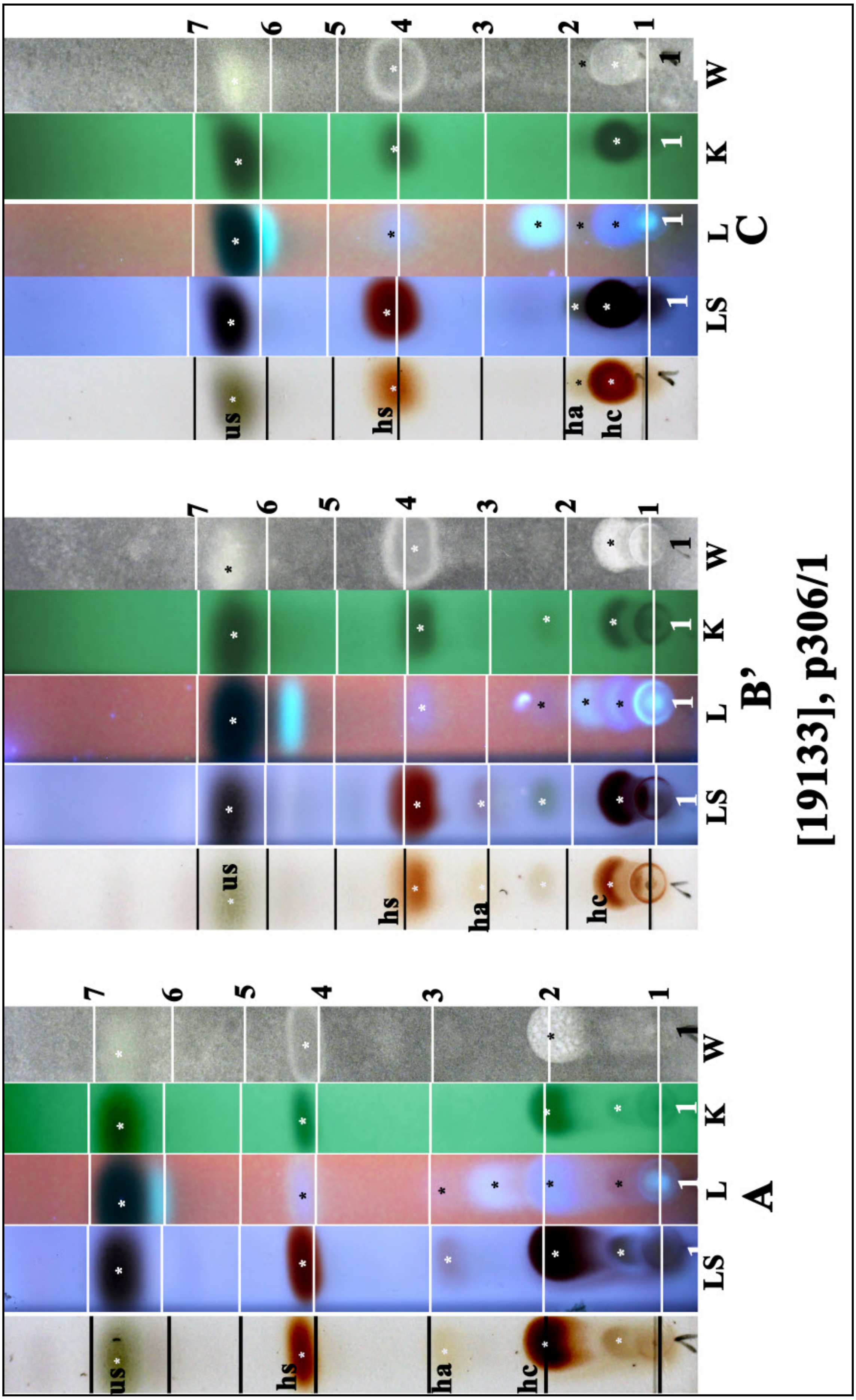
Pertusaria texana **,** [12215], USA, Louisiana, East Baton Rouge Paris, Baird Drive, Baton Rouge, on *Persea borbonia*, cultivated. Leg. Shirley C. Tucker (No 24434), 01.02.1982.

hypoconstictic acid



Xanthoparmelia *(Paraparmelia)* ***hypoconstictica,*** [19093], Australia, Queensland, Slopes of Mt. Timbeerwah, 5 km west of Tewantin.

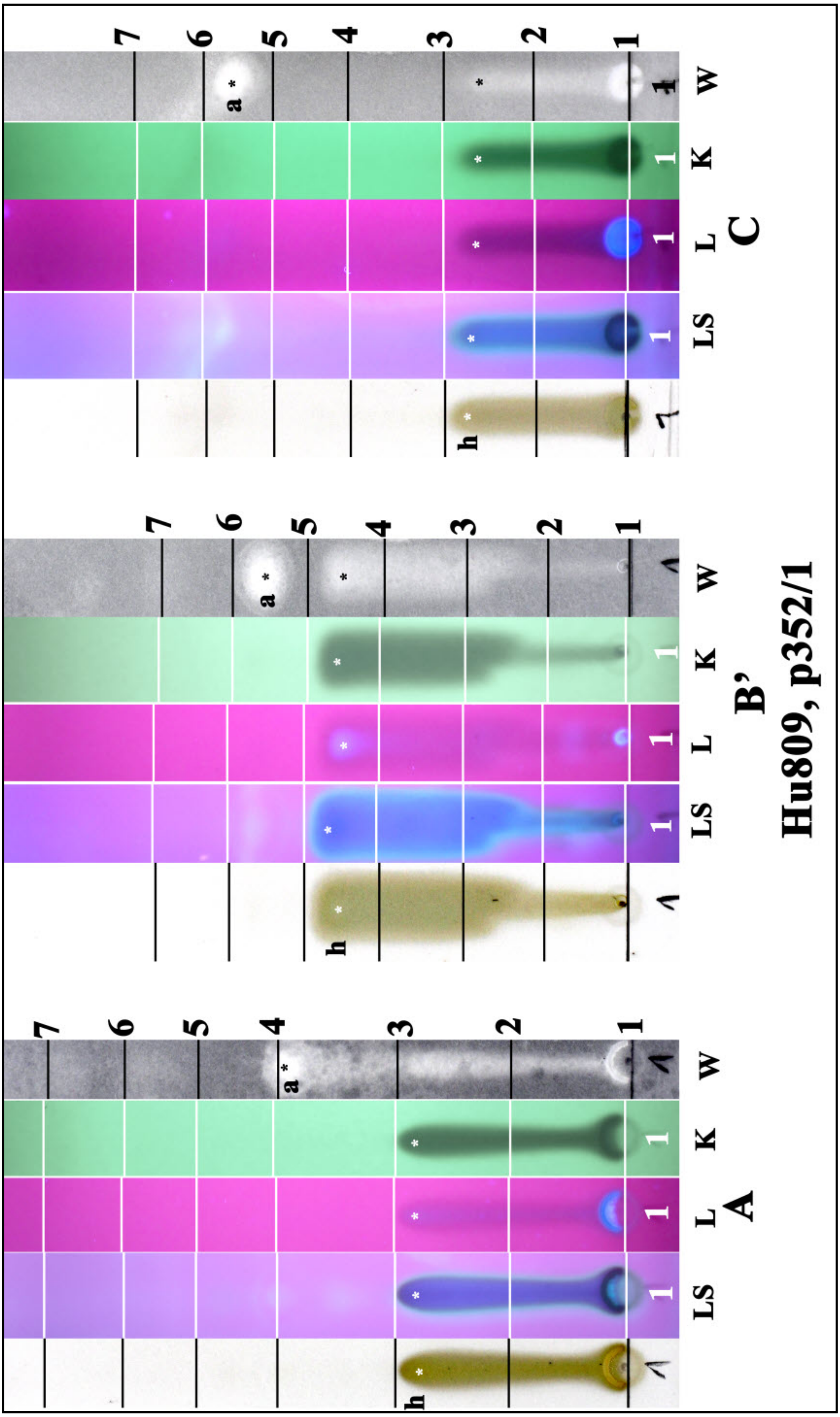
hypoconstictic acid



us: usnic acid, hs: hypostictic acid, ha: hyposalazinic acid, **hc: hypoconstictic acid**

Xanthoparmelia metastrigosa **,** [19133], Australia, New South Wales, northern slopes of Mount Canobolas, 8 km south-west of Orange.

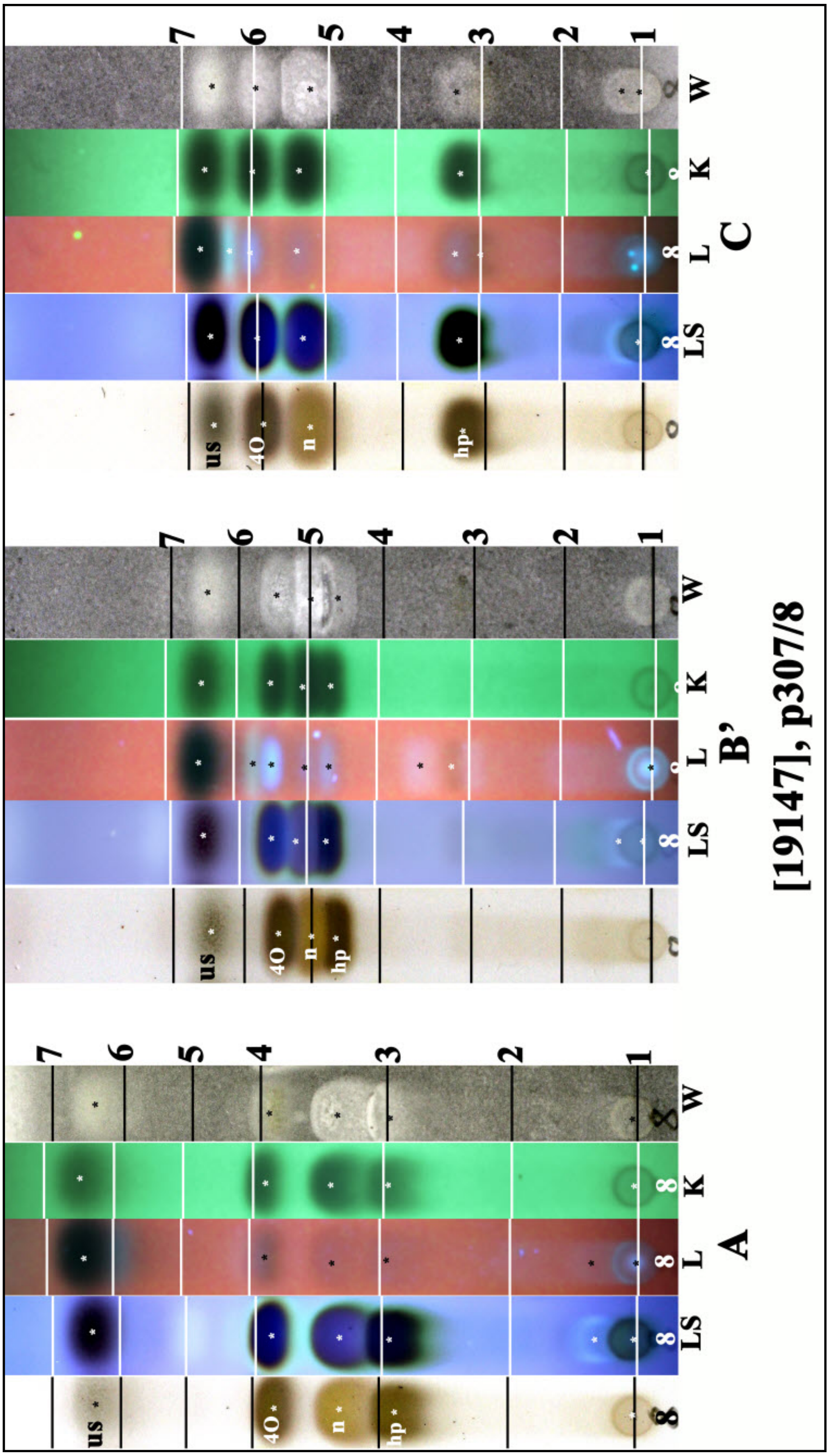
hypoprotocetraric acid



h: hypoprotocetraric acid, a: unknown, conf. J.A. Elix

S. Huneck's collection of lichen substances No 809: hypoprotocetraric acid. Botanisches Museum Berlin-Dahlem

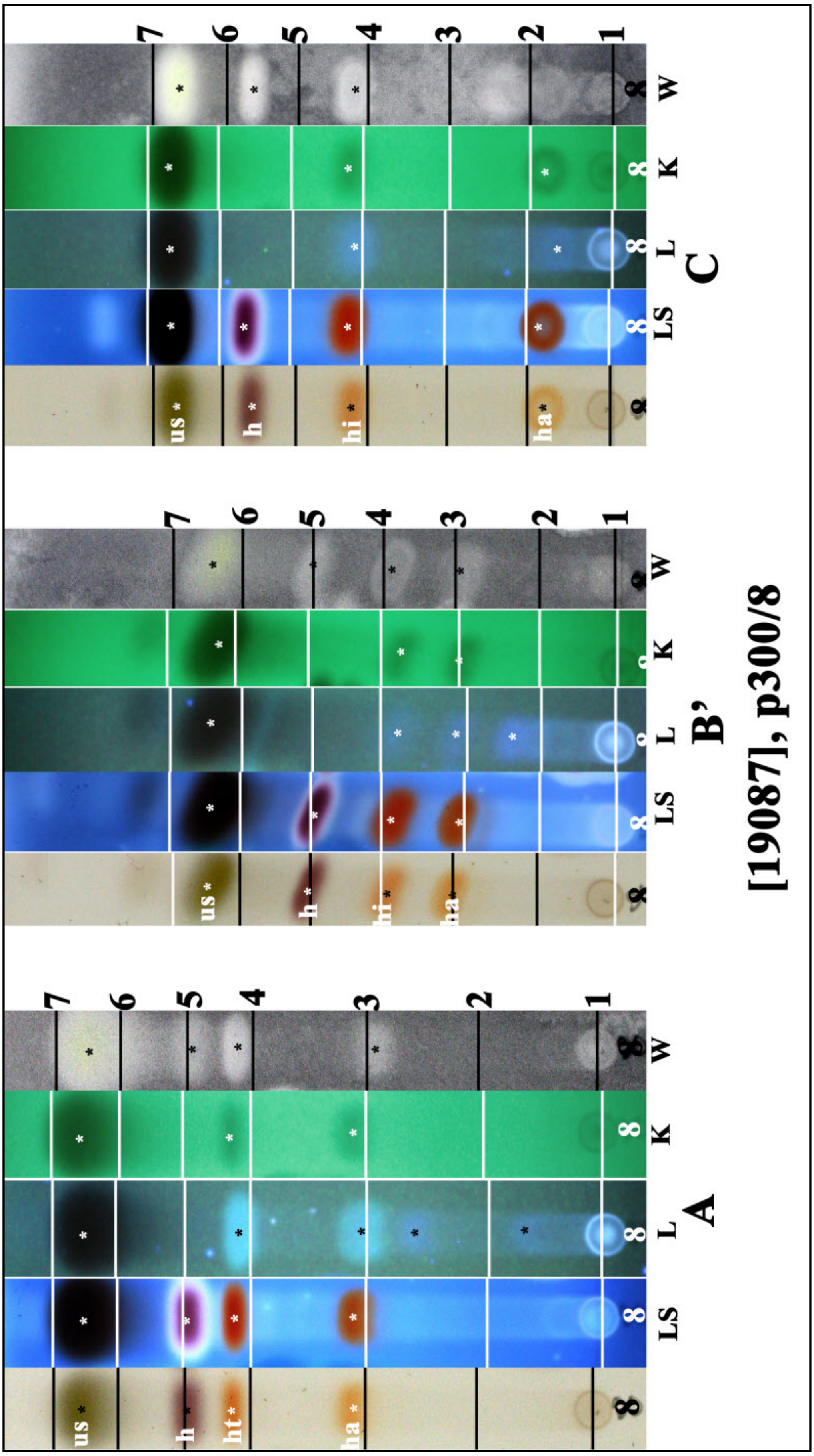
hypoprotocetraric acid



us: usnic acid, 4O: 4-O-methylhypoprotocetrariuc acid (3,8/5,5/6), n: notatic acid (3,3/5/5,3),
hp: hypoprotocetraric acid (2,9/4,6/3,25)

Xanthoparmelia hypoprotocetrarica, [19147], Australia, Australian Capital Territory, 4.5 km south of Tharwa, 35°34' S, 149°04' E, 670 m, growing on exposed granite rocks in open pasture land. This collection is obviously a mix of ***Xanthoparmelia notata*** and ***Xanthoparmelia hypoprotocetrarica***.

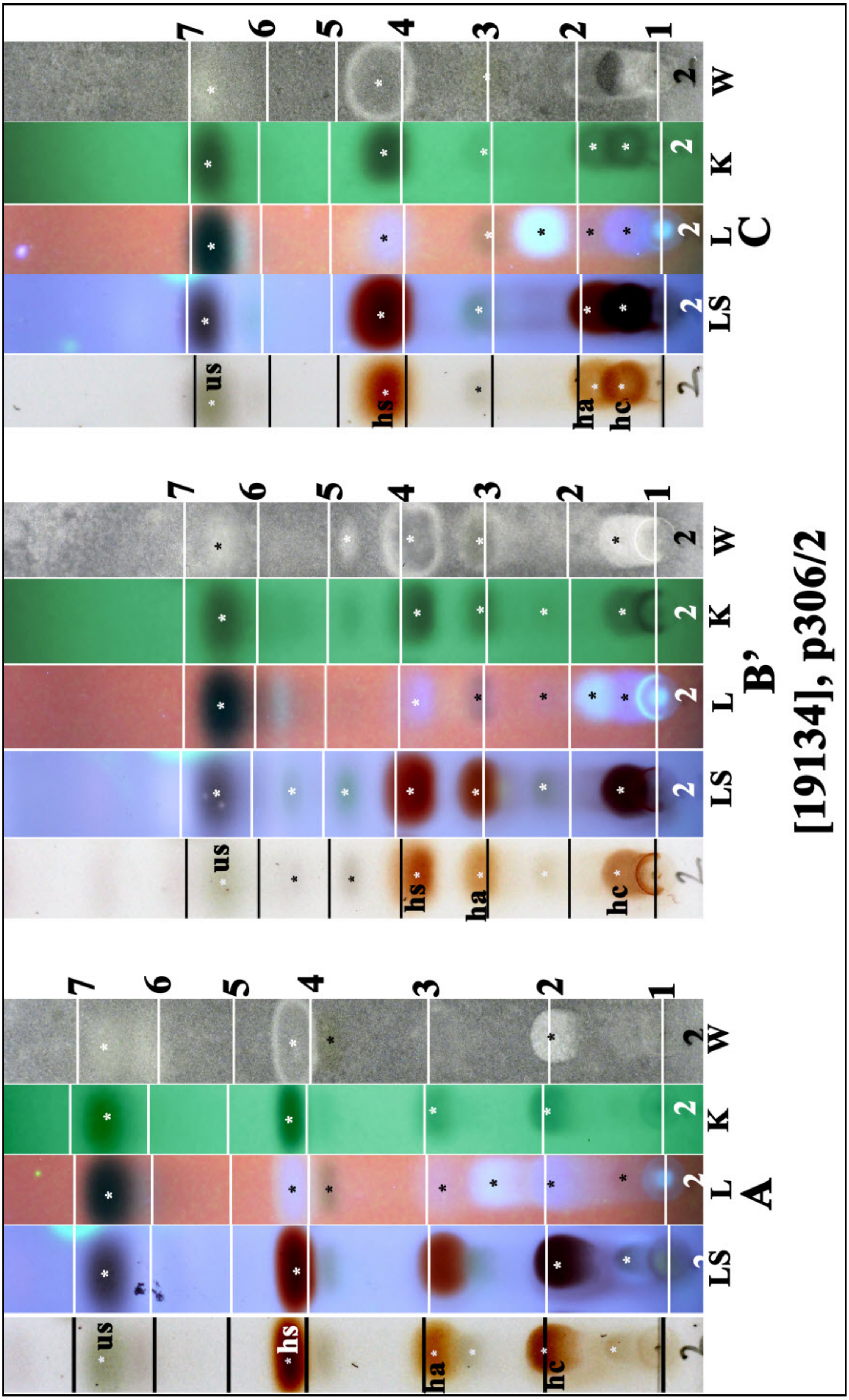
hyposalazinic acid



us: usnic acid, h:hopane-6α,22-diol,hi: hypostictic acid, **ha: hyposalazinic acid**

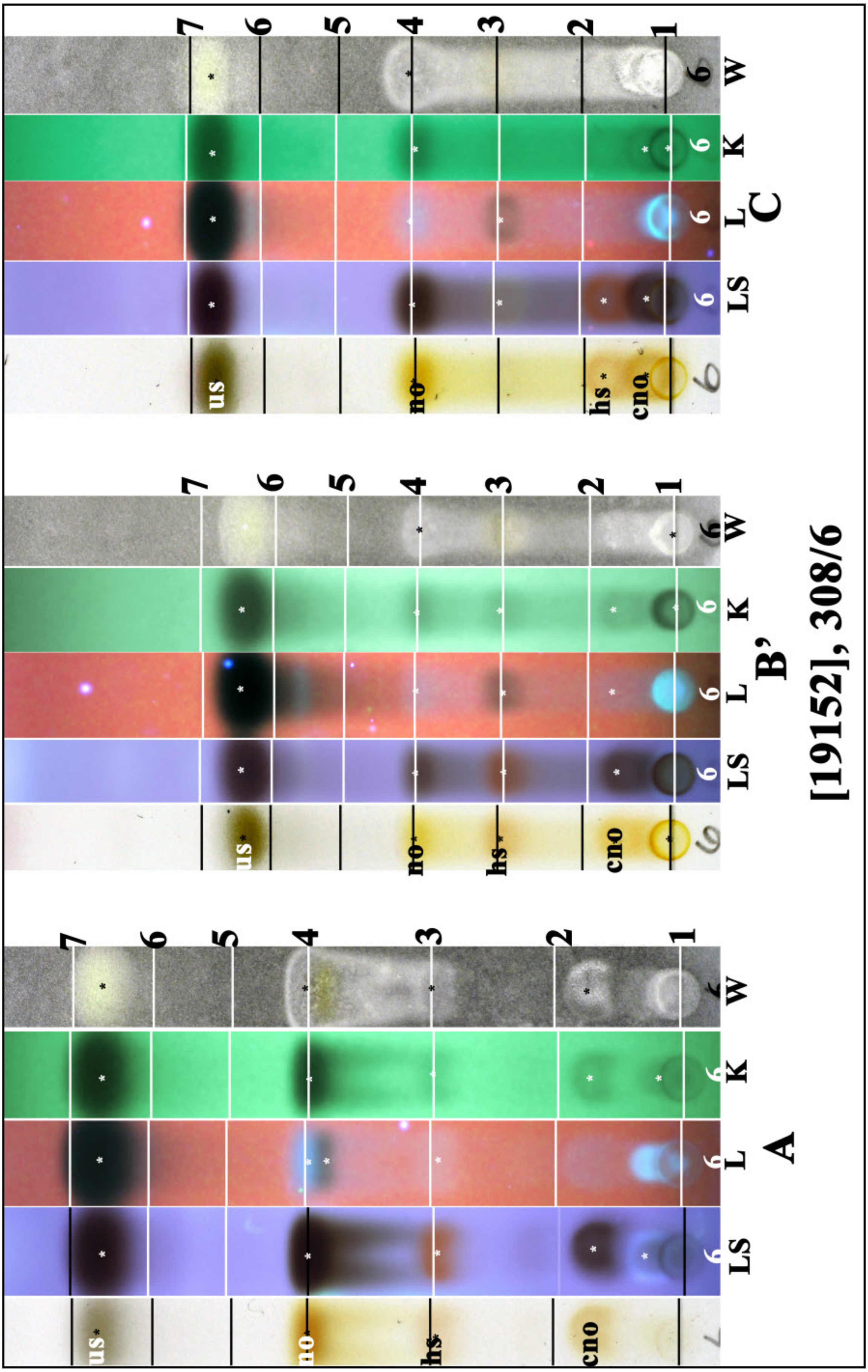
Nephroma australe, [19087], New Zealand, South Island, Fiordland, Mackay Creek, 21.6 km north of Te Anau Downs, growing in open silver beech forest along the road.

hyposalazinic acid



Xanthoparmelia multipartita **,** [19134], Australia, Australian Capital Territory, Gudgenby River Gorge, 4.5 km south of Tharwa.

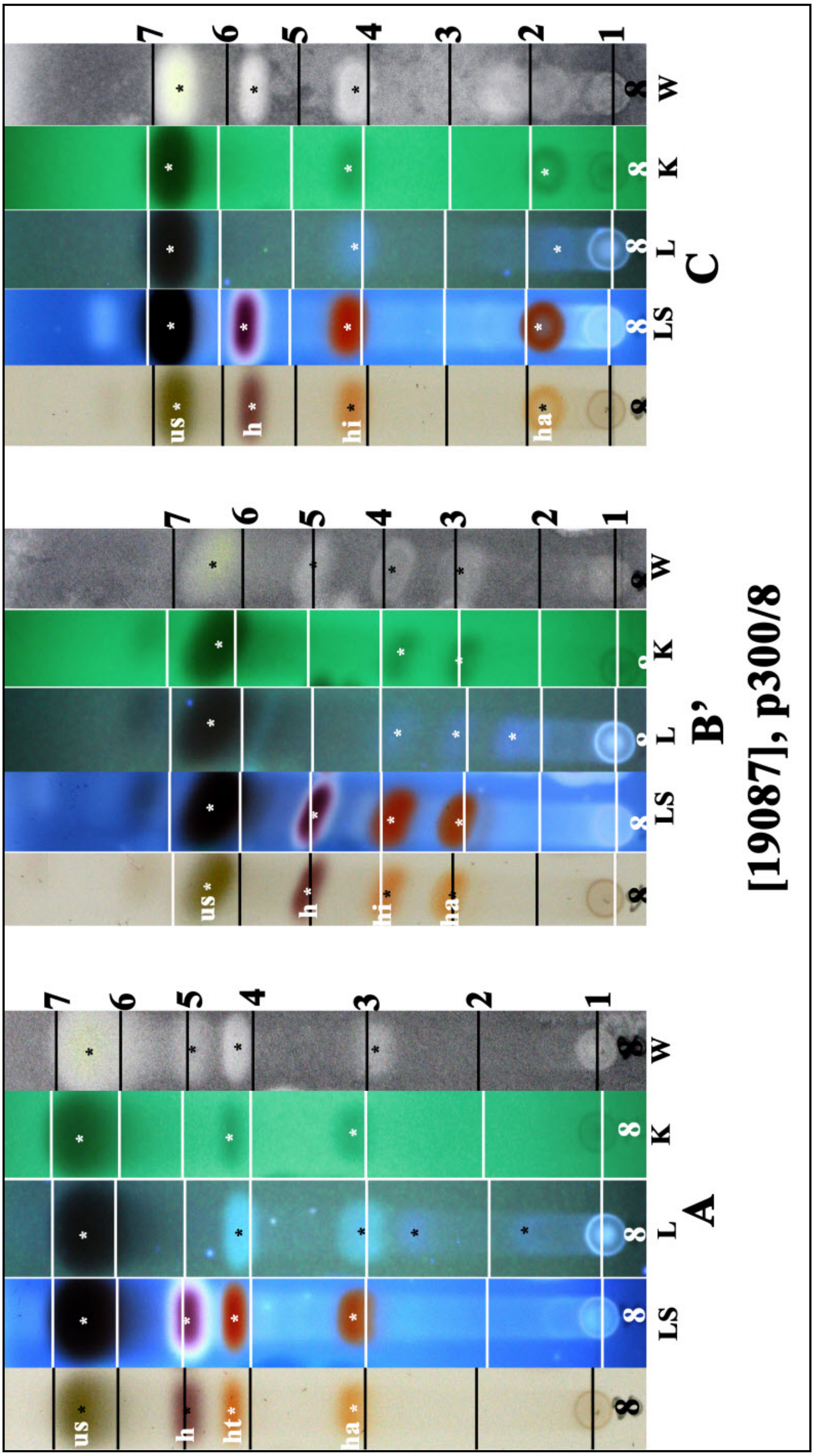
hyposalazinic acid



us: usnic acid, no: norstictic acid (major), **hs: hyposalazinic acid**, cno: connostictic acid

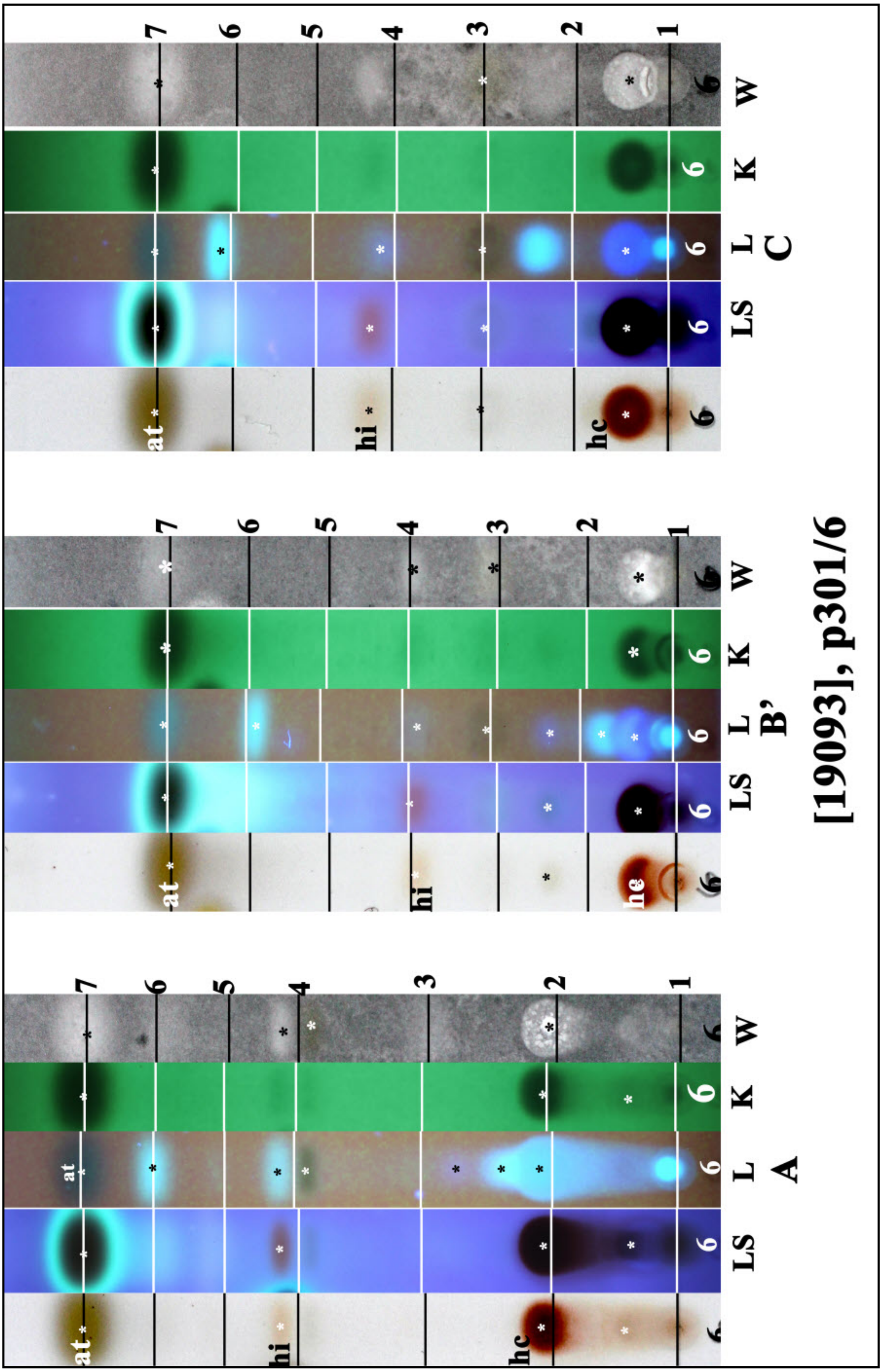
Xanthoparmelia pseudoamphixantha , [19152], Australia, New South Wales, Weddin State Forest, 25 km west-.south-west of Greenfell, 33°54' S, 148°00'E, 340 m.

hypostictic acid



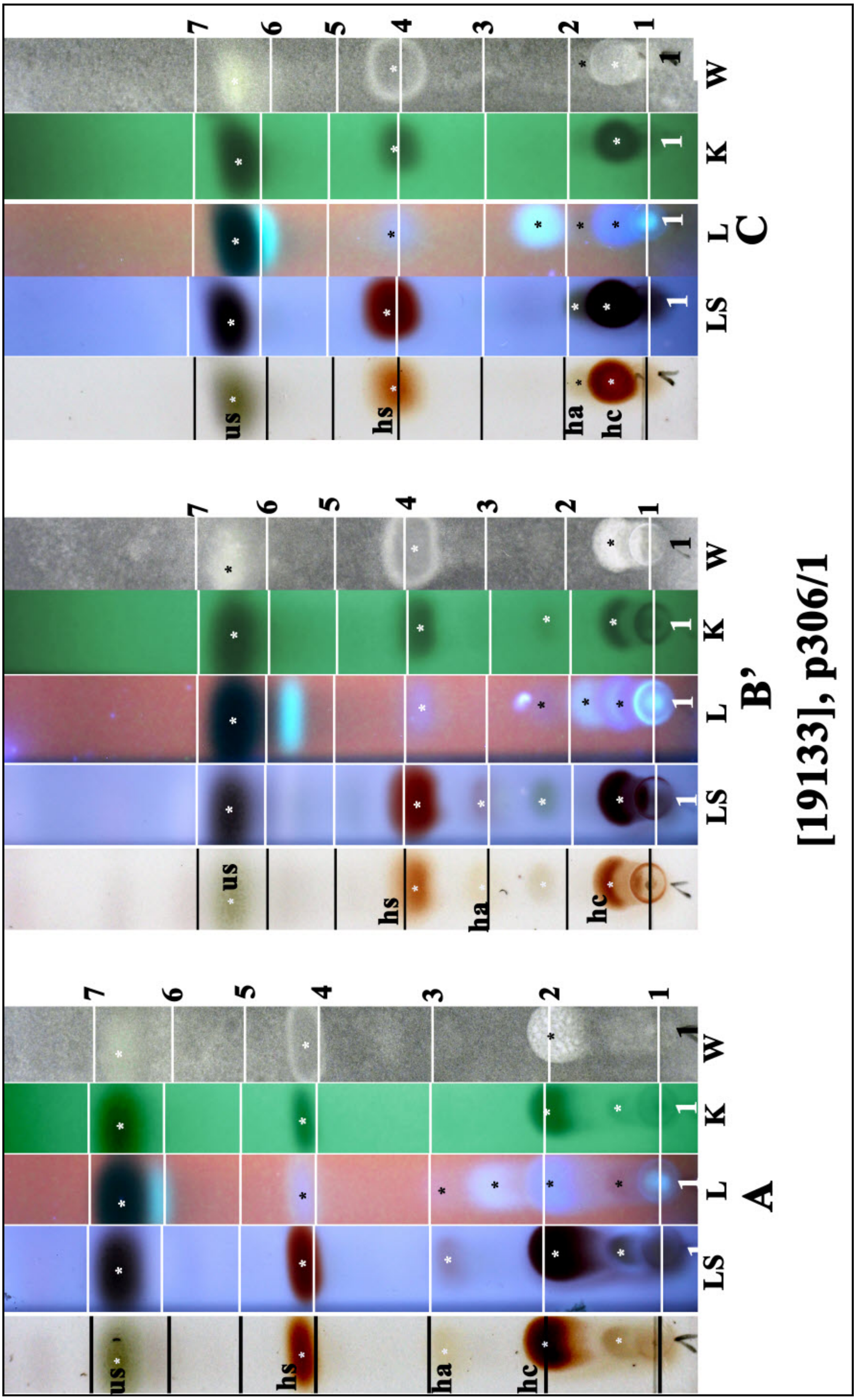
Nephroma australe, [19087], New Zealand, South Island, Fiordland, Mackay Creek, 21.6 km north of Te Anau Downs, growing in open silver beech forest along the road.

hypostictic acid



Xanthoparmelia** (Paraparmelia)* ***hypoconstictica, [19093], Australia, Queensland, Slopes of Mt. Timbeerwah, 5 km west of Tewantin.

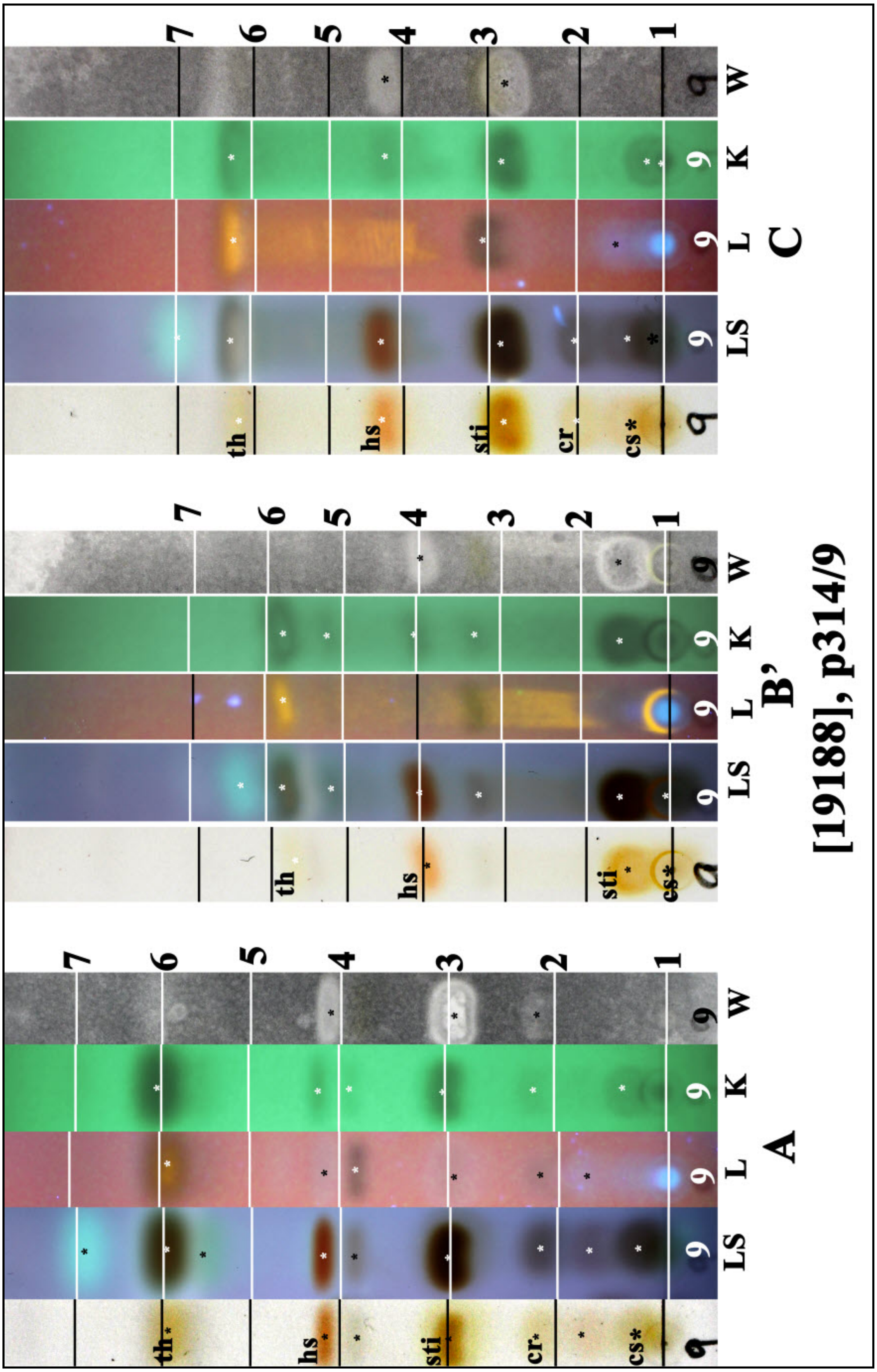
hypostictic acid



us: usnic acid, **hs: hypostictic acid**, ha: hyposalazinic acid, hc: hypoconstictic acid

Xanthoparmelia metastrigosa **,** [19133], Australia, New South Wales, northern slopes of Mount Canobolas, 8 km south-west of Orange.

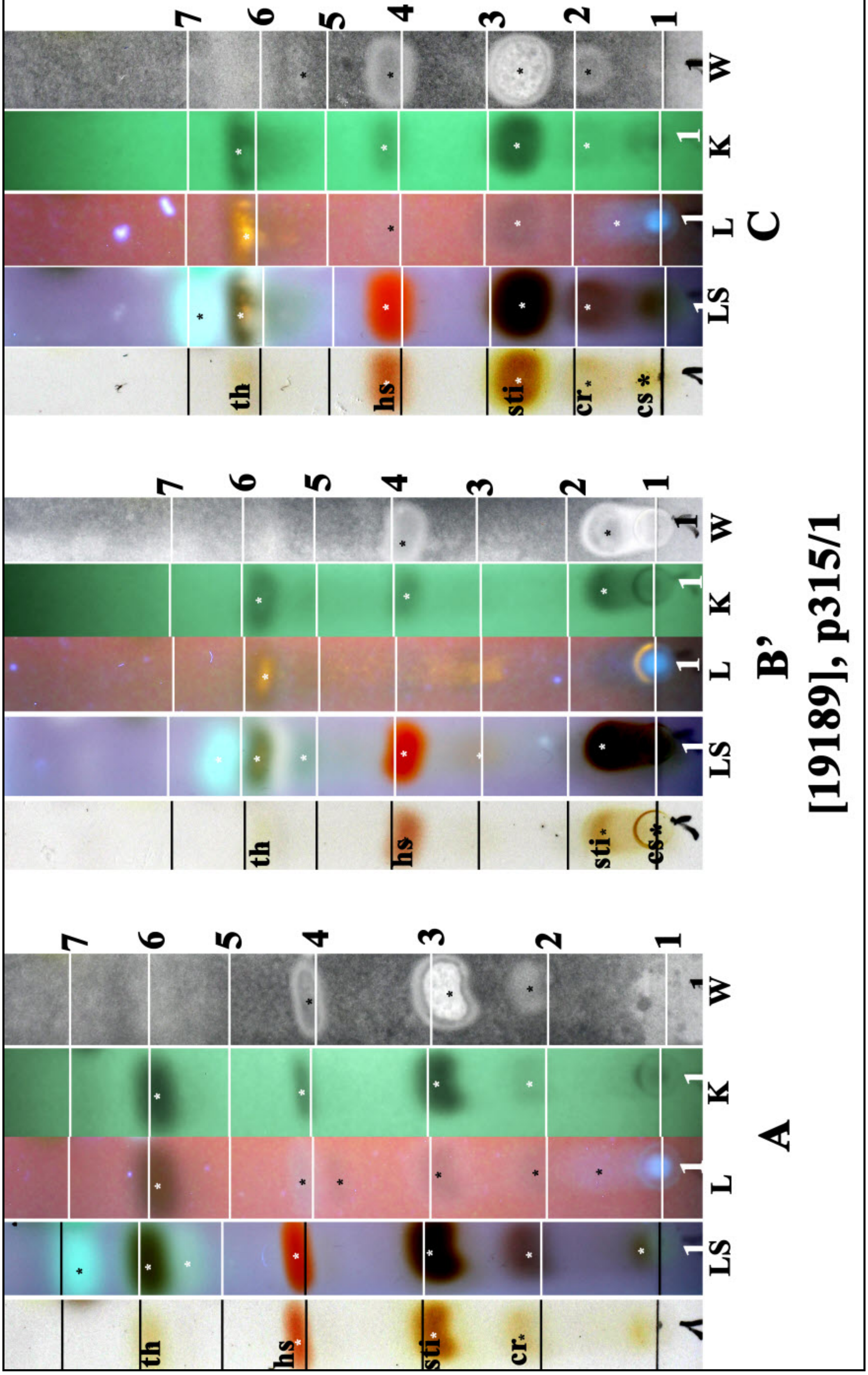
hypostictic acid



th: thiophaninic acid, sti: stictic acid, **hs: hypostictic acid**, cr: cryptostictic acid, cs: constictic acid.

Pertusaria remota, [19188], Australia, Western Australia, Kununurra - Timber Creek Highway, 25 km south-east of Kununurra, 15°54' S, 128°56' E, 100 m.

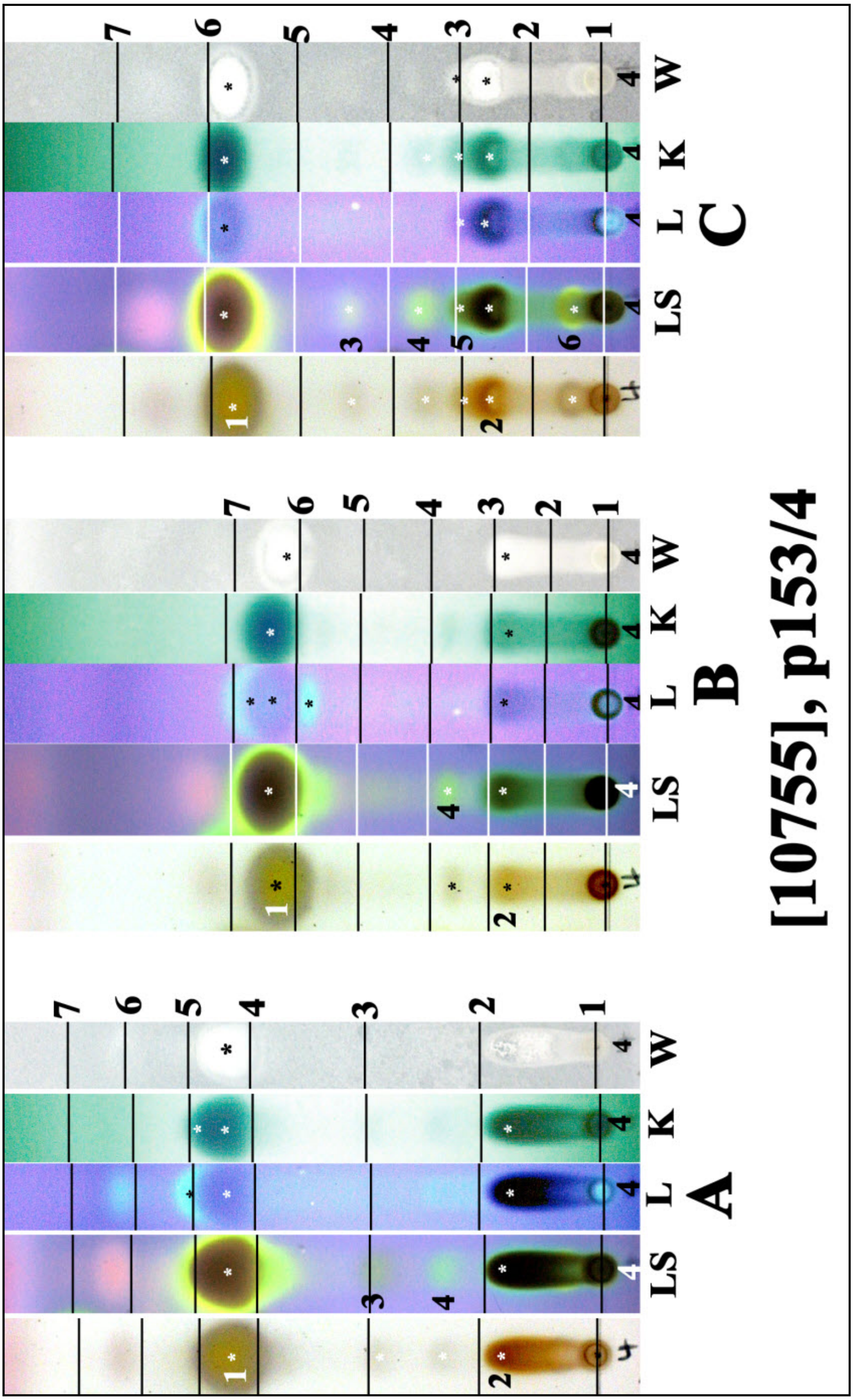
hypostictic acid



th: thiophaninic acid, **hs: hypostictic acid**, sti: stictic acid, cr: cryptostictic acid, cs: constictic acid

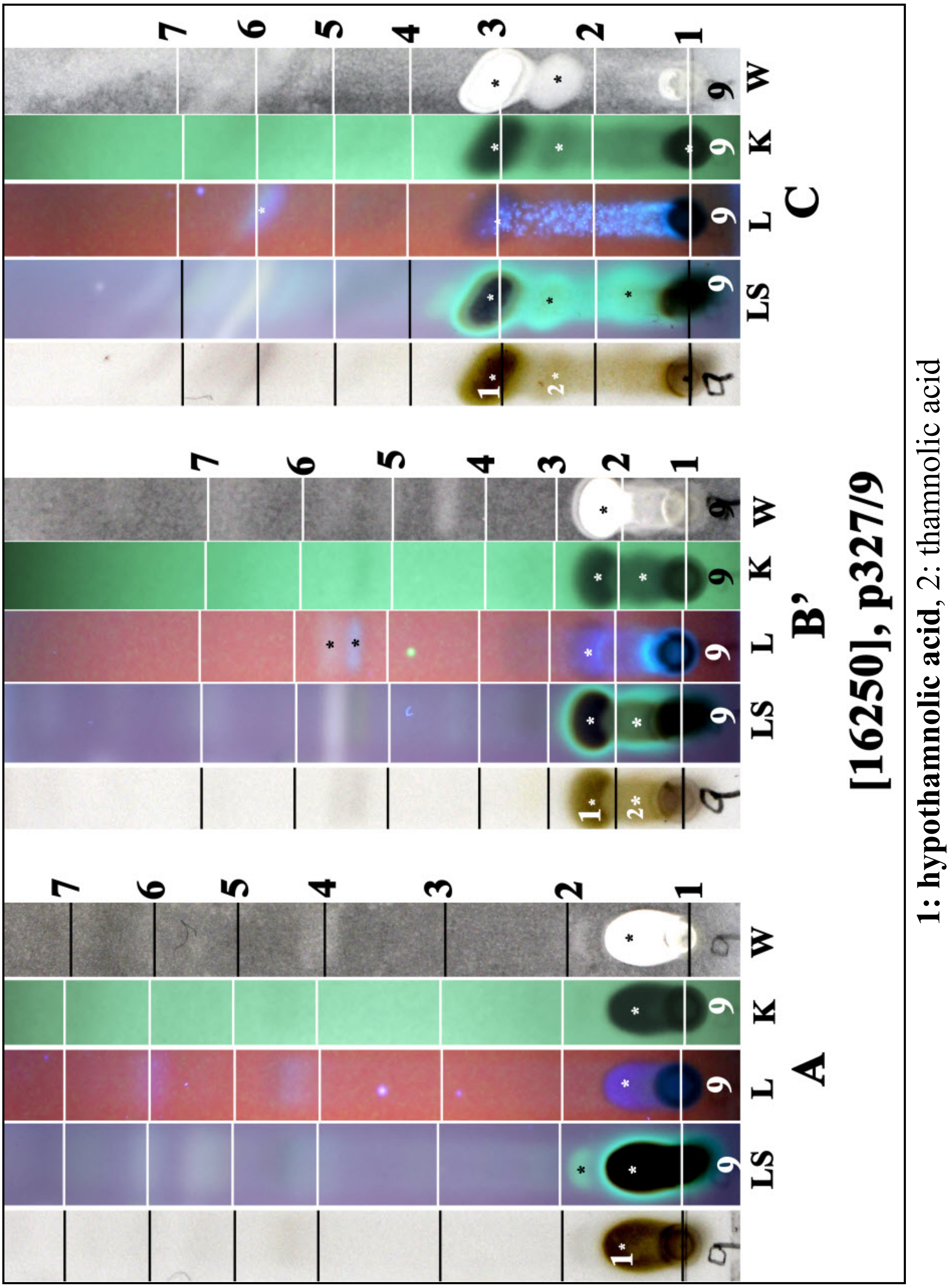
Pertusaria remota, [19189], Australia, Northern Territory, Jasper Gorge, Victoria River Downs Road, 52 km south-east of Timber Creek, 16°02' S, 130°46' E, 140 m, growing on semi-shaded rock faces.

hypothamnolic acid



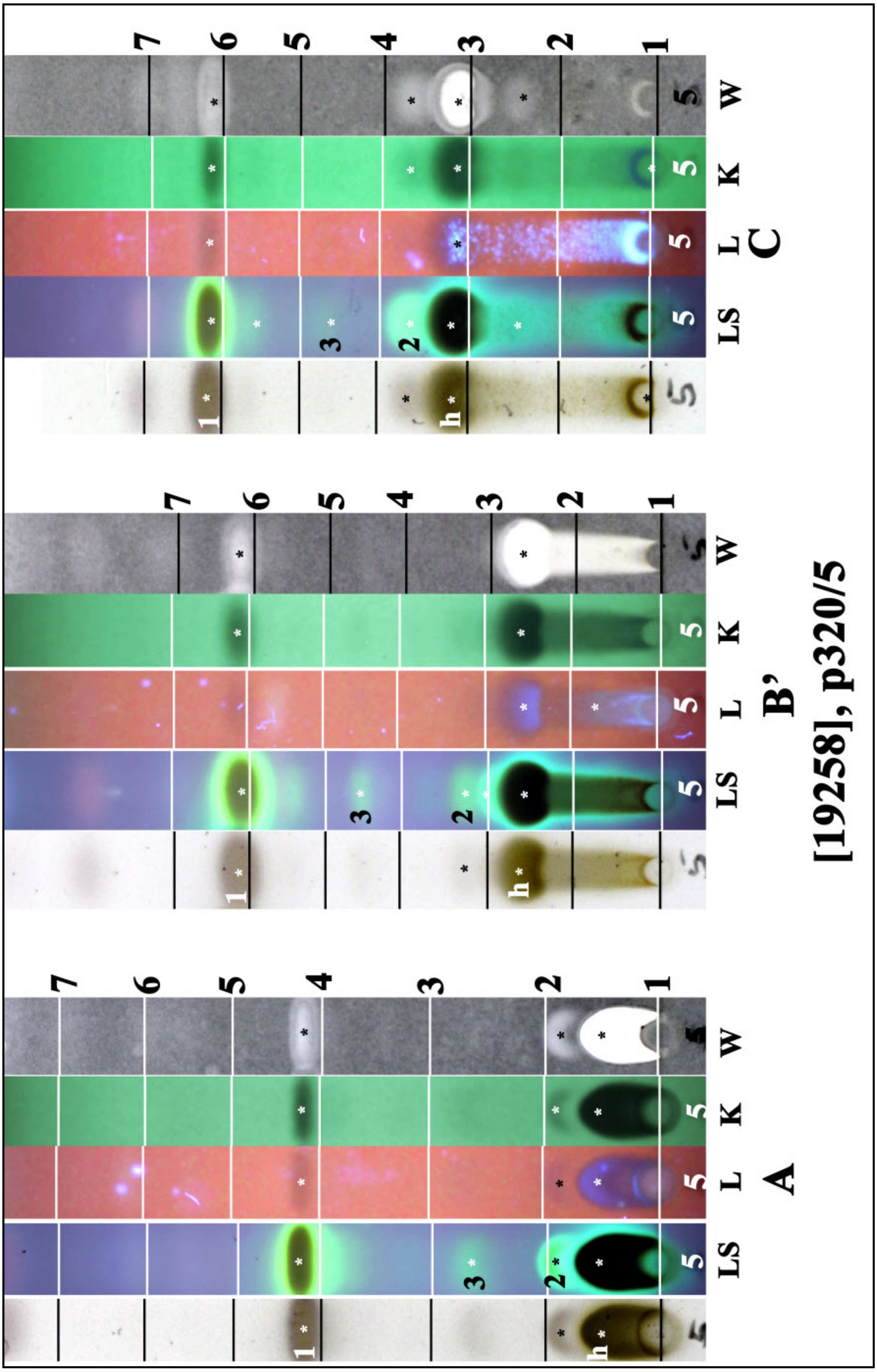
Cladonia parasitica, [10755], Germany, Baden-Württemberg, Kreis Göppingen, Rechberghausen, an Wegrändern im Ödach, Stubensandsteingebiet, Nadelwald, ca. 400 m, TK 7223. Leg. F. Schumm 13.03.1971.

hypothamnolic acid



Pertusaria novaezelandiae, [16250], Australia, New South Wales, between Bermagui and Tathra, trail from Aragunnu Beach to Mimosa Rocks, 36.853° S, 150.562° E, 10 m, growing on bark. Leg. F. Schumm & E. Stocker-Wörgötter, 12.11.2009. Chemistry: soralia UV+ blue white, K+ purple.

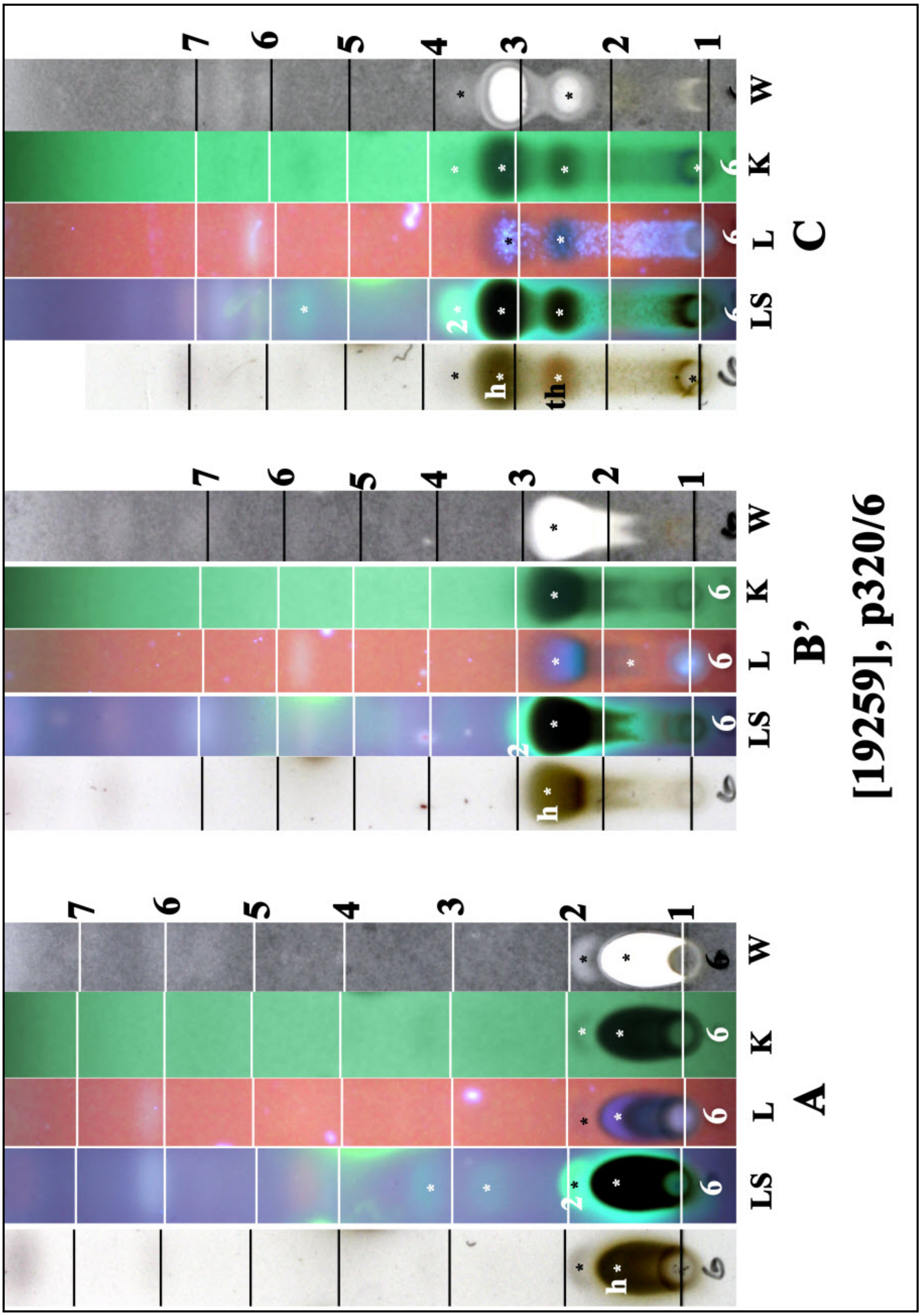
hypothamnolic acid



h: hypothamnolic acid, 1, 2, 3: unknown

Ramboldia stuartii, [19258], Australia, Tasmania, Lake Emmet, 42°37' S, 146°33' E, 980 m.

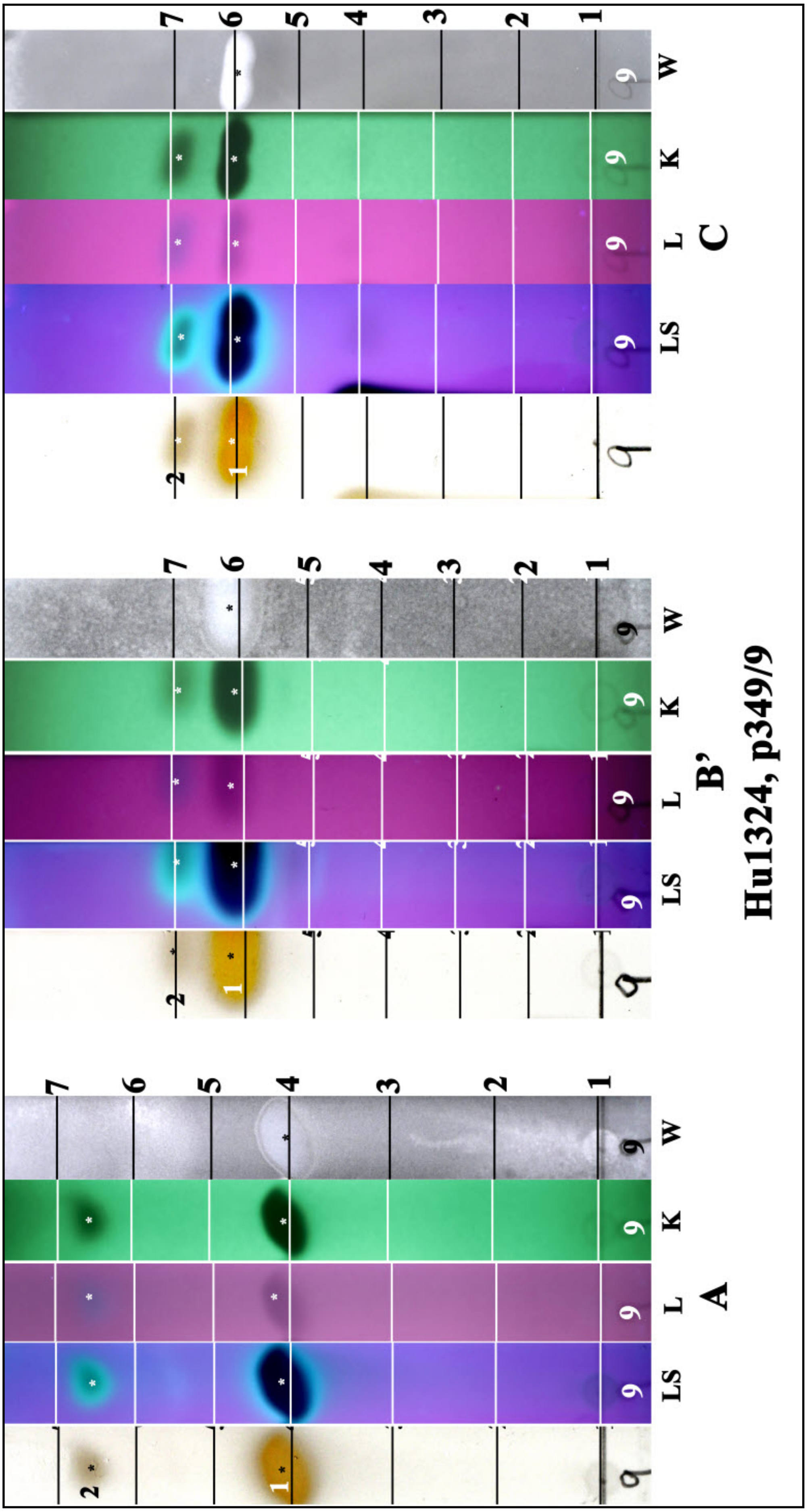
hypothamnolic acid



h: hypothamnolic acid, th: thamnolic acid, 2: unknown
the TLC sample is a mix of Ramboldia stuartii and R. subnexa

Ramboldia subnexa, [19259], Australia, Australian Capital Territory, Summit of Mt. Clear, Clear Range, 65 km S of Canberra, 35°16' S, 149°17' E, 1600 m.

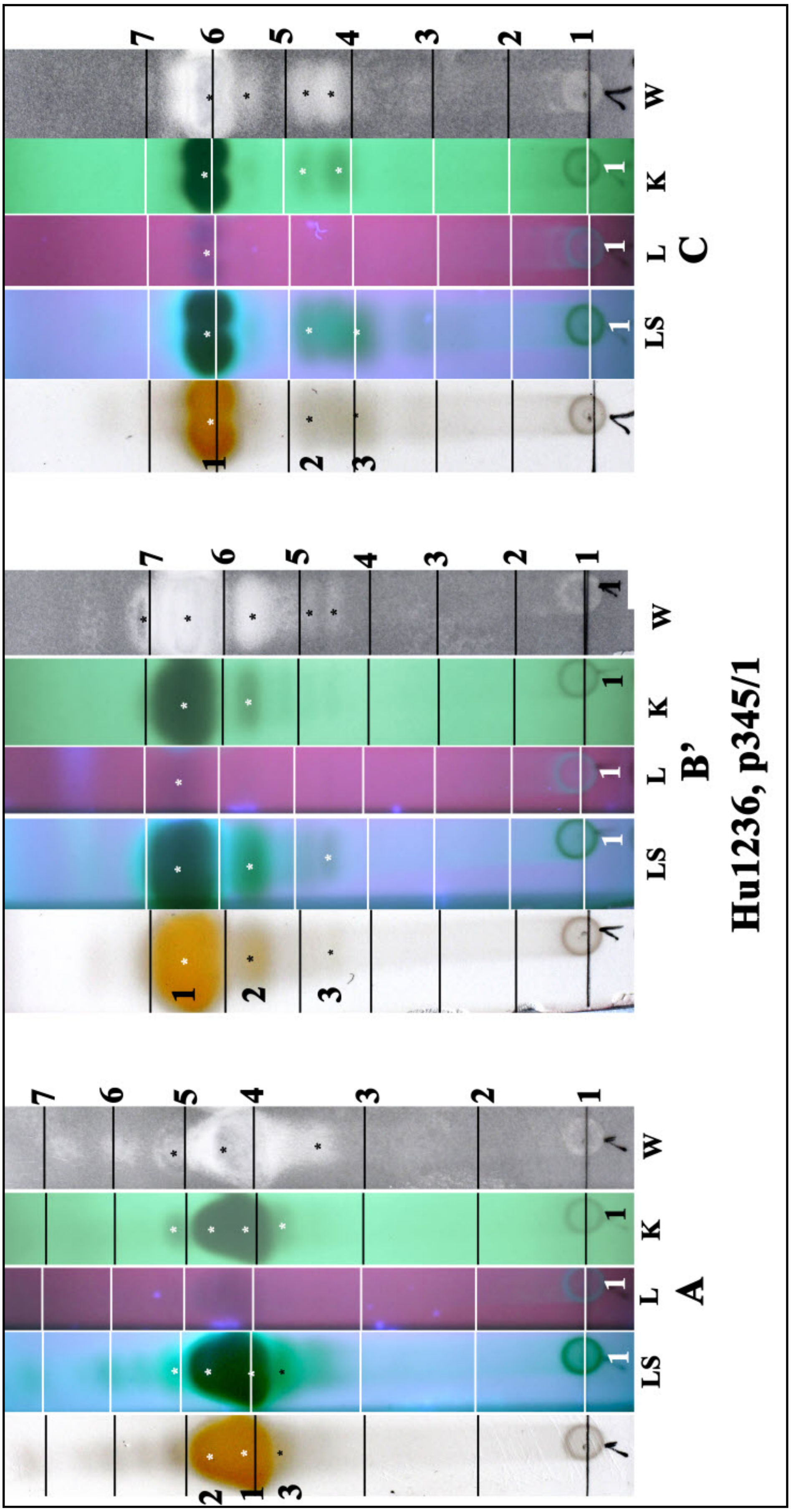
imbricaric acid



1: imbricaric acid, 2: perlatolic acid, conf. J.A. Elix

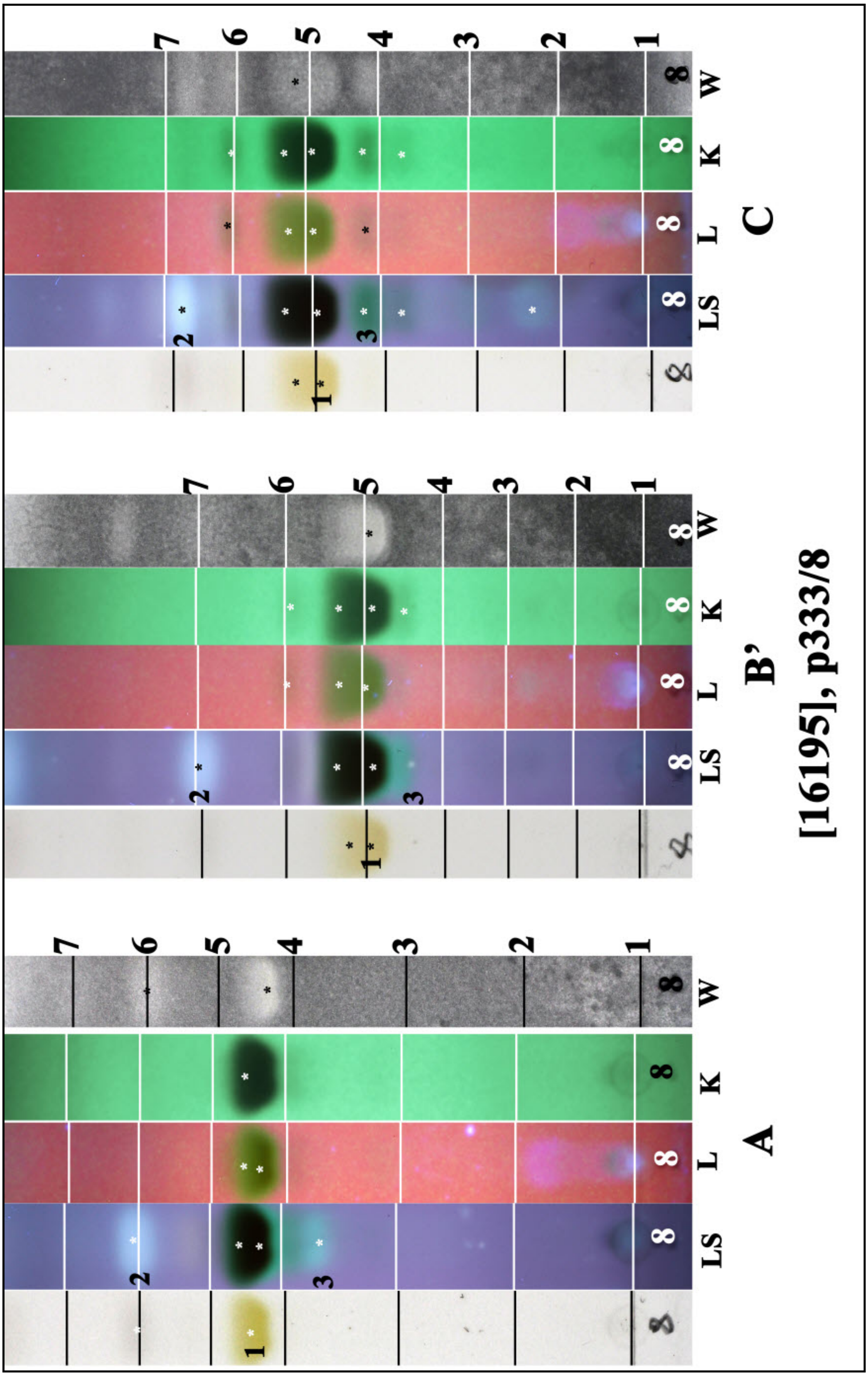
S. Huneck’s collection of lichen substances No 1324: imbricaric acid
Botanisches Museum Berlin-Dahlem

imbricaric acid



1: imbricaric acid, 2,3: unknowns, conf. J.A. Elix
Huneck's collection of lichen substances No 1236 imbricaric acid
Botanisches Museum Berlin-Dahlem

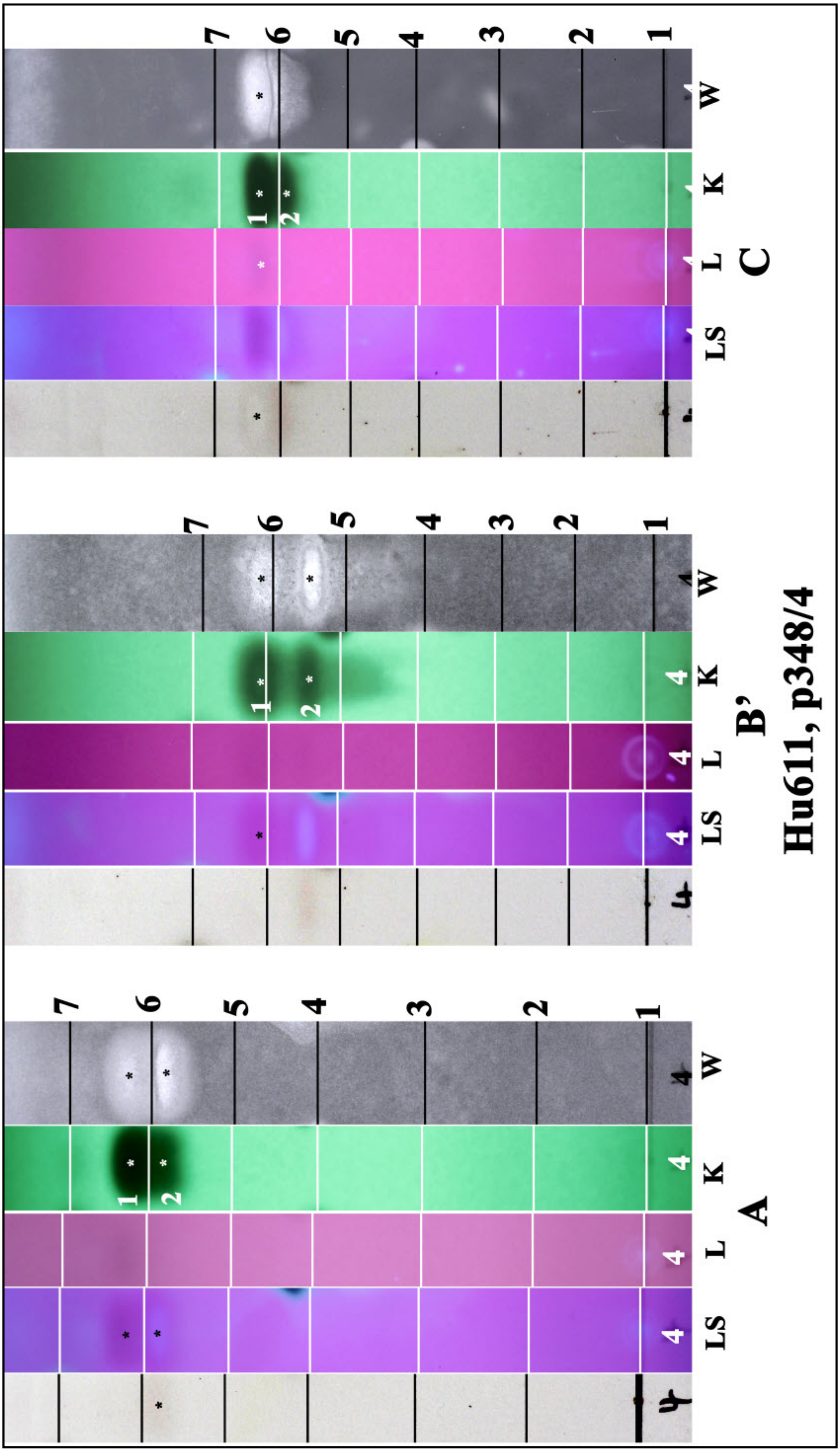
isoarthothelin



1: **isoarthothelin and arthothelin**, 2: lichexanthone, 3: 2,5-dichloronorlichexanthone

Buellia aeruginosa [16195], Australia, New South Wales, Mystery Bay south of Narooma, Pool Beach, 36.305° S, 150.136° E, 0 m. Leg. F. Schumm & E. Stocker-Wörgötter, 11.11.2009, det. F. Schumm, conf. J.A. Elix.

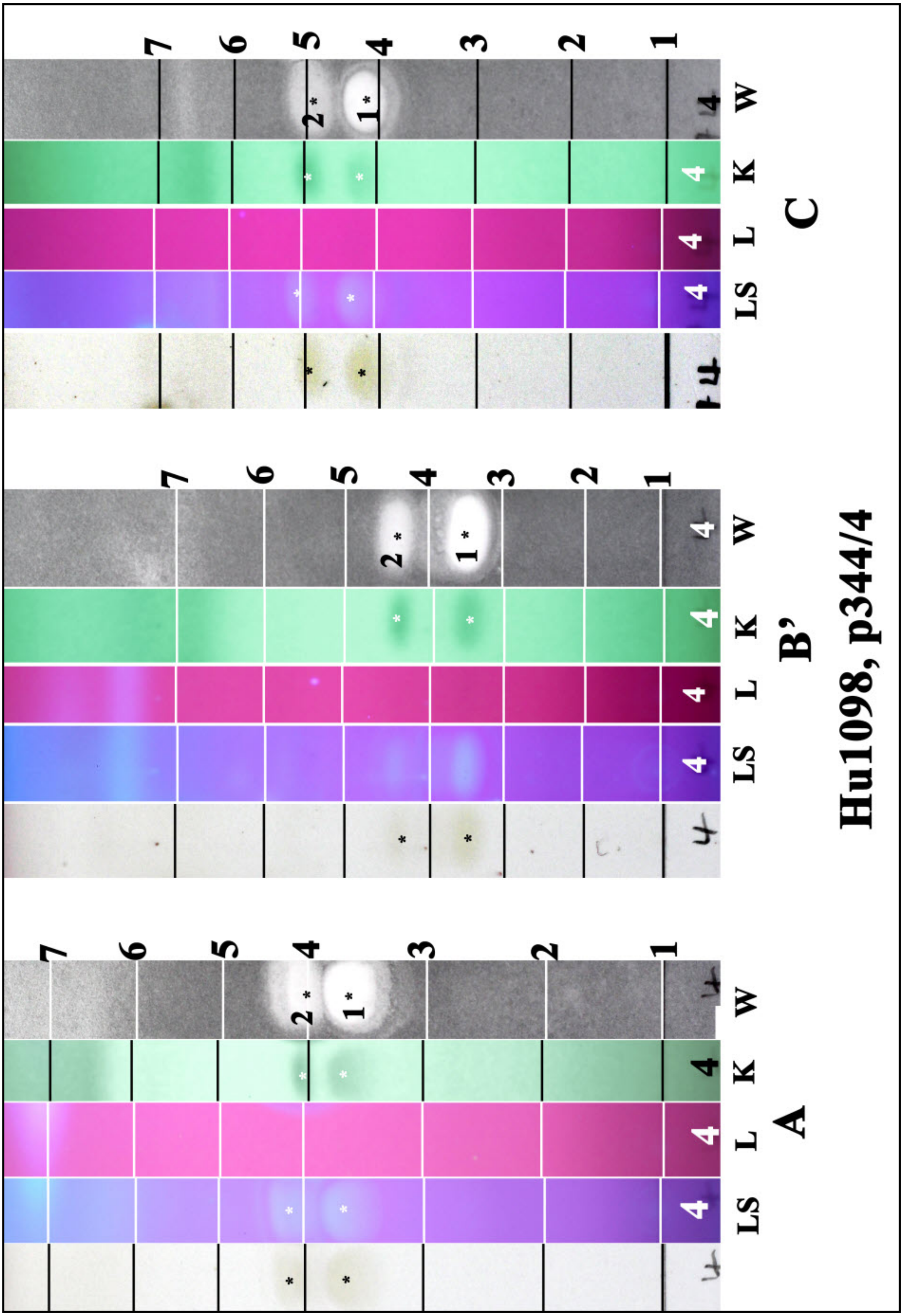
isofulgidin



1: diploicin, **2: isofulgidin**, conf. J.A. Elix

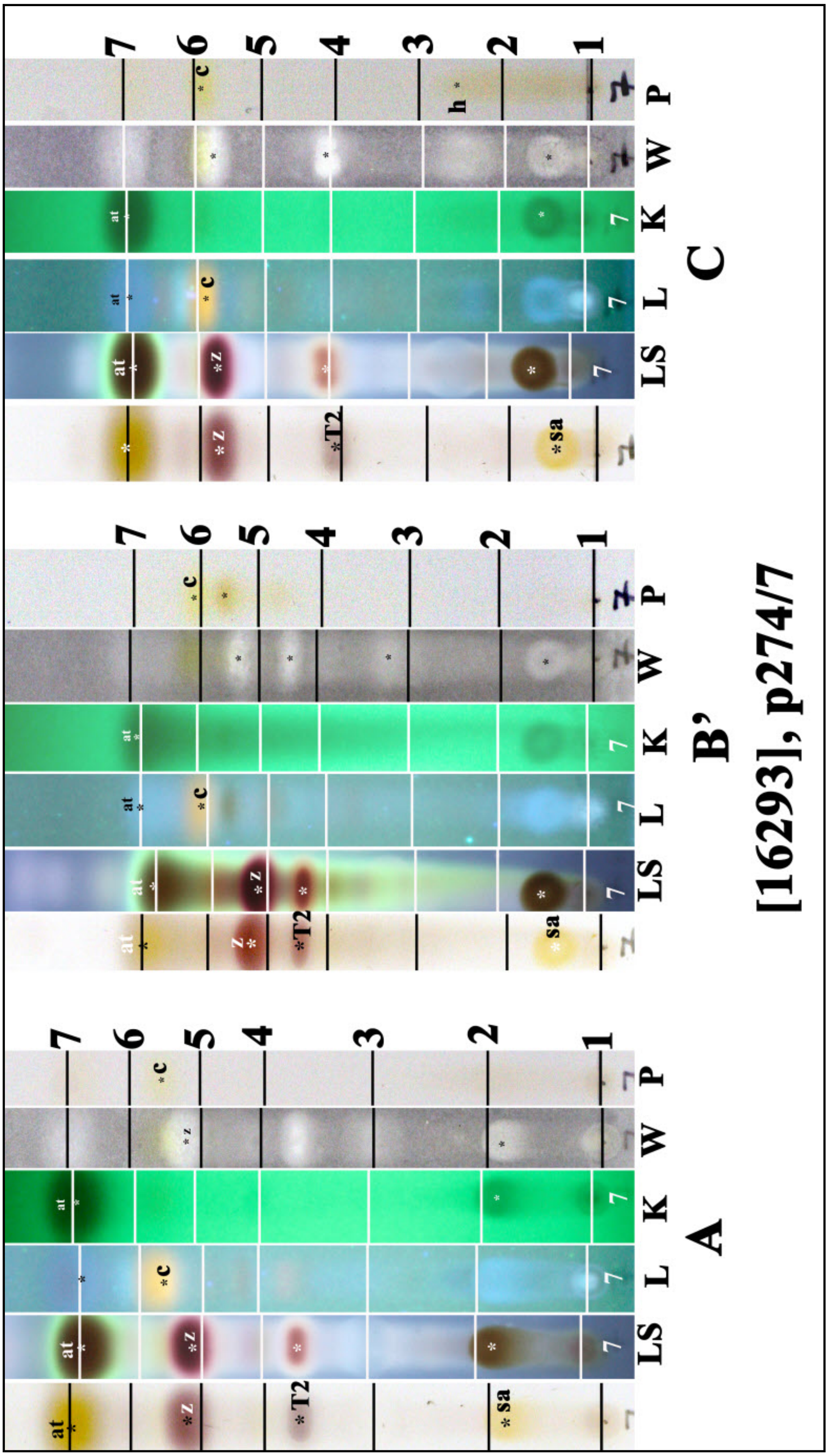
S. Huneck's collection of lichen substances No 611: diploicin
Botanisches Museum Berlin-Dahlem

isomuronic acid



1: muronic acid, **2: isomuronic acid**, conf. J.A. Elix
S. Huneck's collection of lichen substances No 1098: muronic acid.
Botanisches Museum Berlin-Dahlem

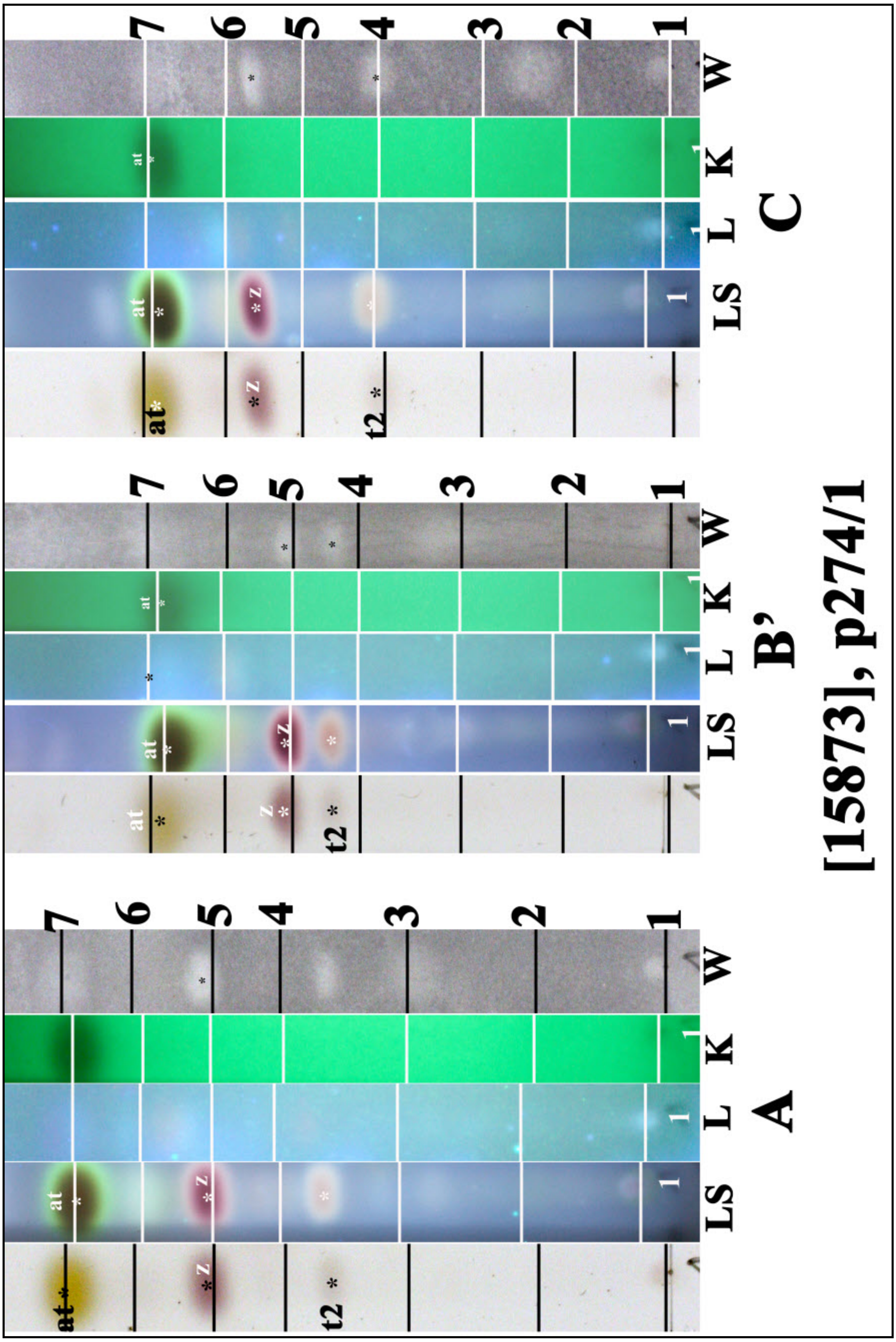
japonene („japonin“)



at: atranorin, z: zeorin, **T2: japonene**, sa: salazinic acid, c: 7-chloroemodin, h: hybocarpone

Heterodermia hypocaesia [16239], Australia, New South Wales, between Bermagui and Tathra, on way from Aragunnu Beach to the Mimosa Rocks, 36.585° S, 150,056° E, 10 m. Leg. F. Schumm & E. Stocker-Wörgötter, 12.11.2009.

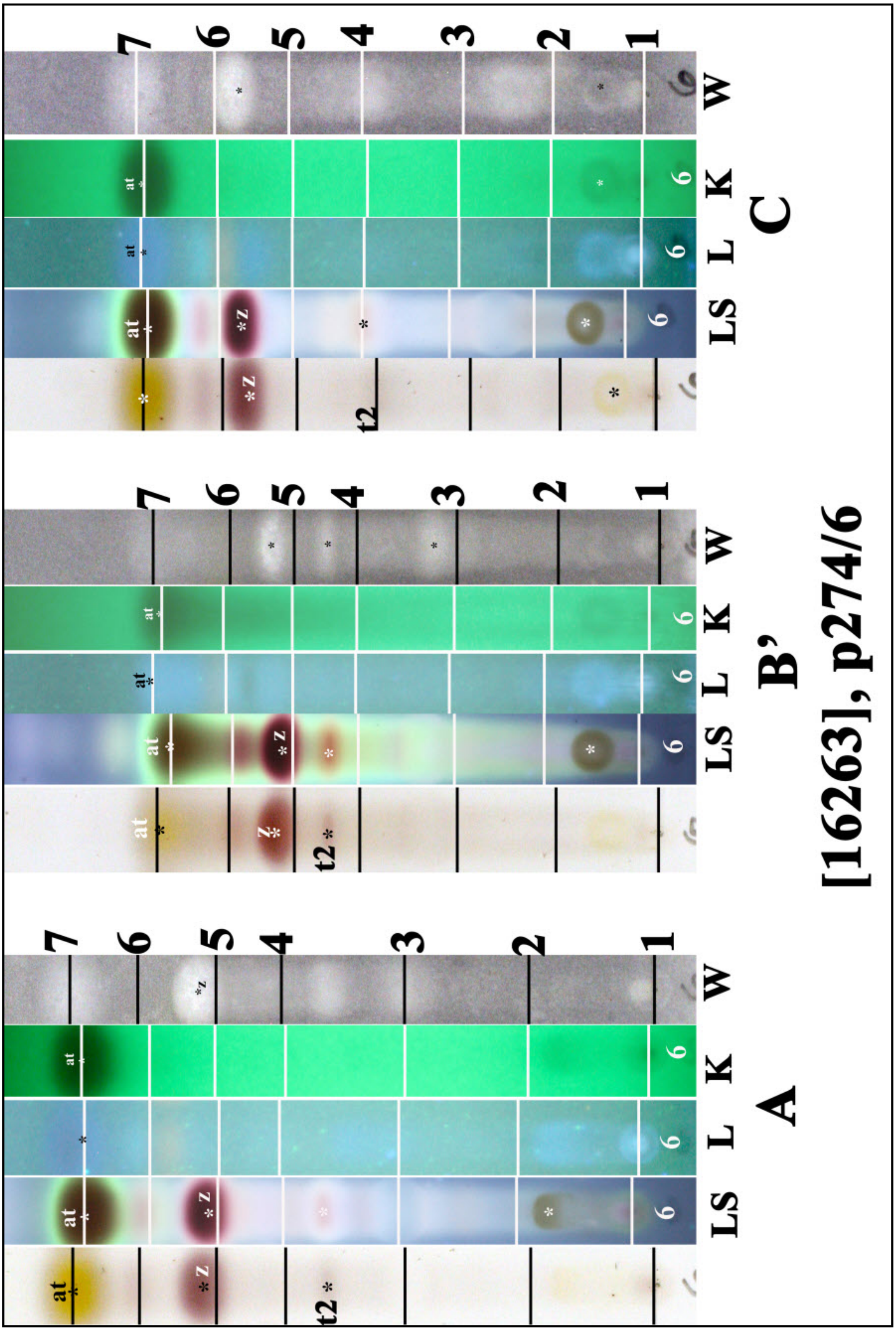
japonene („japonin“)



at: atranorin, z: zeorin, **t2: japonene**

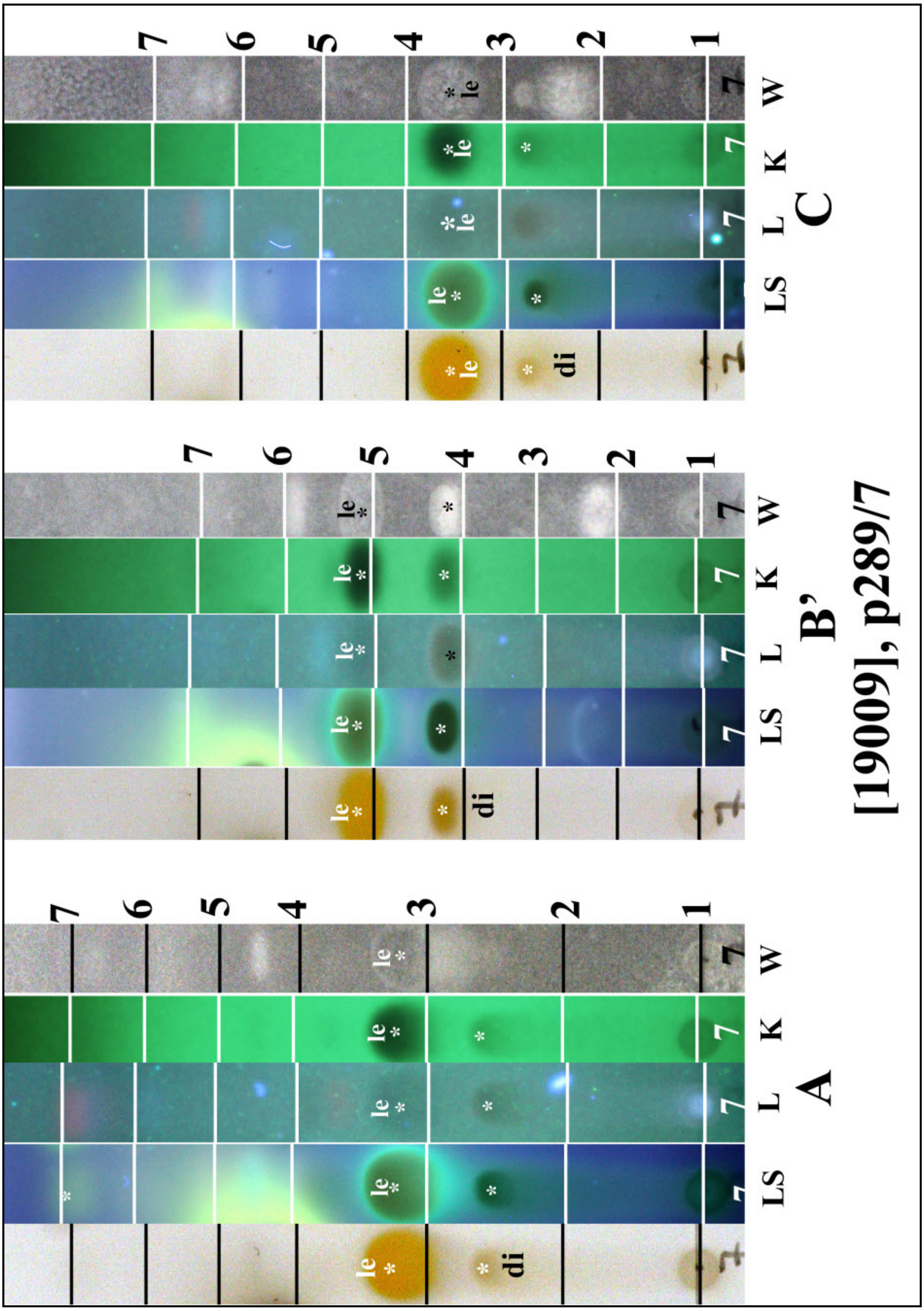
Heterodermia subneglecta, [15873], Australia, Western Australia, Donnelly Well south of Yornup along SW Highway, wetland associated with *Eucalyptus rudis* and *Melaleuca preissiana,* 34.073° S, 116,180° E, 260 m. Leg. F. Schumm & E. Stocker-Wörgötter, 25.19 2009.

japonene („japonin“)



Heterodermia subneglecta, [16263], Australia, New South Wales, Brown Mountain, near Cooma, Fred Piper Memorial Lookout, 36.597° S, 149.444° E, 910 m. Leg. F. Schumm & E. Stocker-Wörgötter, 13.11.2009. Chemistry: atranorin (major), zeorin (major), japonene (minor) by HPTLC, anal. F. Schumm.

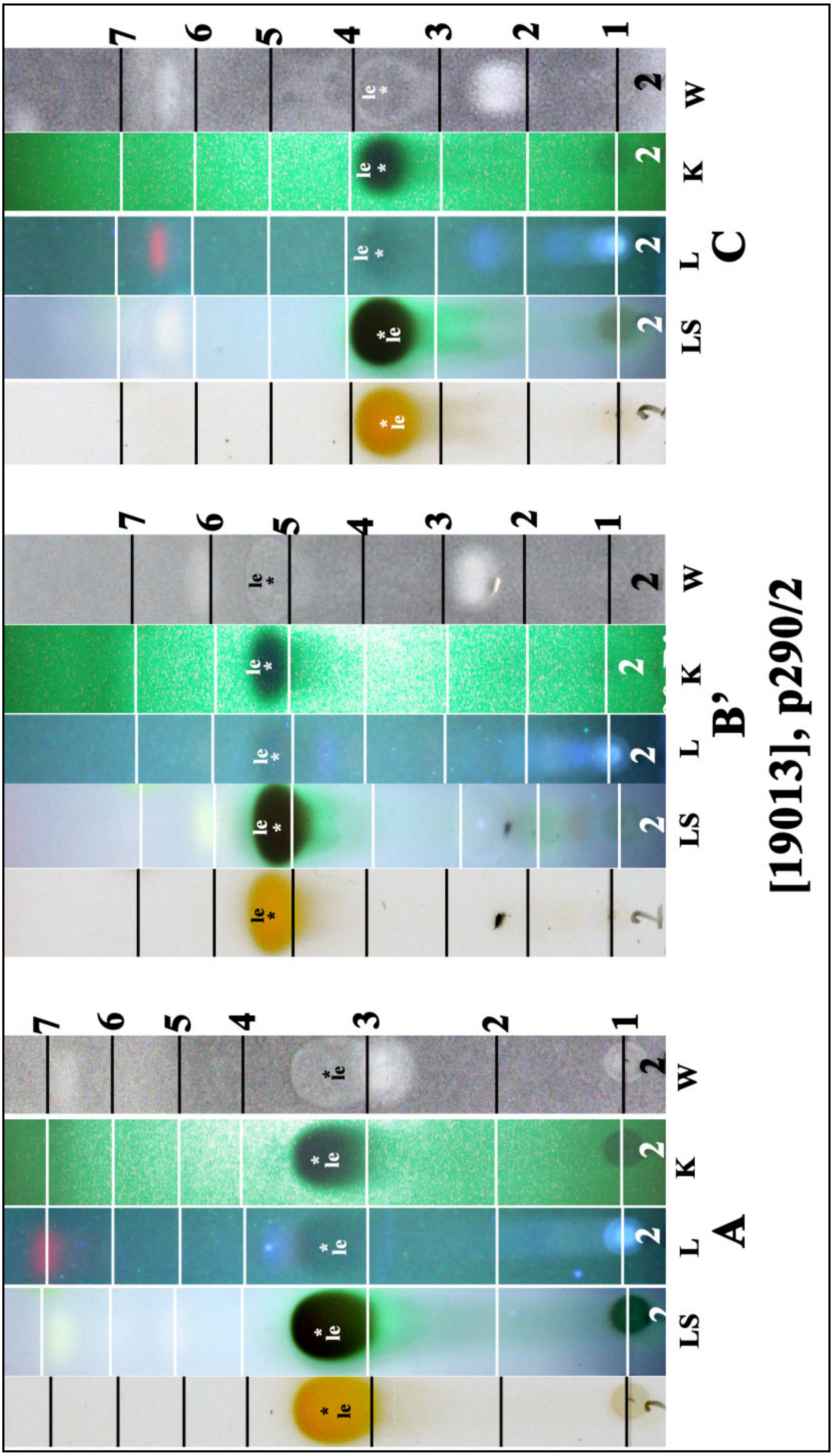
lecanoric acid



le: lecanoric acid, di: diploschistesic acid

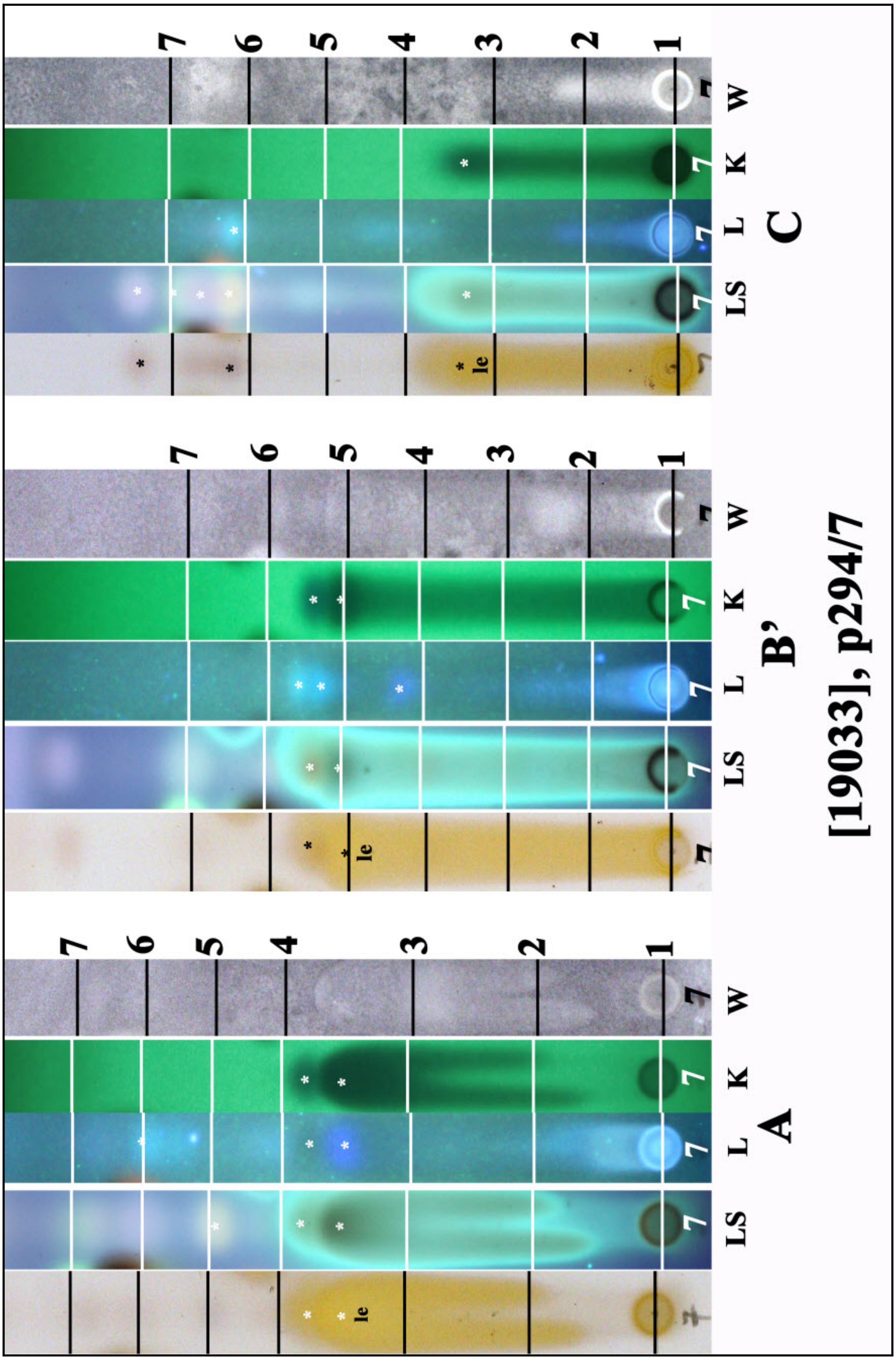
Diploschistes actinostomus (Pers. ex Ach.) Zahlbr. [19009], Australia, Queensland

lecanoric acid



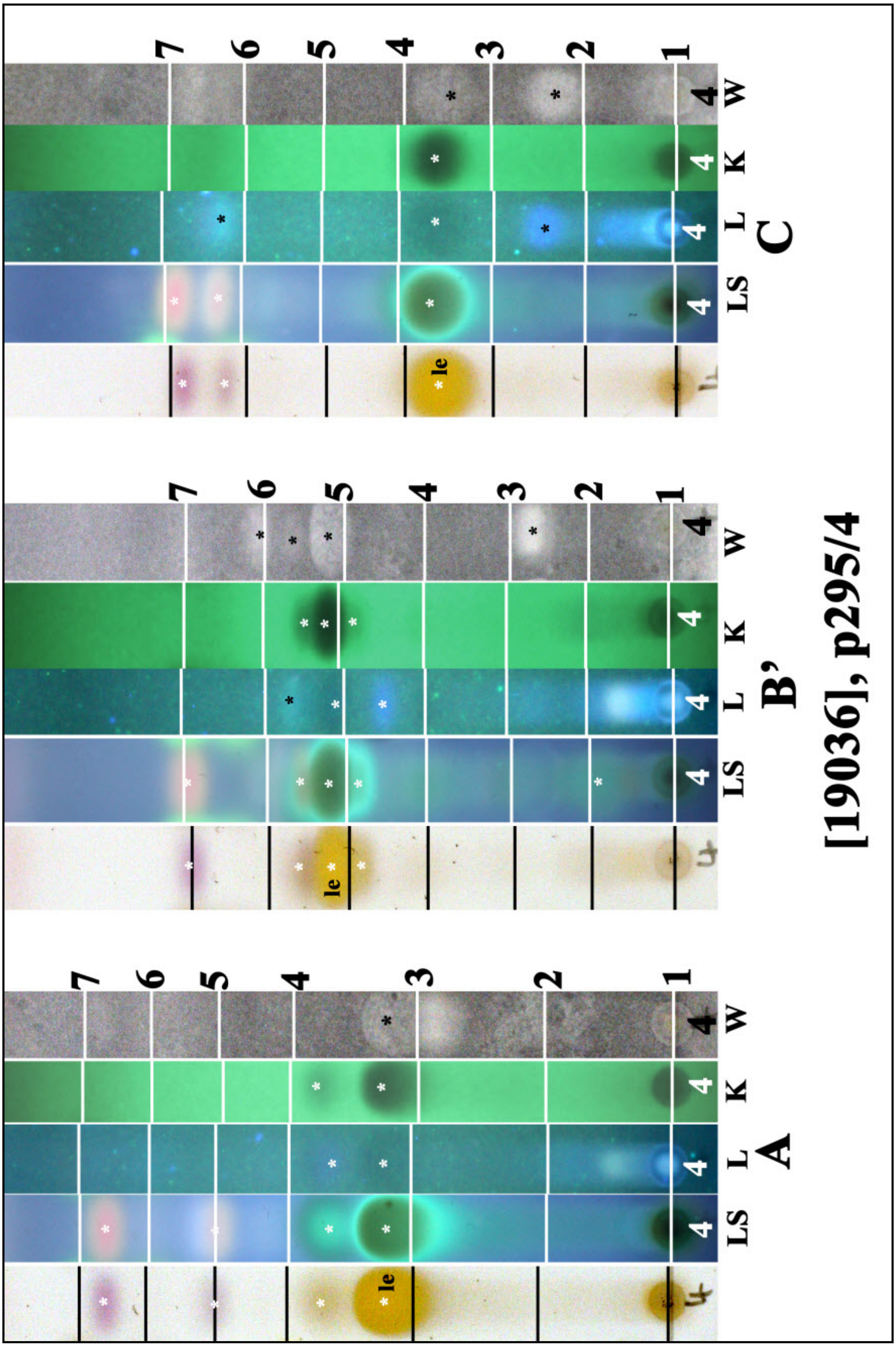
Diploschistes diploschistoides, [19013], Australia, Western Australia, Gibb River Range

lecanoric acid



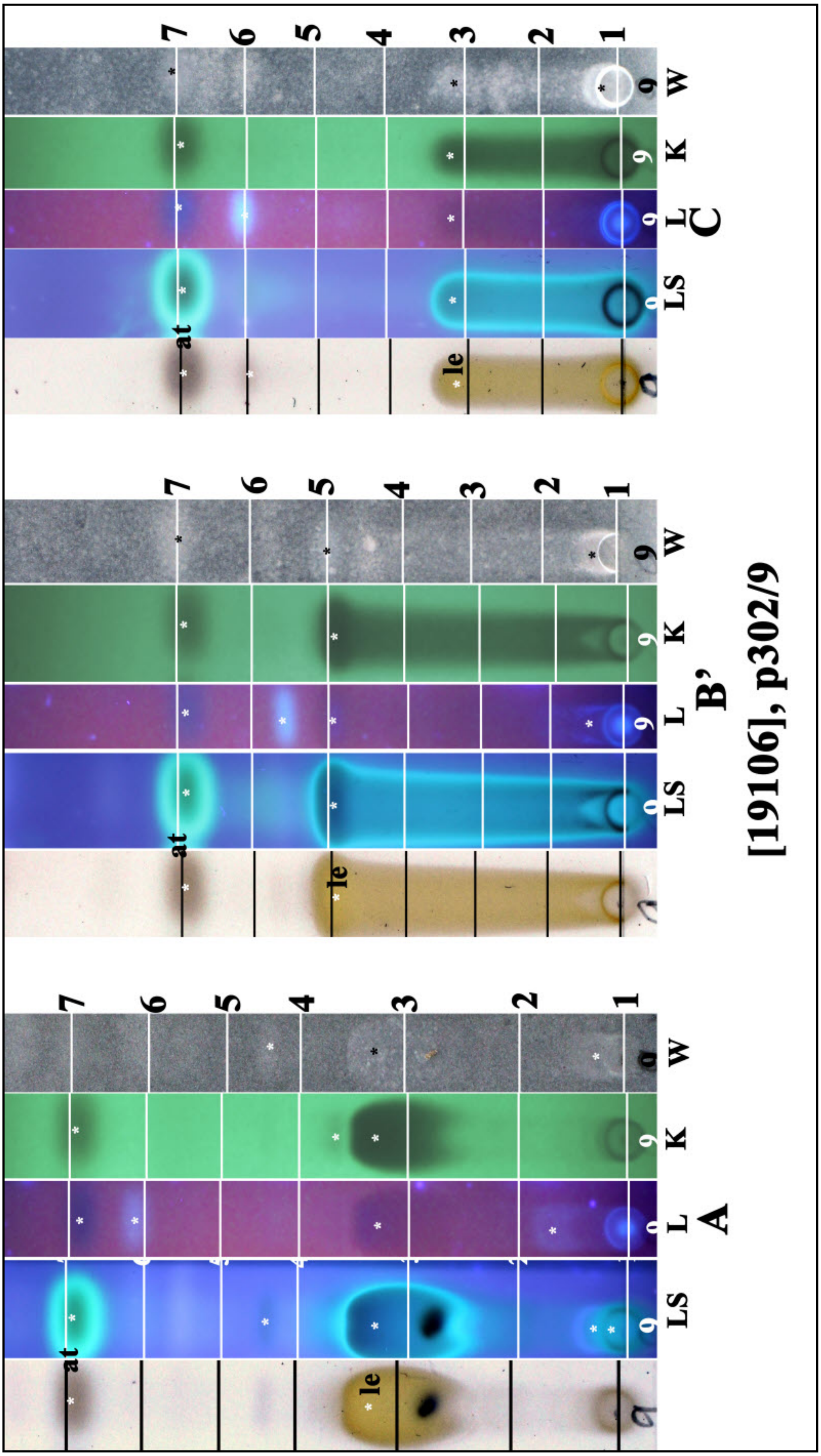
Hypocenomyce australis Timdal, [19033], Australia, Australian Capital Territory

lecanoric acid



Hypocenomyce scalaris **,**[19036], Australia, Australian Capital Territory, Canberra Nature Park, Bruce Ridge.

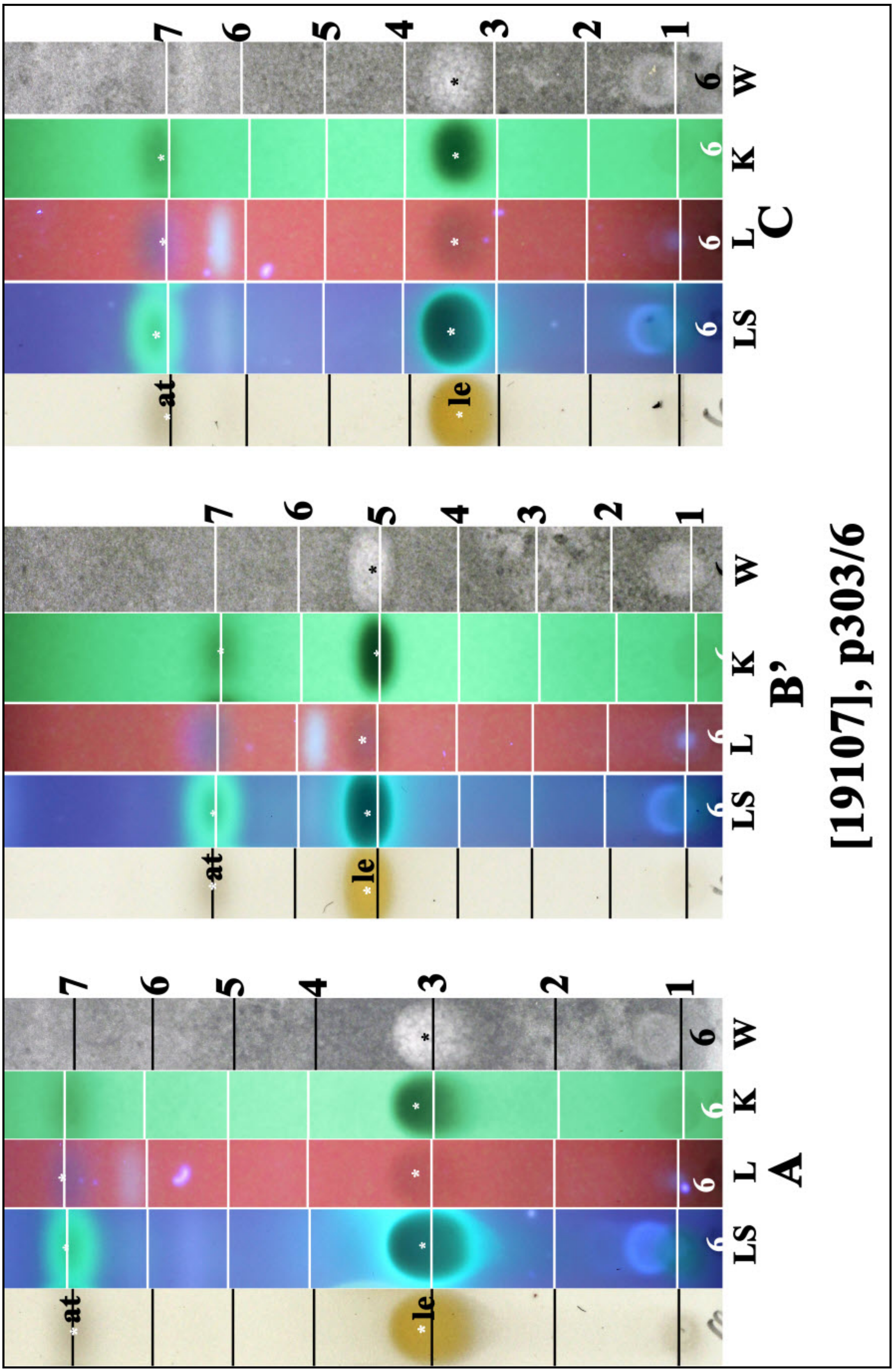
lecanoric acid



at: atranorin, le: lecanoric acid

Austroparmelina *(Parmelina)* ***conlabrosa,*** [19106], Australia, New South Wales, Goorooyarroo Reserve, 15 km north of Qeanbeyan along the Sutton road, 35°14' S, 149°15' E, 740 m.

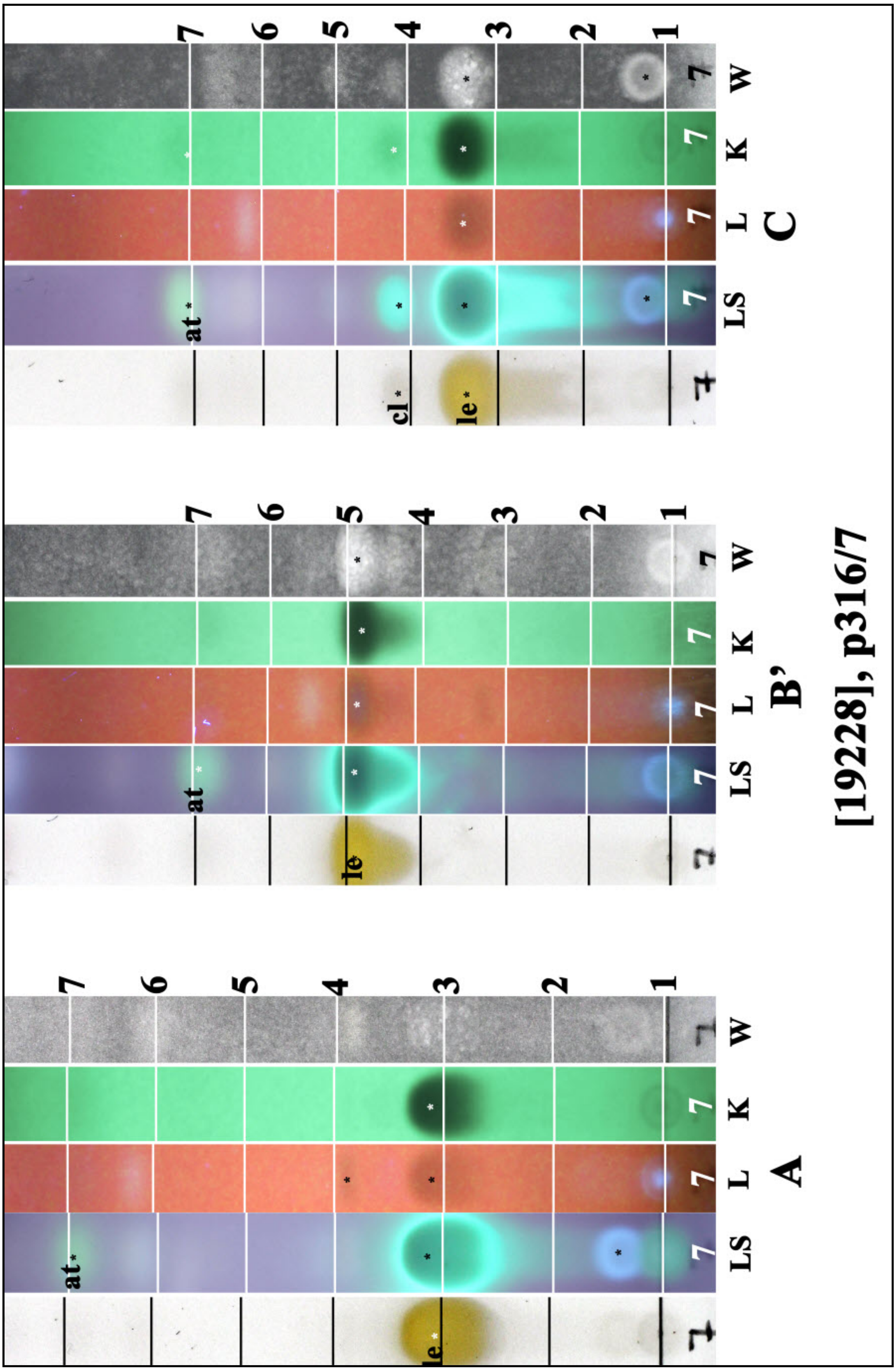
lecanoric acid



at: atranorin, le: lecanoric acid

Austroparmelina *(Parmelina)* ***pseudorelicina*** [19107], Australia, Australian Capital Territory, trail to summit of Mt Coree, Brindabella Range, 31 km west of Canberra.

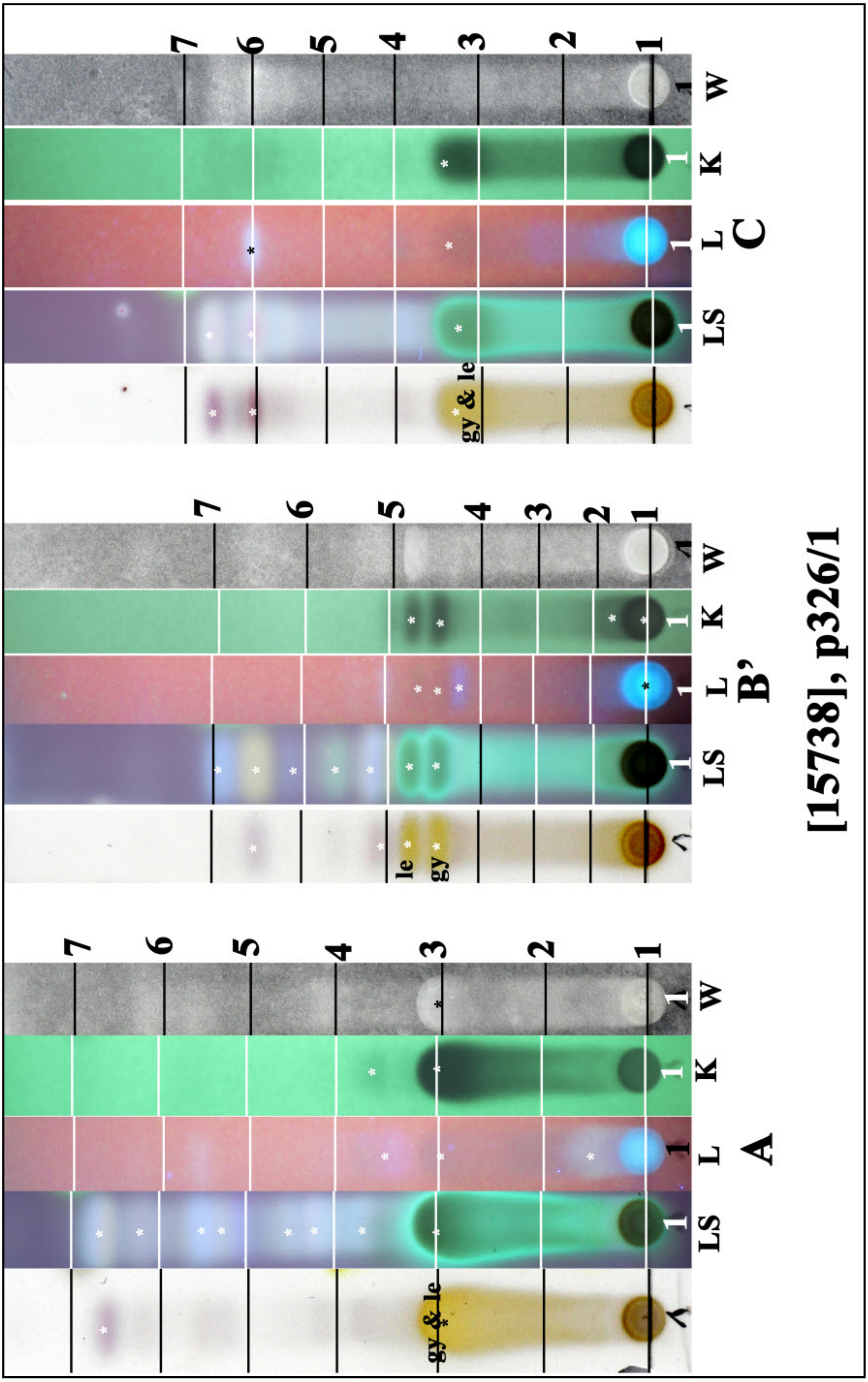
lecanoric acid



at: atranorin, le: lecanoric acid

Punctelia subalbicans, [19228], Australia, New South Wales, Weddin State Forest, 14 km south-west of Greenfell, 33°00' S, 148°01'E, 340 m.

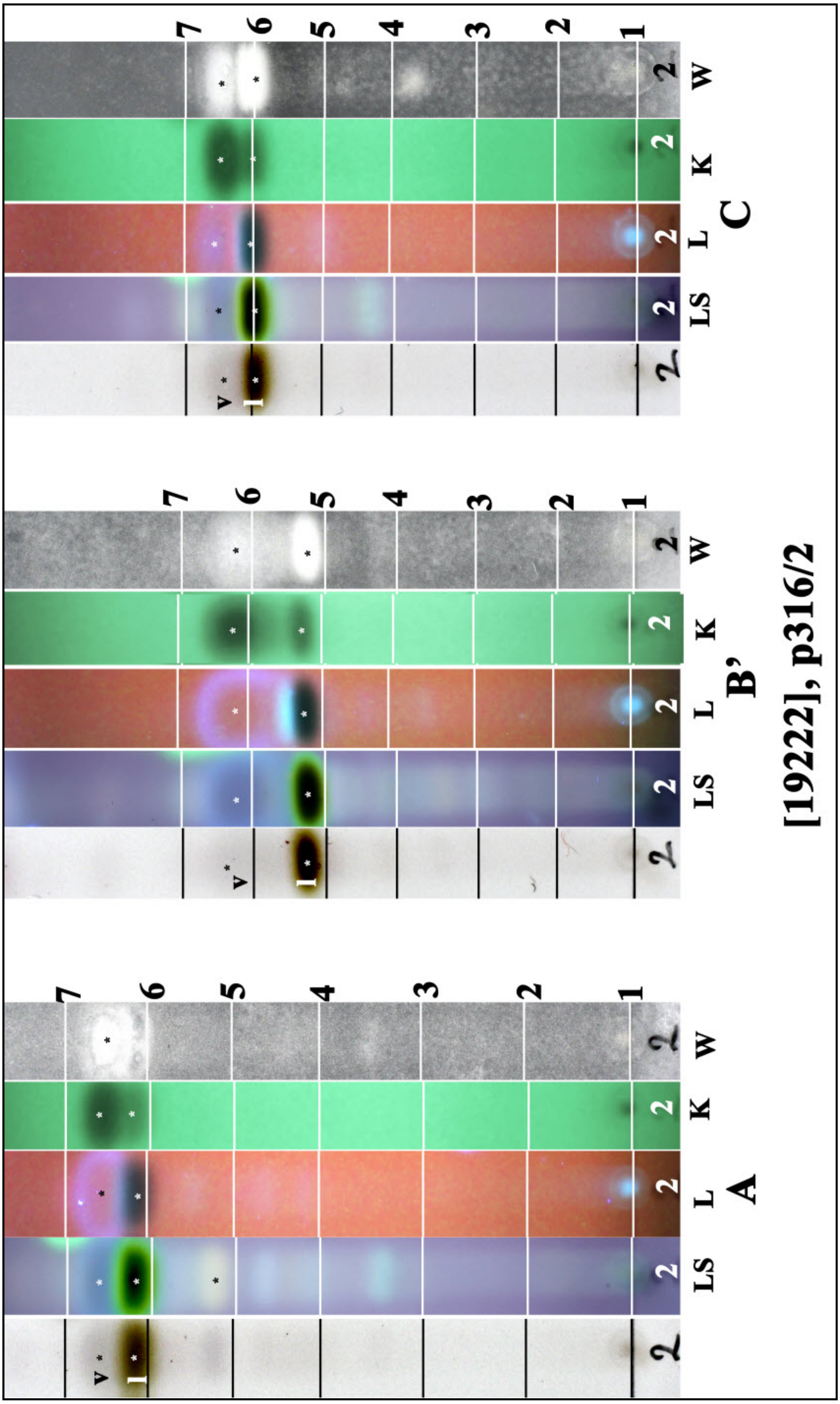
lecanoric acid



gy: gyrophoric acid, le: lecanoric acid

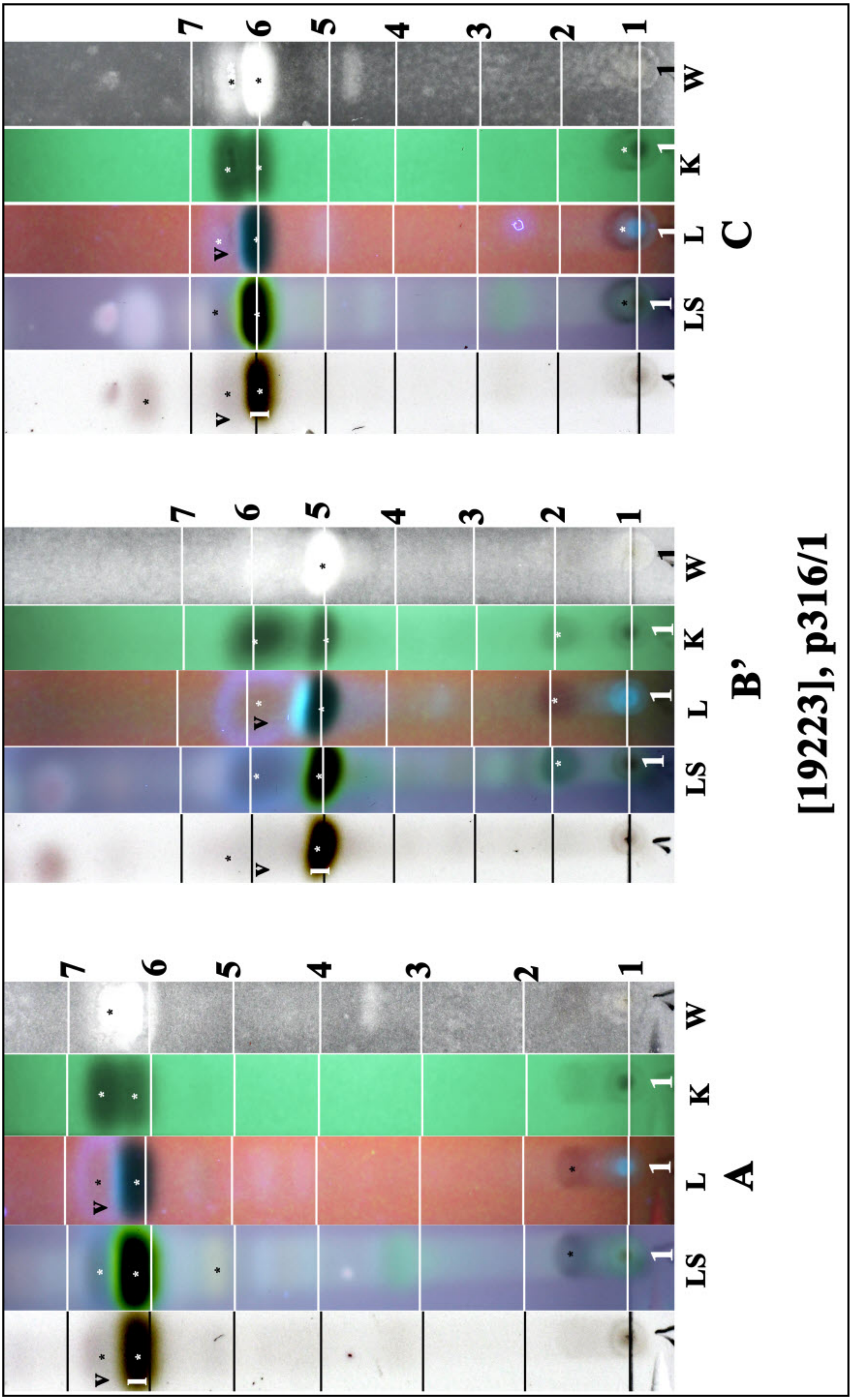
Ochrolechia africana, [15738], Australia, Western Australia, south of Yornup, 34.102° S, 116.232° E, 280 m, growing on shrubs. Leg. F. Schumm & E. Stocker-Wörgötter, 23.10.2009.

leprolomin



Pannaria farinosa, [19222], Australia, New South Wales, Great Dividing Range, 6 km east of Captains Flat, 2 km north of Parkers Gap, 35°37' S, 149°30' E, 1260 m.

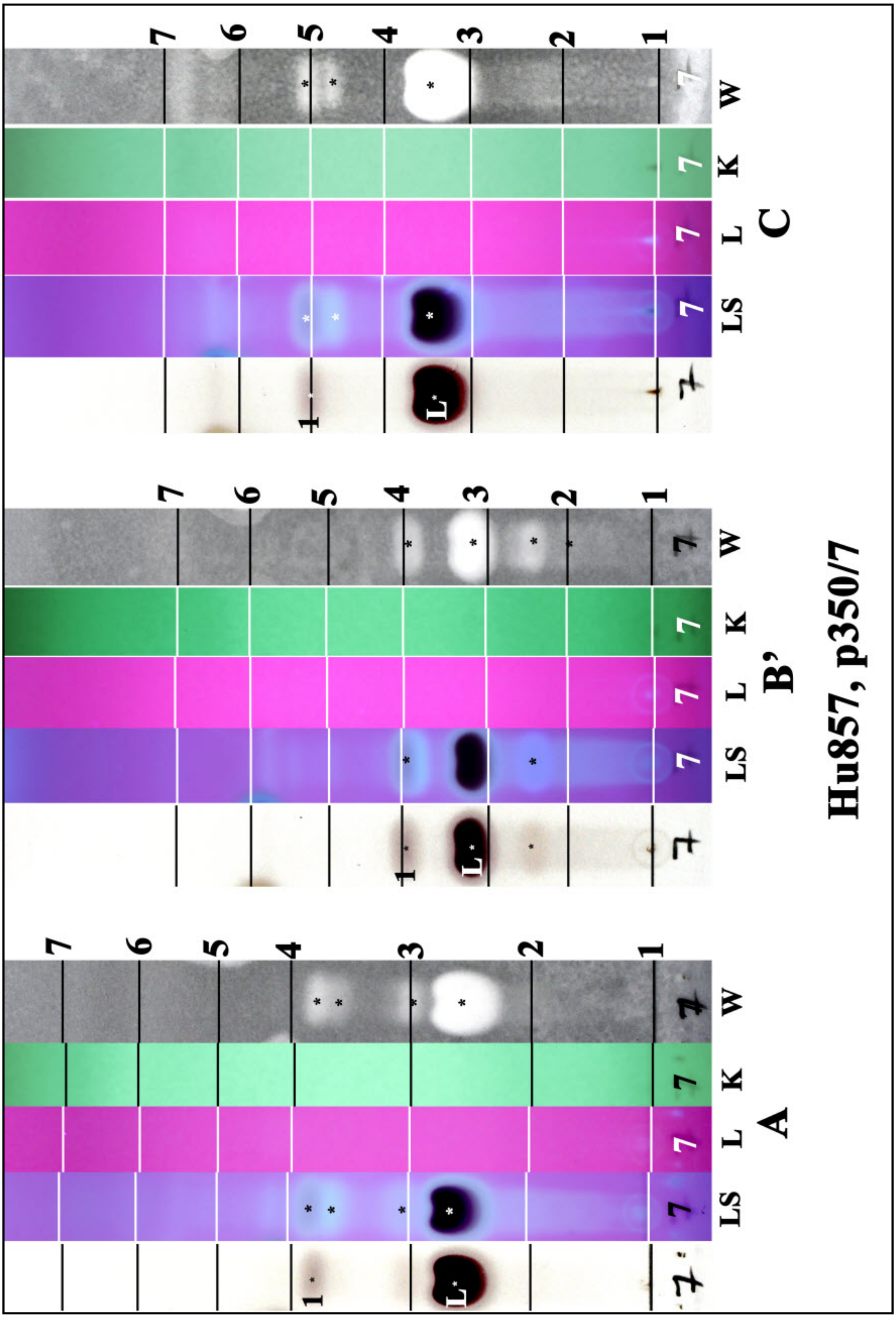
leprolomin



l: leprolomin, v: vicanicin

Pannaria farinosa, [19223], Australia, New South Wales, Big Badja Hill, 44 km south-west of Araluen, 36°00' S, 149°34' E, 1250 m.

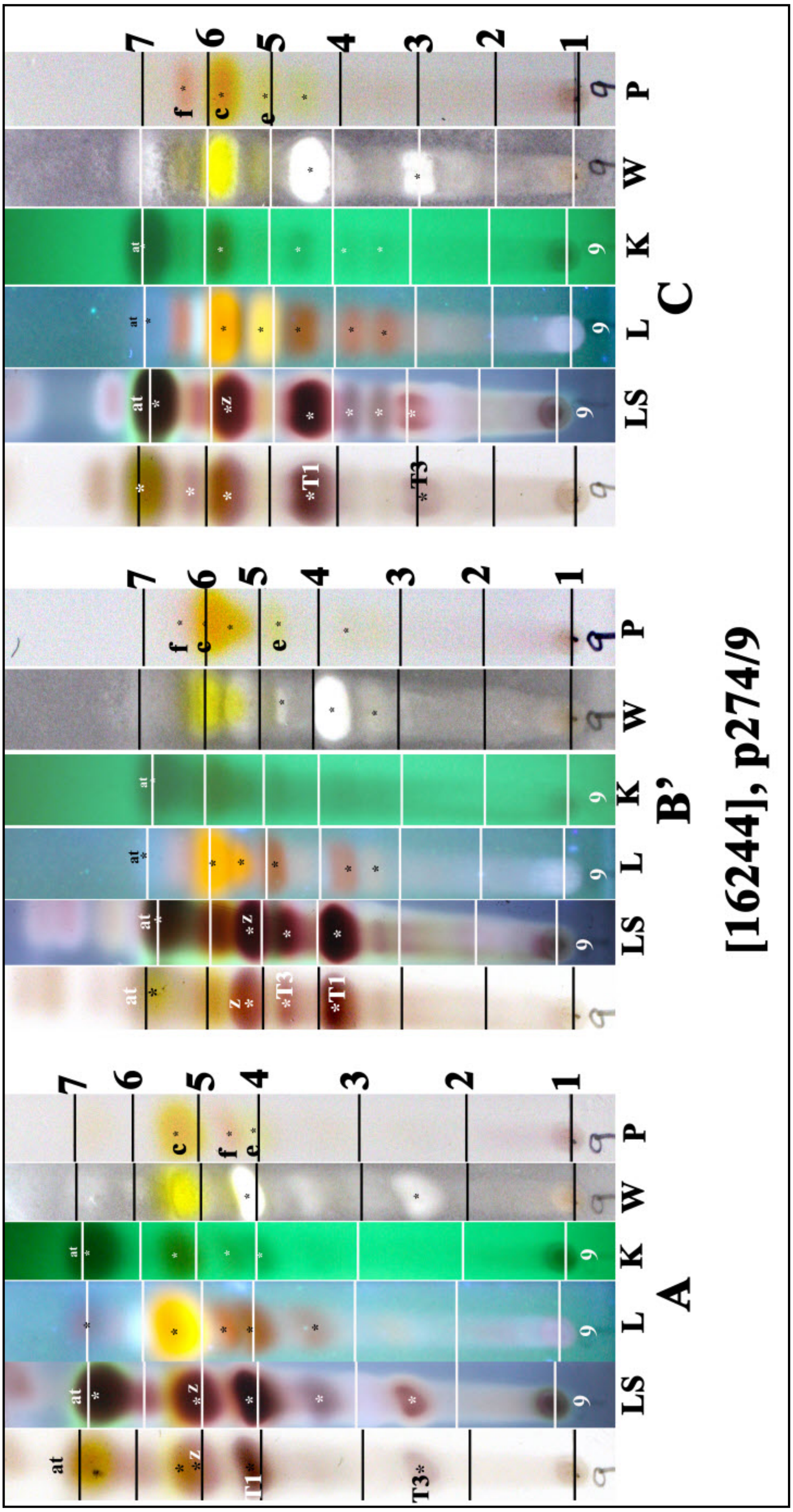
leucotylin



L: **leucotylin**, 1: unknown, conf. J.A. Elix

S. Huneck's collection of lichen substances No 857: leucotylin, roh aus *Lecanora muralis.* Botanisches Museum Berlin-Dahlem

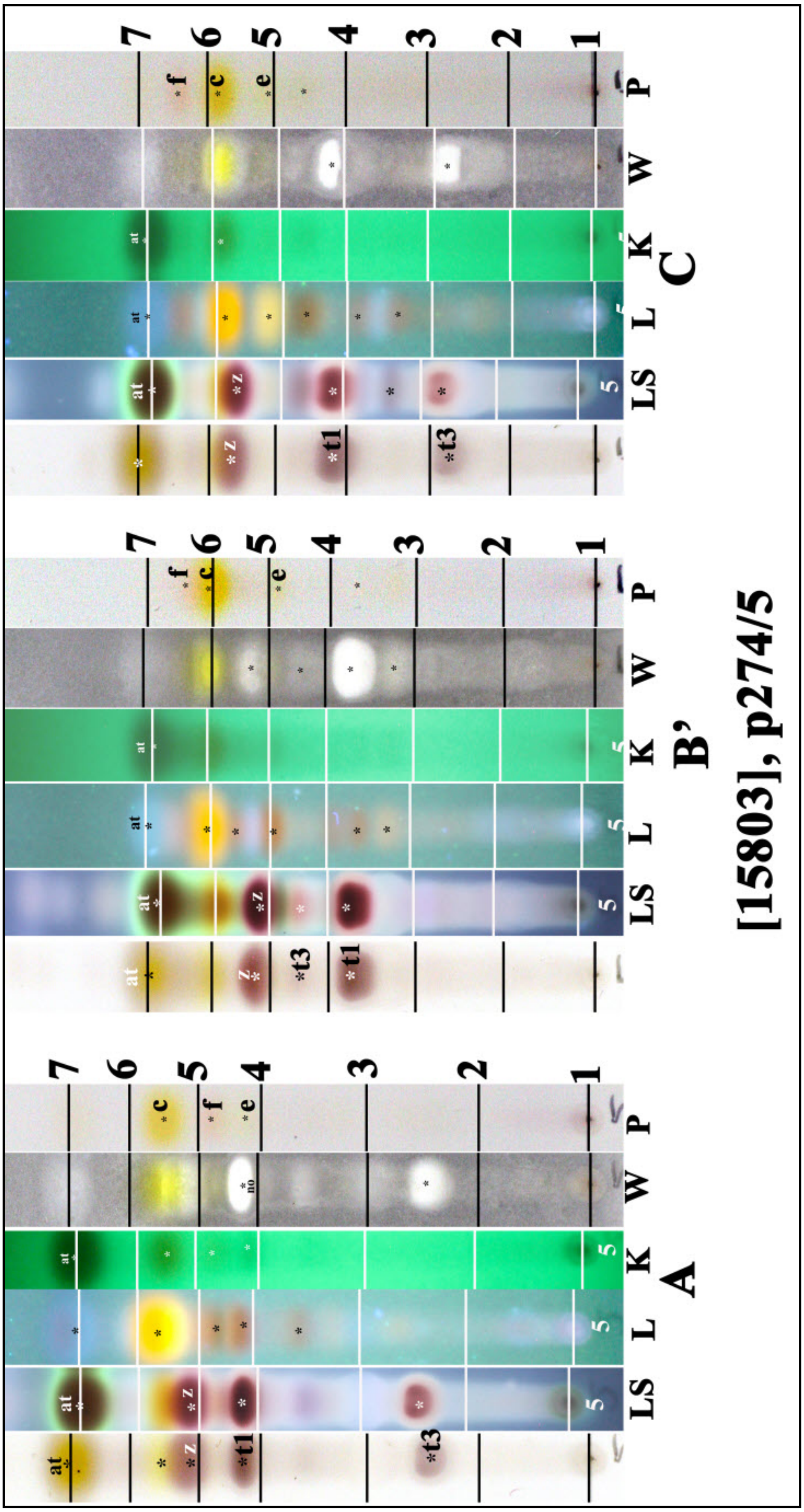
leucotylin



at: atranorin, z: zeorin, T1: 16β-acetoxyhopane-6α,22-diol, **T3: leucotylin,**
c: 7-chloroemodin. e: emodin, f: flavoobscurins

Heterodermia obscurata, [16244], Australia, New South Wales, between Bermagui and Tathra, on way from Aragunnu Beach to the Mimosa Rocks, 36.585° S, 150.056° E, 10 m, growing on rocks. Leg. F. Schumm & E. Stocker-Wörgötter, 12.11.2009.

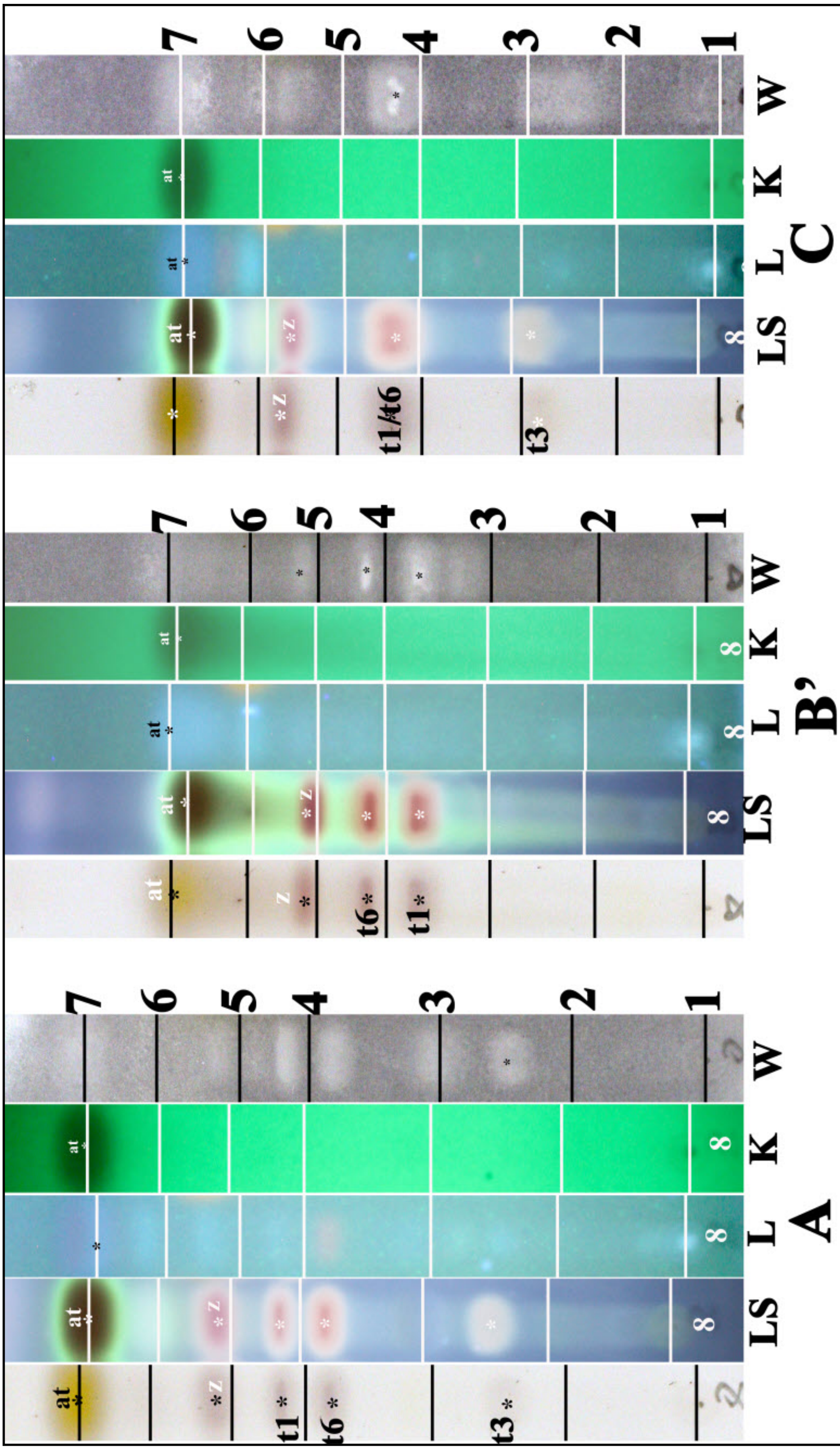
leucotylin



at: atranorin, z: zeorin, t1: 16β-acetoxyhopane-6α,22-diol, t3: **leucotylin**, c: 7-chloroemodin, e: emodin, f: flavoobscurins

Heterodermia obscurata, [15803], Australia, Western Australia, 75 km south of Mt. Chudalup, wetland with *Agonis junipera* and *Eucalyptus marginata,* 34.734° S, 116,088° E, 75 m. Leg. F. Schumm & E. Stocker-Wörgötter, 24.10.2009.

leucotylin

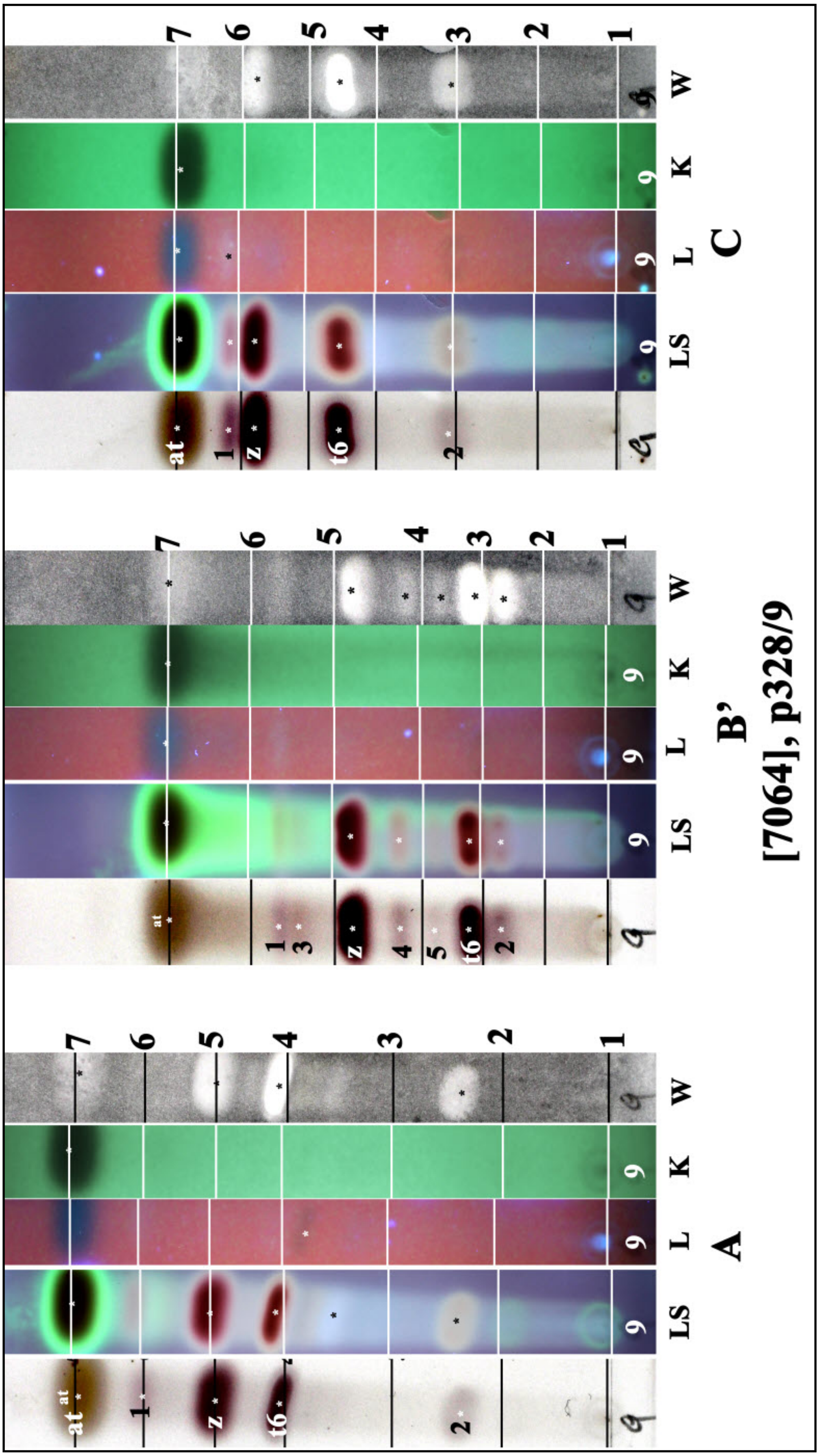


[16151], p274/8

at: atranorin, z: zeorin, t1: 16β-acetoxyhopane-6α, 22-diol, t6: 6α-acetoxyhopane-16β,22-diol, **t3: leucotylin**

Heterodermia tremulans, [16151], Australia (SE), Burrewarra Point near Tomakin, Guerilla Bay, Banksia Walk, 35.831° S, 150,229° E, 36 m. Leg. F. Schumm & E. Stocker-Wörgötter, 10.11.2009.

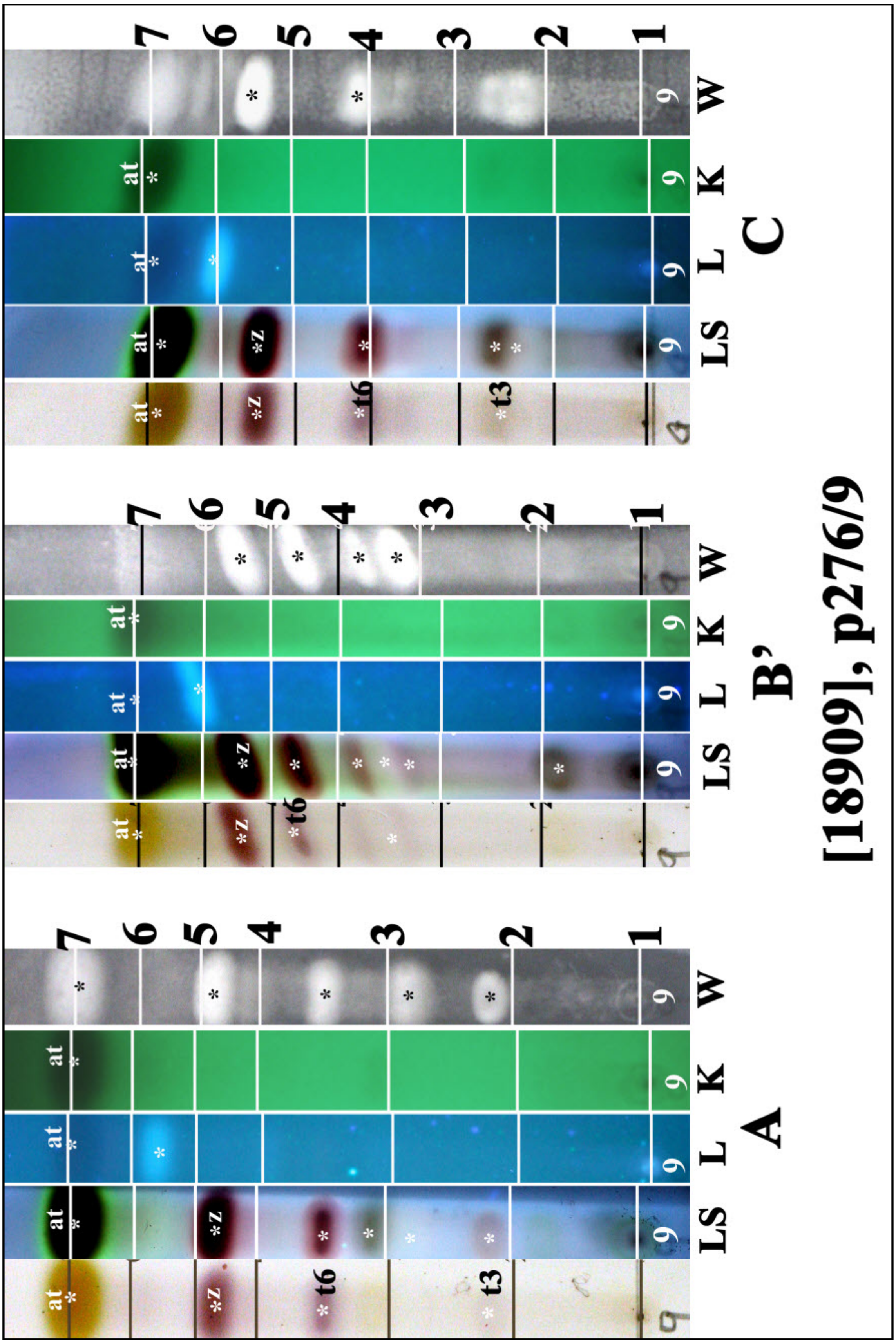
leucotylin



at: atranorin, z: zeorin, t6: 16β-acetoxyhopane-6α,22-diol,
1: 16β-acetoxyhopane-22-ol, **2: leucotylin**,
3: 6α-acetoxy-22-hydroxyhopane-25-oic acid,
4: 6α,16β-diacetoxyhopane-22-ol, 5: 6α-acetoxyhopane-16β,22-diol.

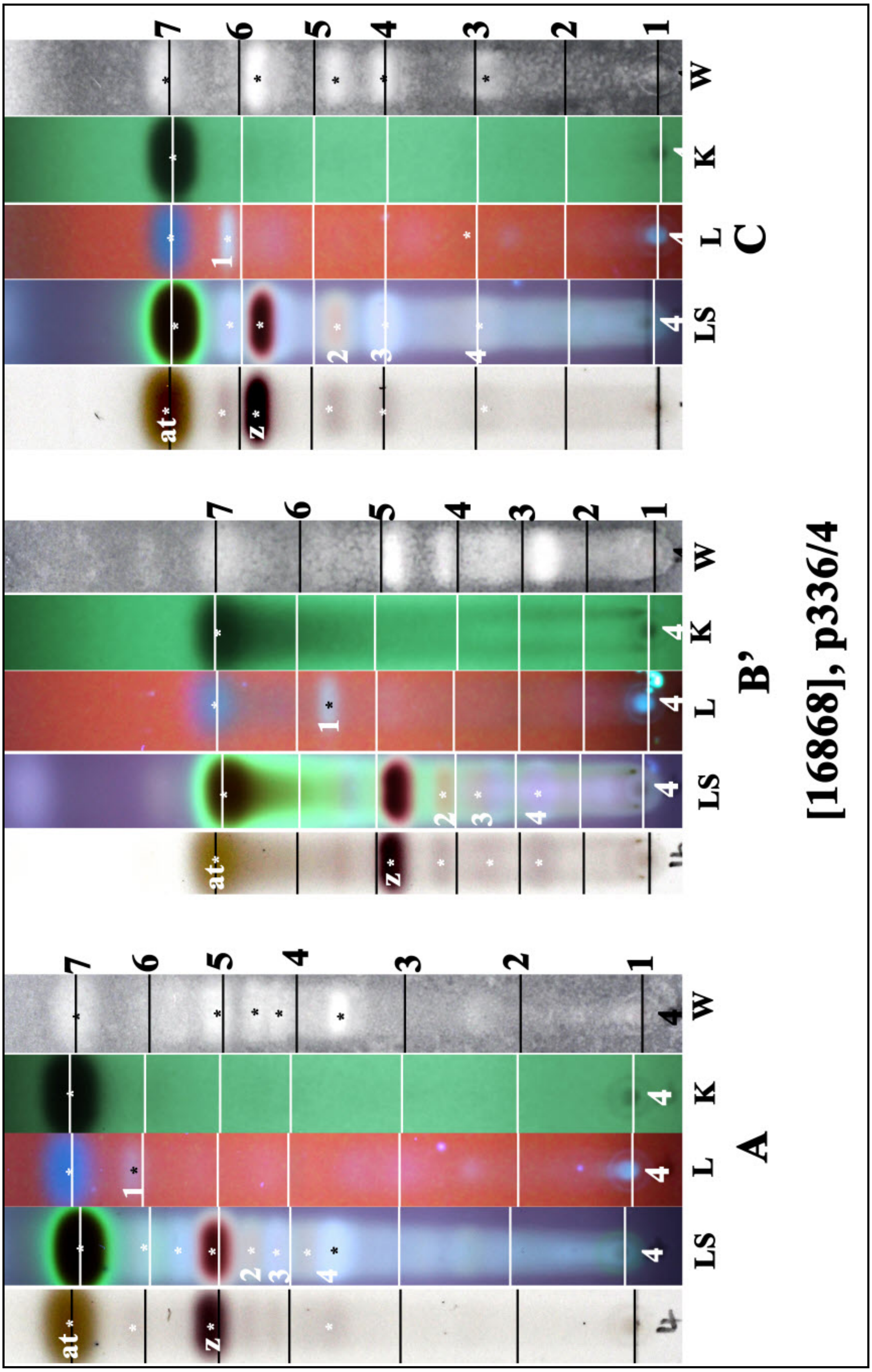
Heterodermia isidiophora, [7064], Indonesien, Bali, valley of the kings graves (Tal der Königsgräber), growing on rocks. Leg. D. & F. Schumm, 30.12.1985.

leucotylin



Heterodermia subcomosa, [18909], Australia, Norfolk Island, Mt. Pitt Reserve, summit trail below Mt. Bates, 29°00'30" S, 167°56'30" E, 300 m, growing on *Citrus limonia* in dense subtropical rainforest. Leg. J.A. Elix & H. Streimann, 6.12.1984, det. P.W. James. LICHENES AUSTRALASICI EXSICCATi No. 080.

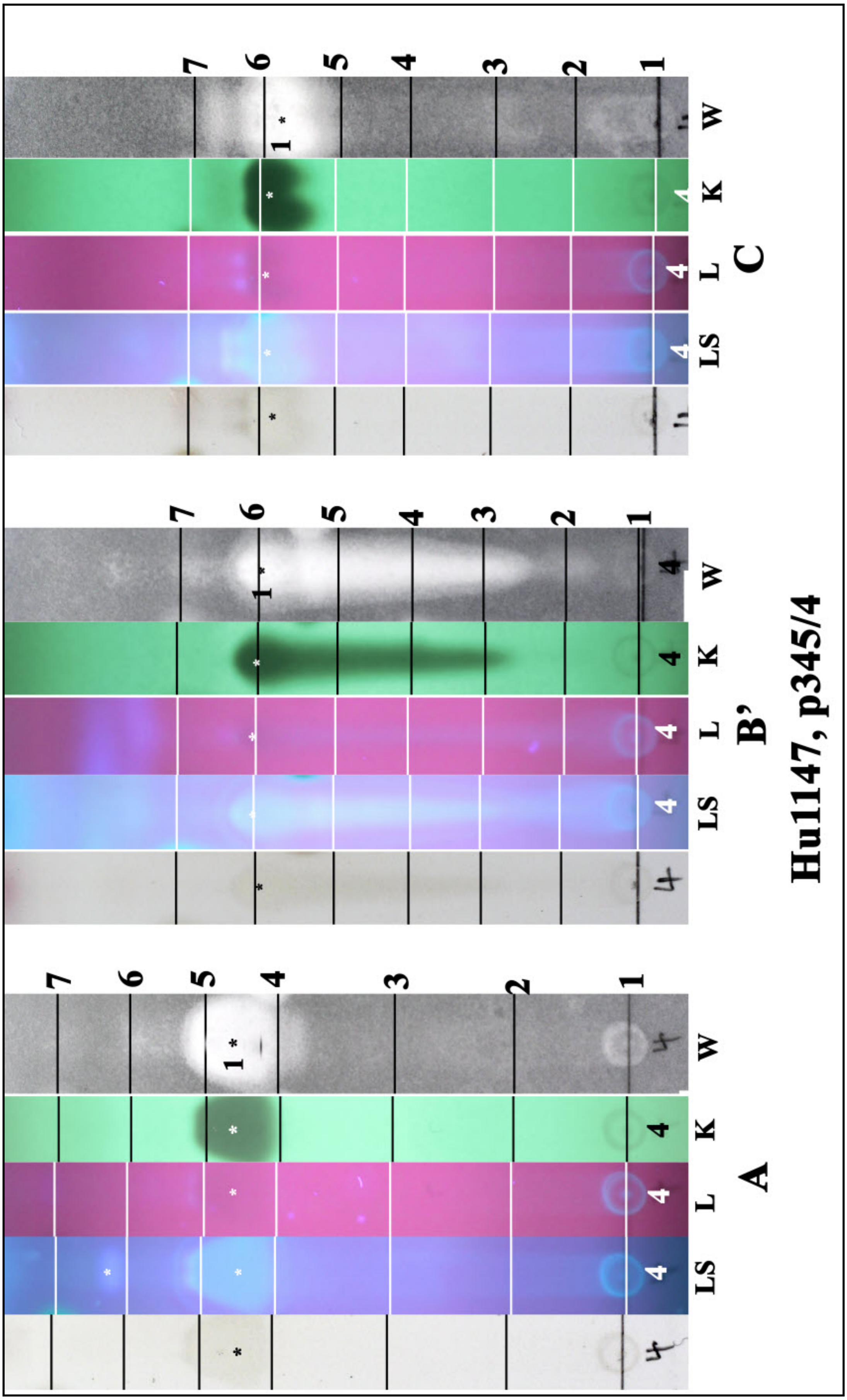
leucotylin



at: atranorin, z: zeorin, 1: 6α-acetoxy-22-hydroxyhopane-25-oic acid, 2: 6α-acetoxyhopane-16β,22-diol, 3: 6α-acetoxy-16β,22-dihydroxyhopane-25-oic acid, **4: leucotylin**, conf. J.A. Elix

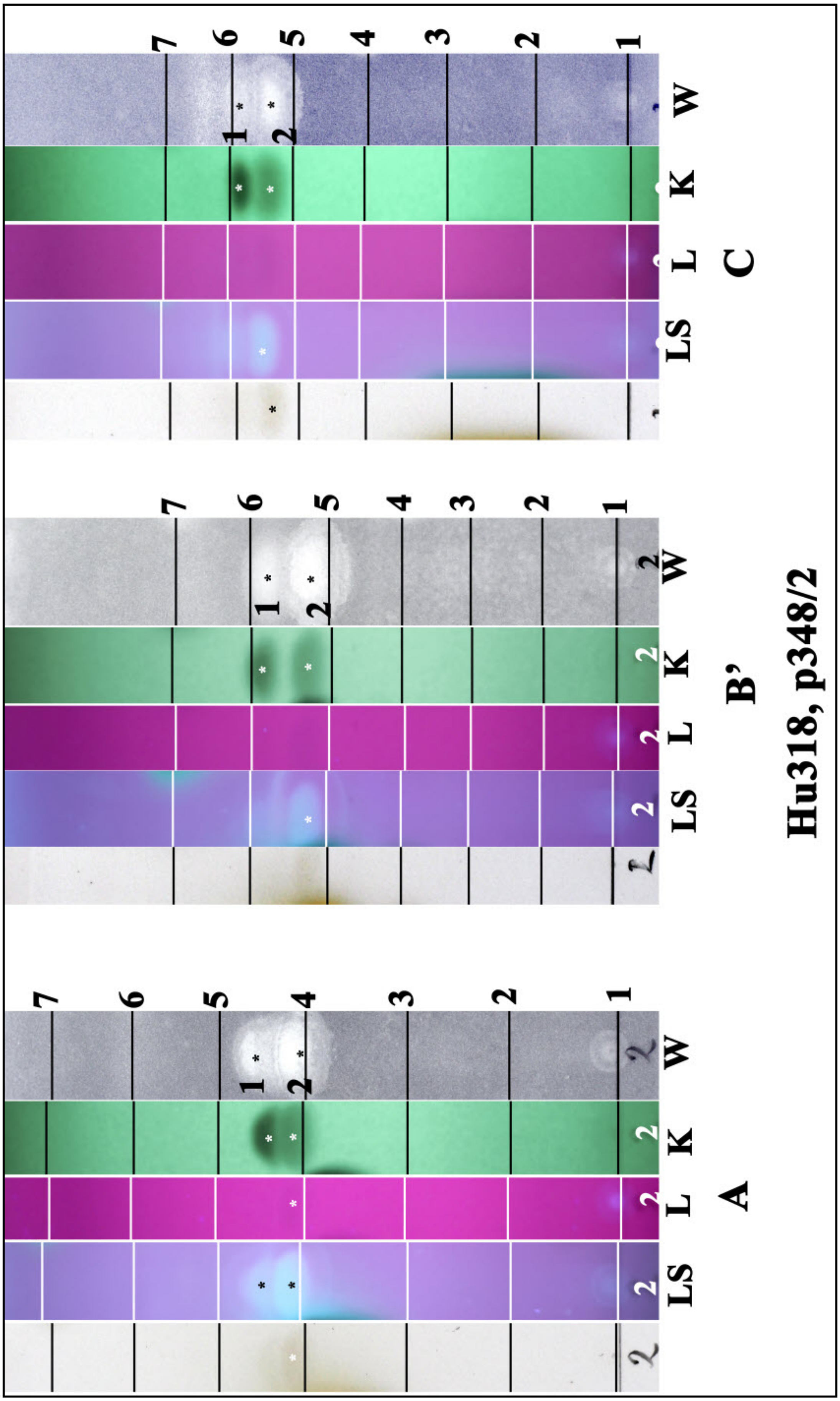
Physcia atrostriata, [16868], USA, Hawaii, Oahu, NE-Küste, Heeia State Park north of Kaneohe, 21,43486° N, 157,81089° W, 27 m. Leg. F. Schumm & J.-P. Frahm 10.02.2011

lichesterinic acid



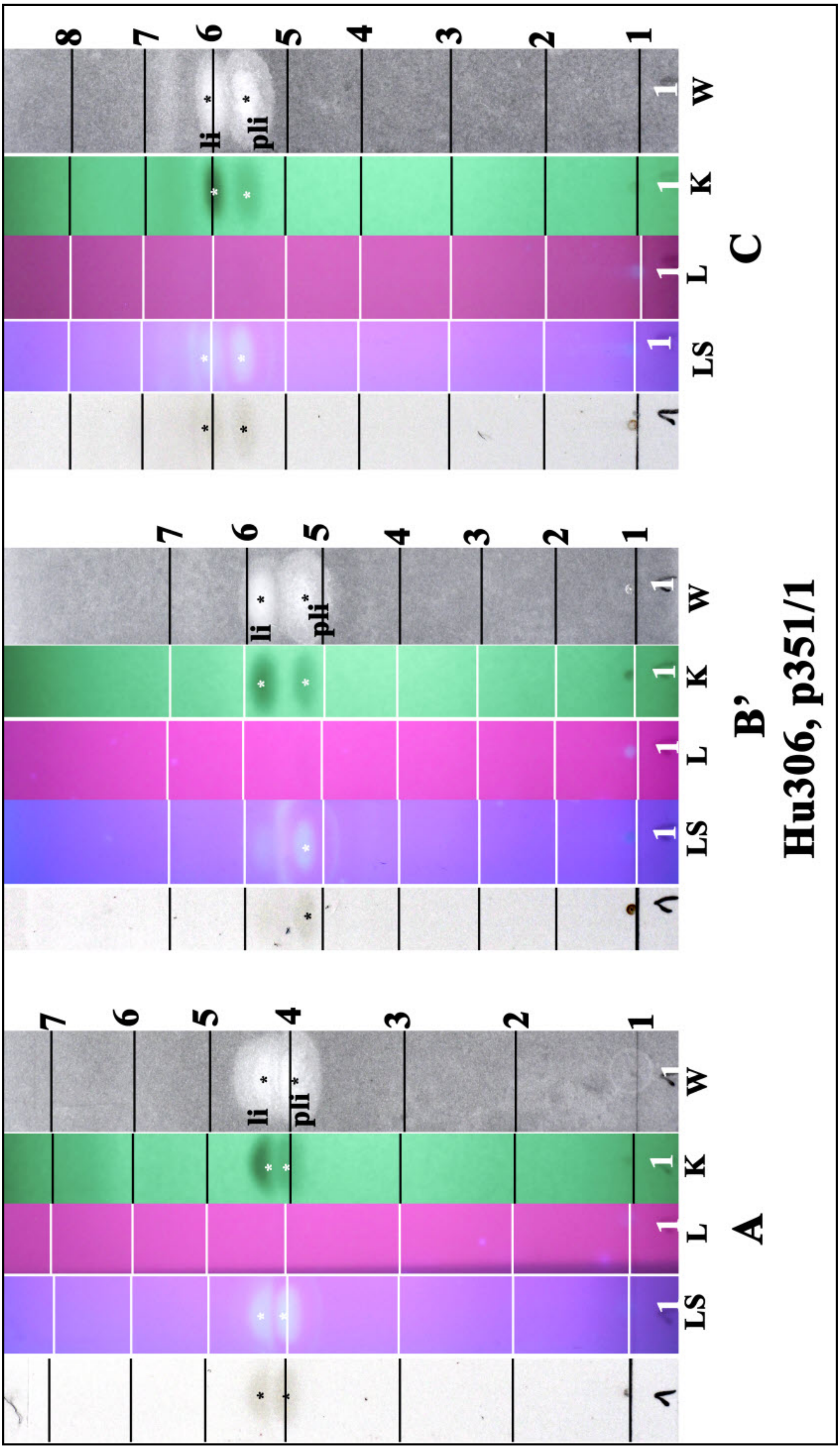
S. Huneck's collection of lichen substances No 1147: lichesterinic acid
Botanisches Museum Berlin-Dahlem

lichesterinic acid



S. Huneck’s collection of lichen substances No 318: lichesterinic acid (20%), protolichesterinic acid (80%). Botanisches Museum Berlin-Dahlem

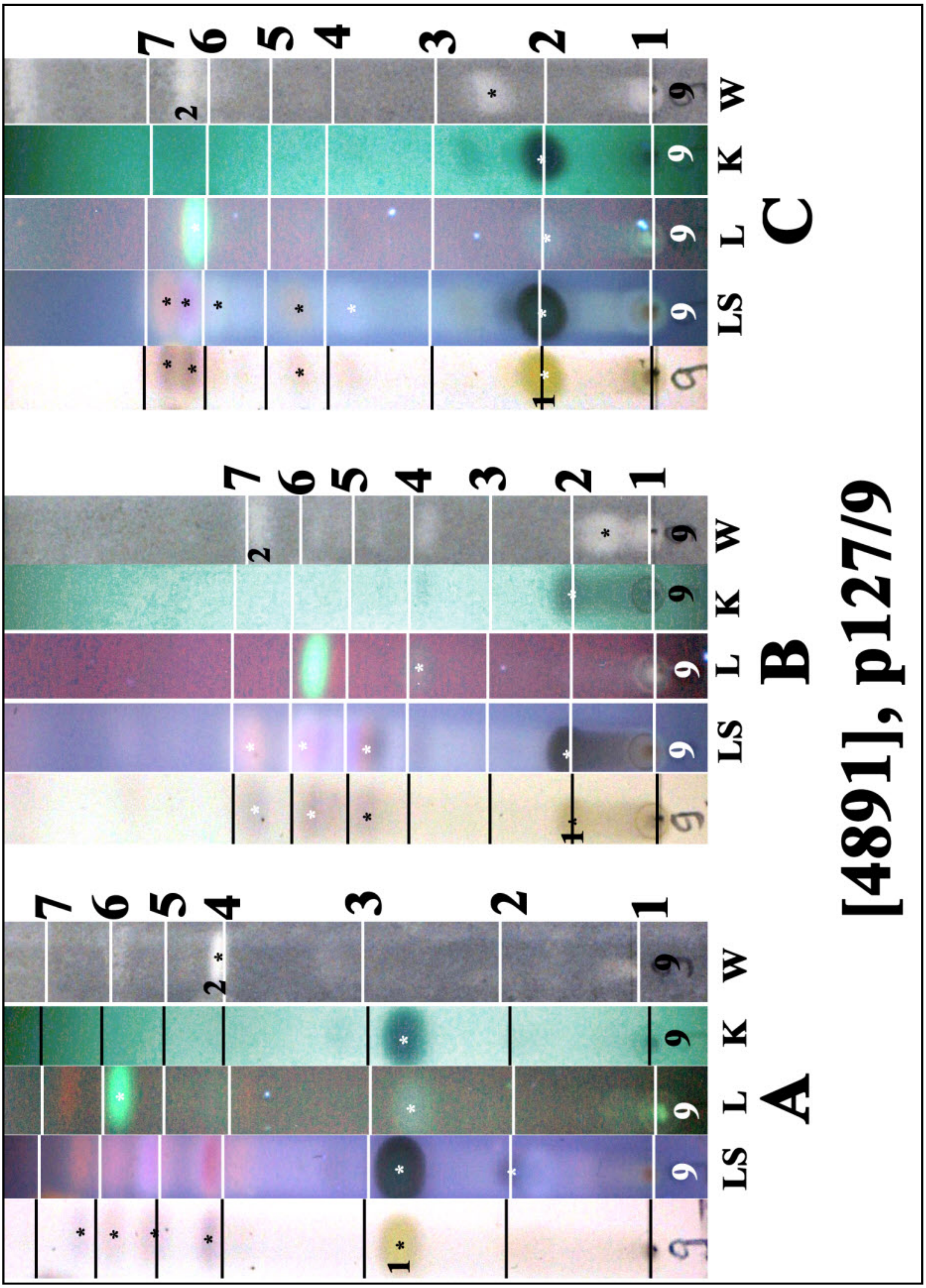
lichesterinic acid



pli: protolichesterinic acid, **li: lichesterinic acid**, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 306: protolichesterinic acid. Botanisches Museum Berlin-Dahlem

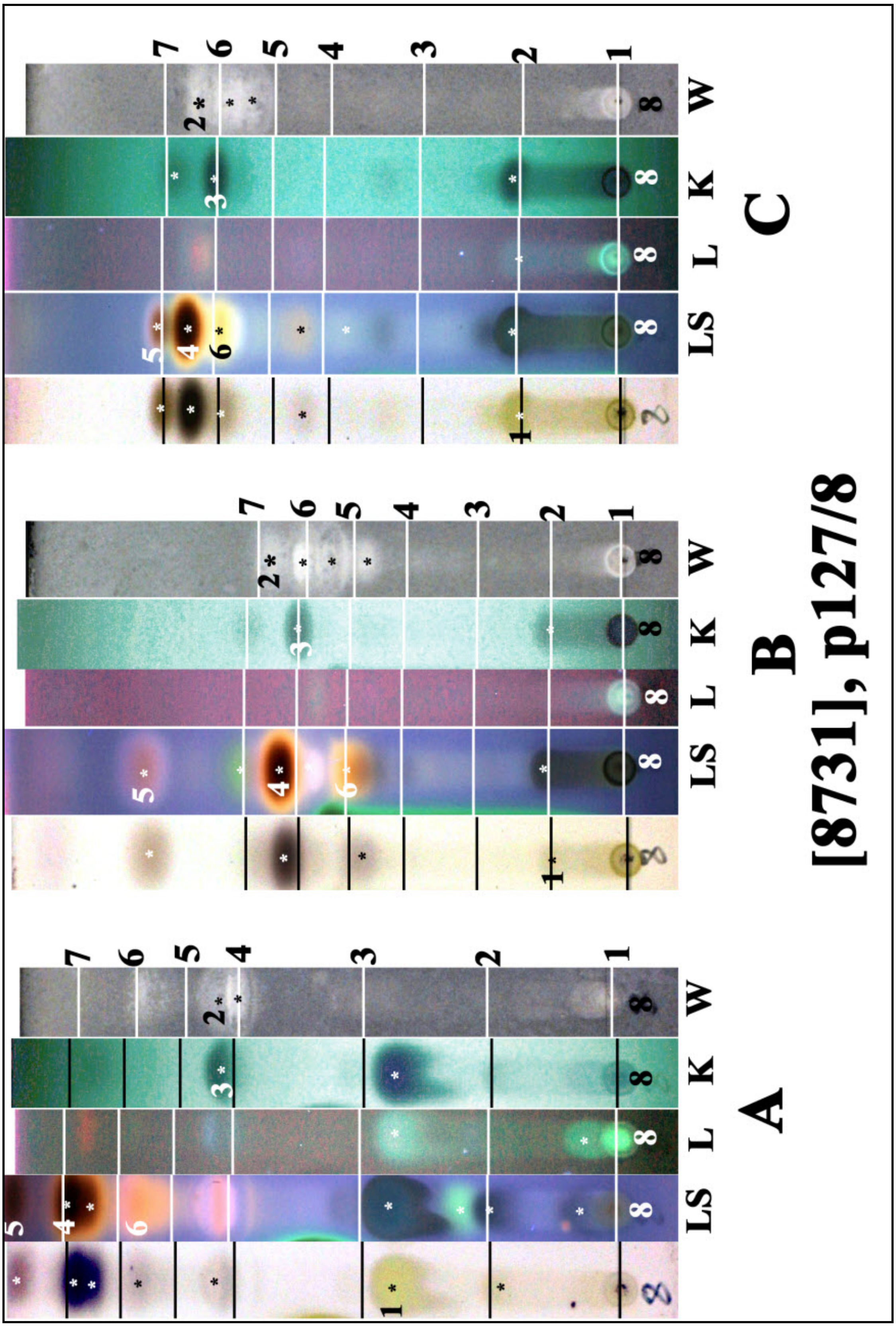
lichesterinic acid



1: variolaric acid, **2: lichesterinic acid**,
other minor spots are terpenes from the Carpinus, conf. J.A. Elix

Ochrolechia microstictoides, [4891], Germany, Baden-Württemberg, Kreis Biberach, Kloster Heiligkreuztal westlich von Riedlingen, auf *Carpinus* im Klostergarten, TK 7822/SW. Leg. F. Schumm, L. Krause & Gebert, det. F. Schumm 02.08.1998.

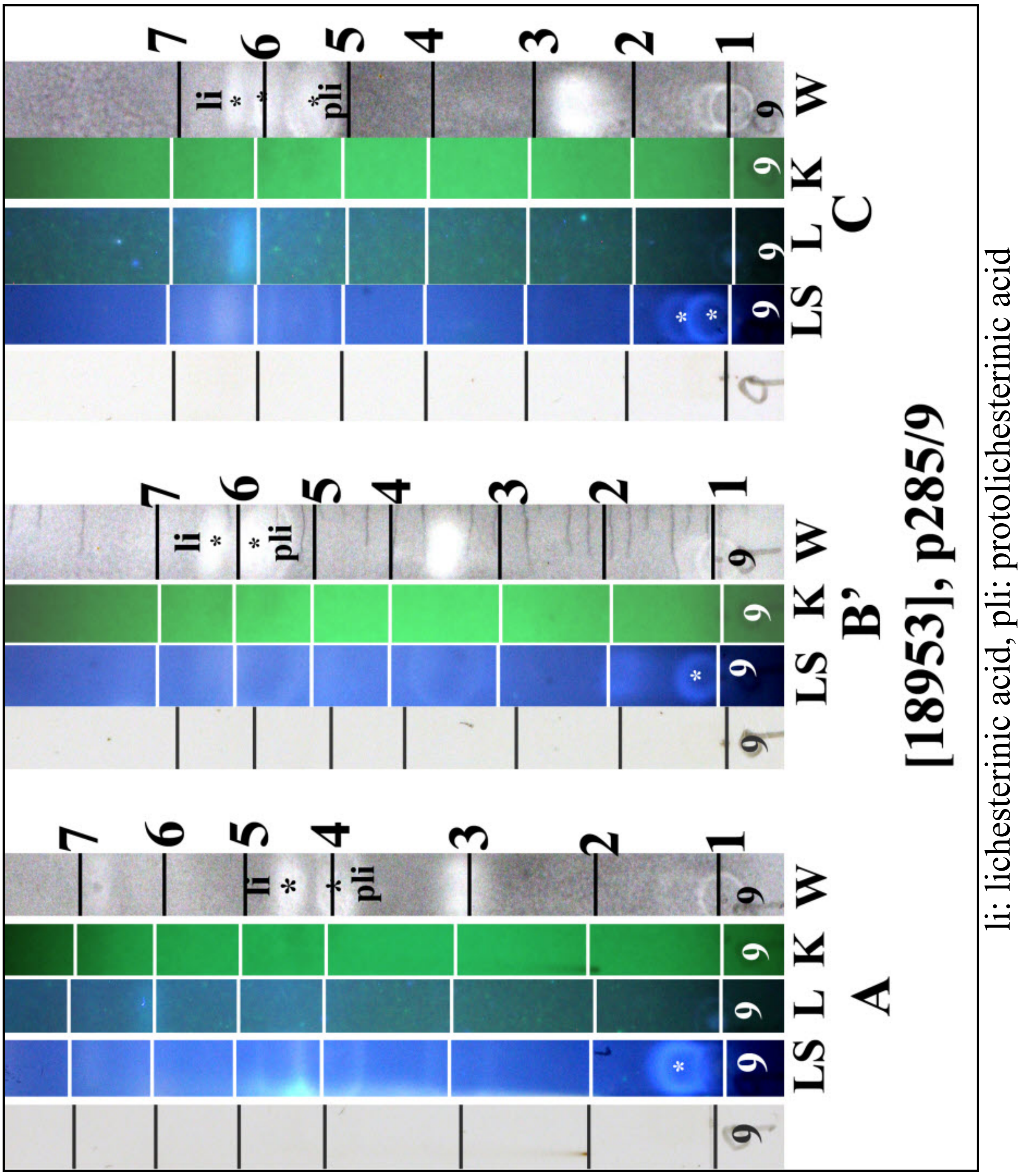
lichesterinic acid



1: variolaric acid, **2: lichesterinic acid**,
4,5,6: terpenes from the picea, conf. J.A. Elix

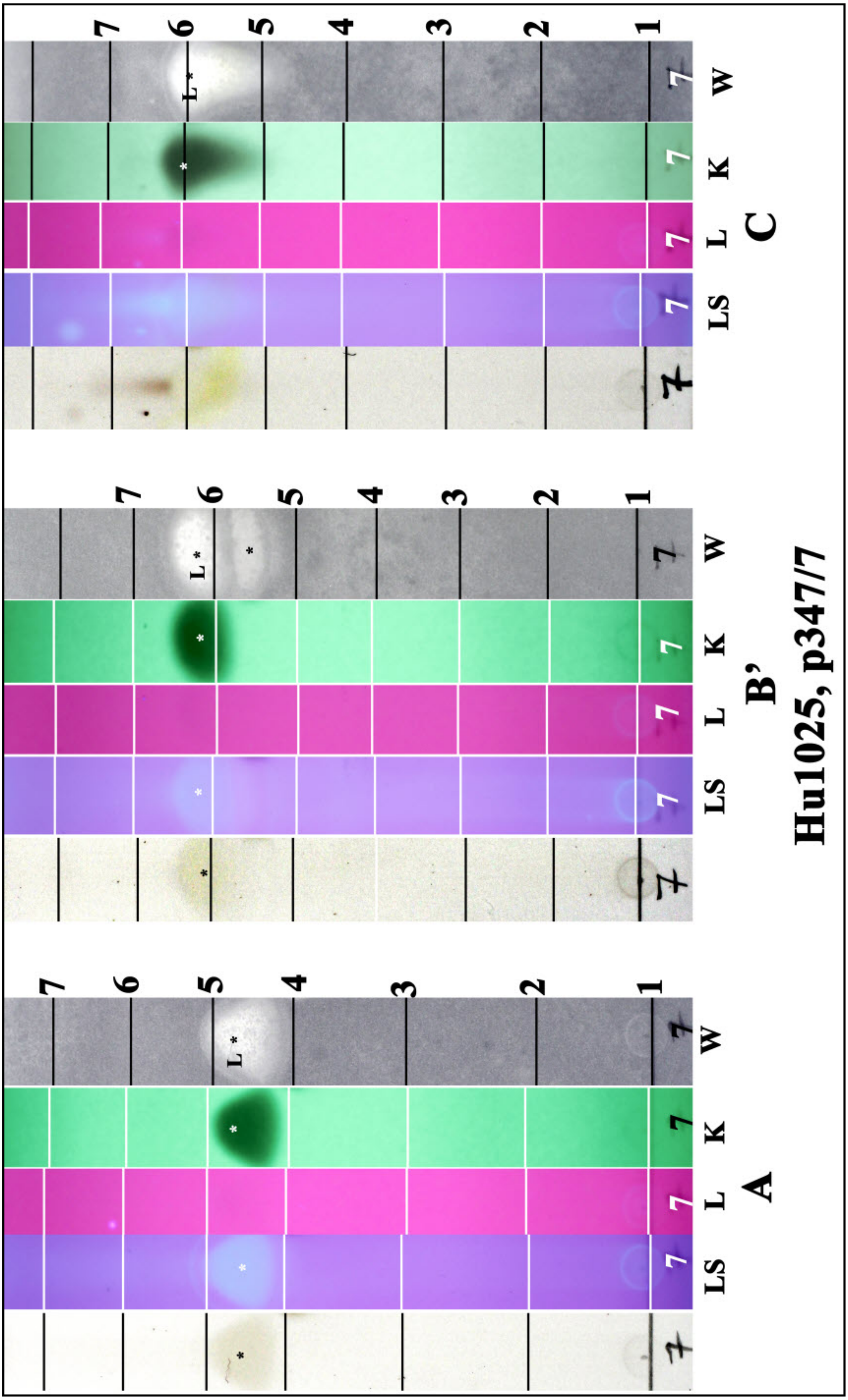
Ochrolechia microstictoides, [8731], Germany, Baden-Württemberg, Kreis Calw, Meistern südlich von Wildbad, 48°41.564' N, 8°32.517' E, 780 m, an Fichten, TK 7317. Leg. F. Schumm, 31.05.2001, det. F. Schumm

lichesterinic acid



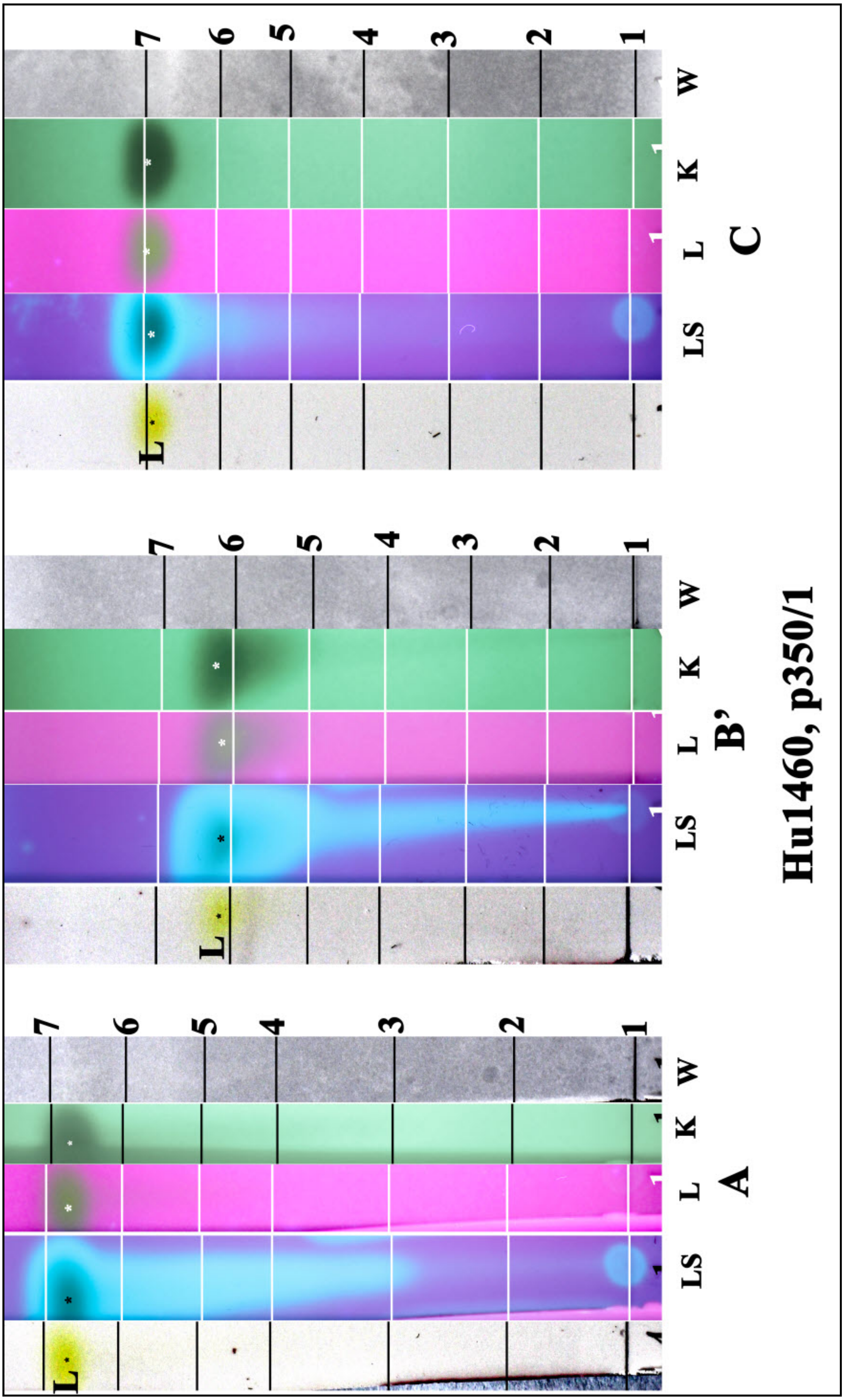
Cetraria australiensis, [18953], Australia, New South Wales, Koszciusko National Park.

(+)-lichesterinic acid



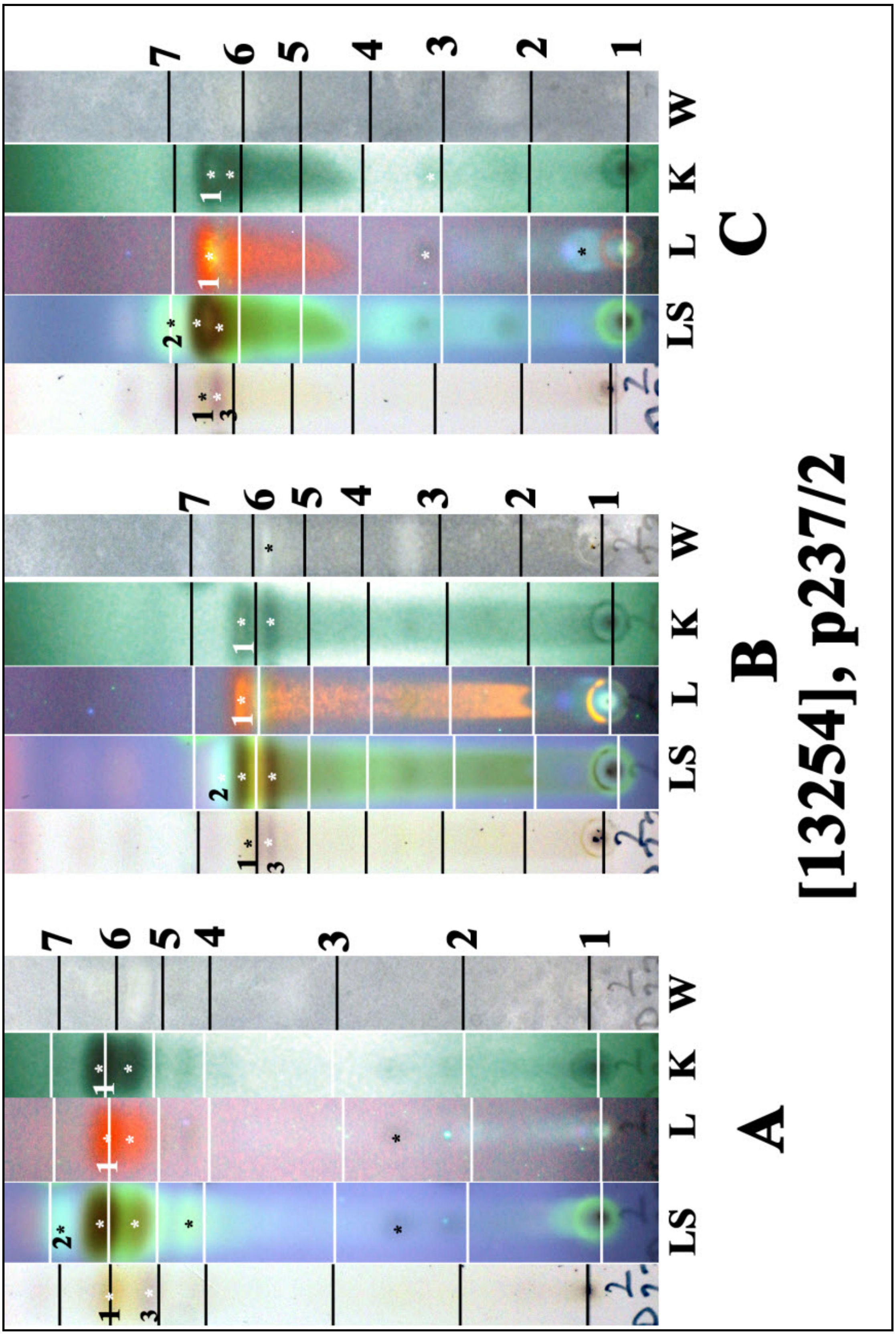
S. Huneck's collection of lichen substances No 1025: (+)-lichesterinic acid, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

lichexanthone



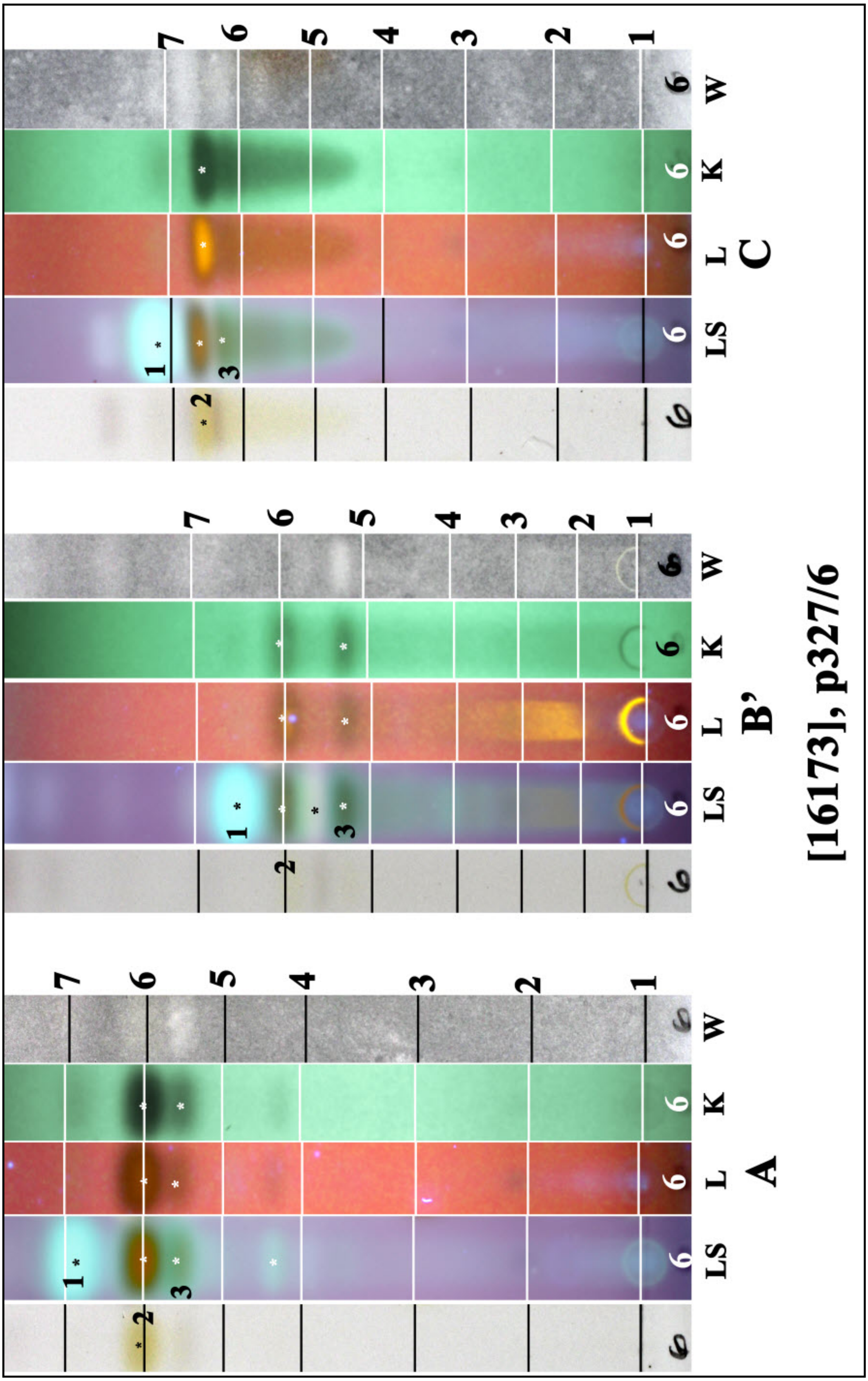
S. Huneck’s collection of lichen substances No 1460: lichexanthone
Botanisches Museum Berlin-Dahlem

lichexanthone



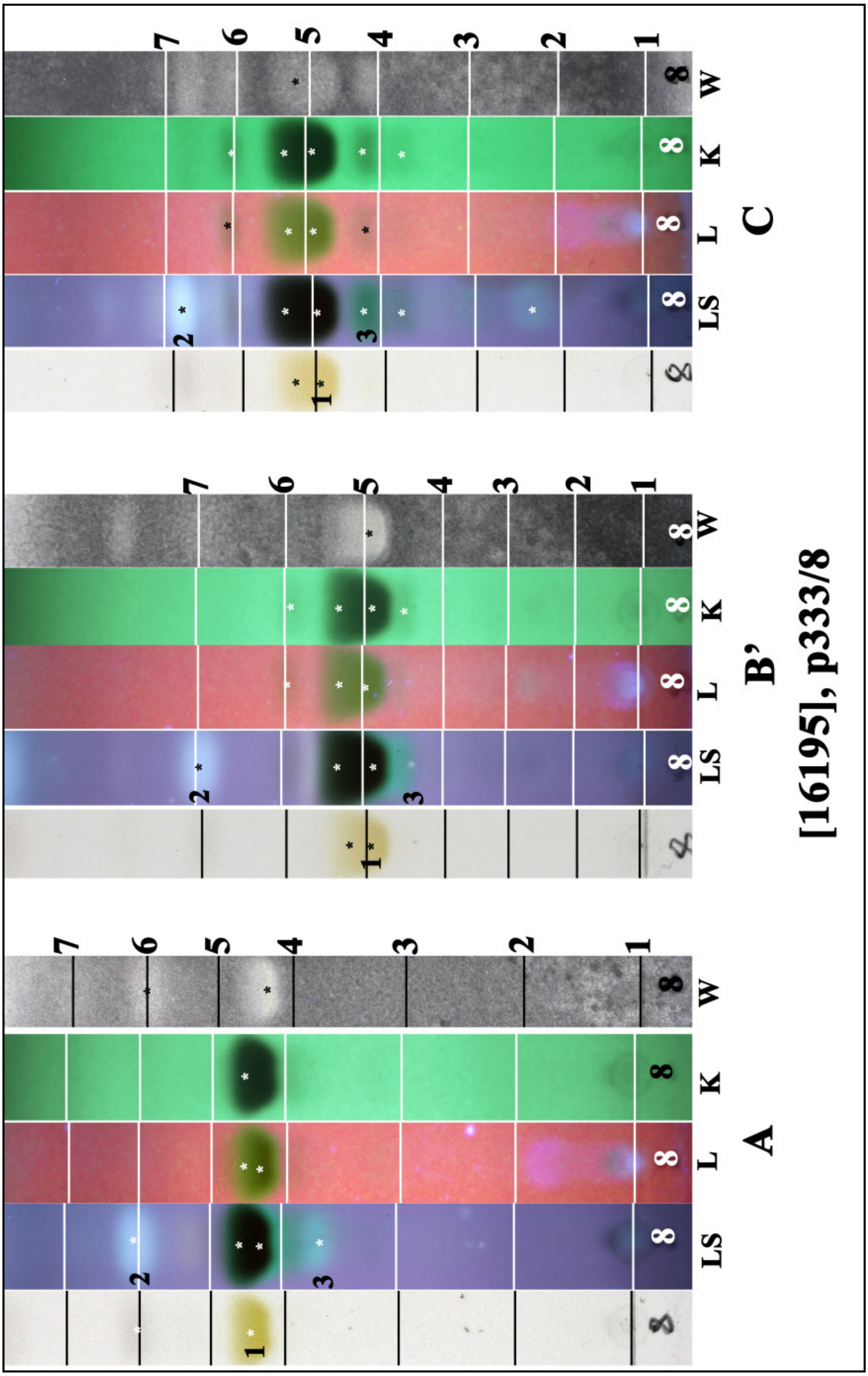
Pertusaria flavida, [13254], Germany, Baden-Württemberg, Kreis Göppingen, südwestlich Oberberken, Abzweigung zur Triebhütte an der Beckenschlagstr. nach Baiereck, an Querkus am Waldrand, ca. 500 m, TK 7223. Leg. et det. F. Schumm, 29.7.2007.

lichexanthone



Pertusaria xanthoplaca, [16173], Australia, New South Wales, Tomakin, rocks near the sea, 35.830° S, 150.20554° E, 0 m. Leg. F. Schumm & E. Stocker-Wörgötter, 10.11.2009.

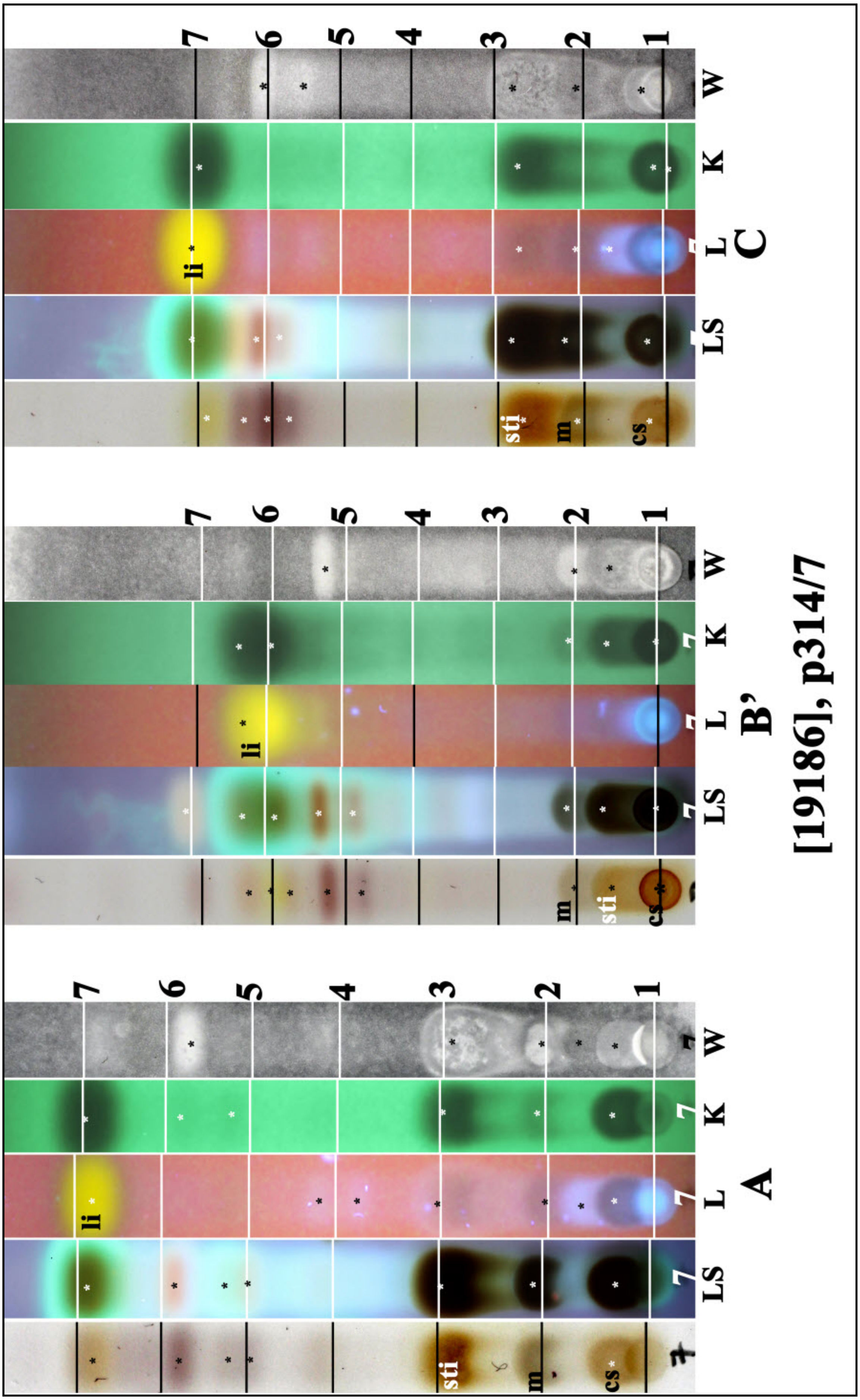
lichexanthone



1: isoarthothelin and arthothelin, **2: lichexanthone**, 3: 2,5-dichloronorlichexanthone

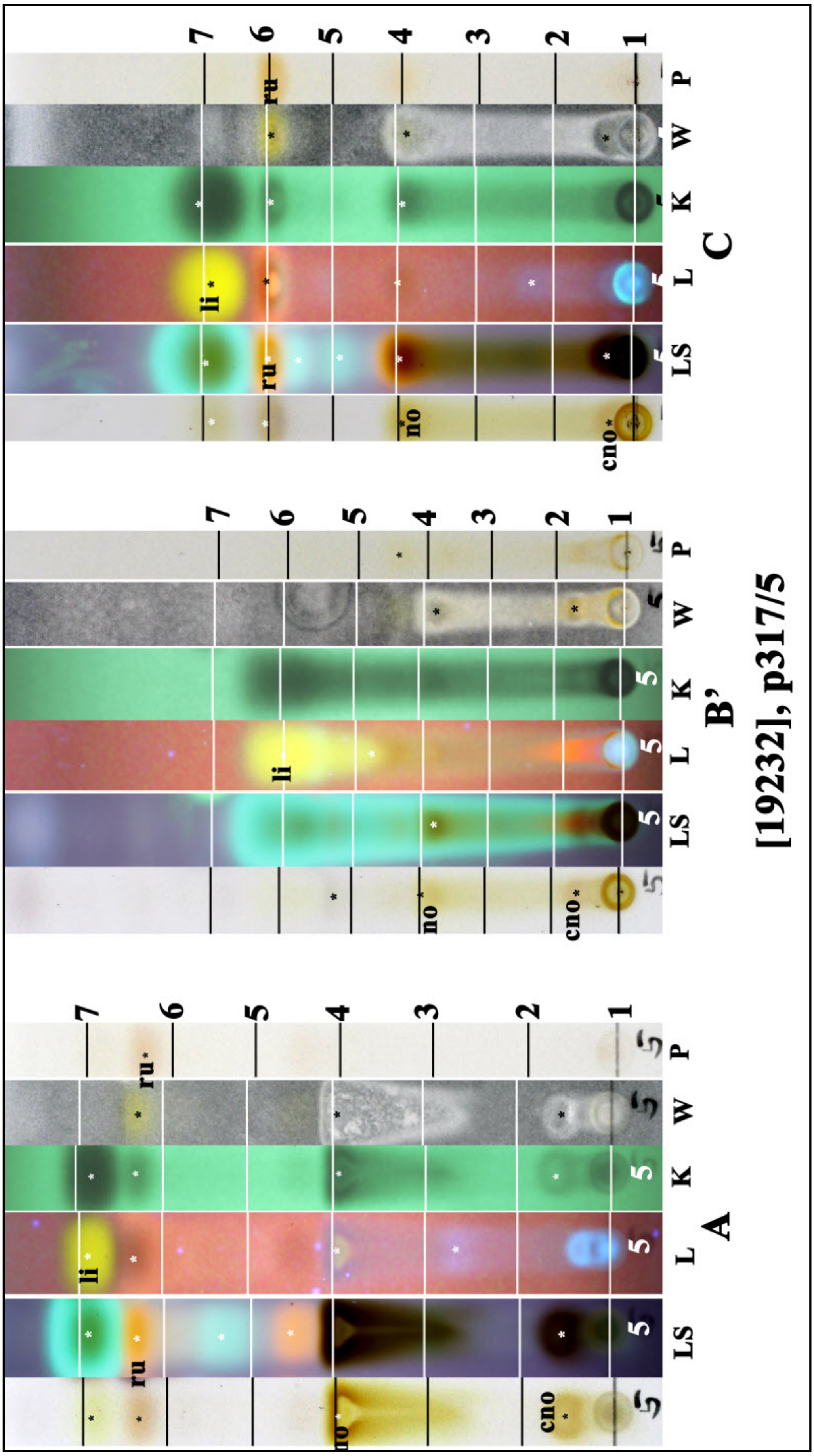
Buellia aeruginosa [16195], Australia, New South Wales, Mystery Bay south of Narooma, Pool Beach, 36.305° S, 150.136° E, 0 m. Leg. F. Schumm & E. Stocker-Wörgötter, 11.11.2009, det. F. Schumm, conf. J.A. Elix.

lichexanthone



Pertusaria hadrocarpa, [19186], Australia, New South Wales, Lord Howe Island, Max Nicholls Track, 31°31'08" S, 159°03'03" E, 50m.

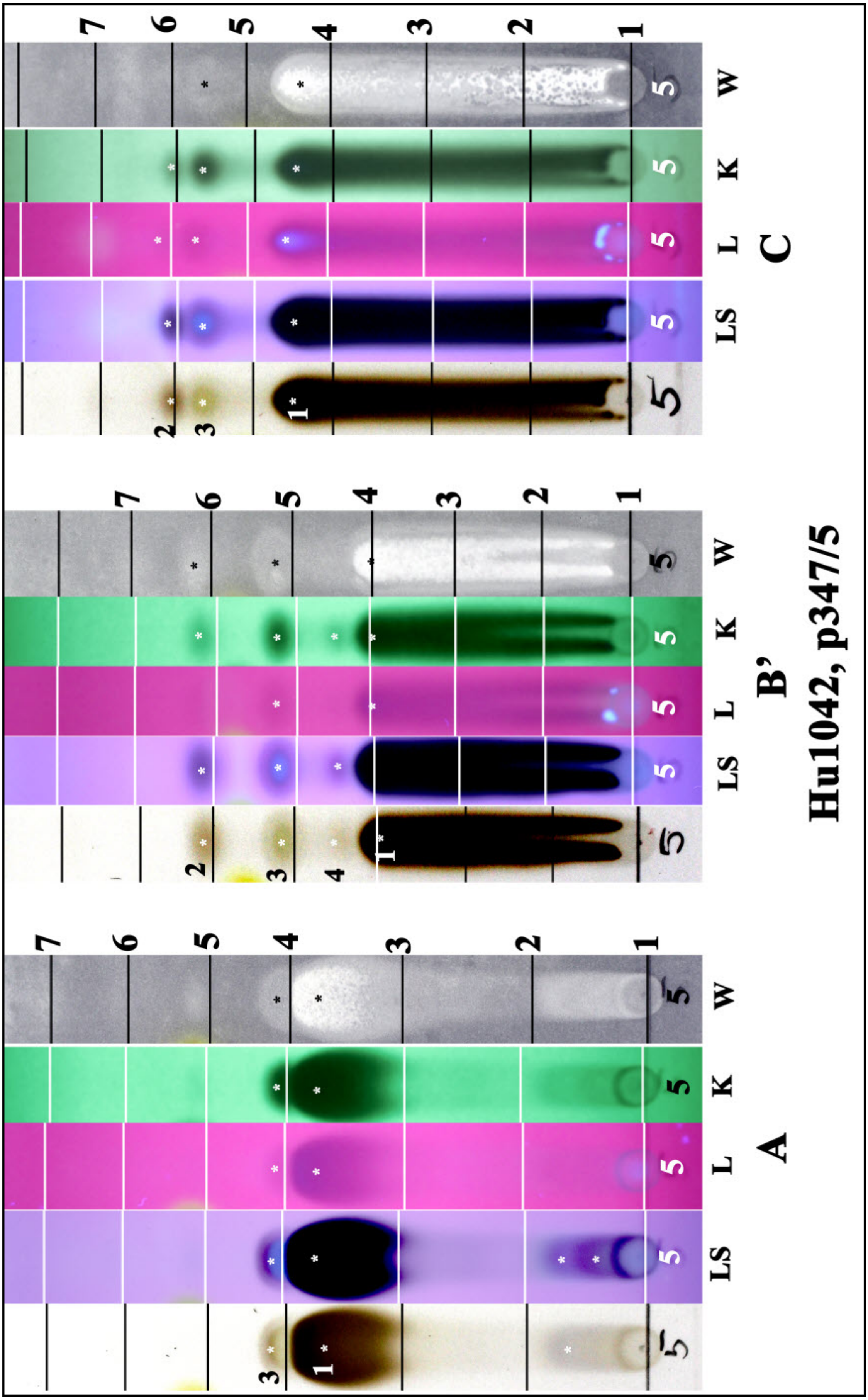
lichexanthone



li: lichexanthone, ru: russulone, no: norstictic acid, con: connorstictic acid

Ramboldia sanguinolenta, [19232], Australia, New South Wales, Stroud-Gloucester Road, 37 km south of Gloucester, 32°20' S, 151°55' E, 80 m.

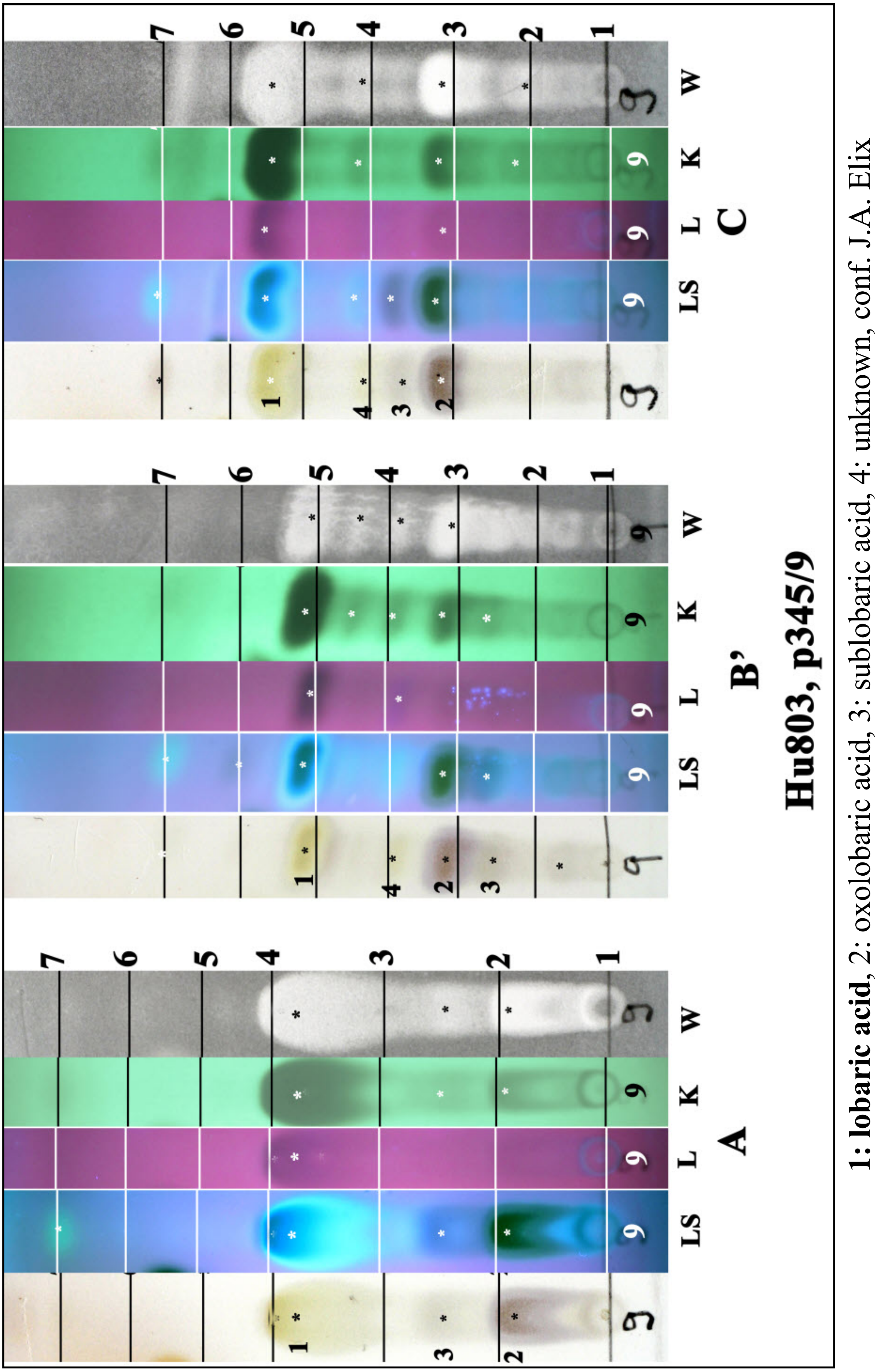
lividic acid



1: lividic acid, 2: methoxycolensoic acid, 3: 4-*O*-methylphysodic acid, 4: unknown

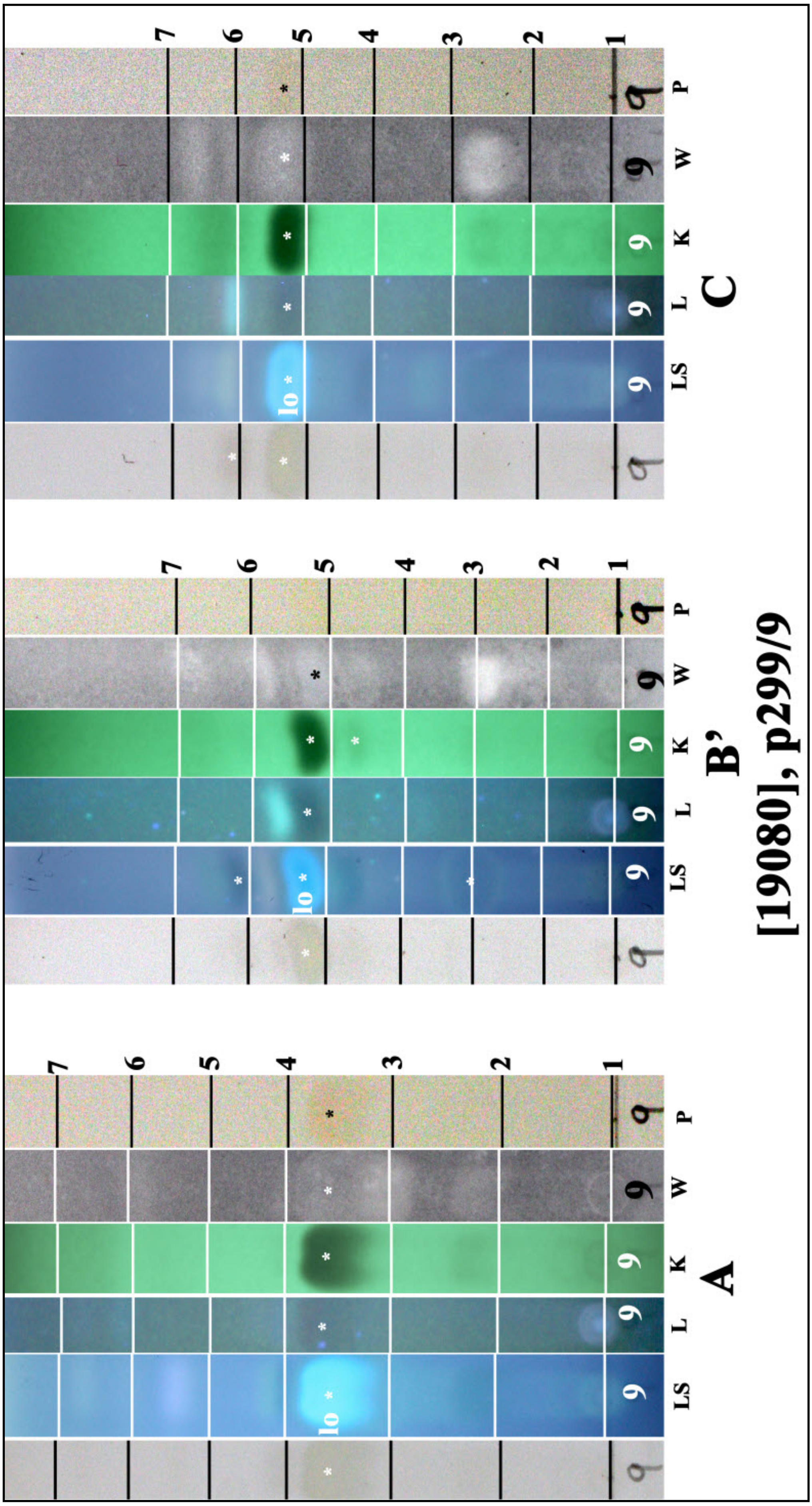
S. Huneck’s collection of lichen substances No 1042: lividic acid, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

lobaric acid



S. Huneck's collection of lichen substances No 803: lobaric acid
Botanisches Museum Berlin-Dahlem

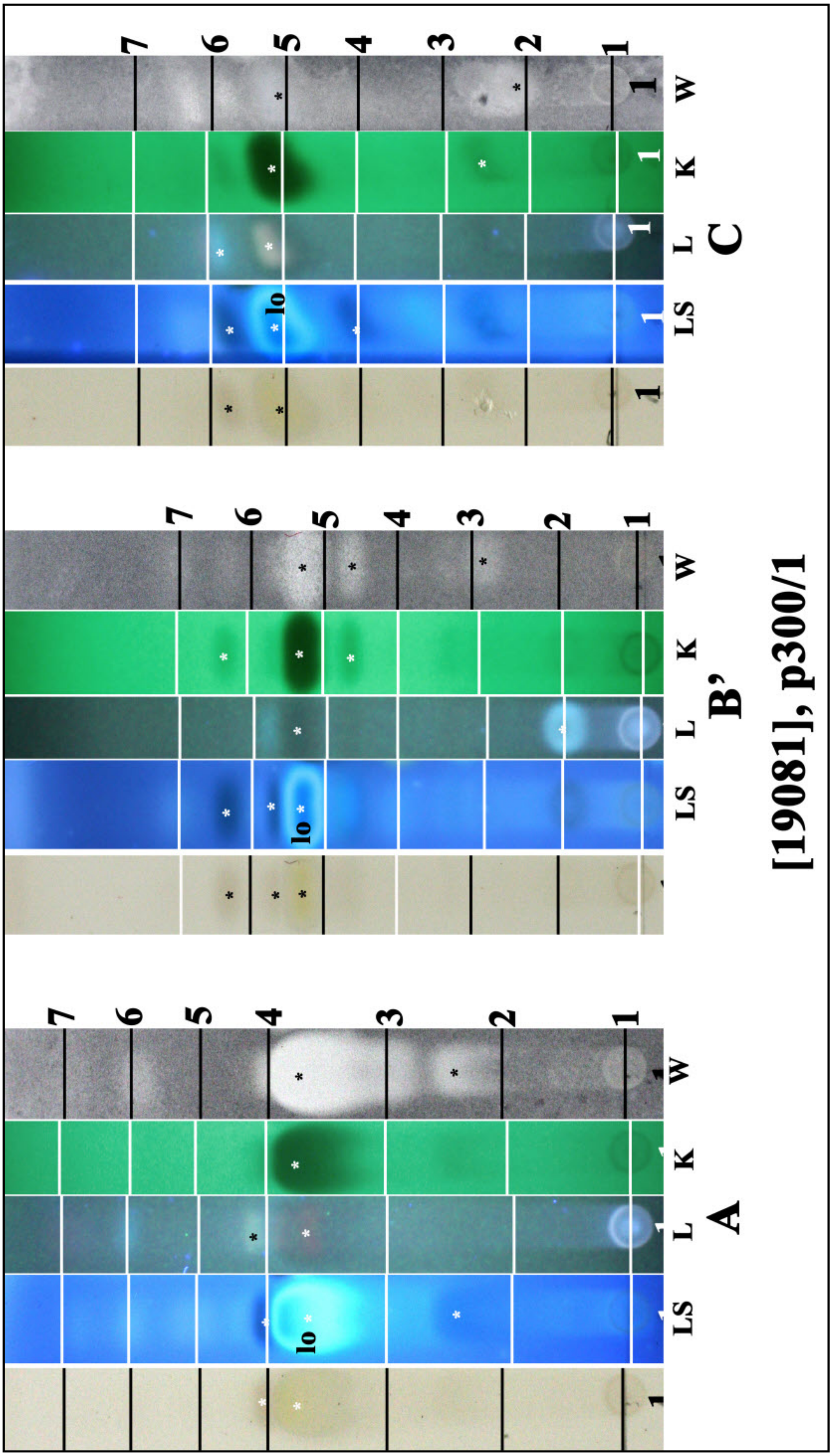
lobaric acid



lo: lobaric acid

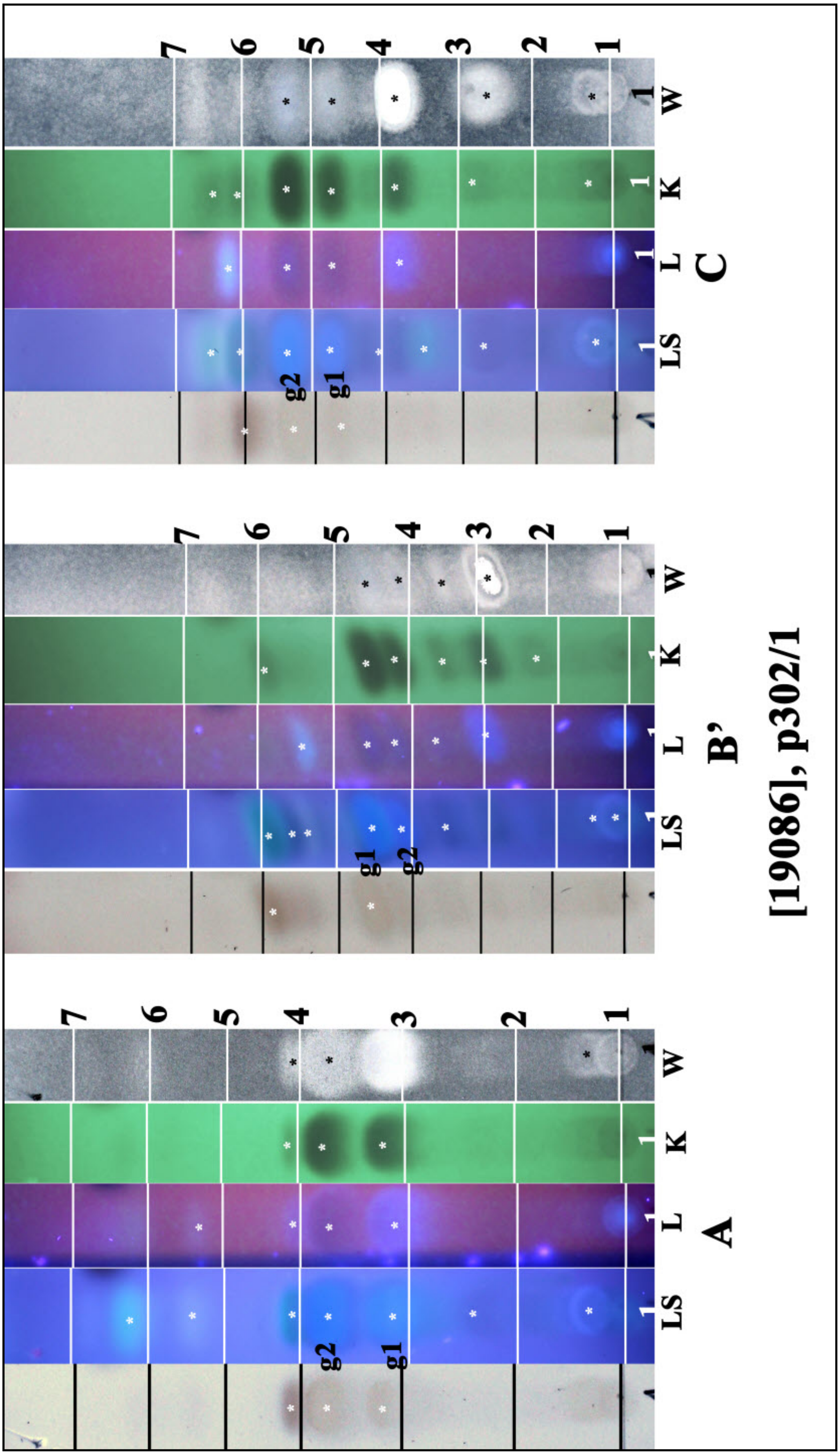
Myelorriza jenjiana, [19080], Australia, Queensland, Mount Windsor Tableland, 45 km north-west of Mossman.

lobaric acid



Myelorrhiza jenjiana, [19081], Australia, Queensland, Blencoe Creek, Cardwell Range, 48 km north-west of Cardwell.

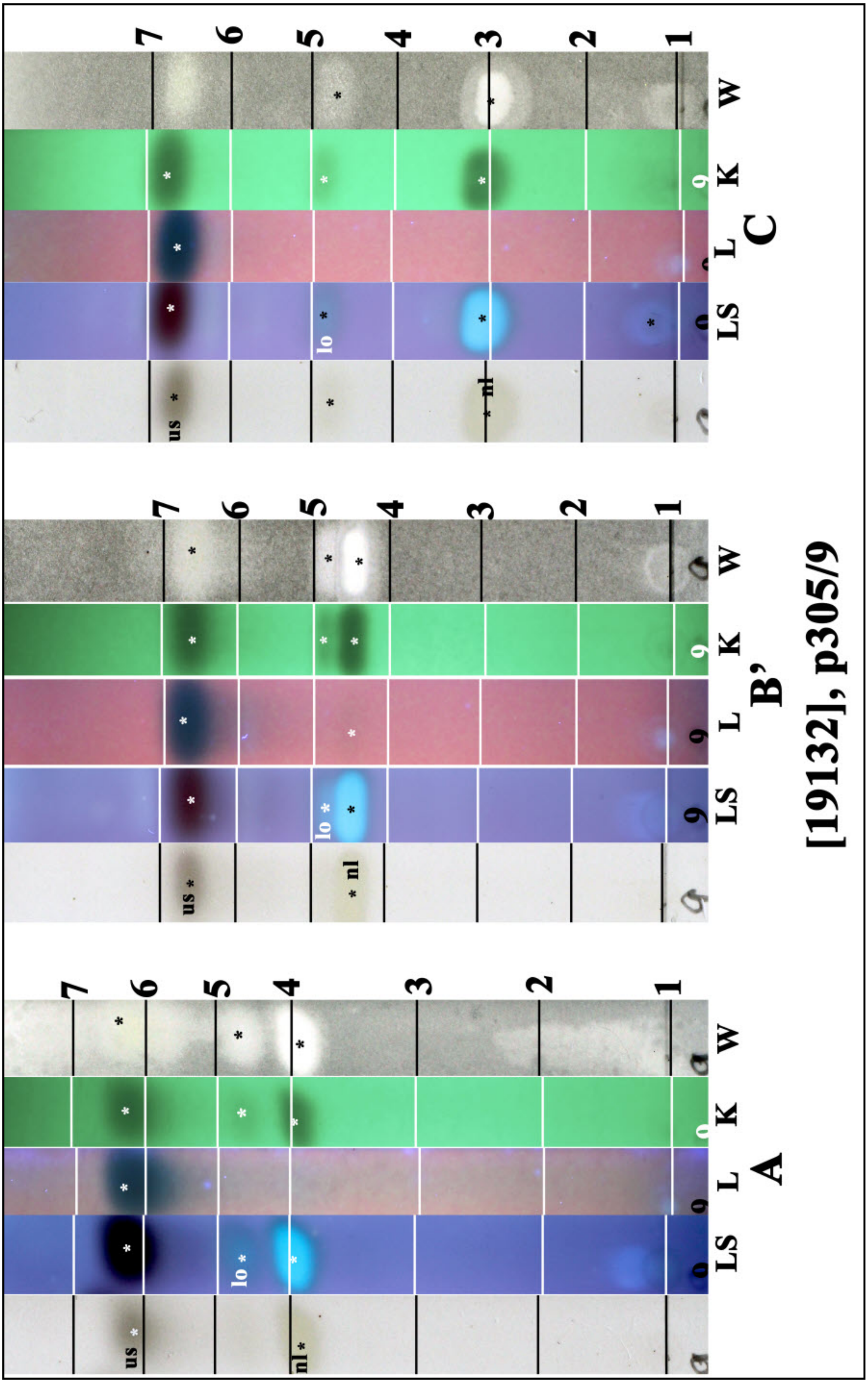
loxodellonic acid



g1: loxodellonic acid, *g2*: glomelliferonic acid

Xanthoparmelia subincerta (Essl.) Blanco et al., [19086], Australia, Australian Capital Territory, Kowen Forest, 16 km east of Canberra.

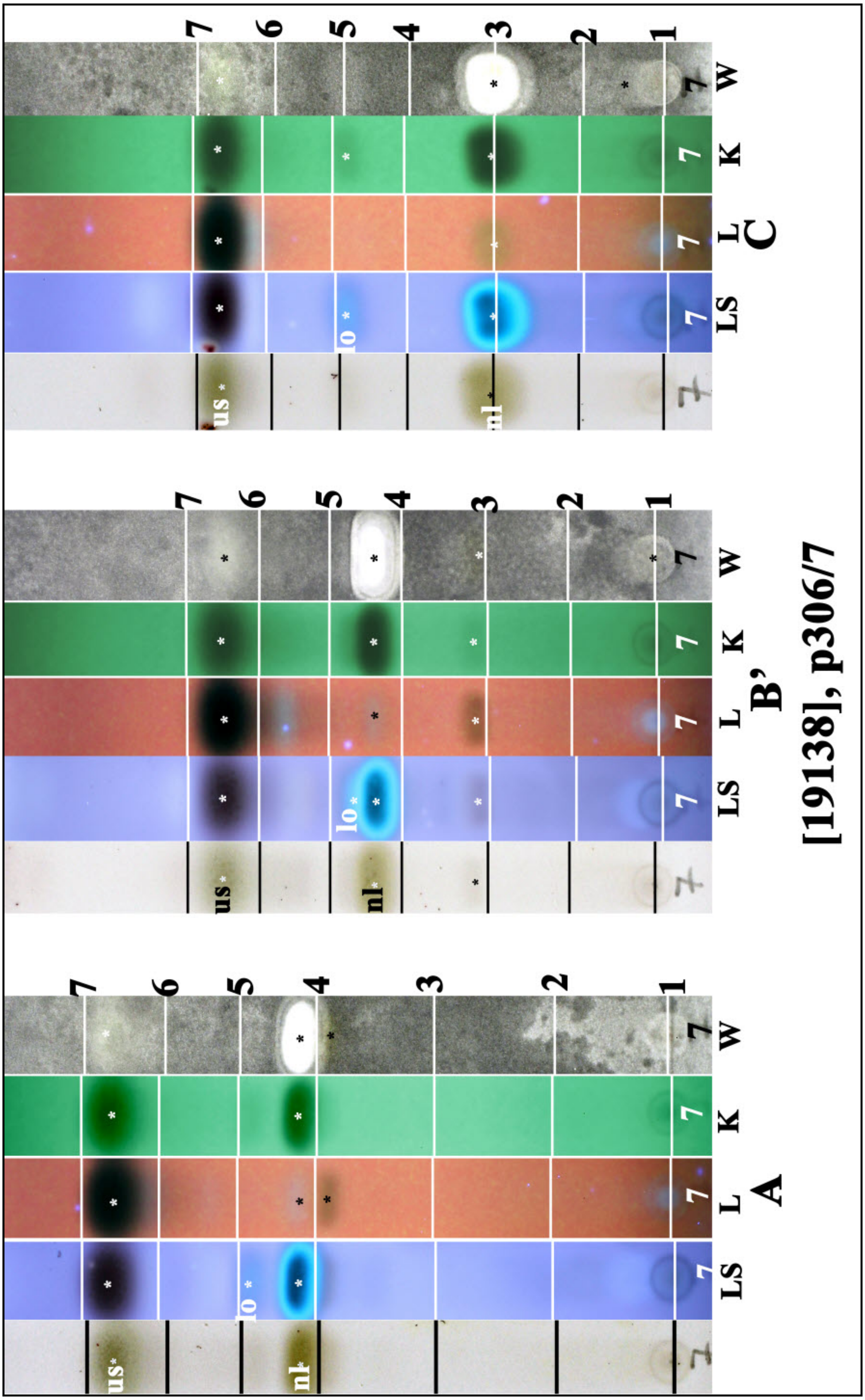
loxodin



us: usnic acid, nl: norlobaridone, **lo: loxodin**

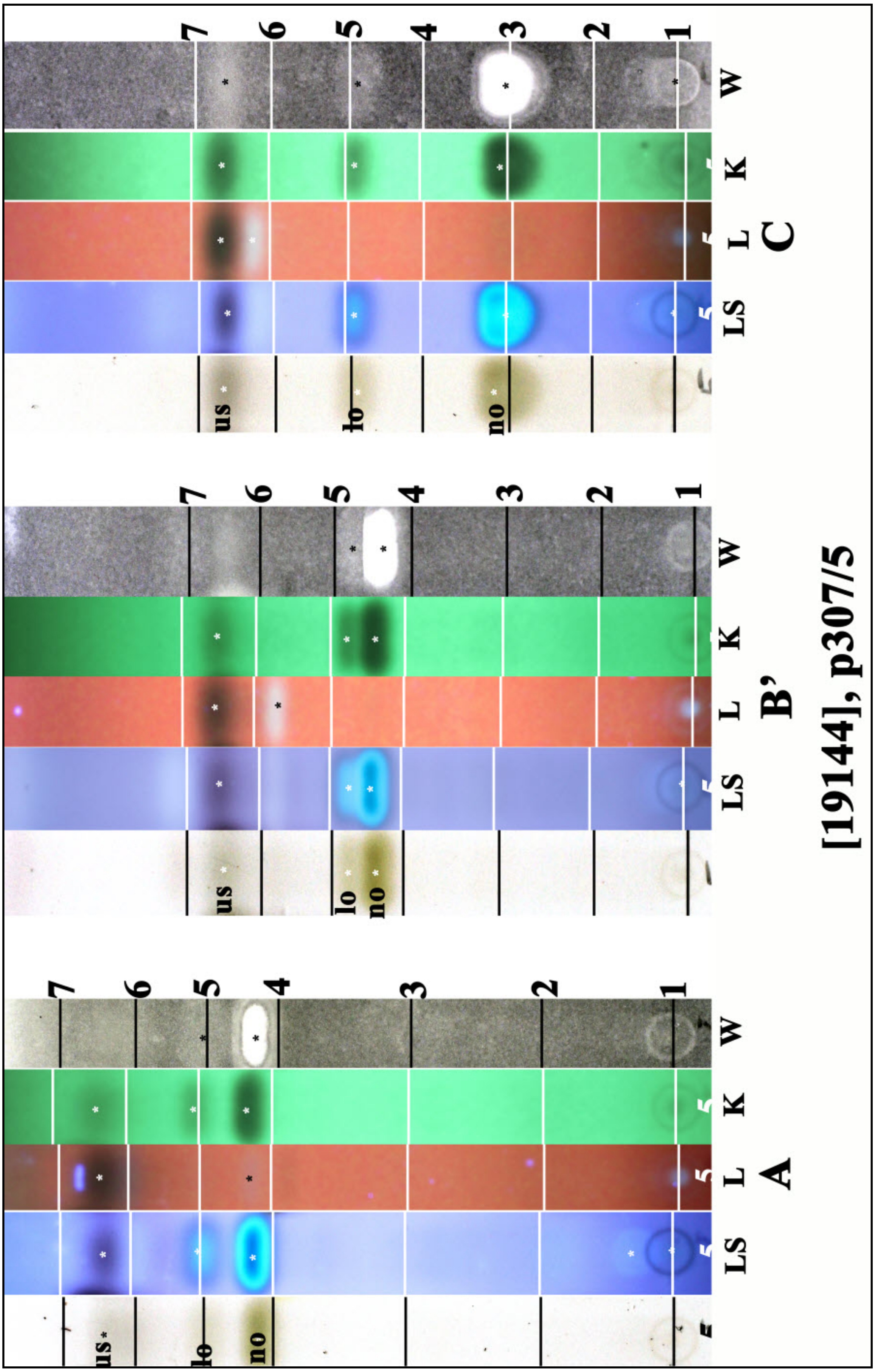
Xanthoparmelia flavescentireagens, [19132], Australia, New South Wales, Kosciusko National Park, Wilsons Valley, 11 km northwest of Jindabyne.

loxodin



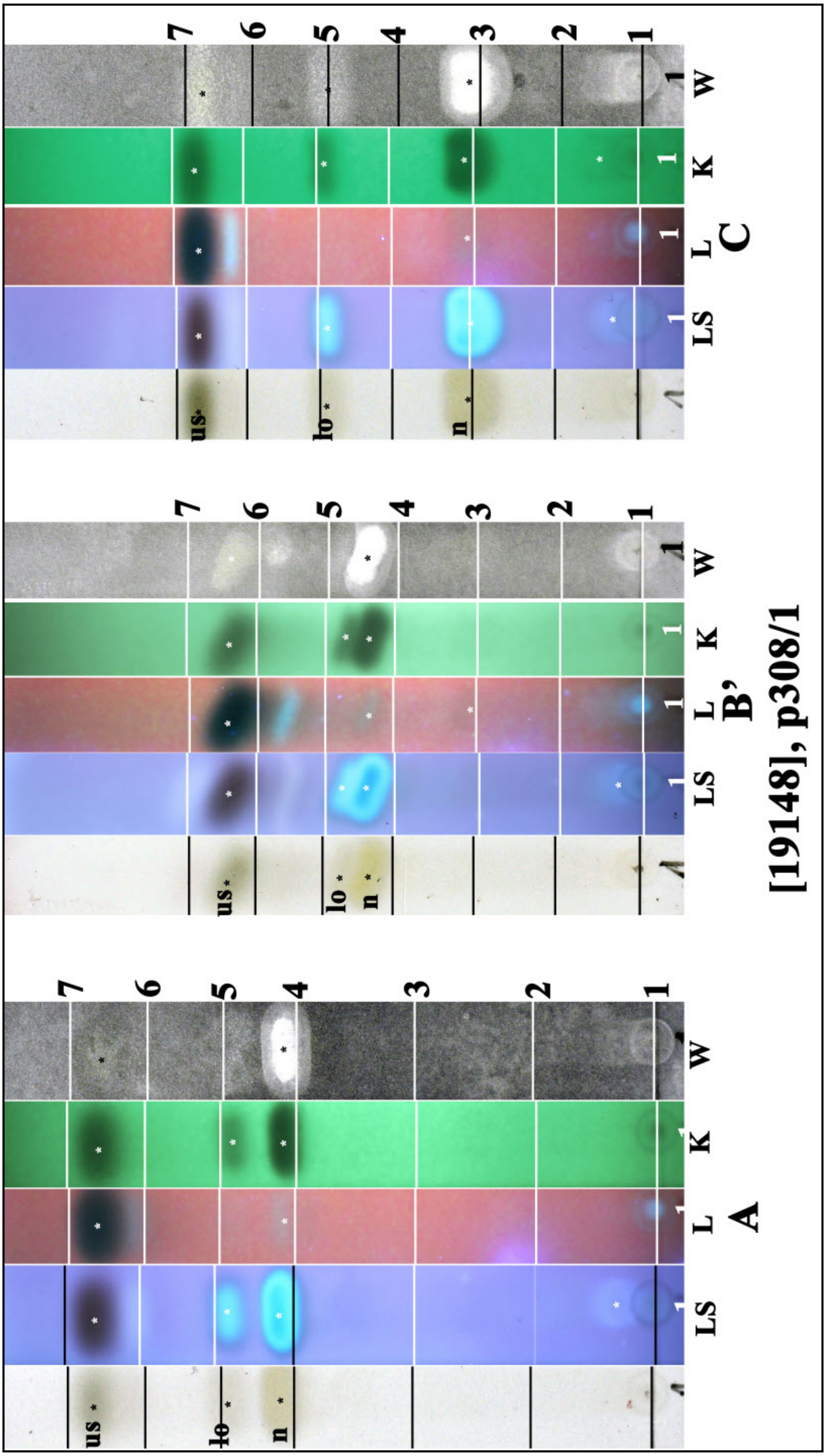
Xanthoparmelia amplexula **,** [19138], Australia, Queensland, Tumouline State Forest, 6 km north of Ravenshoe.

loxodin



Xanthoparmelia furcata, [19144], Australia, South Australia, Mount Lofty Ranges, Borthwick road, 6.5 km east of Tungkillo.

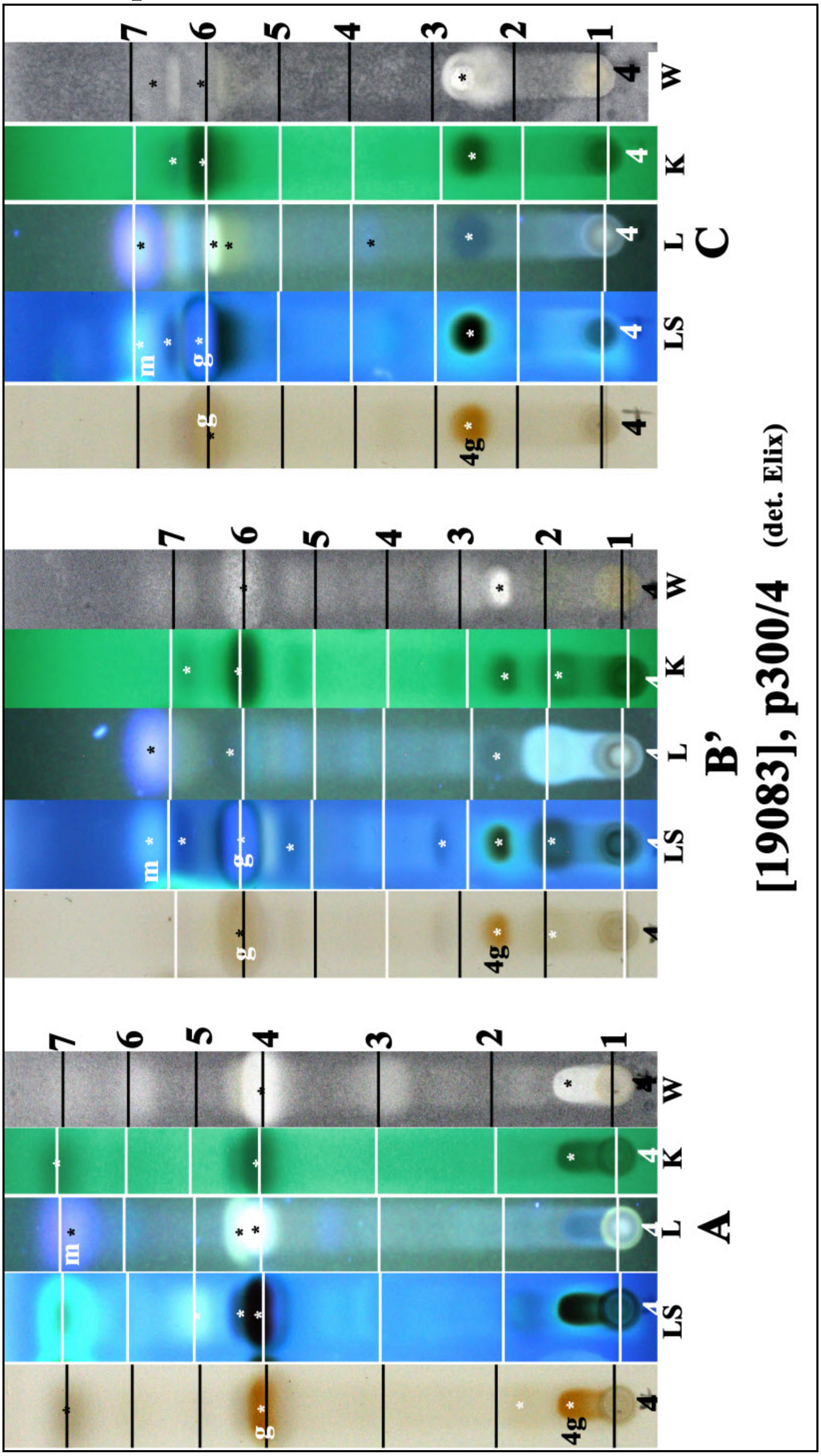
loxodin



us: usnic acid, **lo: loxodin**, n: norlobaridone

Xanthoparmelia metamorphosa **,**[19148], Australia, Australian Capital Territory, Gudgenby River Gorge, 4.5 km south of Tharwa, 35°34' S, 149°04' E, 620 m.

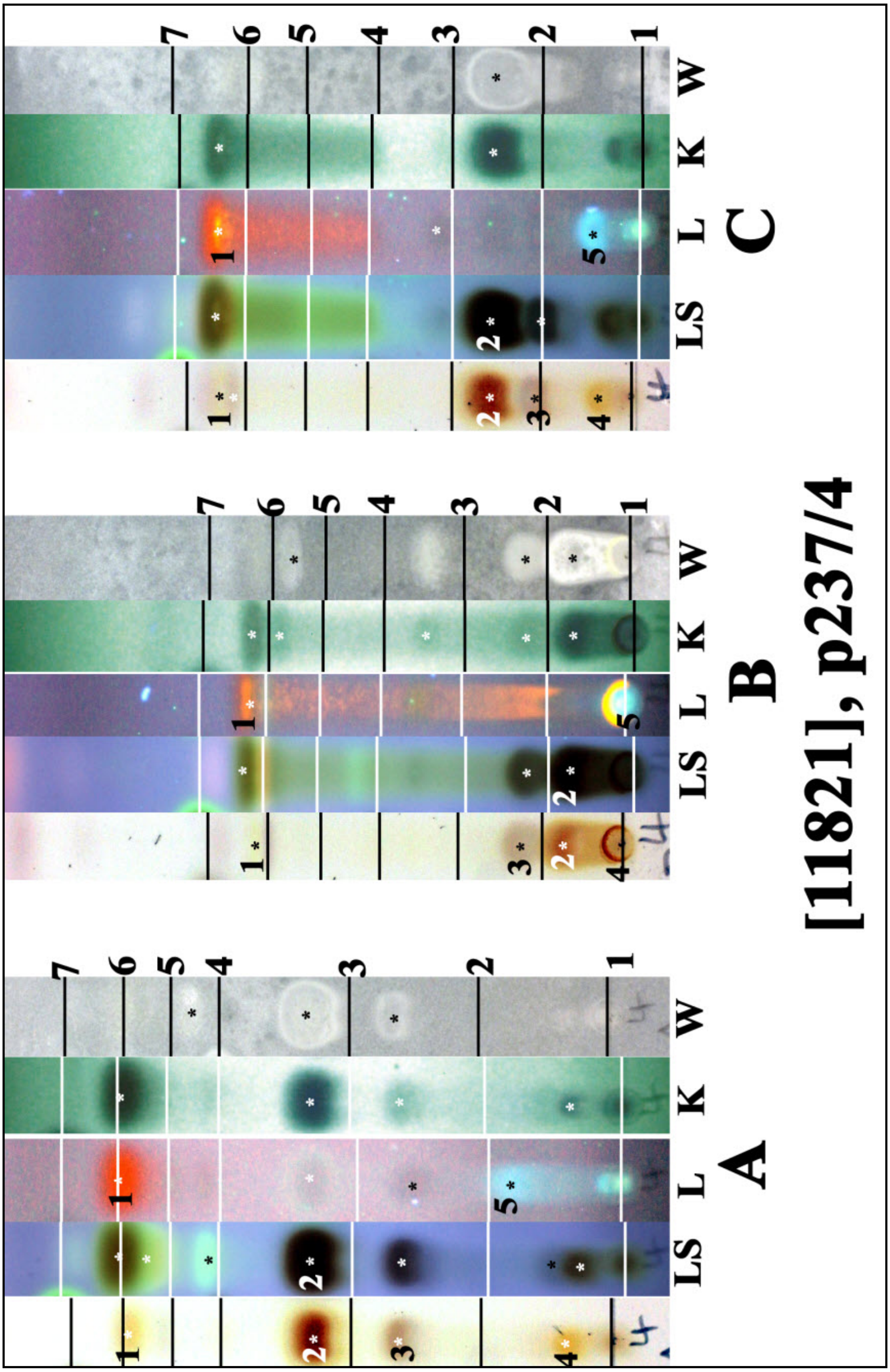
melacarpic acid



g: grayanic acid, 4g: 4-O-demethylgrayanic acid, **m: melacarpic acid**

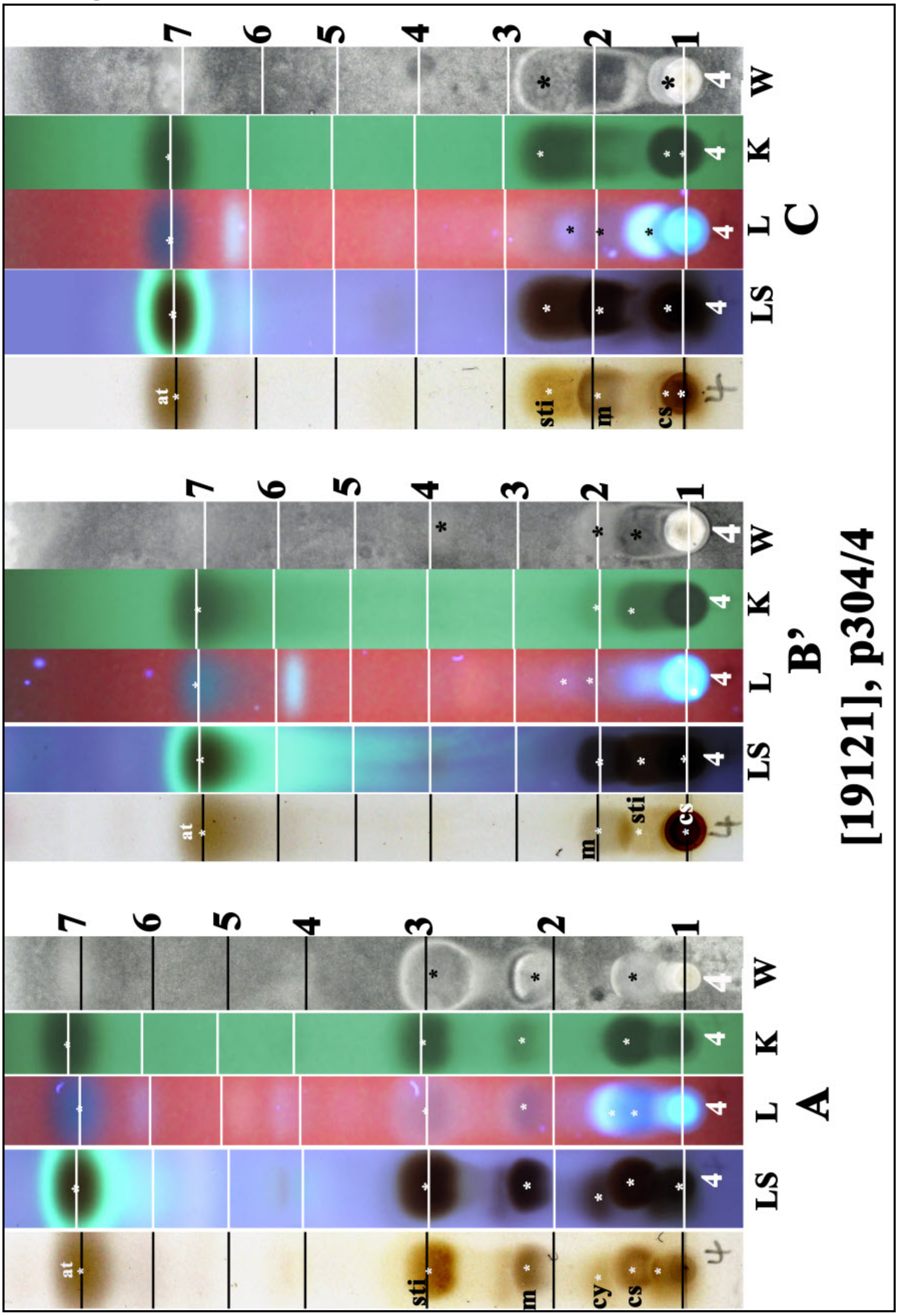
Neophyllis melacarpa, [19083], Australia, New South Wales, Great dividing Range, 6 km east of Captains Flat, 2 km north of Parkers Gap.

menegazziaic acid



Pertusaria flavicunda, [11821], Mexico, Baja California, Guadalupe Island, east-facing rocky outcrops in grassland S of the east end of runway and E of the south peak, on basalt, 29°00'30" N, 118°15'20" W, 750 m. Leg. et det. T.H. Nash III 04. Jan. 1996 (Nr. 38508).

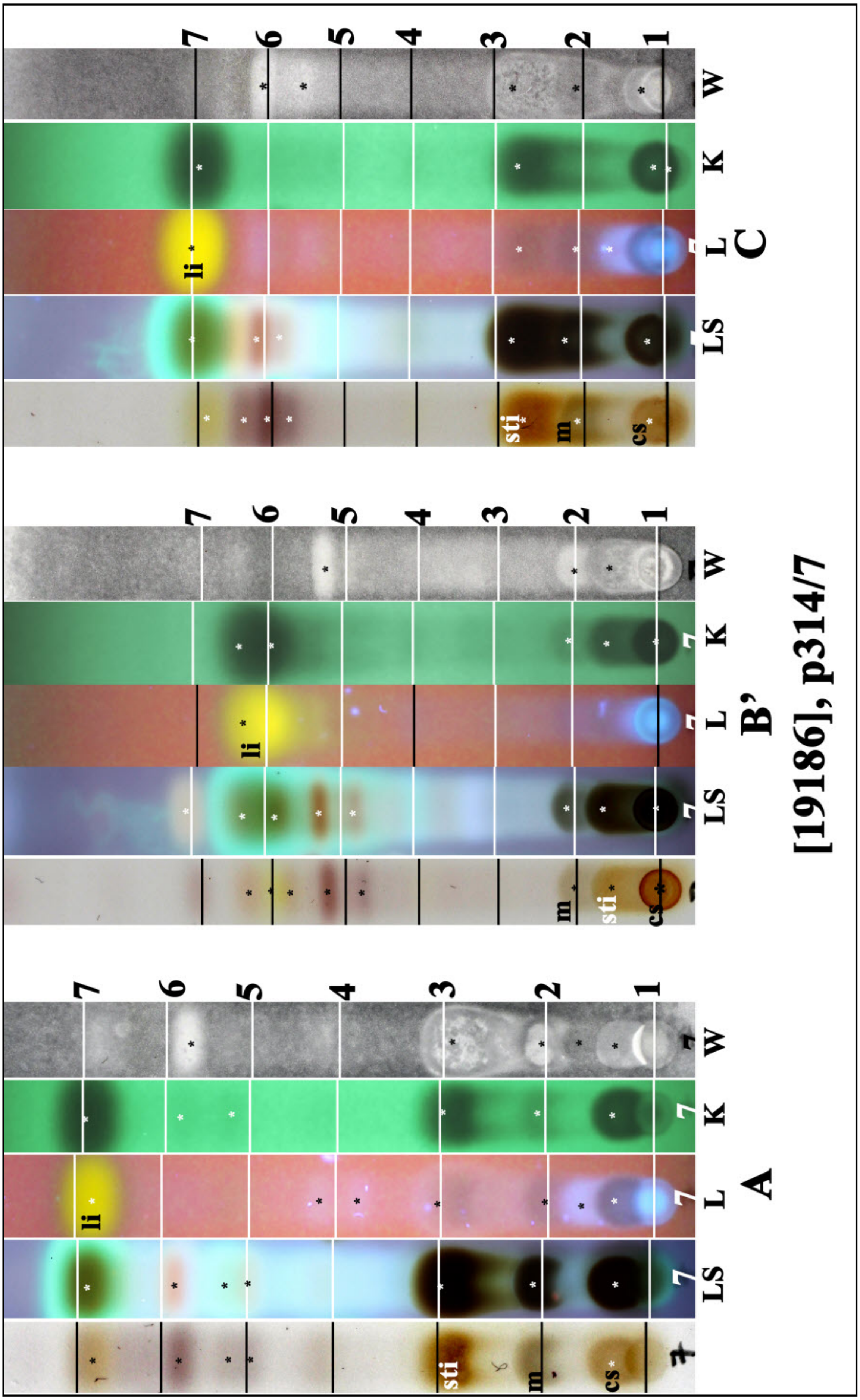
menegazziaic acid



at: atranorin, sti: stictic acid, **m: menegazziaic acid**, cs: constictic acid, cy: cryptostictic acid

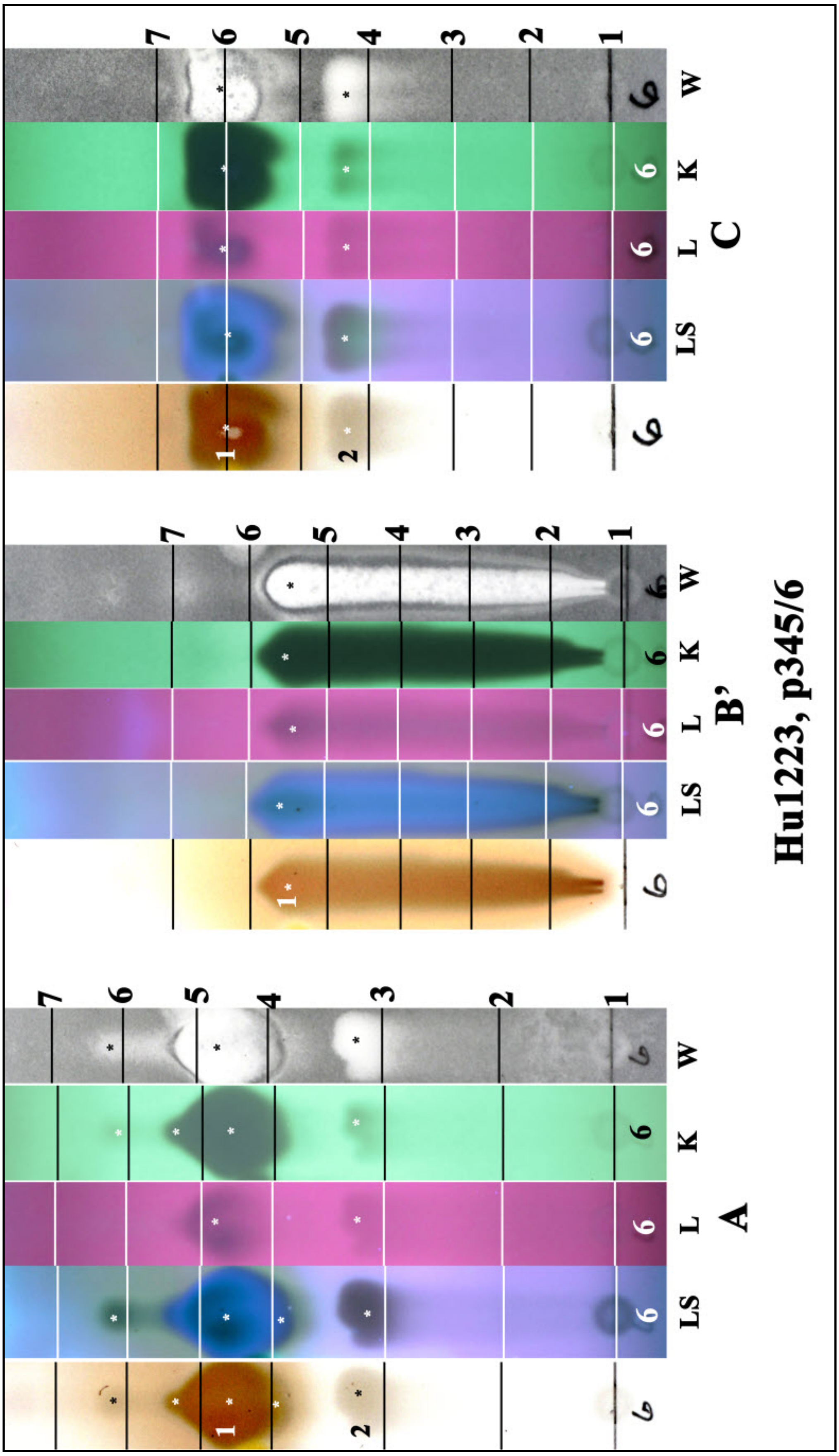
Parmotrema perlatum, [19121], New Zealand, North Island, South Auckland, adjacent to scenic reserve overlooking Lake Taupo, 1 km south of Wharewaka

menegazziaic acid



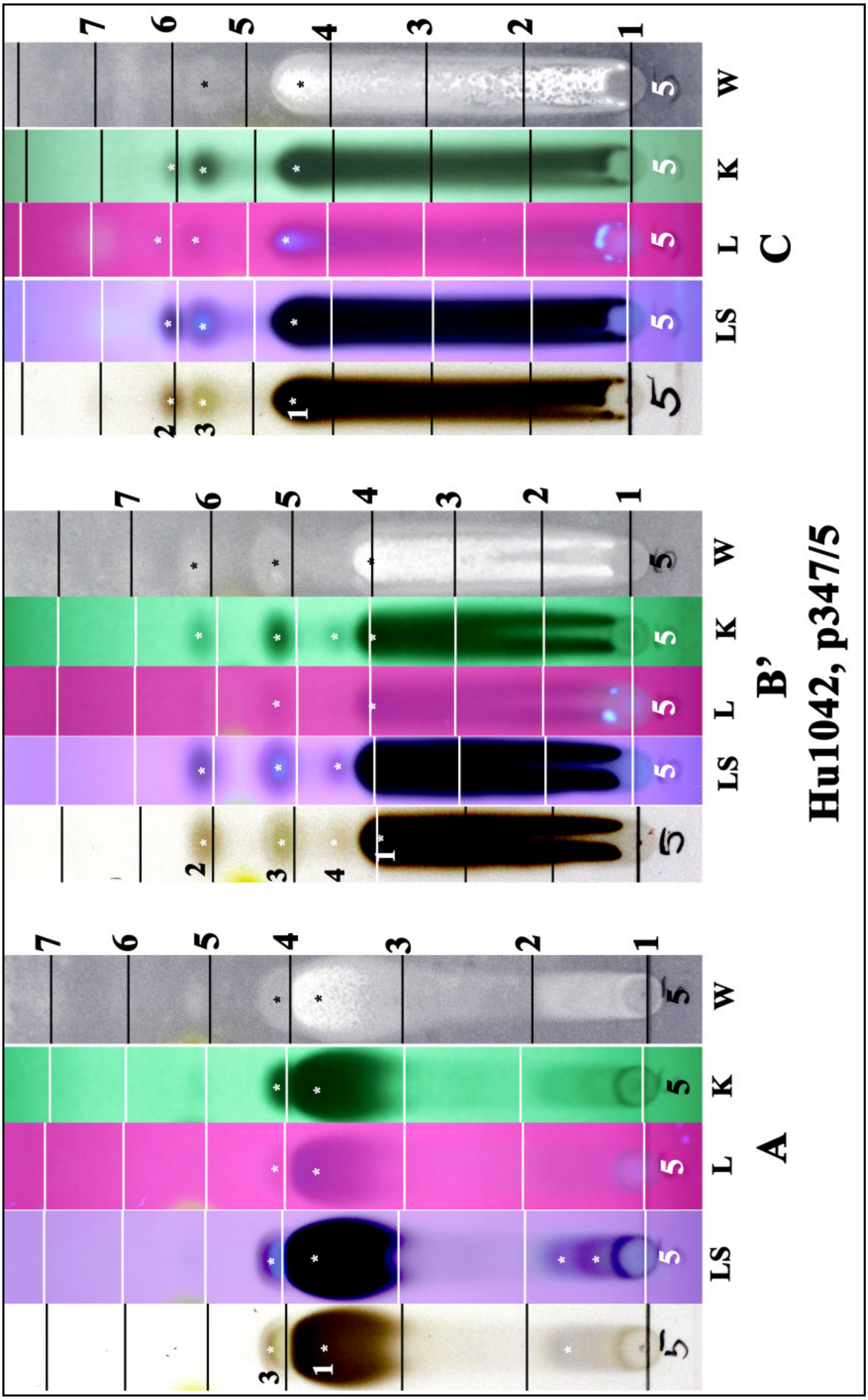
Pertusaria hadrocarpa, [19186], Australia, New South Wales, Lord Howe Island, Max Nicholls Track, 31°31'08" S, 159°03'03" E, 50m.

merochlorophaeic acid



1: merochlorophaeic acid, 2: unknown, conf. J.A. Elix
S. Huneck's collection of lichen substances No 1223: merochloropha-eic acid
Botanisches Museum Berlin-Dahlem

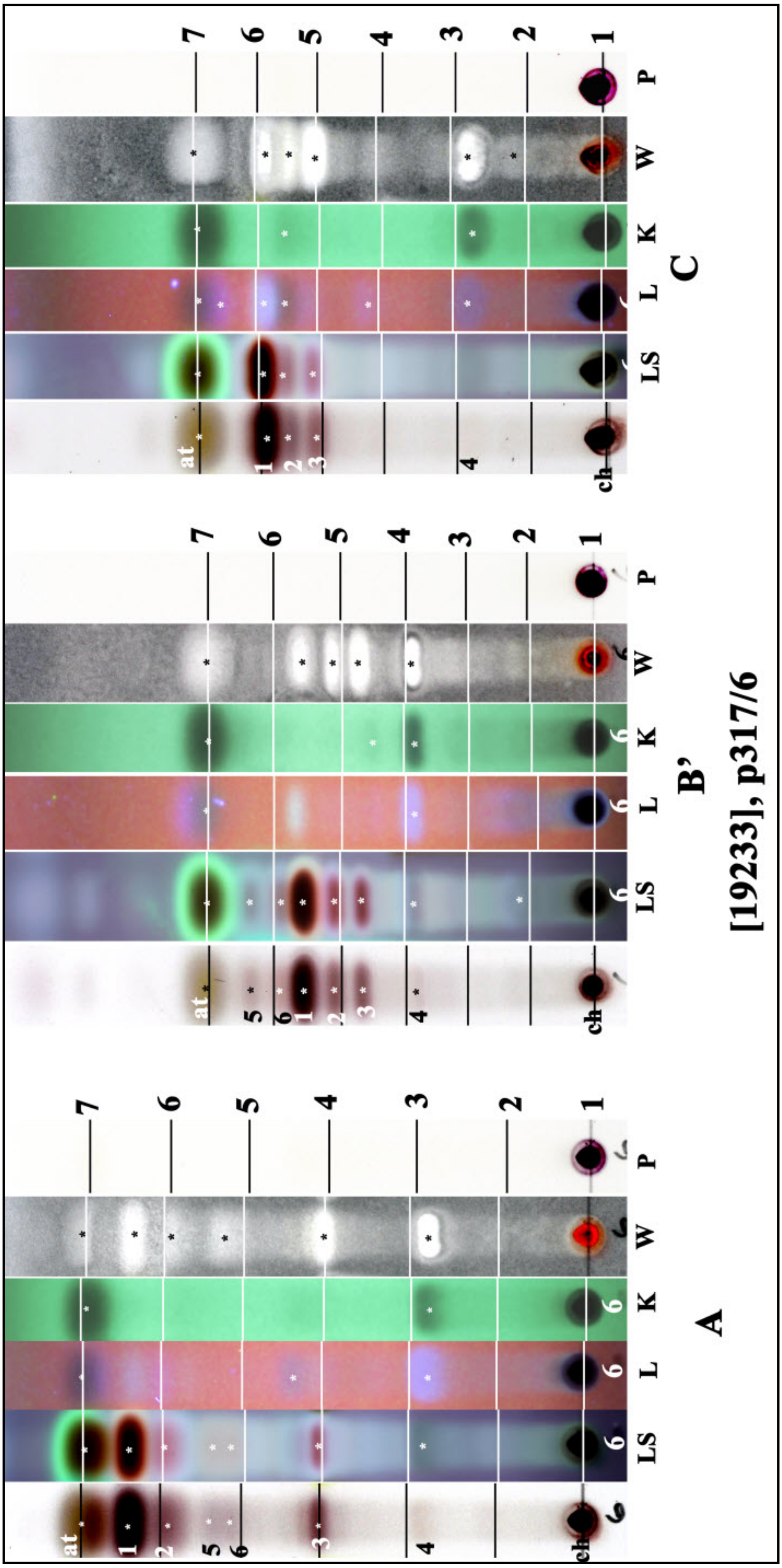
methoxycolensoic acid



1: lividic acid, **2: methoxycolensoic acid**, 3: 4-*O*-methylphysodic acid, 4: unknown

S. Huneck's collection of lichen substances No 1042: lividic acid, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

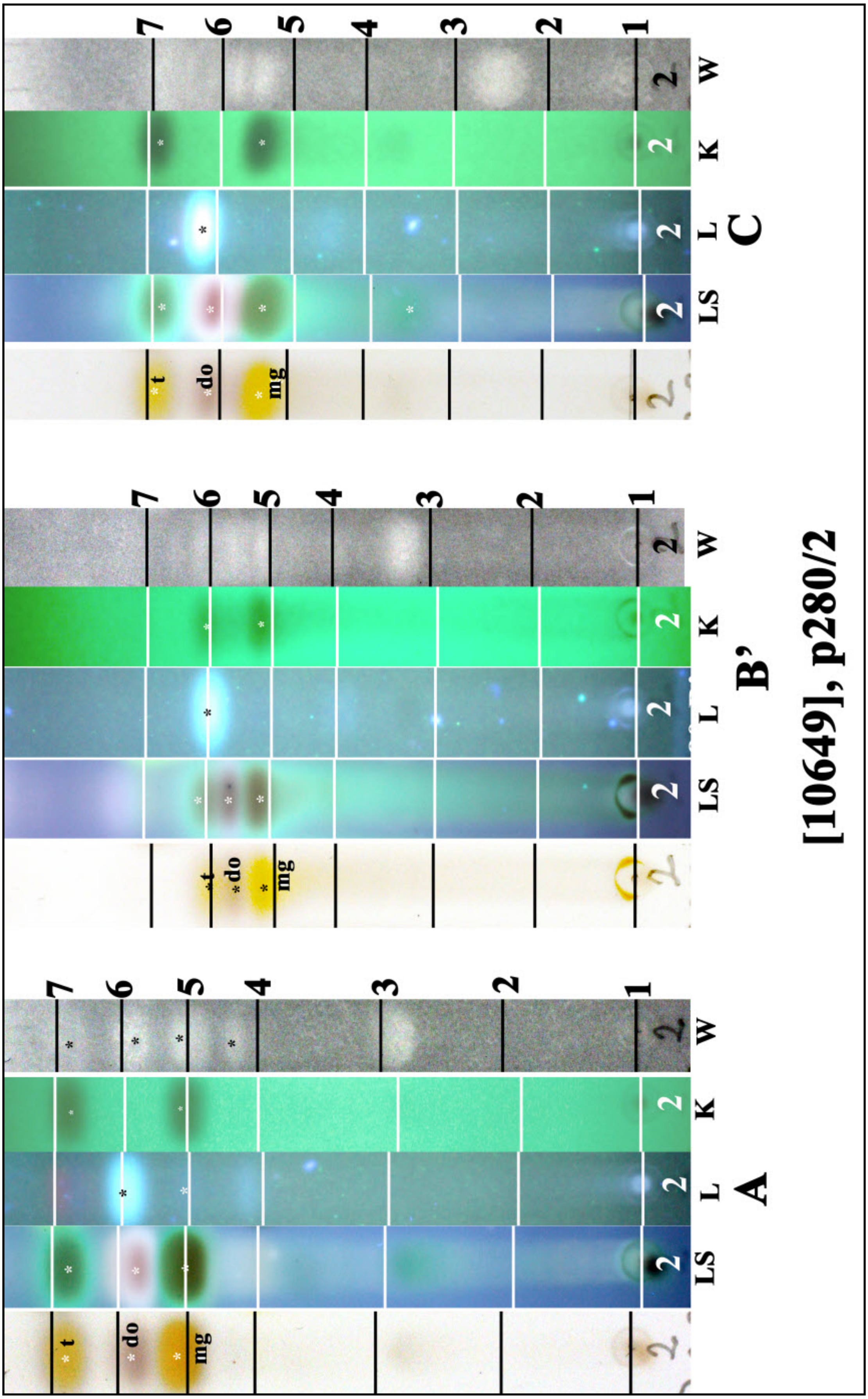
methyl 3-O-acetoxypyxinate



at: atranorin, ch: chiodectonic acid, 1: 25-acetoxy-20,24-epoxydammarane-3β-ol, **2: methyl 3-O-acetoxypyxinate**, 3: 25-acetoxy-20,24-epoxydammarone-3-one, 4: pyxinic acid, 5: methyl pyxinate, 6: unknown

Pyxine coccifera **,** [19233], Australia, Northern Territory, Tabletop Range, Litchfield Park, 25 km south-west of Batchelor, 15°11' S, 130°50' E, 180 m.

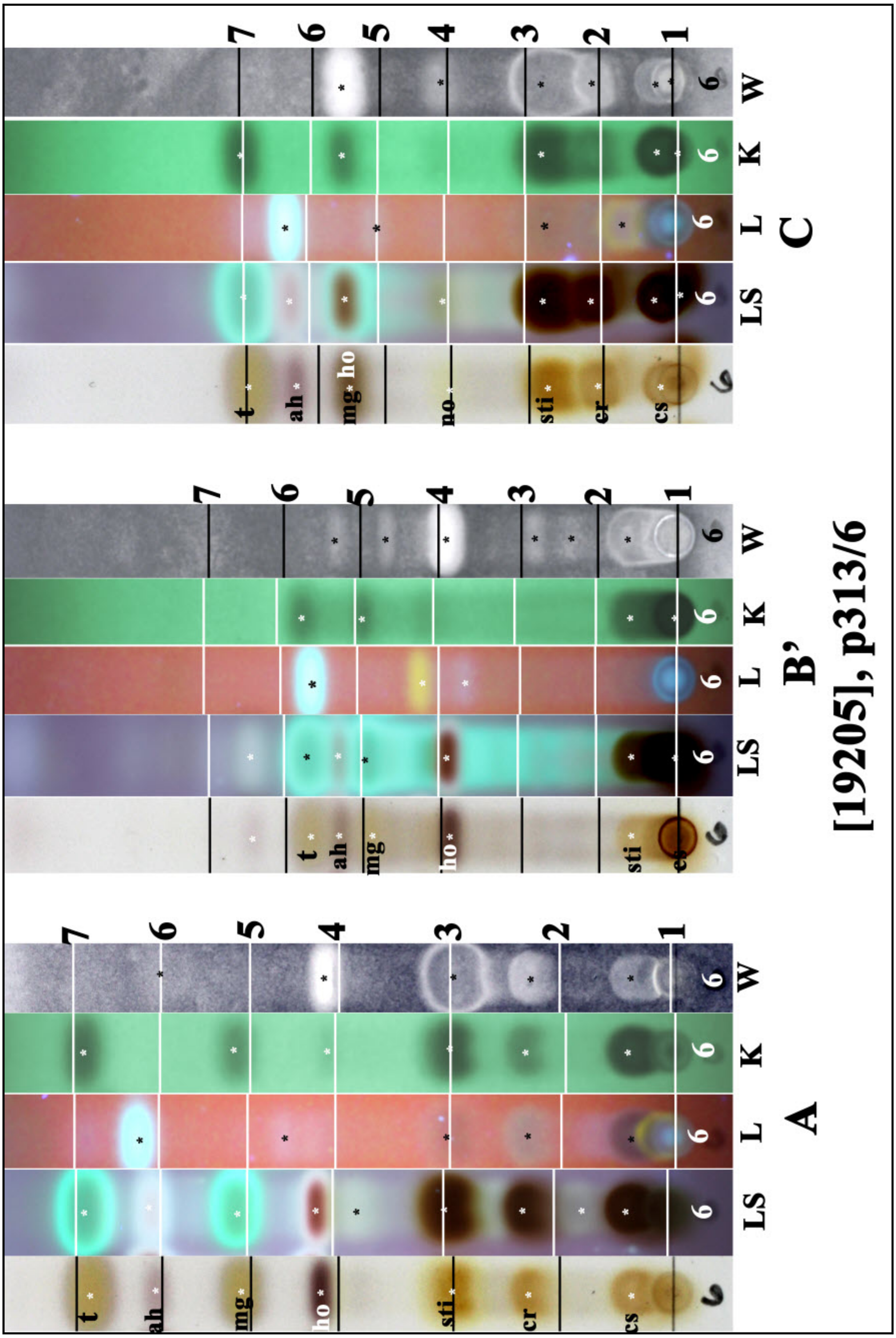
methyl gyrophorate



do: 15α-acetoxyhopane-22-ol, t: tenuiorin, mg: methyl gyrophorate

Peltigera dissecta, [10649], Portugal, Azoren, Sao Miguel, NE from Lagoa do Fogo near Lombadas; Erica bewachsene steile Lavahänge, 37°46.863' N, 25°27.470' W, 640 m. Leg. F. Schumm 02.06.2003, det. A. Aptroot 2010.

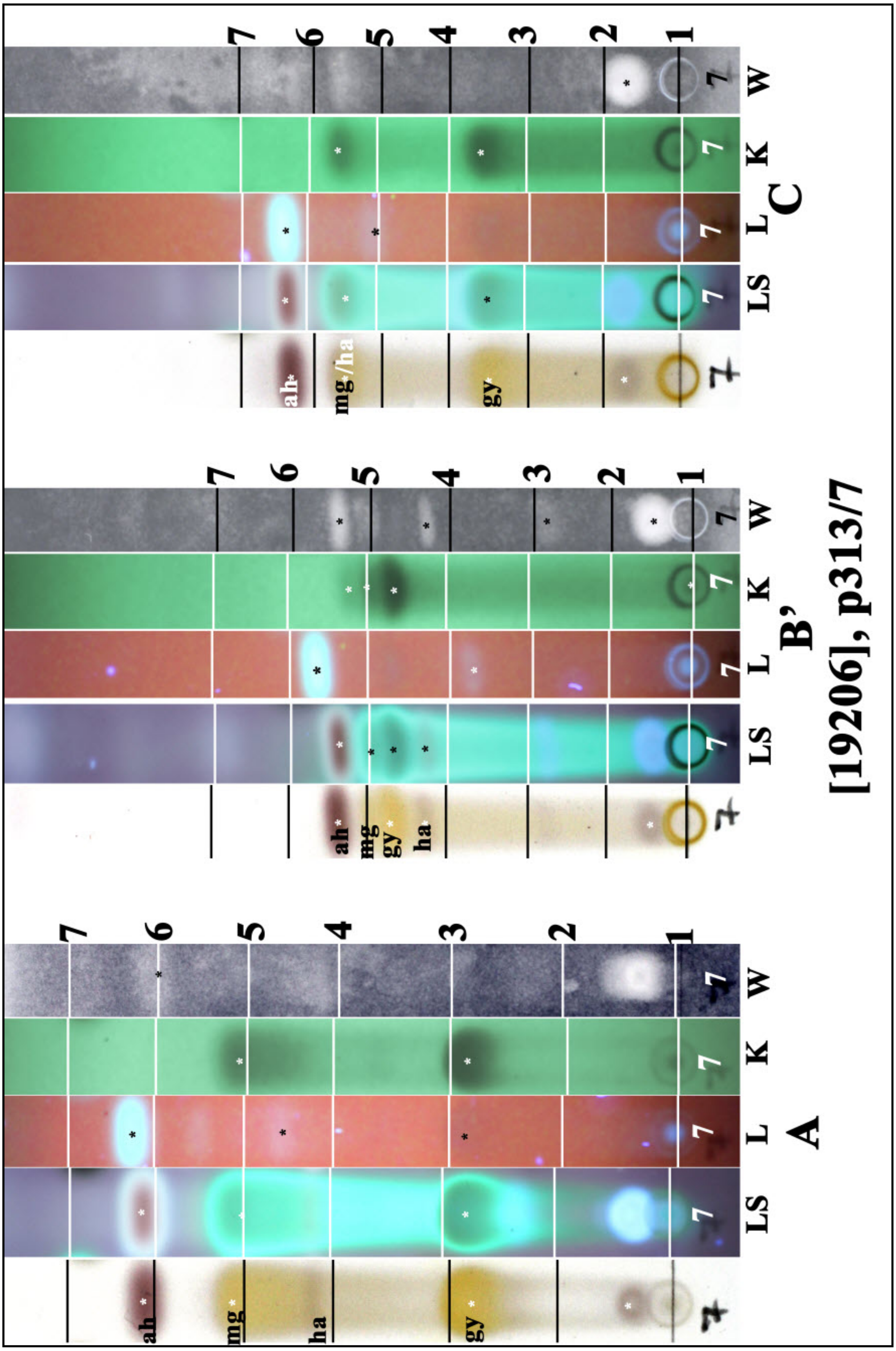
methyl gyrophorate



t: tenuiorin, ah: 7β-acetoxyhopane-22-ol, **mg: methyl gyrophorate**,
ho: hopane-6α,7β,22-triol, no: norstictic acid,
sti: stictic acid, cs:constictic acid, cr: cryptostictic acid

Pseudocyphellaria desfontainii, [19205], Australien, Queensland, Vine Creek, 6 km south east of Ravenshoe, 17°39' S, 145°30' E, 900 m.

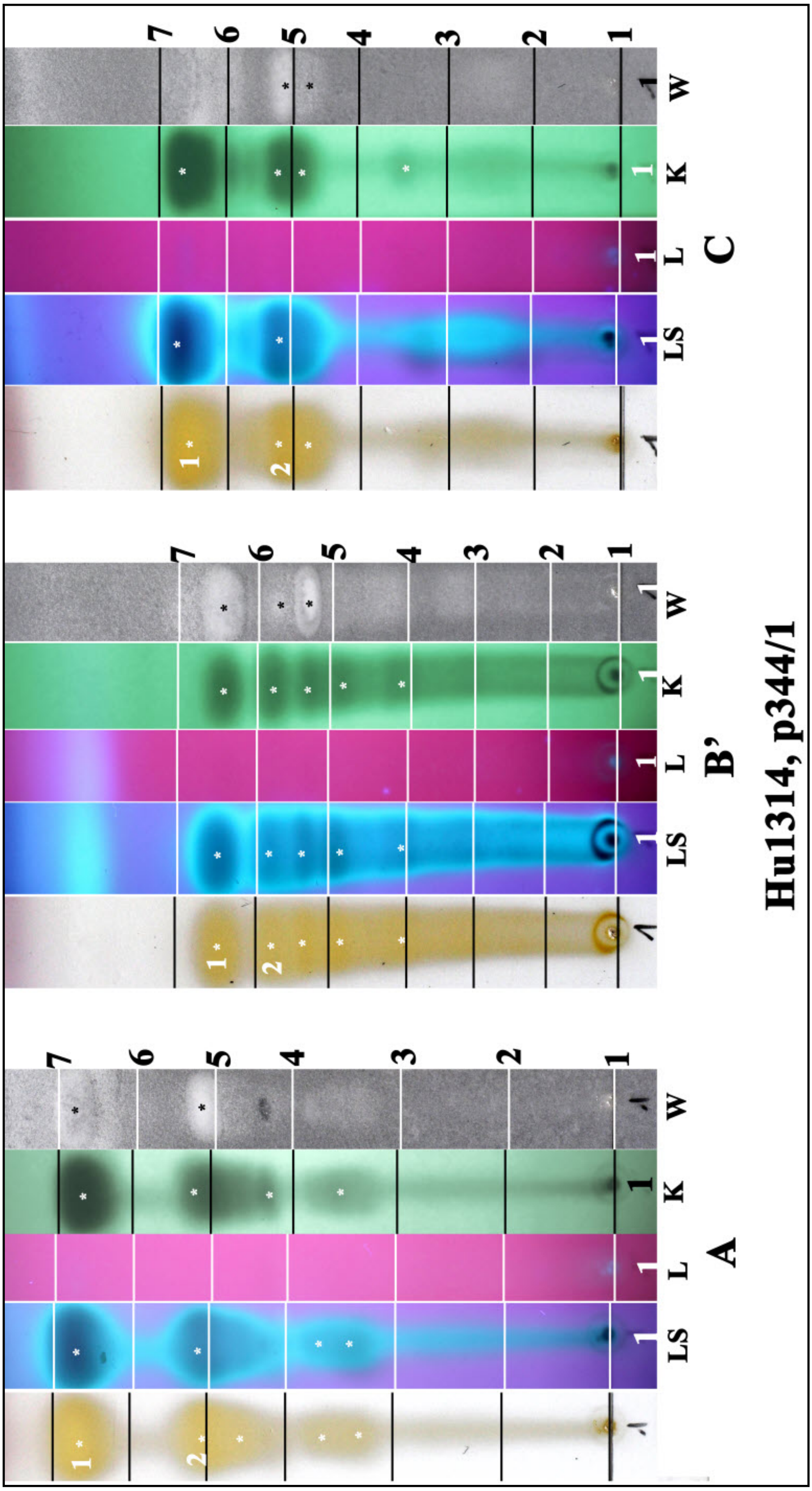
methyl gyrophorate



ah: 7β-acetoxyhopane-22-ol, **mg: methyl gyrophorate**, ha: hopane-15α,22-diol, gy: gyrophoric

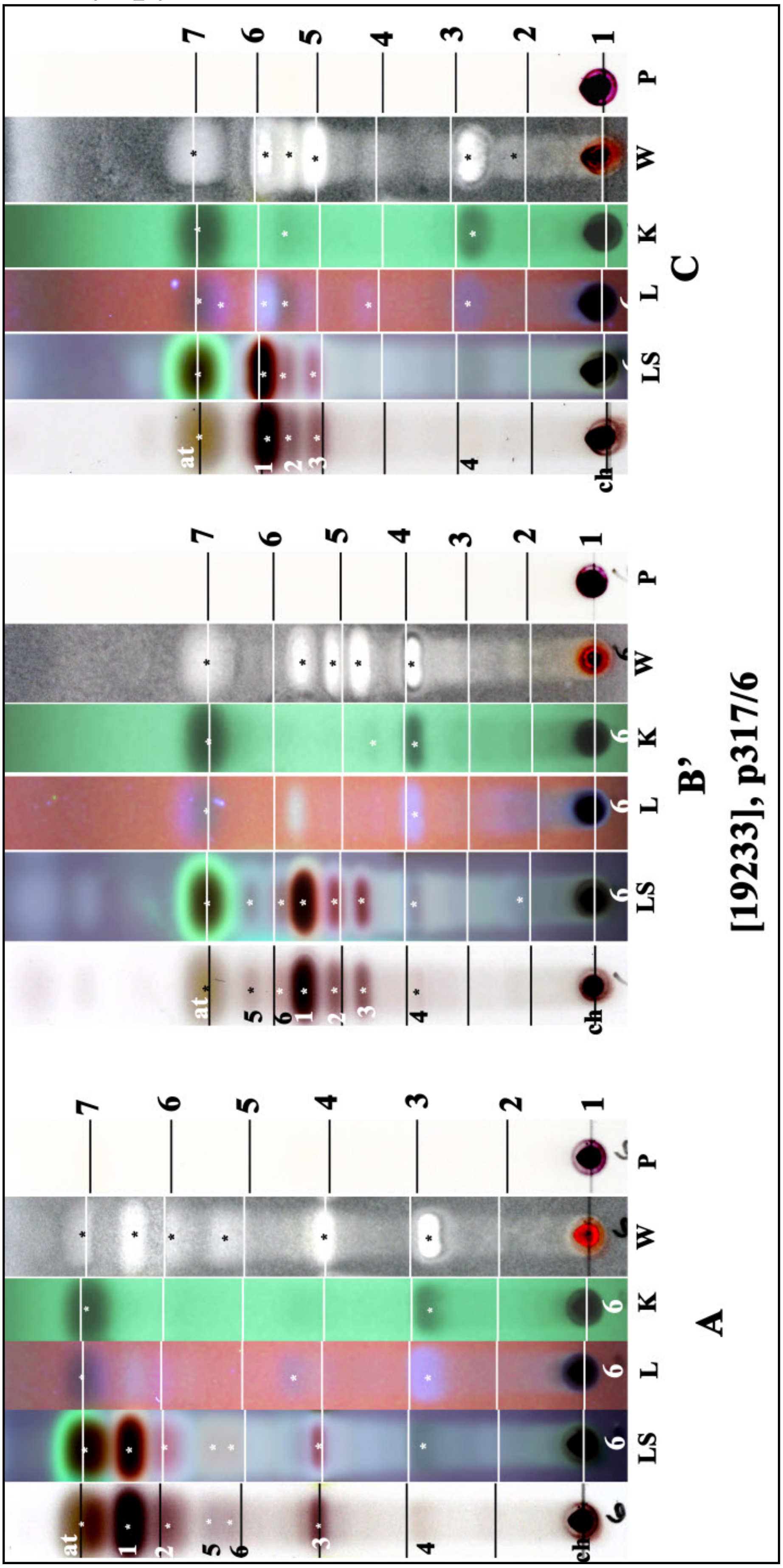
Pseudocyphellaria dissimilis,[19206], Australia, New South Wales, Moppy Lookout, Barrington Tops State Forest, 40 km west-north-west of Gloucester, 31°53' S, 151°32' E, 1200 m.

methyl gyrophorate



1: tenuiorin, **2: methyl gyrophorate**, conf. J.A. Elix
S. Huneck's collection of lichen substances No 1314: tenuiorin.
Botanisches Museum Berlin-Dahlem

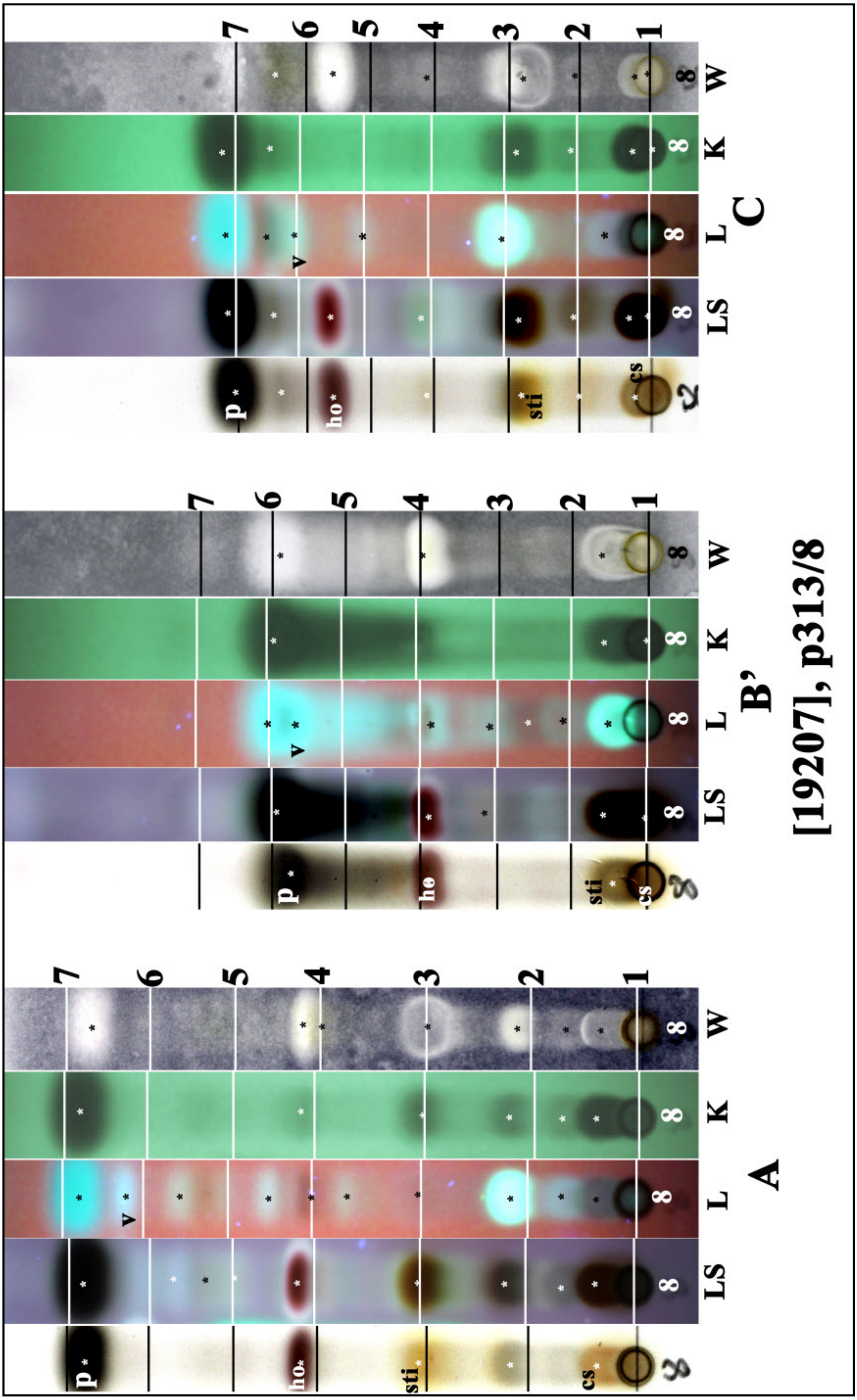
methyl pyxinate



at: atranorin, ch: chiodectonic acid, 1: 25-acetoxy-20,24-epoxydammarane-3β-ol,
2: methyl 3-O-acetoxypyxinate, 3: 25-acetoxy-20,24-epoxydammarone-3-one,
4: pyxinic acid, **5: methyl pyxinate**, 6: unknown

Pyxine coccifera , [19233], Australia, Northern Territory, Tabletop Range, Litchfield Park, 25 km south-west of Batchelor, 15°11' S, 130°50' E, 180 m.

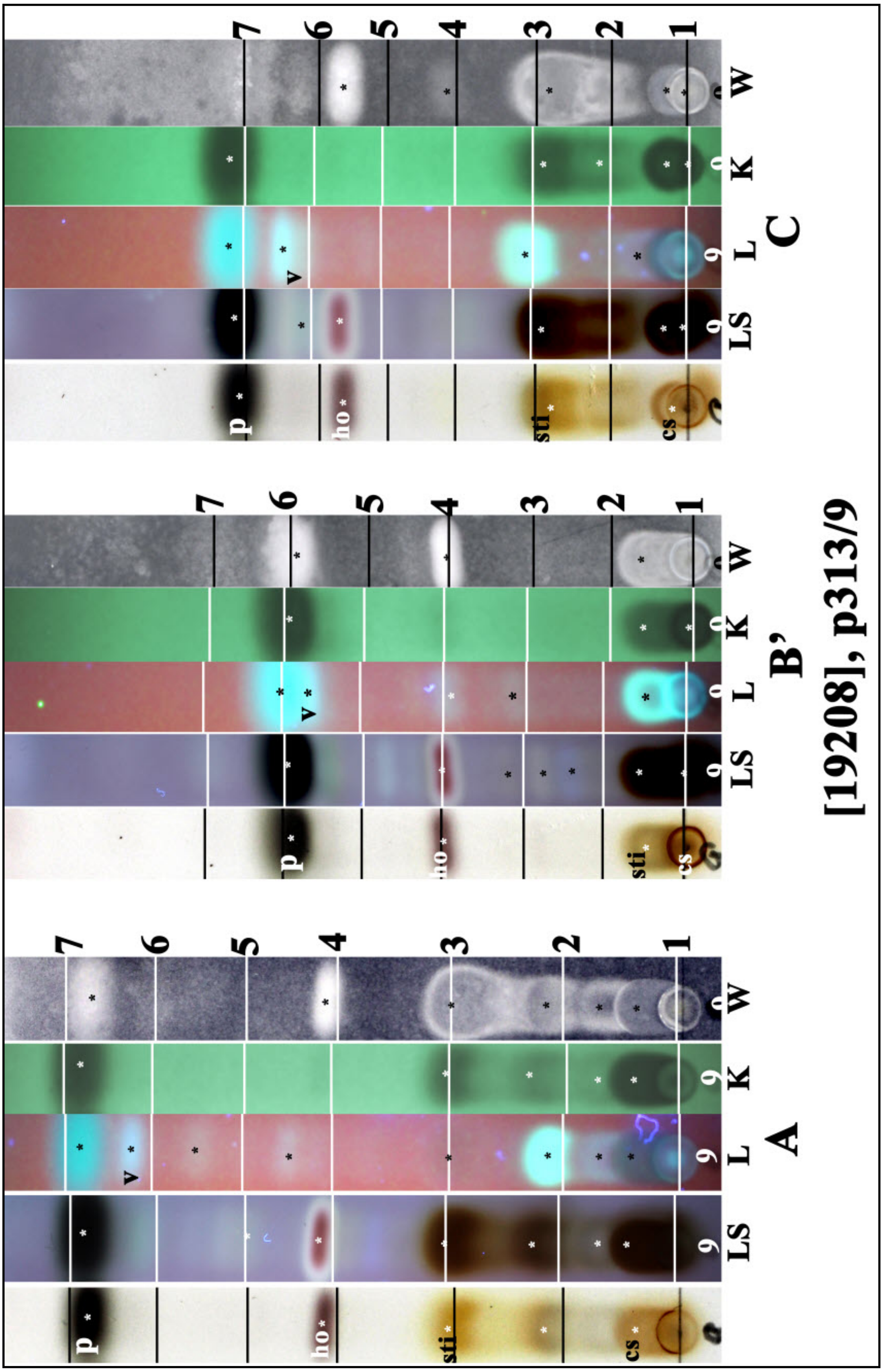
methyl virensate



p: physciosporin, ho: hopane-6a,7b,22-triol, sti: stictic acid, cs: constictic acid, **v: methyl virensate**

Pseudocyphellaria granulata, [19207], Australia, Victoria, Gunmark Road, near junction with Goonmirk Rocks Road, 13.5 km south of Bendoc, 37°16' S, 148°52' E, 1060 m.

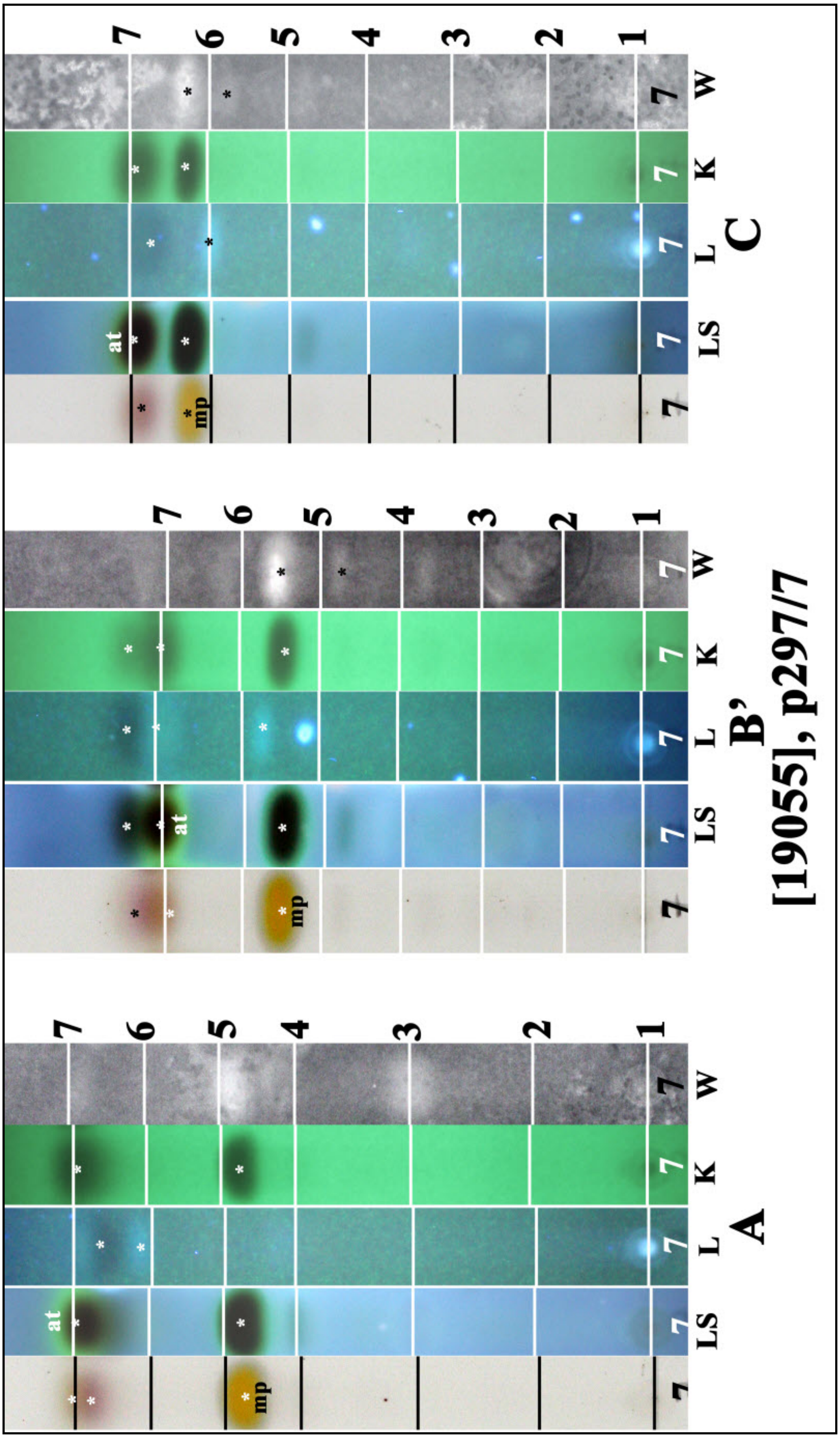
methyl virensate



p: physciosporin, ho: hopane-6a,7b,22-triol, sti: stictic acid, cs: constictic acid, **v: methyl virensate**

Pseudocyphellaria granulata, [19208], Australia, New South Wales, Great Dividing Range, 6 km east of Captains Flat, 2 km north of Parkers Gap, 35°37' S, 149°30' E, 1260 m.

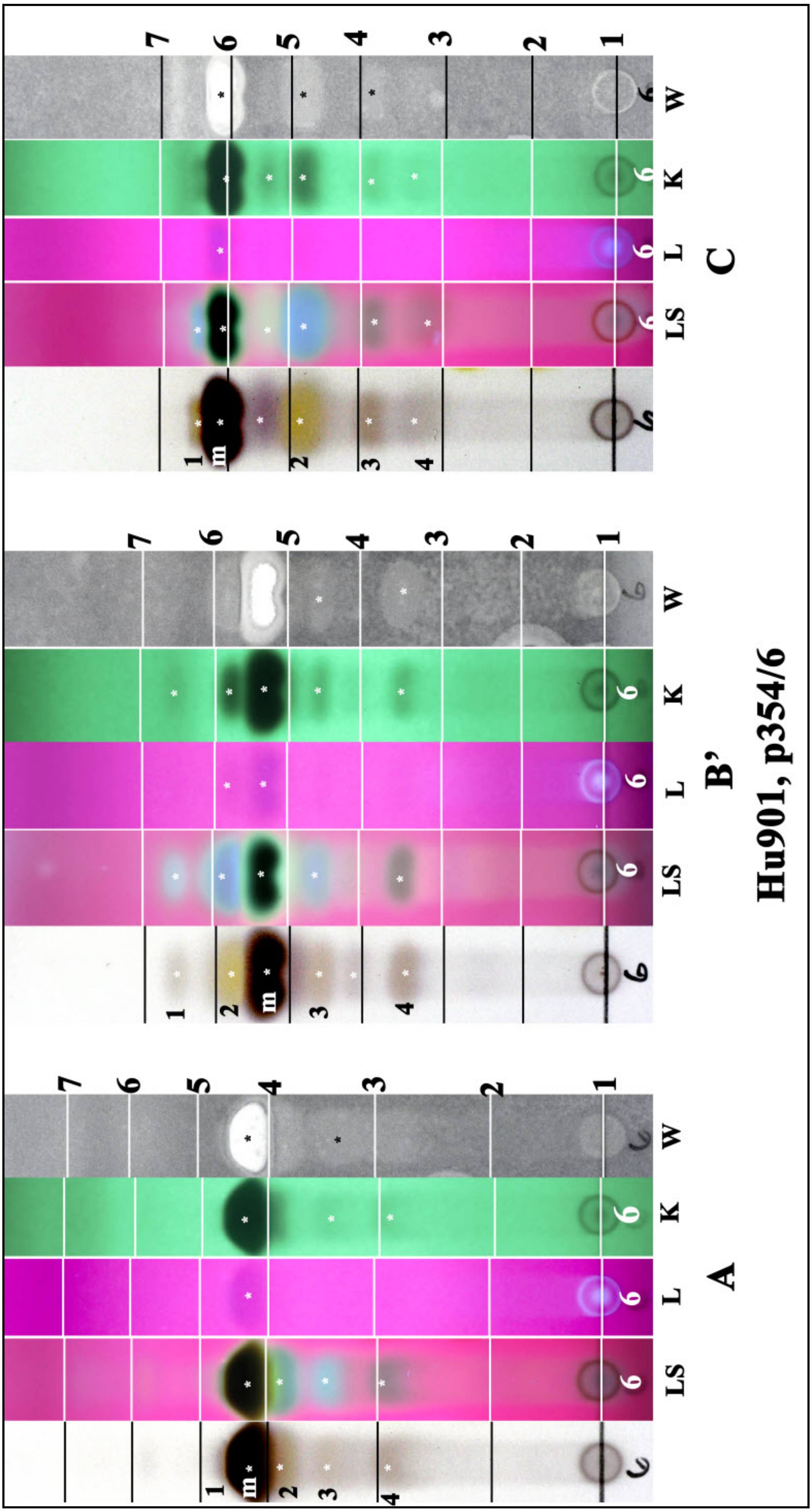
methylperlatolic acid



at: atranorin, mp: methylperlatolic acid

Lecanora helva [19055], Norfolk Islands, Flat Rock Bay Picnic Area, 29°01'30" S, 167°55' E, 40 m, growing on old fence posts in open *Araucaria* grassland. Leg. J.A. Elix (18707) & H. Streimann, 07.12.1984. Lichenes Australasici Exsiccati No. 258.

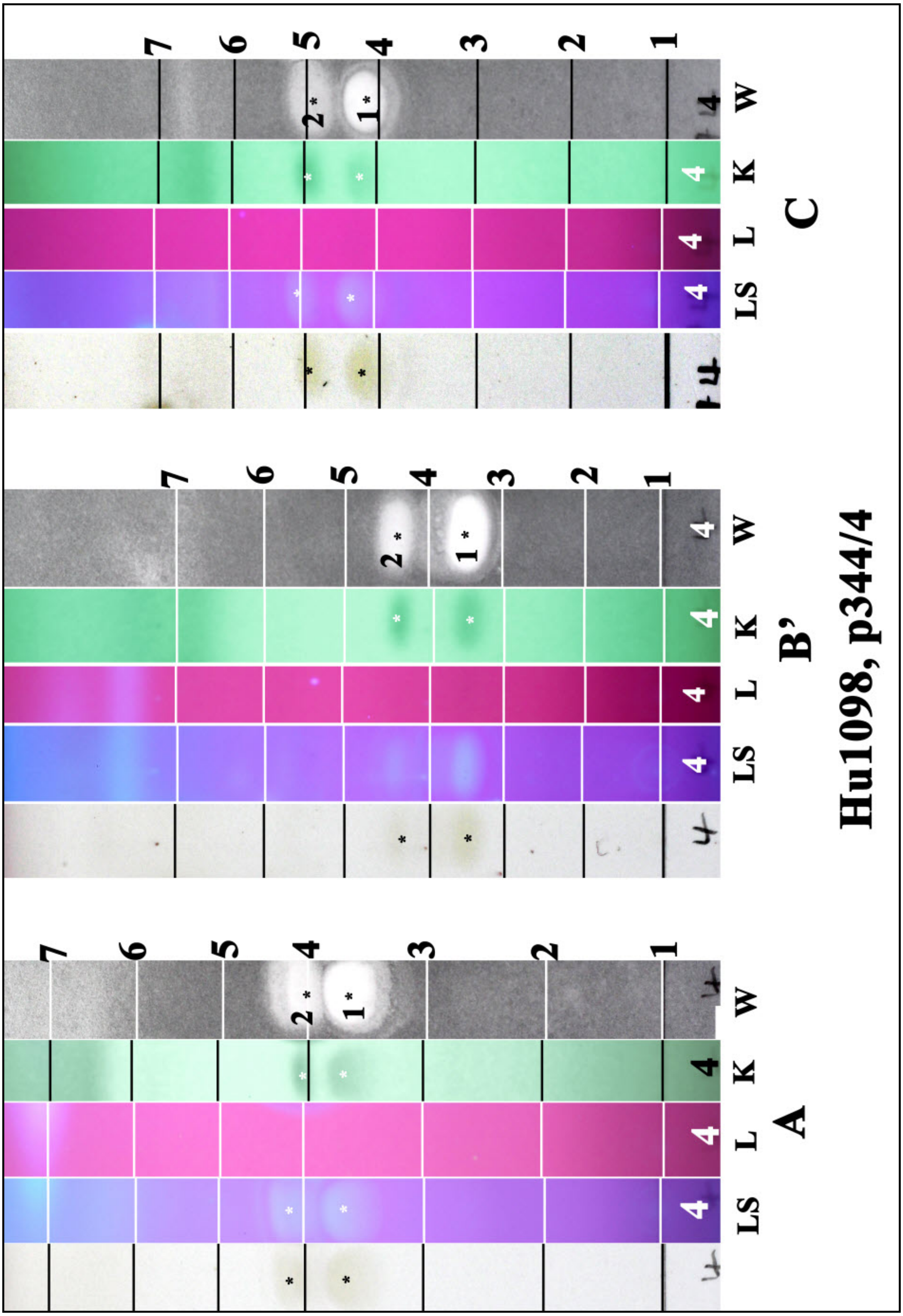
miriquidic acid



m: miriquidic acid, 4: normiriquidic acid, 1,2,3: unknown, conf. J.A. Elix

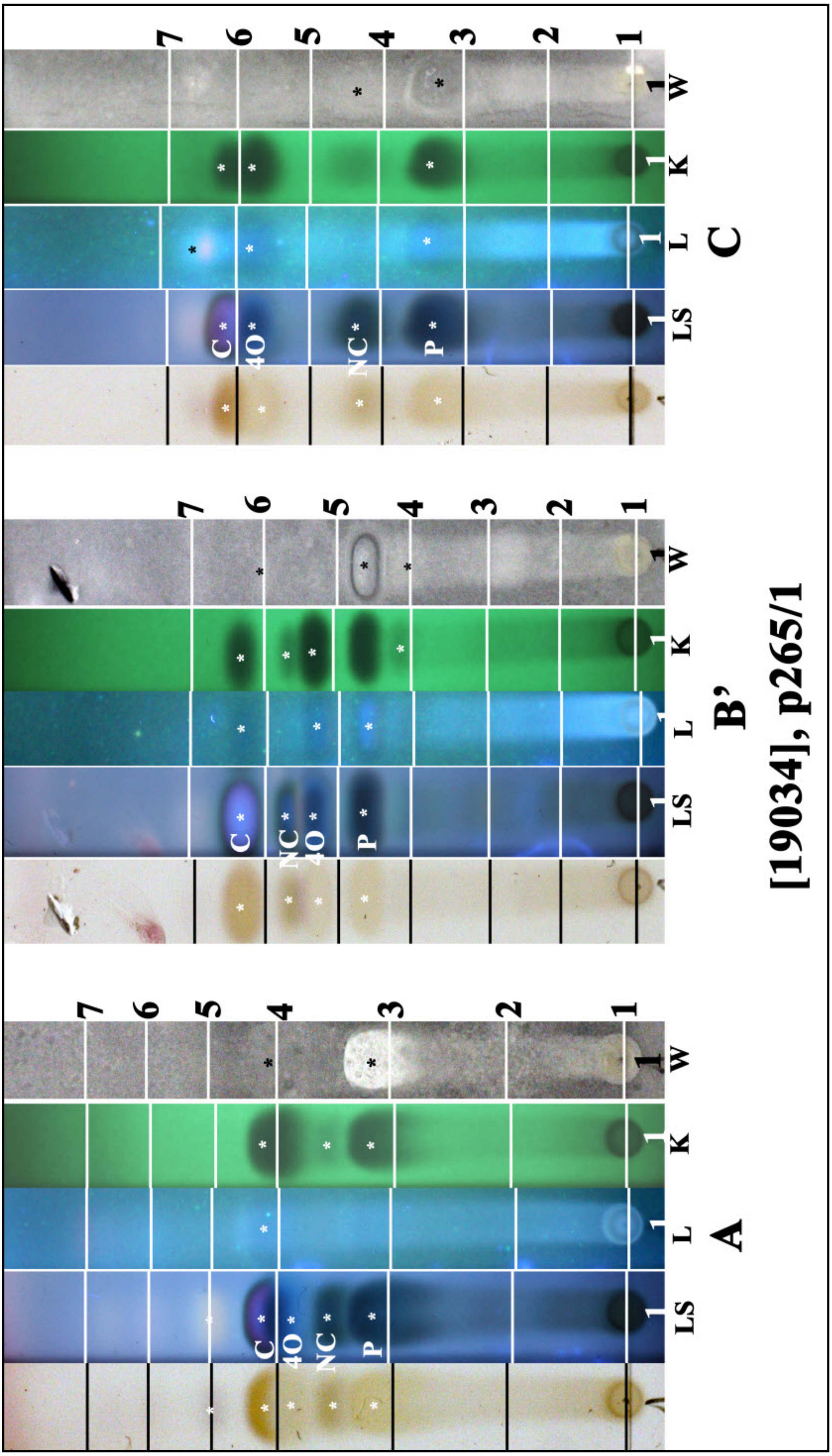
S. Huneck’s collection of lichen substances No 901: miriquidic acid. Botanisches Museum Berlin-Dahlem

muronic acid



1: muronic acid, 2: isomuronic acid, conf. J.A. Elix
S. Huneck's collection of lichen substances No 1098: muronic acid.
Botanisches Museum Berlin-Dahlem

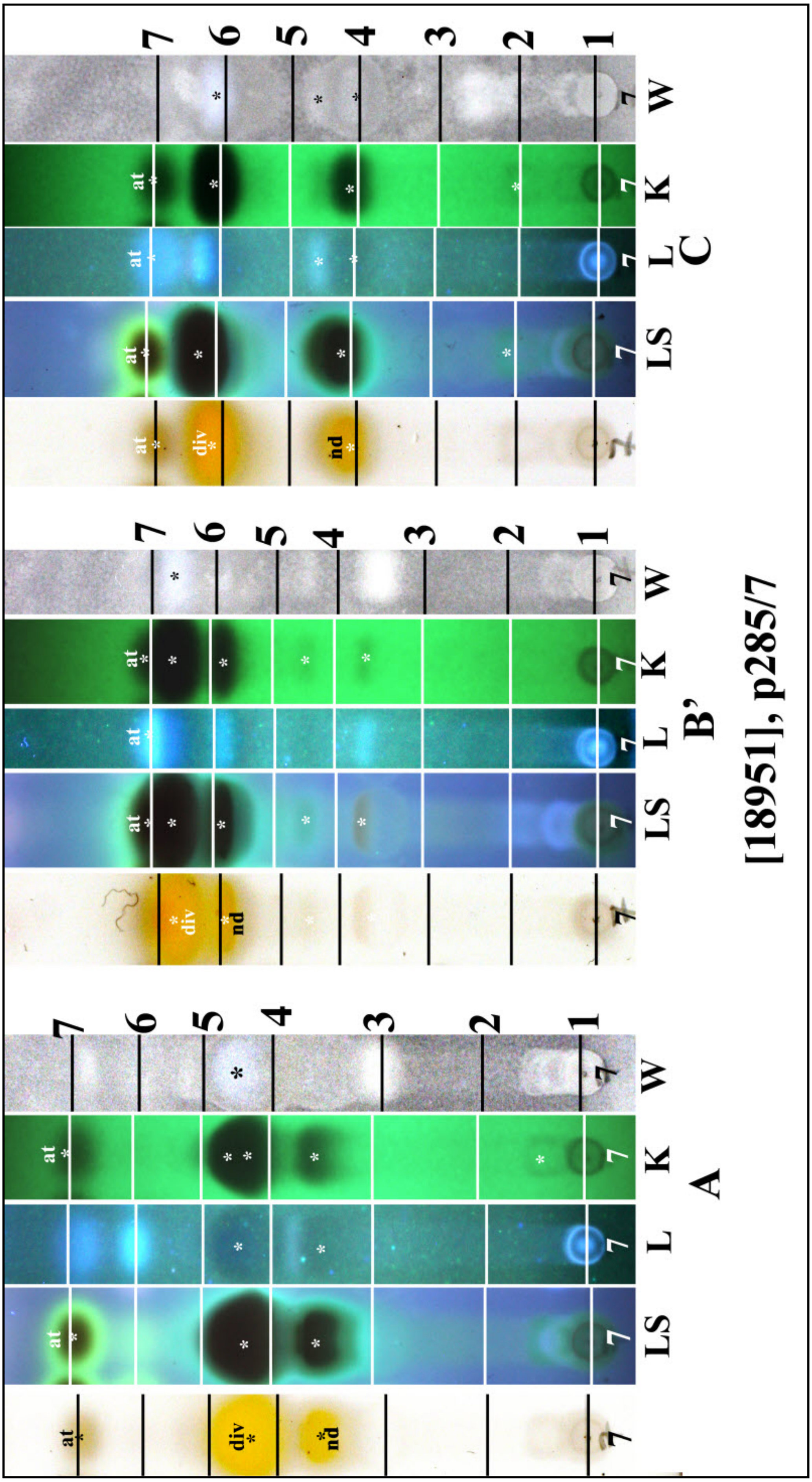
norcolensoic acid



C: colensoic acid, **NC: norcolensoic acid**, 4O: 4-O-methylphysodic acid, P: physodic acid

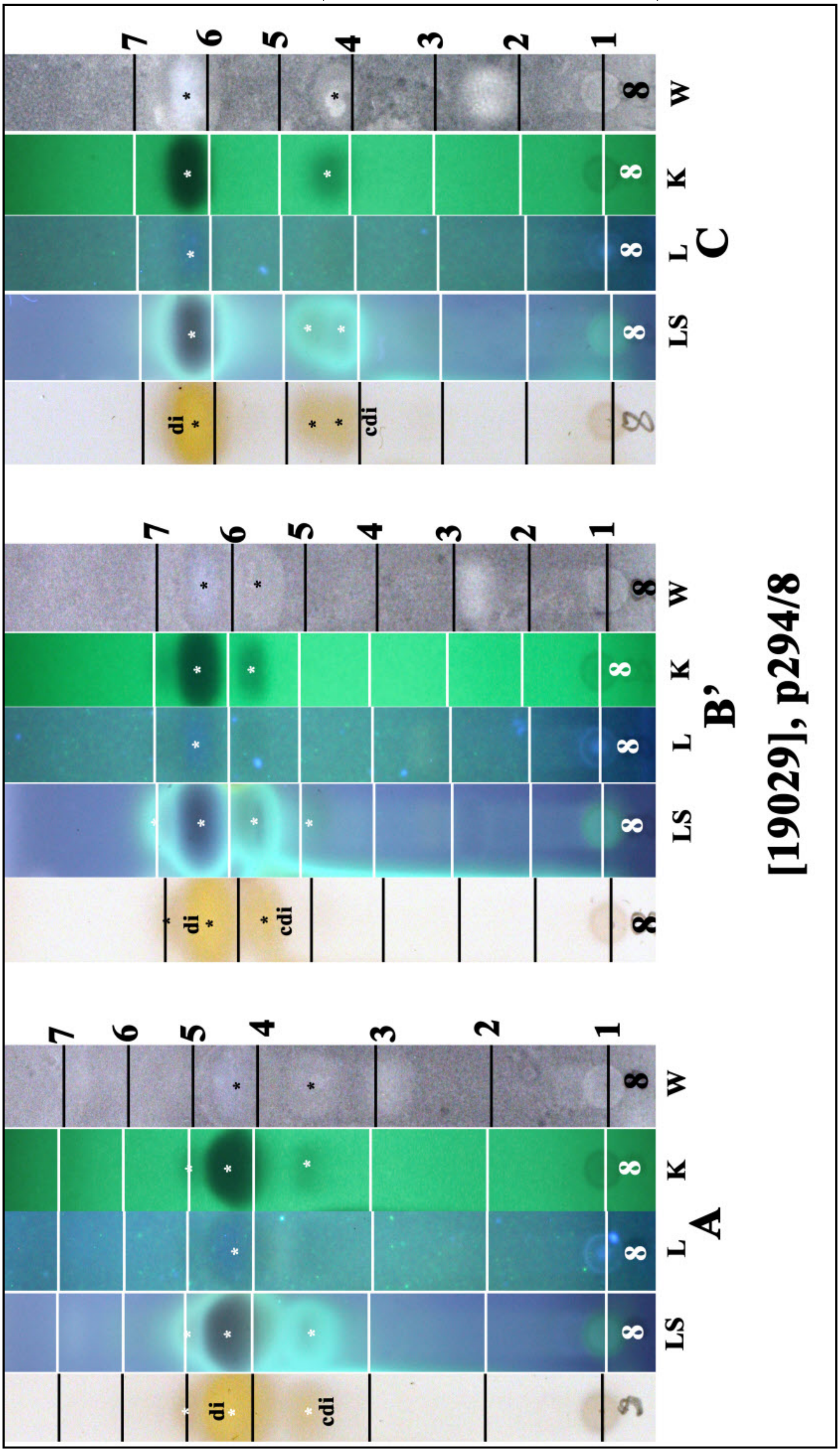
Carbonicola foveata, [19034], Australia, New South wales, Great dividing Range, Tuena-Binda road, 30 km north-west of Crookwell

nordivaricatic acid



Canoparmelia texana, [18951], Australia, Queensland, Kelvin Grove, Brisbane.

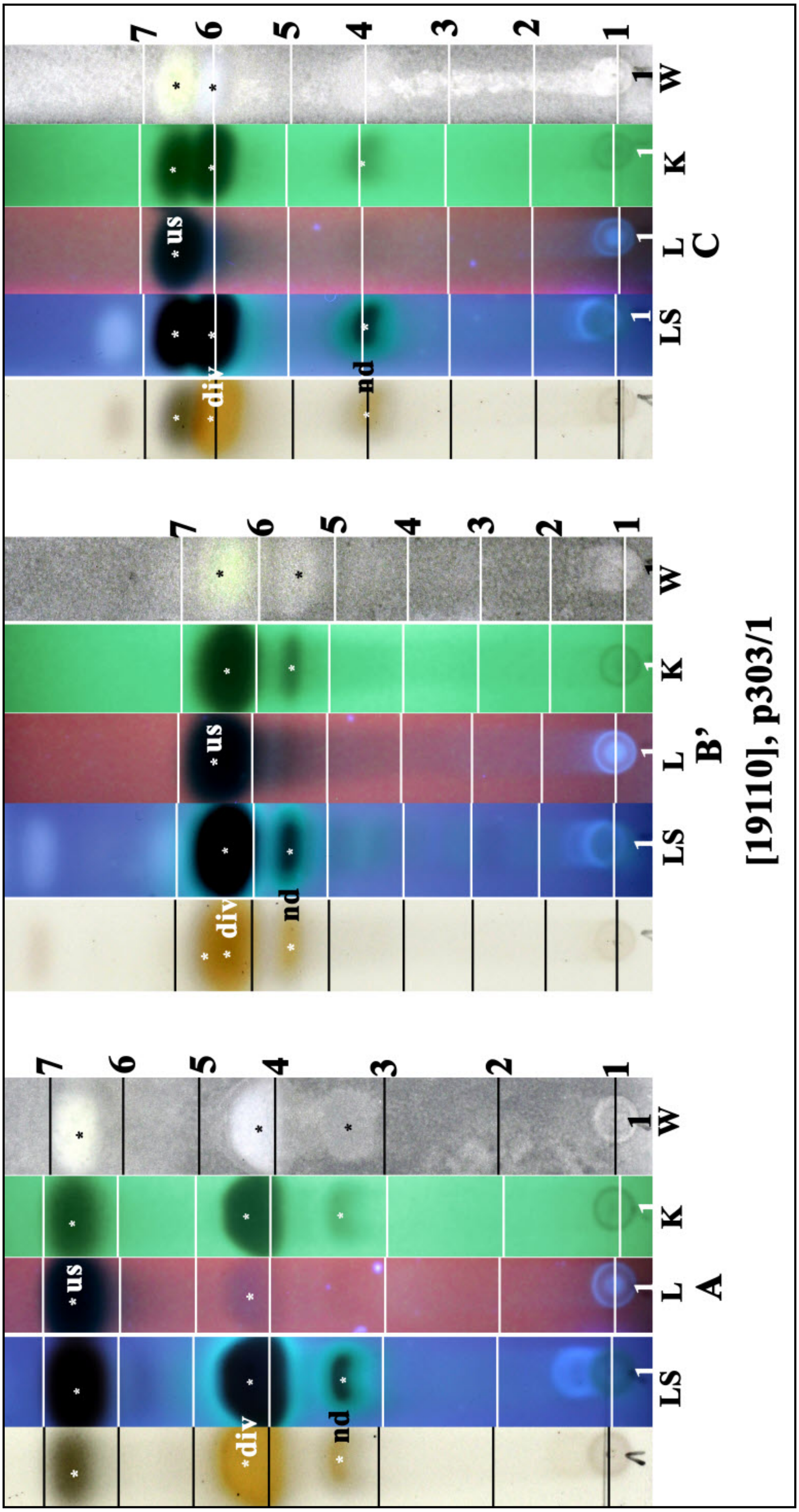
nordivaricatic acid (= condivaricatic acid)



di: divaricatic acid, **cdi: nordivaricatic acid (= condivaricatic acid)**

Heterodea beaugleholei [19029], Australia, New South Wales, Jerrabomberra Hill, 2 km south-west of Qeanbeyan

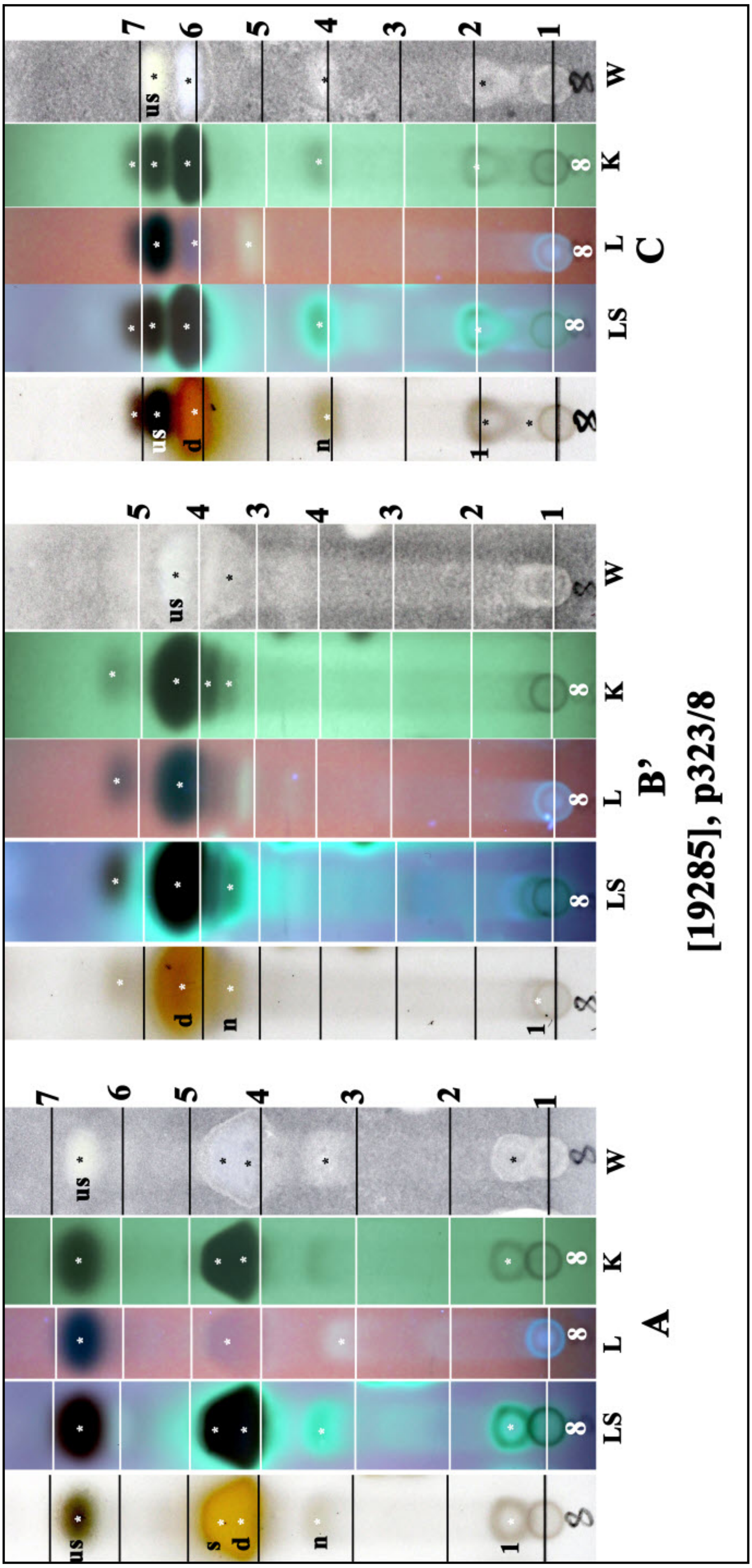
nordivaricatic acid



us: usnic acid, div:divaricatic acid, nd: nordivaricatic acid

Parmeliopsis ambigua, [19110], Australia, Victoria, Pretty Valley, Alpine National Park, 18 km south-south-east of Mt. Beauty

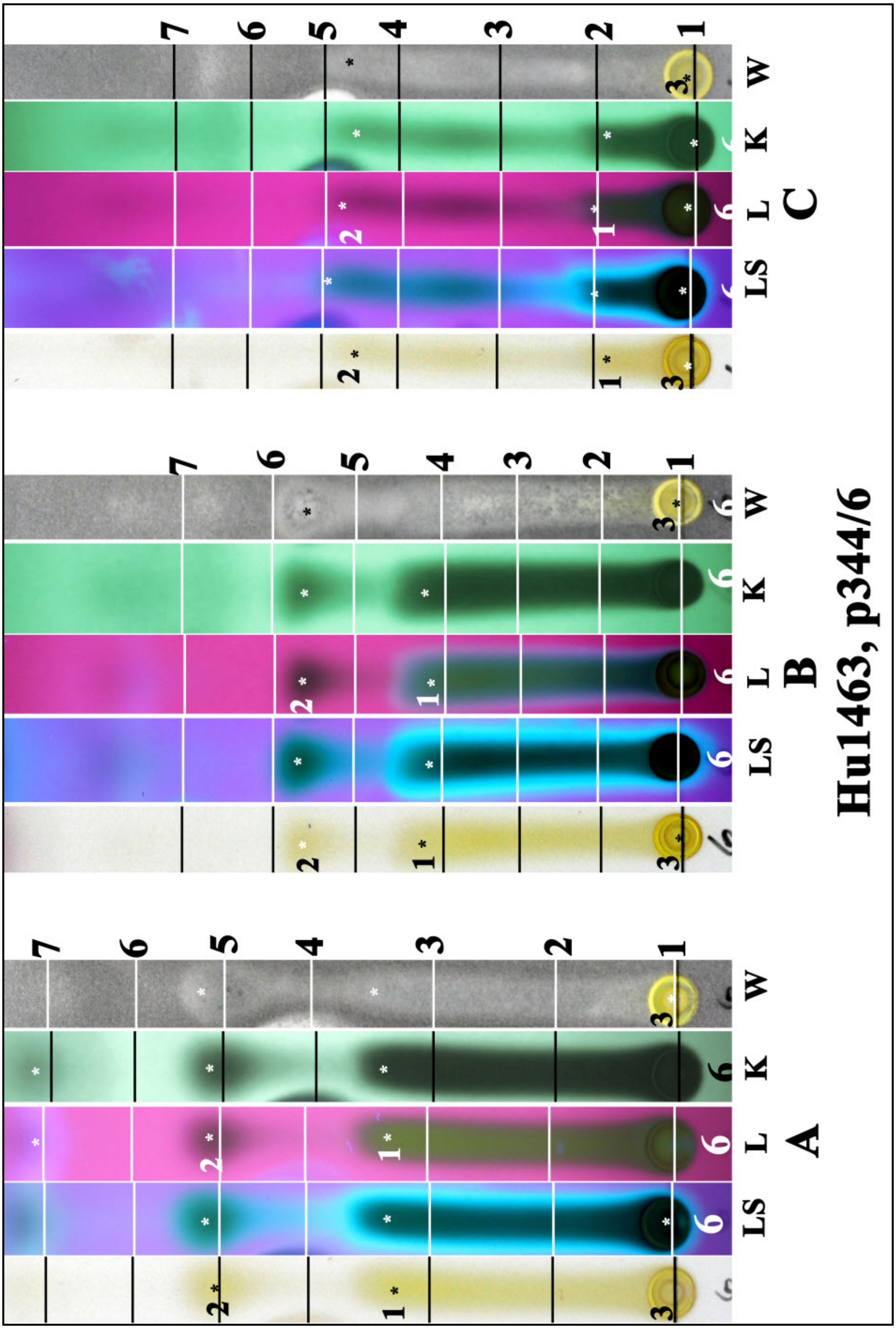
nordivaricatic acid



us: usnic acid, d: divaricatic acid, **n: nordivaricatic acid**,
s: stenosporic acid, 1: hydrolysis product, an artifact

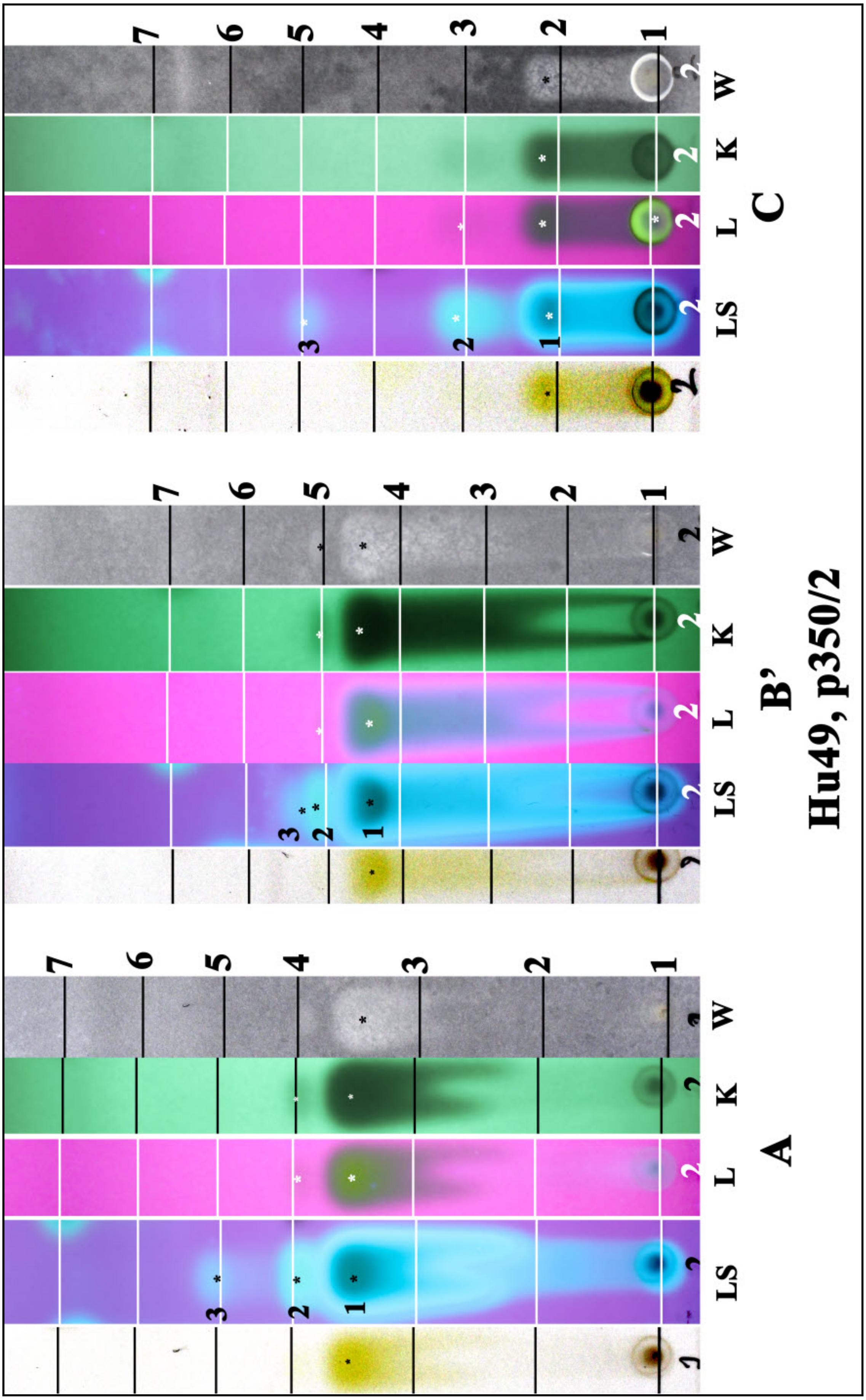
Thysanothecium scutellatum **,** [19285], Australia, Queensland, Big Tableland, 26 km south of Cooktown, 15°43' S, 145°17' E, 610 m.

norlichexanthone



1: norlichexanthone, 2,3: unknowns, conf. J.A. Elix
S. Huneck's collection of lichen substances No 1463: norlichexanthone. Botanisches Museum Berlin-Dahlem

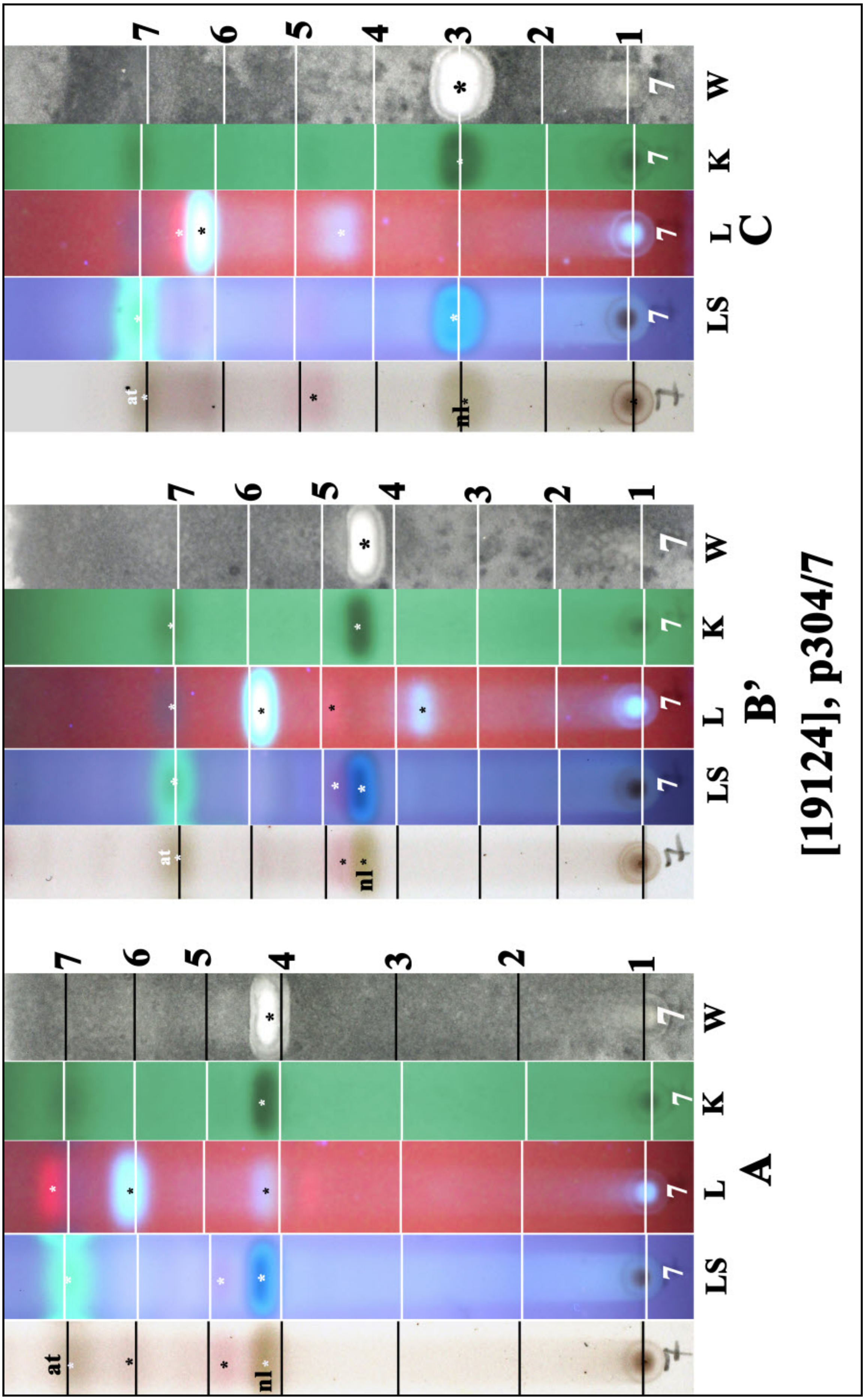
norlichexanthone



1: norlichexanthone, 2,3: unknown, conf. J.A. Elix

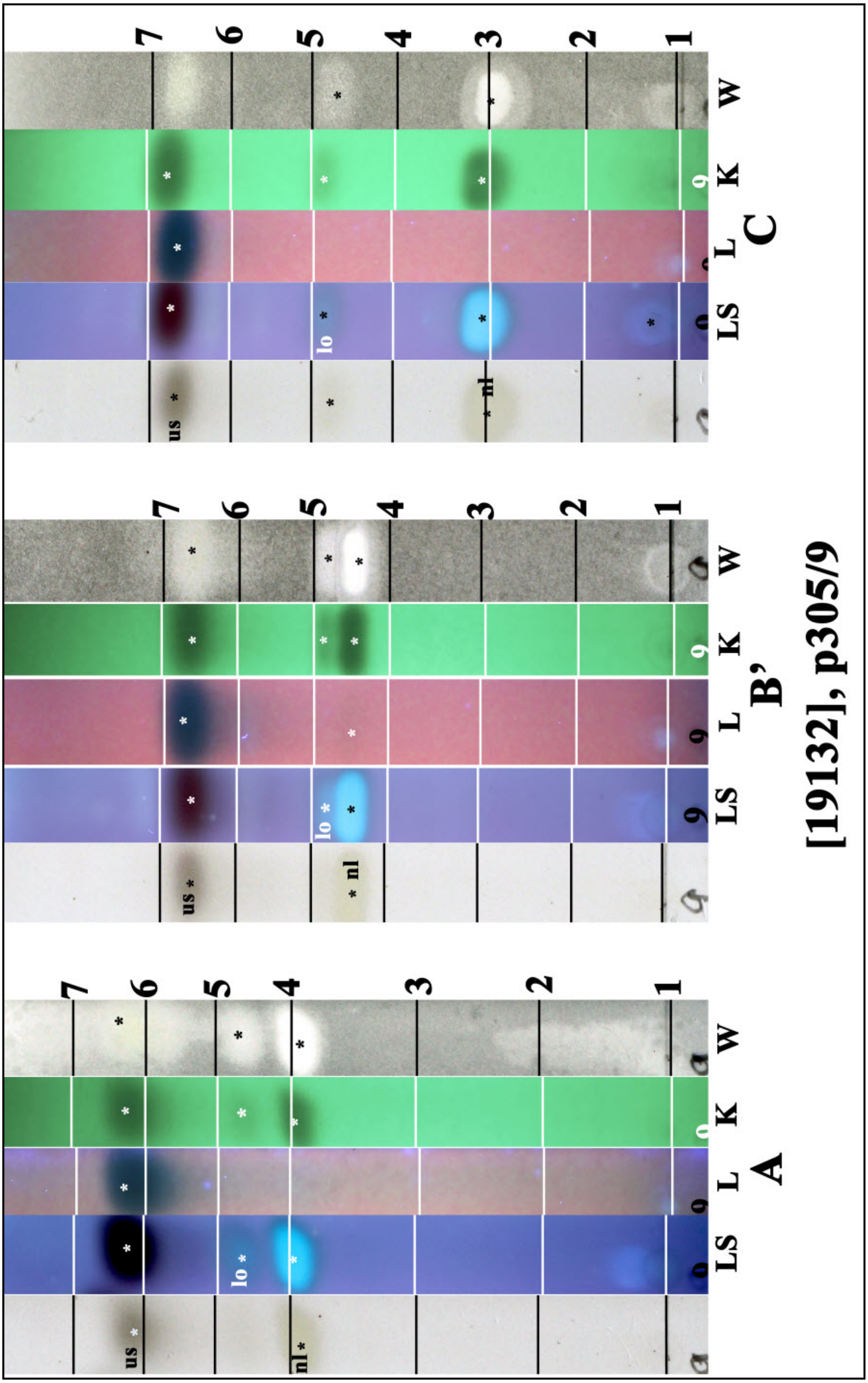
S. Huneck's collection of lichen substances No 49: norlichexanthone
Botanisches Museum Berlin-Dahlem

norlobaridone



Parmotrema recipiendum, [19124], Australia, New South Wales, Bimbi State Forest, 23 km west-south-west of Grenfell.

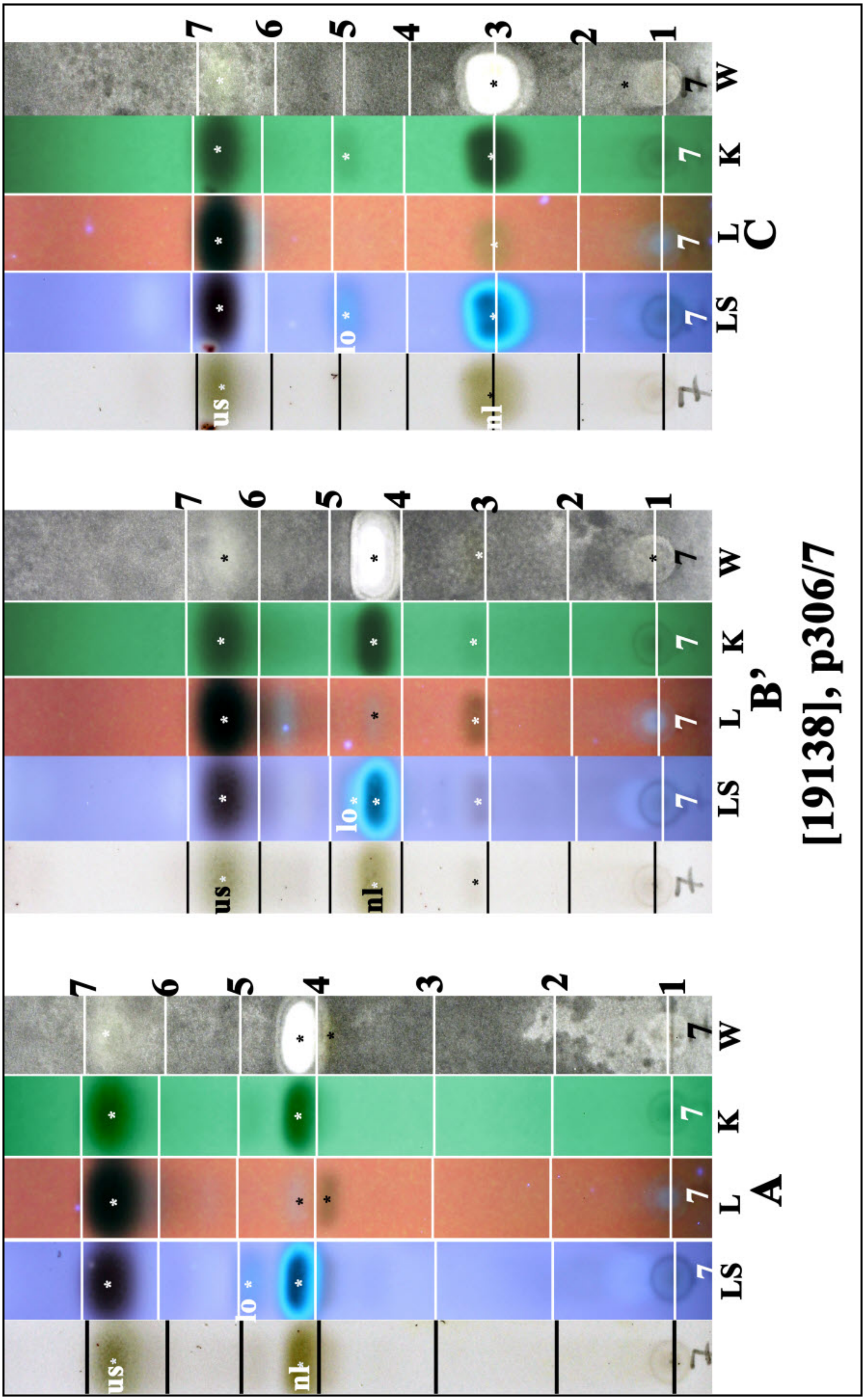
norlobaridone



us: usnic acid, **nl: norlobaridone**, lo: loxodin

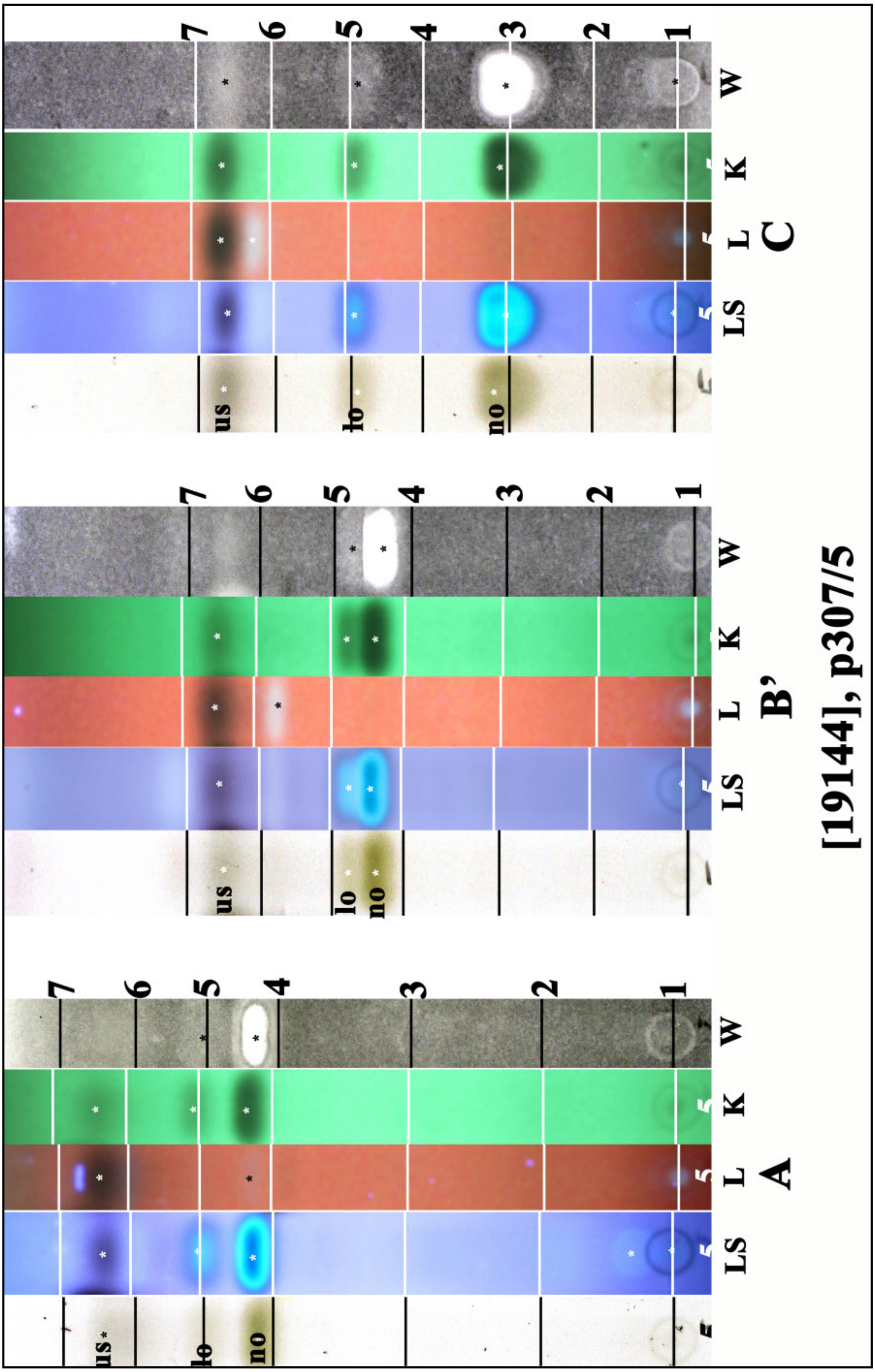
Xanthoparmelia flavescentireagens, [19132], Australia, New South Wales, Kosciusko National Park, Wilsons Valley, 11 km northwest of Jindabyne.

norlobaridone



Xanthoparmelia amplexula **,** [19138], Australia, Queensland, Tumouline State Forest, 6 km north of Ravenshoe.

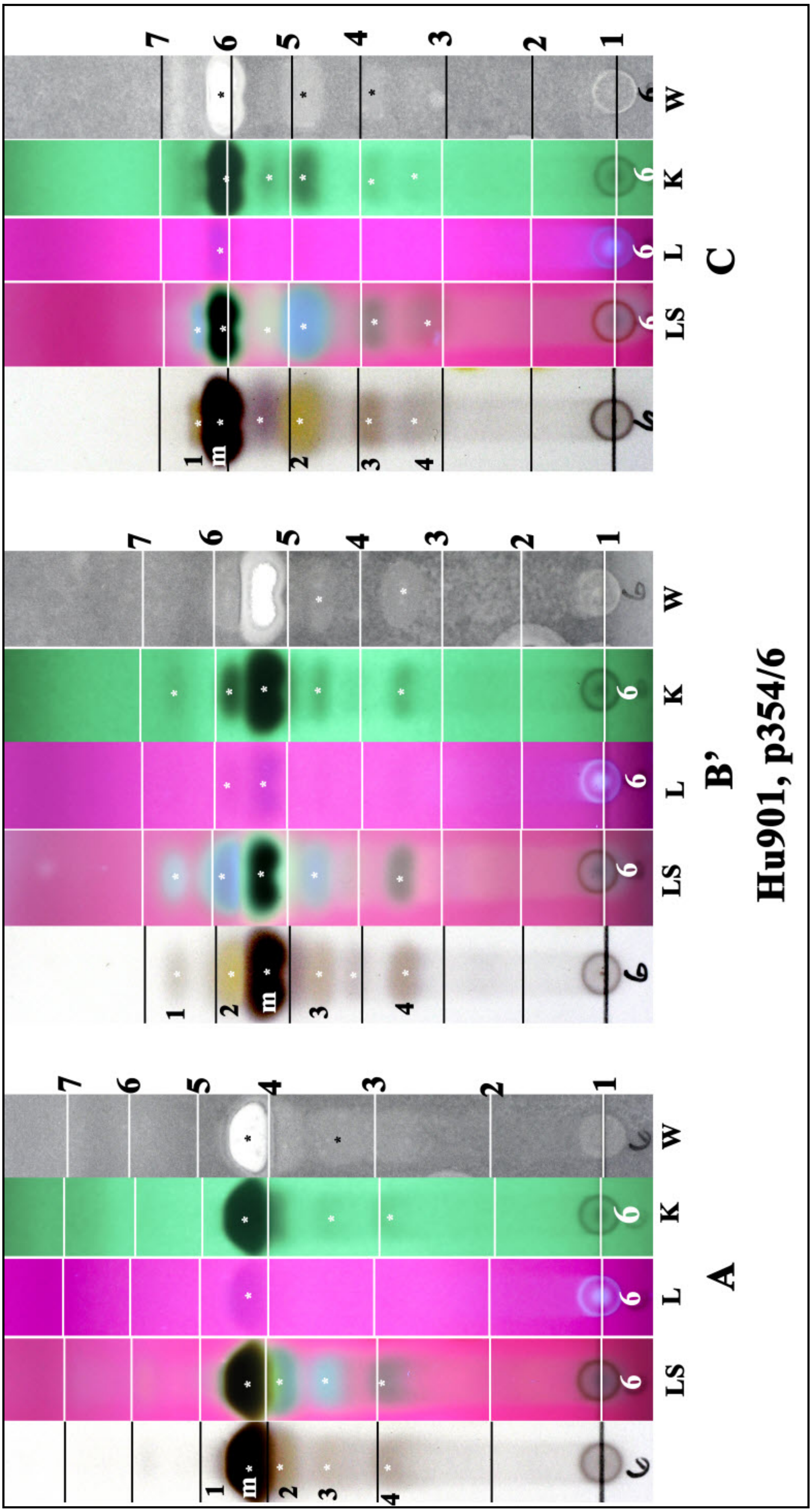
norlobaridone



us: usnic acid, **no: norlobaridone**, lo: loxodin

Xanthoparmelia furcata, [19144], Australia, South Australia, Mount Lofty Ranges, Borthwick road, 6.5 km east of Tungkillo.

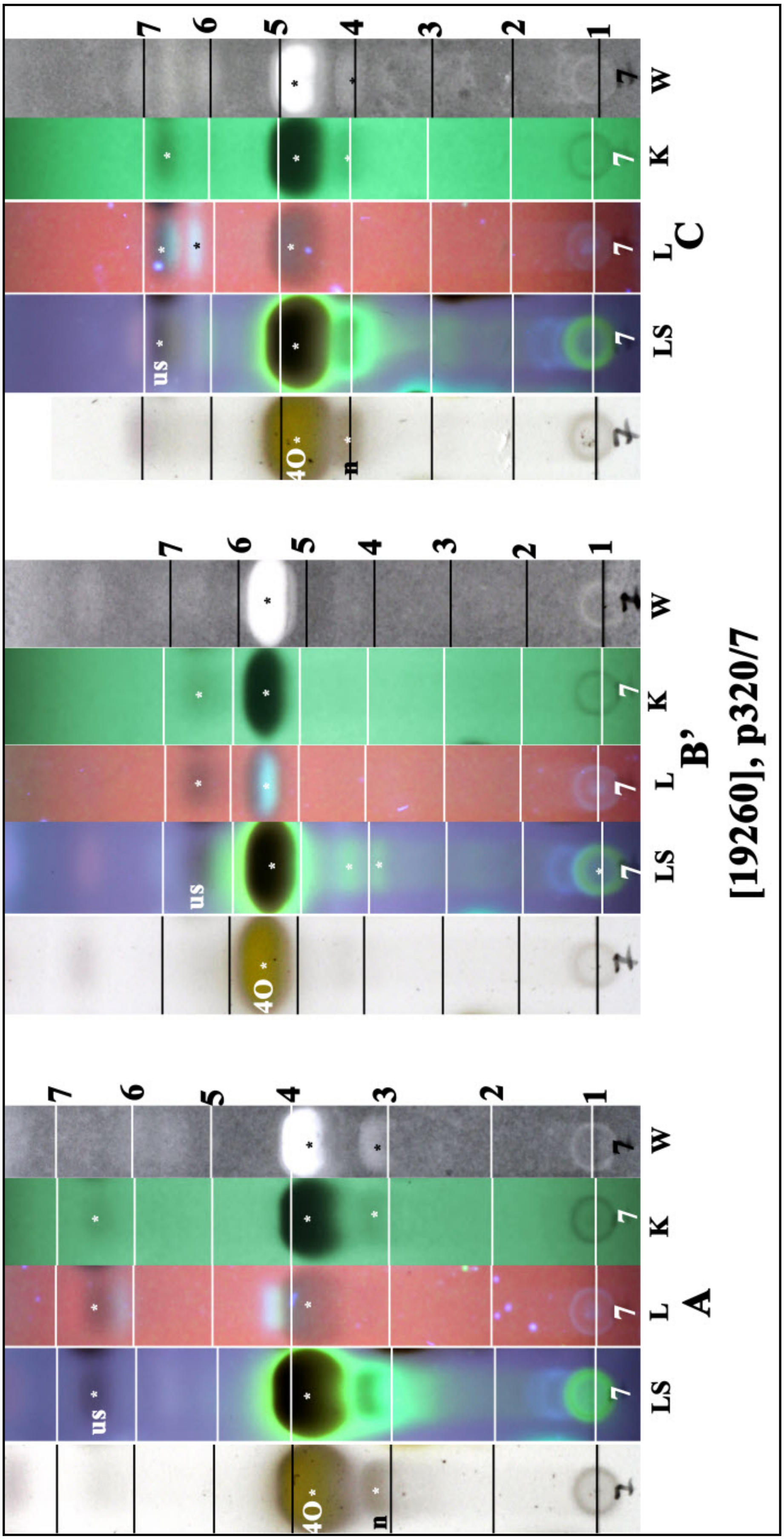
normiriquidic acid



m: miriquidic acid, **4: normiriquidic acid**, 1,2,3: unknown, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 901: miriquidic acid. Botanisches Museum Berlin-Dahlem

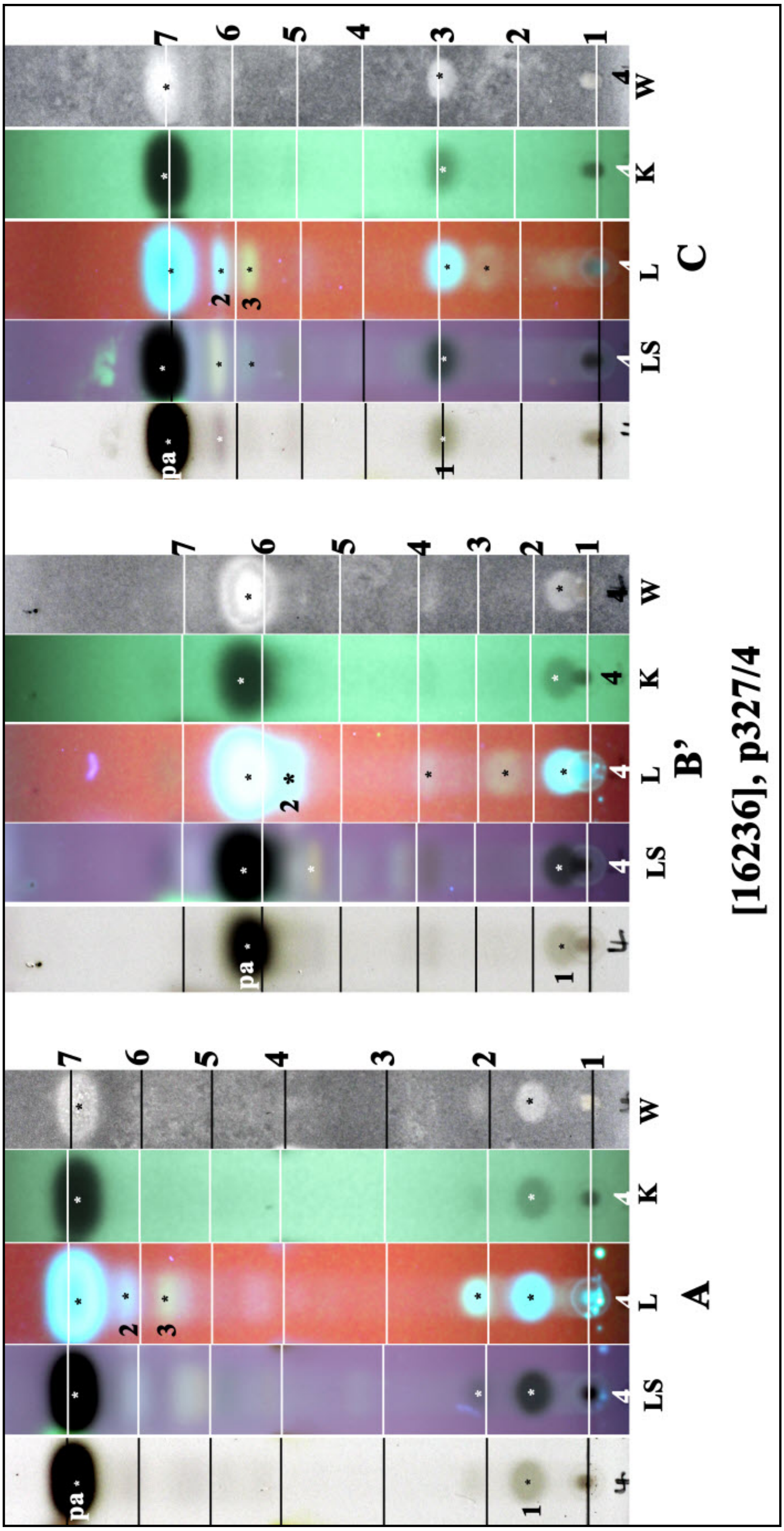
norobtusatic acid



us: usnic acid, 4O: 4-*O*-demethylbarbatic acid, **n: norobtusatic acid**

Relicina demethylbarbatica, [19260], Australia, Queensland, Conway State Forest, 18 km east-north-east of Proserpine, 20°21' S, 148°45' E, 180 m.

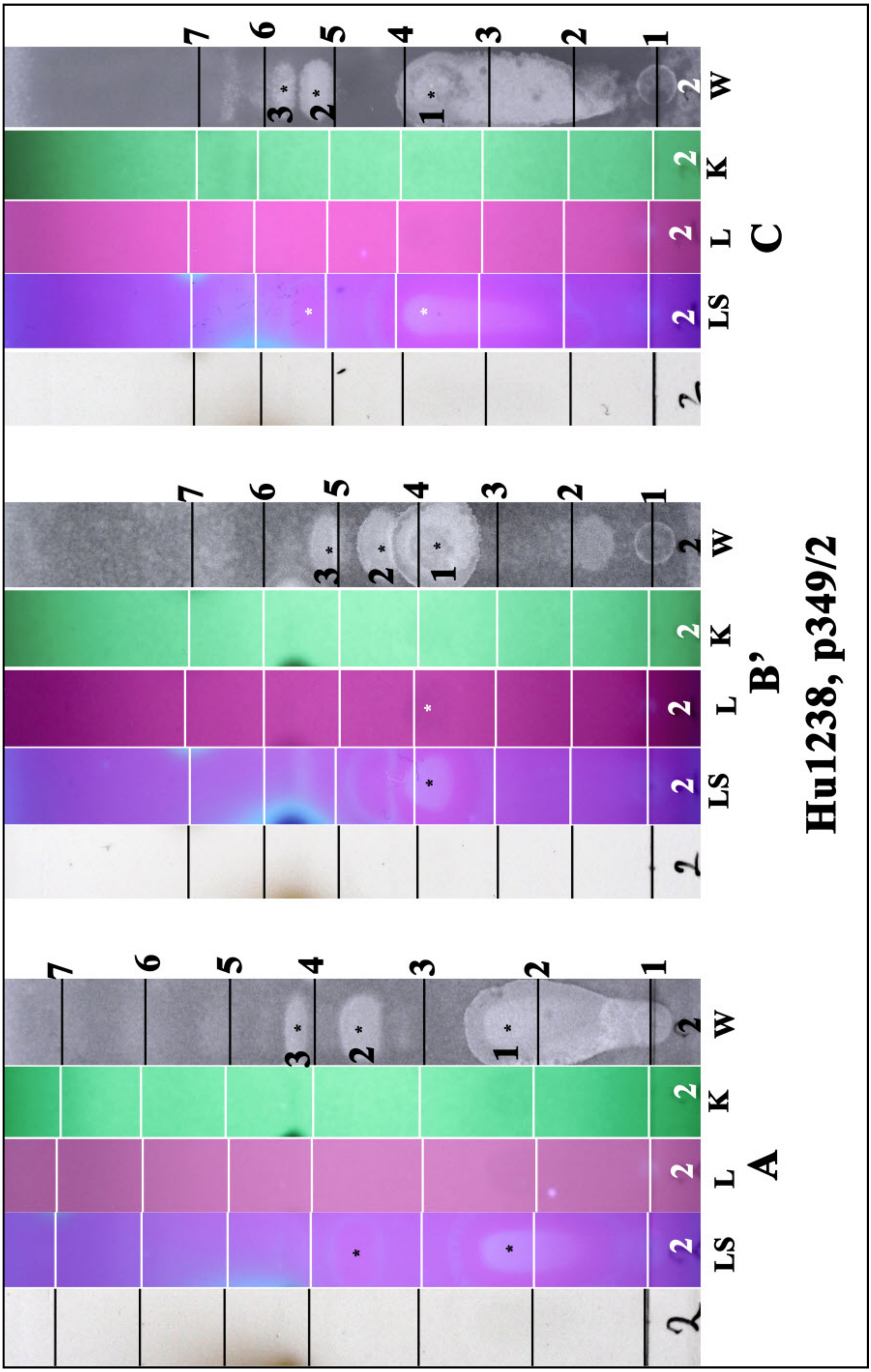
norpannarin



pa: pannarin, **1: norpannarin**, 2: dechloropannarin, 3: unknown

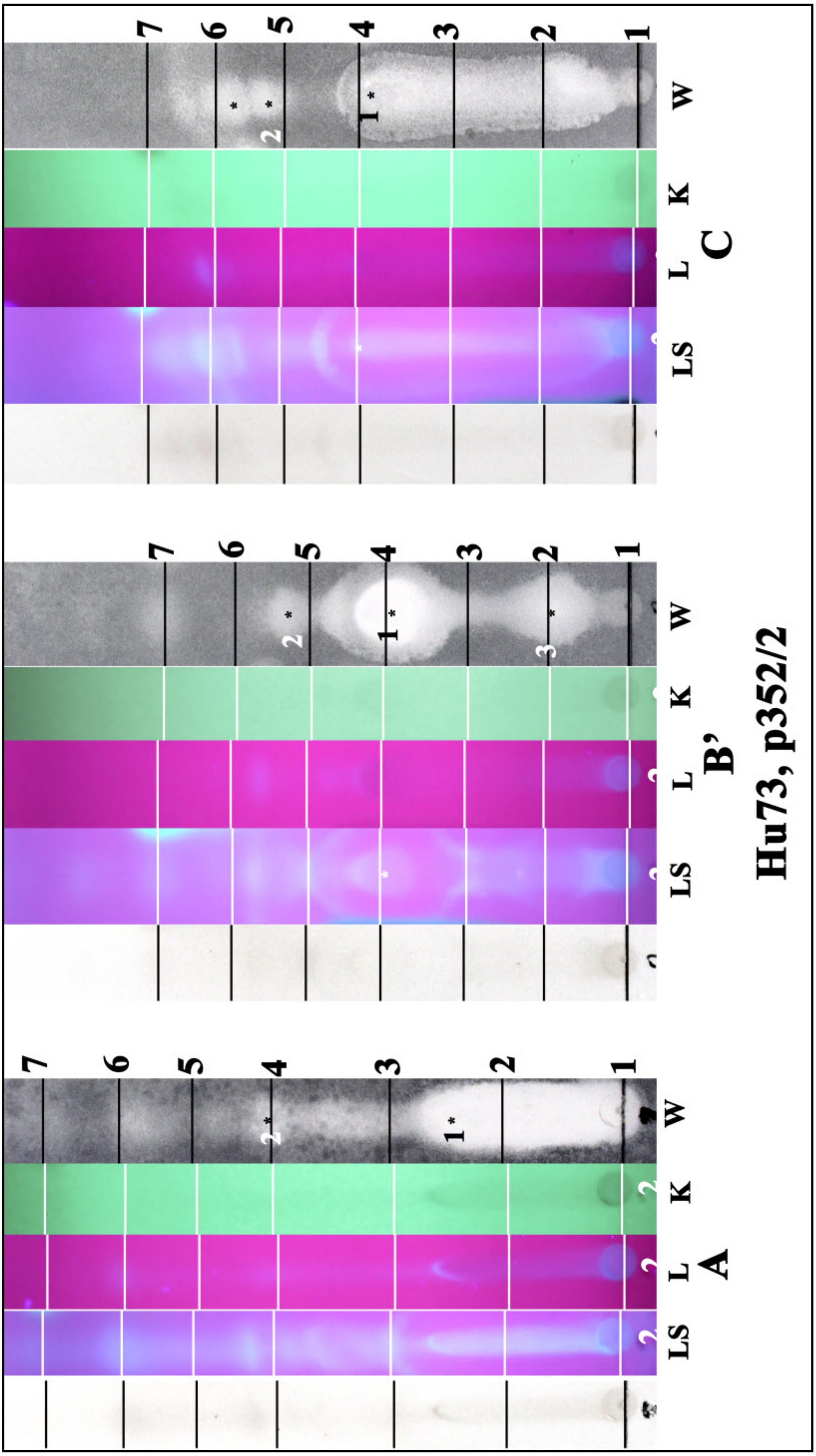
Pannaria fulvescens, [16236], Australia, New South Wales, between Bermagui and Tathra, trail from Aragunnu Beach to Mimosa Rocks, 36.585° S, 150.056° E, 10 m, growing on bark. Leg. F. Schumm & E. Stocker-Wörgötter, 12.11.2009.

norrangiformic acid



S. Huneck's collection of lichen substances No 1238: norrangiformic acid. Botanisches Museum Berlin-Dahlem

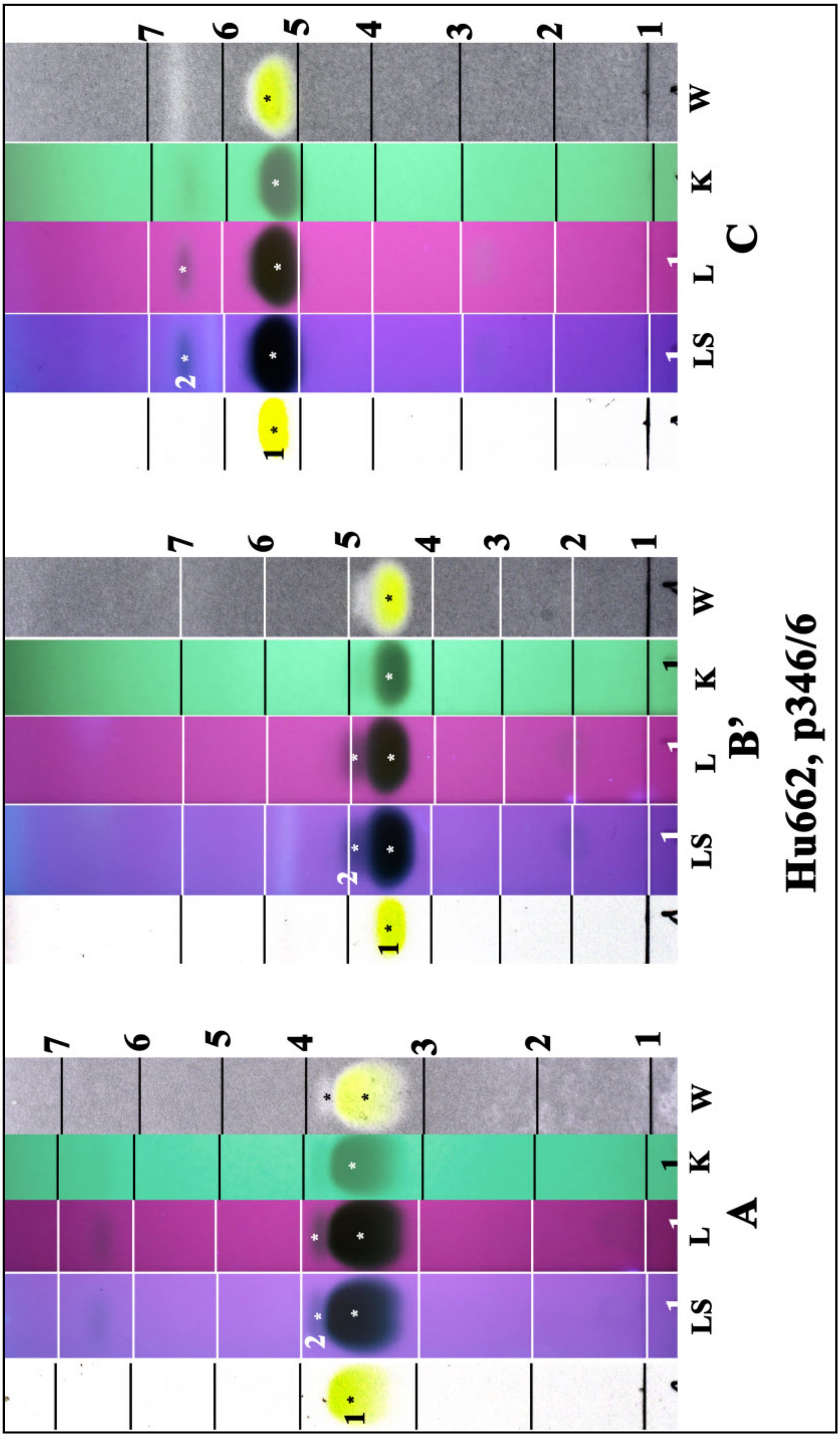
norrangiformic acid



1: **norrangiformic acid**, 2,3: unknown, conf. J.A. Elix

S. Huneck's collection of lichen substances No 073: norrangiformic acid. Botanisches Museum Berlin-Dahlem

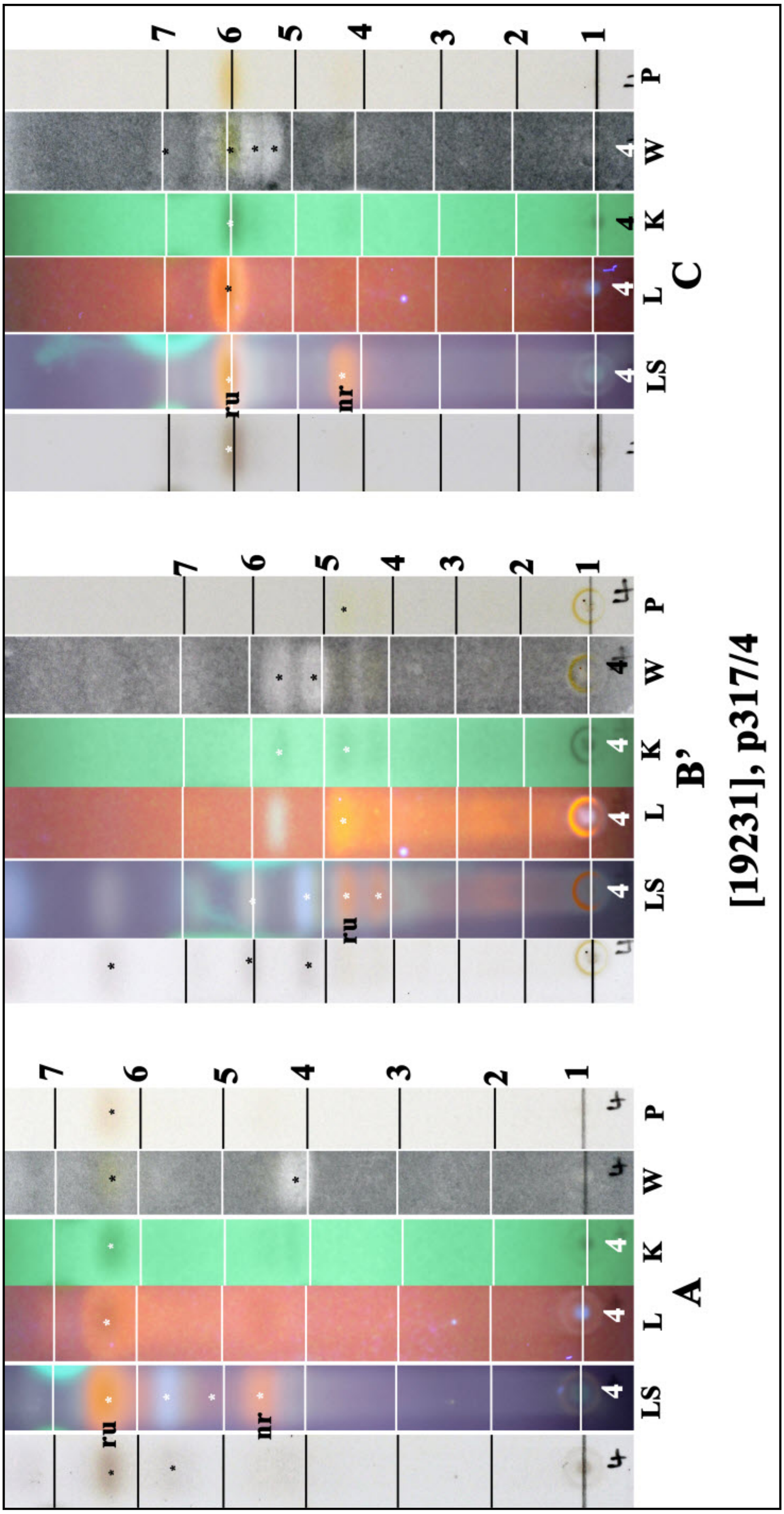
norrhizocarpic acid



1: norrhizocarpic acid, 2: unknown

S. Huneck's collection of lichen substances No 662: norrhizocarpic acid, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

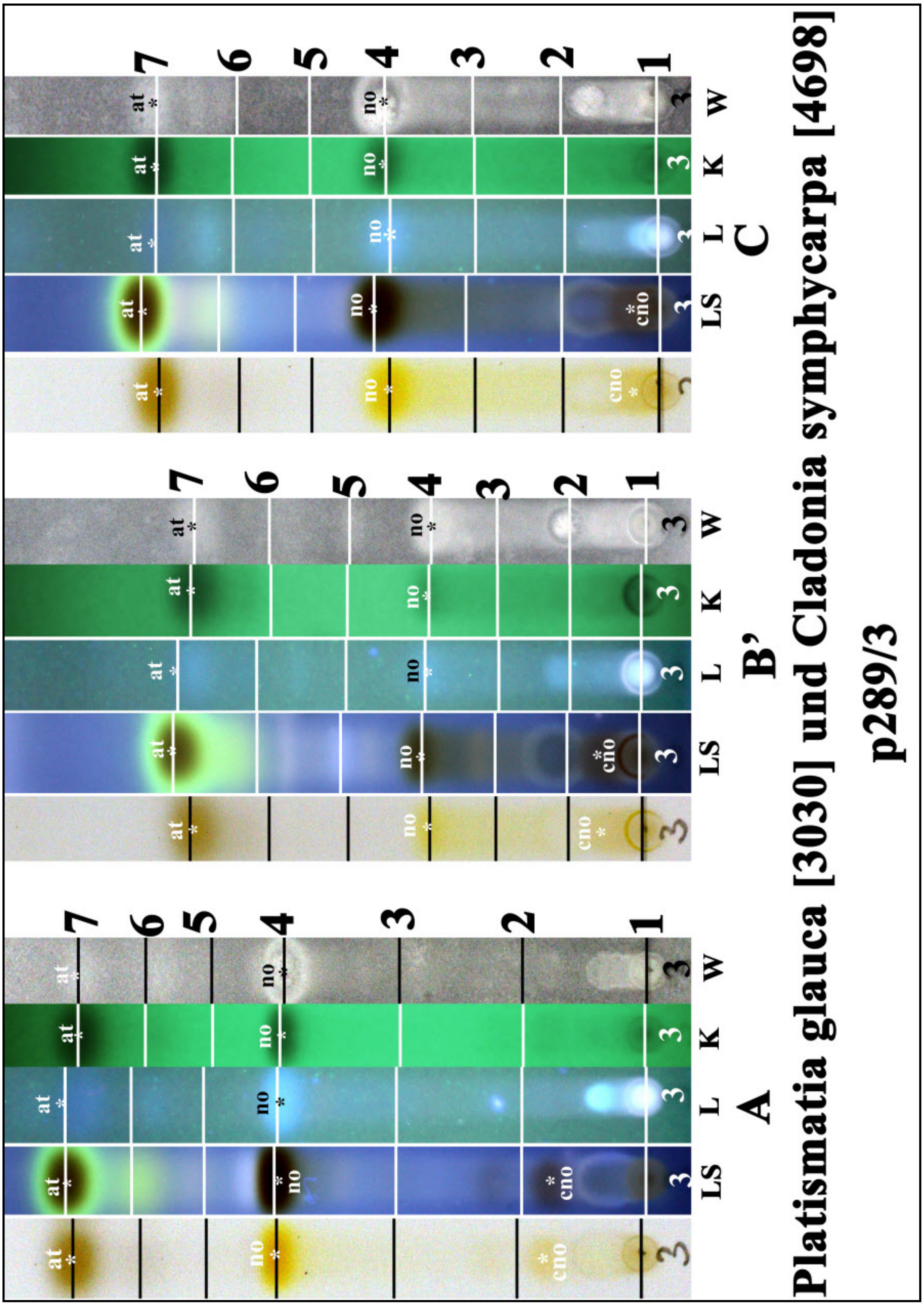
norrussulone



ru: russulone, nr: norrussulone

Ramboldia laeta, [19231], Australia, New South Wales, Koszciusko National Park, Johnnies Plain, 1 km east of Charlottes Pass, 36°25' S, 148°21' E, 1750 m.

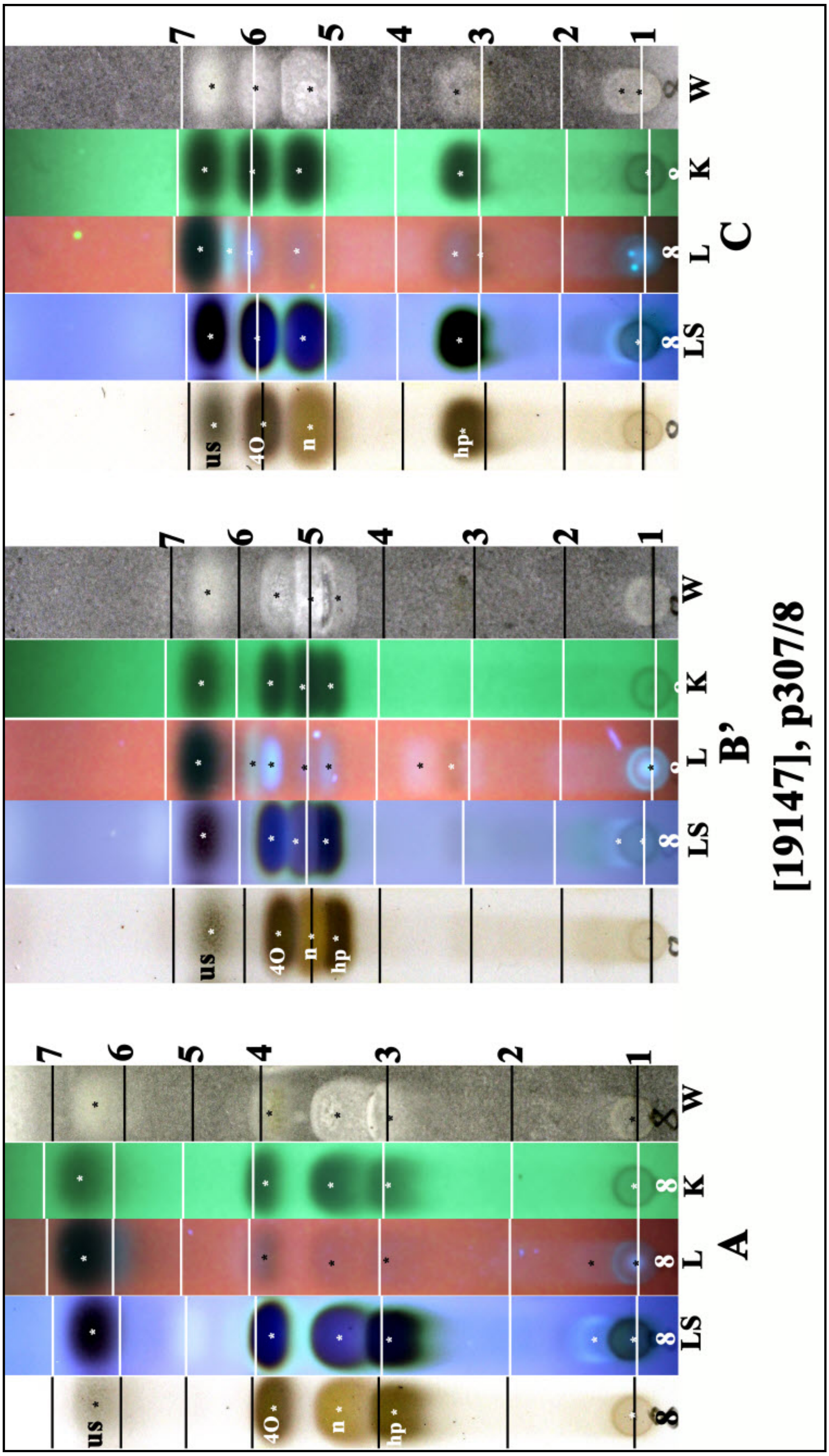
norstictic acid



at: atranorin, no: norstictic acid, cno: connorstictic acid

Gemisch aus ***Platismatia glauca*** [3030] und ***Cladonia symphycarpa*** [4698]

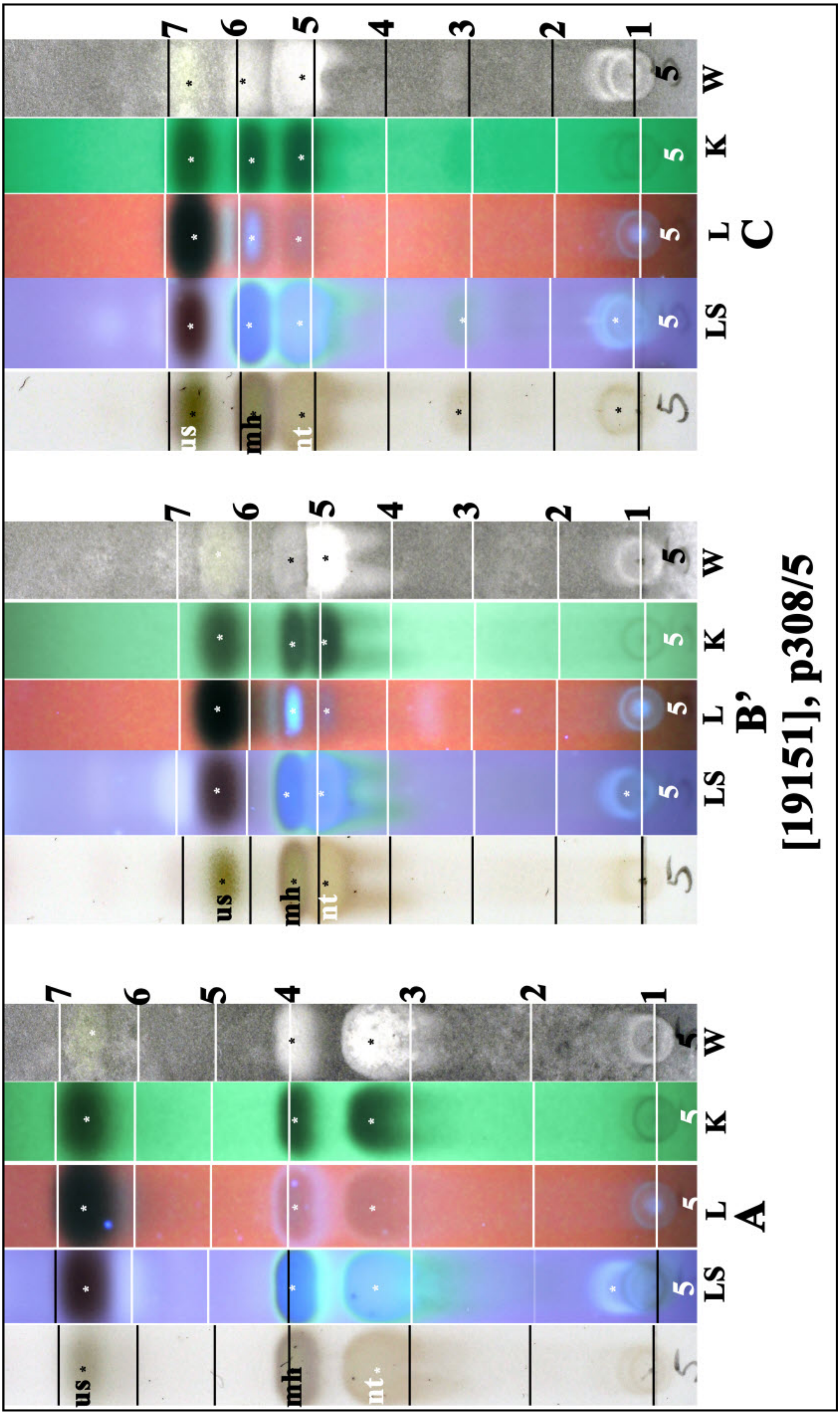
notatic acid



us: usnic acid, 4O: 4-O-methylhypoprotocetrariuc acid (3,8/5,5/6), **n: notatic acid** (3,3/5/5,3), hp: hypoprotocetraric acid (2,9/4,6/3,25)

Xanthoparmelia hypoprotocetrarica, [19147], Australia, Australian Capital Territory, 4.5 km south of Tharwa, 35°34' S, 149°04' E, 670 m, growing on exposed granite rocks in open pasture land. This collection is obviously a mix of ***Xanthoparmelia notata*** and ***Xanthoparmelia hypoprotocetrarica***.

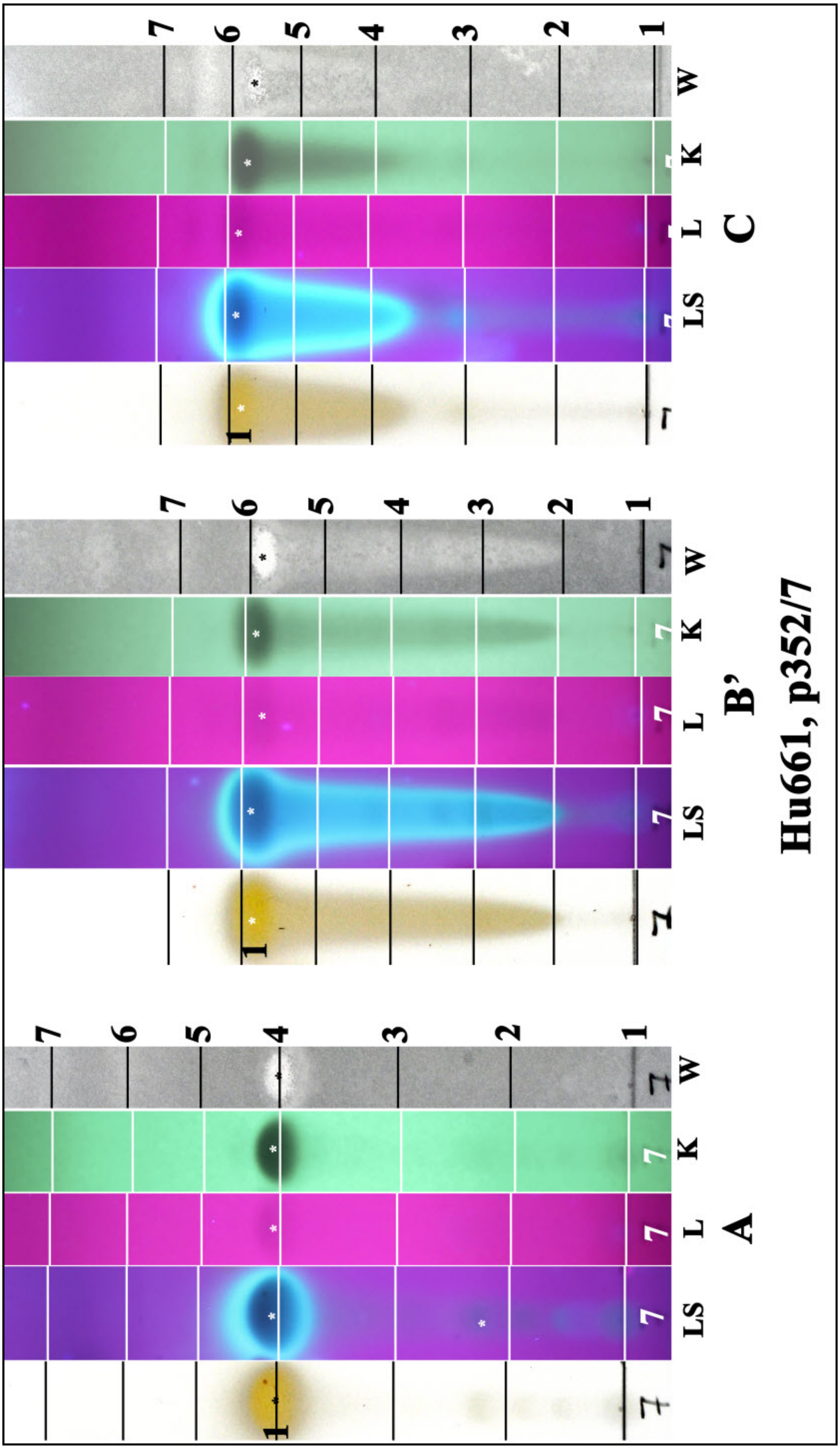
notatic acid



us: usnic acid, **nt: notatic acid** (3.33|4.98|5.18), mh: 4-*O*-methylhypoprotocetraric acid (3.96|5.41|5.88)

Xanthoparmelia notata, [19151], Australia, South Australia, Mt. Lofty Ranges, Borthwick road, 6.5 km east of Tungkillo, 34°50' S, 139°09'E, 470 m, growing on exposed granite rocks in pasture land.

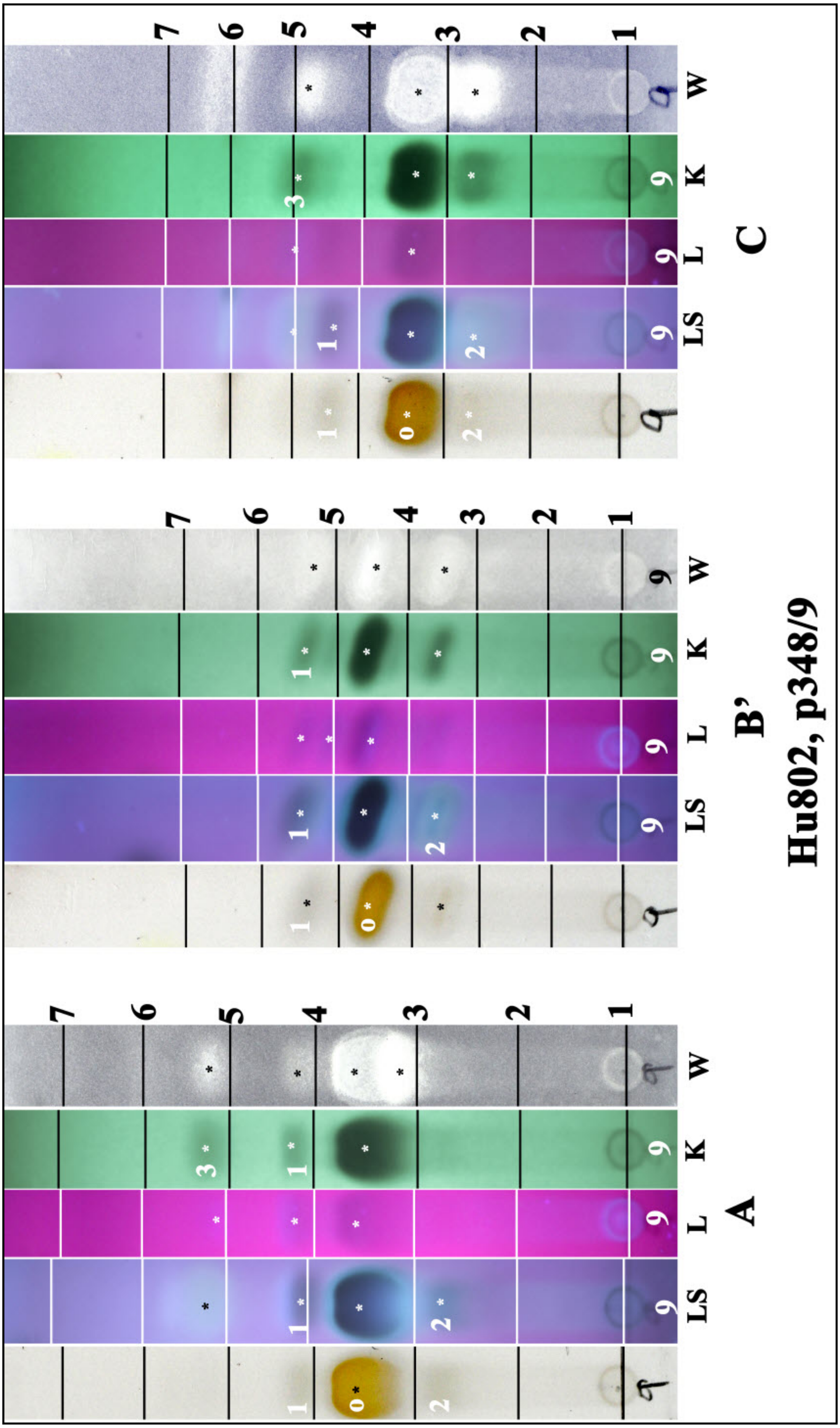
obtusatic acid



1: obtusatic acid, conf. J.A. Elix

Huneck's collection of lichen substances No 661: obtusatic acid
Botanisches Museum Berlin-Dahlem

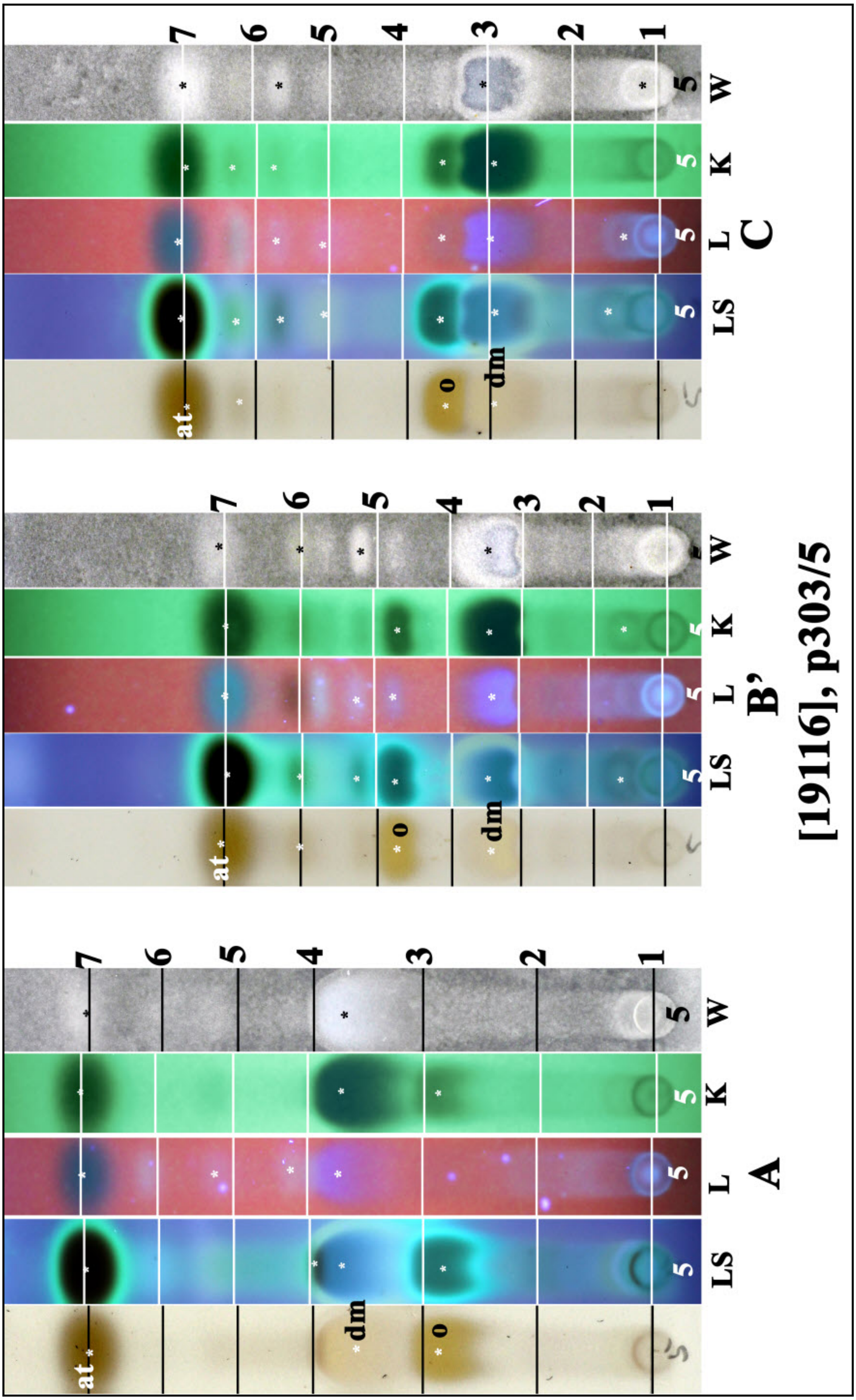
olivetoric acid



o: olivetoric acid, 1,2,3: unknown, conf. J.A. Elix

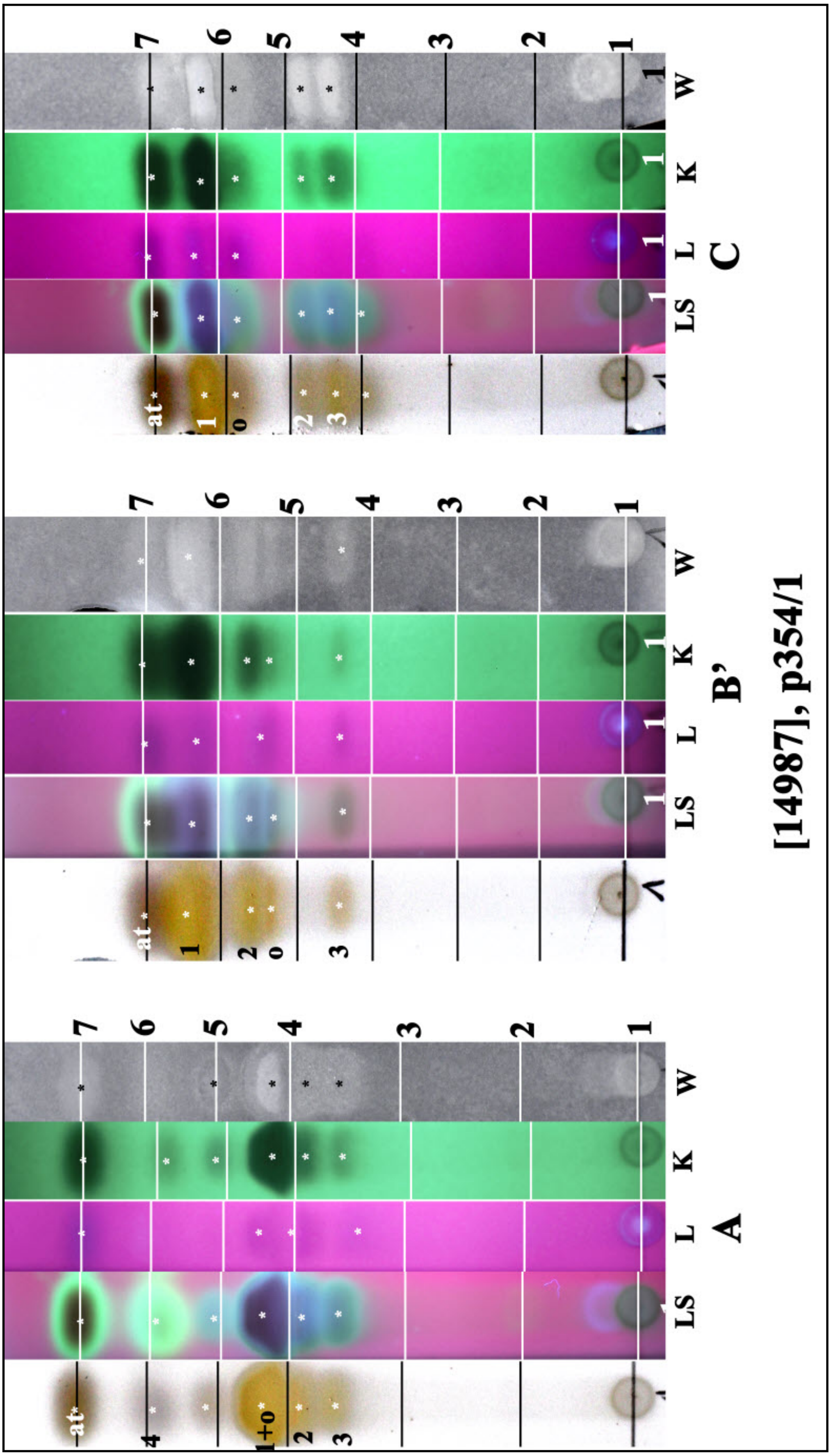
S. Huneck's collection of lichen substances No 802: olivetoric acid
Botanisches Museum Berlin-Dahlem

olivetoric acid



Parmotrema demethylmicrophyllinicum, [19116], Australia, Queensland, Mt. Windsor Tableland, 37 km north-west of Mossman.

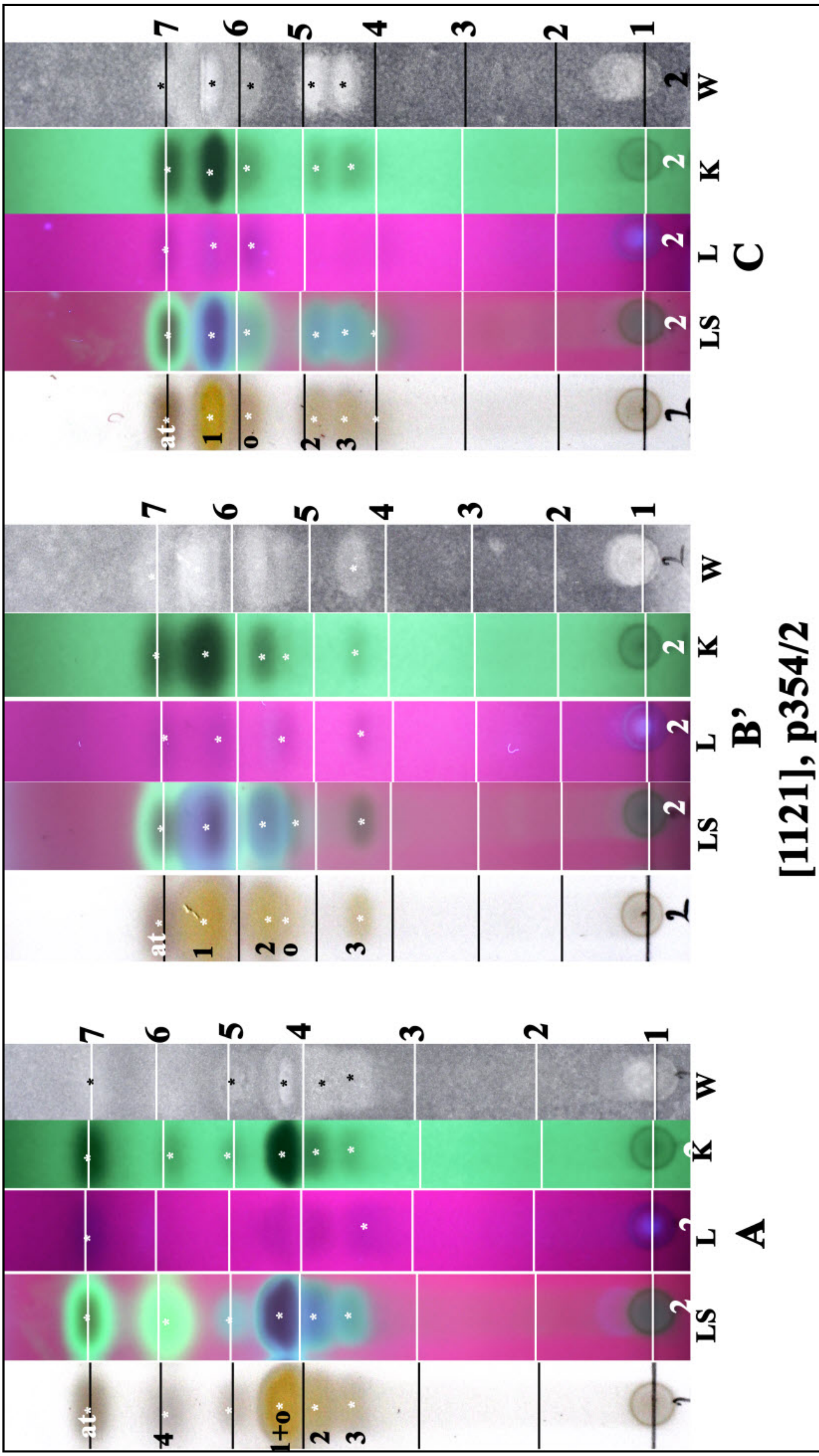
olivetoric acid



at: atranorin, 1: perlatolic acid, 2: anziaic acid, **3: olivetoric acid**, 4:superlatolic acid, o: 4-*O*-methylolivetoric acid, conf. J.A. Elix.

Cetrelia cetrarioides, [14987], Germany, Bayern, Kreis Traunstein, Chiemgauer Alpen, Hochfelln, Weg von der Mittelstation der Seilbahn (47,76966°N, 12,57550°E, 1090 m) zur Talstation, an Fagus bei 950 m. Leg. et det. F. Schumm 27.08.2009.

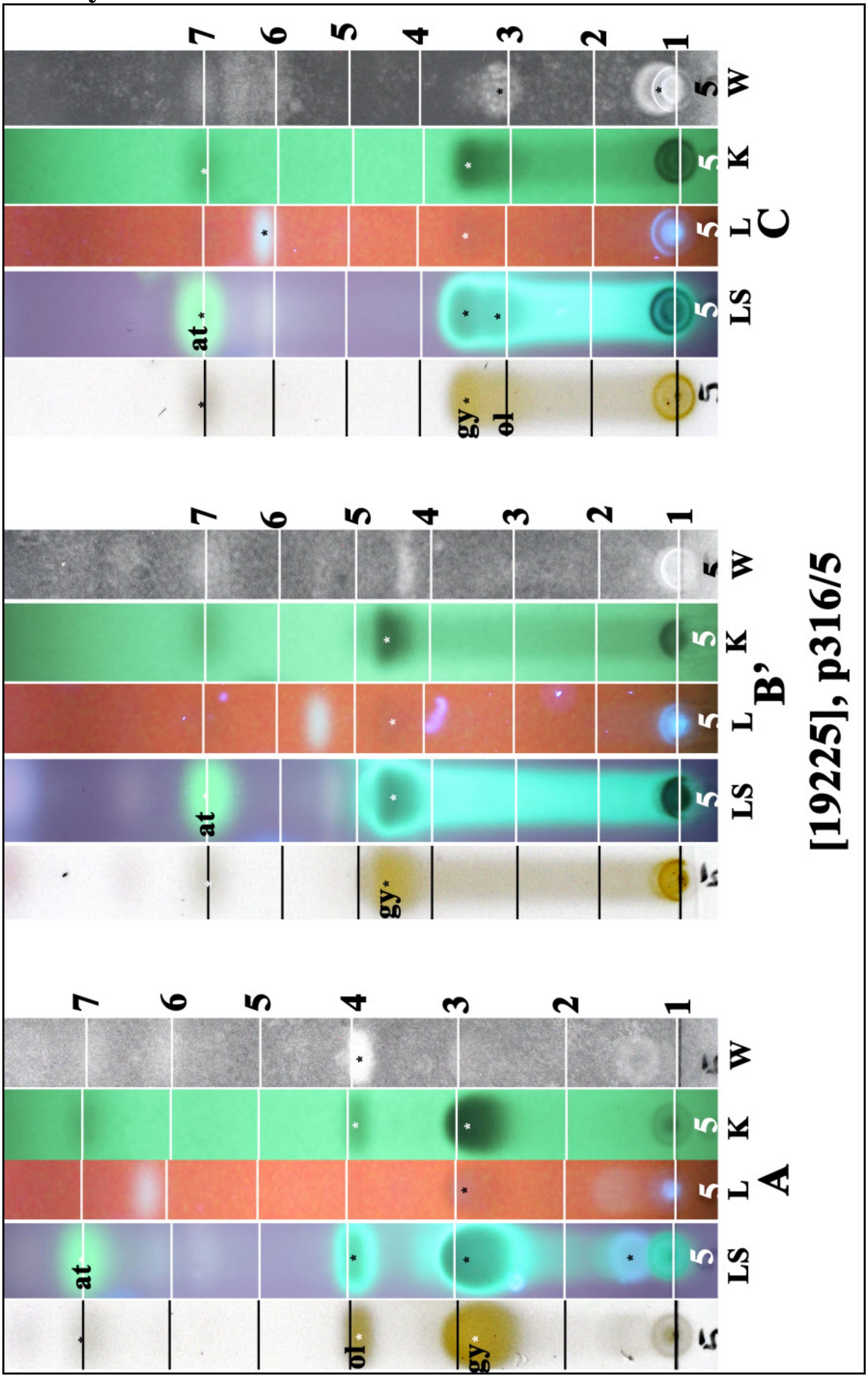
olivetoric acid



at: atranorin, 1: perlatolic acid, 2 anziaic acid, 3: **olivetoric acid**, 4: superlatolic acid, o: 4-*O*-methylolivetoric acid, conf J.A. Elix

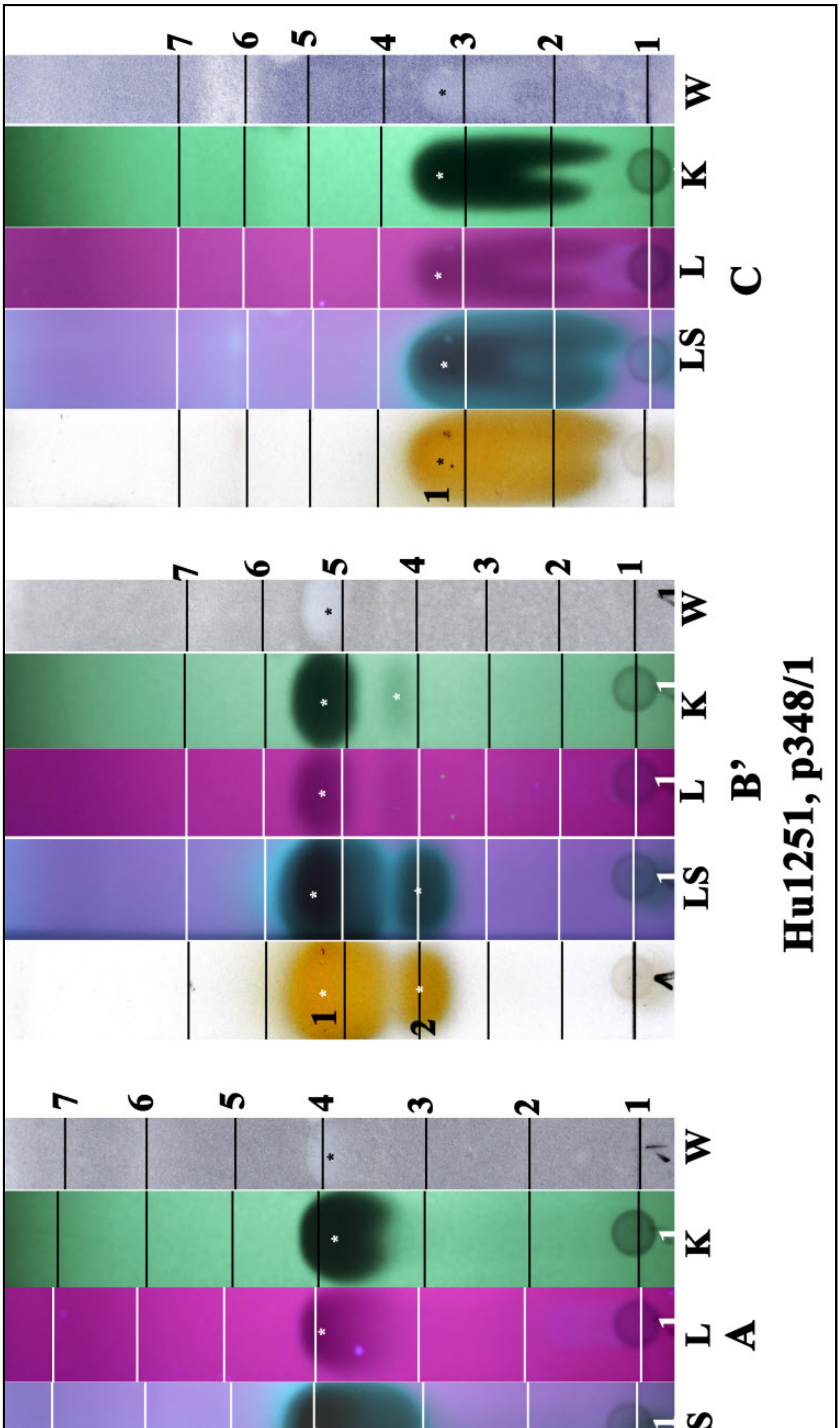
Cetrelia cetrarioides, [1121], Germany, Baden-Württemberg, Stuttgart, Rotwildpark, an Fagus, TK: 7220/2. Leg. et det. E. Putzler 17.05.1950.

orcenyl lecanorate



Punctelia borreri, [19225], Australia, New South Wales, 36 km east-south-east of Cooma along the Countegany-Kybean road, 36°19' S, 149°30 'E, 1000 m.

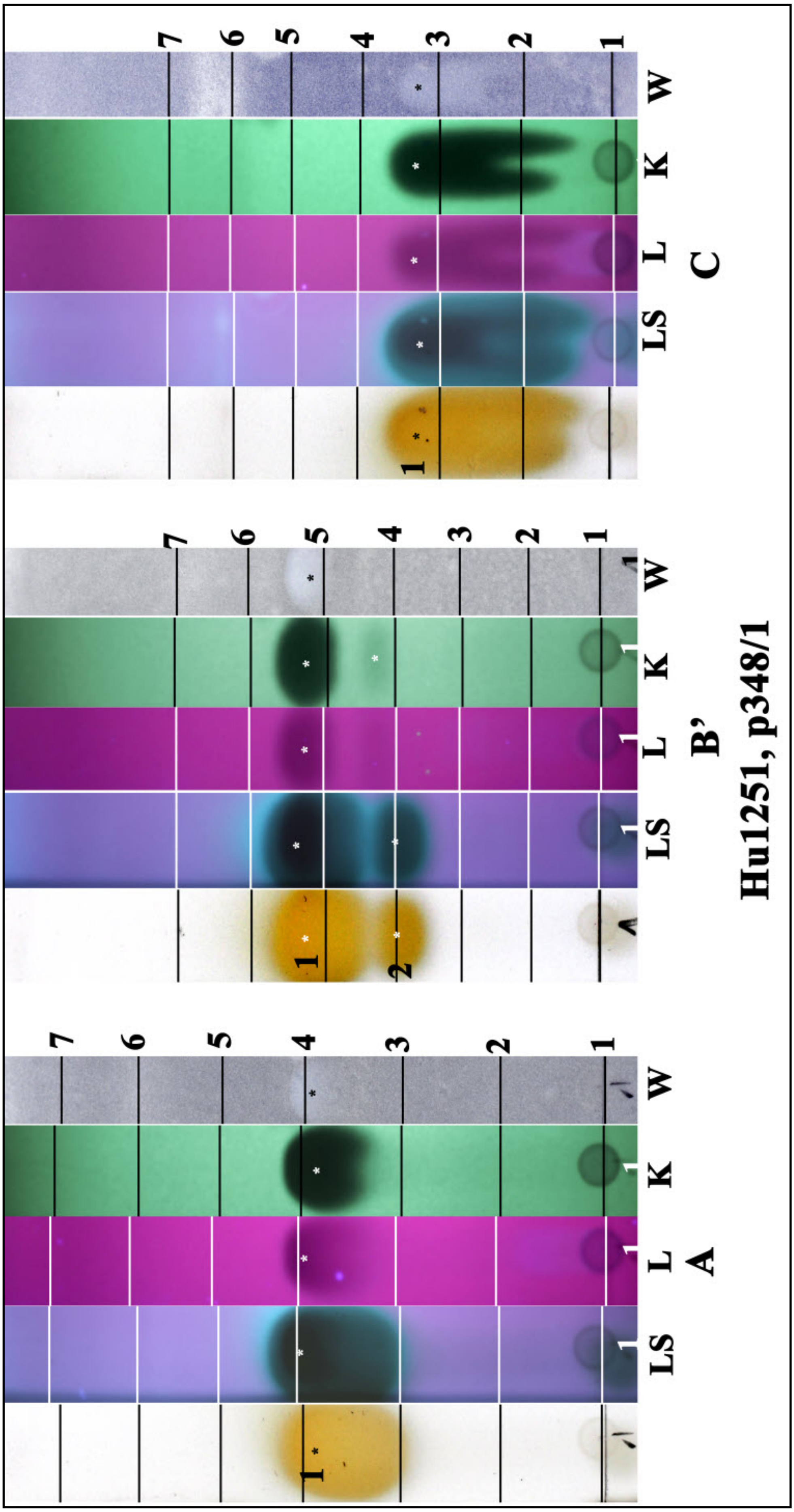
orcinol



1: orsellinic acid, **2: orcinol**, conf. J.A. Elix

S. Huneck's collection of lichen substances No 1251: orsellinic acid
Botanisches Museum Berlin-Dahlem

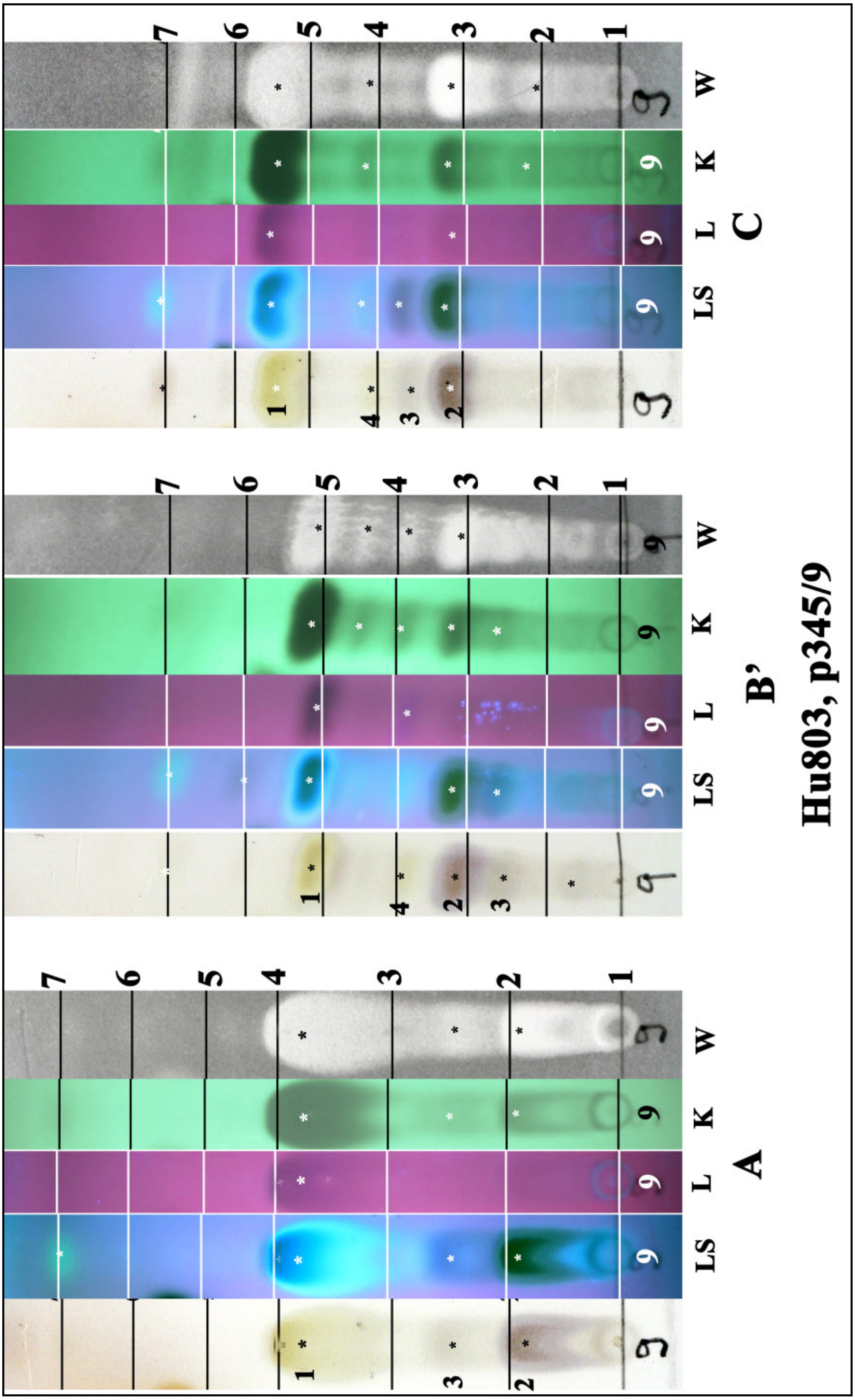
orsellinic acid



1: orsellinic acid, 2: orcinol, conf. J.A. Elix

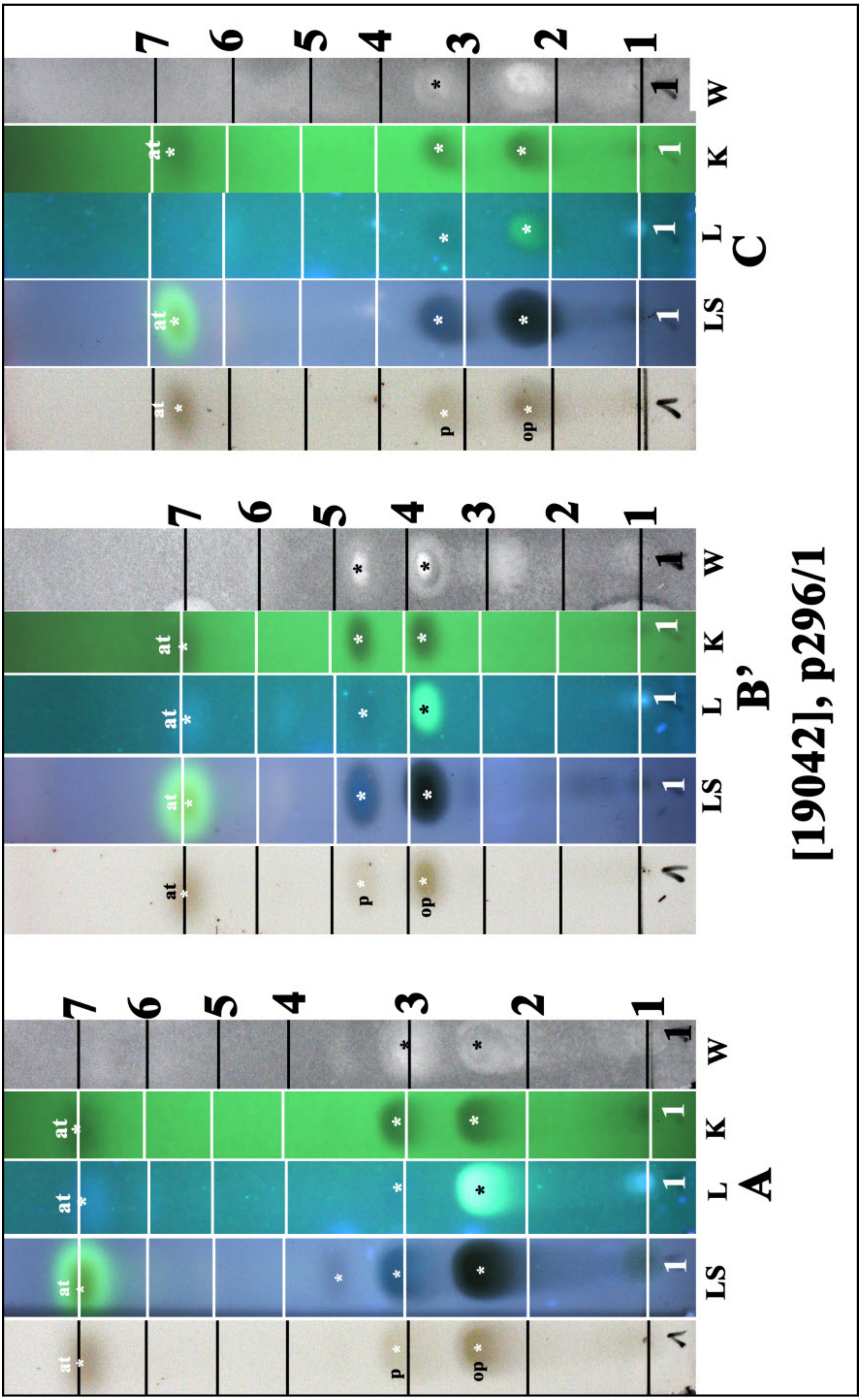
S. Huneck’s collection of lichen substances No 1251: orsellinic acid
Botanisches Museum Berlin-Dahlem

oxolobaric acid



S. Huneck’s collection of lichen substances No 803: lobaric acid
Botanisches Museum Berlin-Dahlem

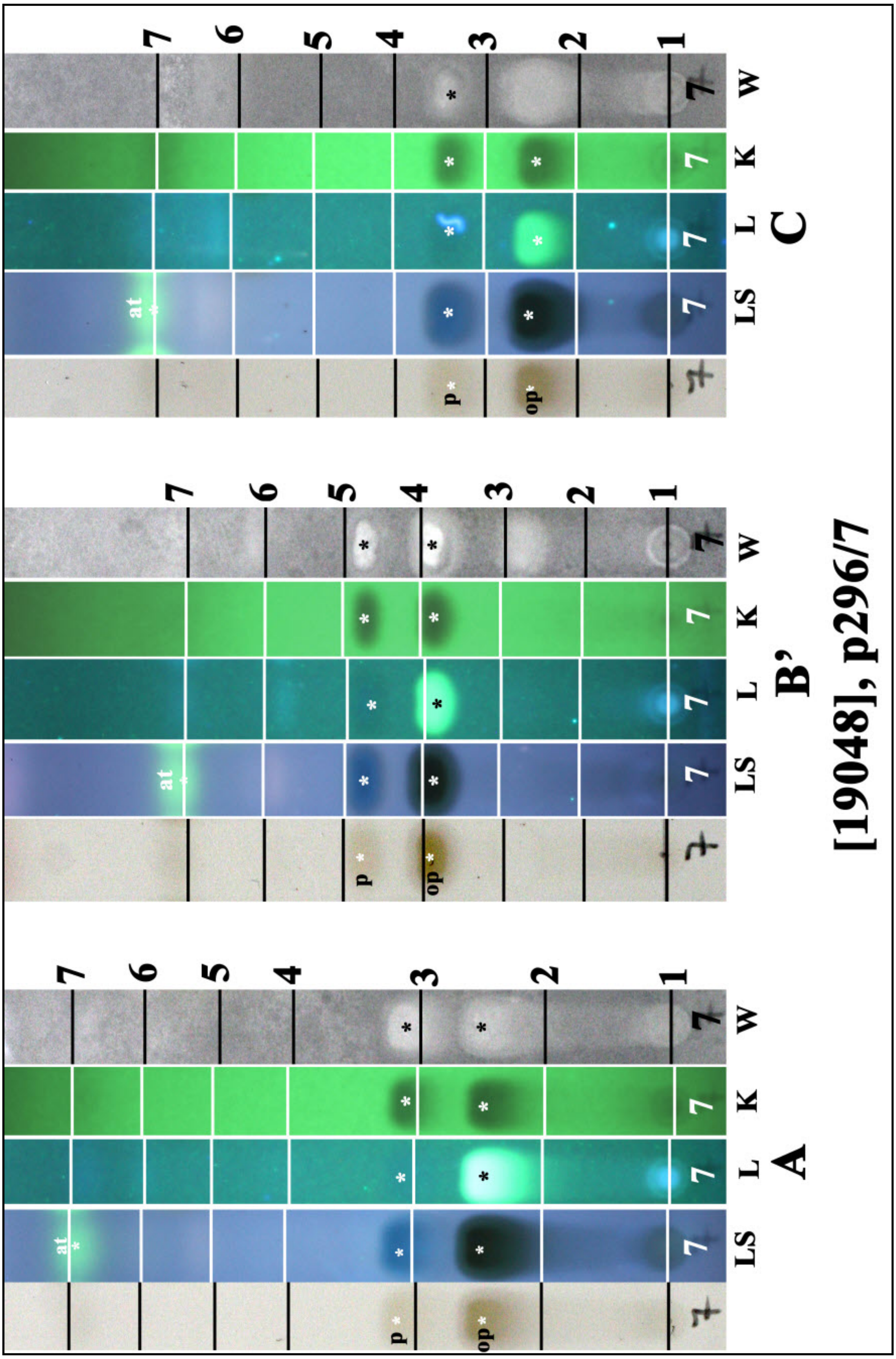
oxyphysodic acid



a: atranorin, p: physodic acid, op: oxyphysodic acid

Hypogymnia lugubris var. ***sublugubris,*** [19042], New Zealand, South Island, Canterbury, Porters Pass.

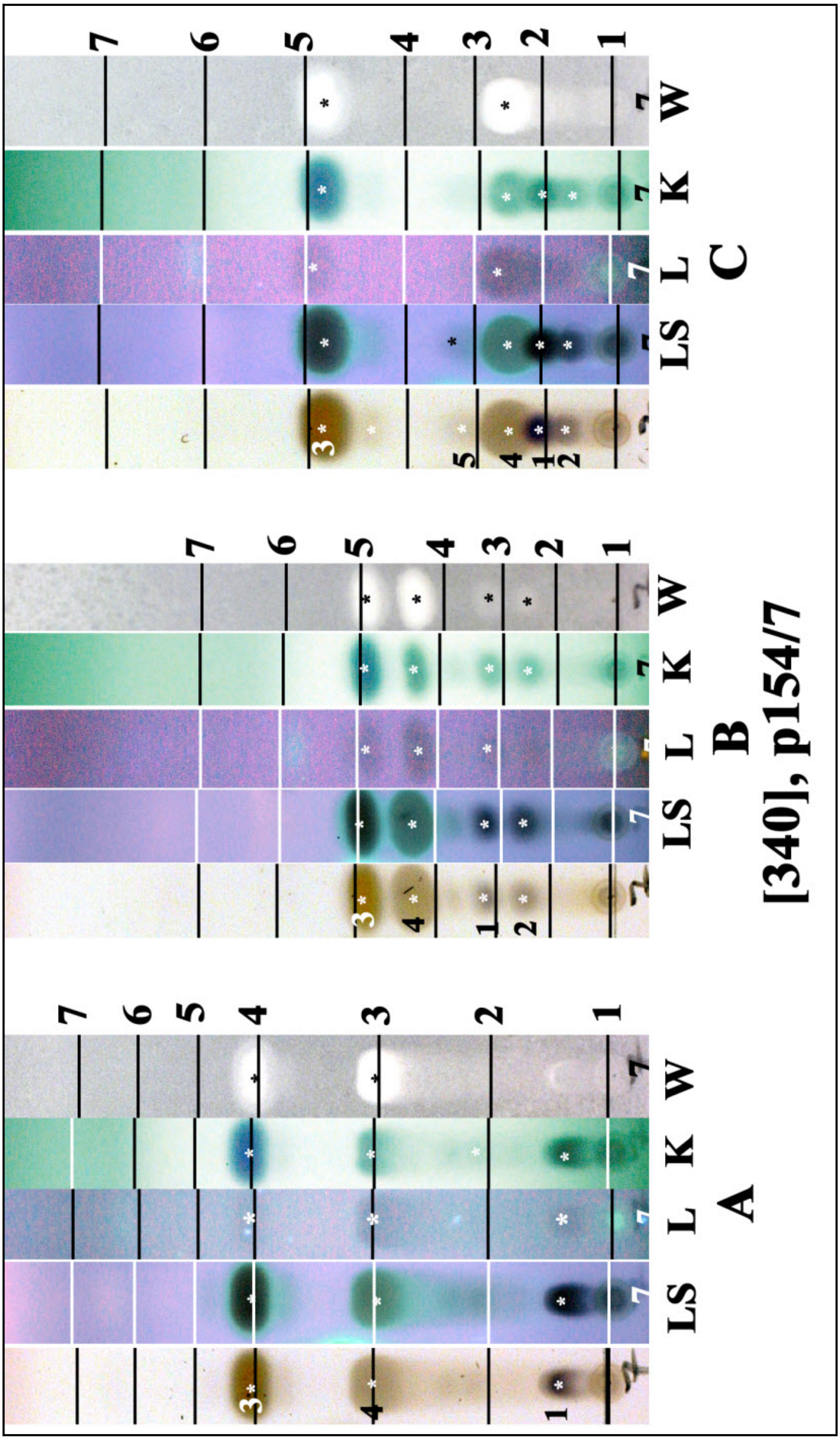
oxyphysodic acid



at: atranorin (trace), p: physodic acid, op: oxyphysodic acid

Hypogymnia turgidula [19048], New Zealand, South Island, Canterbury,

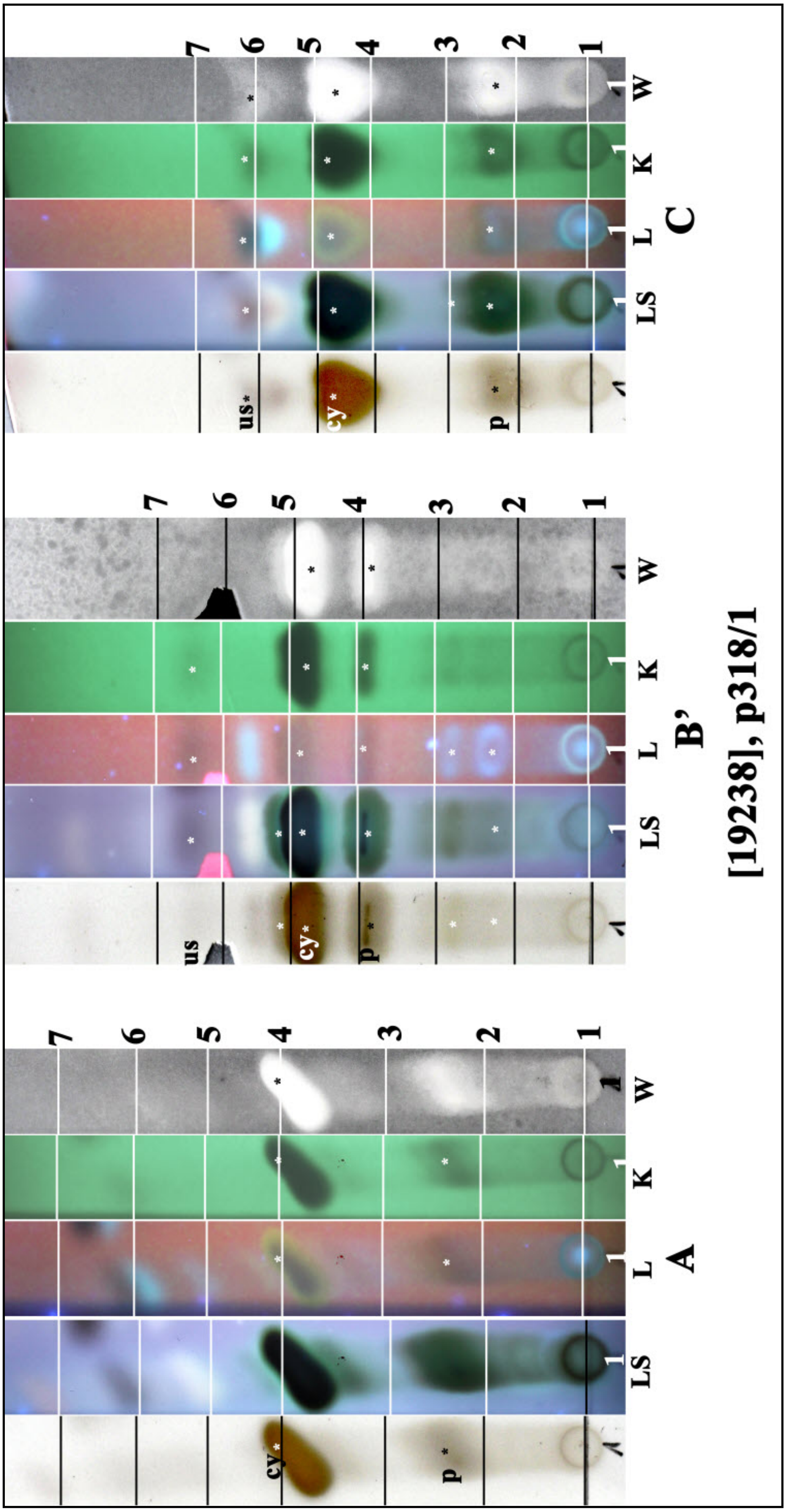
paludosic acid



1: fumarprotocetraric acid, 2: protocetraric acid, 3: cryptochlorophaeic acid, **4: paludosic acid**, 5: unknown, conf. J.A. Elix

Cladonia chlorophaea , [340], Germany, Baden-Württemberg, Schwarzwald, Mitteltal, auf einem Laubbaum über Moosen. Leg. Eisele 17.03.1947, det. J. Poelt

paludosic acid

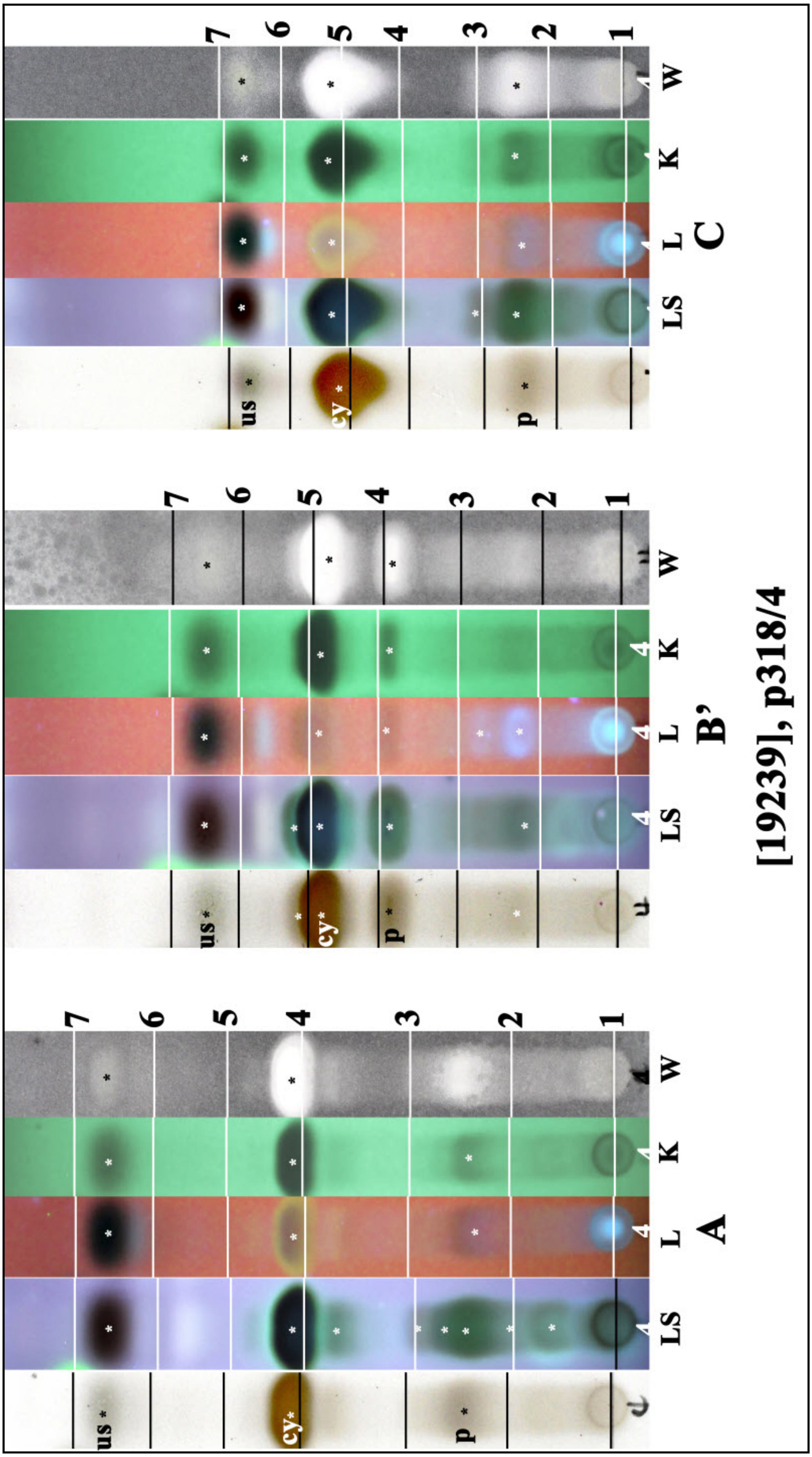


us: usnic acid, cy: cryptochlorophaeic acid, **p: paludosic acid**

rem: A, C with Rf marginal mistakes of the columns

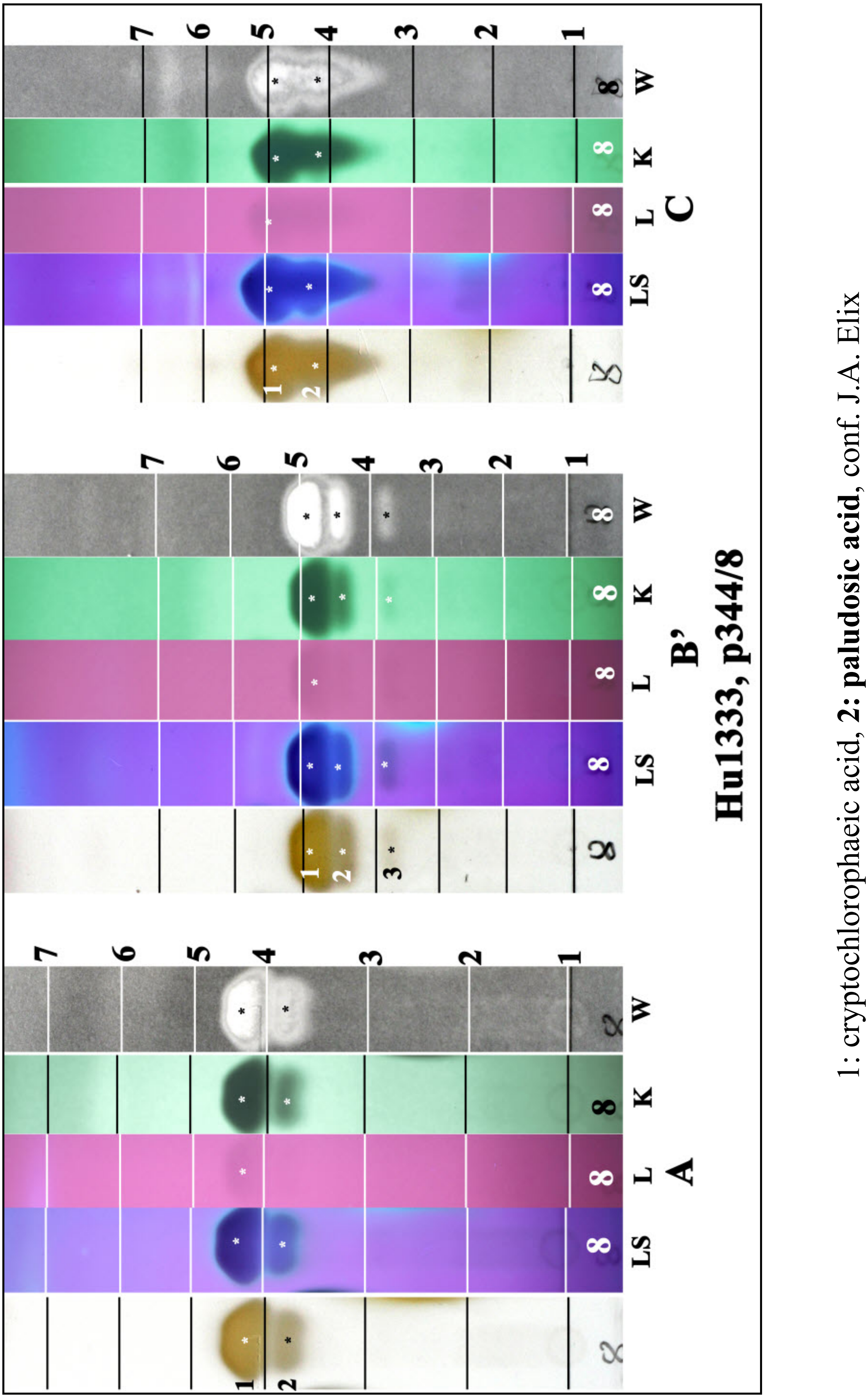
Ramalina confirmata, [19238], Australia, Queensland, Wilson Beach, 17 km south-east of Proserpine, 20°29' S, 148°43' E, 1 m.

paludosic acid



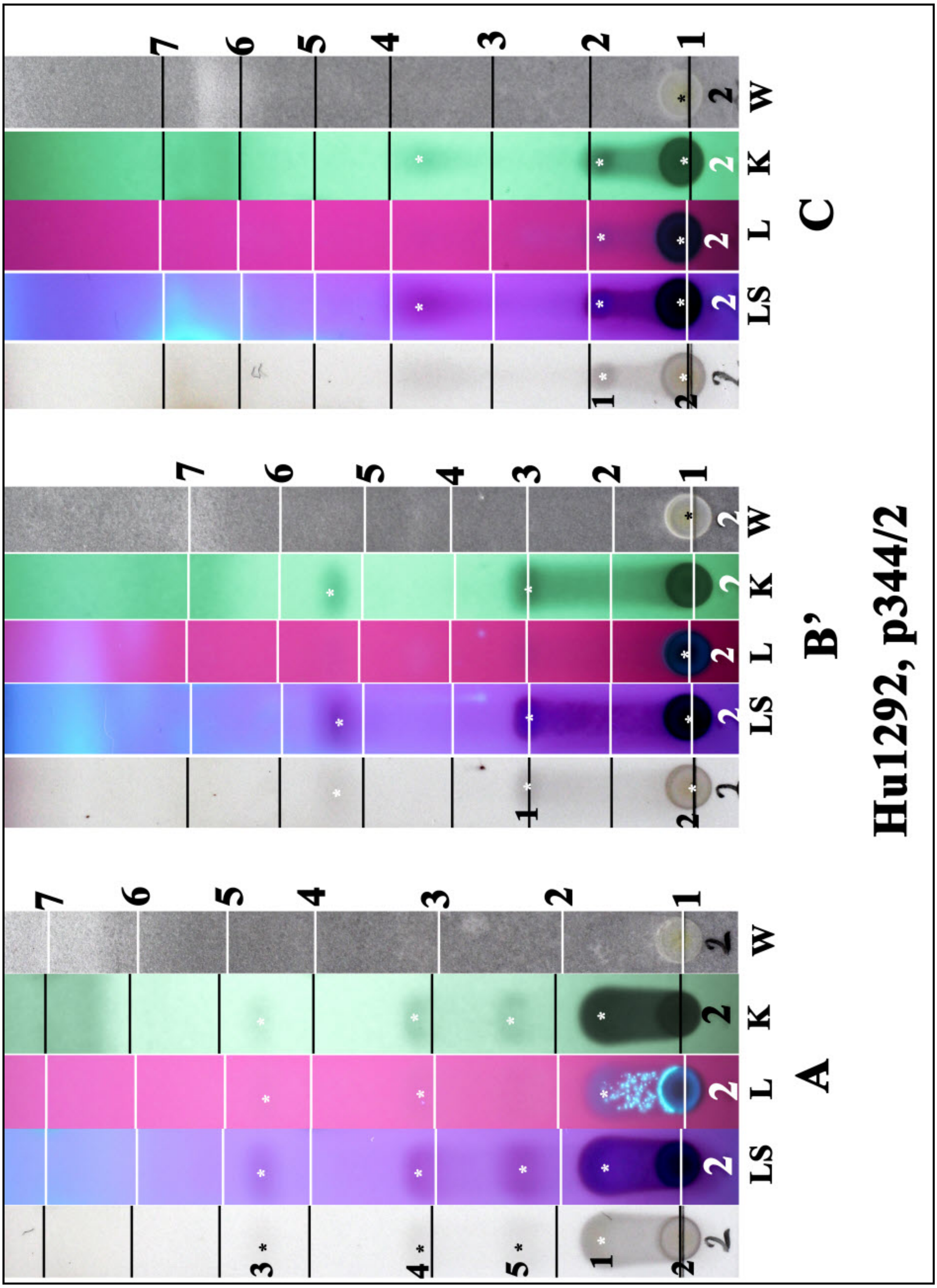
Ramalina confirmata, [19239], Australia, Queensland, Tin Can Inlet, Tin Can Bay, 25°54' S, 153°01' E, sea level.

paludosic acid



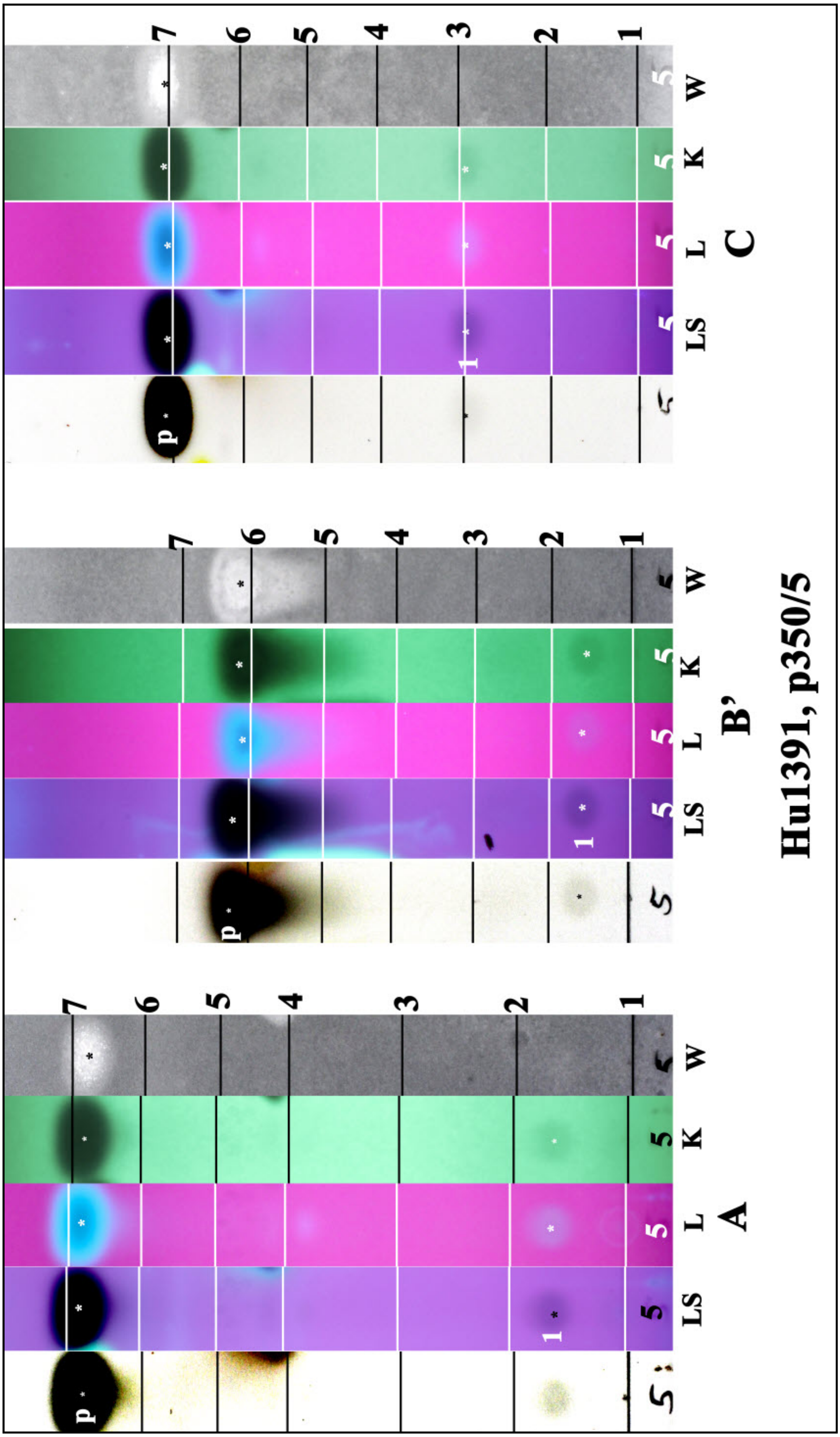
S. Huneck’s collection of lichen substances No 1333: cryptochlorophaeic acid. Botanisches Museum Berlin-Dahlem

pannaric acid



1: pannaric acid, 2,3,4,5: unknowns, conf. J.A. Elix
S. Huneck's collection of lichen substances No 1292: pannaric acid.
Botanisches Museum Berlin-Dahlem

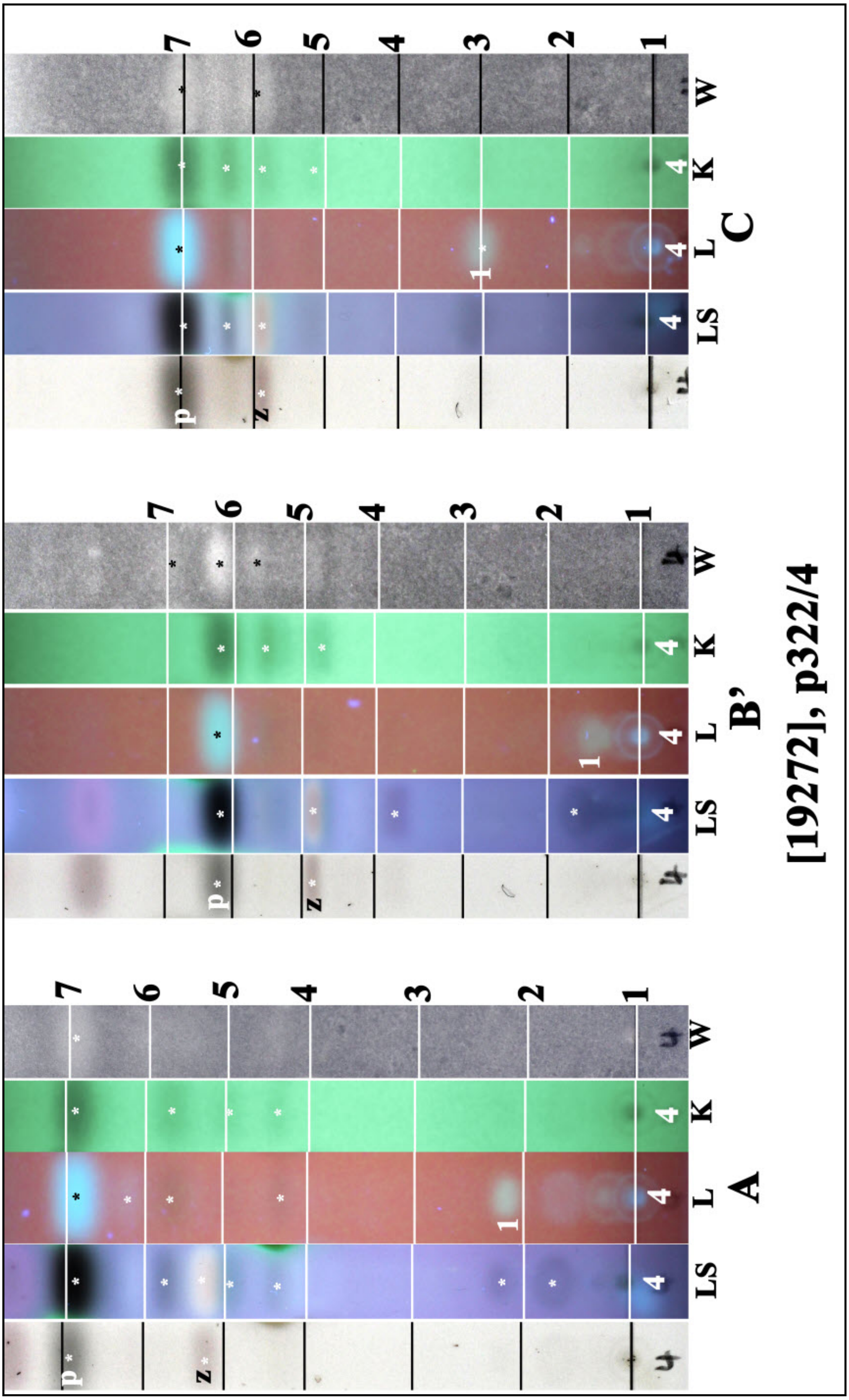
pannarin



p: pannarin, 1: unknown, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 1391: pannarin
Botanisches Museum Berlin-Dahlem

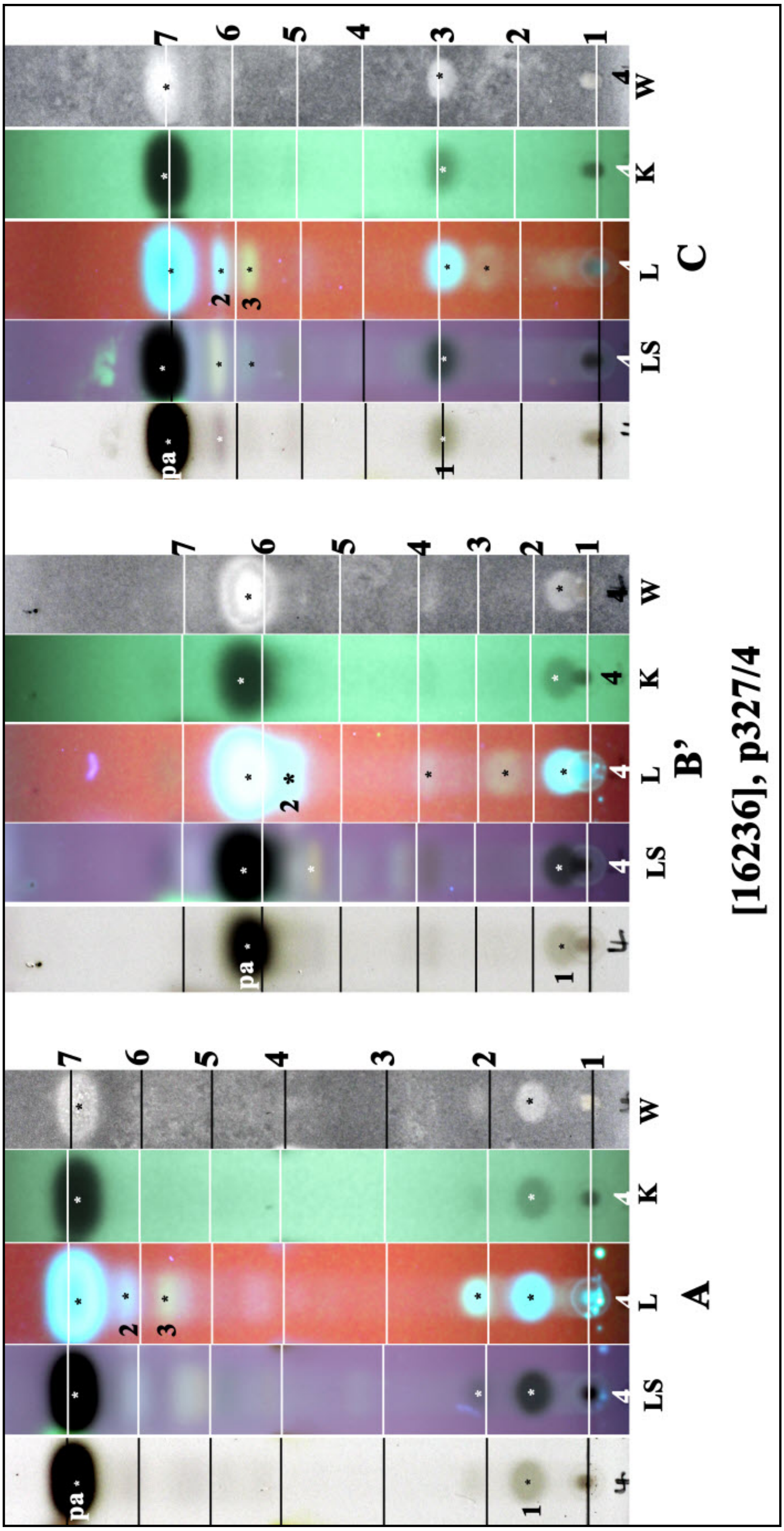
pannarin



p: pannarin, z: zeorin, 1: unknown

Sporopodium vezdeanum [19272], Australia, New South Wales, Yatteyattar, Currowar Creek, 35°16' S, 150°25' E, 30-60 m, growing on leaves in remnant rainforest.

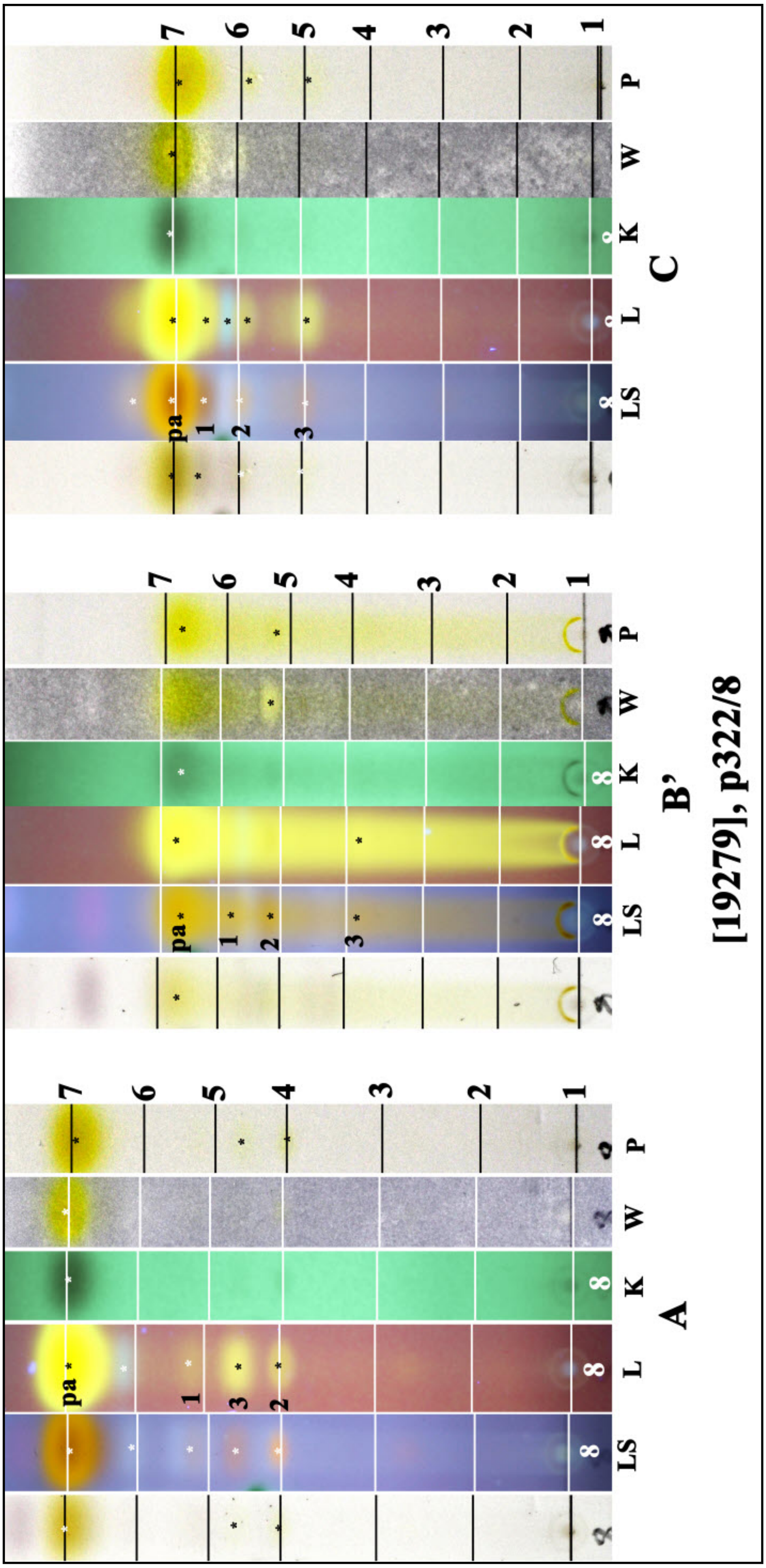
pannarin



pa: pannarin, 1: norpannarin, 2: dechloropannarin, 3: unknown

Pannaria fulvescens, [16236], Australia, New South Wales, between Bermagui and Tathra, trail from Aragunnu Beach to Mimosa Rocks, 36.585° S, 150.056° E, 10 m, growing on bark. Leg. F. Schumm & E. Stocker-Wörgötter, 12.11.2009.

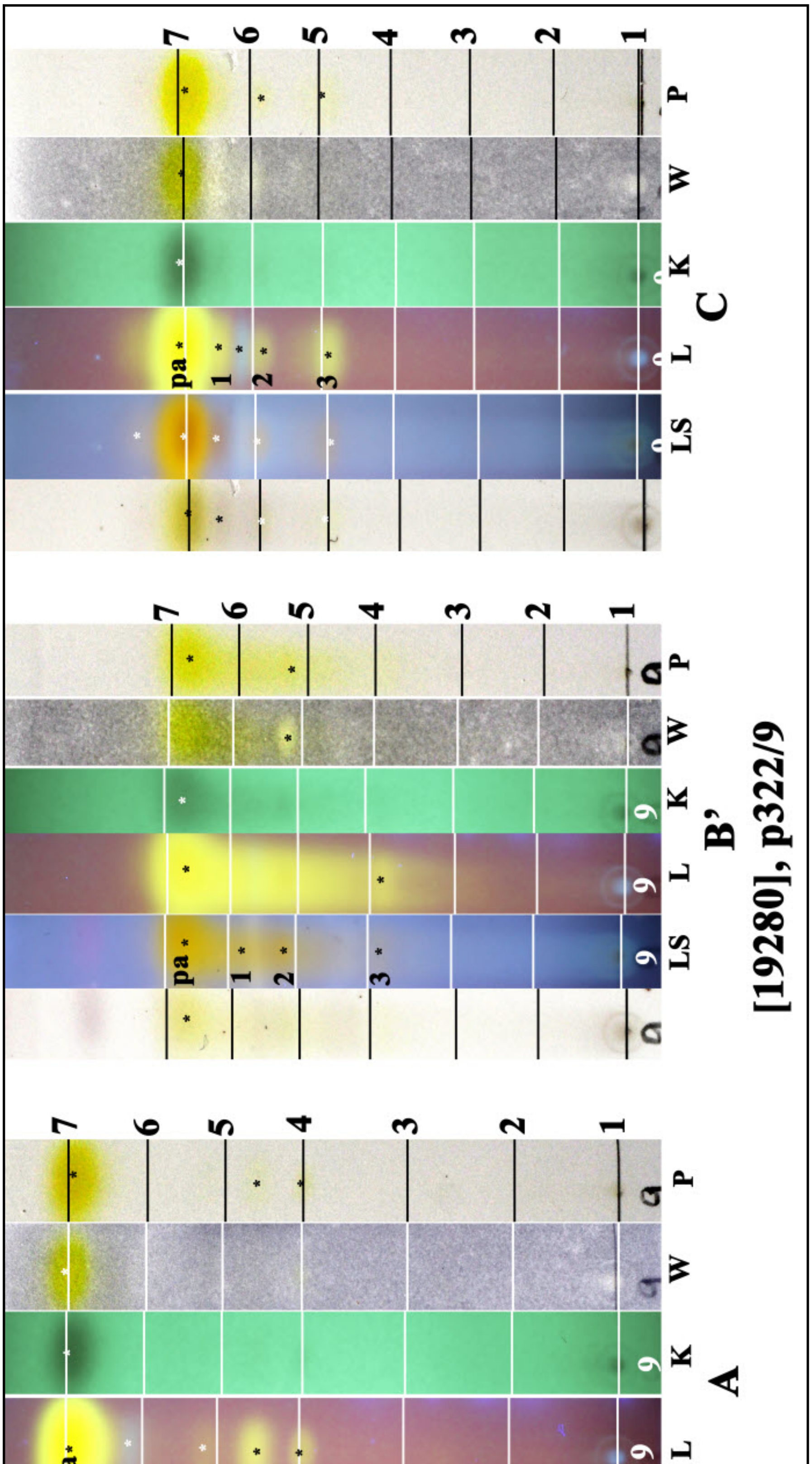
parietin



pa: parietin, 1: fallacinal, 2: parietinic acid, 3: teloschistin

Teloschistes chrysophthalmus, [19279], Australia, South Australia, Kangaroo Island, King George Beach, 35°40' S, 137°04' E, 2 m.

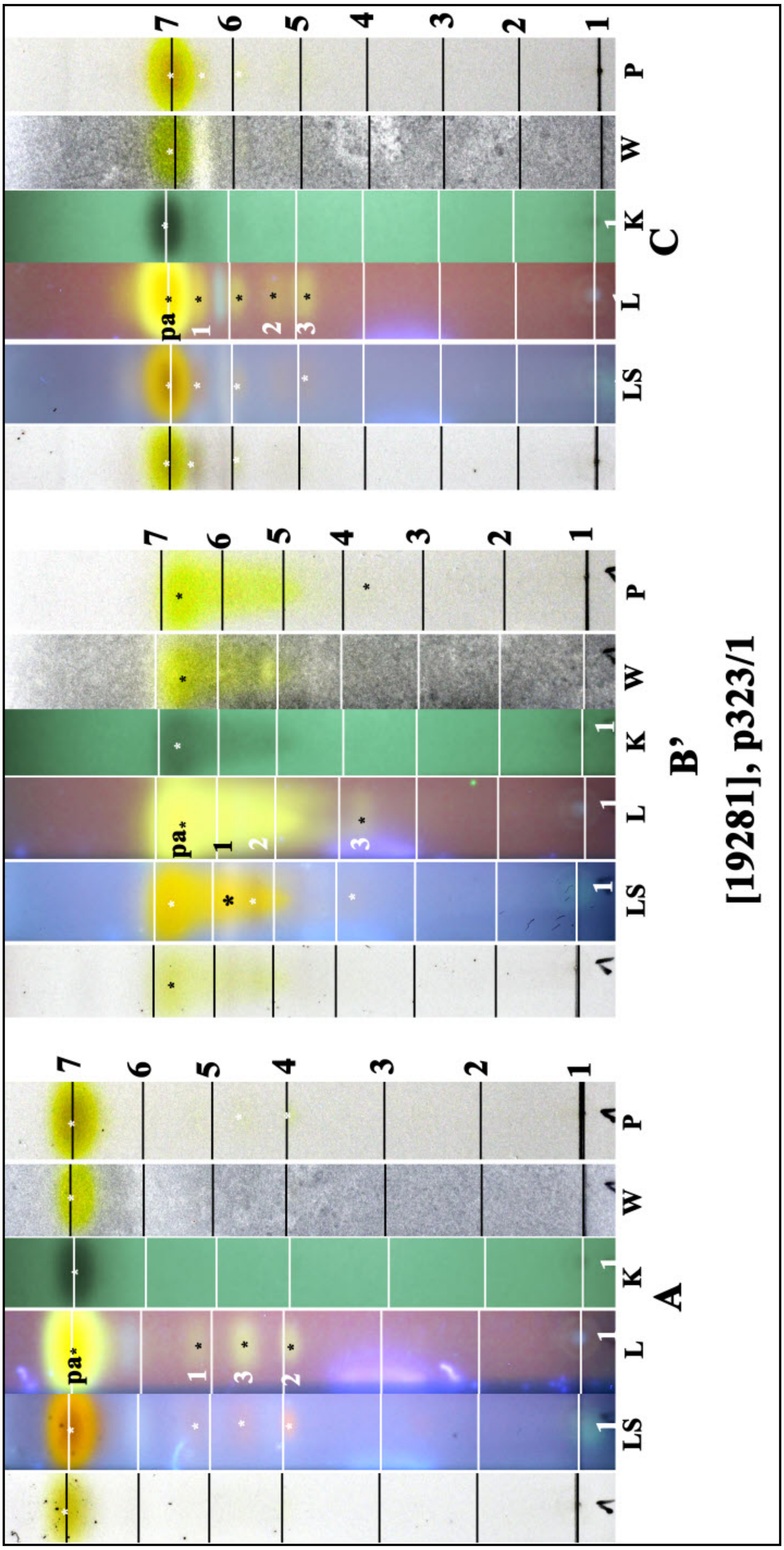
parietin



pa: parietin, 1: fallacinal, 2: parietinic acid, 3: teloschistin

Teloschistes chrysophthalmus, [19280], Australia, South Australia, Kangaroo Island, Playford Highway, 1 km west of Kingscote Airport, 35°43' S, 137°31' E, 15 m.

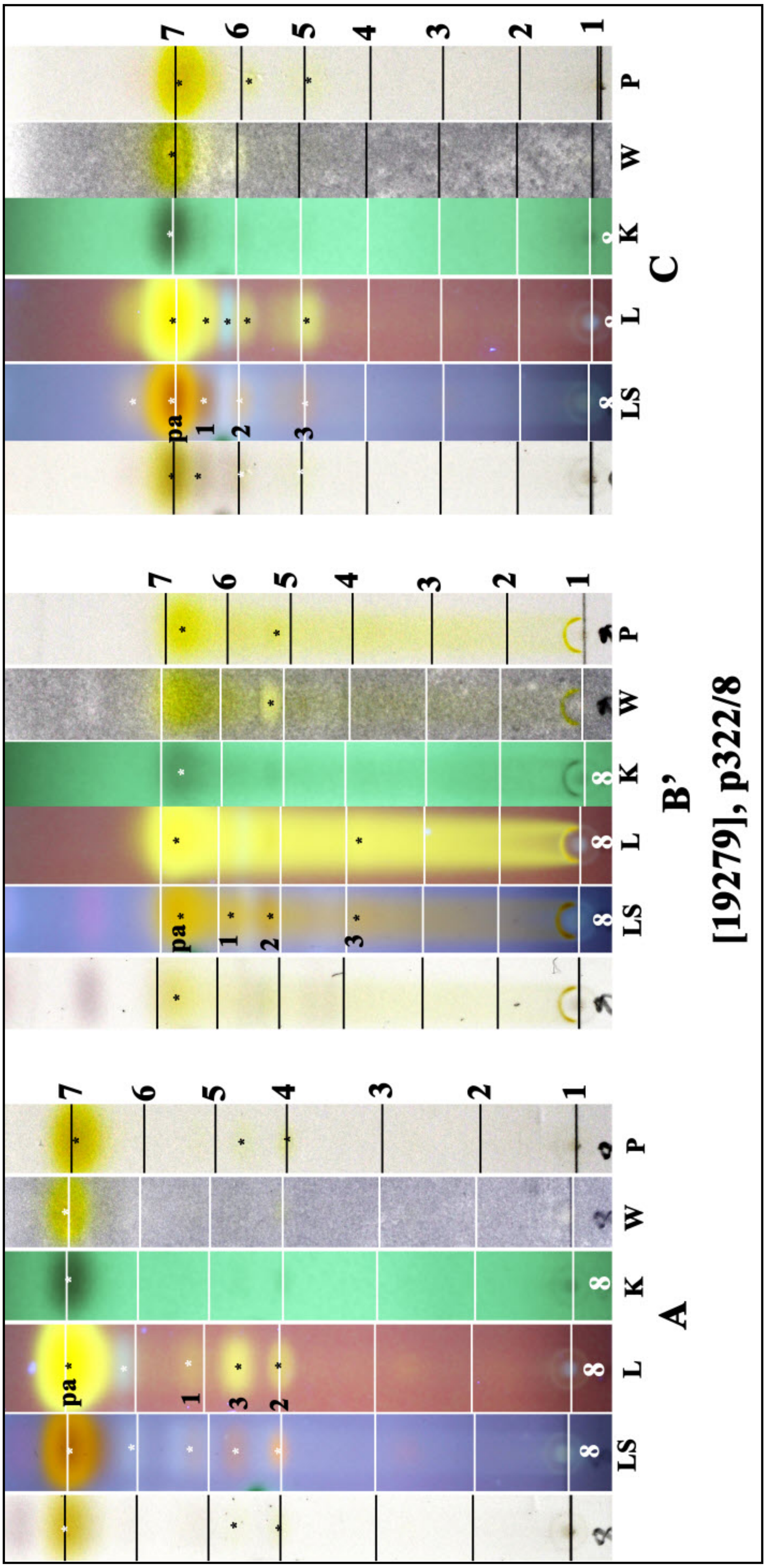
parietin



pa: parietin, 1: fallacinal, 2: parietinic acid, 3: teloschistin

Teloschistes fasciculatus , [19281], Australia, Victoria, Basalt Hill, Alpine National Park, Bogong High Plains, 20 km south-east of Mt. Beauty, 36°53' S, 147°18' E, 1650 m.

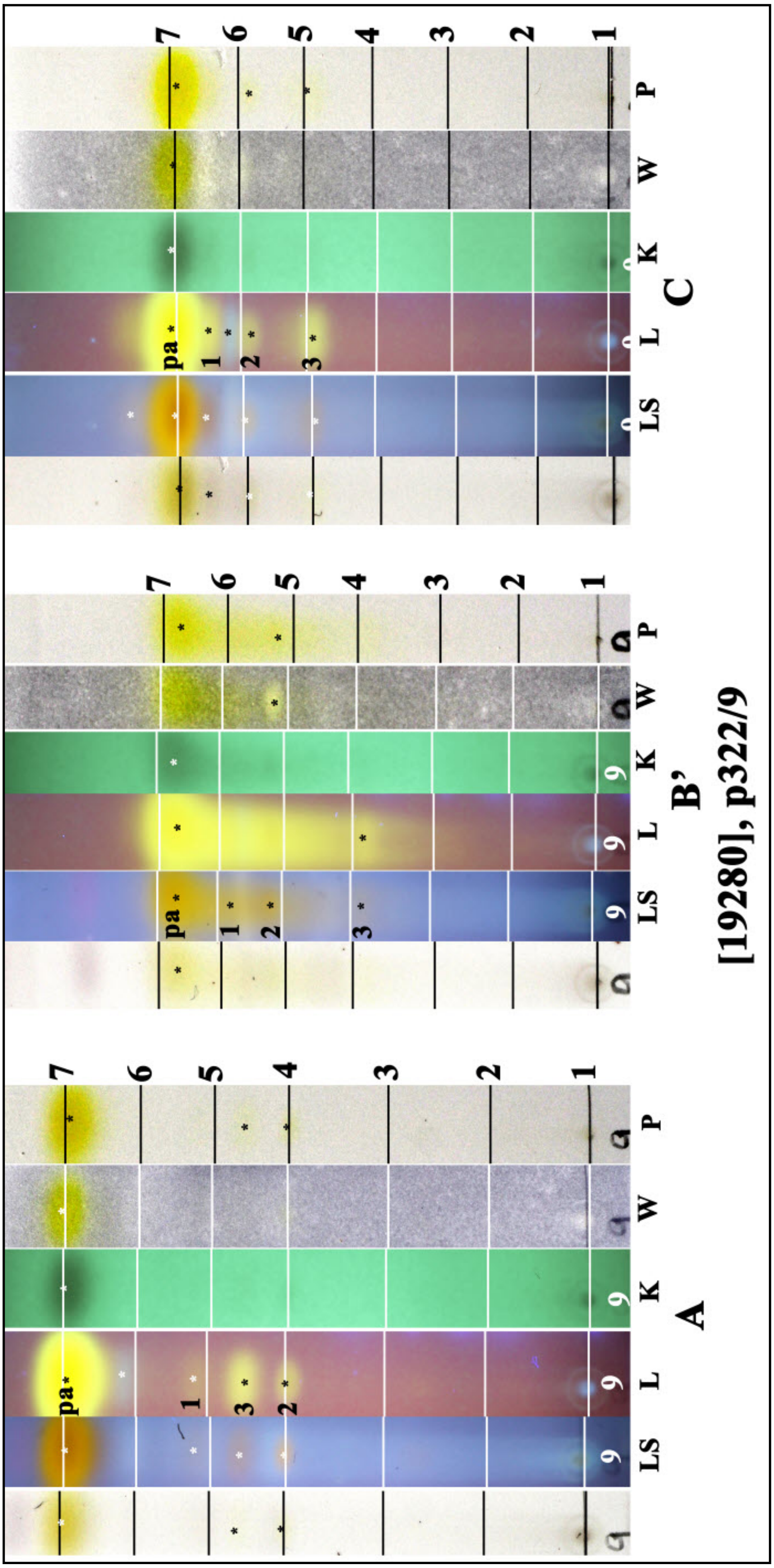
parietinic acid



pa: parietin, 1: fallacinal, **2: parietinic acid**, 3: teloschistin

Teloschistes chrysophthalmus, [19279], Australia, South Australia, Kangaroo Island, King George Beach, 35°40' S, 137°04' E, 2 m.

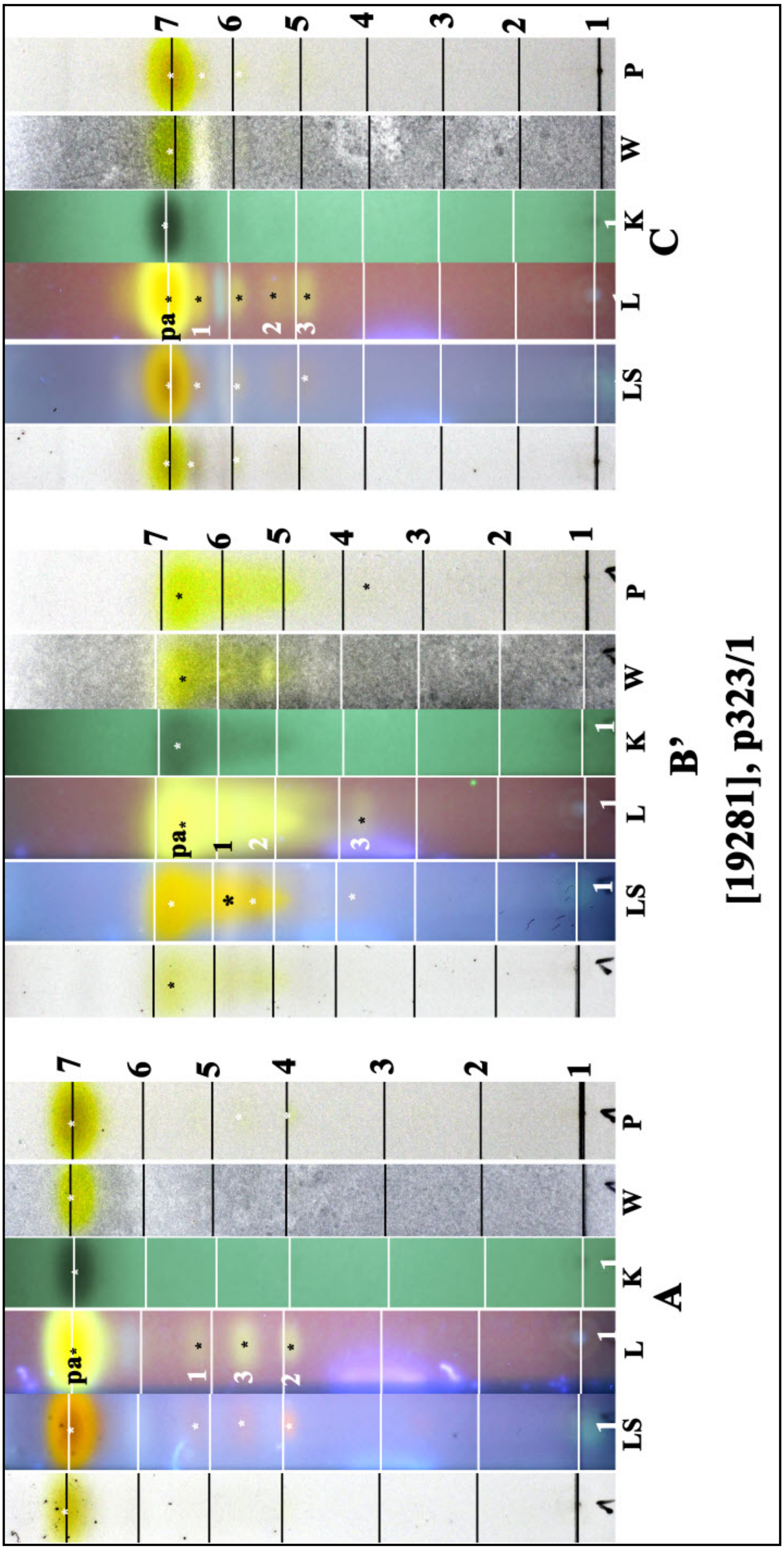
parietinic acid



pa: parietin, 1: fallacinal, **2: parietinic acid**, 3: teloschistin

Teloschistes chrysophthalmus, [19280], Australia, South Australia, Kangaroo Island, Playford Highway, 1 km west of Kingscote Airport, 35°43' S, 137°31' E, 15 m.

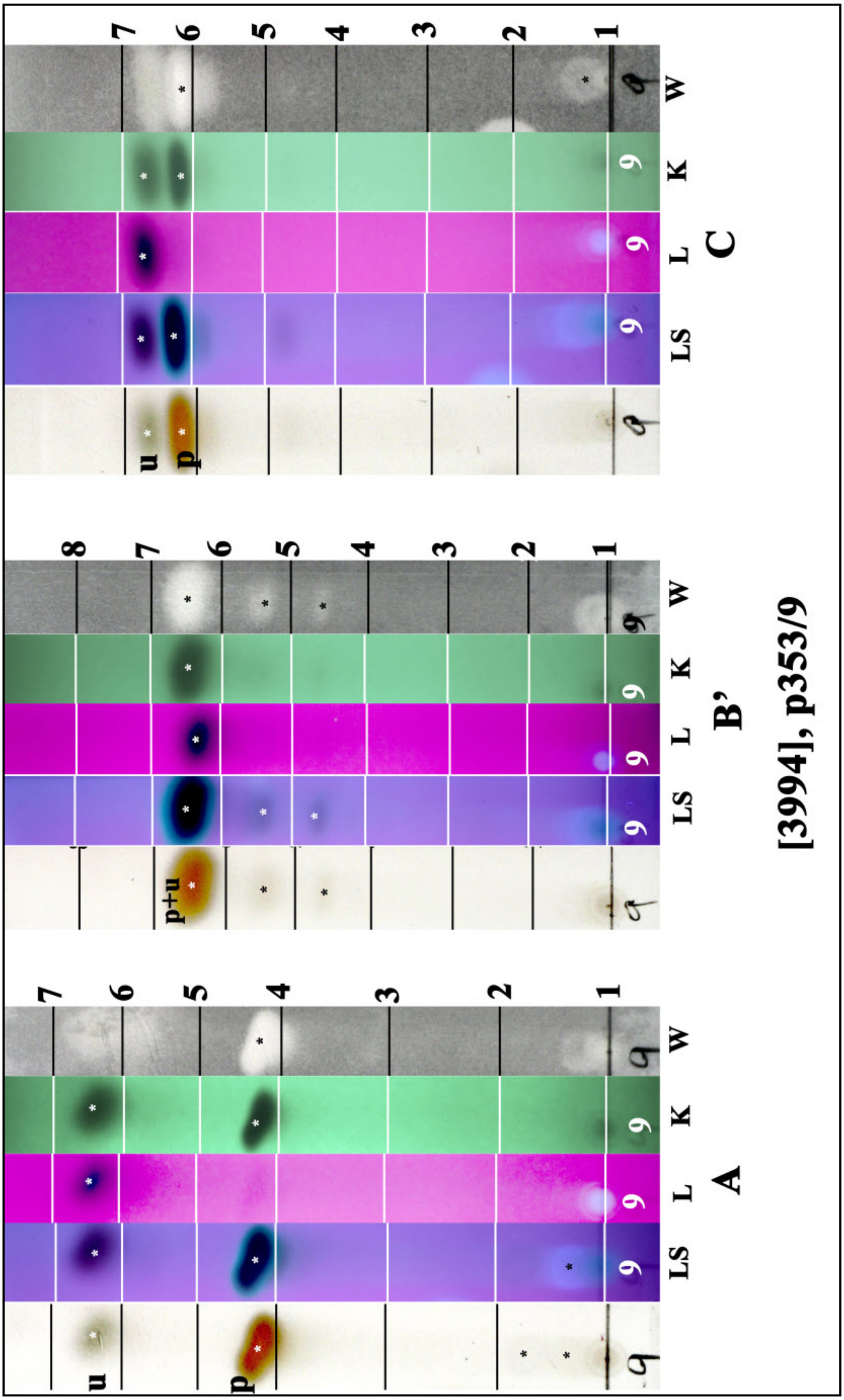
parietinic acid



pa: parietin, 1: fallacinal, **2: parietinic acid**, 3: teloschistin

Teloschistes fasciculatus , [19281], Australia, Victoria, Basalt Hill, Alpine National Park, Bogong High Plains, 20 km south-east of Mt. Beauty, 36°53' S, 147°18' E, 1650 m.

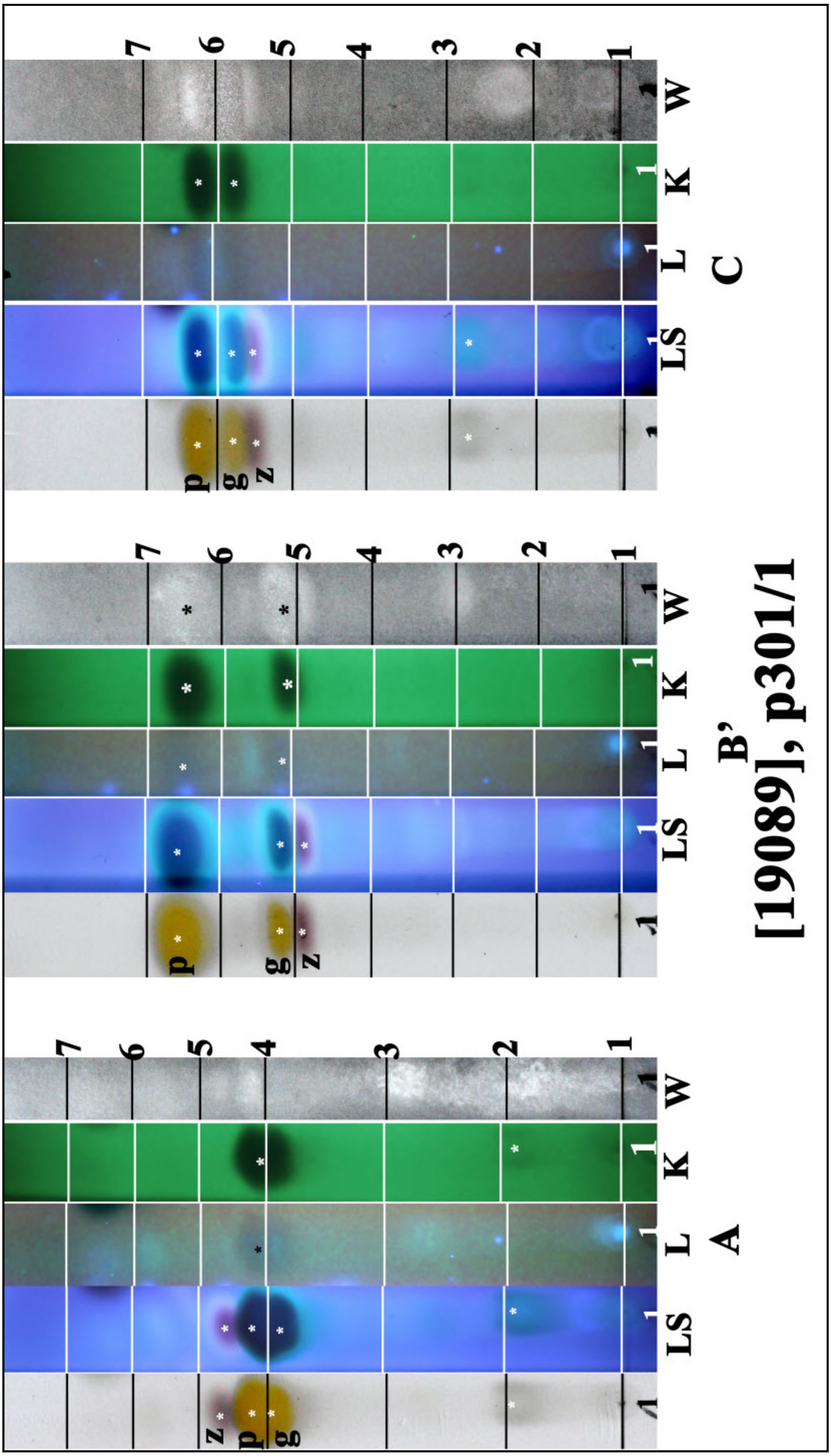
perlatolic acid



p: perlatolic acid, u: usnic acid, conf. J.A. Elix

Cladonia portentosa, [3994], Germany, Baden-Württemberg, Sandbruch im oberen Stubensandstein im Wald bei Riemenfeld. Am Rand eines vernäßten, sauren, lichtoffenen, kleinen sphagnumreichen Waldmoores. Leg. et det. F. Schumm 27.04.1991.

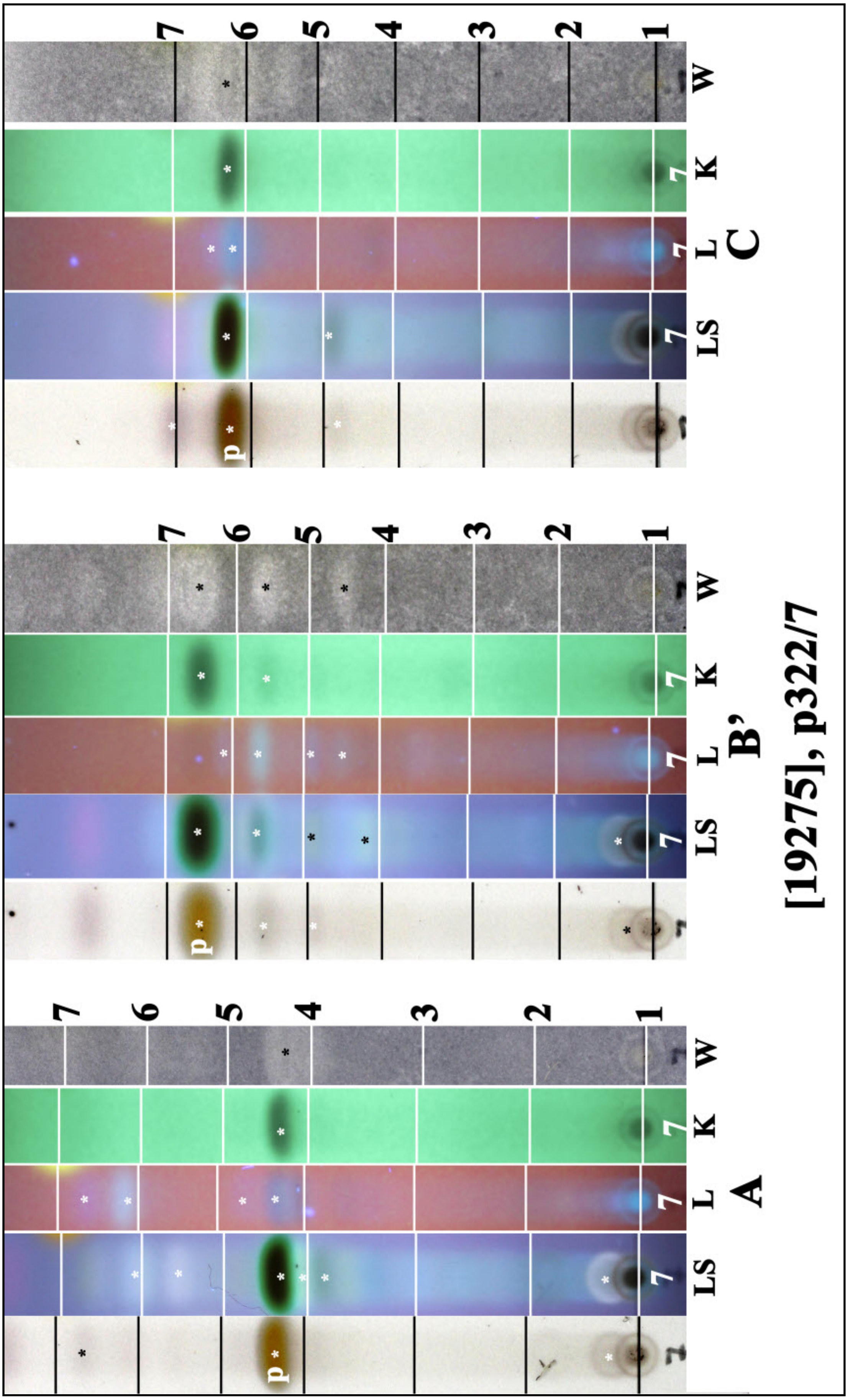
perlatolic acid



z: zeorin, **p: perlatolic acid**, g: glomelliferic acid

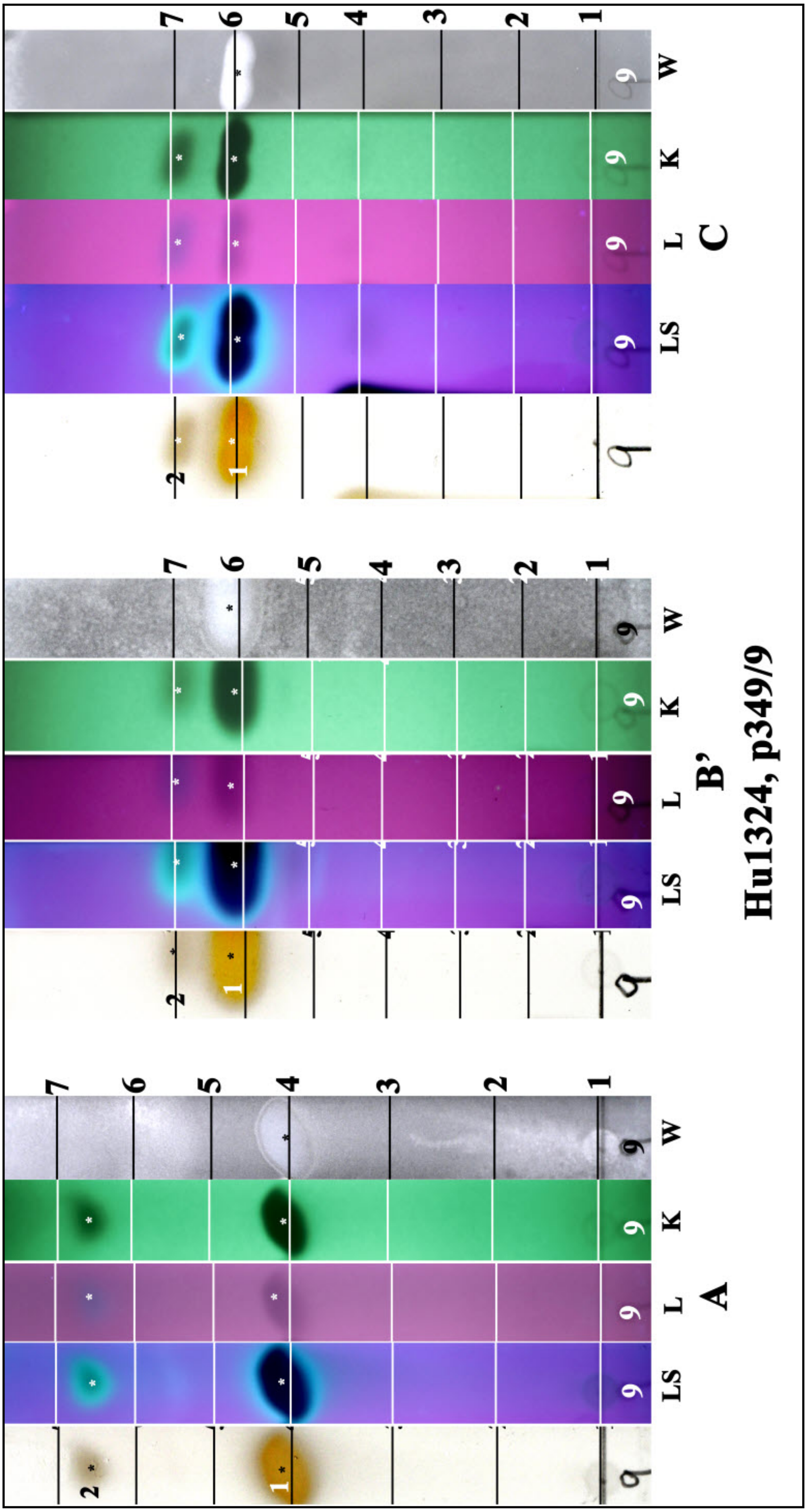
Nephroma cellulosum, [19089], Australia, New South wales, Great dividing Range, 6 km east of Captains Flat, 2 km north of Parkers Gap

perlatolic acid



Streimannia variseptata, [19275], Australia, Queensland, Blencoe Creek, Cardwell Range, 48 km north-west of Cardwell, 18°03' S, 145°39' E, 740 m.

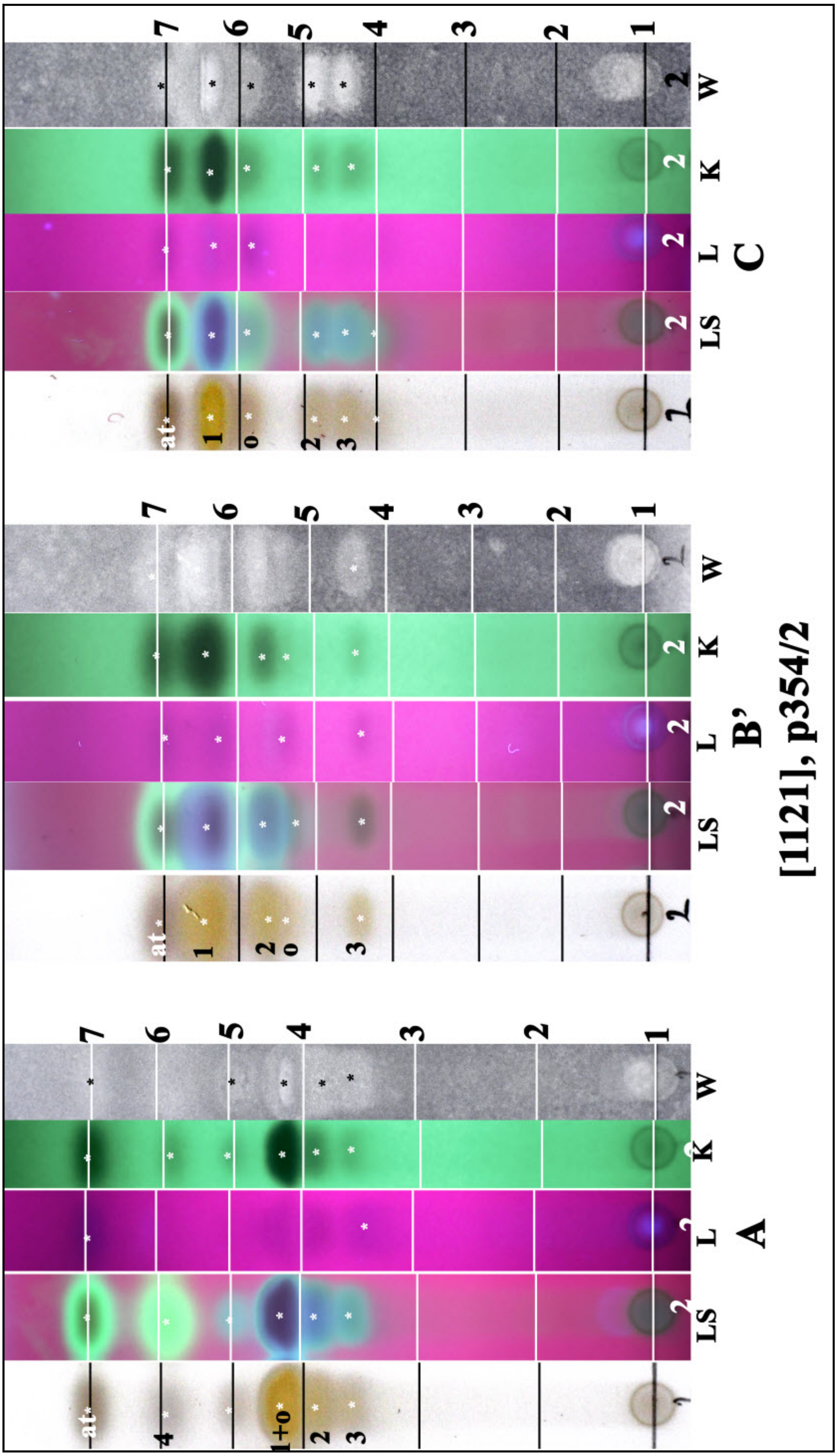
perlatolic acid



1: imbricaric acid, **2: perlatolic acid**, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 1324: imbricaric acid
Botanisches Museum Berlin-Dahlem

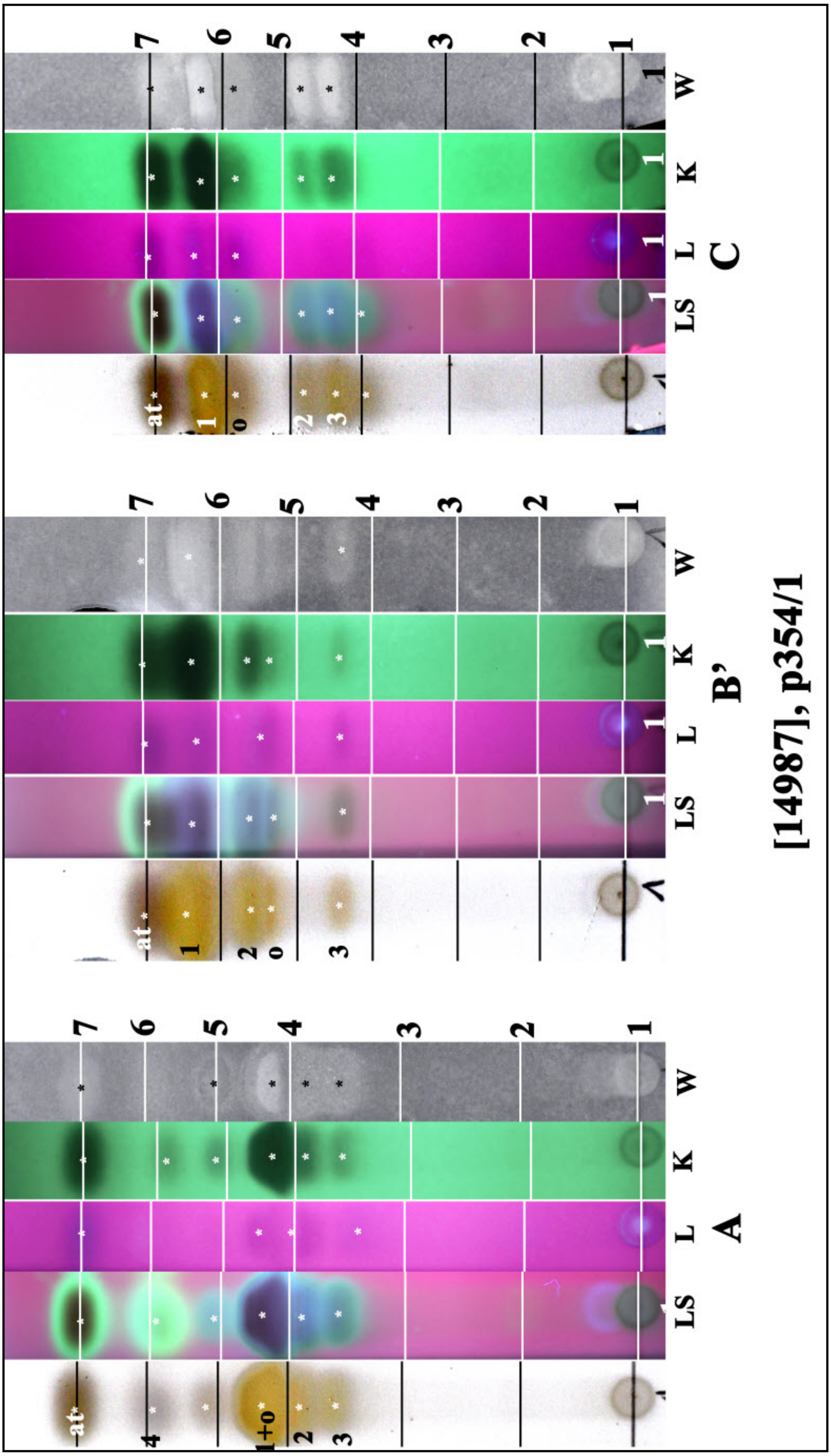
perlatolic acid



at: atranorin, **1: perlatolic acid**, 2 anziaic acid, 3: olivetoric acid, 4: superlatolic acid, o: 4-*O*-methylolivetoric acid, conf J.A. Elix

Cetrelia cetrarioides, [1121], Germany, Baden-Württemberg, Stuttgart, Rotwildpark, an Fagus, TK: 7220/2. Leg. et det. E. Putzler 17.05.1950.

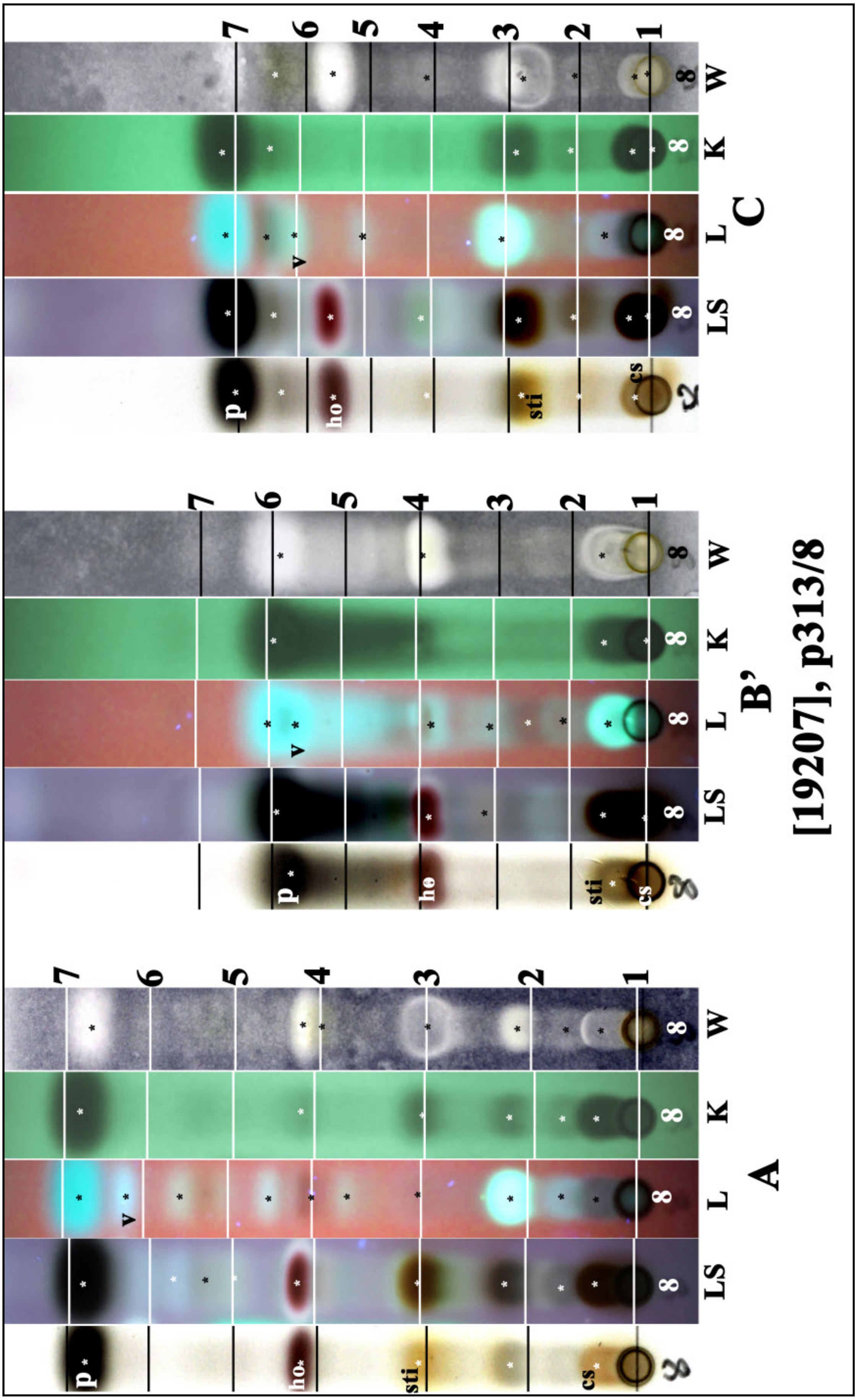
perlatolic acid



at: atranorin, **1: perlatolic acid**, 2: anziaic acid, 3: olivetoric acid, 4:superlatolic acid, o: 4-*O*-methylolivetoric acid, conf. J.A. Elix.

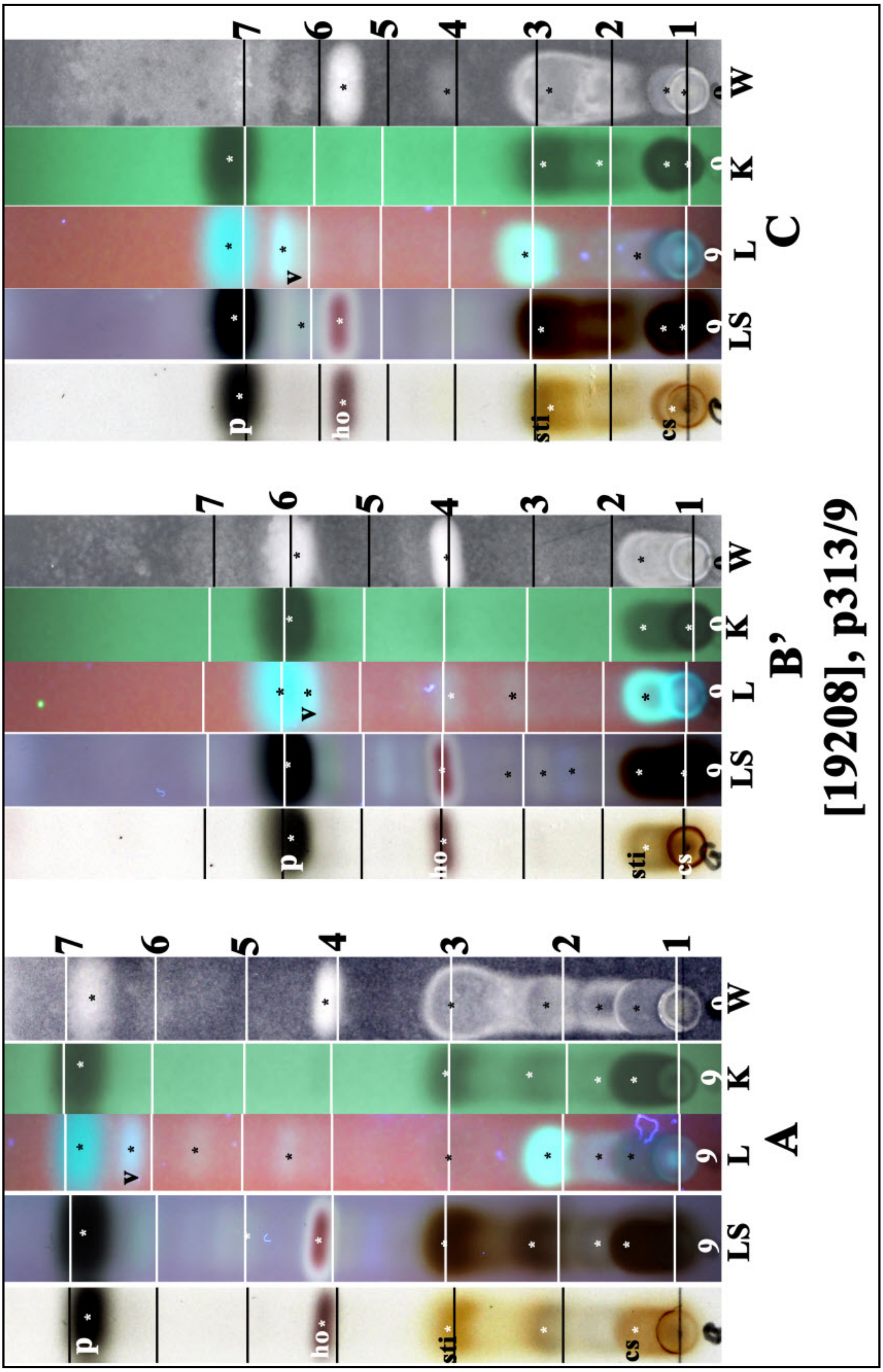
Cetrelia cetrarioides, [14987], Germany, Bayern, Kreis Traunstein, Chiemgauer Alpen, Hochfelln, Weg von der Mittelstation der Seilbahn (47,76966°N, 12,57550°E, 1090 m) zur Talstation, an Fagus bei 950 m. Leg. et det. F. Schumm 27.08.2009.

physciosporin



Pseudocyphellaria granulata, [19207], Australia, Victoria, Gunmark Road, near junction with Goonmirk Rocks Road, 13.5 km south of Bendoc, 37°16' S, 148°52' E, 1060 m.

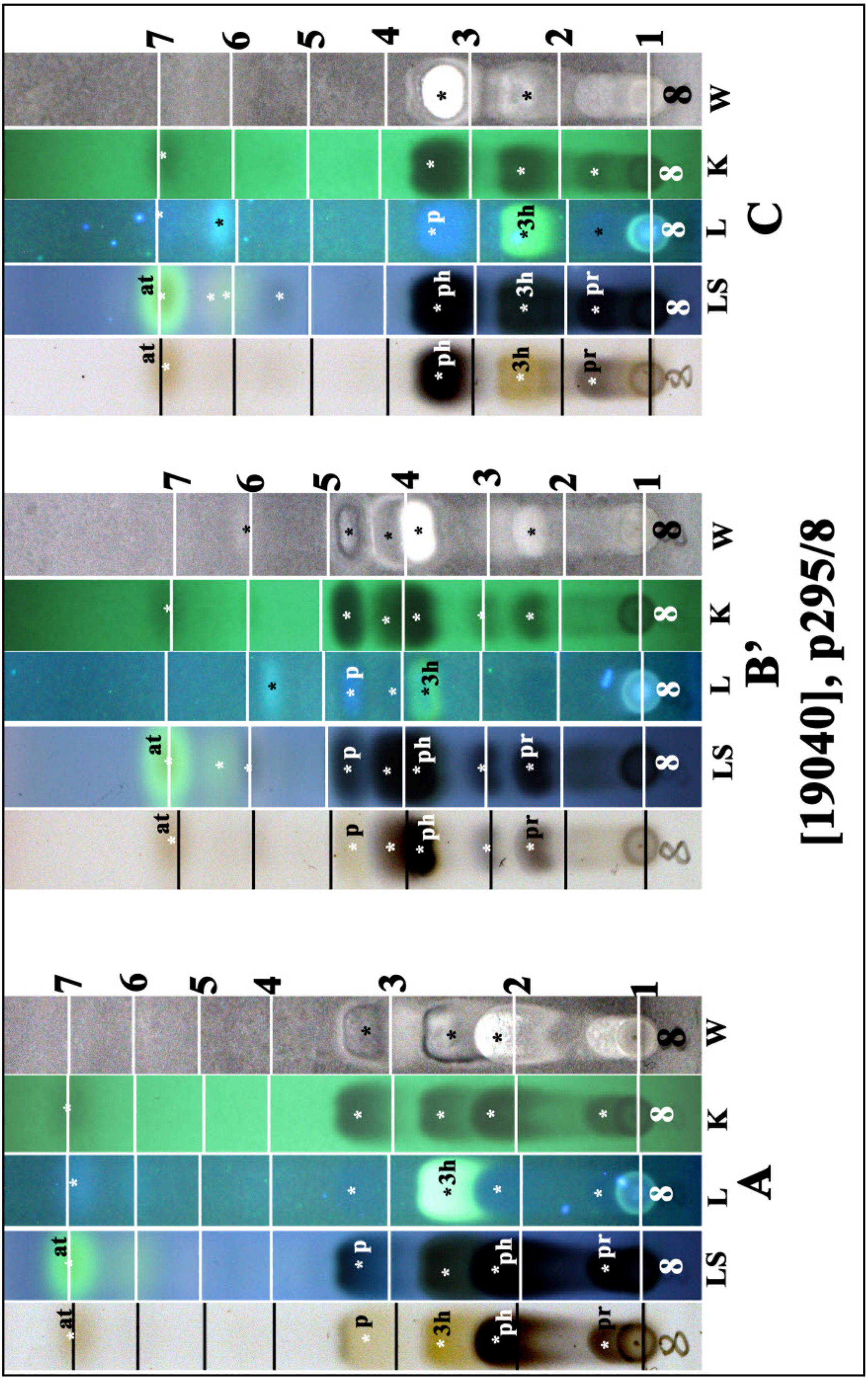
physciosporin



p: physciosporin, ho: hopane-6a,7b,22-triol, sti: stictic acid, cs: constictic acid, v: methyl virensate

Pseudocyphellaria granulata, [19208], Australia, New South Wales, Great Dividing Range, 6 km east of Captains Flat, 2 km north of Parkers Gap, 35°37' S, 149°30' E, 1260 m.

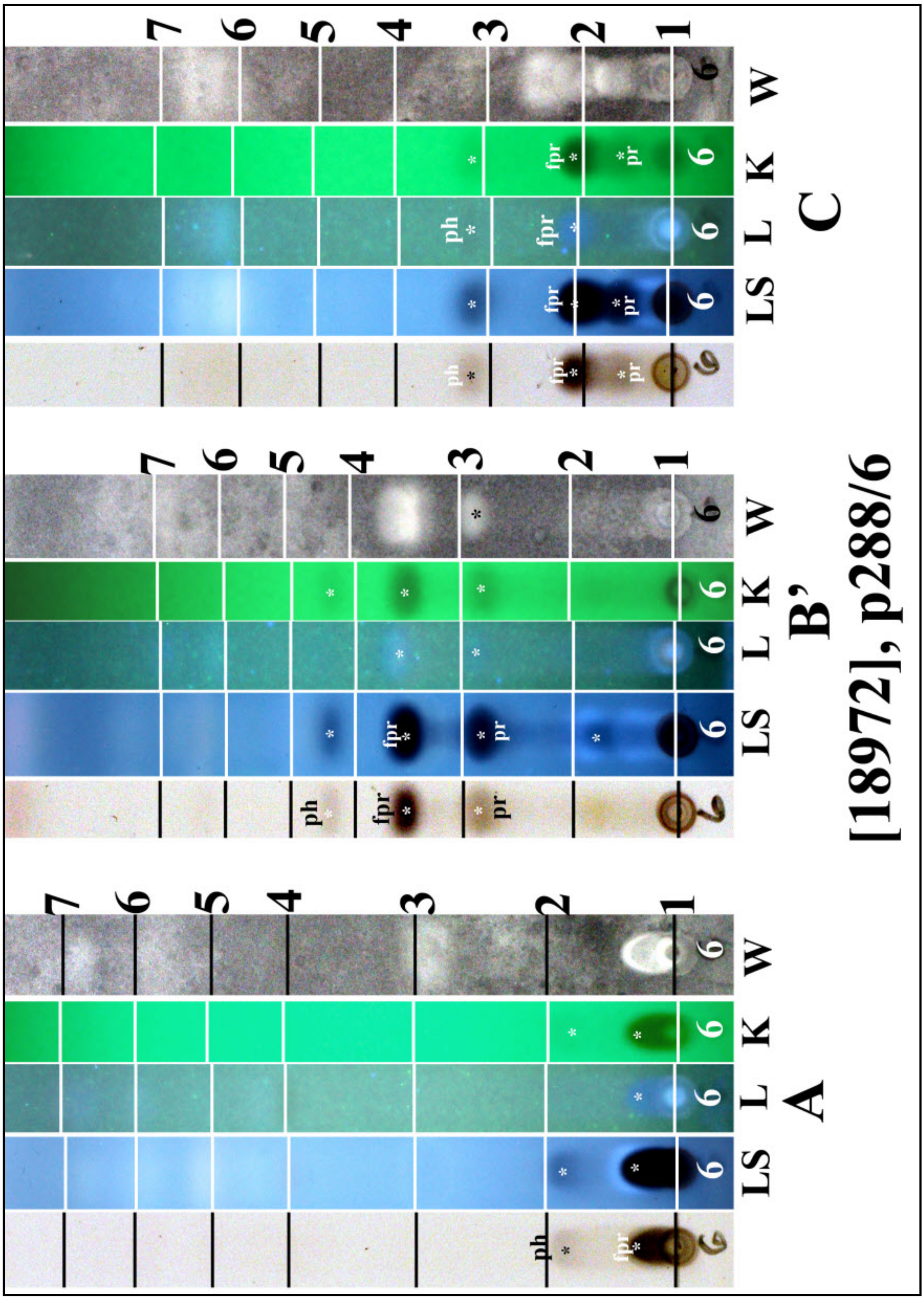
physodalic acid



at: atranorin, p: physodic acid, 3h: 3-hydroxyphysodic acid, **ph: physodalic acid**, pr: protocatraric acid

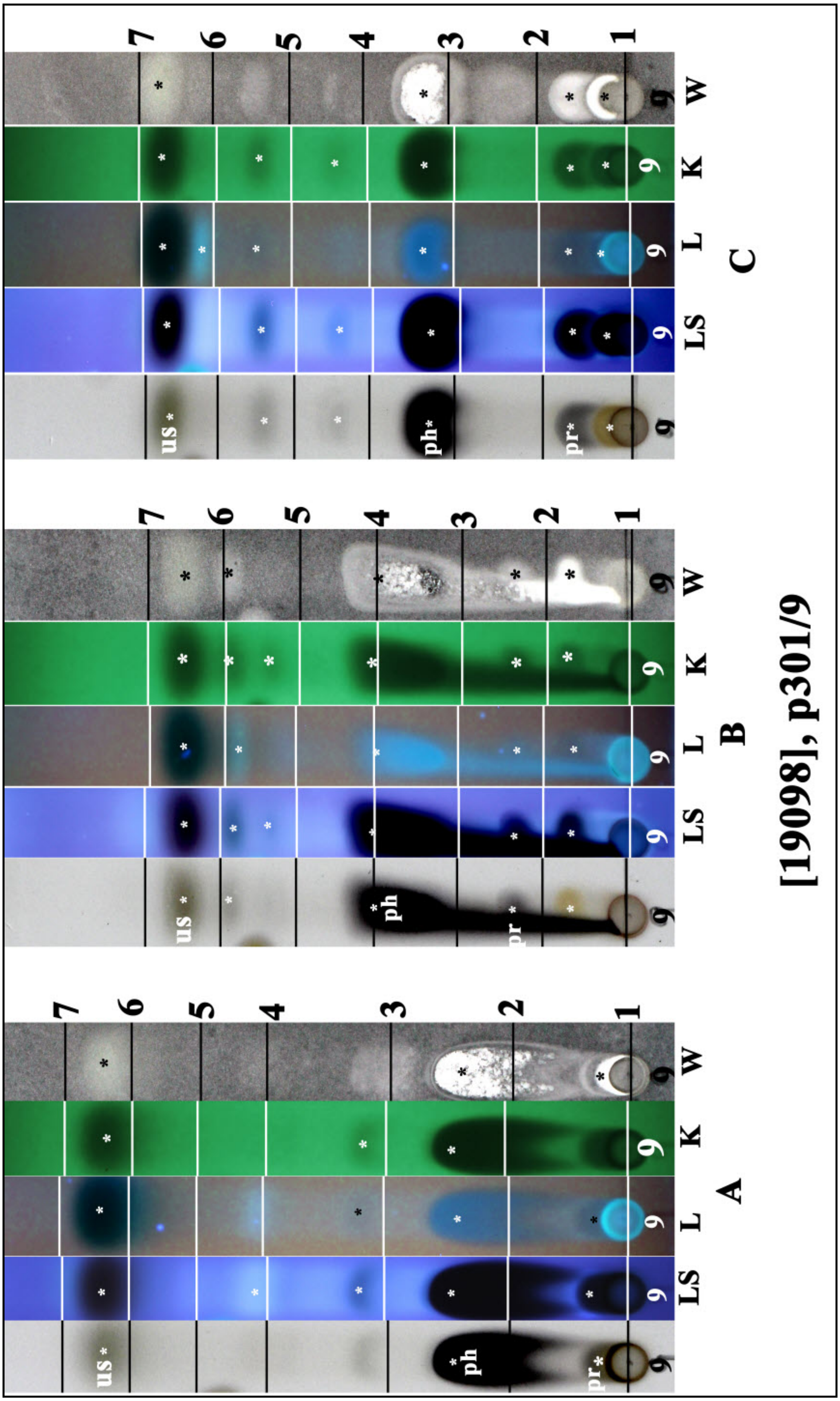
Hypogymnia enteromorphoides, [19040], Australia, New South Wales, Kosciusko National Park.

physodalic acid



Cladonia ochrochlora (= Cladonia physodalica), [18972], Australia, Queensland, Main Coast Range, Mt. Lewis Track, Mary Creek, 15 km north-north-west of Mt. Molloy.

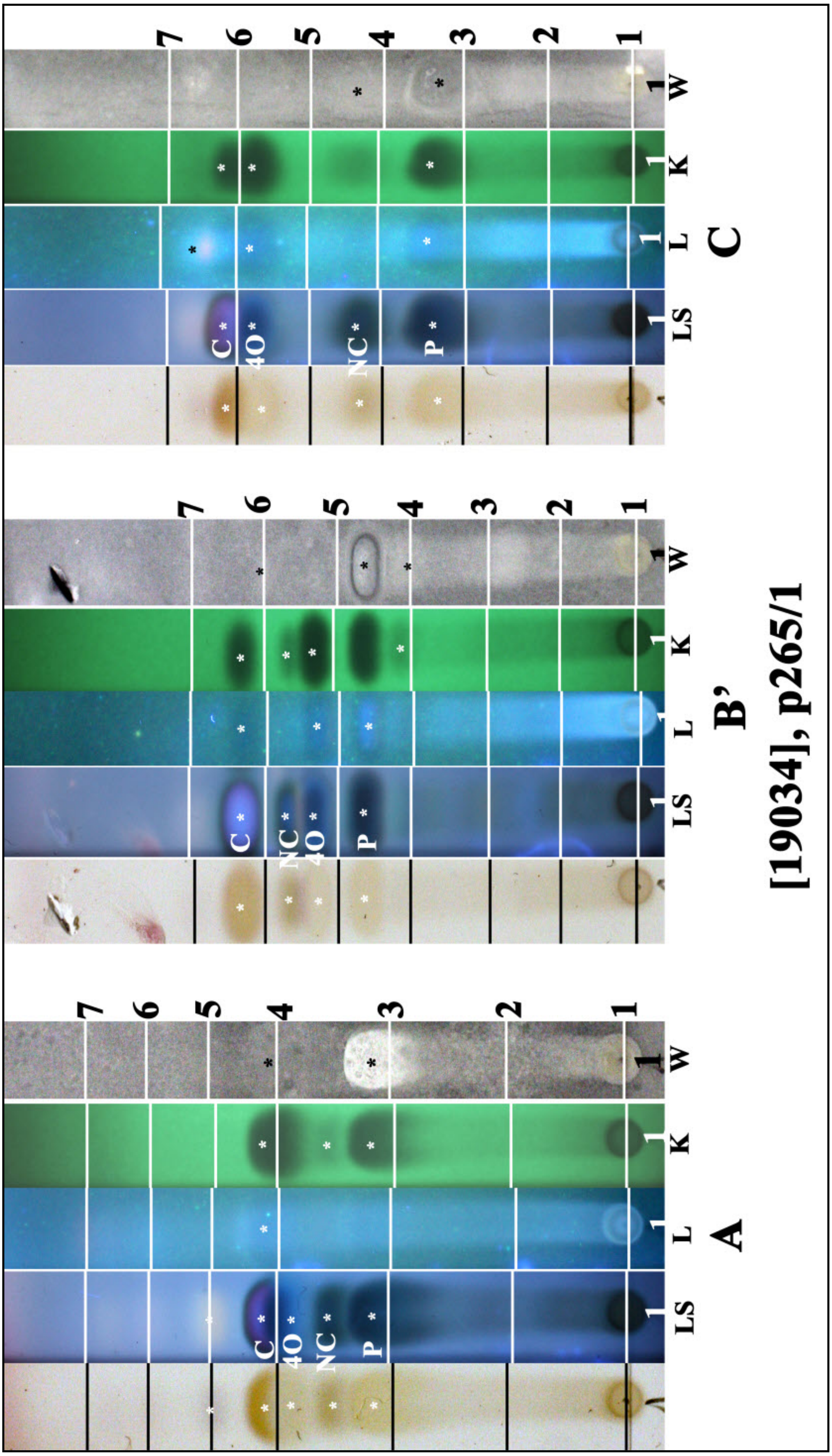
physodalic acid



us: usnic acid, **ph: physodalic acid**, pr: protocetraric acid

Flavoparmelia ferax, [19098], Australien, New South Wales, 29 km west of Narrandera along the Sturt Highway.

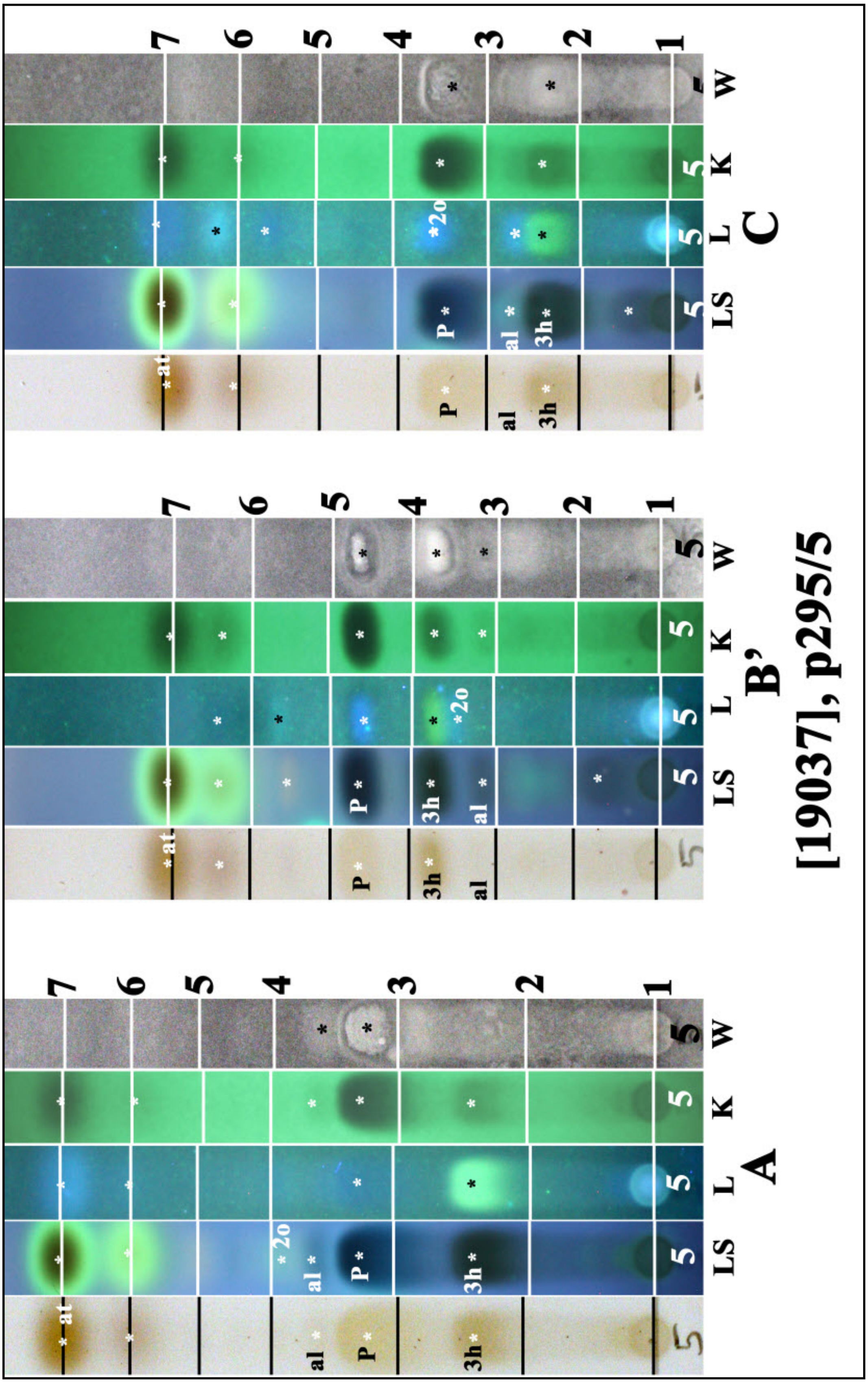
physodic acid



C: colensoic acid, NC: norcolensoic acid, 4O: 4-O-methylphysodic acid, **P: physodic acid**

Carbonicola foveata, [19034], Australia, New South wales, Great dividing Range, Tuena-Binda road, 30 km north-west of Crookwell

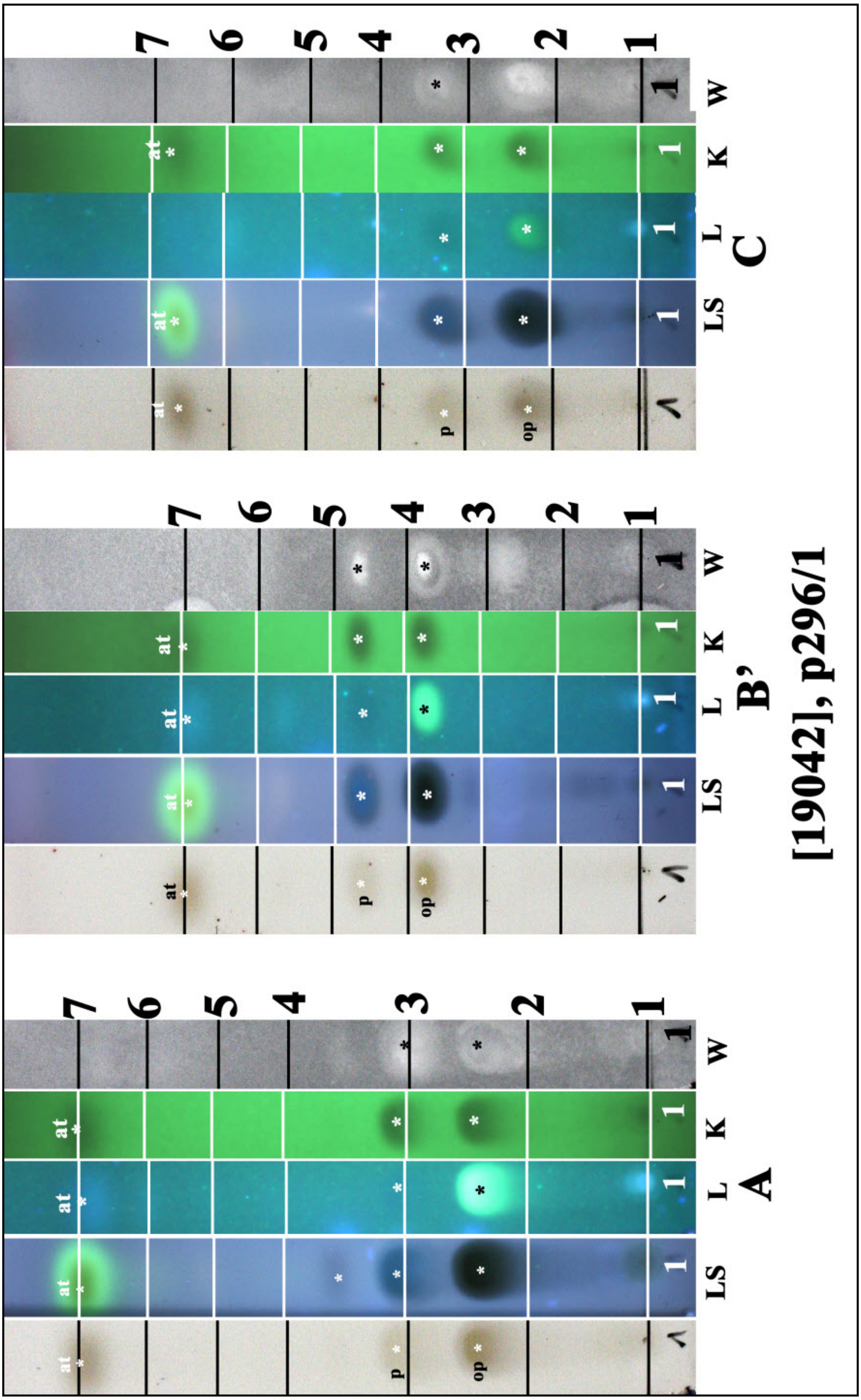
physodic acid



at= atranorin, chloroatranorin, **p= physodic acid** (major), 3h= 3-hydroxyphysodic acid, 2o= 2’O-methylphysodic acid (minor), al= alectoronic acid (trace)

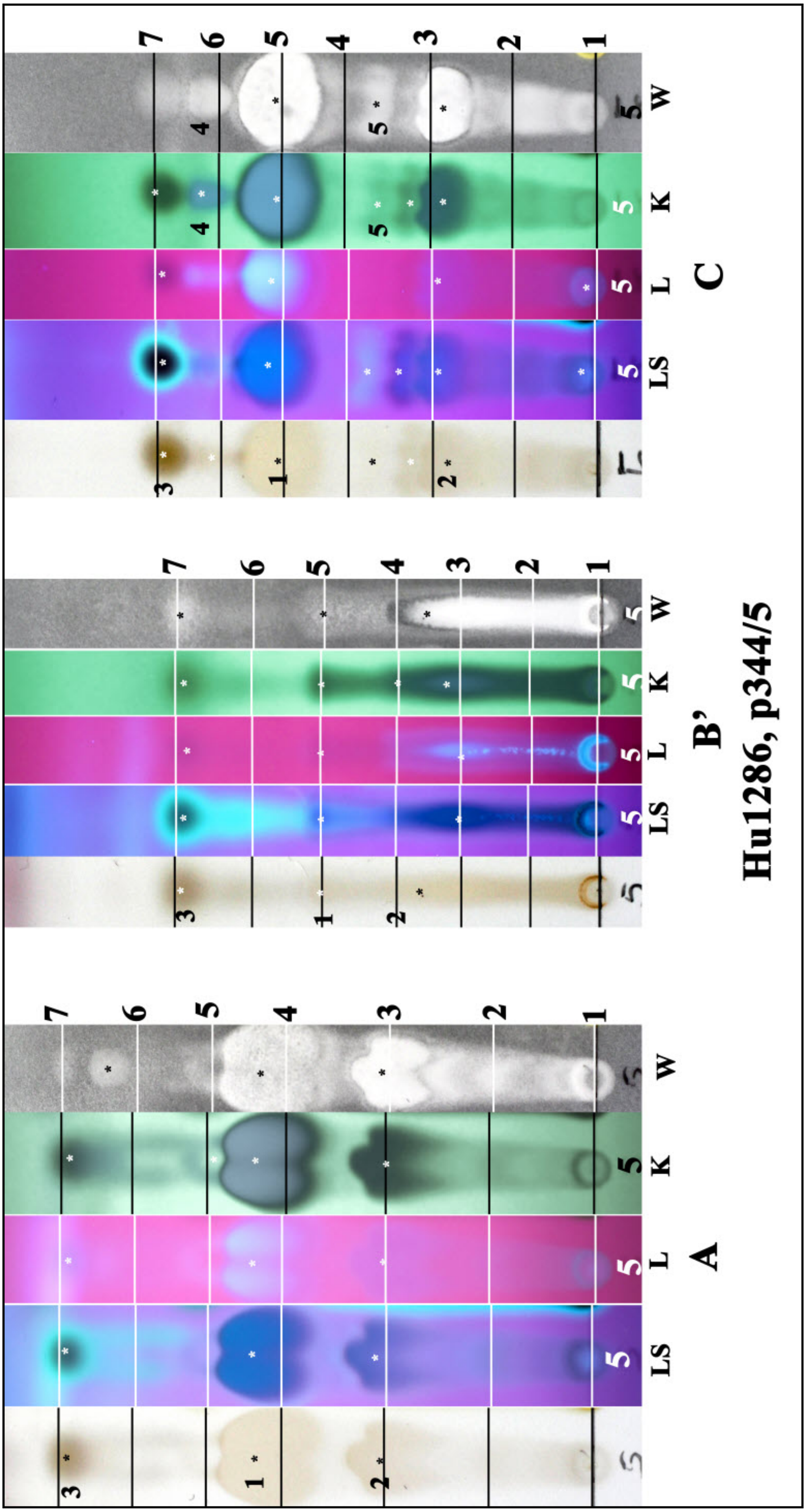
Hypogymnia billardieri [19037], Australia, New South Wales, Jerrabomberra Hills

physodic acid



Hypogymnia lugubris var. ***sublugubris,*** [19042], New Zealand, South Island, Canterbury, Porters Pass.

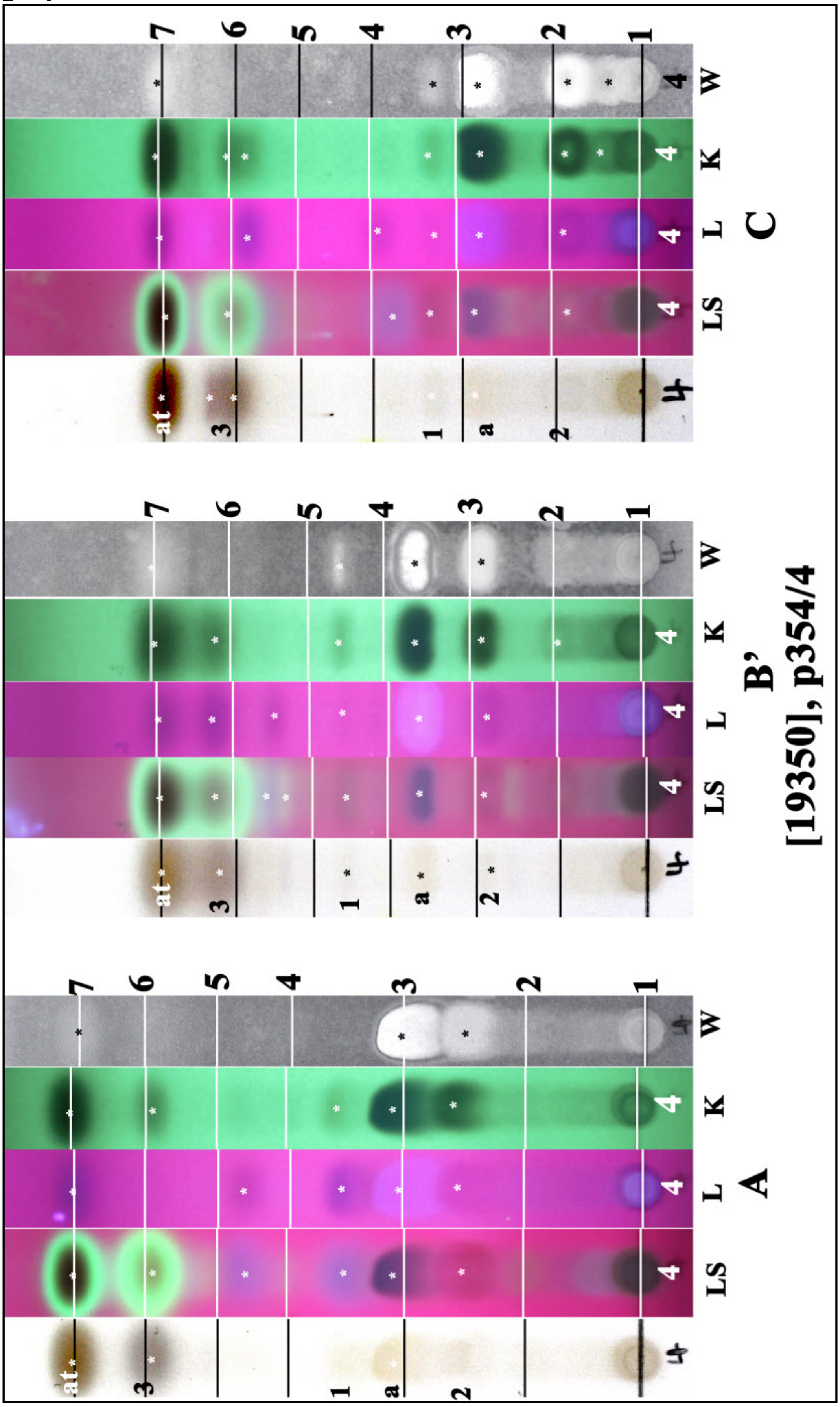
physodic acid



1: α-collatolic acid, 2: alectoronic acid, 3: atranorin, 4: 4-*O*-methylphysodic acid, **5: physodic acid**, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 1286: α-collatolic acid
Botanisches Museum Berlin-Dahlem

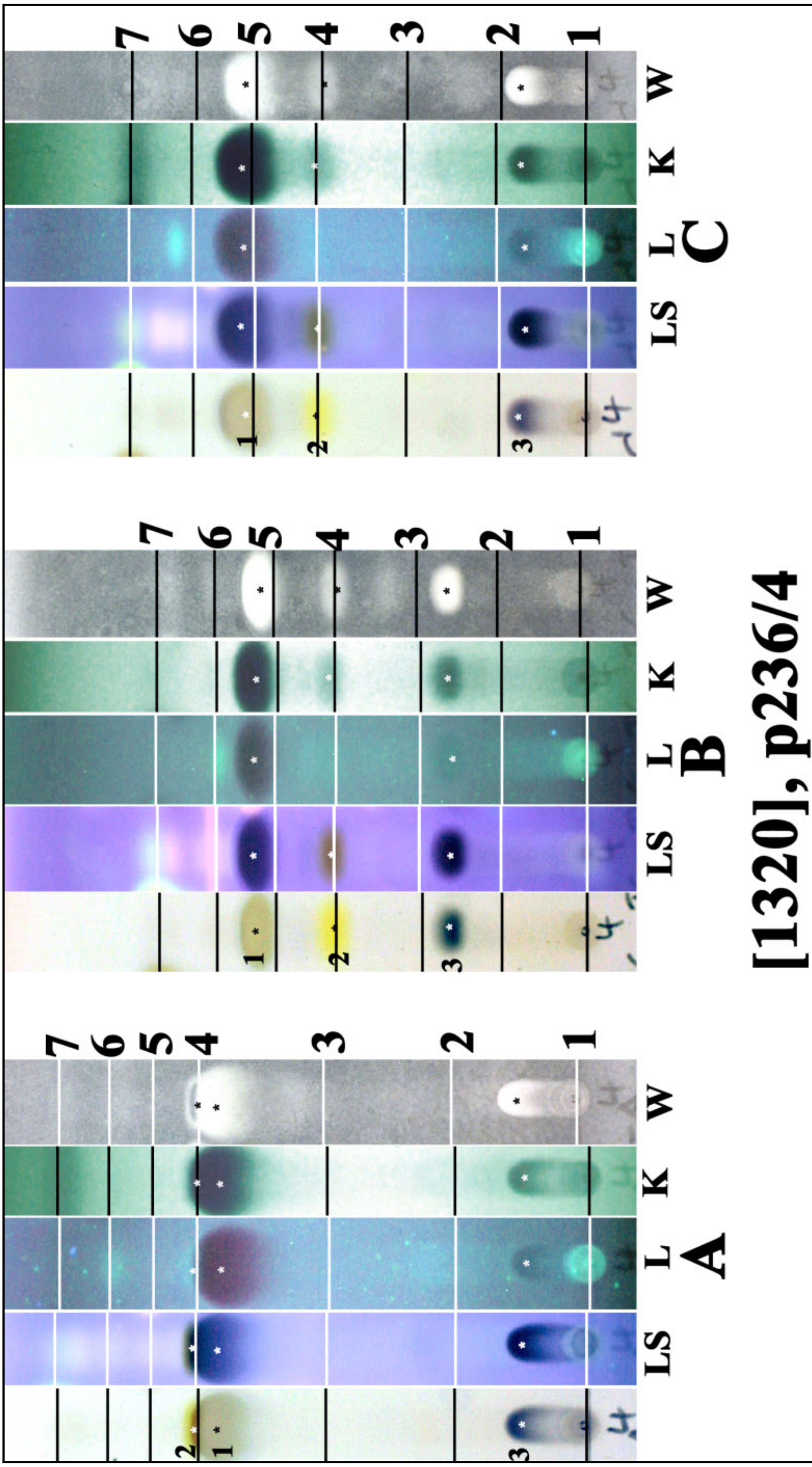
physodic acid



at: atranorin, a: alectoronic acid, **1: physodic acid**, 2: vittatolic acid, 3: colensoic acid ,conf. J.A. Elix.

Tephromela aff. ***alectoronica*** [19350], Australia, Queensland, Kennedy Highway c. 12 km SSE of Kuranda, on roadside trees at the edge of a disturbed tropical rainforest, 420 m, 16°54'40" S, 145°36'04"E. Leg. K. & D. Kalb, 21.08.2015 (Nr. 40535).

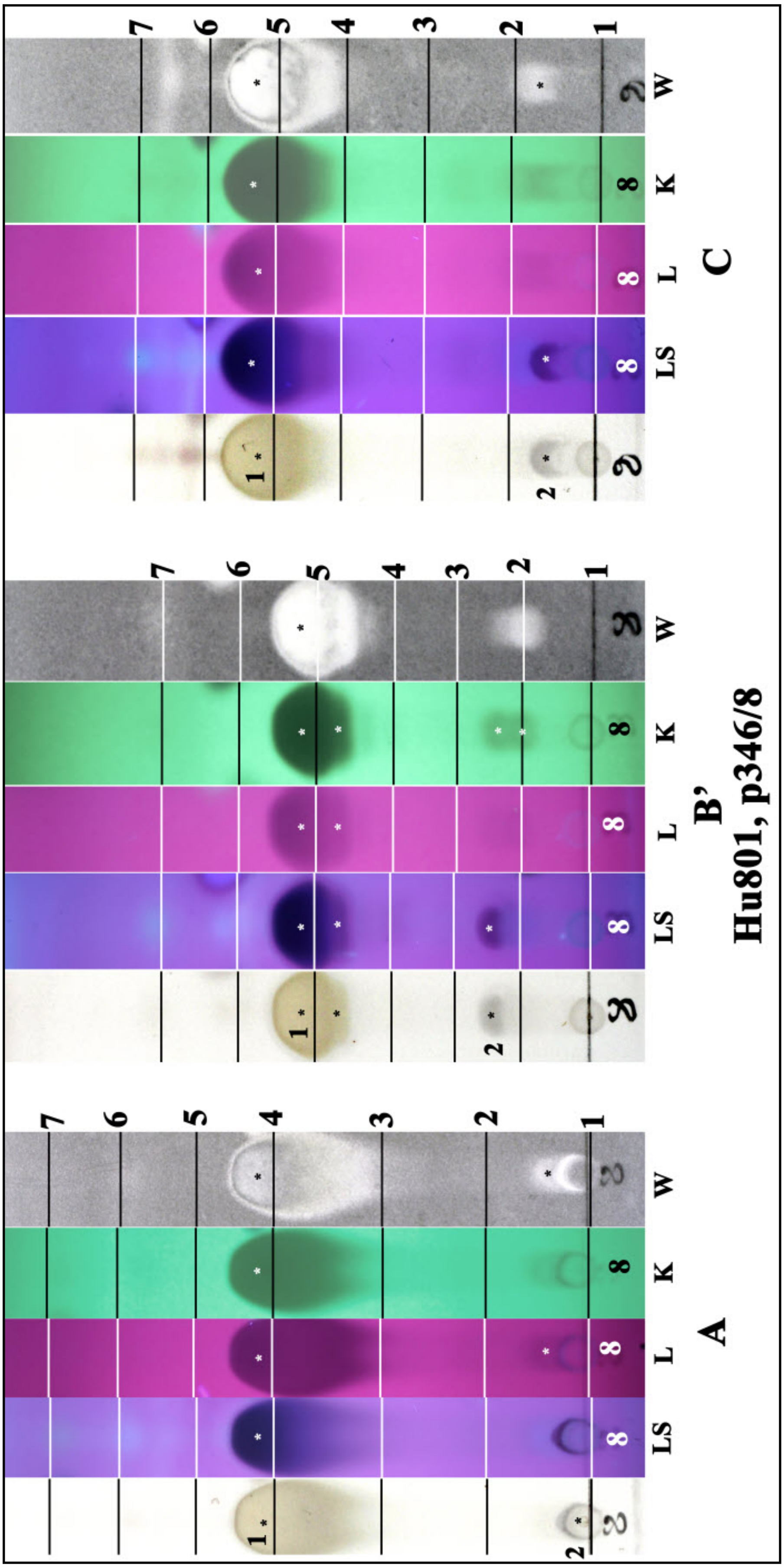
picrolichenic acid



1: picrolichenic acid, 2: norstictic acid, 3: protocetraric acid, conf. J.A. Elix

Pertusaria amara, [1320], Germany, Baden-Württemberg, Kreis Göppingen, Marbachtal bei Zell-Börtlingen, an Quercus, ca. 350 m, TK 7223. Leg. et det. F. Schumm 01.10.1967.

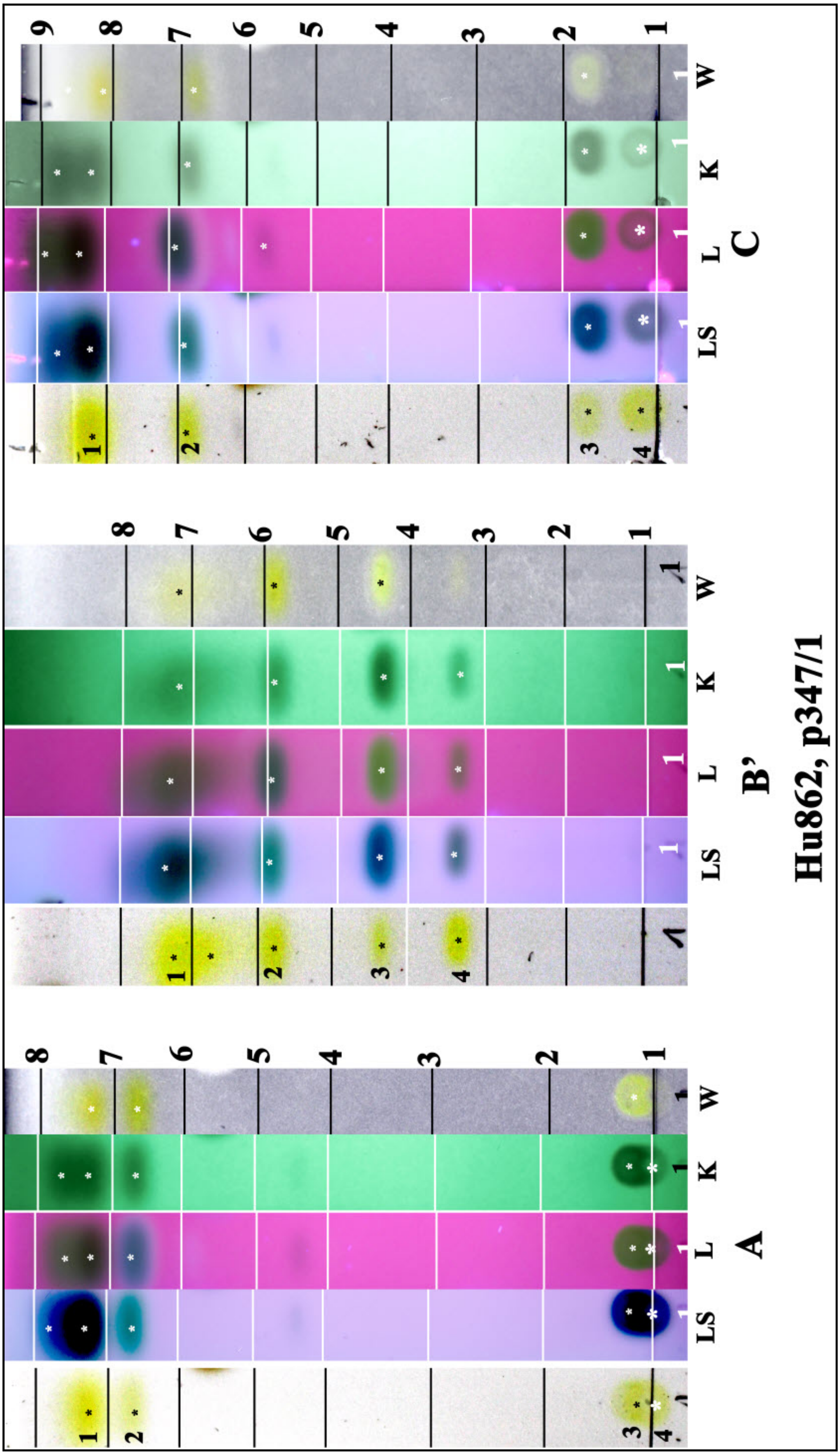
picrolichenic acid



1: picrolichenic acid, 2: unknown

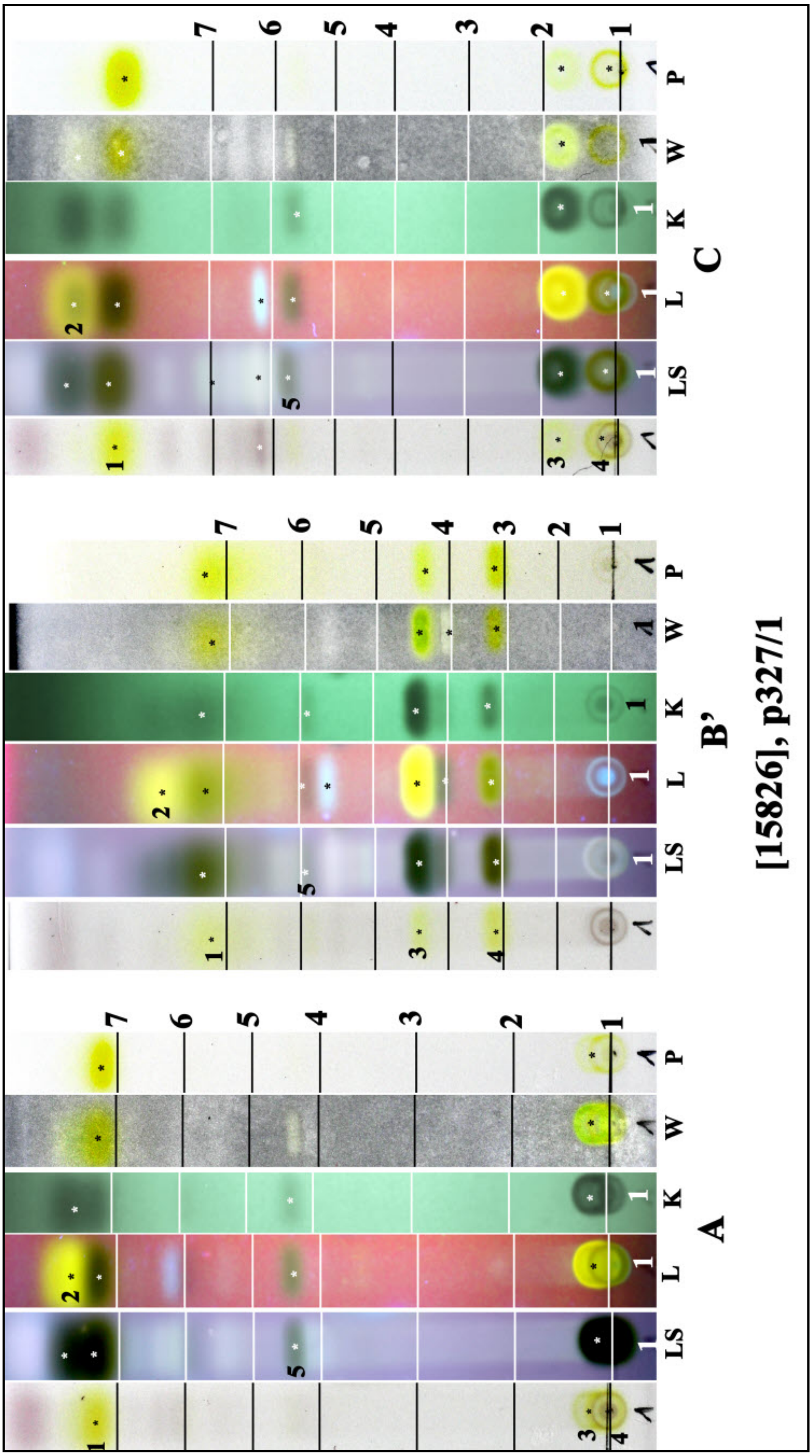
S. Huneck’s collection of lichen substances No 801: picrolichenic acid, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

pinastric acid



S. Huneck’s collection of lichen substances No 862: pinastric acid, conf. J.A. Elix.. Botanisches Museum Berlin-Dahlem

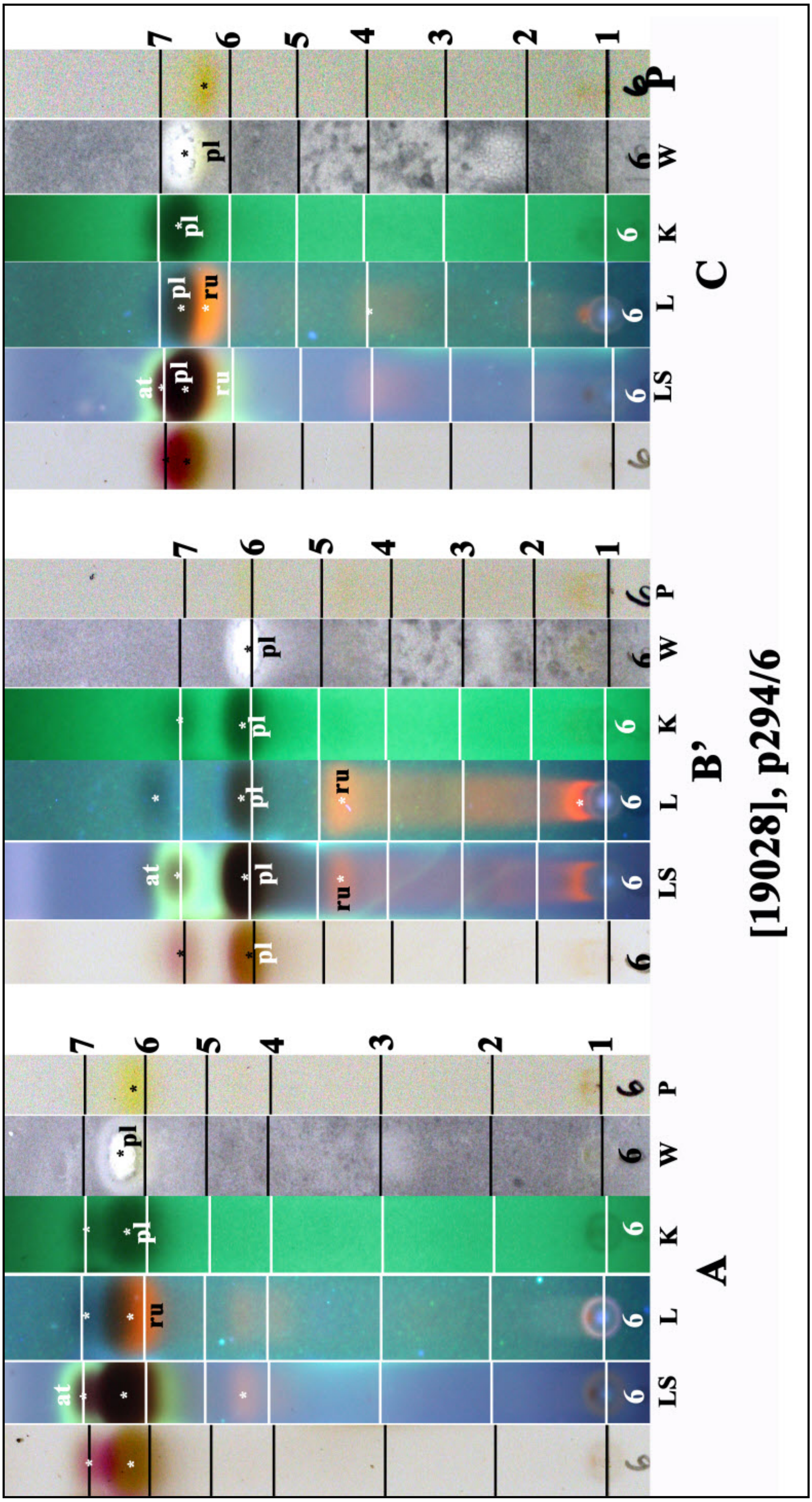
pinastric acid



1: pinastric acid, 2: pulvinic dilactone, 3: pulvinic acid, 4,5: unknown

Chrysothrix xanthina, [15826], Australia, Western Australia, North Boundary Rock c. 20 km north-northeast of Manjimup off North Boundary Road, granite outcrop associated with *Allocasuarina huegeliana* und *Corymbia calophylla,* 34.072° S, 116,325° E, 320 m, growing on bark. Leg. F. Schumm & E. Stocker-Wörgötter, 25.10.2009.

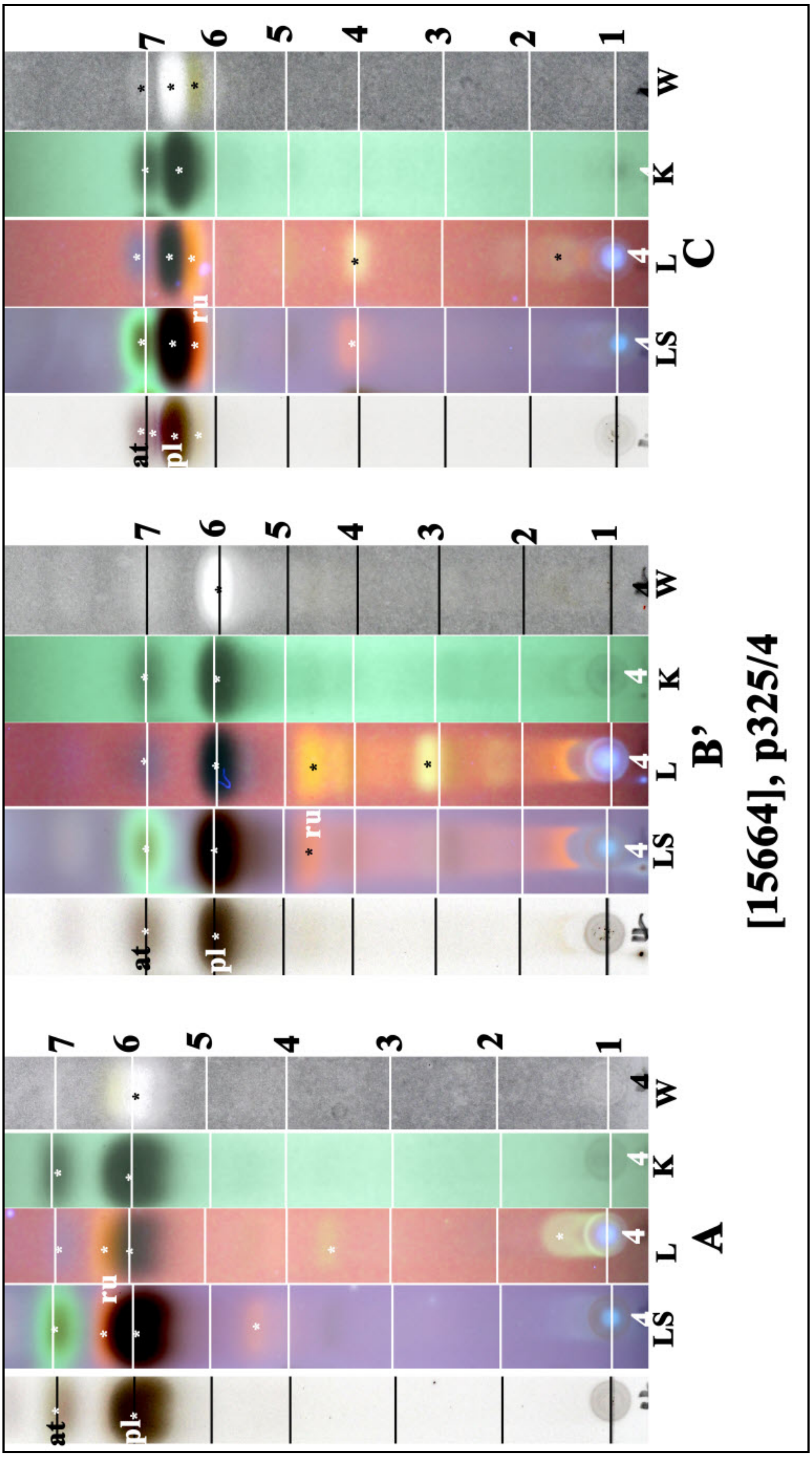
placodiolic acid



at: atranorin, **pl: placodiolic acid**, ru: russulone

Haematomma eremaeum [19028], Australia, Western Australia, Pumphreys Bridge, 21 km south-west of Pingelly

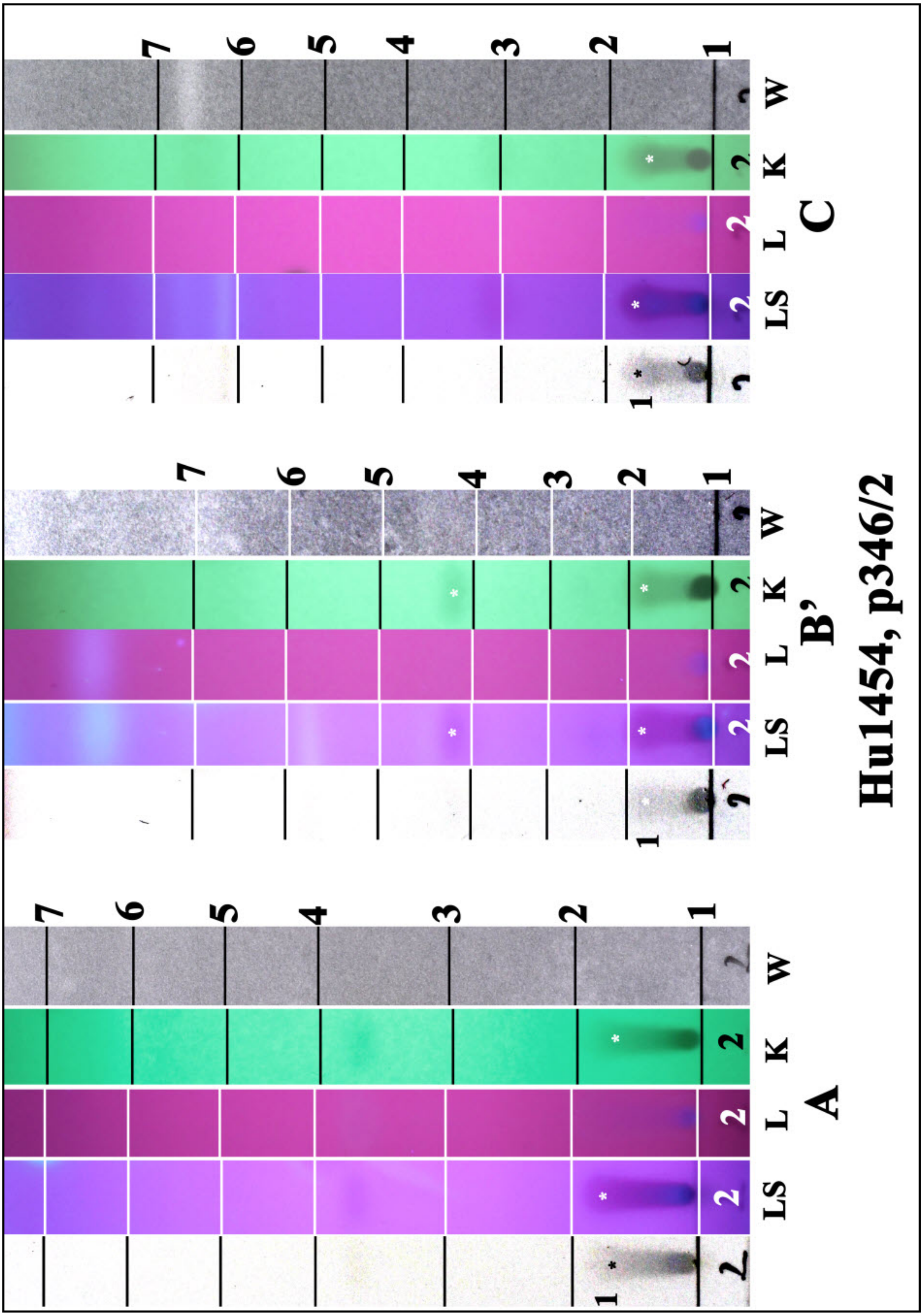
placodiolic acid



at: atranorin, **pl: placodiolic acid**, ru: russulone

Haematomma eremaeum, [15664], Australia, Western Australia, between Narrogin und Williams, allee beside the street, 32.983°S, 117.067° E, 336 m. Leg. F. Schumm & E. Stocker-Wörgötter, 22.10.2009, det. J.A. Elix.

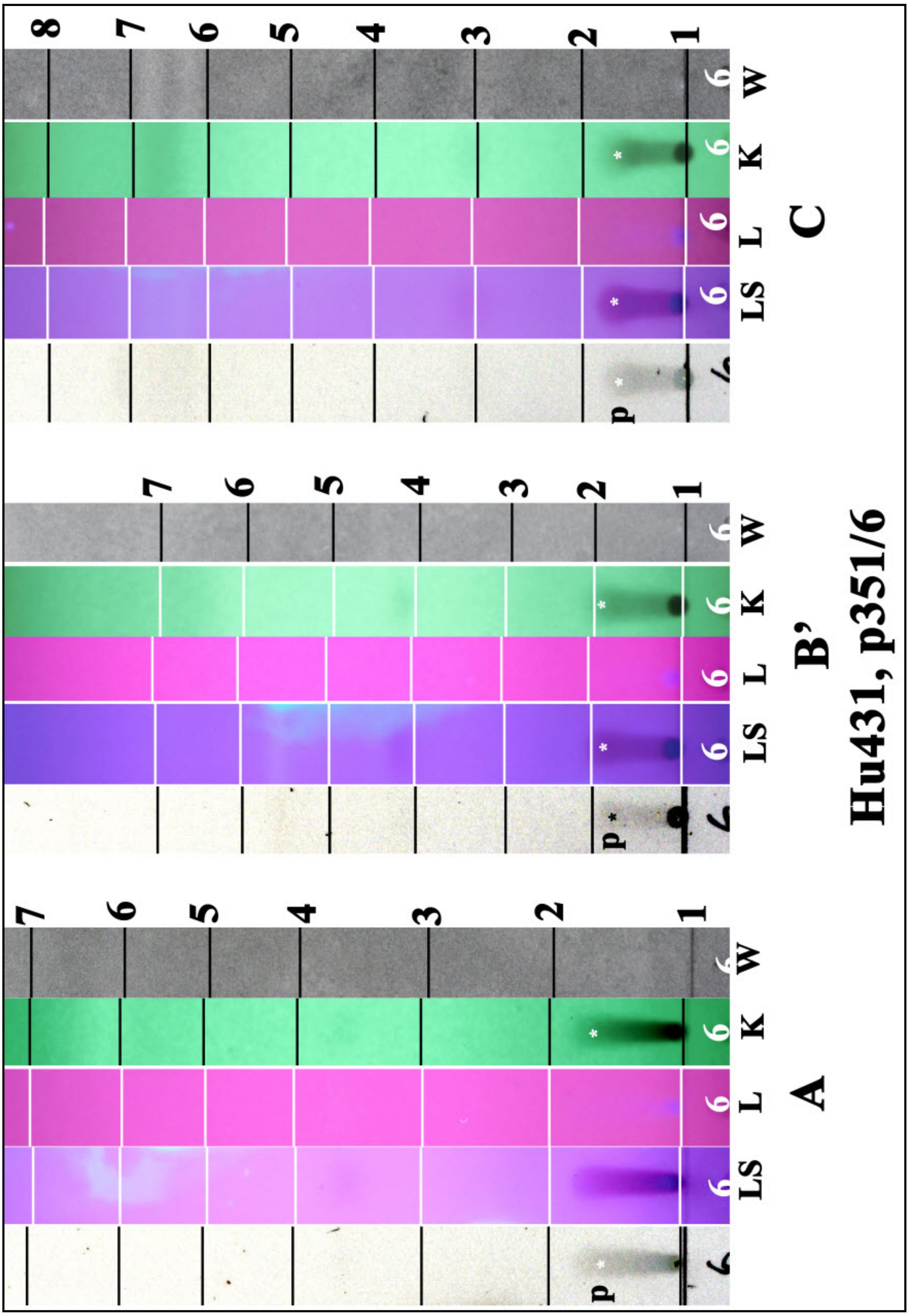
porphyrilic acid



1: porphyrilic acid

S. Huneck's collection of lichen substances No 1454: porphyrilic acid, conf. J.A. Elix. Botanisches Museum Berlin-Dahlem

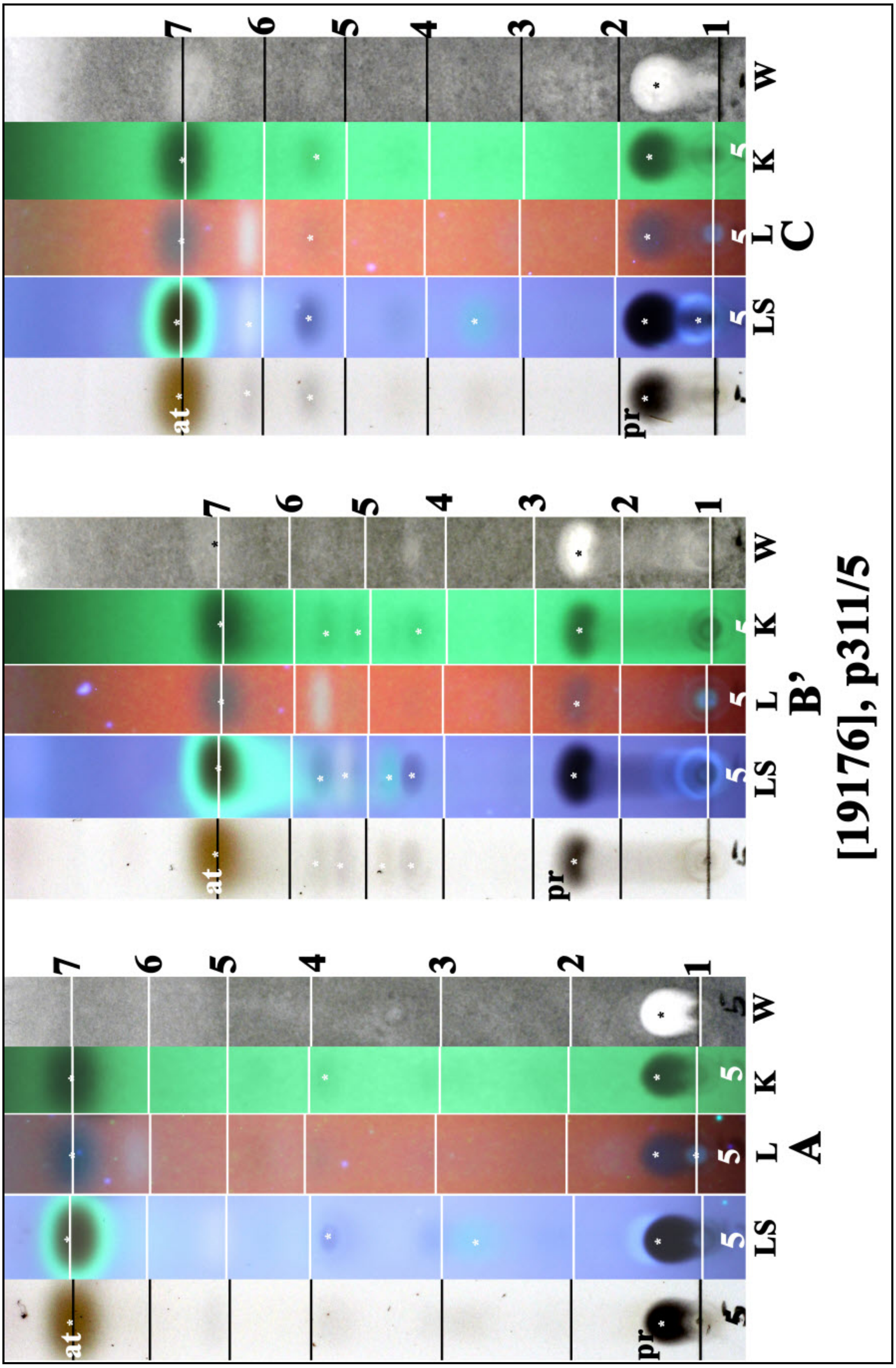
porphyrilic acid



p: porphyrilic acid, conf. J.A. Elix

S. Huneck's collection of lichen substances No 431: porphyrilic acid aus Stereocaulon sp.
Botanisches Museum Berlin-Dahlem

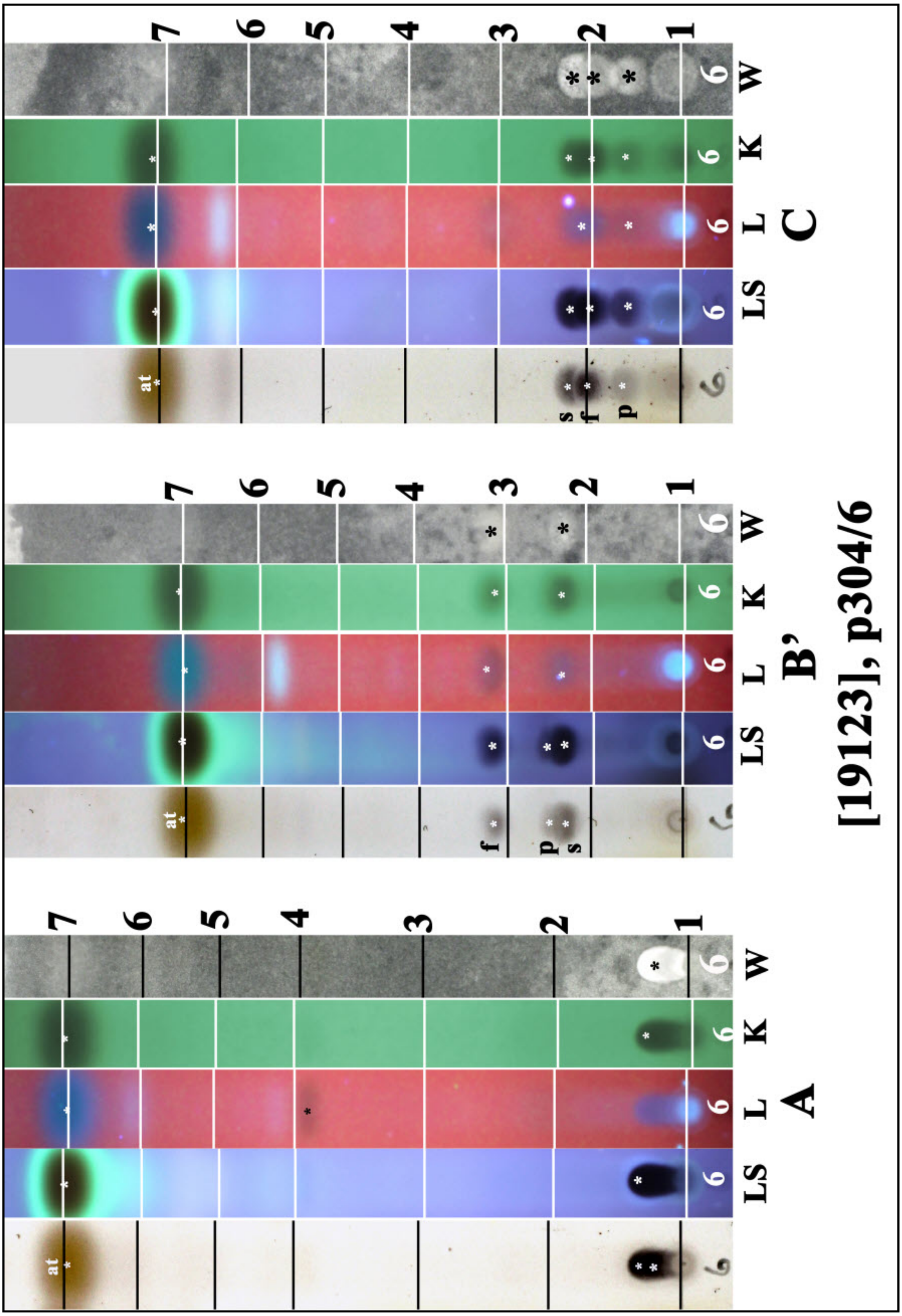
protocetraric acid



at: atranorin, pr: protocetraric acid

Notoparmelia crambidiocarpa, [19176], New Zealand, South Island, Canterbury, north-eastern boundary of Otepatotu Scenic Reserve, Summit Road, outer Banks Peninsula, 720 m.

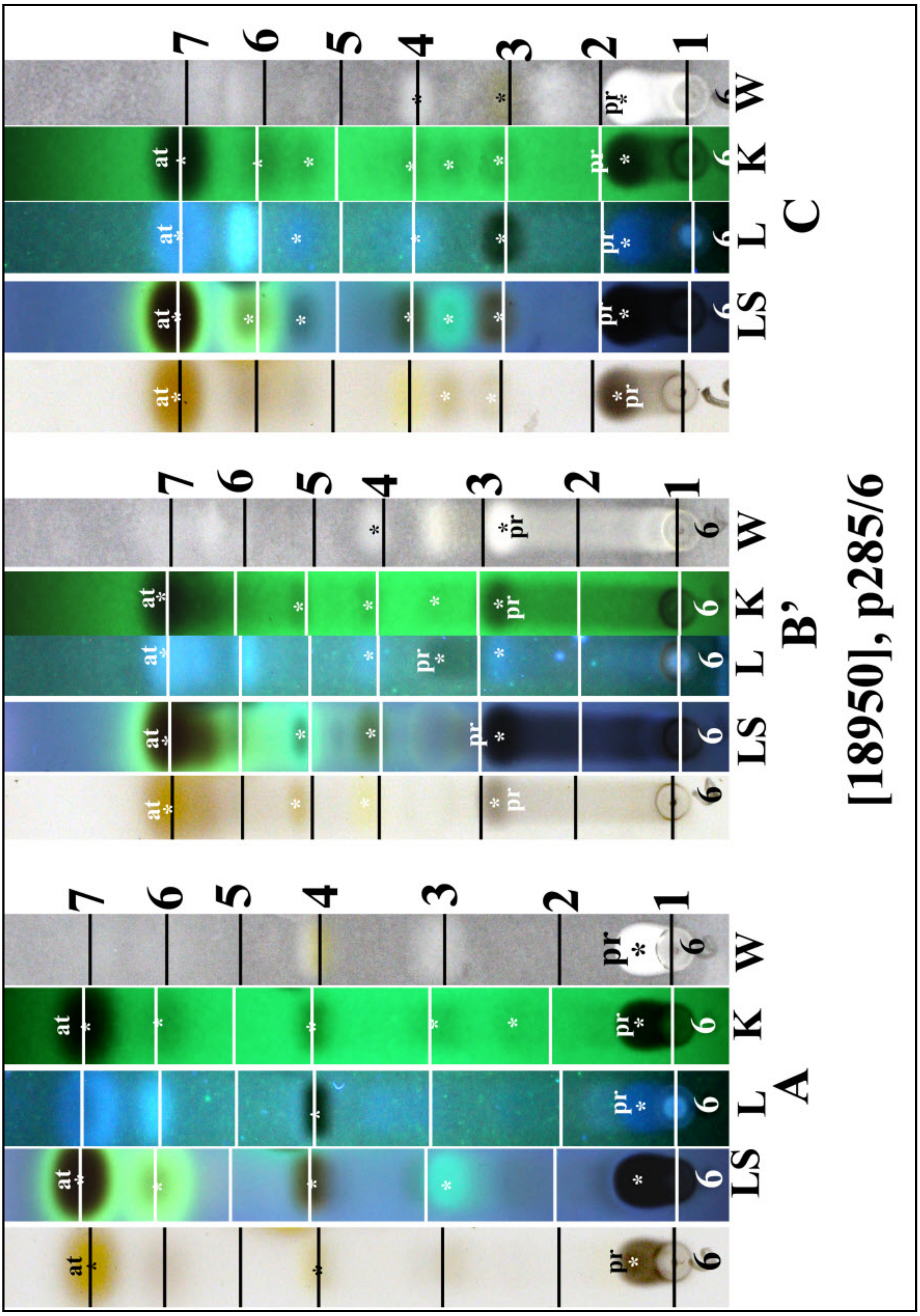
protocetraric acid



at: atranorin, **p: protocetraric acid**, f:fumarprotocetraric acid, s: succinprotocetraric acid

Parmotrema queenslandense, [19123], Australia, Queensland, Mt. Catharina, 10 km north-east of Ingham.

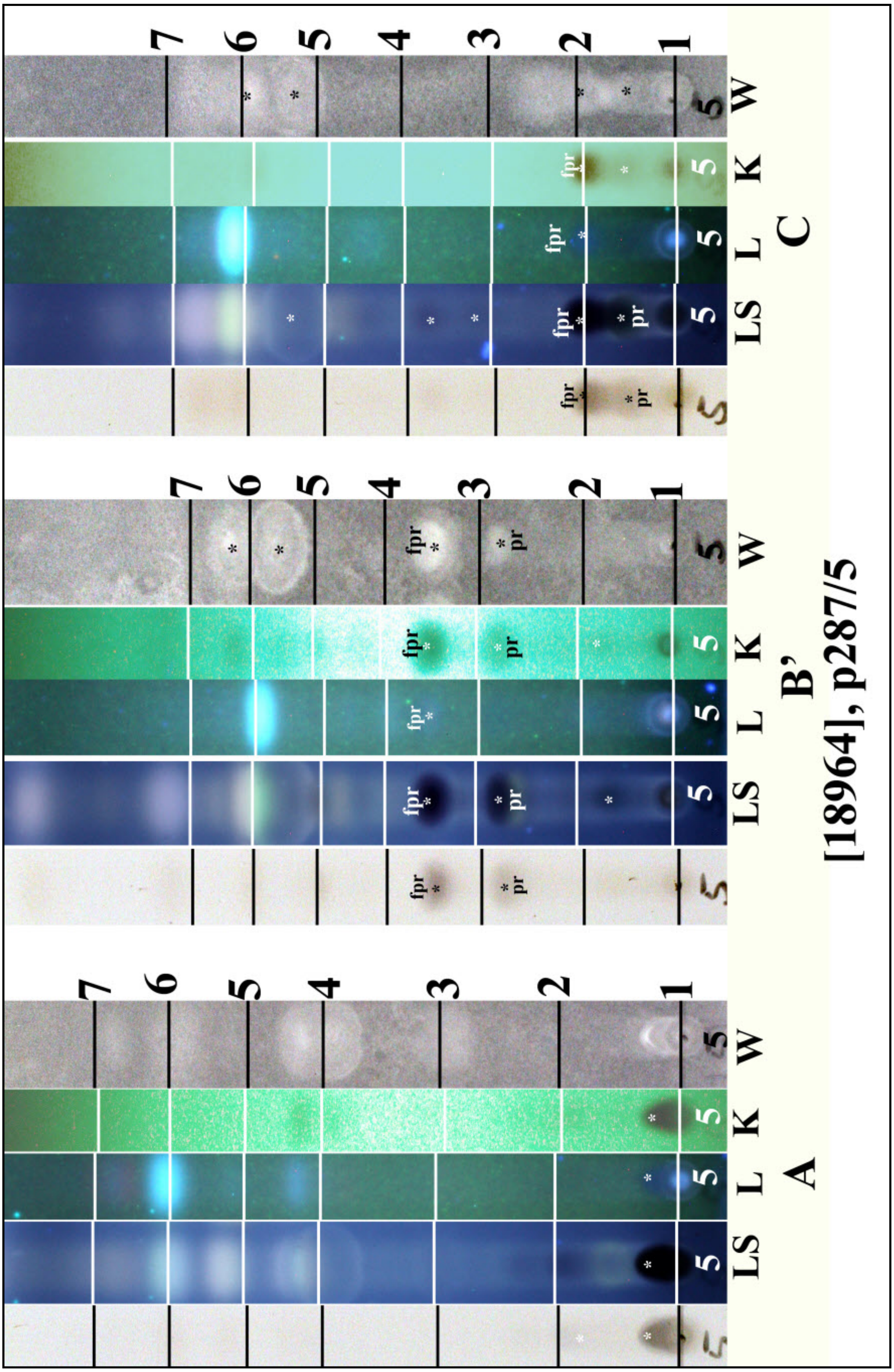
protocetraric acid



at: atranorin, pr: protocetraric acid

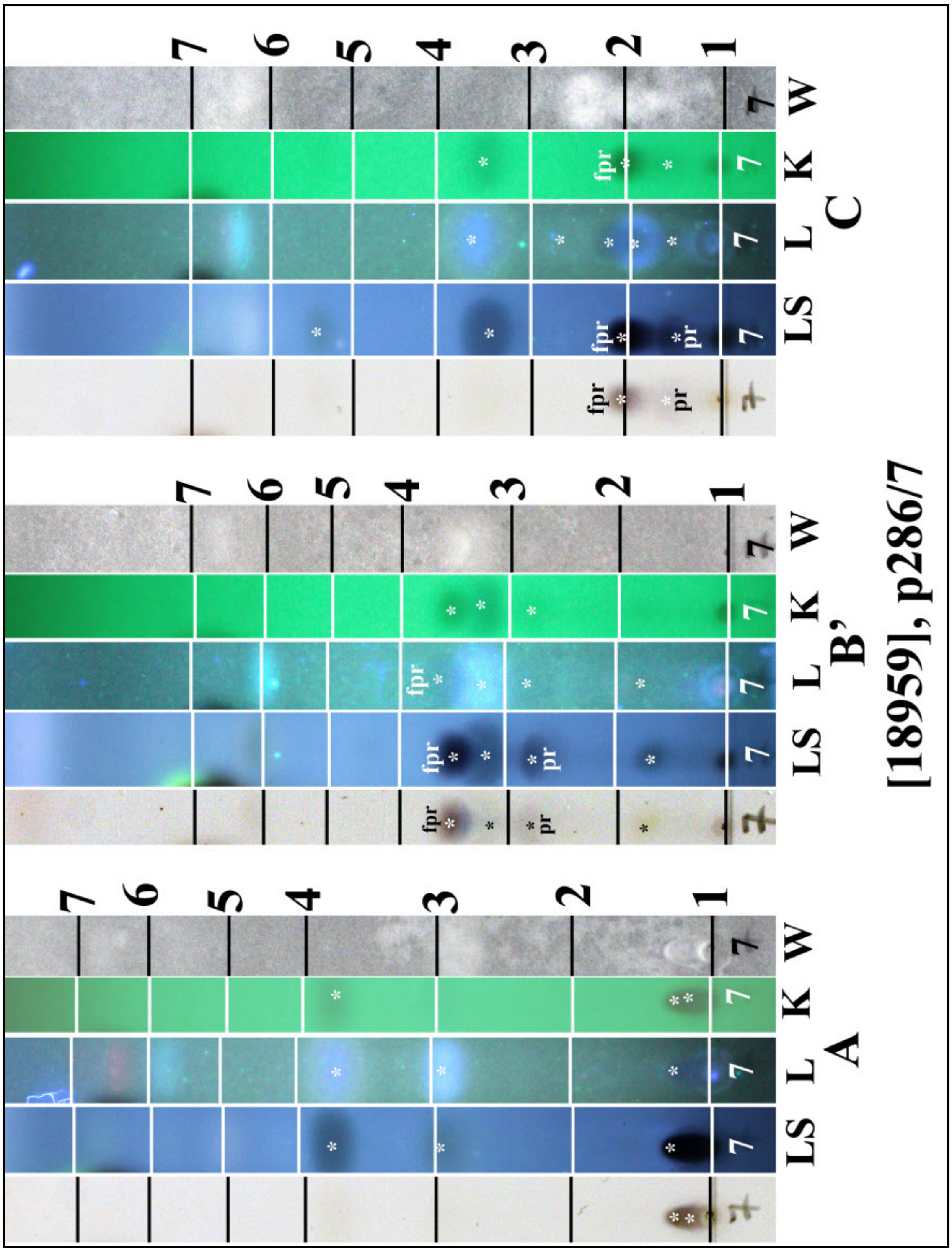
Canoparmelia raunkiaeri, [18950], Australia, Northern Territory, Arnhem Land, 18 km east-north-east of Jabiru airfield.

protocetraric acid



Cladonia fruticulosa, [18964], Australia, Queensland, Main Coast Range, Windmill Creek, 14 km north-north-west of Mt. Molloy.

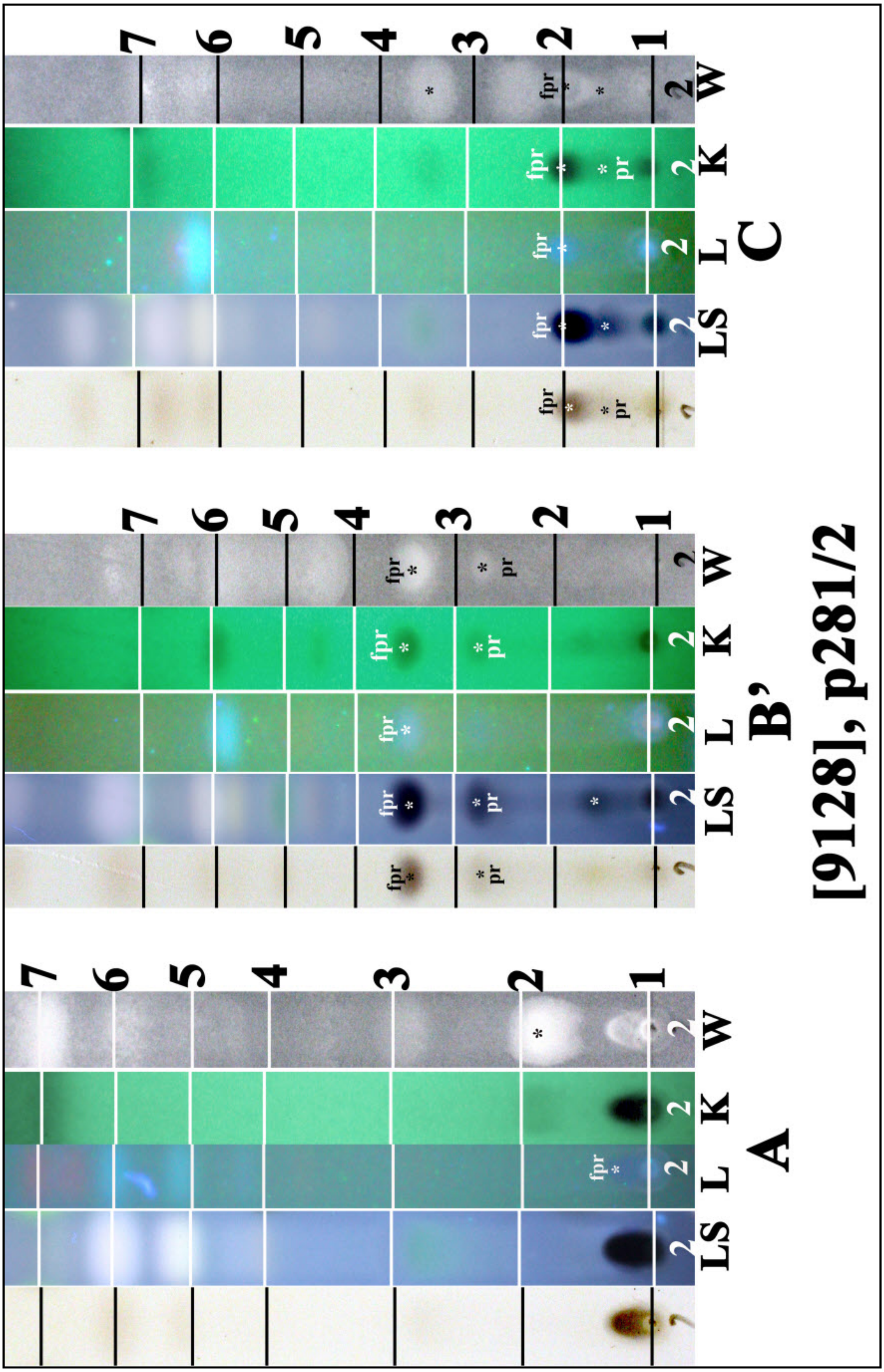
protocetraric acid



fpr: fumarprotocetraric acid, pf: protocetraric acid

Cladia inflata, [18959], Australia, New South Wales, Morton National Park.

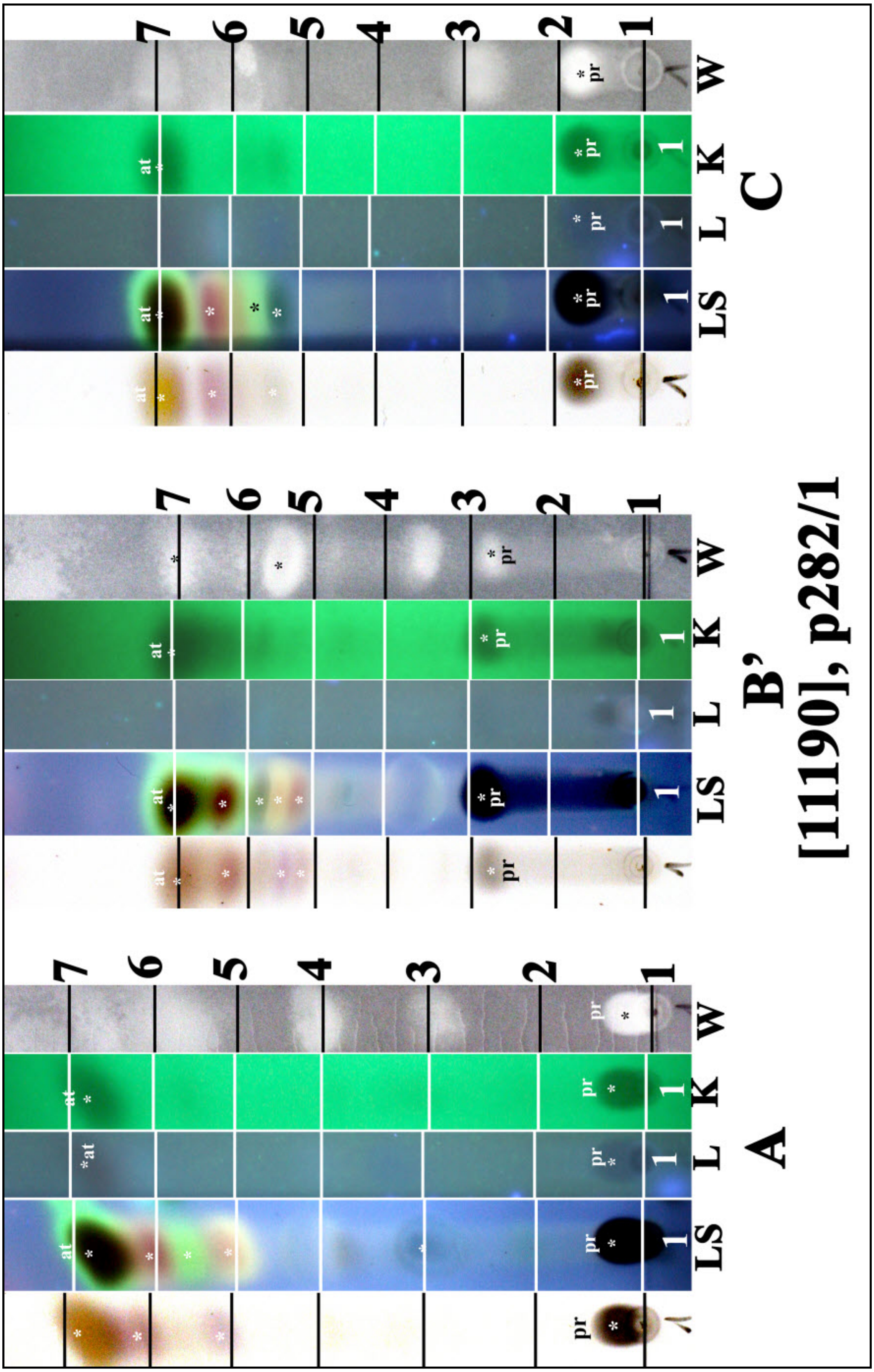
protocetraric acid



pr: protocetraric acid, fpr: fumarprotocetraric acid

Cladonia cervicornis, [9128], Spanien, Kanarische Inseln, La Gomera, beim Mirador de Alojera (Piedras Hincadas) nördlich von Arure im Lorbeer-Erica Wald, 28°08.995' N, 17°18.483 W, 1000 m. Leg. F. Schumm 10.02.2002, det. T. Ahti 2010.

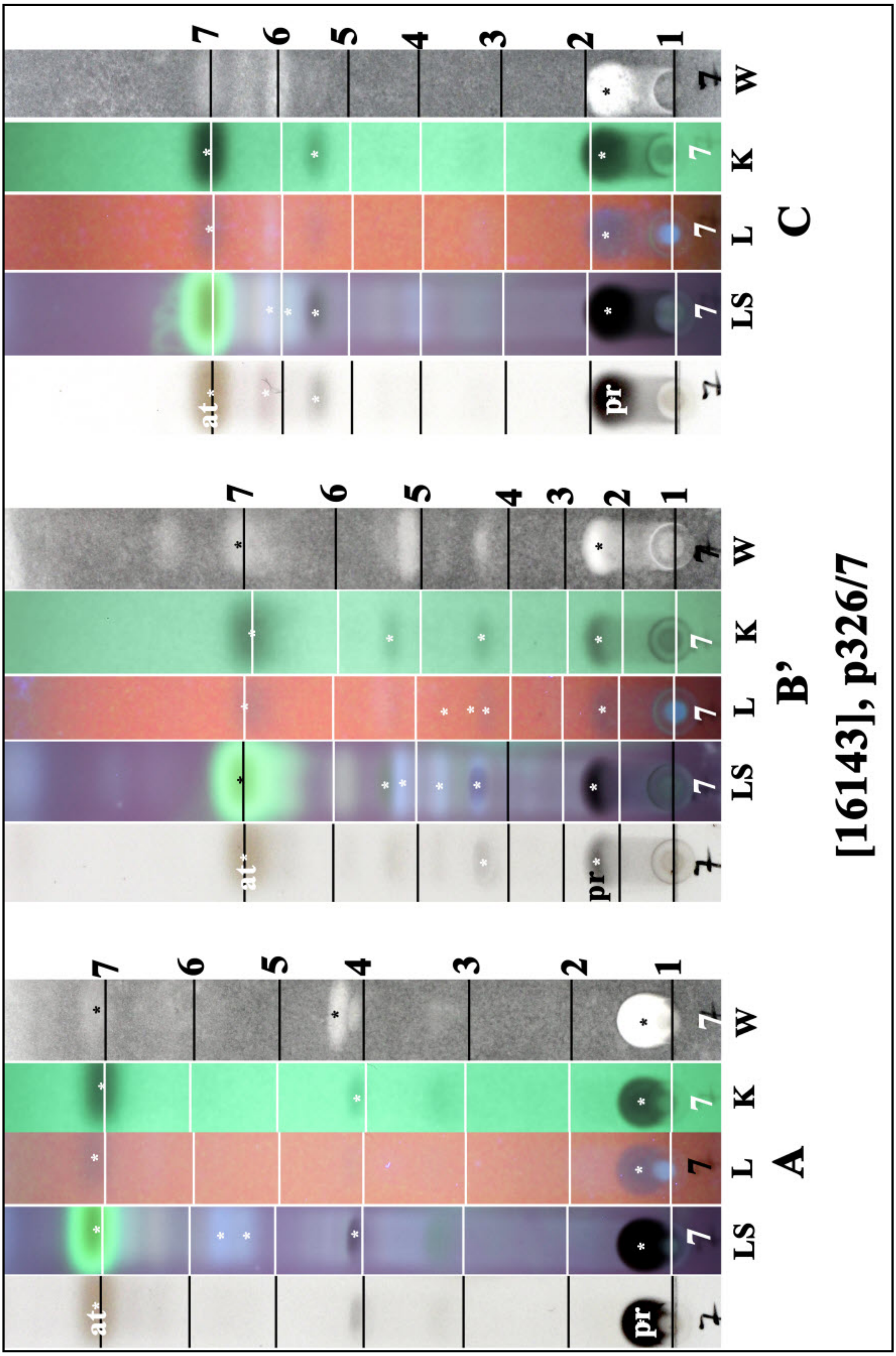
protocetraric acid



at: atranorin, pr: protocetraric acid

Lecanora albella [11190], Portugal, Azoren, Sao Miguel, SO-Ufer des Lagoa Azul, 37°51.307' N, 25°47.060' W, 280 m, an Laubbaumrinden. F. Schumm 06.06.2003, det. A. Aptroot. Thallus, Scheibe u. Rand: K gelb, C-, KC gelb; P: Rd rotorange, Th gelblich

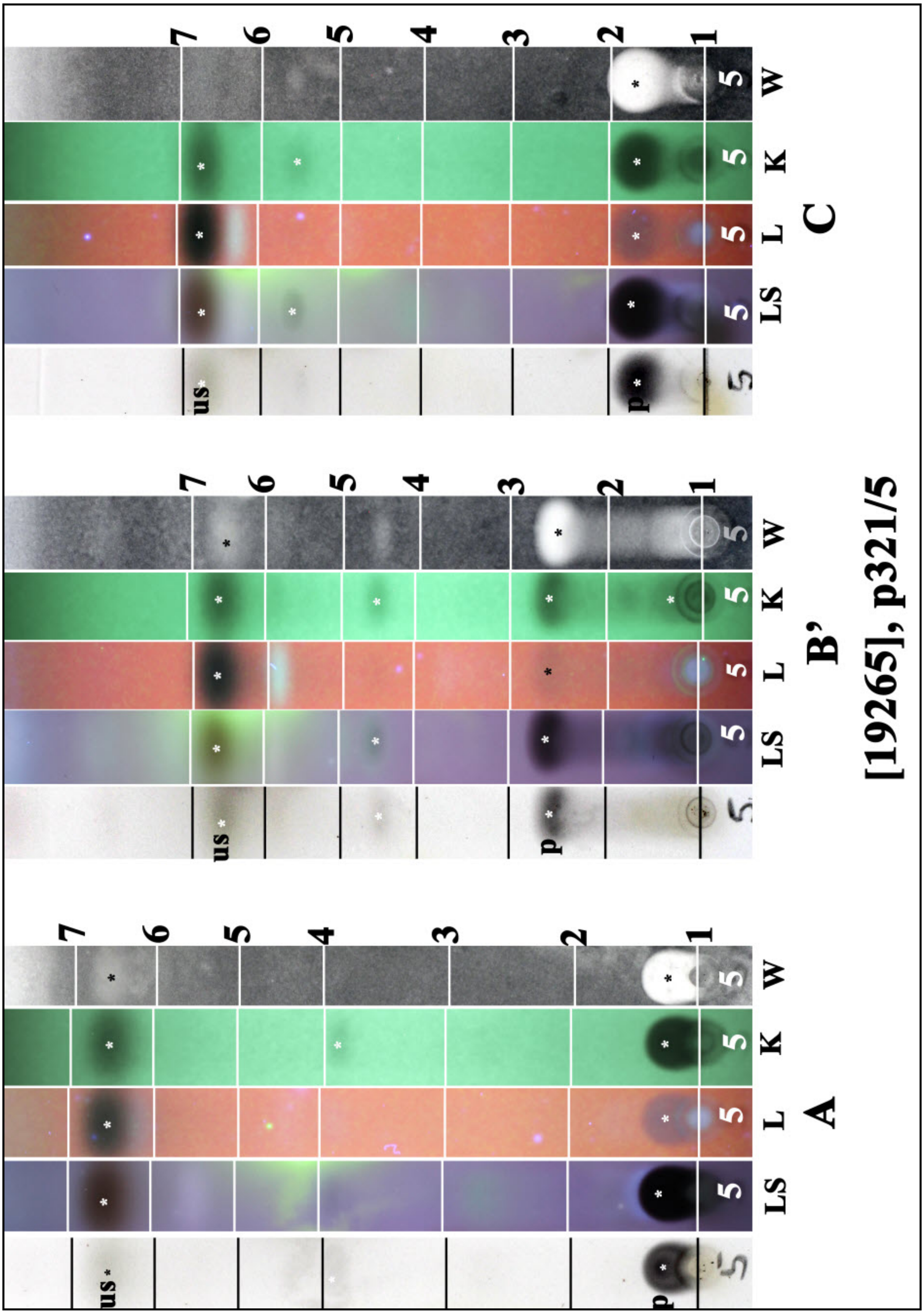
protocetraric acid



at: atranorin, pr: protocetraric acid

Lecanora caesiorubella, [16143], Australia, New South Wales, north of Batemans Bay, Cullendulla Creek Nature Reserve, on *Avicennia marina*, 35.701° S, 150,199° E, 3 m. Leg. F. Schumm & E. Stocker-Wörgötter, 10.11.2009. Chemistry: atranorin, protocetraric acid by HPTLC, anal. F. Schumm.

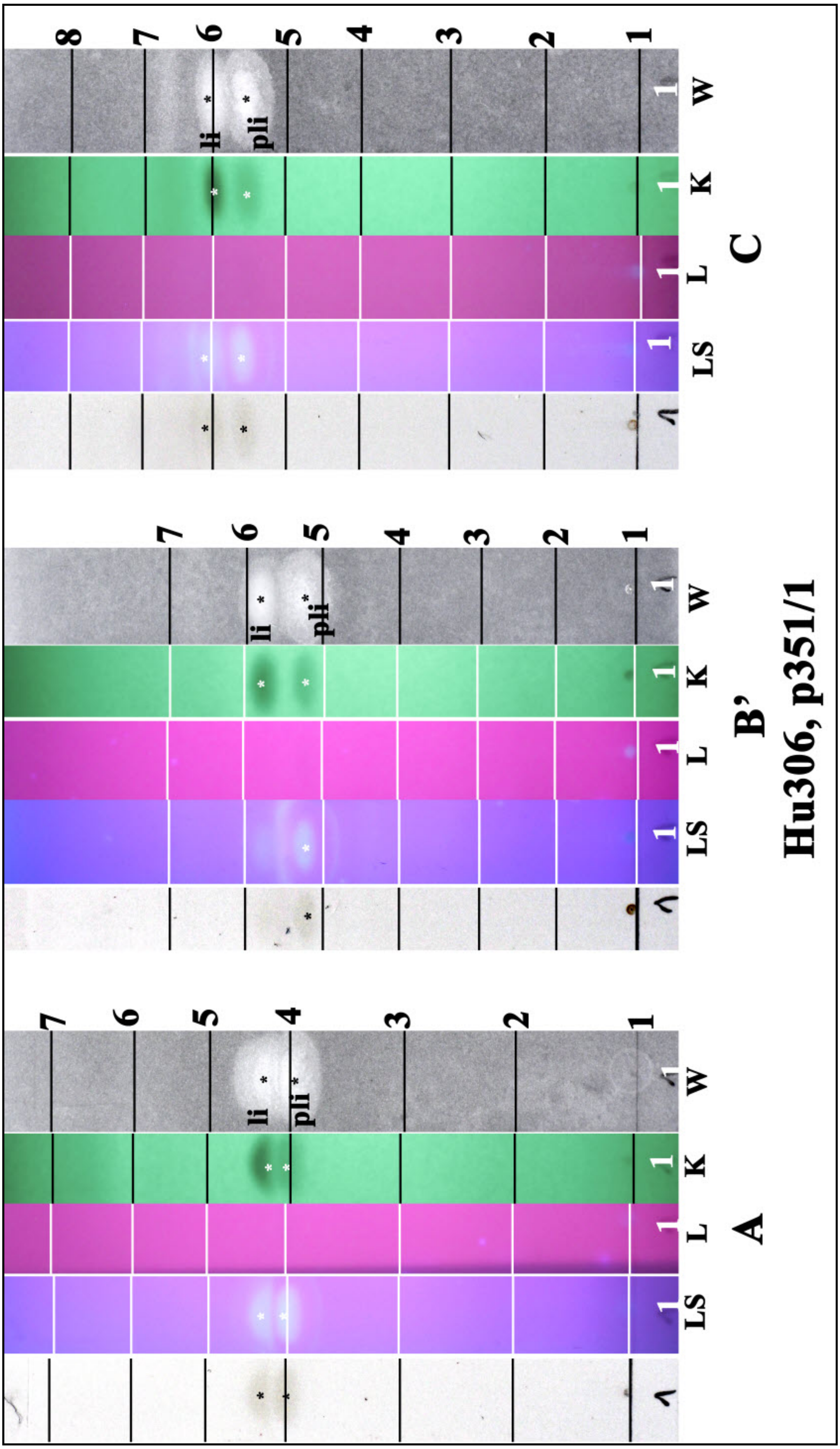
protocetraric acid



us: usnic acid, p: protocetraric acid

Relicinopsis malaccensis, [19265], Australia, Queensland, Conway State Forest, 18 km east-north-east of Proserpine, 20°21' S, 148°45' E, 180 m.

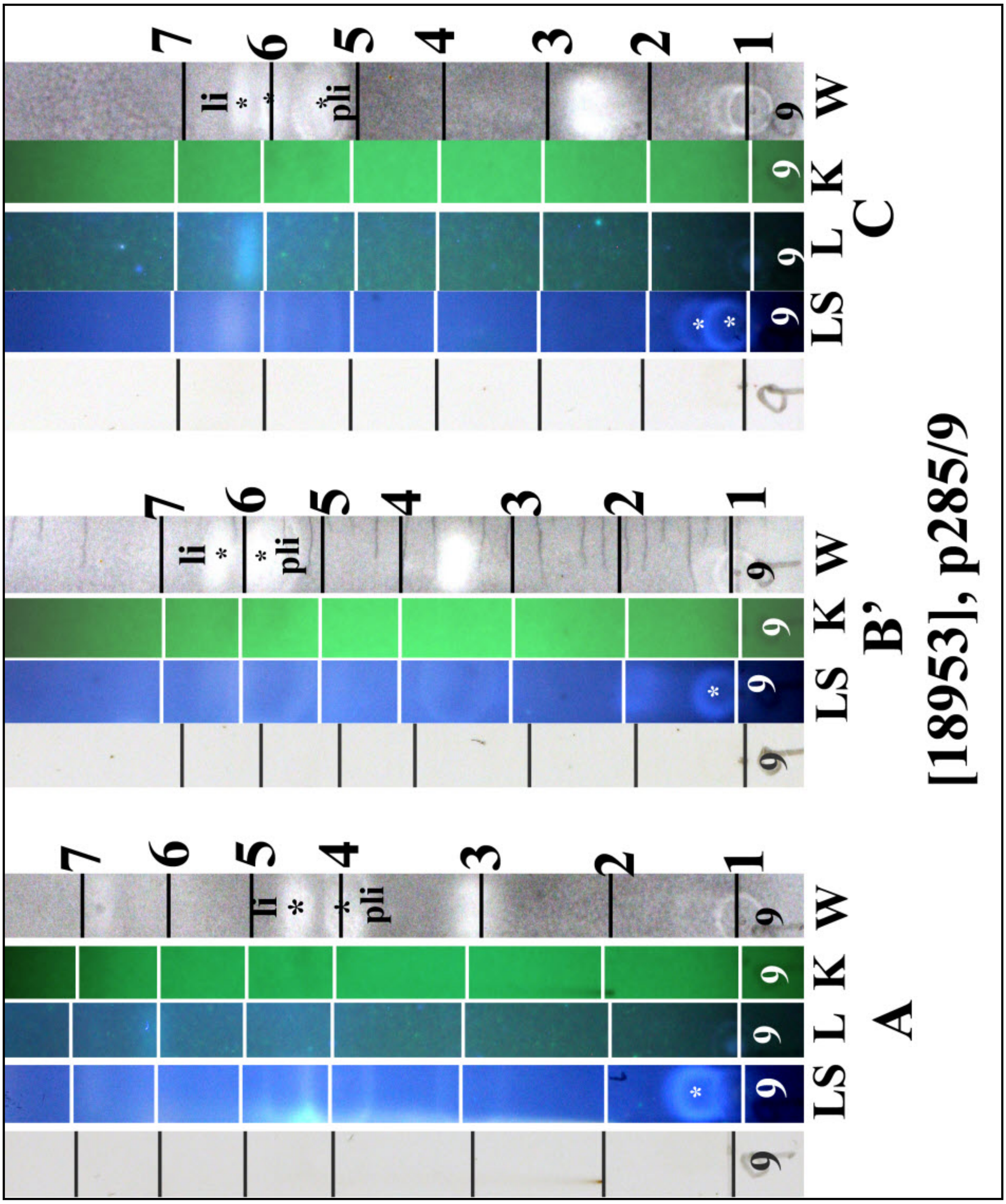
protolichesterinic acid



pli: protolichesterinic acid, li: lichesterinic acid, conf. J.A. Elix

S. Huneck's collection of lichen substances No 306: protolichesterinic acid. Botanisches Museum Berlin-Dahlem

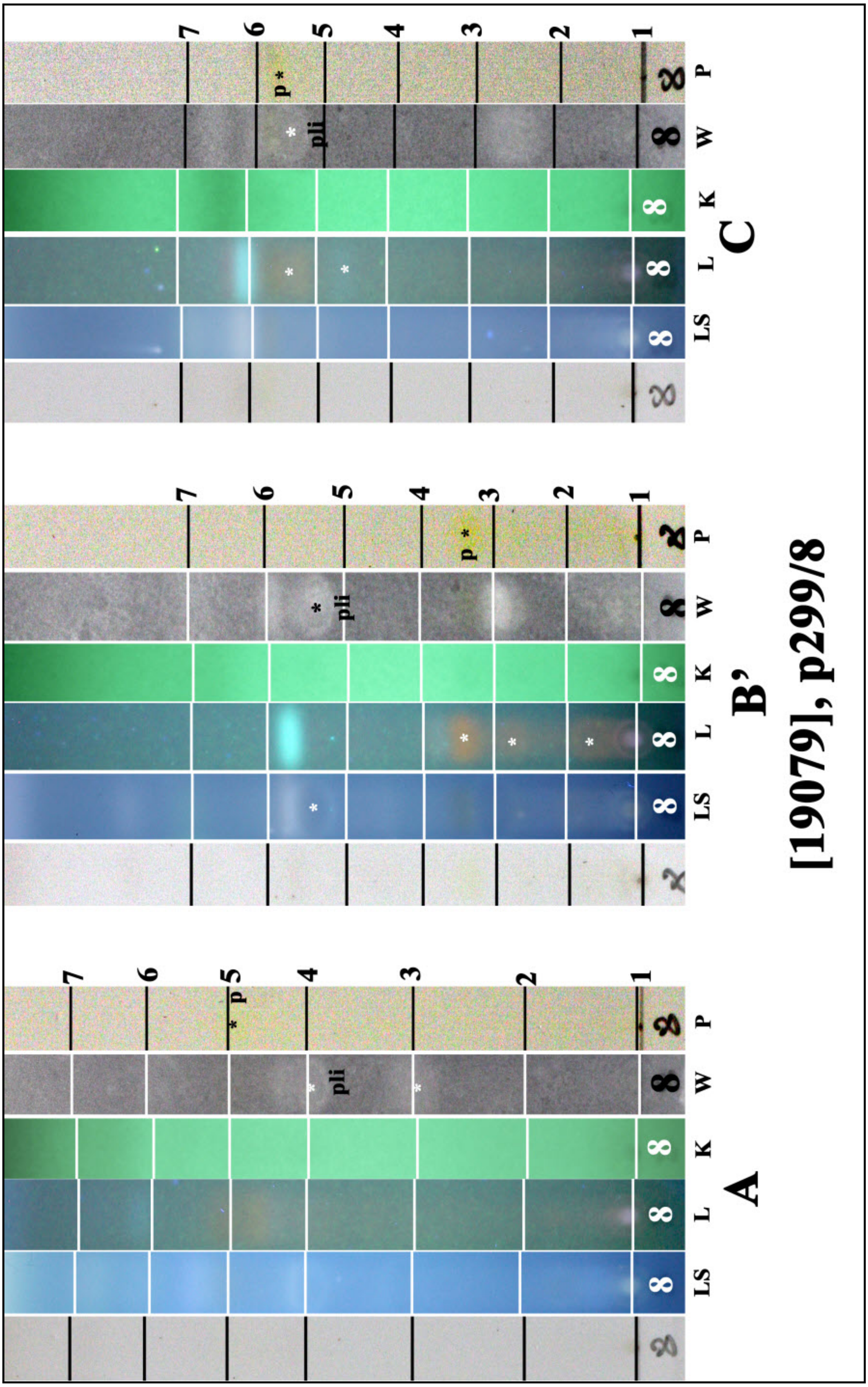
protolichesterinic acid



li: lichesterinic acid, **pli: protolichesterinic acid**

Cetraria australiensis, [18953], Australia, New South Wales, Koszciusko National Park.

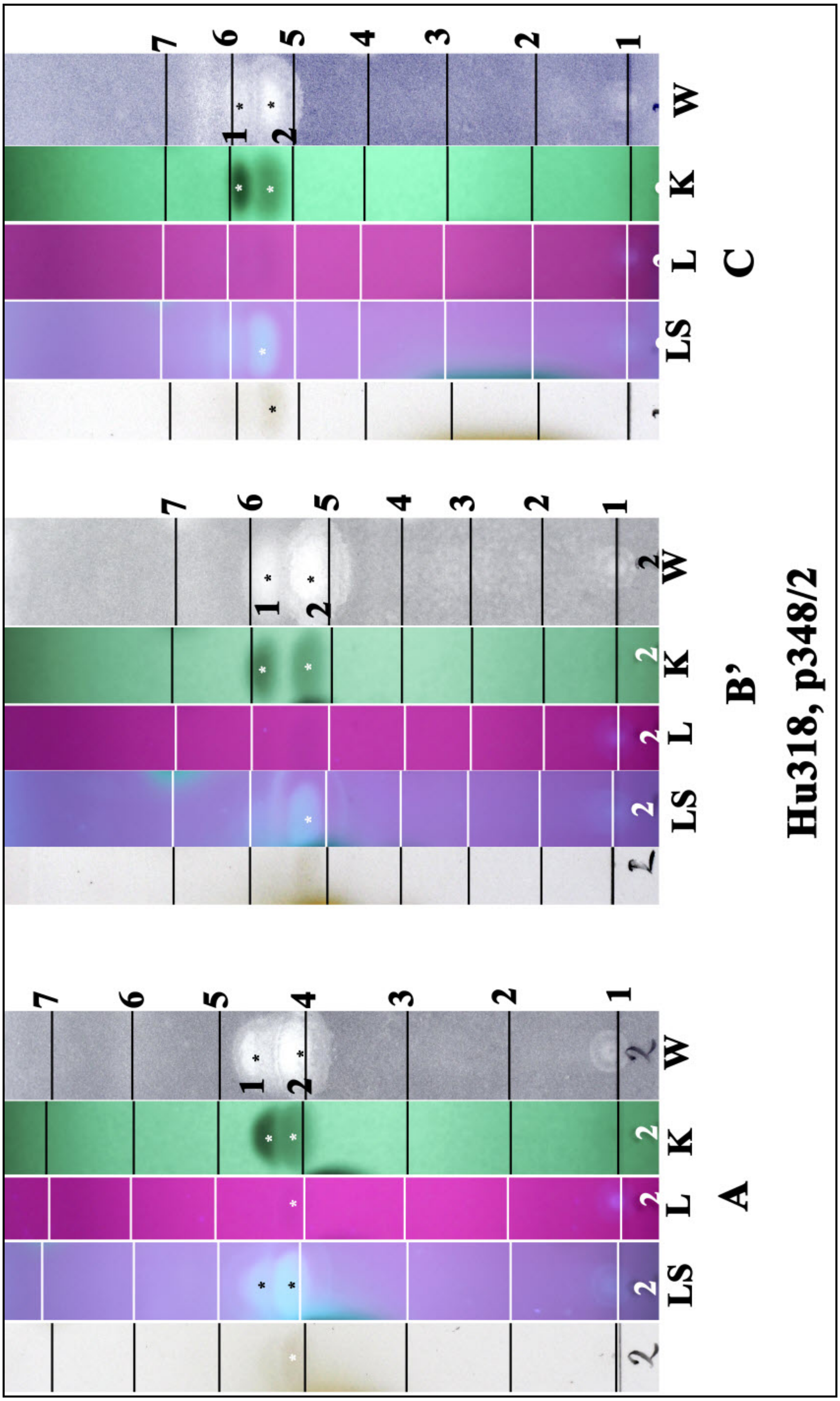
protolichesterinic acid



pli: protolichesterinic acid, p: unknown pigment

Menegazzia weindorferi, [19079], Australia, Victoria, Goonmirk Rocks, Errinundra Flora Reserve, 14 km south of Bendoc.

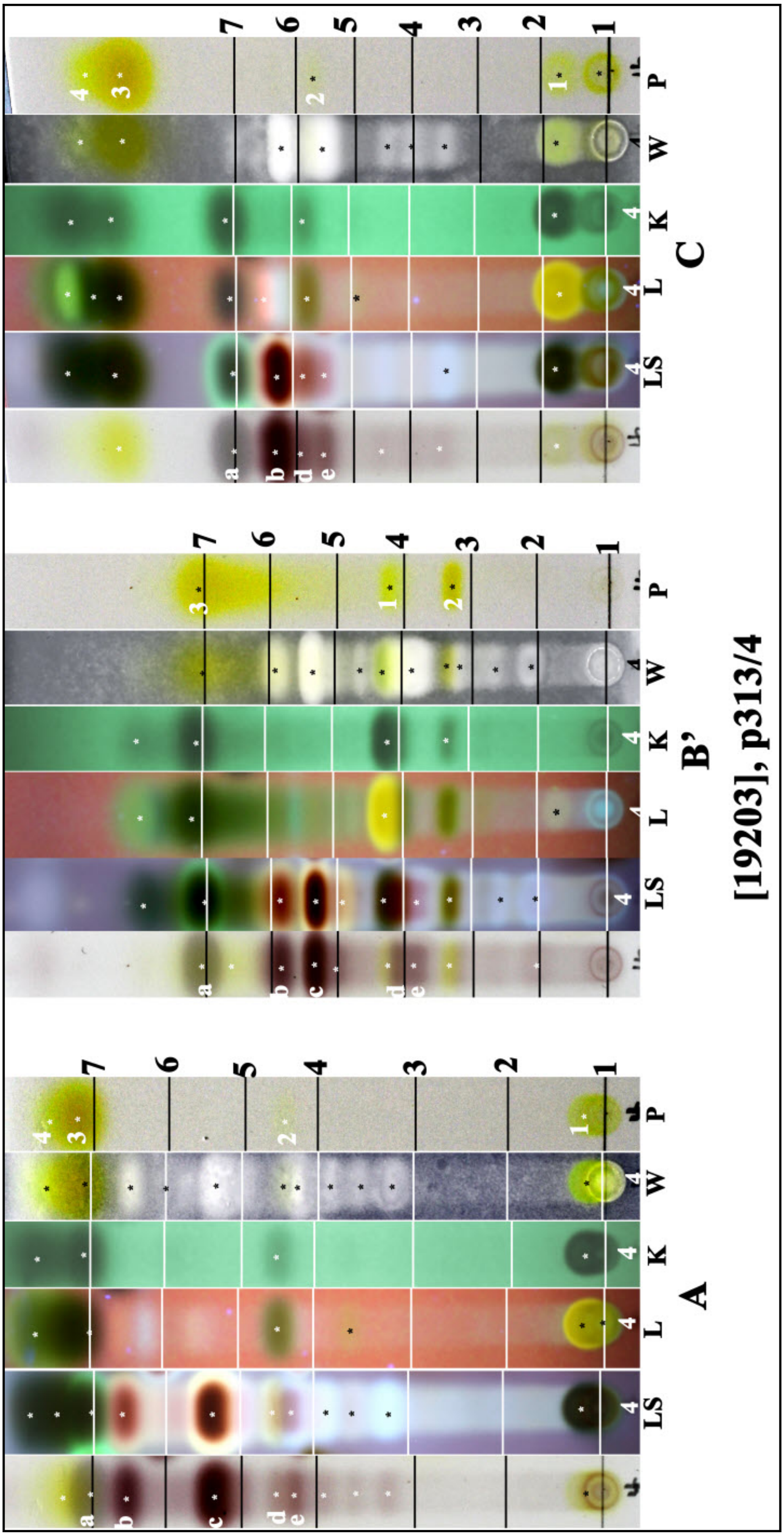
protolichesterinic acid



1: lichesterinic acid, **2: protolichesterinic acid**, conf. J.A. Elix

S. Huneck's collection of lichen substances No 318: lichesterinic acid (20%), protolichesterinic acid (80%). Botanisches Museum Berlin-Dahlem

pseudocyphellarin A

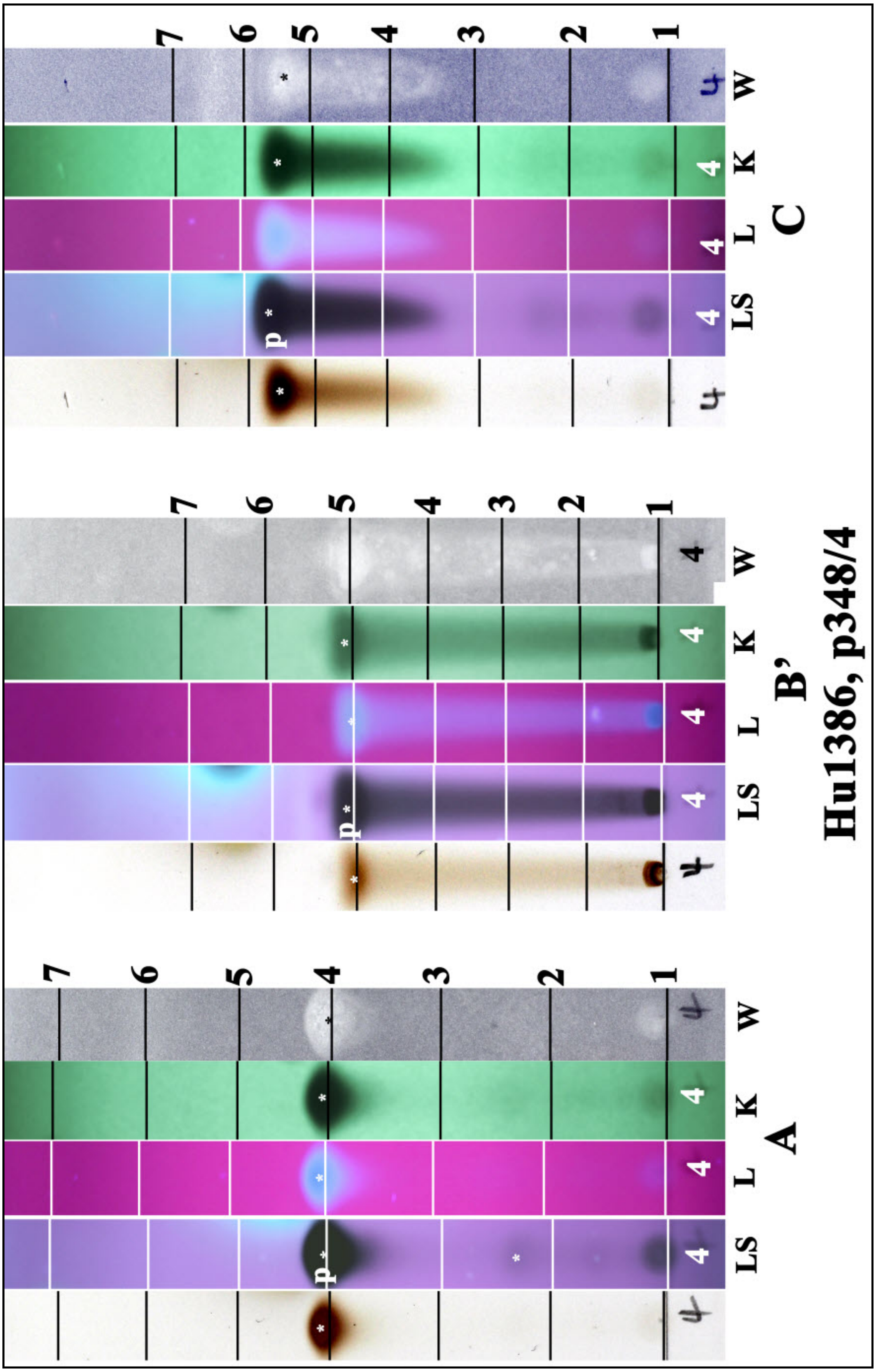


1: pulvinic acid
2: pulvinamide
3: pseudocyphellarin A
4: pulvinic dilactone + calycin

a: 22α-hydroxy-3,4-secostict-4(23)-enaldehyde
b: 22α-hydroxy-3,4-secostict-4(23)-enoic acid
c: stictane-3β,22-diol
d: 3β-acetoxystictane-2,22-diol
e: 2α-acetoxystictane-3β,22-diol

Pseudocyphellaria degelii, [19203], New Zealand, South Island, Canterbury, Porters Pass, south-west slopes of Foggy Peak, Torlesse Range, 1000 m, growing on soil and debris in subalpine heath.

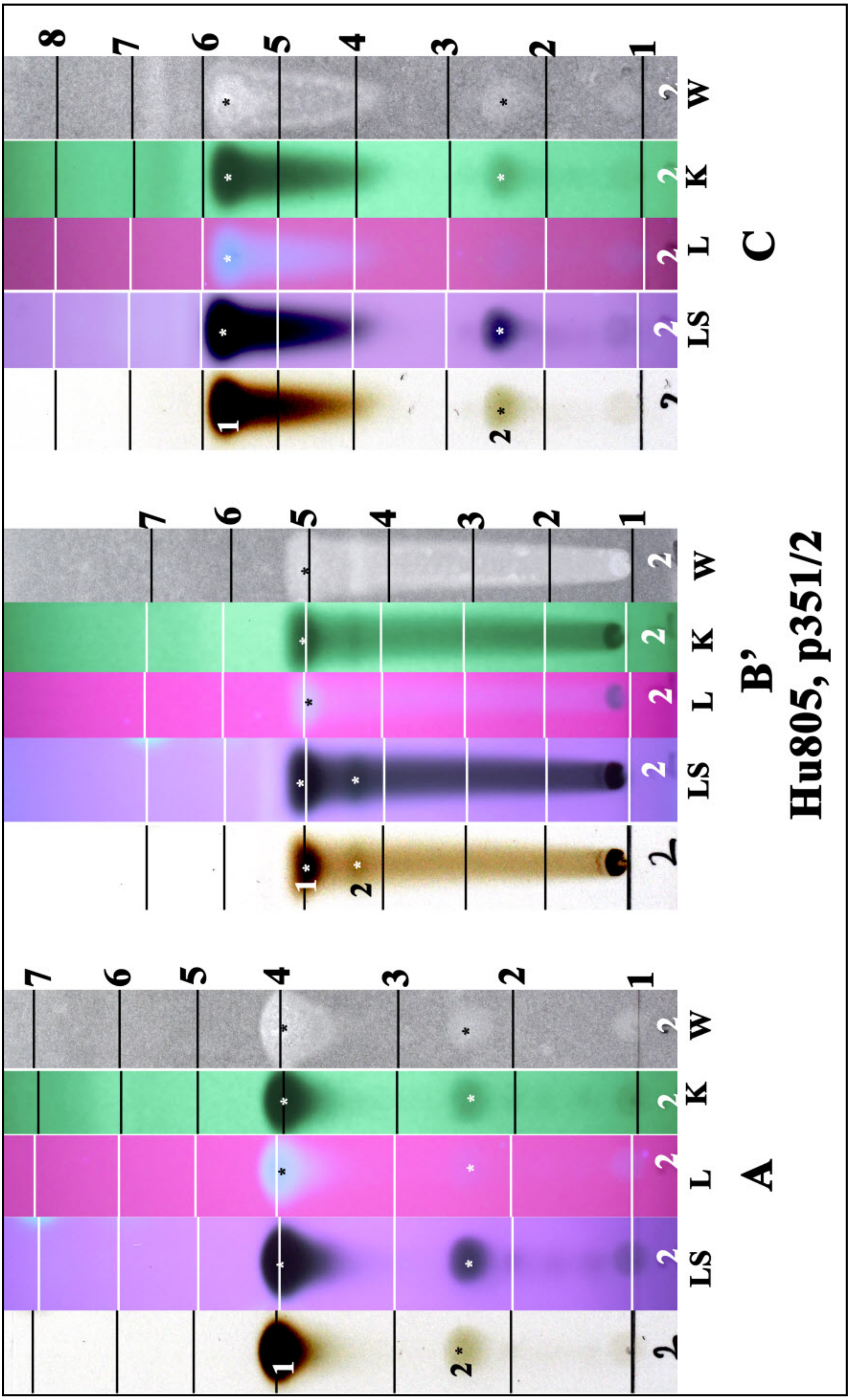
psoromic acid



p: psoromic acid, conf. J.A. Elix

S. Huneck's collection of lichen substances No 1386: psoromic acid
Botanisches Museum Berlin-Dahlem

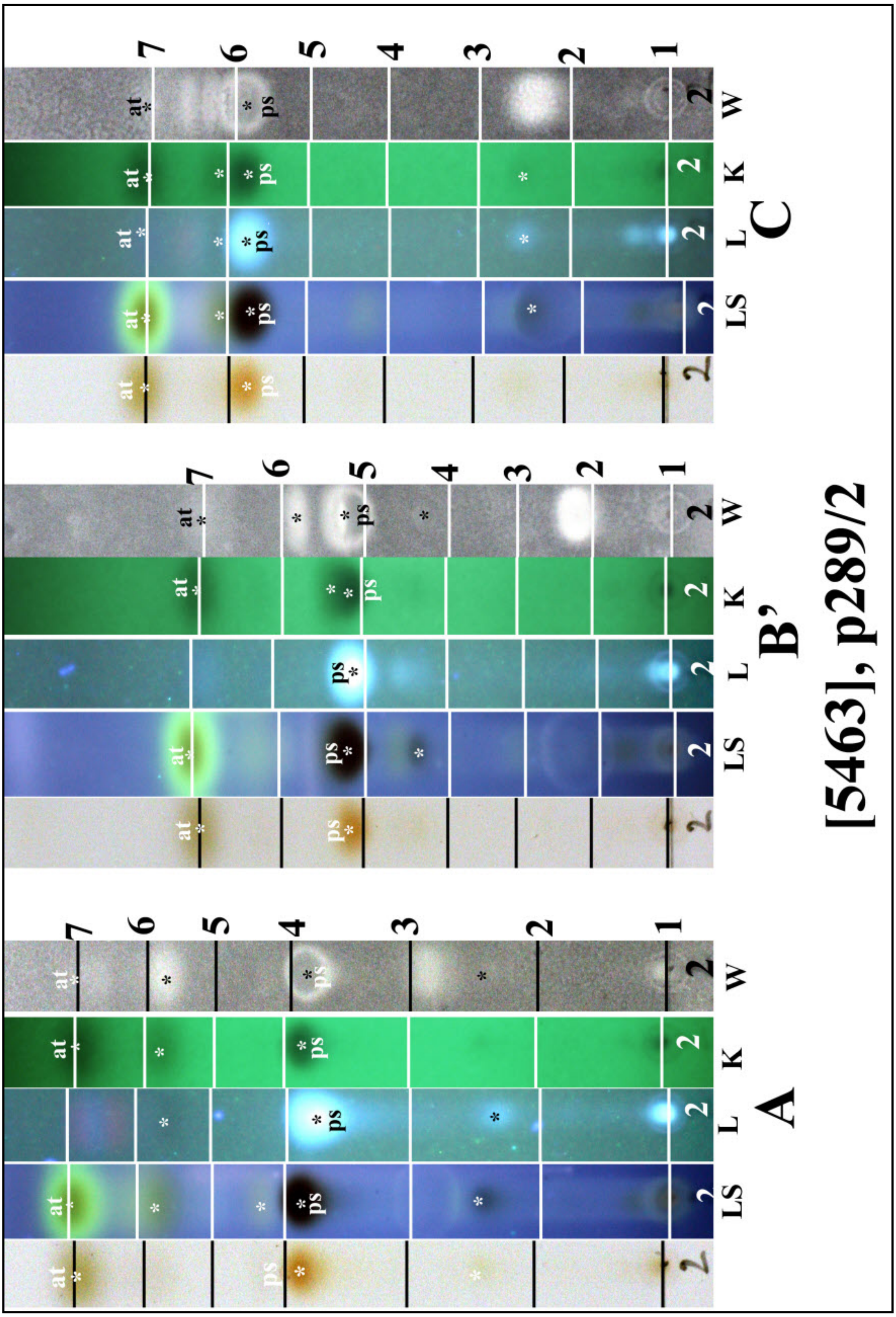
psoromic acid



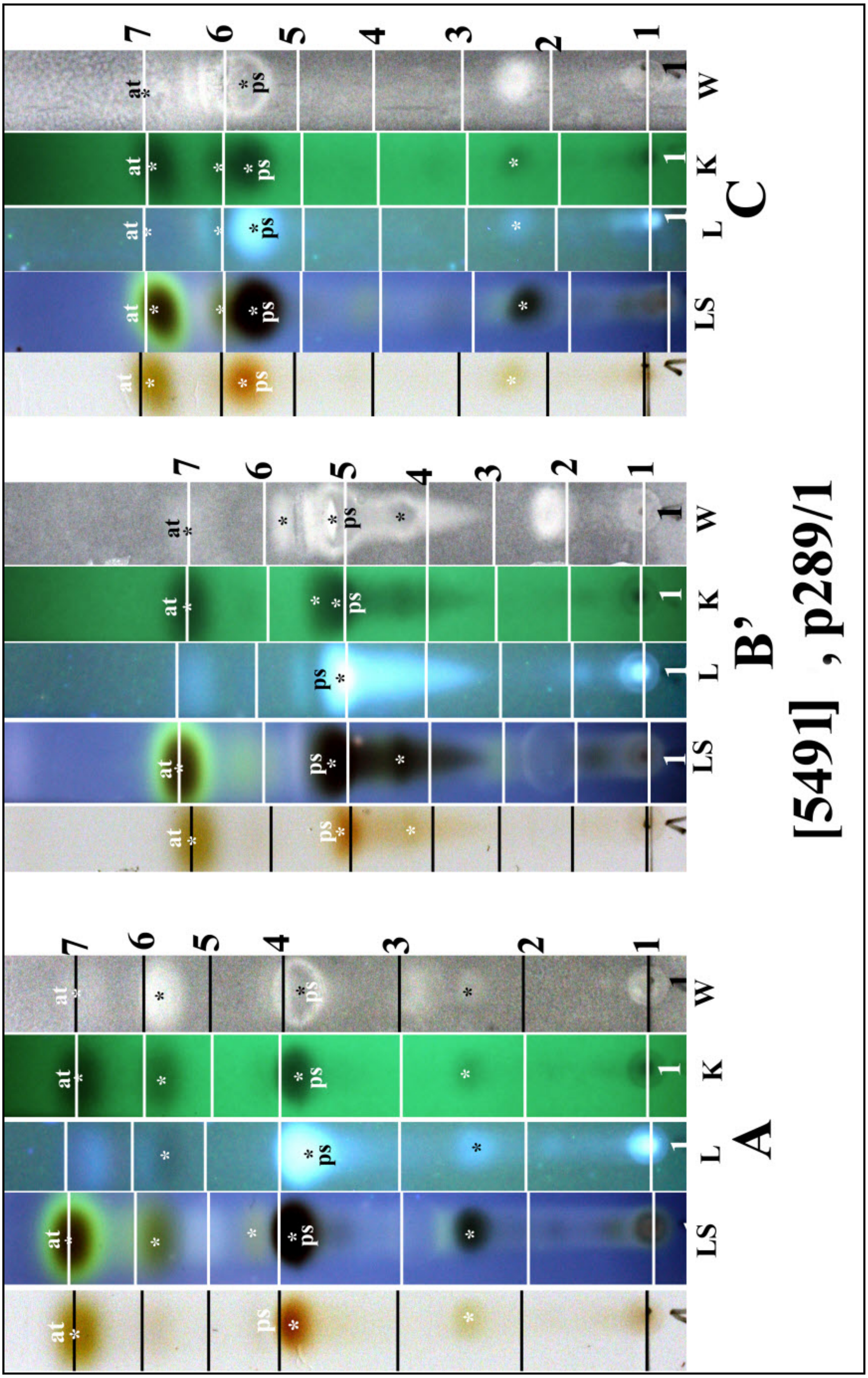
1: psoromic acid, 2: 2'-*O*-demethylpsoromic acid, conf. J.A. Elix

S. Huneck's collection of lichen substances No 805: psoromic acid
Botanisches Museum Berlin-Dahlem

psoromic acid



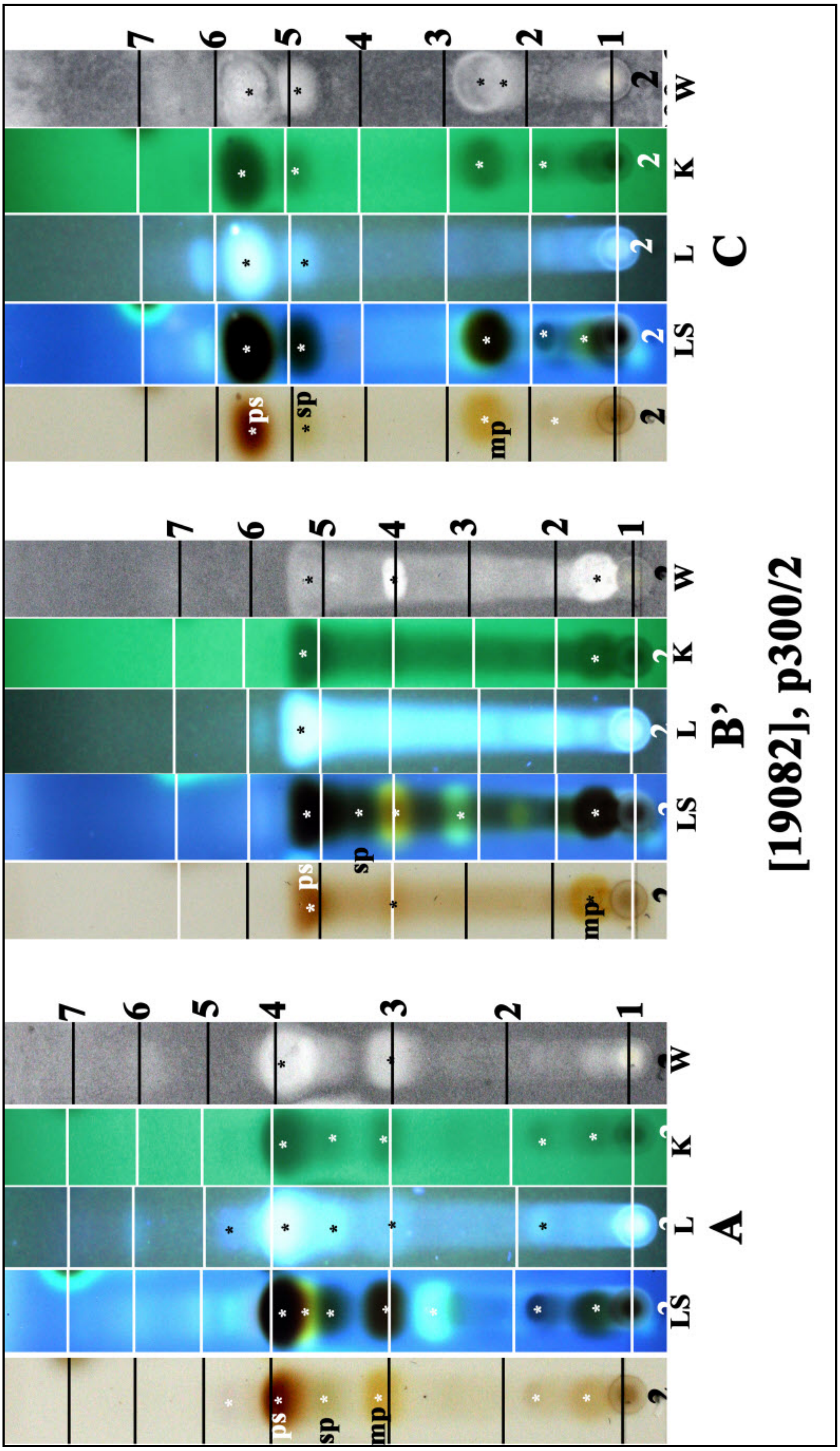
Lecanora subcarpinea [5463], Süd-Deutschland, Schwäbische Alb, Kreis Reutlingen, ca. 4 km südl. Pfullingen beim Parkplatz zwischen Rößleshart und Gielsberg, 48°25.385' N, 9°12.587' E, ca. 800 m, an *Fagus*. F. Schumm 30.03.1999.



ps: psoromic acid, at: atranorin

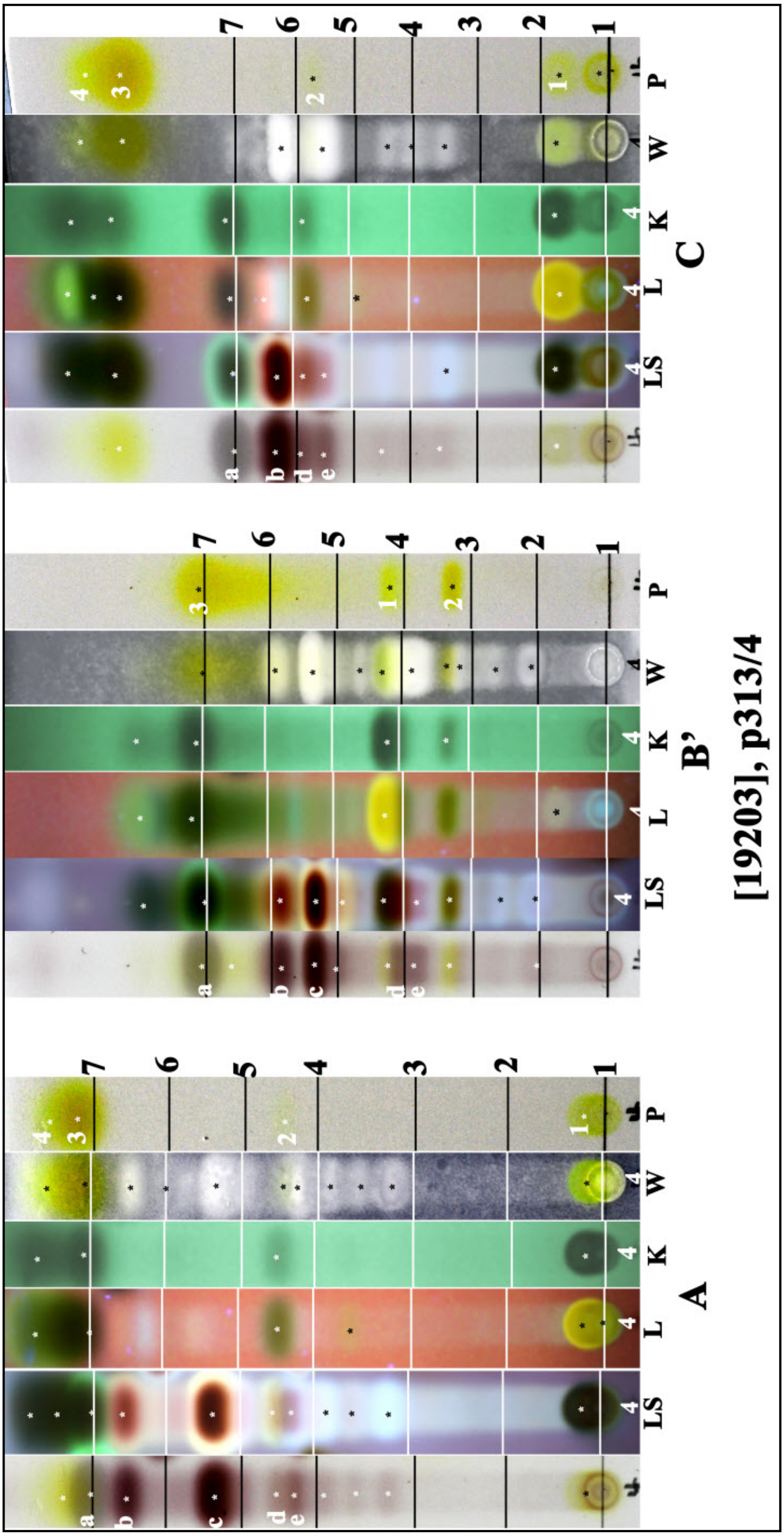
Lecanora subcarpinea [5491], Germany, Schwäbische Alb, Kreis Tübingen, an der Nordkante der Hochfläche des Farrenbergs südlich Mössingen, 810 m, 48°23.206' N, E 9°04.577' E, an *Carpinus,*F. Schumm 03.04.1999

psoromic acid



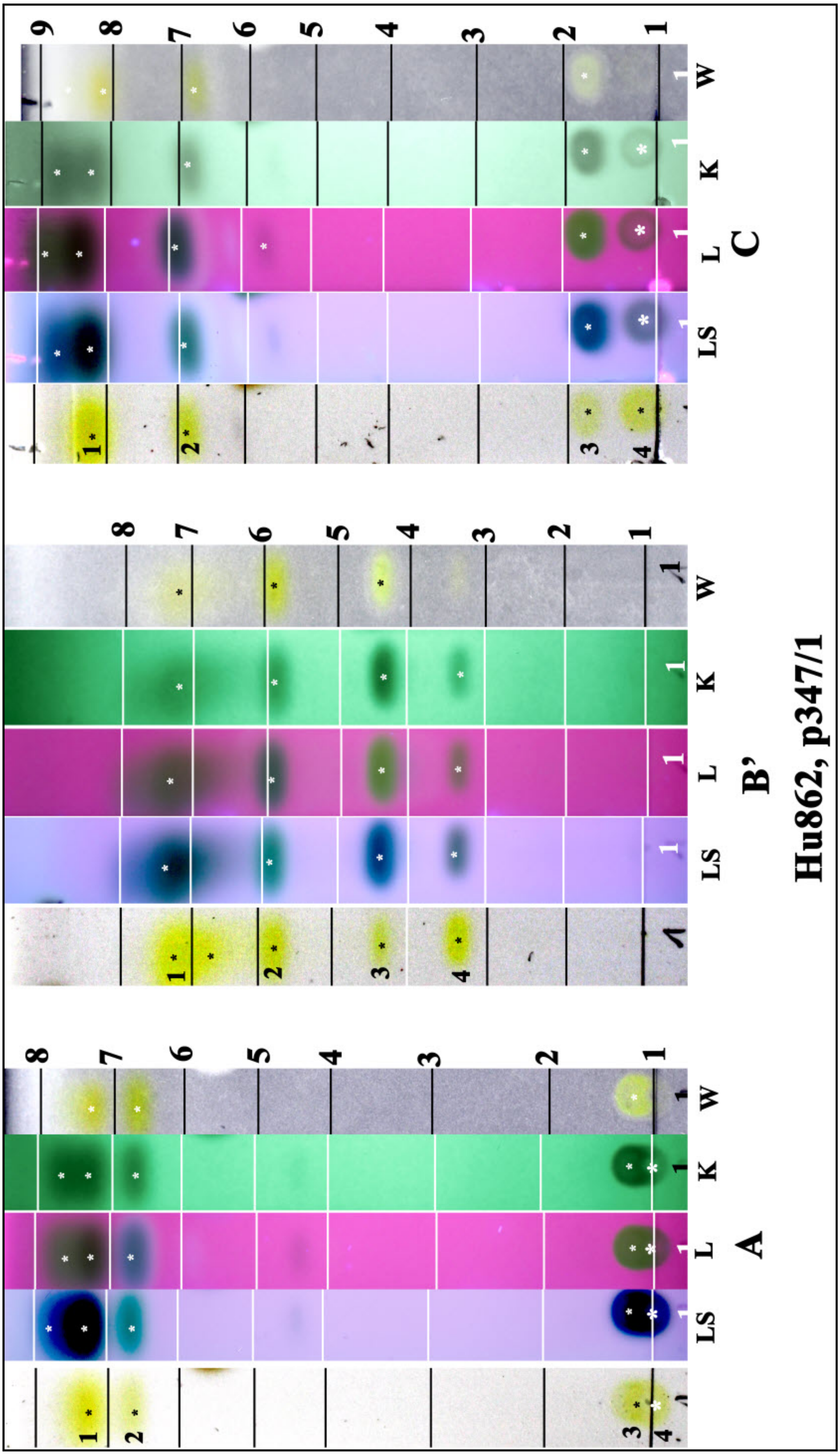
Myriotrema microporum, [19082], Australia, Queensland, Davies Creek Road c. 17 km south of Kennedy Highway, south of Davies Creek Falls National Park, east of Mareeba, on trunk in rainforest logging area.

pulvinamide



Pseudocyphellaria degelii, [19203], New Zealand, South Island, Canterbury, Porters Pass, south-west slopes of Foggy Peak, Torlesse Range, 1000 m, growing on soil and debris in subalpine heath.

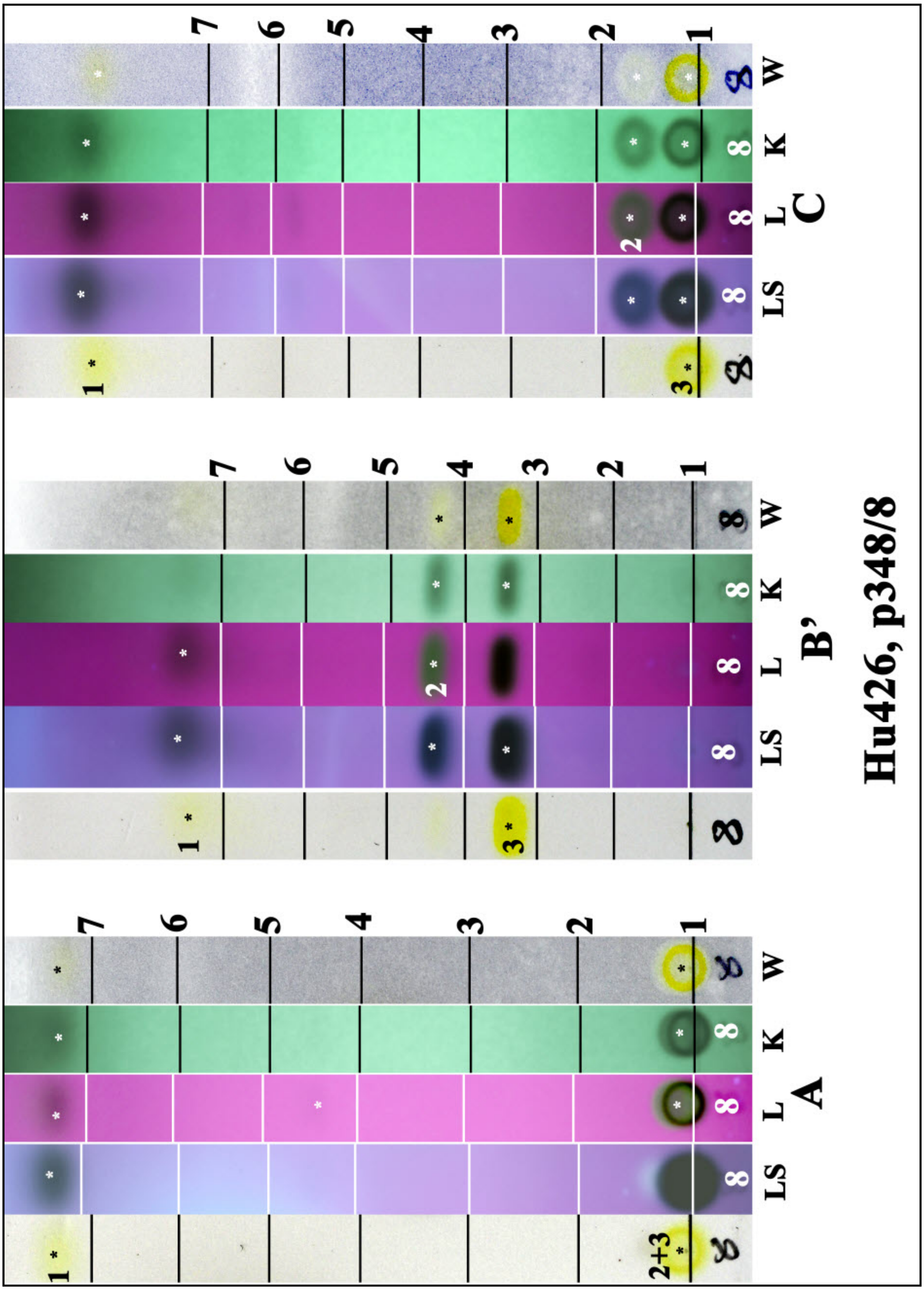
pulvinic acid



1: pinastric acid, **3: pulvinic acid**, 2,4: unknown

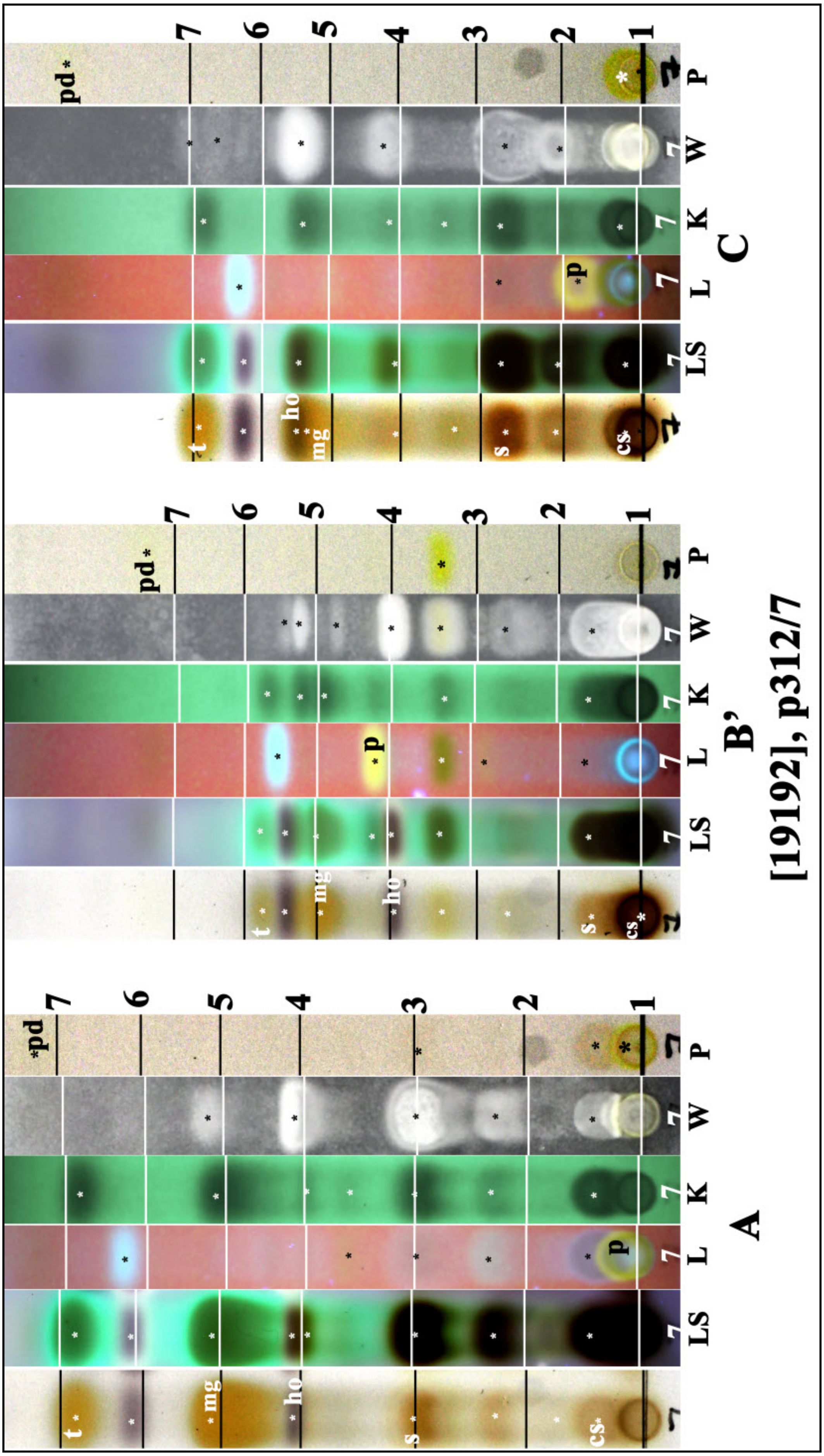
S. Huneck's collection of lichen substances No 862: pinastric acid, conf. J.A. Elix.. Botanisches Museum Berlin-Dahlem

pulvinic acid



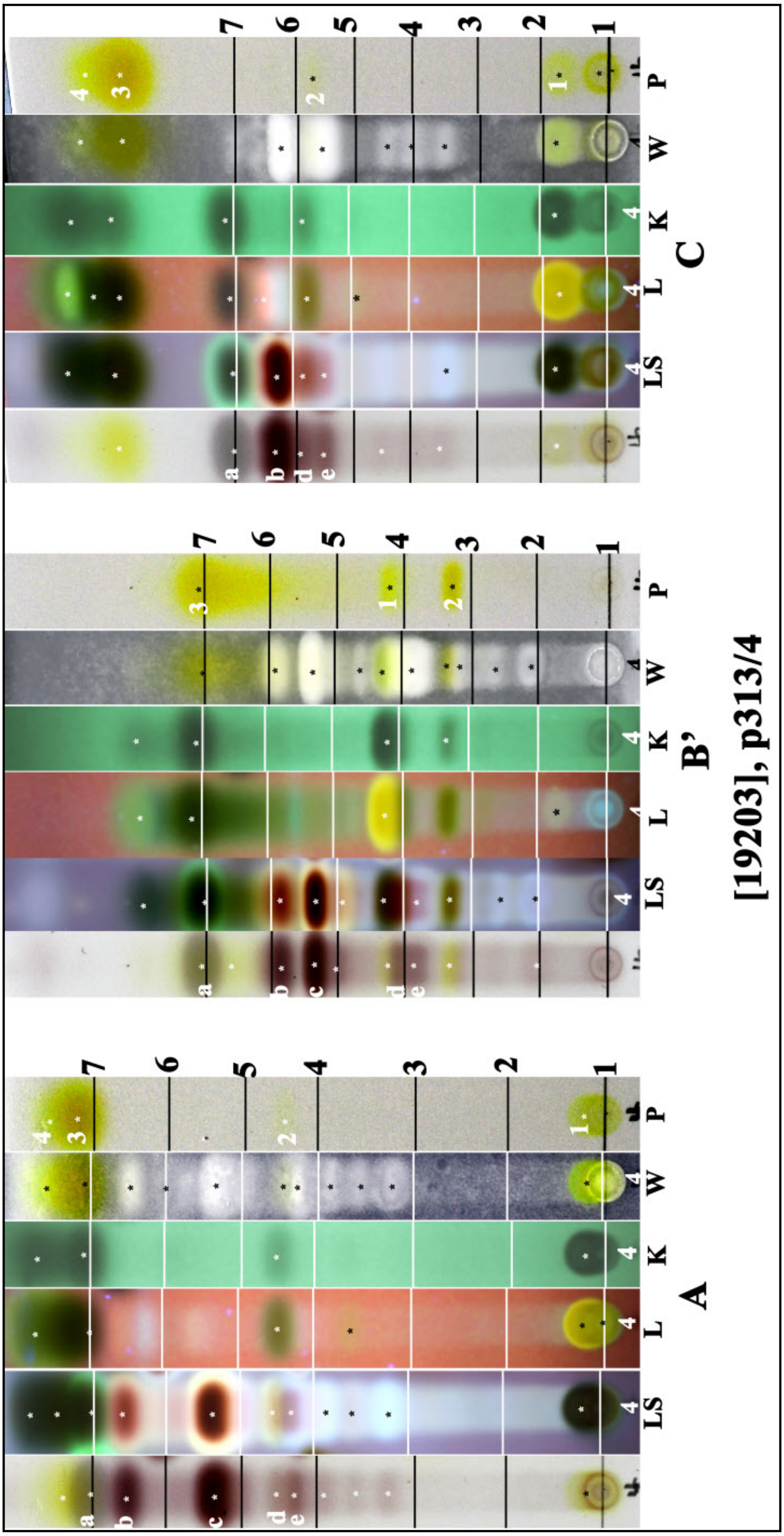
1: calycin, **2: pulvinic acid**, 3: unknown, conf. J.A. Elix
S. Huneck’s collection of lichen substances No 426 Calycin, roh aus *Pseudocyphellaria endochrocea*
Botanisches Museum Berlin-Dahlem

pulvinic acid



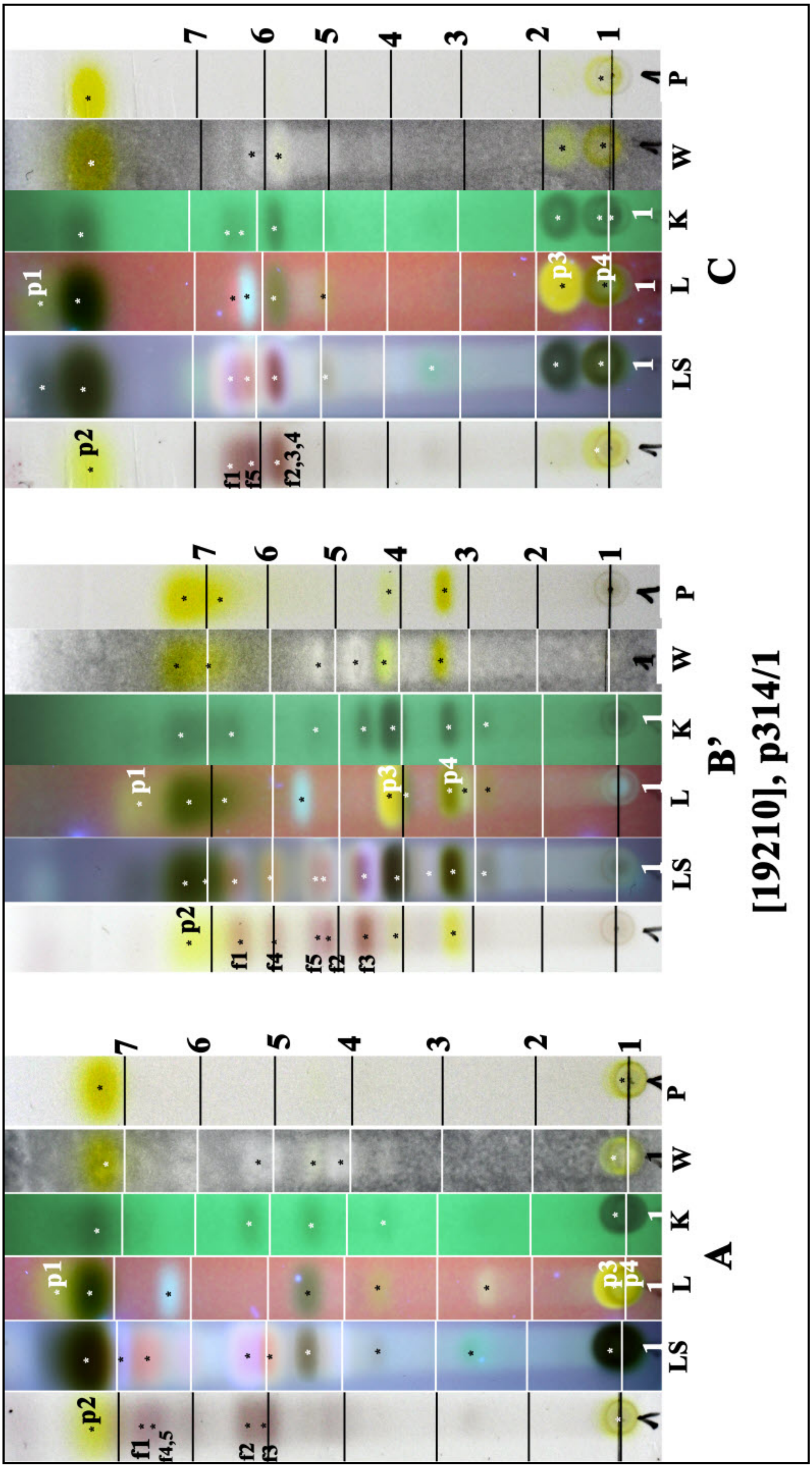
Pseudocyphellaria crocata **,** [19192], Norfolk Island. Mt. Pitt Reserve, Selwyn Pine Track, 29°01' S, 167°56'30" E, 200 m.

pulvinic acid



Pseudocyphellaria degelii, [19203], New Zealand, South Island, Canterbury, Porters Pass, south-west slopes of Foggy Peak, Torlesse Range, 1000 m, growing on soil and debris in subalpine heath.

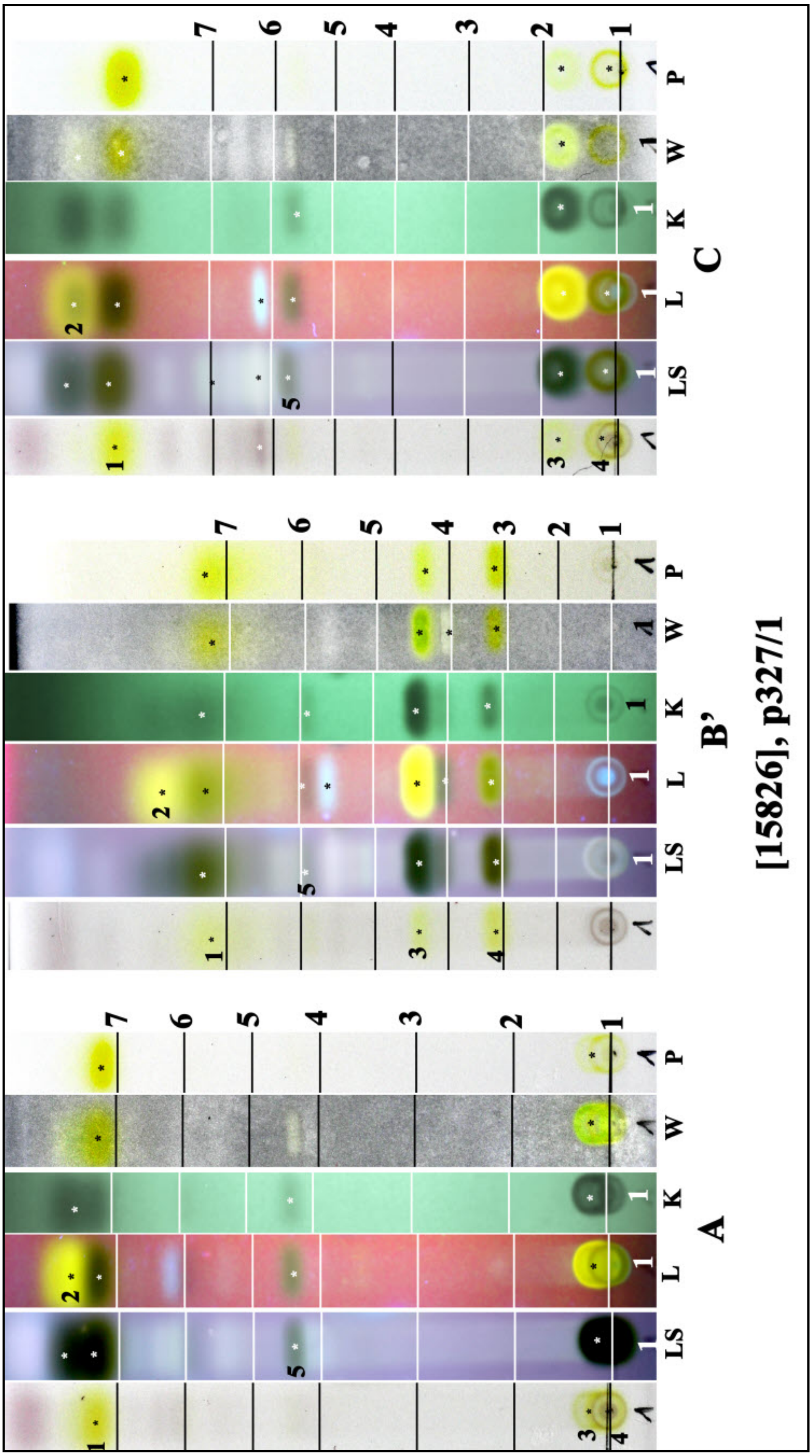
pulvinic acid



p1: pulvinic dilactone, p2: calycin, **p3: pulvinic acid**, p4: unknown, f1: 3β-acetoxyfern-9(11)-en-12-one, f2: 3β-hydroxyfern-9(11)-en-12-one, f3: fern-9(11)-en-3β,12β-diol, f4: 3β-acetoxyfern-9(11)-en-12β-ol, f5: 3β-acetoxyfern-9(11)-en-19β-ol.

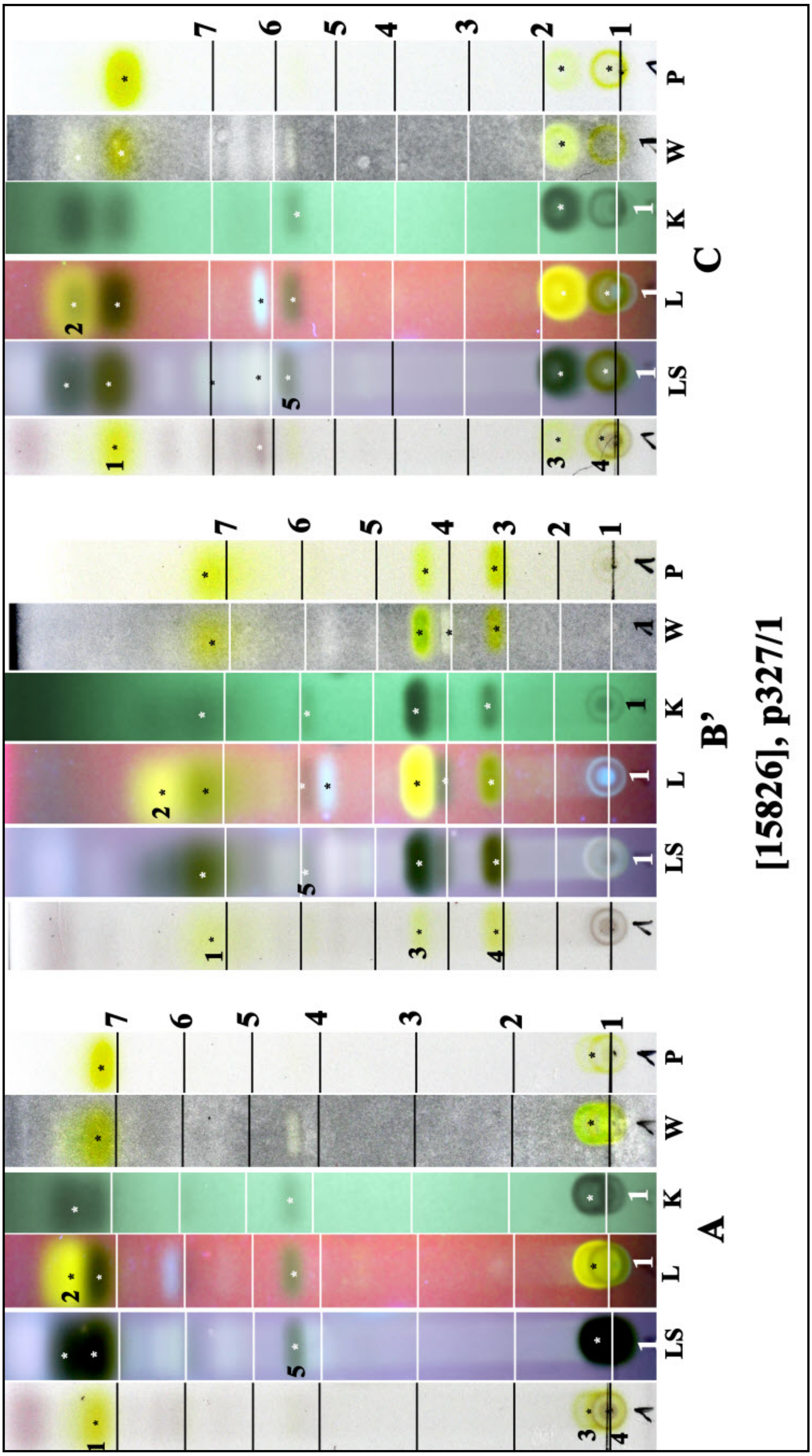
Crocodia poculifera, (= ***Pseudocyphellaria poculifera***)**,** **[**19210], Norfolk Island. Mt. Pitt Reserve, in the vicinity of Broken Pine, 29°00'30" S, 167°56'30" E, 320 m.

pulvinic acid



Chrysothrix xanthina, [15826], Australia, Western Australia, North Boundary Rock c. 20 km north-northeast of Manjimup off North Boundary Road, granite outcrop associated with *Allocasuarina huegeliana* und *Corymbia calophylla,* 34.072° S, 116,325° E, 320 m, growing on bark. Leg. F. Schumm & E. Stocker-Wörgötter, 25.10.2009.

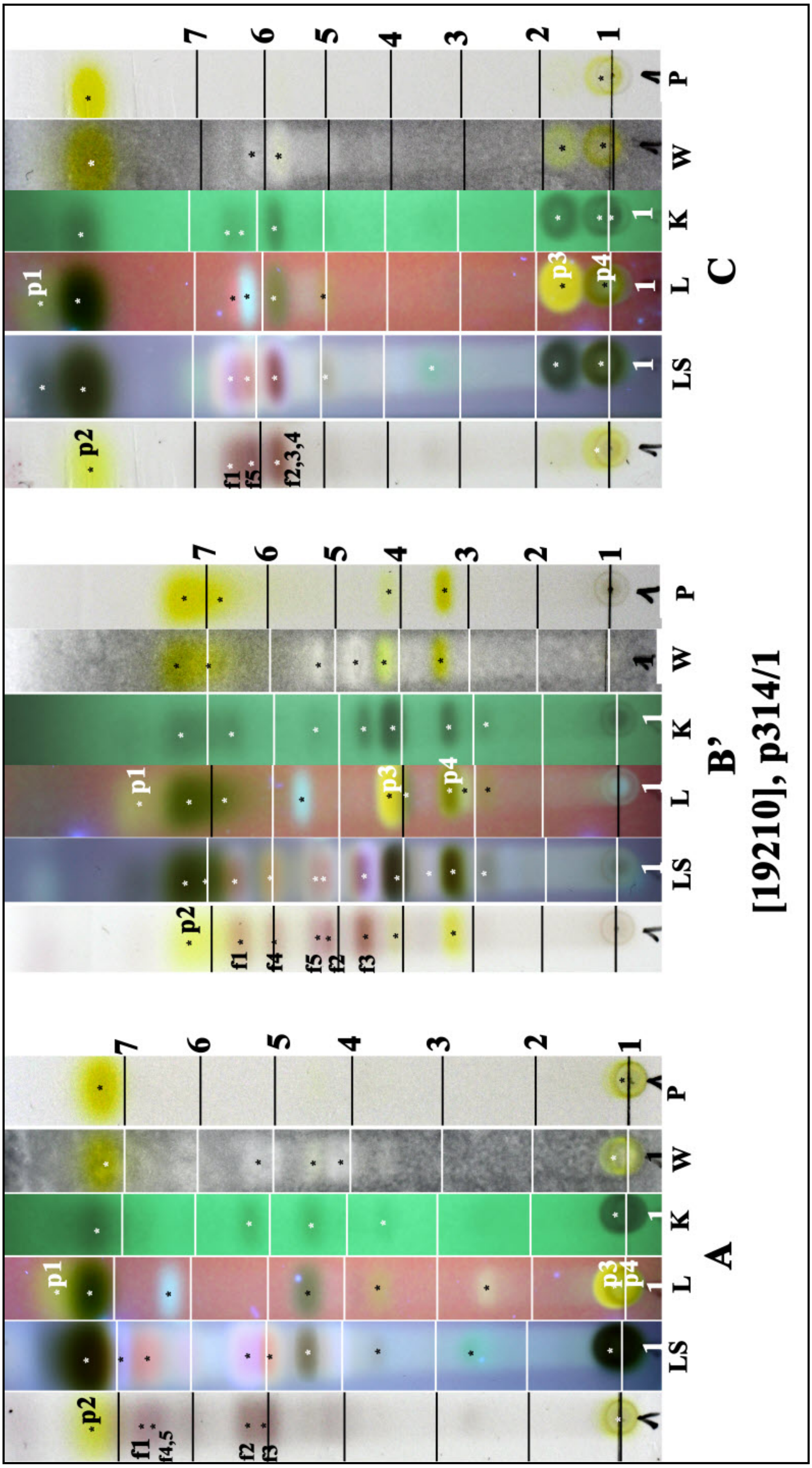
pulvinic dilactone



1: pinastric acid, **2: pulvinic dilactone**, 3: pulvinic acid, 4,5: unknown

Chrysothrix xanthina, [15826], Australia, Western Australia, North Boundary Rock c. 20 km north-northeast of Manjimup off North Boundary Road, granite outcrop associated with *Allocasuarina huegeliana* und *Corymbia calophylla,* 34.072° S, 116,325° E, 320 m, growing on bark. Leg. F. Schumm & E. Stocker-Wörgötter, 25.10.2009.

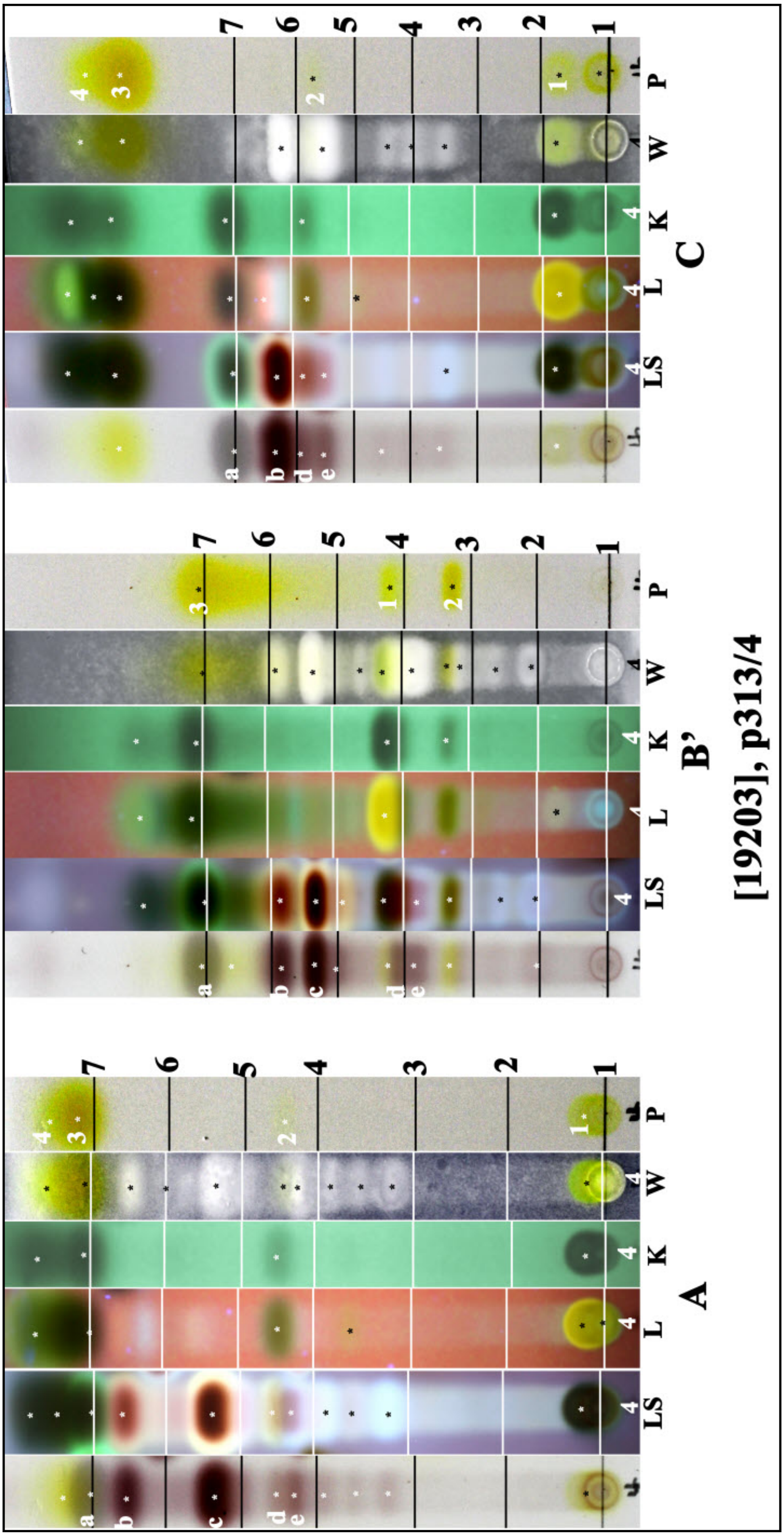
pulvinic dilactone



p1: pulvinic dilactone, p2: calycin, p3: pulvinic acid, p4: unknown, f1: 3β-acetoxyfern-9(11)-en-12-one, f2: 3β-hydroxyfern-9(11)-en-12-one, f3: fern-9(11)-en-3β,12β-diol, f4: 3β-acetoxyfern-9(11)-en-12β-ol, f5: 3β-acetoxyfern-9(11)-en-19β-ol.

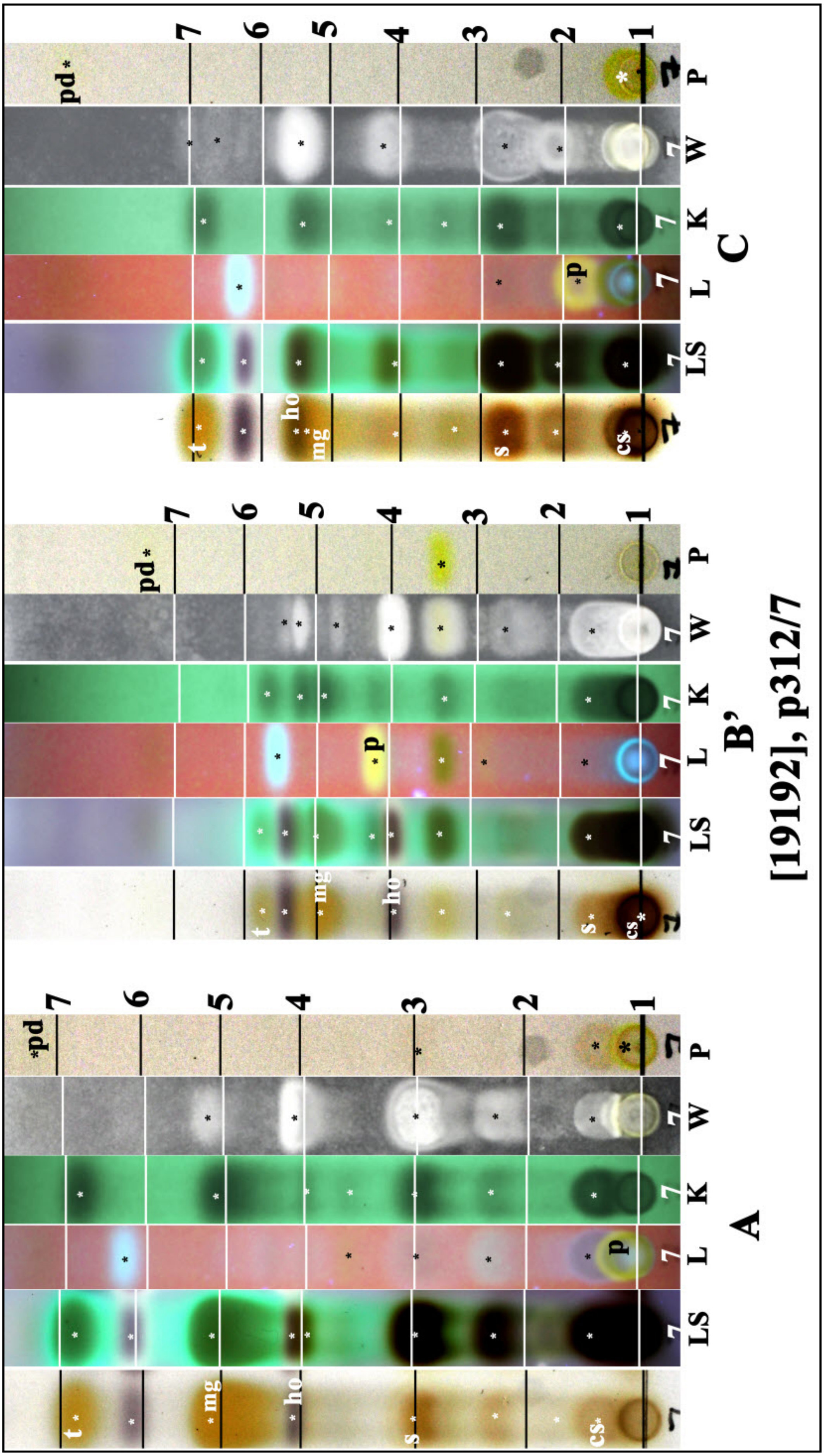
Crocodia poculifera, (= ***Pseudocyphellaria poculifera***), [19210], Norfolk Island. Mt. Pitt Reserve, in the vicinity of Broken Pine, 29°00'30" S, 167°56'30" E, 320 m.

pulvinic dilactone + calycin



Pseudocyphellaria degelii, [19203], New Zealand, South Island, Canterbury, Porters Pass, south-west slopes of Foggy Peak, Torlesse Range, 1000 m, growing on soil and debris in subalpine heath.

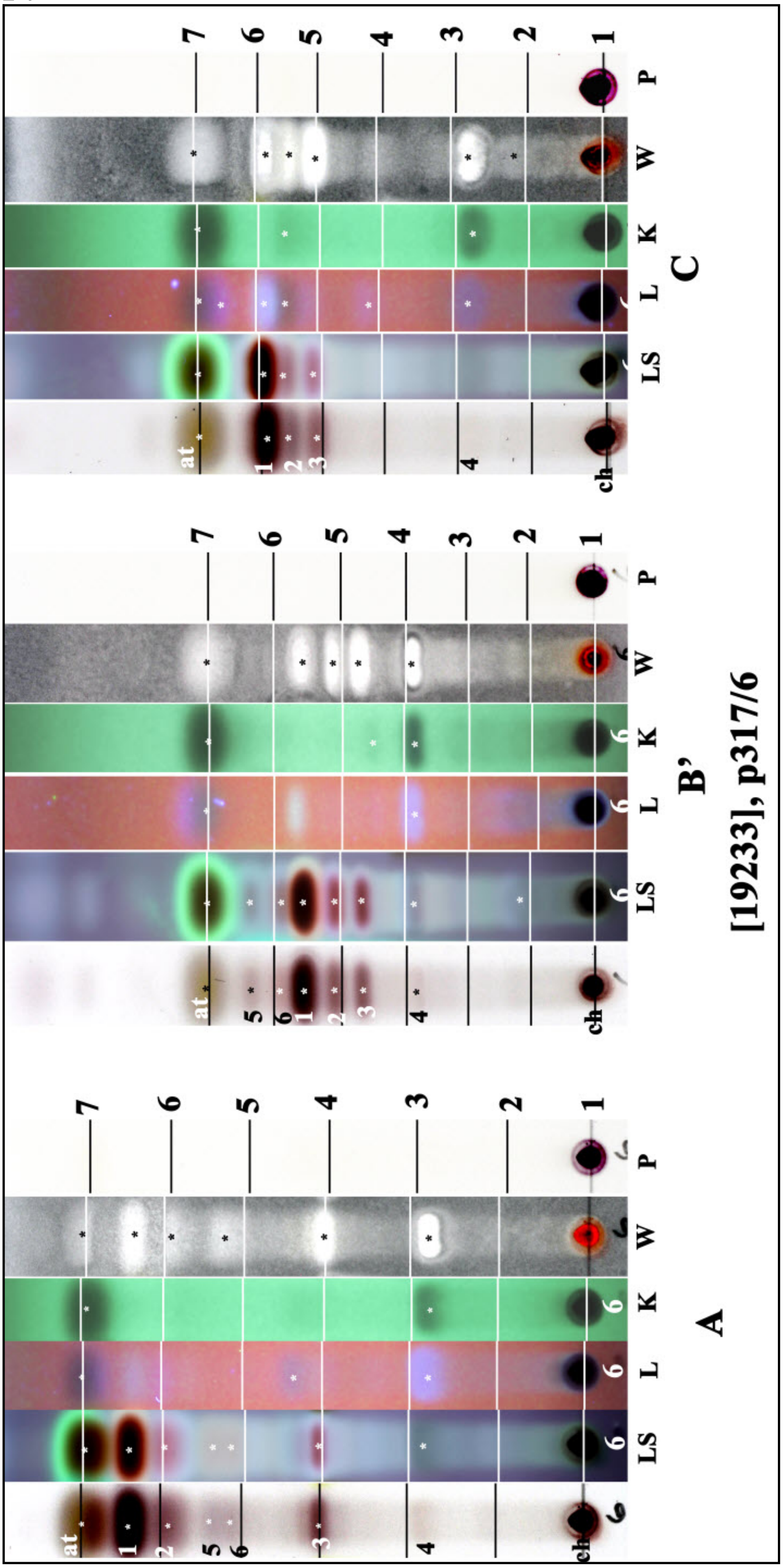
pulvinic dilactone + calycin



pd: pulvinic dilactone + calycin, p: pulvinic acid, t: tenuiorin, mg: methyl gyrophorate, s: stictic acid, cs: constictic acid, ho: hopane-6α,7β,22-triol

Pseudocyphellaria crocata **,** [19192], Norfolk Island. Mt. Pitt Reserve, Selwyn Pine Track, 29°01' S, 167°56'30" E, 200 m.

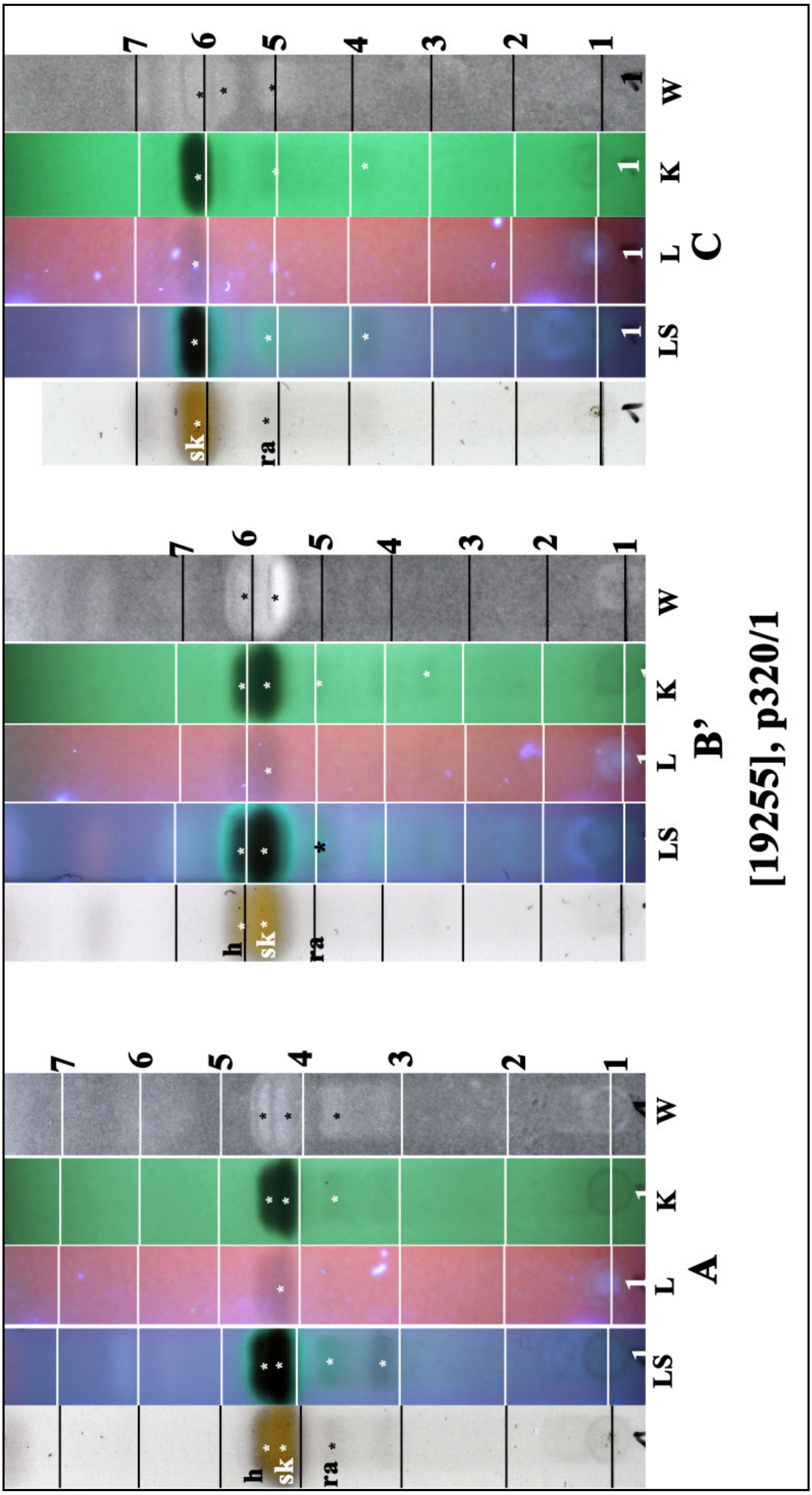
pyxinic acid



at: atranorin, ch: chiodectonic acid, 1: 25-acetoxy-20,24-epoxydammarane-3β-ol, 2: methyl 3-O-acetoxypyxinate, 3: 25-acetoxy-20,24-epoxydammarone-3-one, **4: pyxinic acid**, 5: methyl pyxinate, 6: unknown

Pyxine coccifera , [19233], Australia, Northern Territory, Tabletop Range, Litchfield Park, 25 km south-west of Batchelor, 15°11' S, 130°50' E, 180 m.

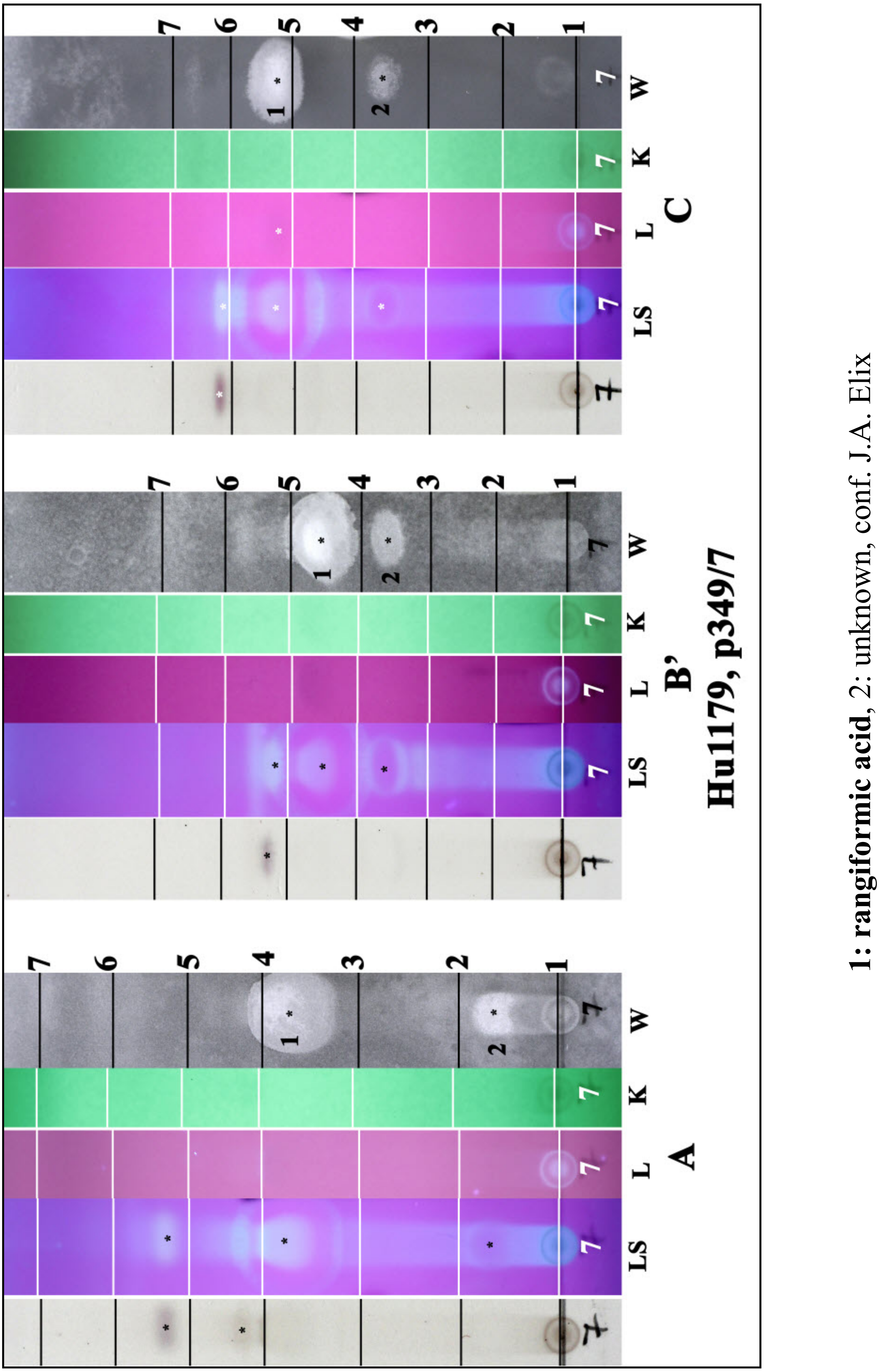
ramalinolic acid



h: homosekikaic acid, sk: sekikaic acid, **ra: ramalinolic acid**

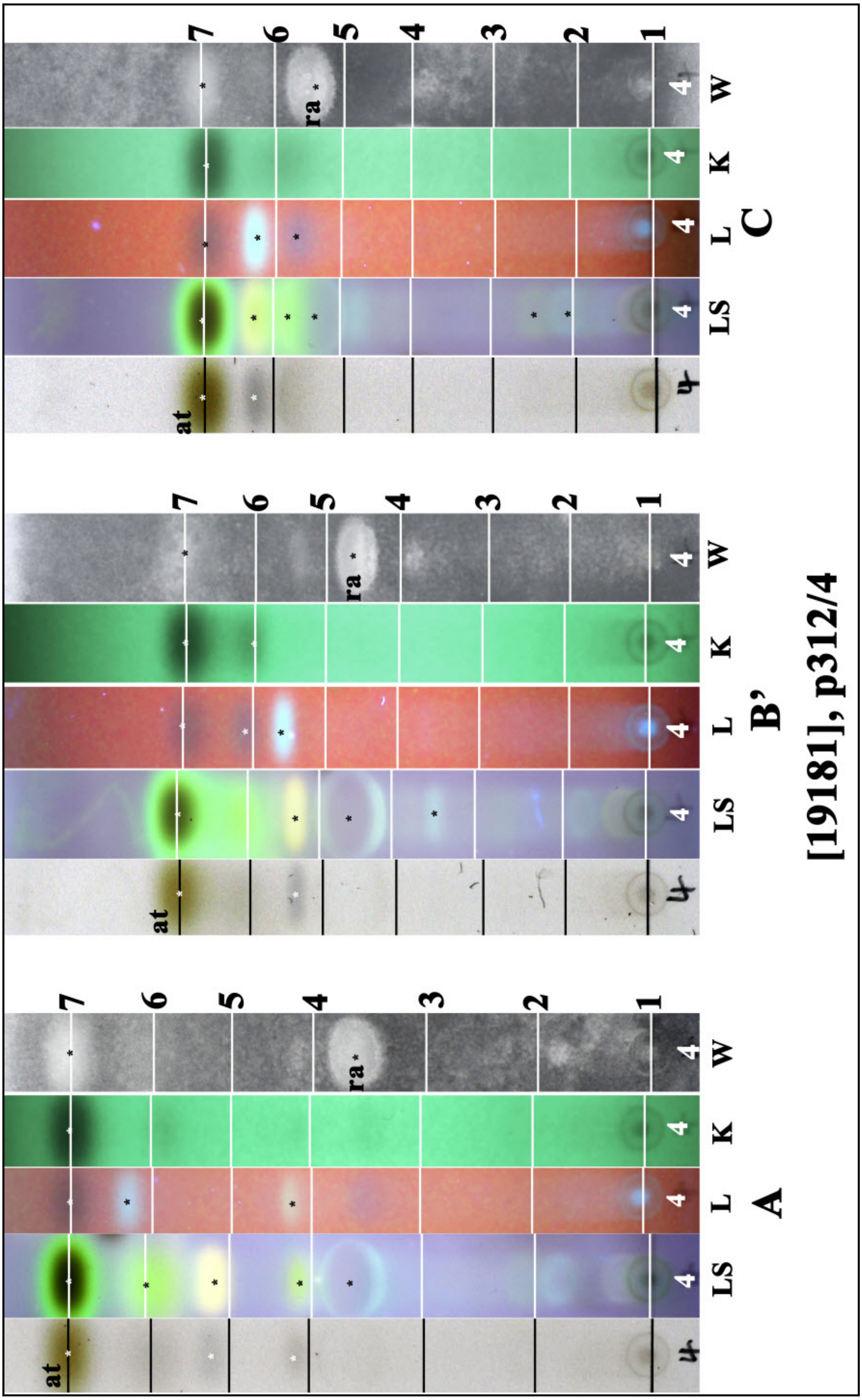
Ramalina peruviana, [19255], Norfolk Island, Rocky Point Reserve, 29°03' S, 167°55' E, 60 m.

rangiformic acid



S. Huneck's collection of lichen substances No 1179: rangiformic acid
Botanisches Museum Berlin-Dahlem

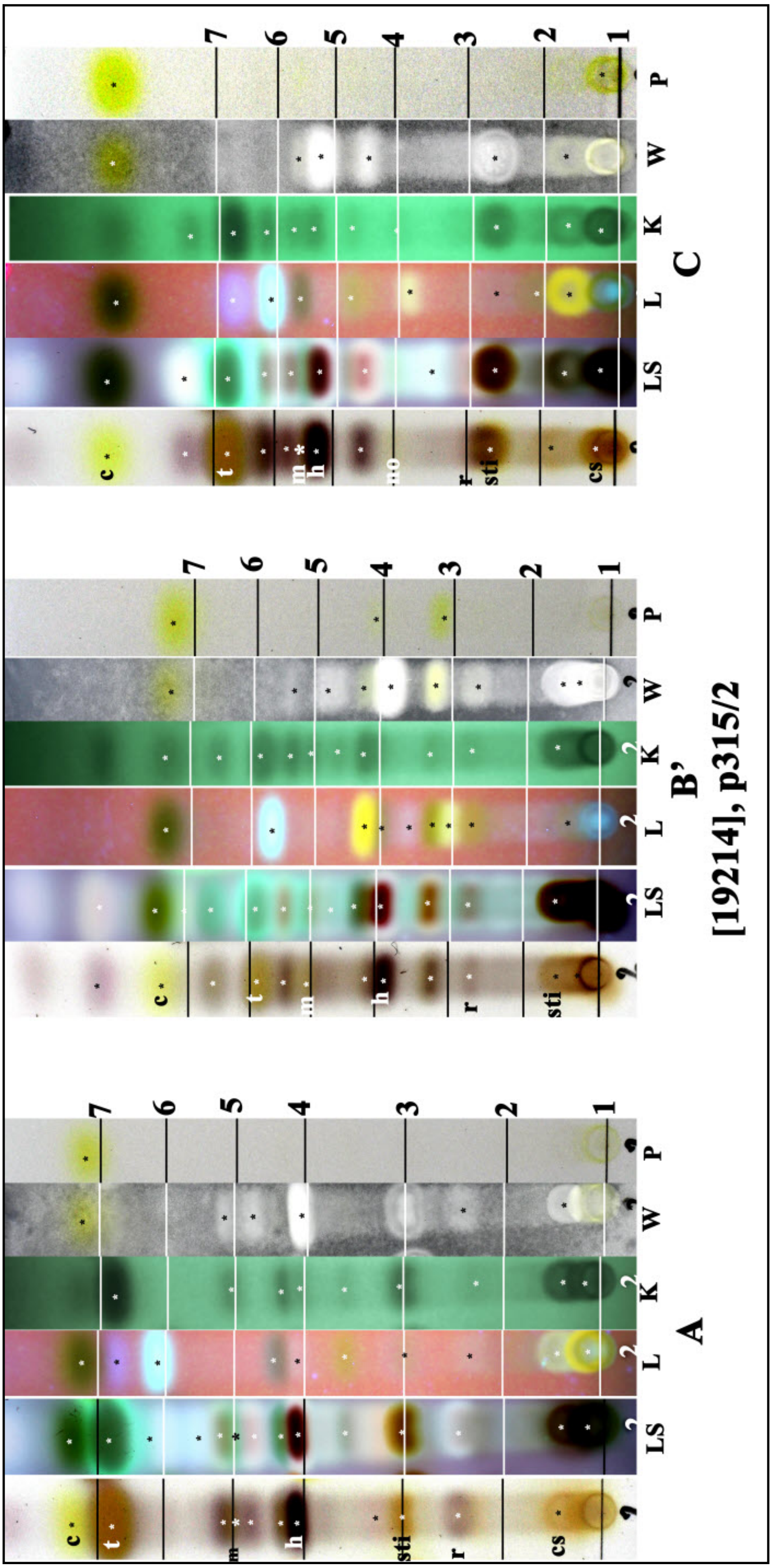
rangiformic acid



at: atranorin, ra: rangiformic acid

***Cladia retipora* ,** [19181], Australia, New South Wales, Morton National Park, 8 km north-east of Nerriga, 35°07' S, 150°08' E, 760 m.

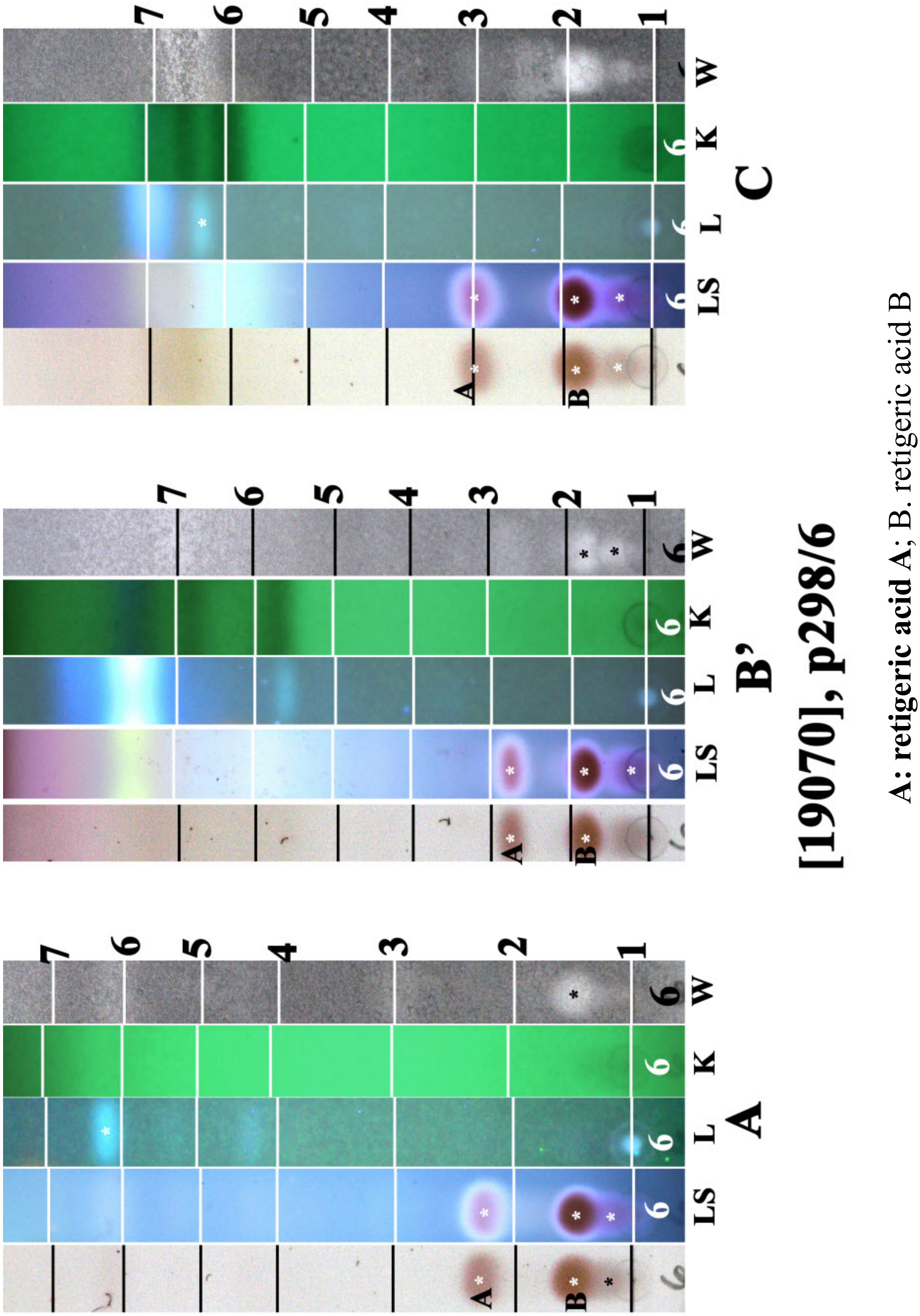
retigeranic acid



c: calycin, t: tenuiorin, h: hopane-6α,7β,22-triol, sti: stictic acid, **r: retigeranic acid**, cs: constictic acid, no: norstictic acid, m: methyl gyrophorate

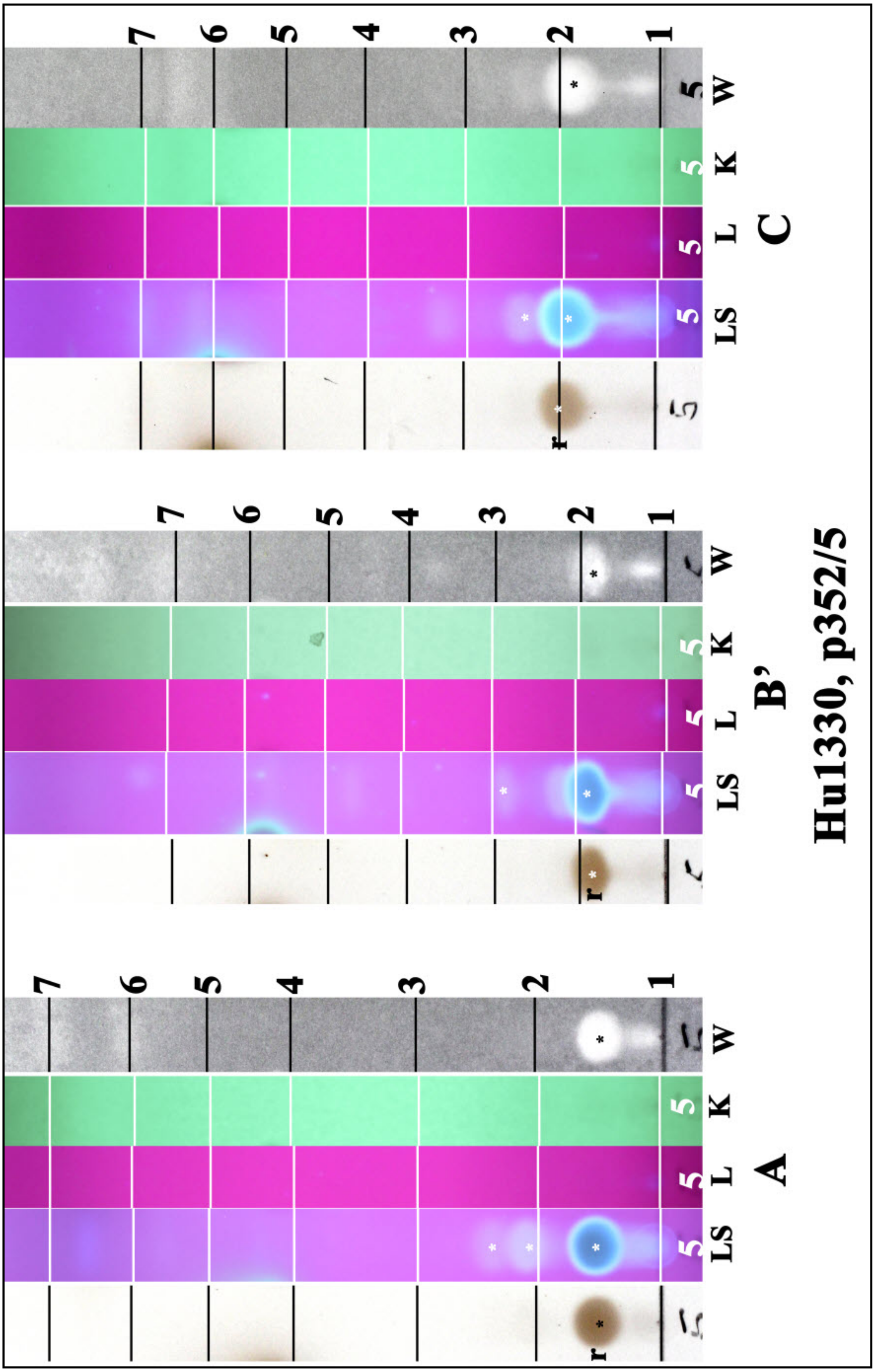
Pseudocyphellaria neglecta,[19214], Australia, New South Wales, Great Dividing Range, 6 km east of Captains Flat, 2 km north of Parkers Gap, 35°37' S, 149°30' E, 1260

retigeric acid A



Lobaria retigera [19070], Australia, Queensland, Crediton State Forest, 20 km south-south-west of Finch Hatton.

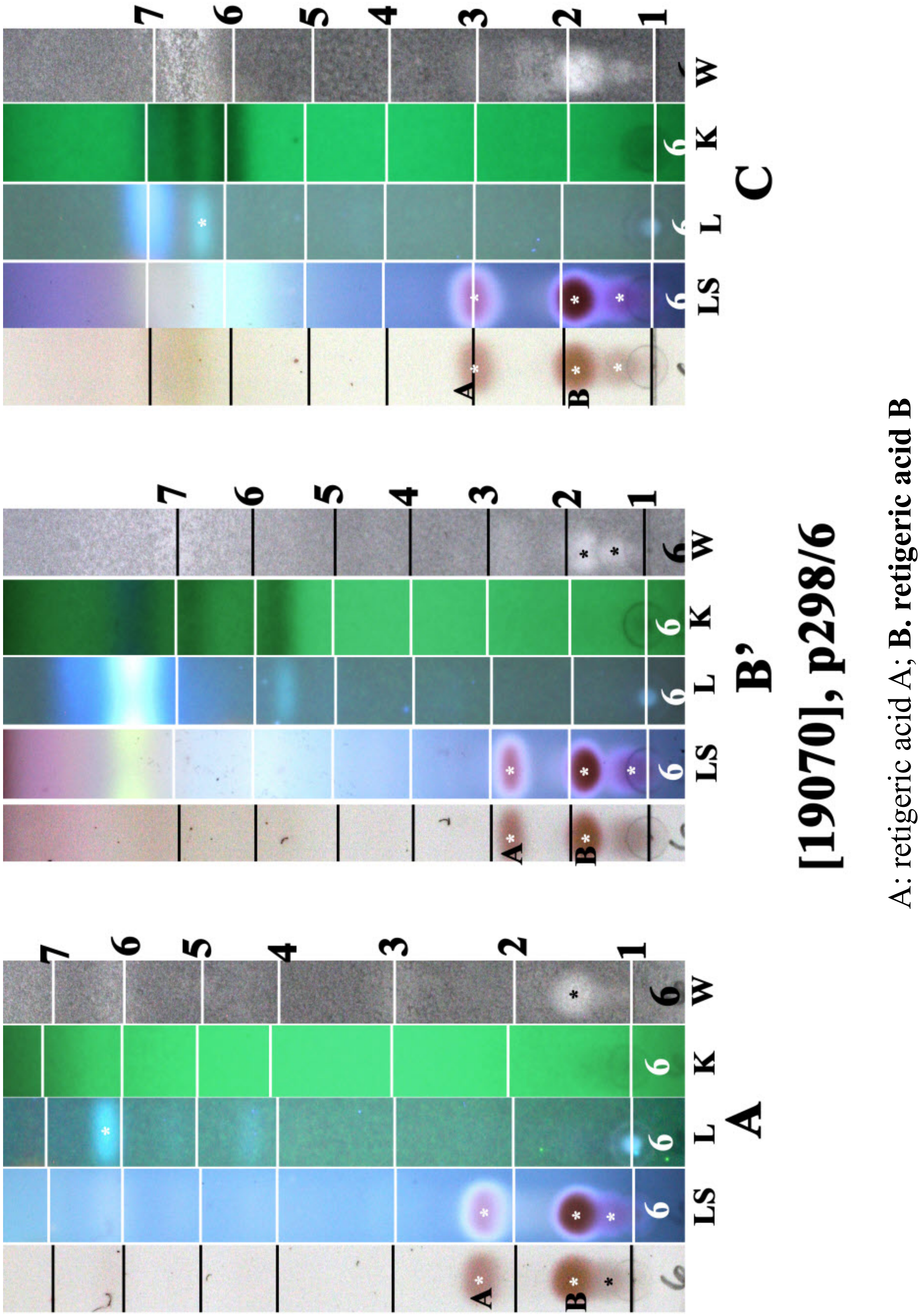
retigeric acid B



r: retigeric acid B, conf. J.A. Elix

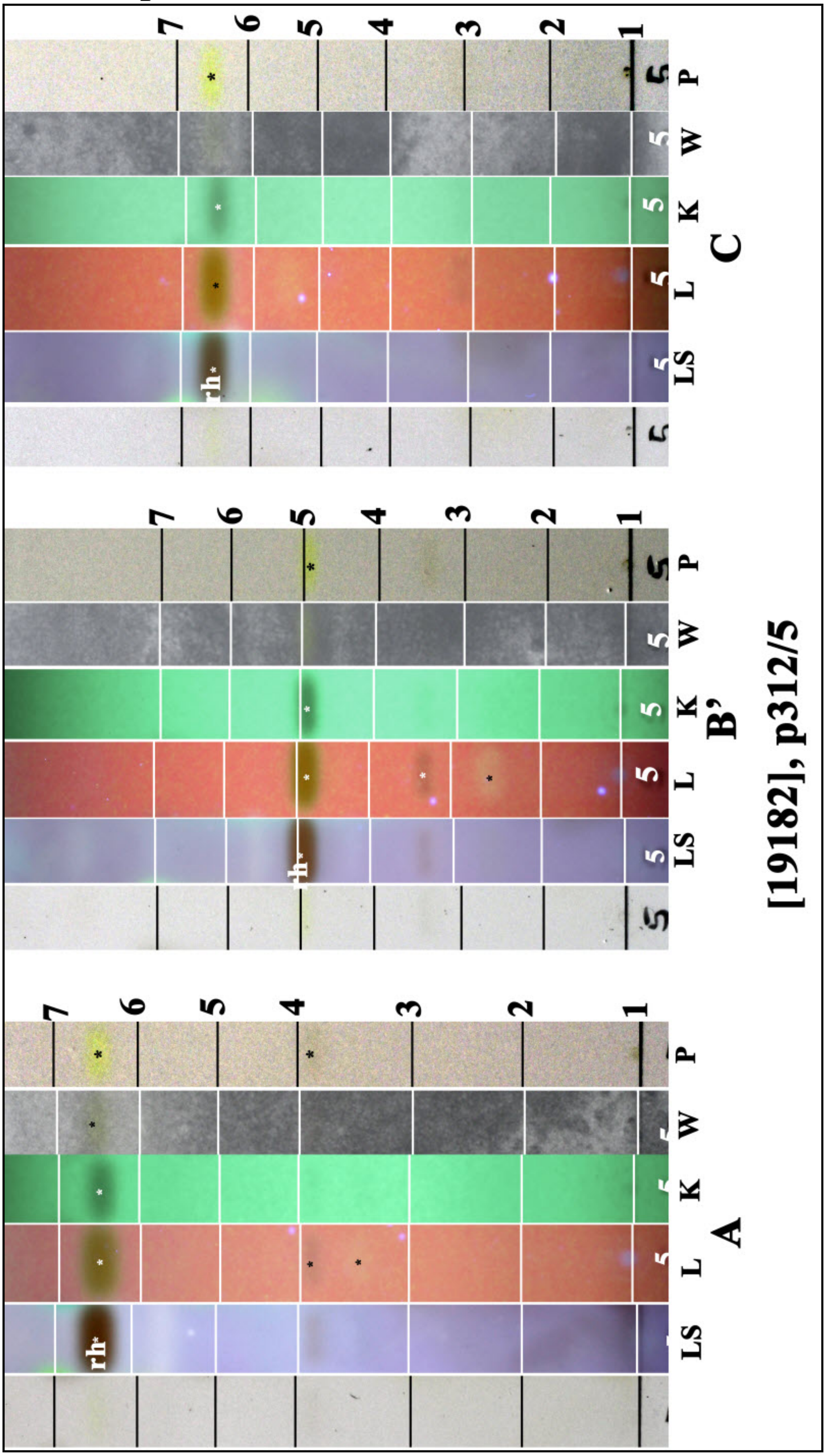
S. Huneck’s collection of lichen substances No 1330: retigeric acid B
Botanisches Museum Berlin-Dahlem

retigeric acid B



Lobaria retigera [19070], Australia, Queensland, Crediton State Forest, 20 km south-south-west of Finch Hatton.

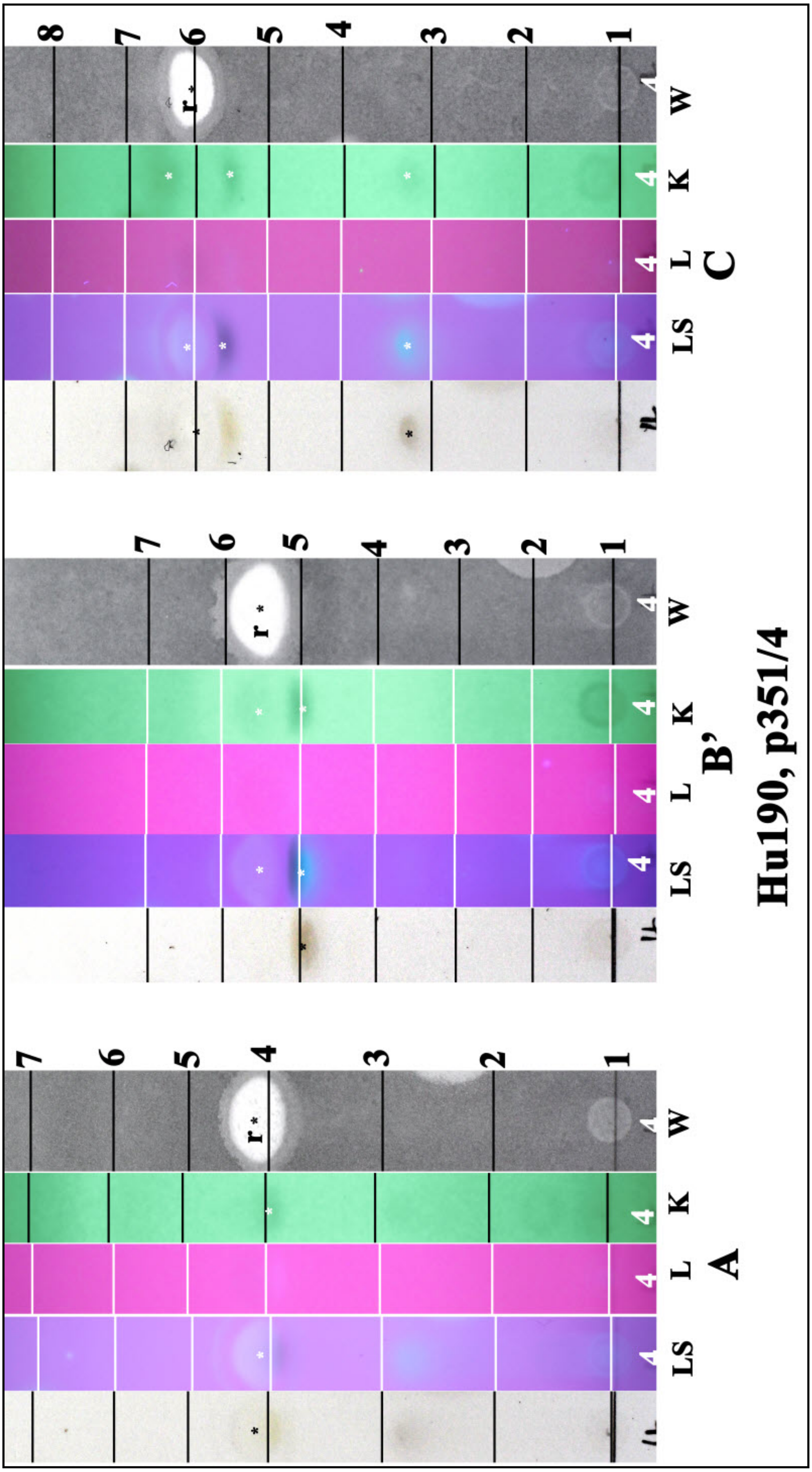
rhizocarpic acid



rh: rhizocarpic acid

Acarospora citrina, [19182], Australia, Western Australia, Erskine Range, Great Northern Highway, between Derby and Fitzroy Crossing, 17°51' S, 124°20' E, 120 m, growing on lateritic rocks.

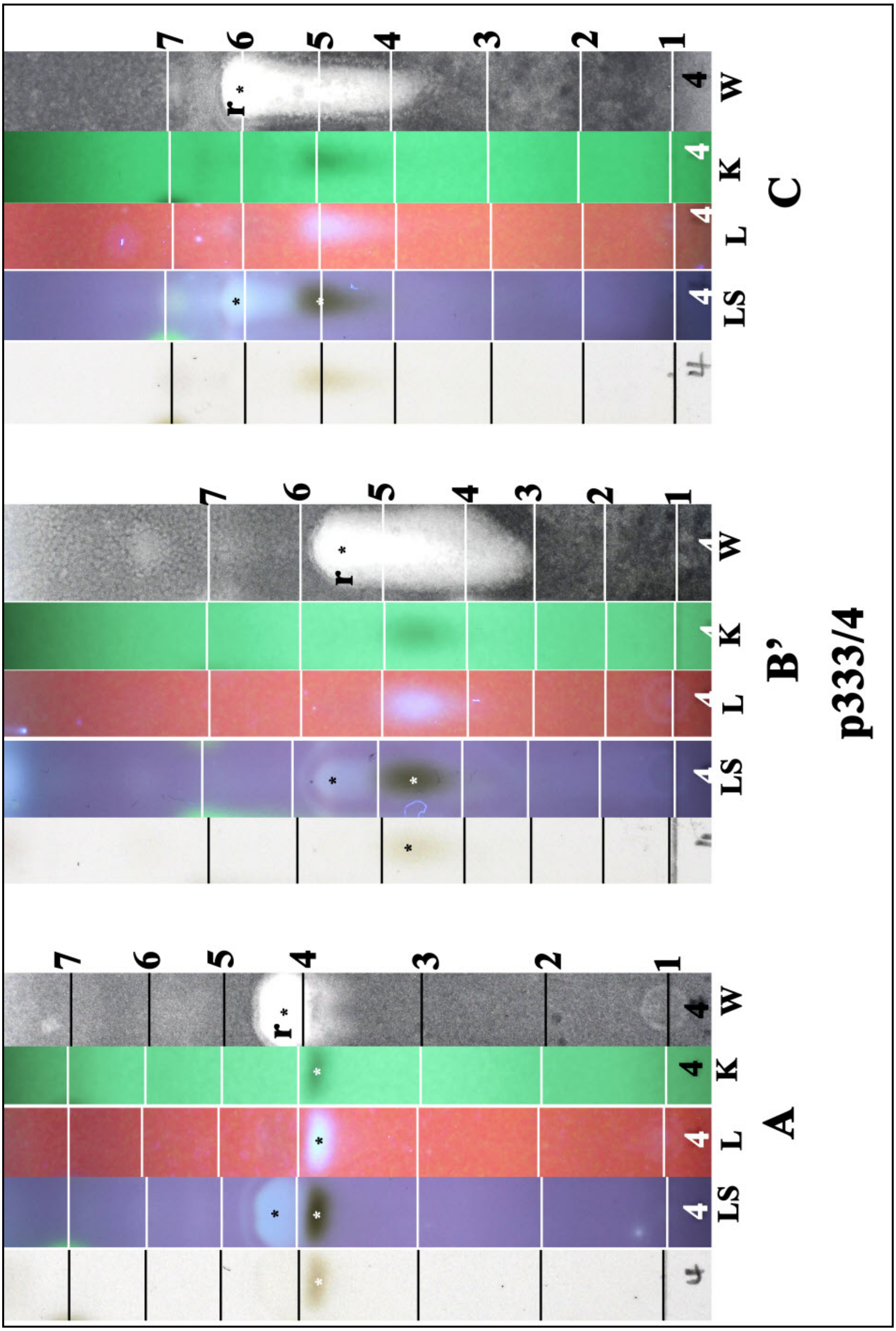
roccellic acid



r: roccellic acid, conf. J.A. Elix

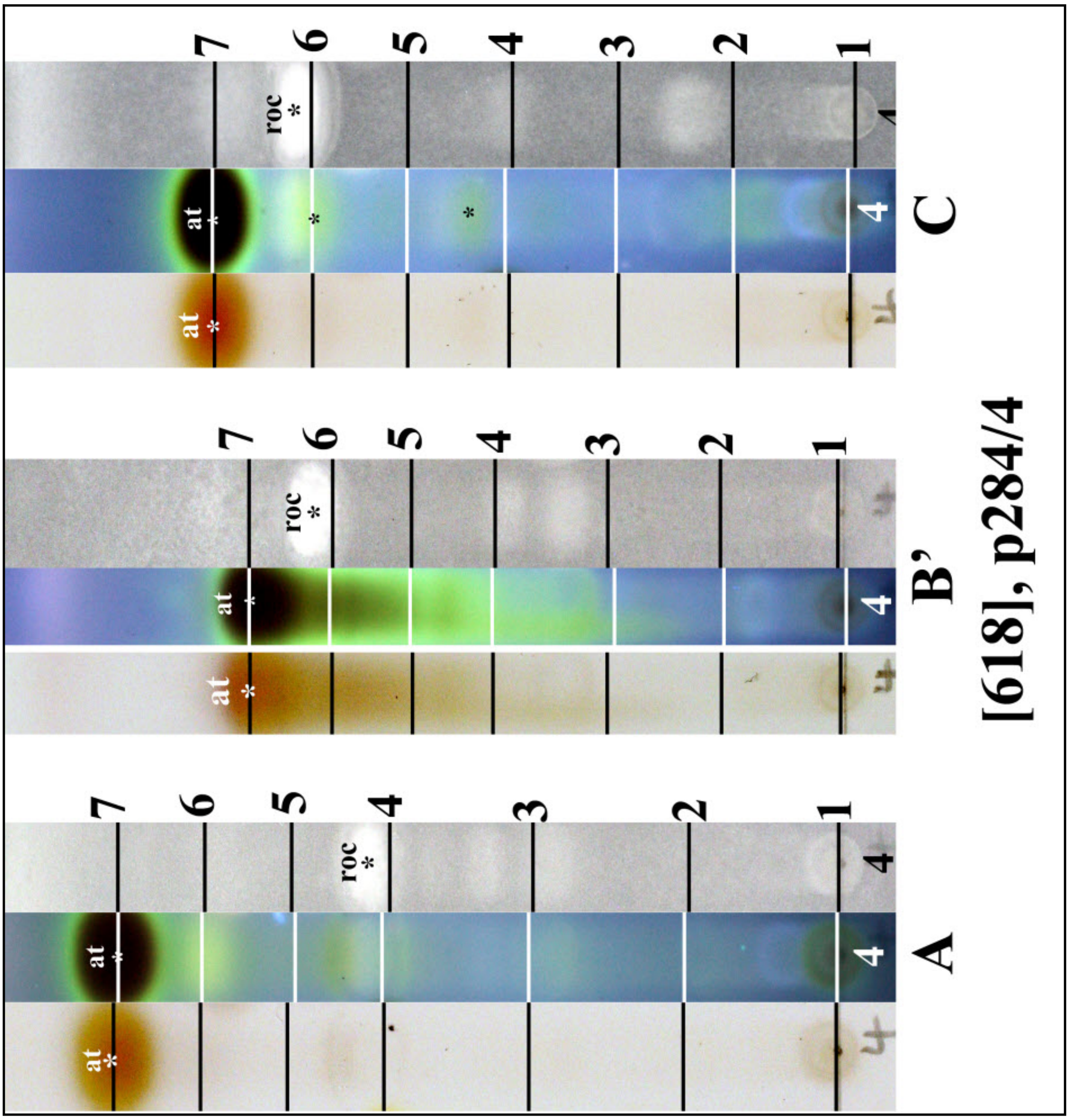
S. Huneck's collection of lichen substances No 190: roccellic acid
Botanisches Museum Berlin-Dahlem

roccellic acid



r: **roccellic acid** pure, received from Klaus Kalb

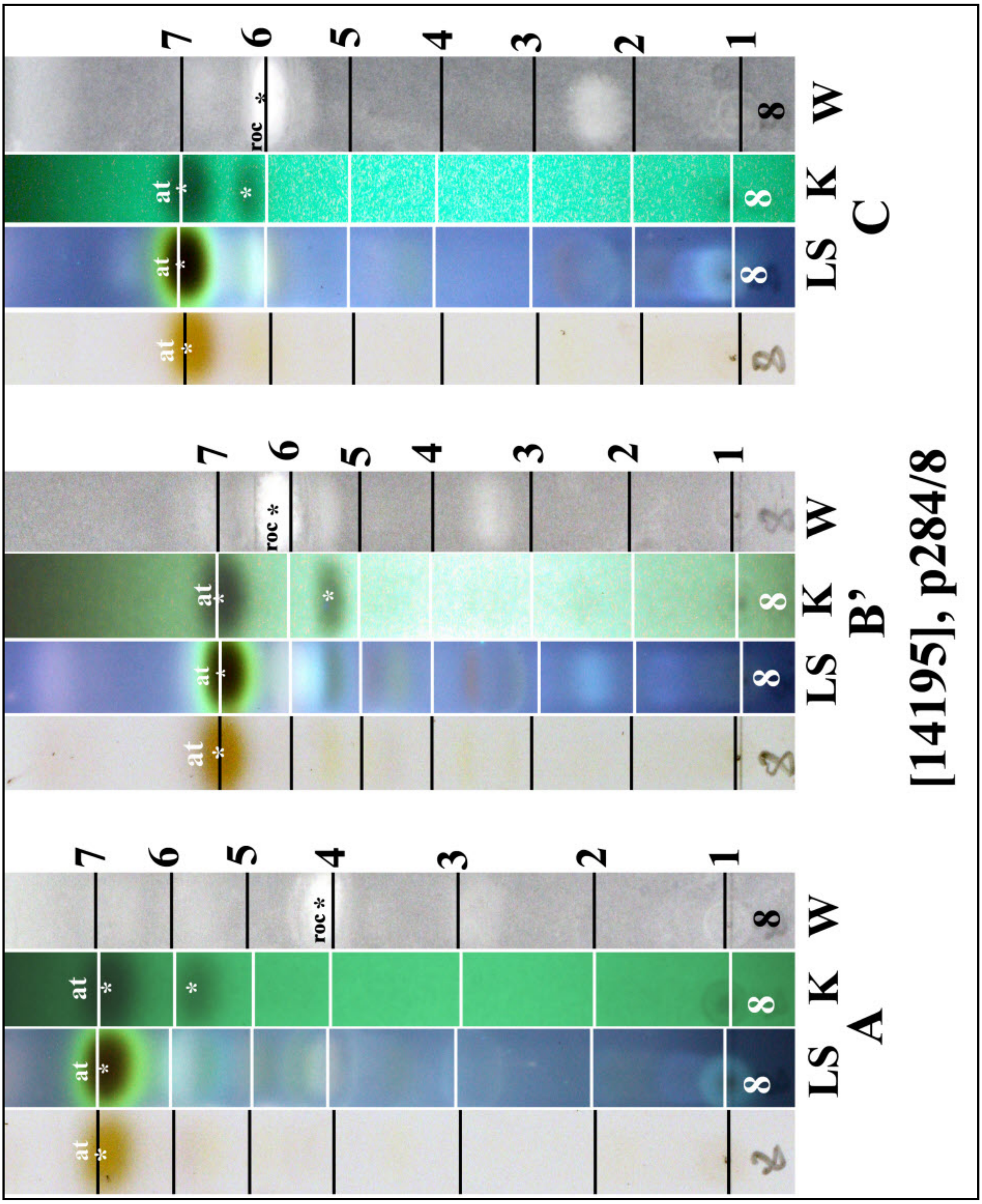
roccellic acid



roc: roccellic acid

Lecanora cenisia [618], Germany, Bayern, Bayerischer Wald, Prolergipfel. Leg. E. Schmid 07.1952, det. J. Poelt.

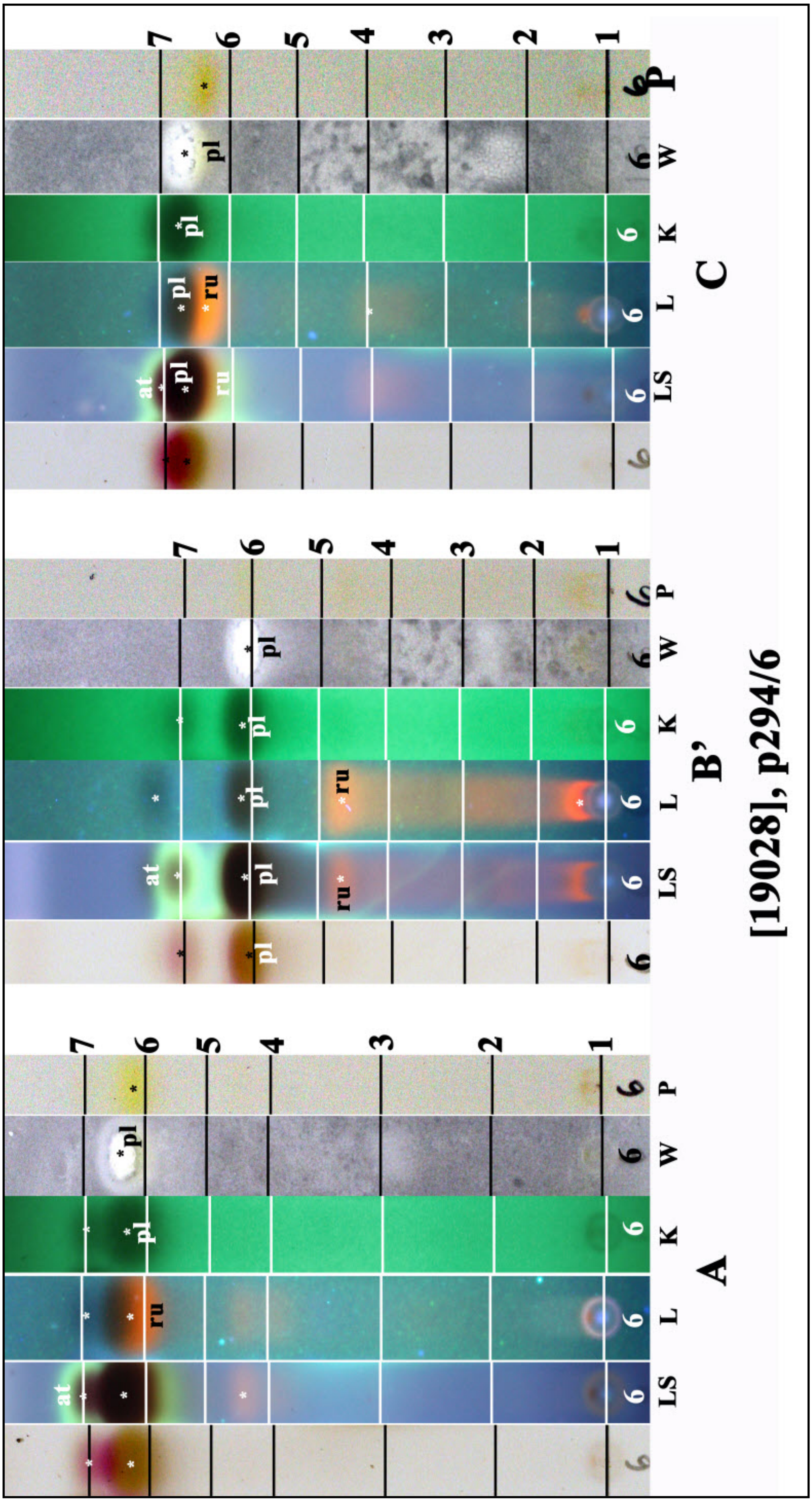
roccellic acid



roc: roccellic acid

Lecanora hybocarpa 14195], Portugal, Azoren, Terceira, Angra Do Heroismo, Fortaleza de Dao Joao Baptista, 38°39.171' N, 27°13.457' W, ca. 44 m. Leg. A. Aptroot & F. Schumm 17.07.2008, det. F. Schumm.

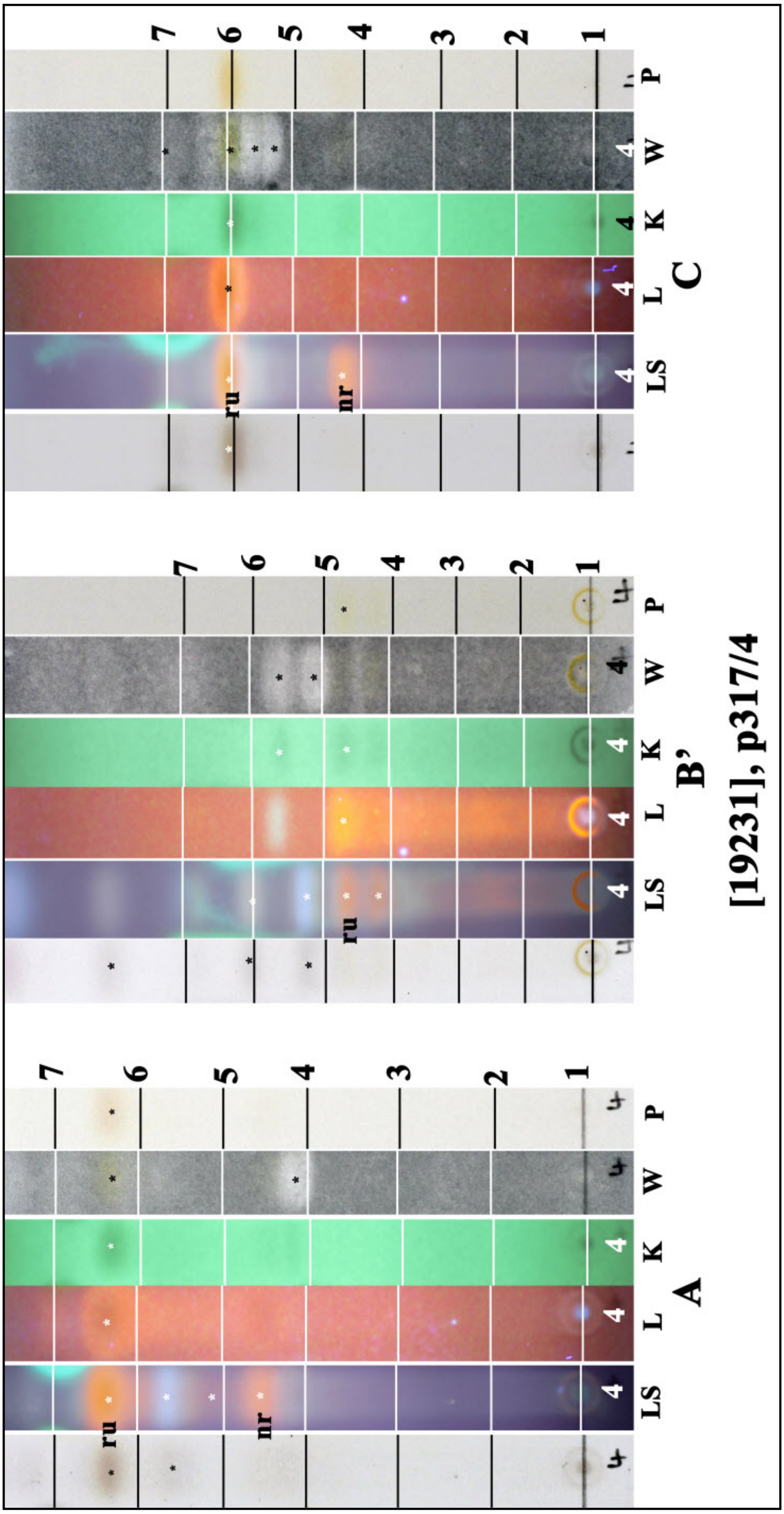
russulone



at: atranorin, pl: placodiolic acid, **ru: russulone**

Haematomma eremaeum [19028], Australia, Western Australia, Pumphreys Bridge, 21 km south-west of Pingelly

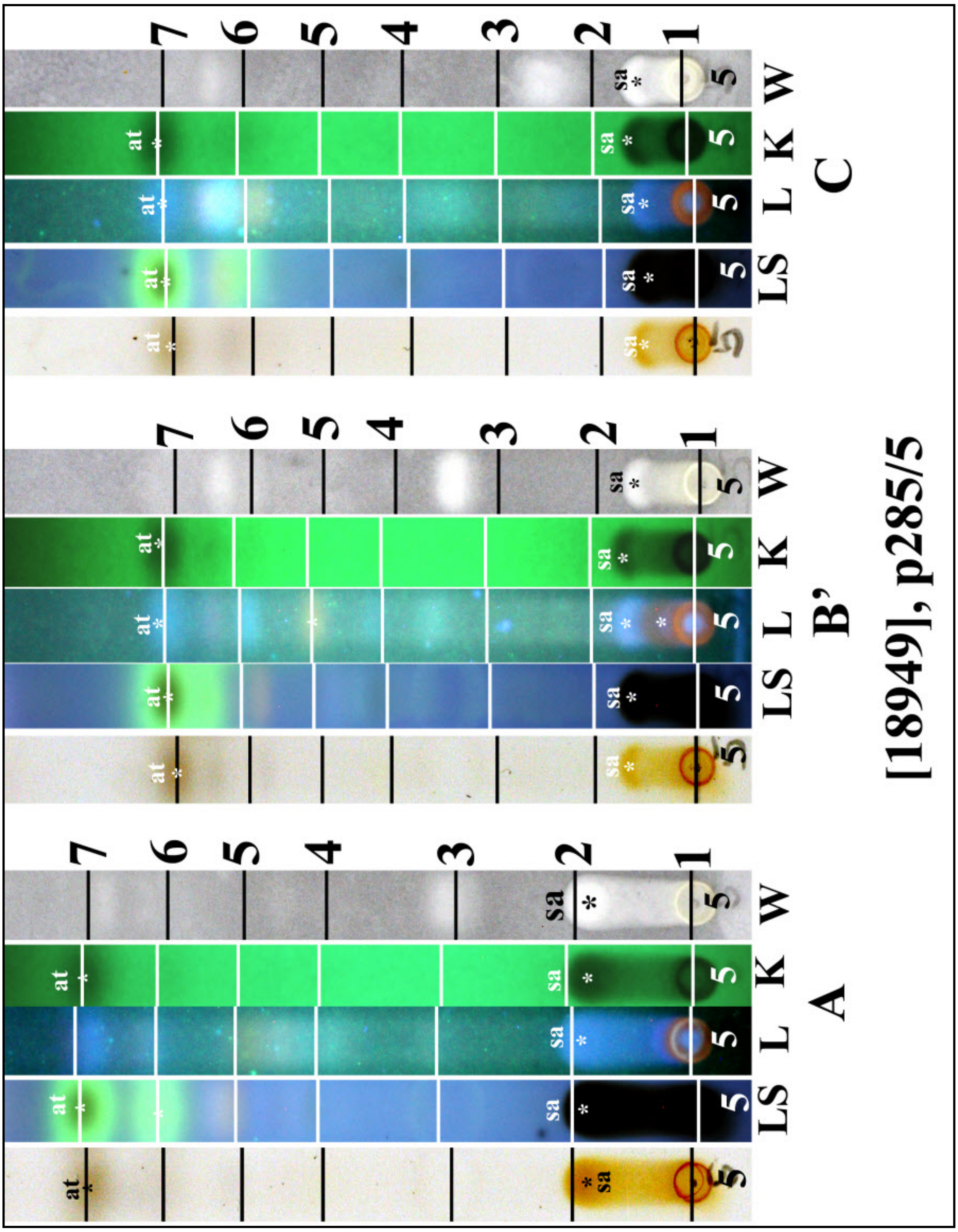
russulone



ru: **russulone**, nr: norrussulone

Ramboldia laeta, [19231], Australia, New South Wales, Koszciusko National Park, Johnnies Plain, 1 km east of Charlottes Pass, 36°25' S, 148°21' E, 1750 m.

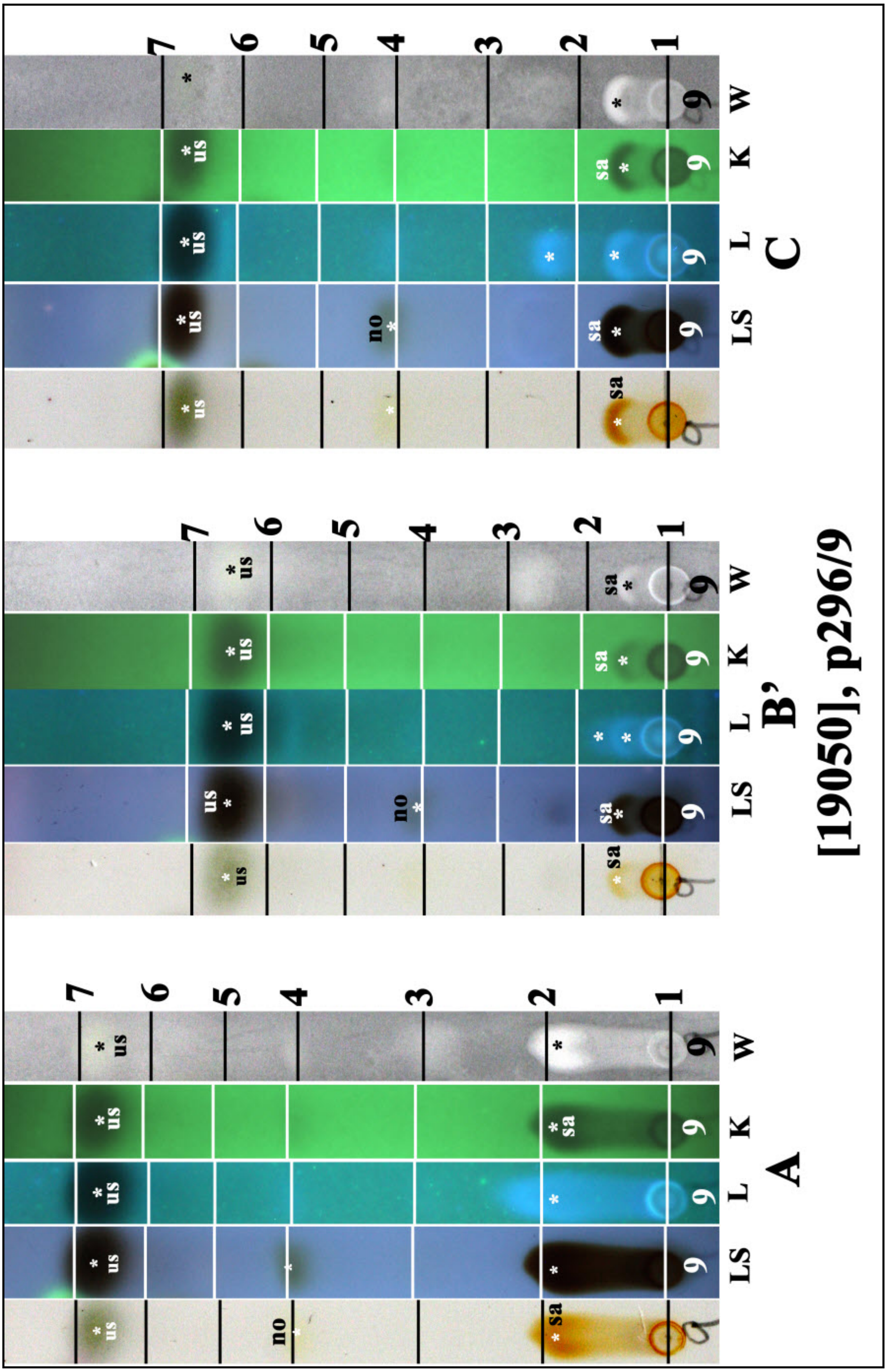
salazinic acid



at: atranorin, **sa: salazinic acid**

Bulbothrix isidiza, [18949], Australia, Queensland, along the foreshore of Tin Can Inlet, Tin Can Bay.

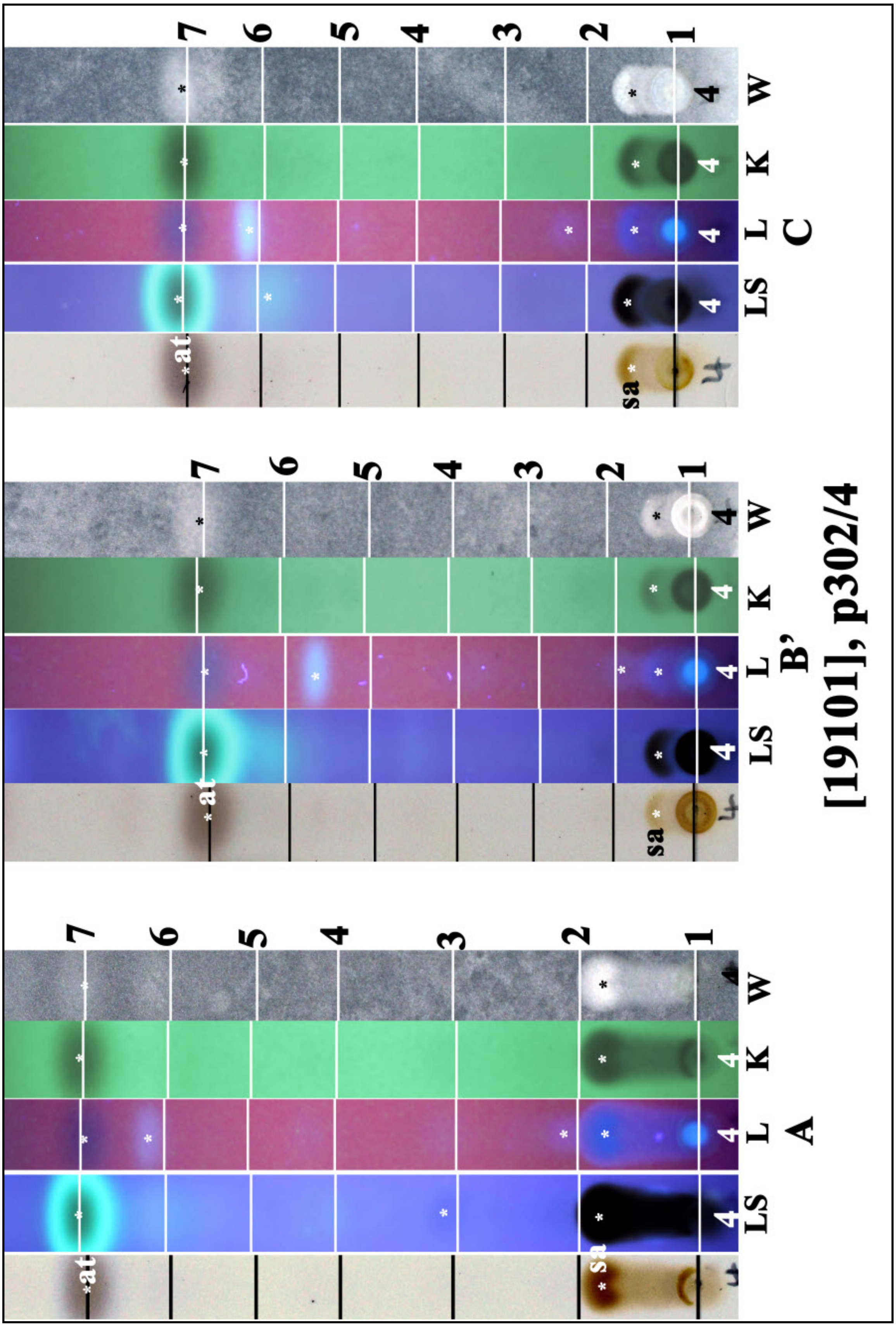
salazinic acid



us: usnic acid, **sa: salazinic acid**, no: norstictic acid (trace)

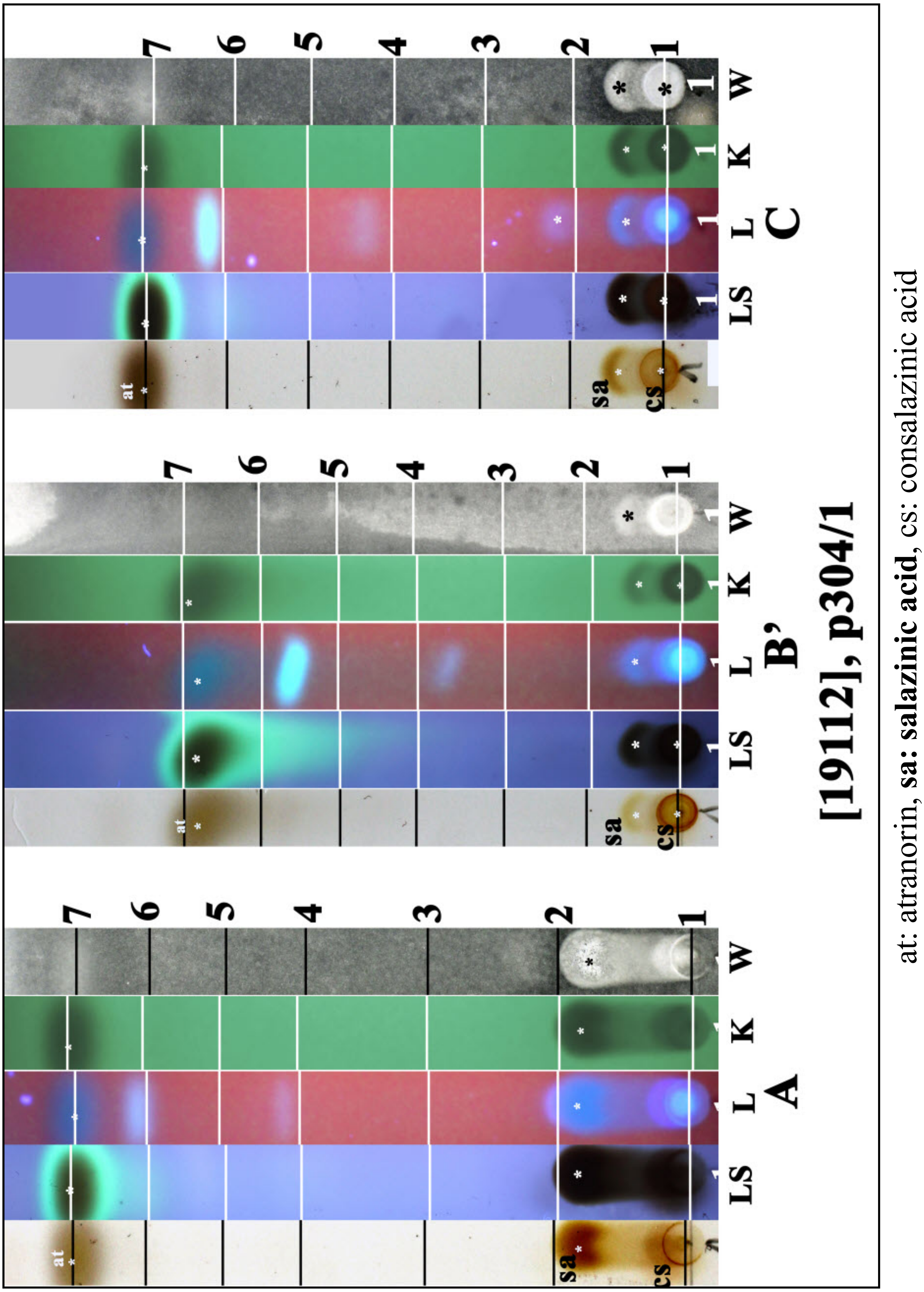
Hypotrachyna sinuosa, [19050], New Zealand, North Island, Wellington, Tongario National Park

salazinic acid



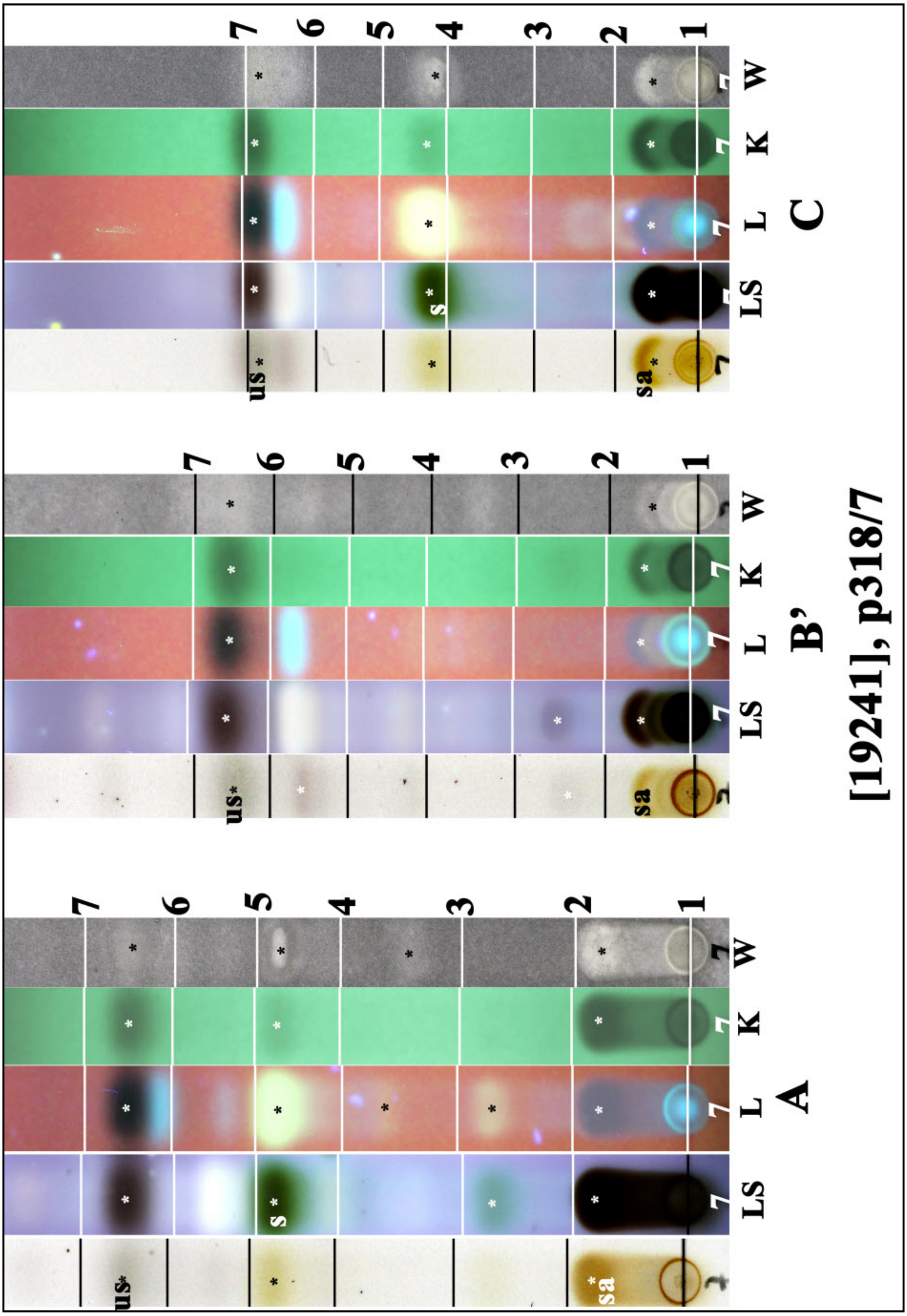
Notoparmelia *(Parmelia)* ***erumpens,*** [19101], Australia, New South Wales, Lord Howe Island, along ridge to Malabar Hill.

salazinic acid



Parmotrema austrocetratum, [19112], New Zealand, North Island, North Auckland, c. 2.5 km south of Kaweka on road to Thames.

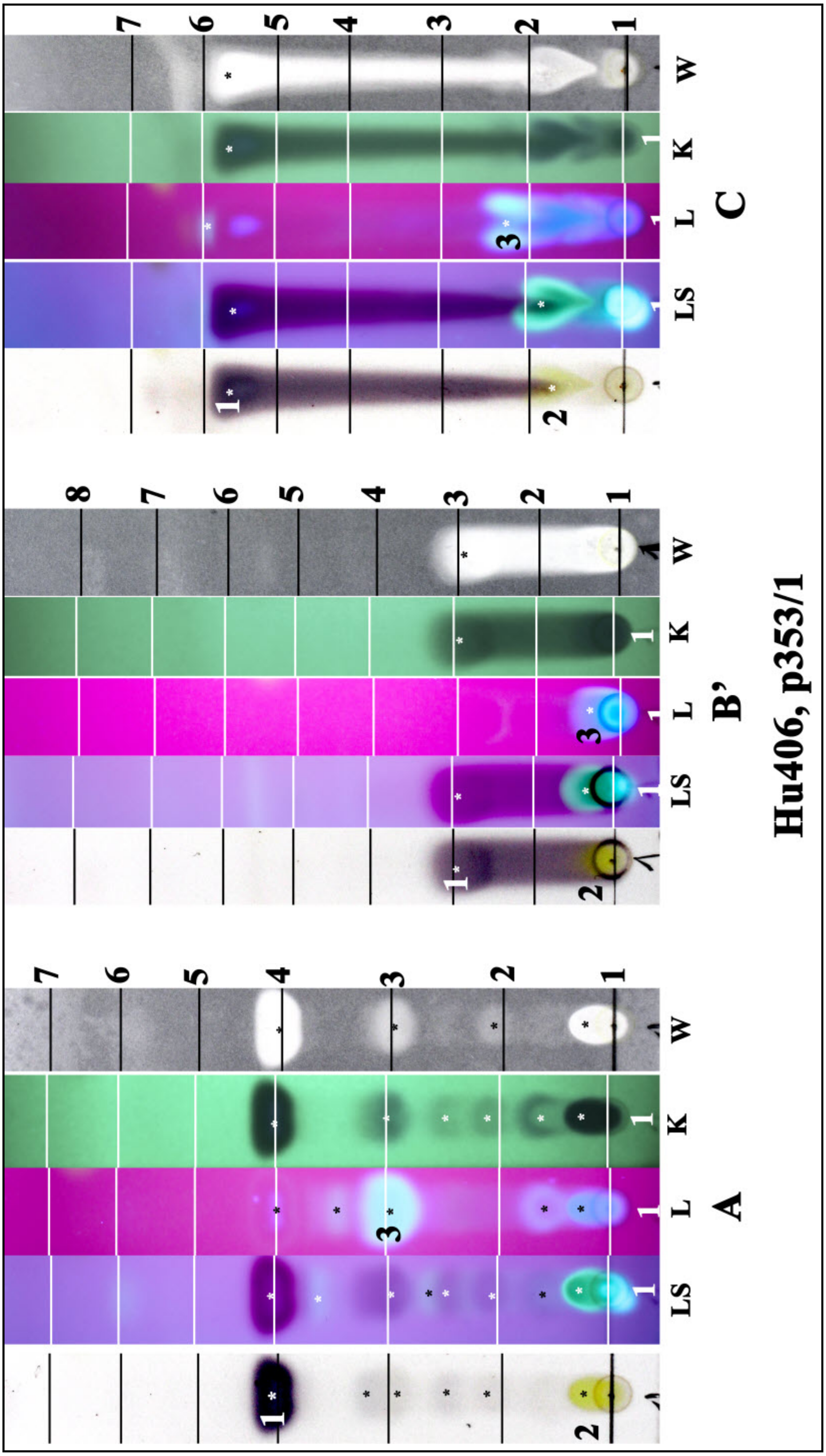
scabrosin 4,4’diacetat



us: usnic acid, sa: salazinic acid, **s: scabrosin 4,4’diacetat**

Ramalina fissa,[19241], Australia, South Australia, Pine Hut Road, 4 km east of Eden Valley, 34°39' S, 139°07' E, 360 m.

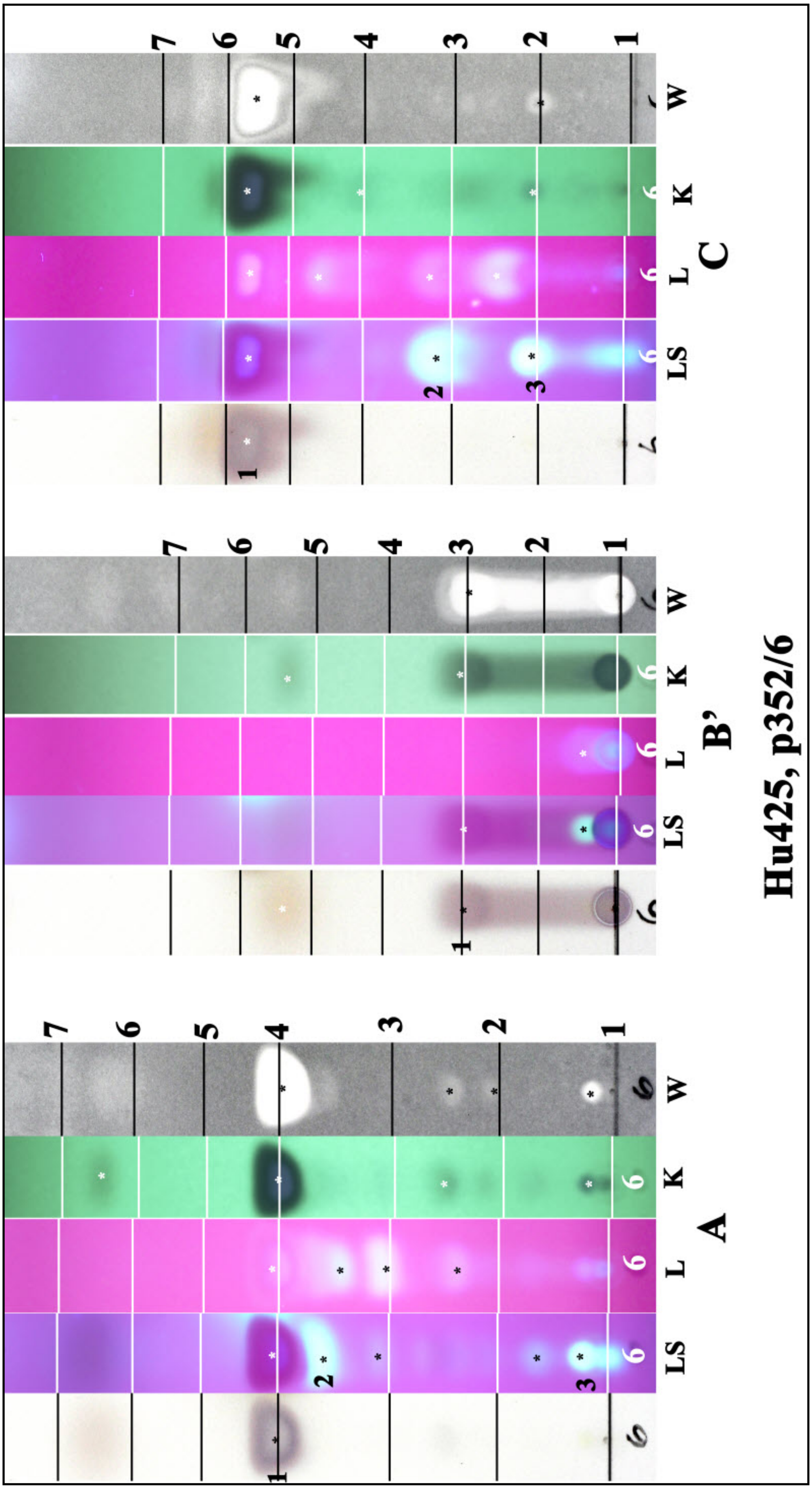
schizopeltic acid



1: schizopeltic acid, 2,3: unknown, conf. J.A. Elix

S. Huneck's collection of lichen substances No 406: schizopeltic acid from *Roccella luteola*. Botanisches Museum Berlin-Dahlem

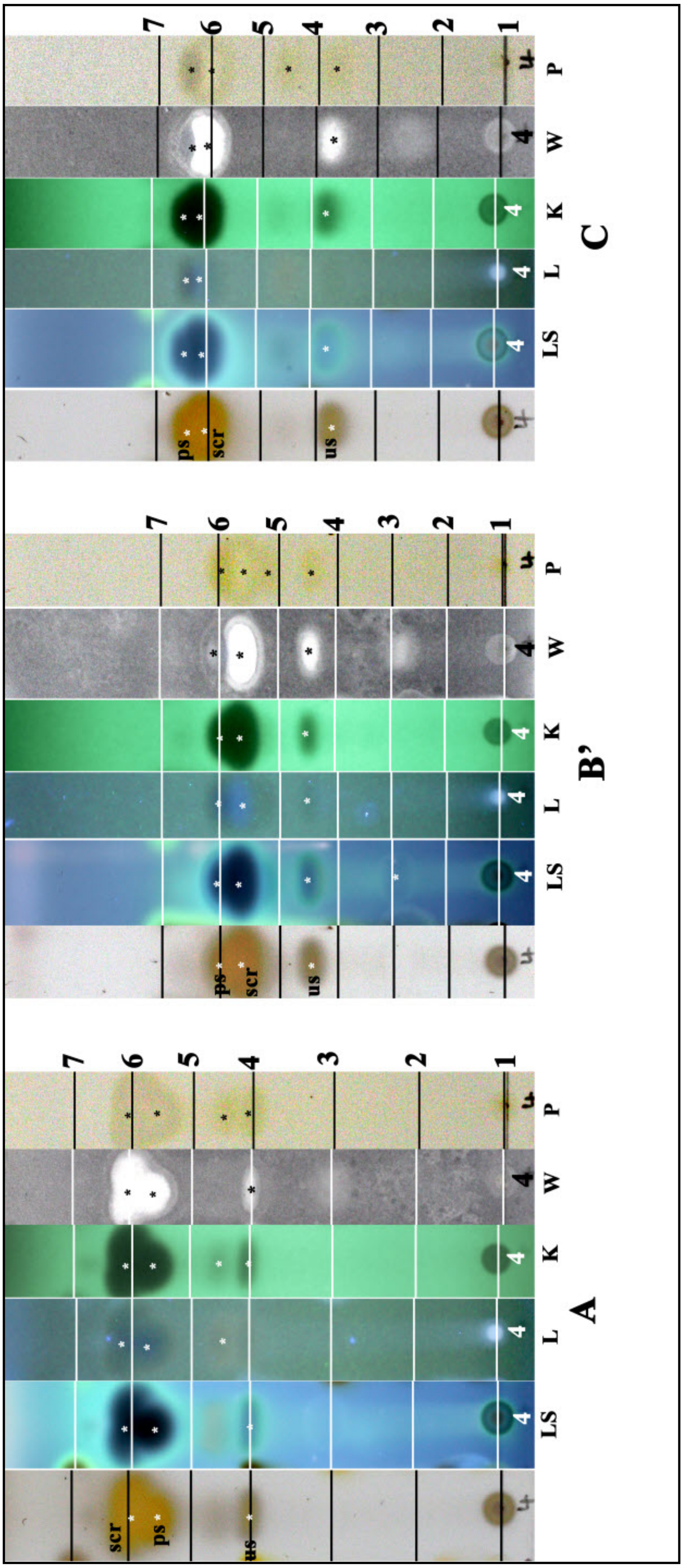
schizopeltic acid



1: schizopeltic acid, 2,3: unknown, conf. J.A. Elix

S. Huneck's collection of lichen substances No 425: schizopeltic acid from *Roccella flavida*. Botanisches Museum Berlin-Dahlem

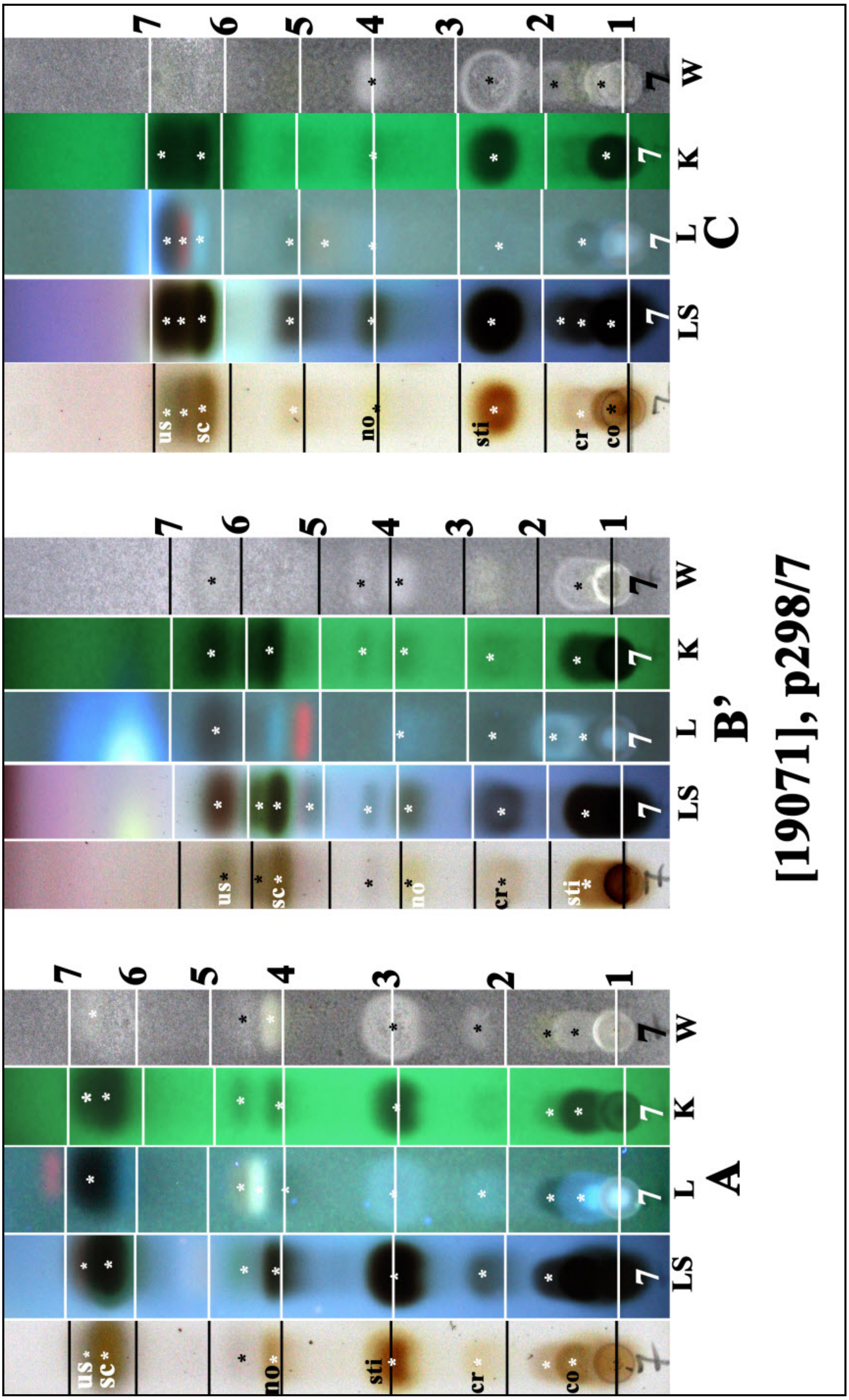
scrobiculin, m-scrobiculin, p-scrobiculin



scr: m-scrobiculin (major), **ps: p-scrobiculin** (submajor), us: unknown scrobiculin derivate (minor)

Scrobiculin „Reinsubstanz“ von Huneck erhalten von K. Kalb. Mit großer Wahrscheinlichkeit ein Extrakt von ***Lobaria amplissima***.

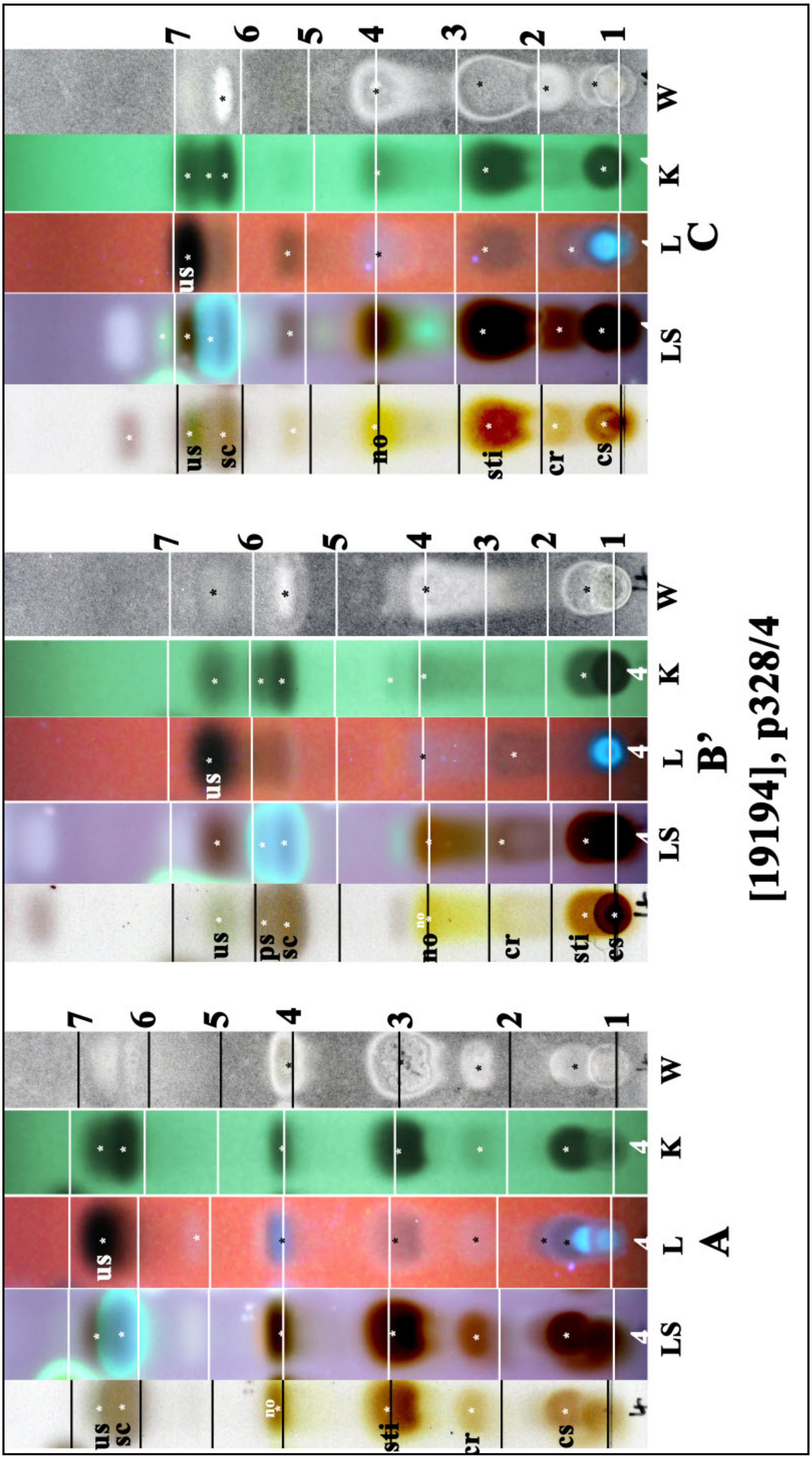
scrobiculin



us: usnic acid, **sc: scrobiculin**, no: norstictic acid, sti: stictic acid, cr: cryptostictic acid, co: constictic acid

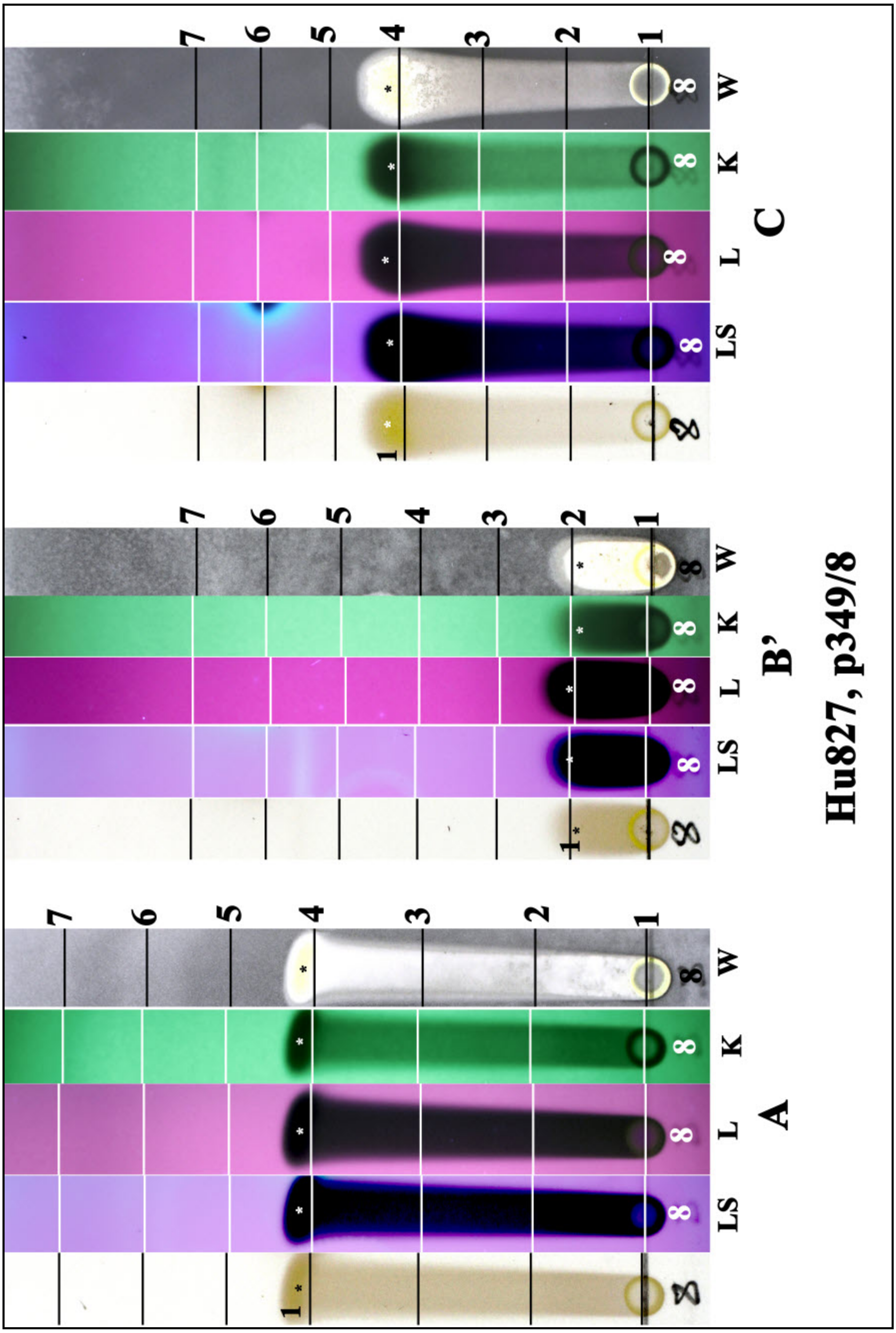
Lobaria scrobiculata, [19071], Australia, New South Wales, Great Dividing Range, Tallaganda State Forest, 10 km east of Captains Flat.

scrobiculin



Lobaria scrobiculata, [19194], Norway, Eidford, 60.469° N, 7.066° E, 40 m, growing on shady deciduous tree. Leg. F. Schumm 21.06.2014.

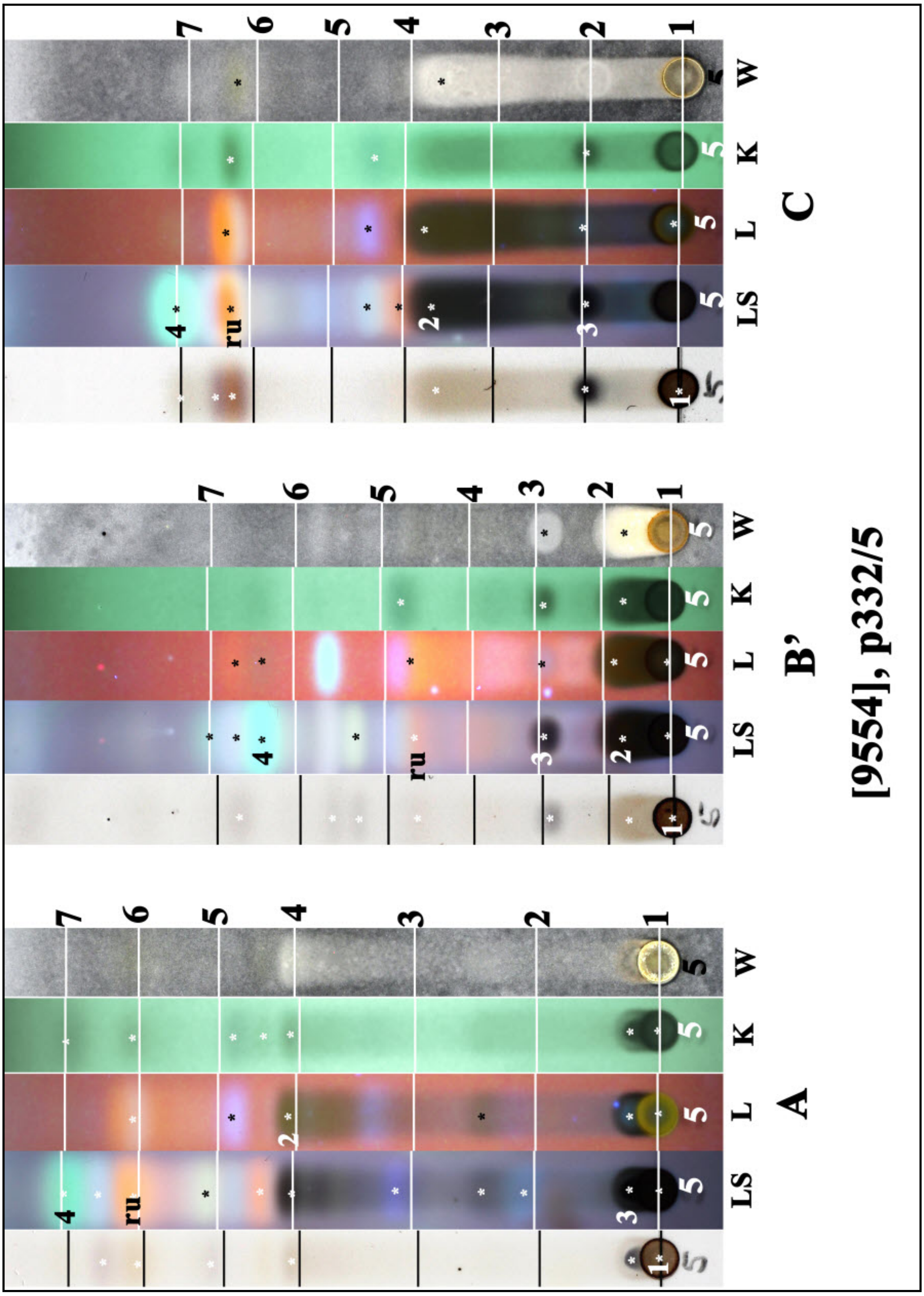
secalonic acid A
(= entothein)



1: secalonic acid A, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 827: entothein
Botanisches Museum Berlin-Dahlem

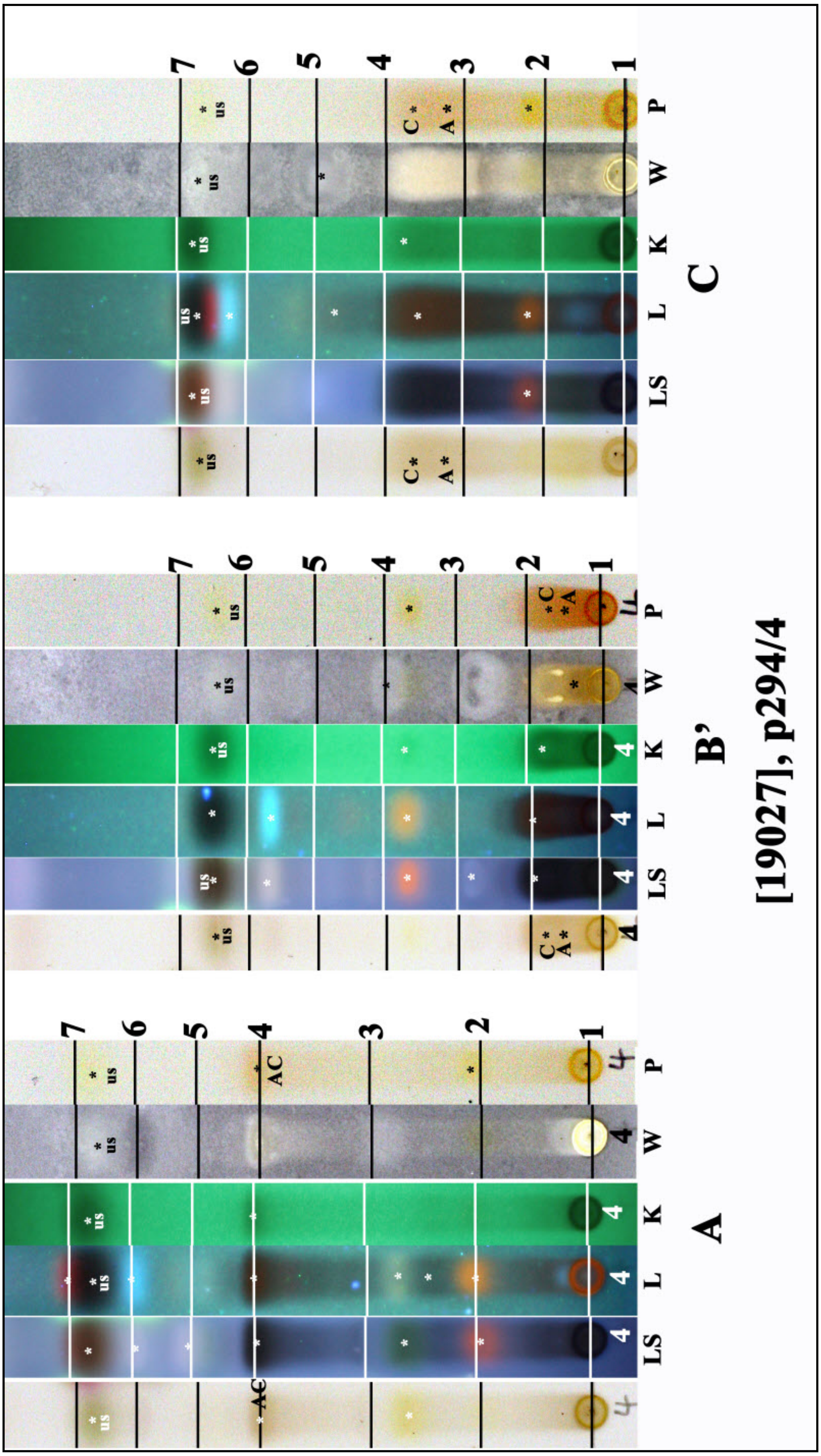
secalonic acid A



ru: russulone, 1: unknown, **2: secalonic acid A**, 3: fumarprotocetraric acid, 4: lichexanthone

Ramboldia russula, [9554], Thailand, Bergdorf der Akha in der Nähe von Chiang Saen, 20°06.275' N, 99°37.524'E, 700 m, corticol. Leg. Schumm 31.03.2002, det. Aptroot 2009. HPTLC, anal. F. Schumm, det. J.A.Elix.

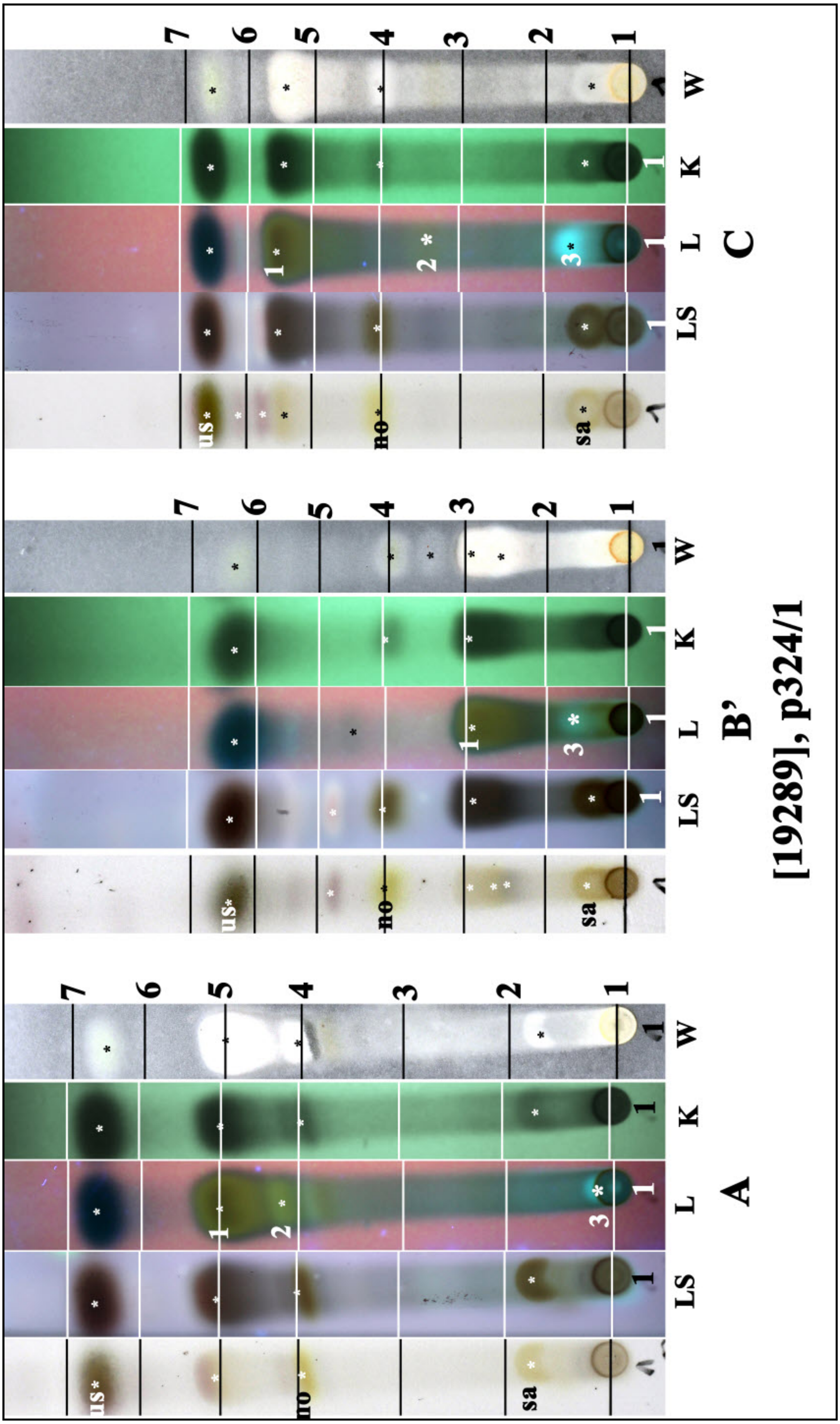
secalonic acid A



us: usnic acid, **A: secalonic acid A**, C: secalonic acid C

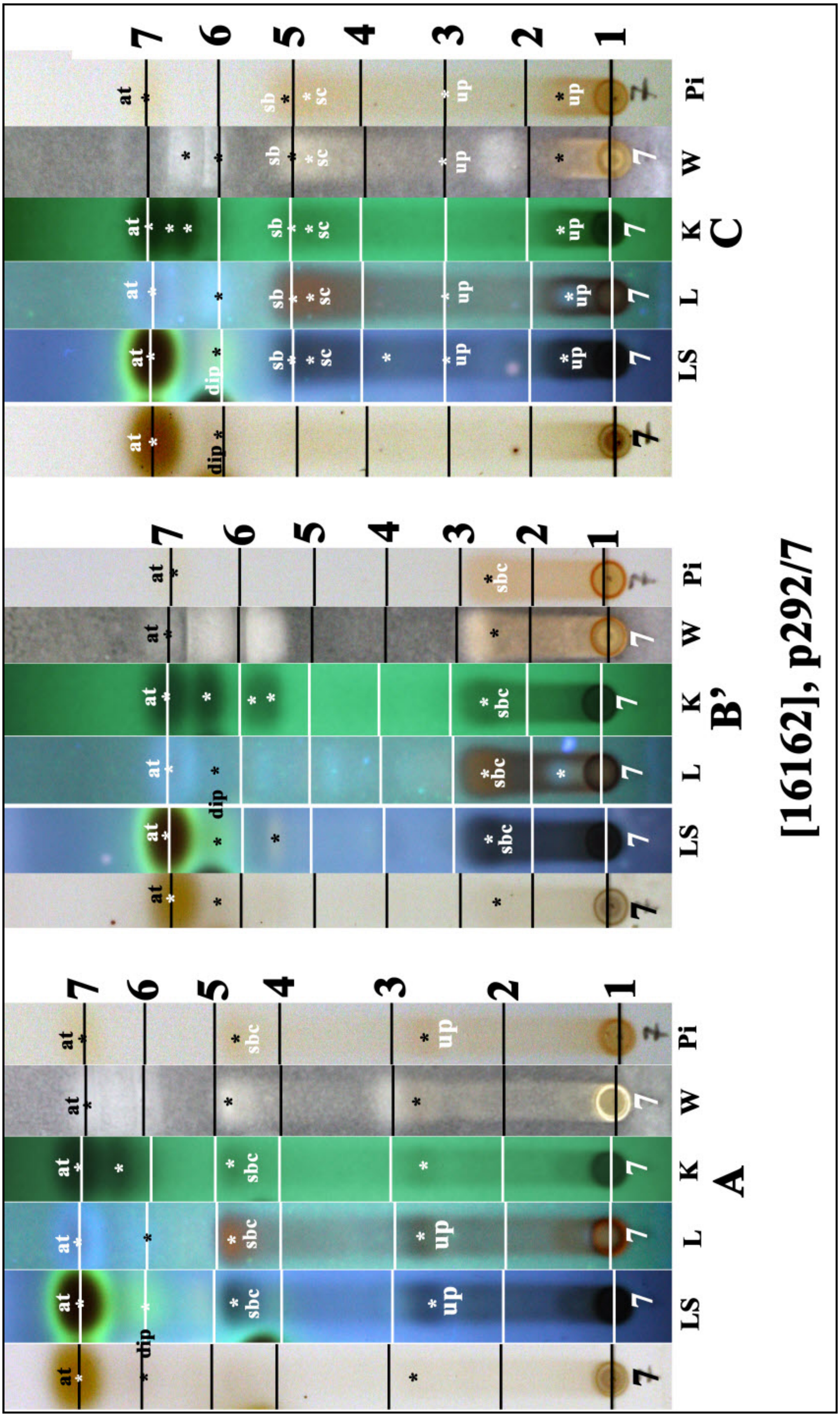
Flavoparmelia secalonica [19027], Australia, Western Australia, along roadside, 10 km south-east of Corrigin along road to Kilin

secalonic acid A



Usnea baileyi, [19289], Australia, Queensland, Crediton State Forest, 16 km south-west of Finch Hatton, 21°15' S, 148°31' E, 700 m.

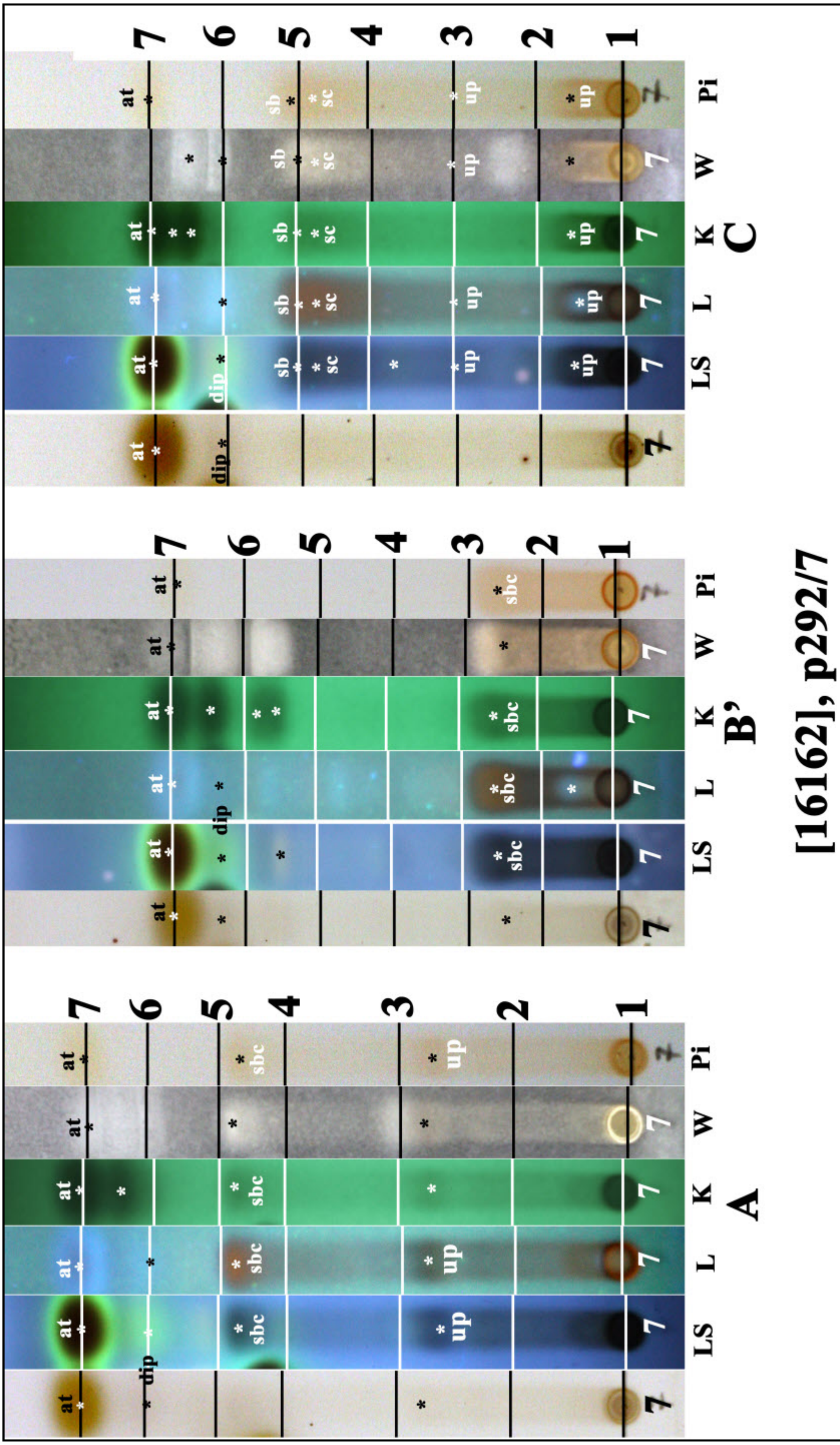
secalonic acid B



at: atranorin, **sbc: secalonic acids B+C**, **sb: secalonic acid B**, sc: secalonic acid C, up: unknown pigments. Spots identified by J.A. Elix 12.2013.

Diploicia canescens ssp. ***australasica*** [16162], SE-Australia, Küstenfelsen Tomakin, on rocks.

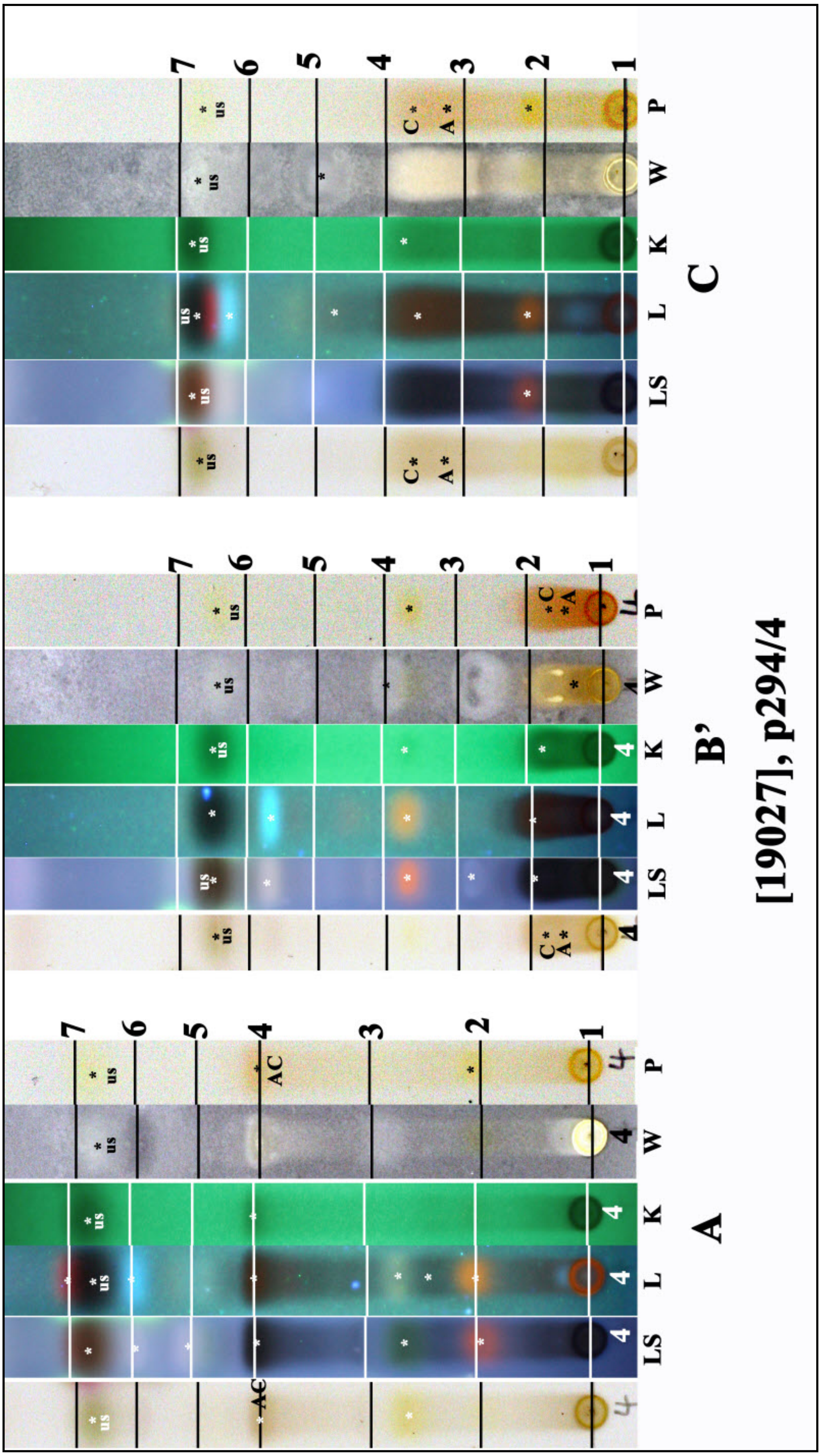
secalonic acid C



at: atranorin, **sbc: secalonic acids B+C**, sb: secalonic acid B, sc: **secalonic acid C**, up: unknown pigments. Spots identified by J.A. Elix 12.2013.

Diploicia canescens ssp. ***australasica*** [16162], SE-Australia, Küstenfelsen Tomakin, on rocks.

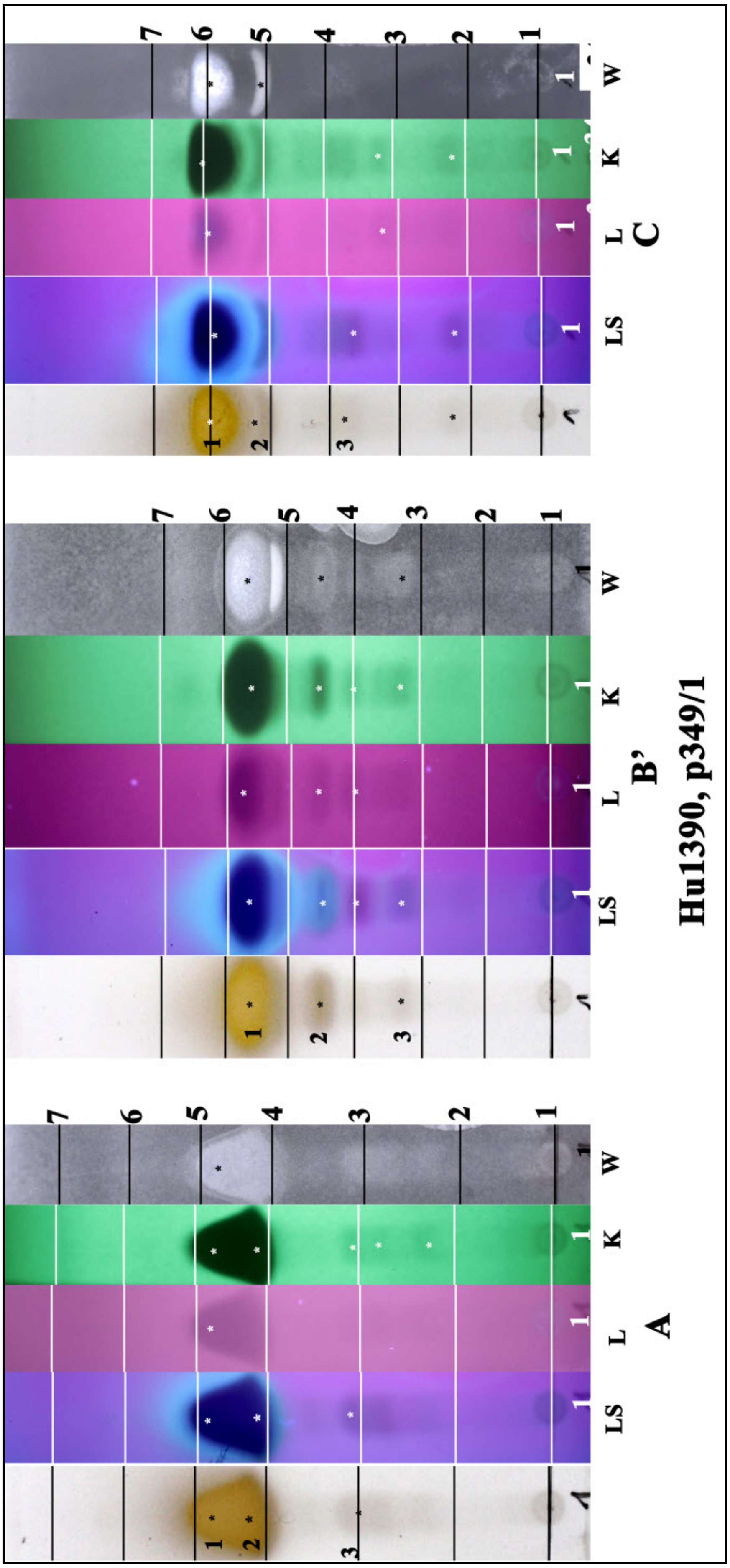
secalonic acid C



us: usnic acid, A: secalonic acid A, C: **secalonic acid C**

Flavoparmelia secalonica [19027], Australia, Western Australia, along roadside, 10 km south-east of Corrigin along road to Kilin

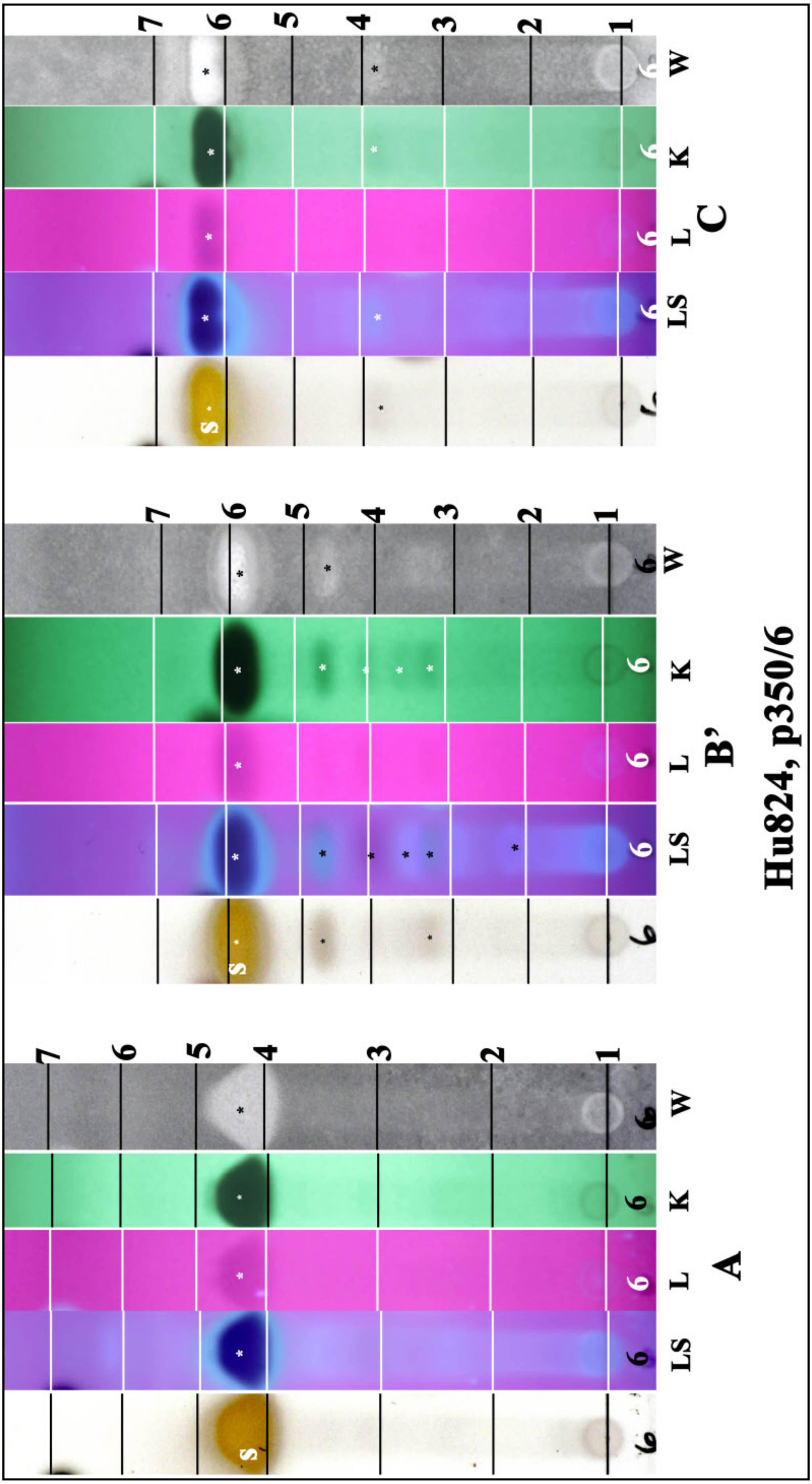
sekikaic acid



1: sekikaic acid, 2,3: unknown, conf. J.A. Elix

S. Huneck's collection of lichen substances No 1390: sekikaic acid
Botanisches Museum Berlin-Dahlem

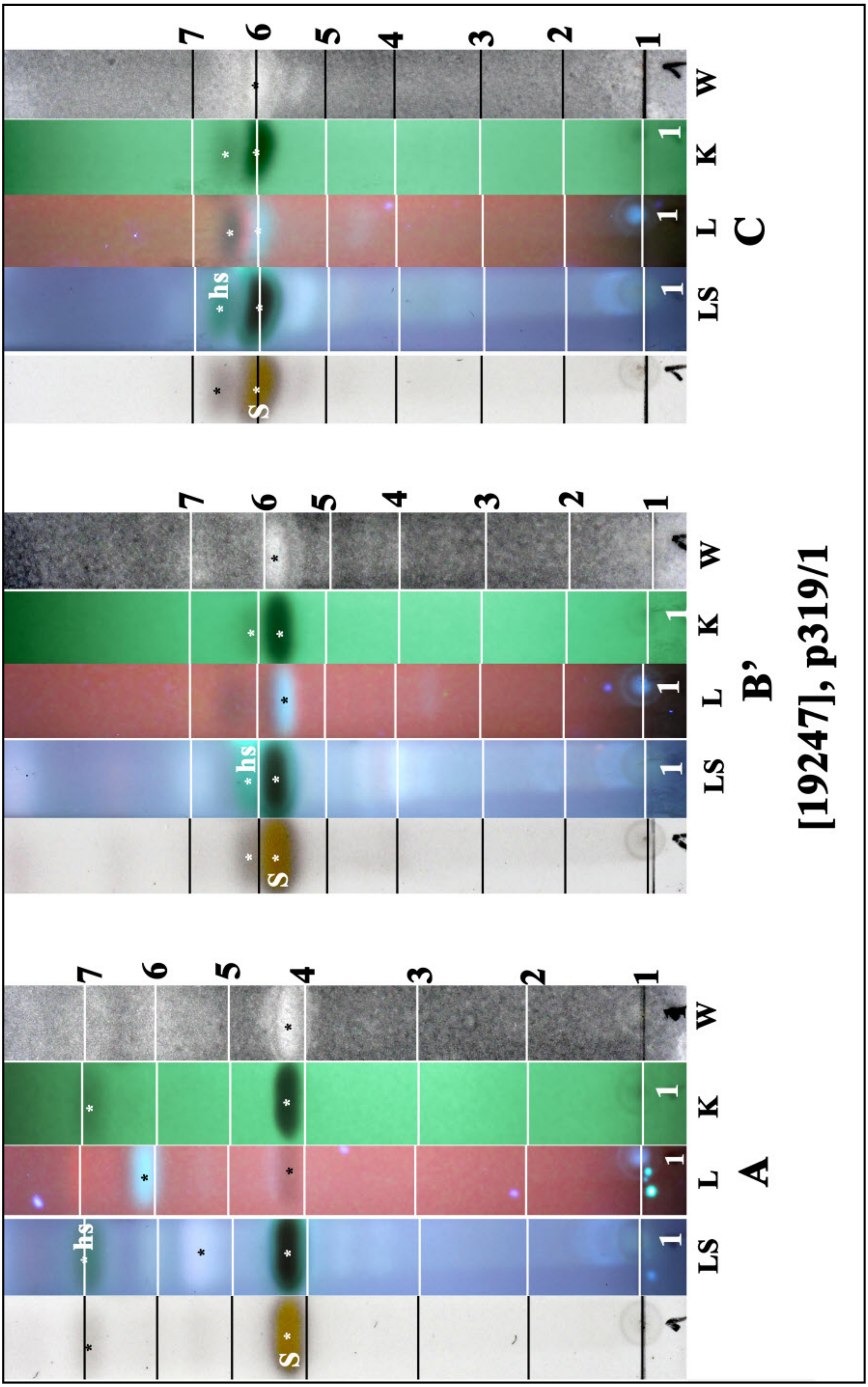
sekikaic acid



s: **sekikaic acid**, conf. J.A. Elix

S. Huneck's collection of lichen substances No 824: sekikaic acid
Botanisches Museum Berlin-Dahlem

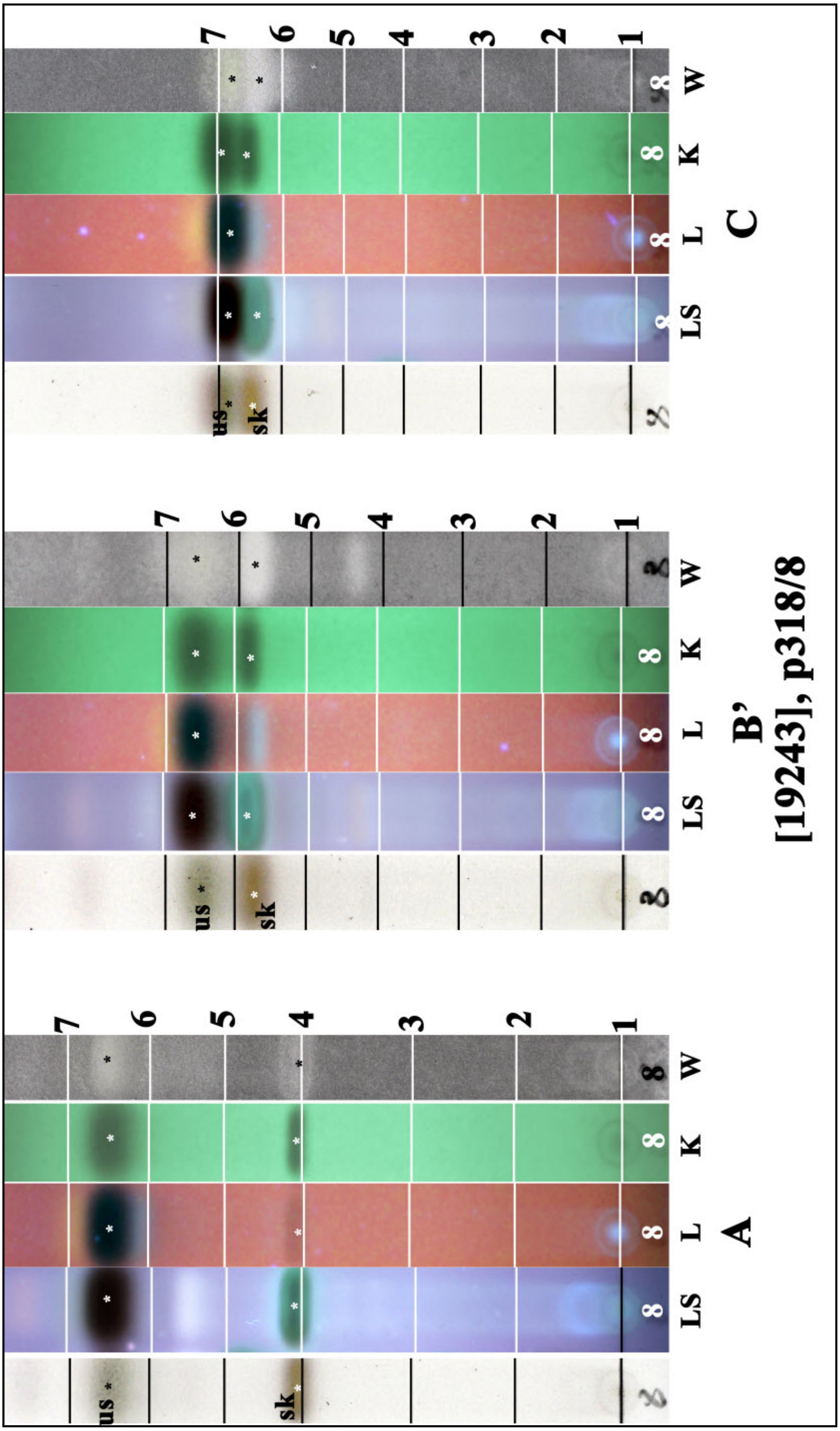
sekikaic acid



s: sekikaic acid, hs: homosekikaic acid

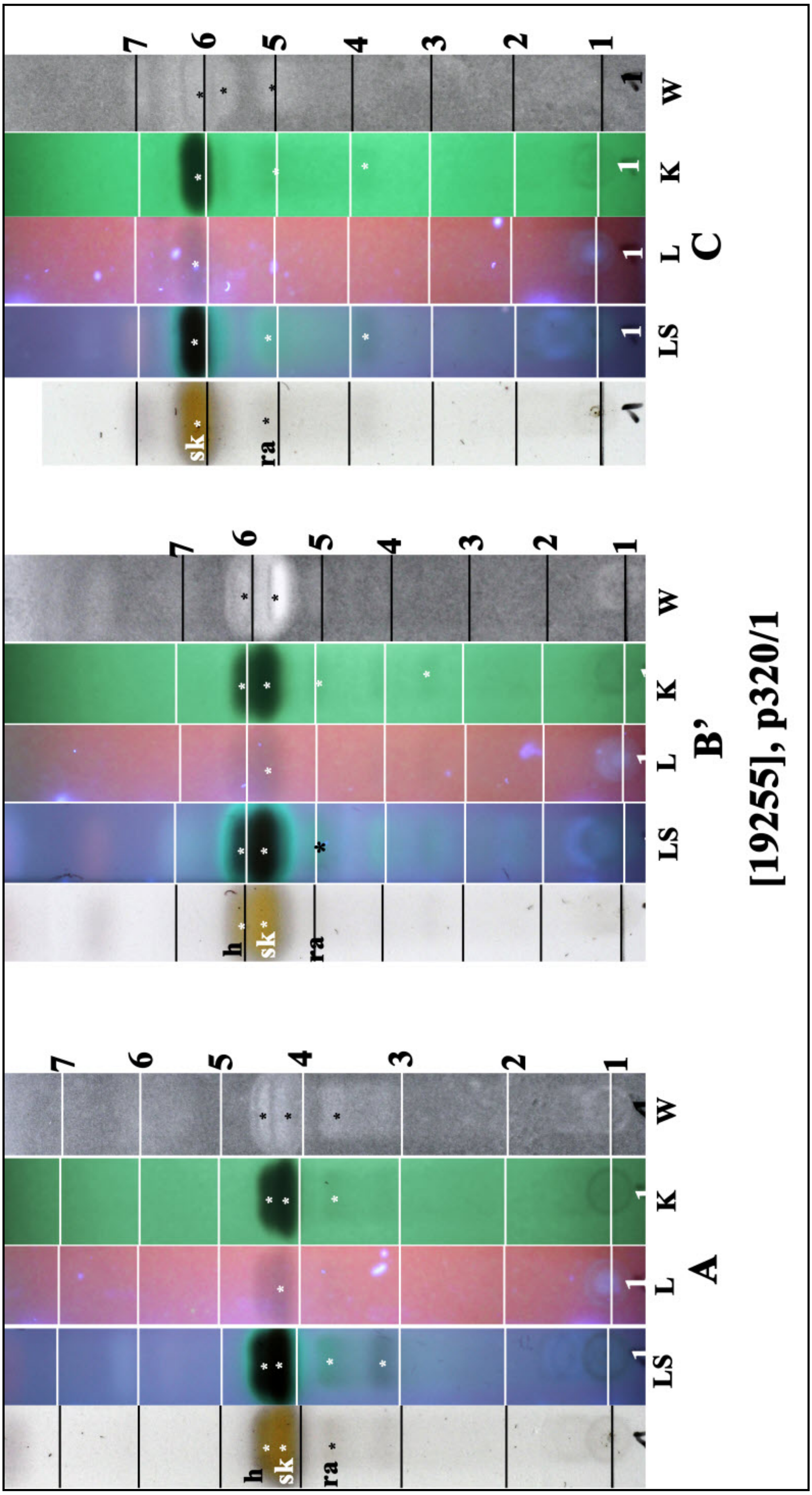
Ramalina glaucescens, [19247], Australia, Victoria, Omeo, 37°06' S, 147°36' E, 720 m.

sekikaic acid



Ramalina glaucescens, [19243], New Zealand, South Island, Otago, rocky hillside, c. 27.5 km west-south-est of Ranfurly on Alexandra-Palmerston road.

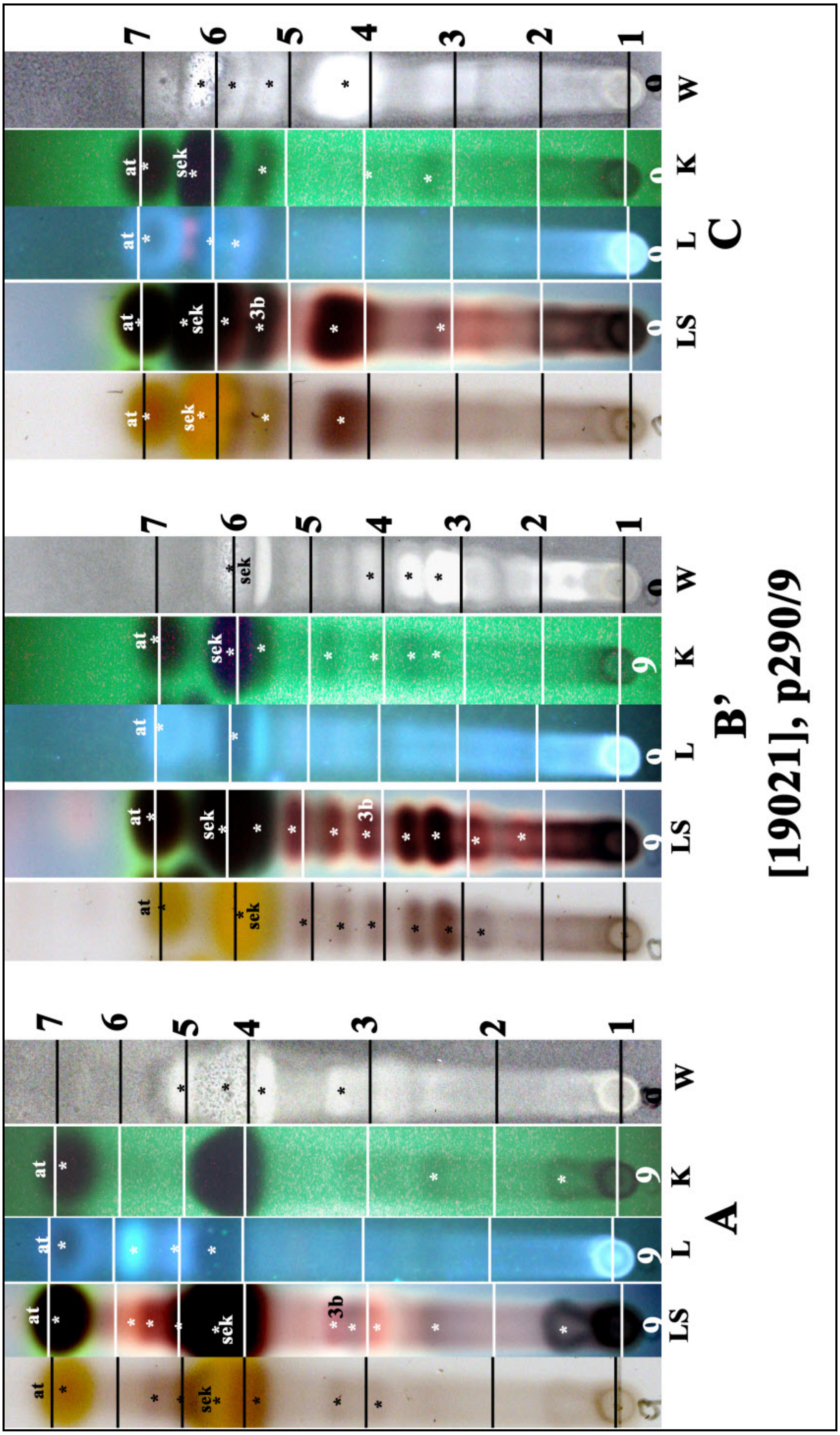
sekikaic acid



h: homosekikaic acid, **sk: sekikaic acid**, ra: ramalinolic acid

Ramalina peruviana, [19255], Norfolk Island, Rocky Point Reserve, 29°03' S, 167°55' E, 60 m.

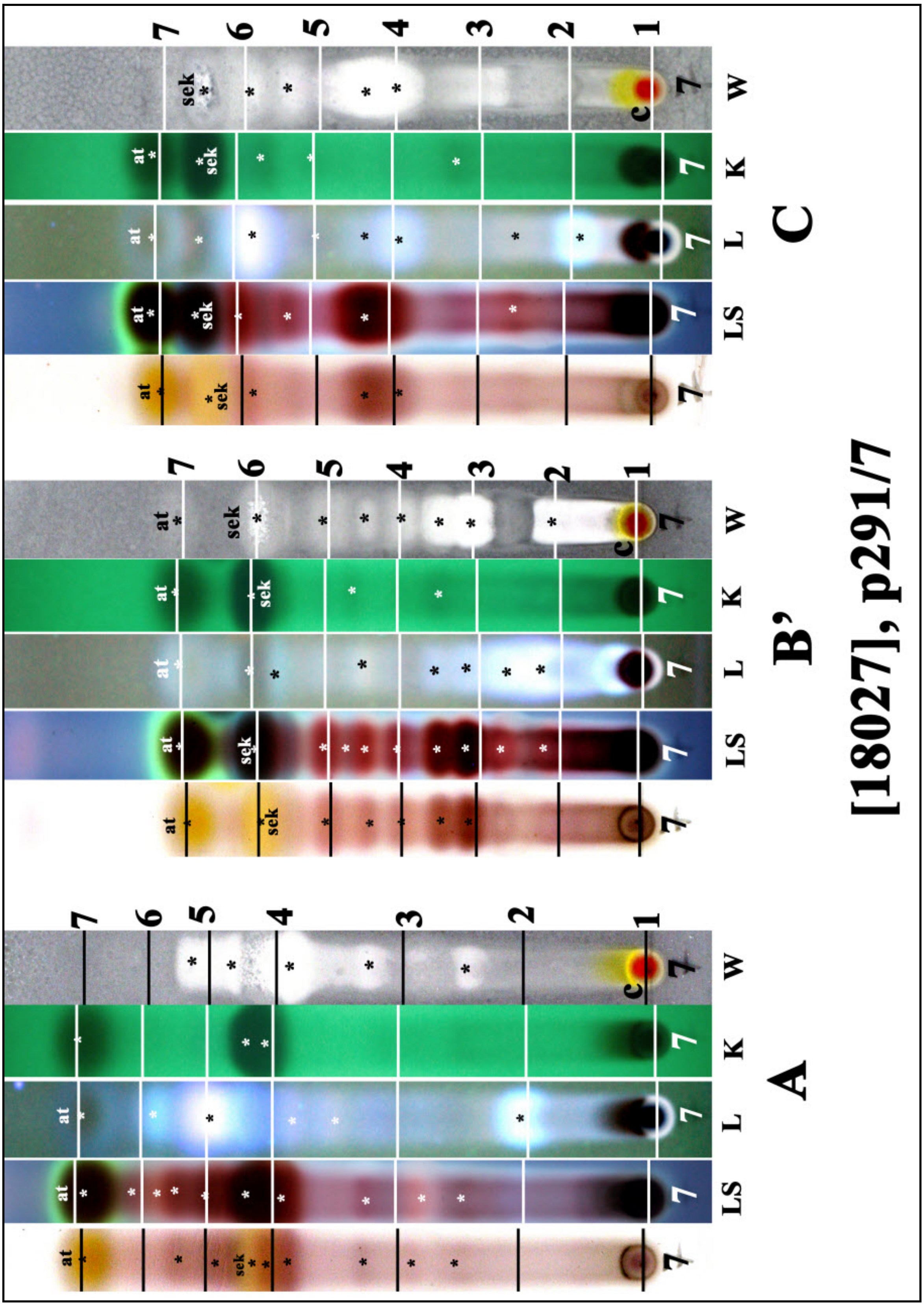
sekikaic acid



at: atranorin, sek: sekikaic acid

Dirinaria sekikaica [19021], Australia, New South Wales, Old Maclay River estuar.

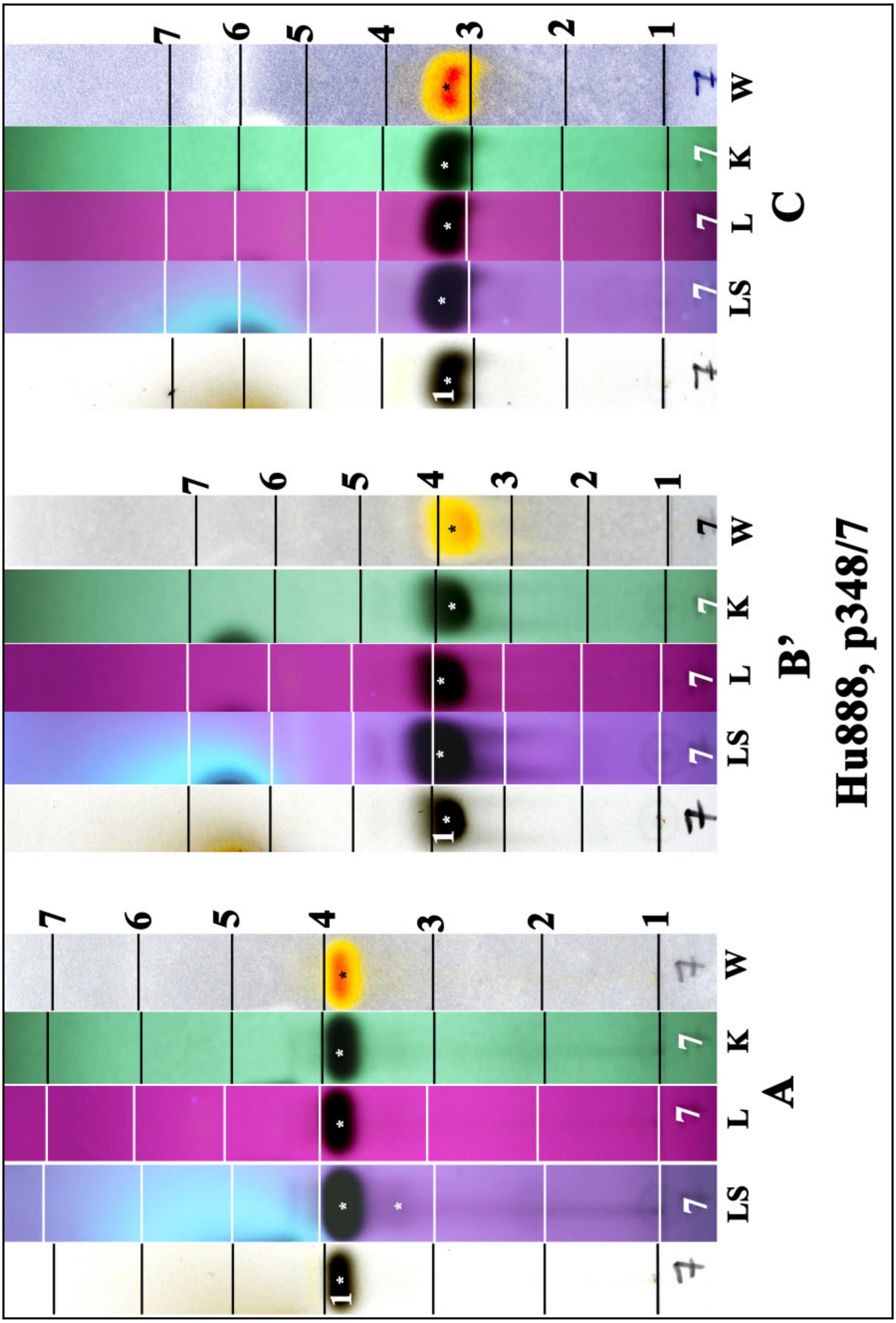
sekikaic acid



at: atranorin, **sek: sekikaic acid**,
3b:3β-acetoxyhopane-1β,22-diol, c: canarione

Dirinaria leopoldii, [18027], Brasilien/ Bahia. Zwischen Feira de Santana und Milagres, etwa 10 km vor Milagres, in einer lichten Castinga an dünnen Ästen. 200 m. Leg. K. Kalb & M. Marcelli 21.07.1980, det. K. Kalb. Lichenes Neotropici 62.

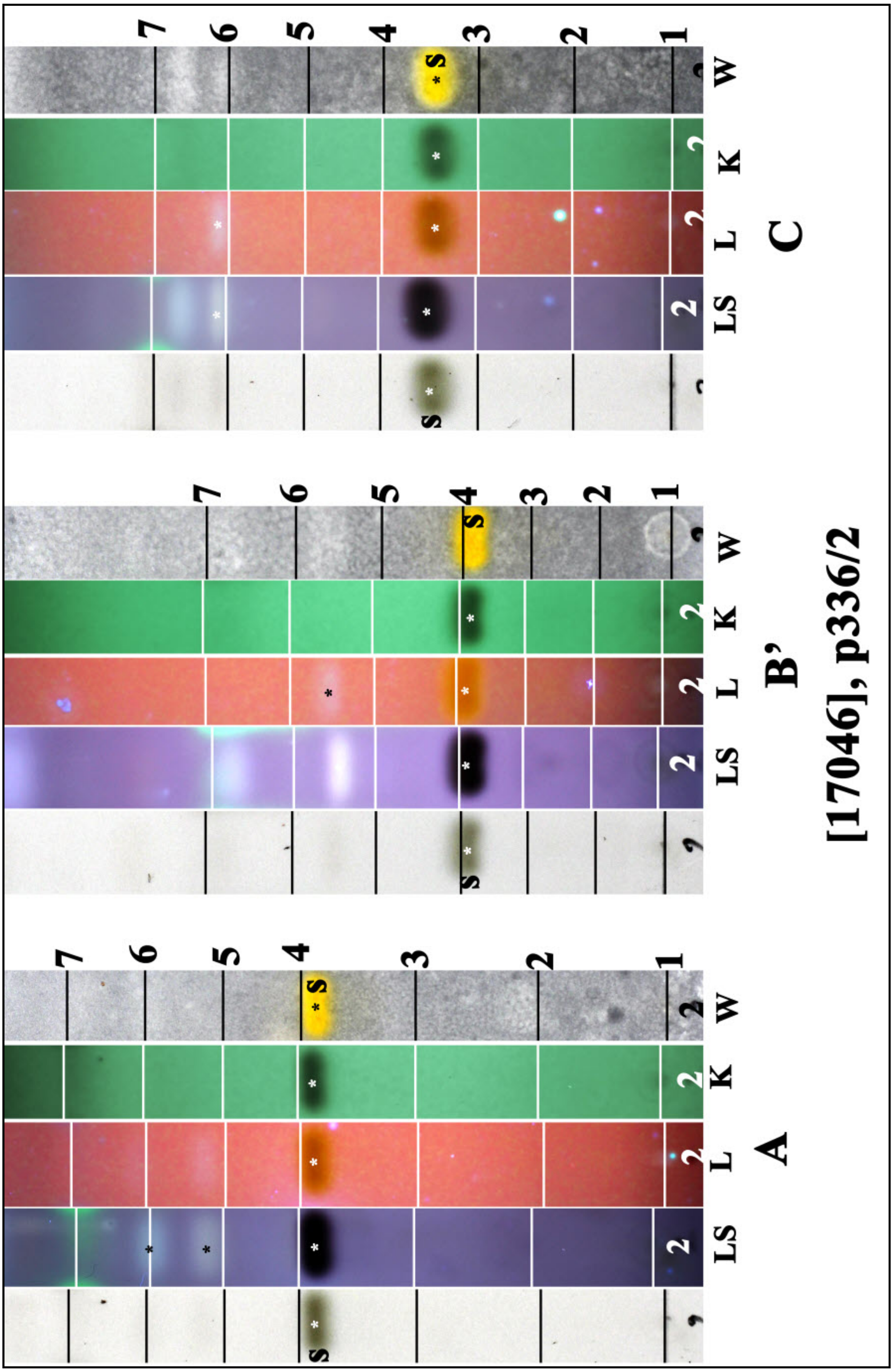
skyrin



1: skyrin, conf. J.A. Elix

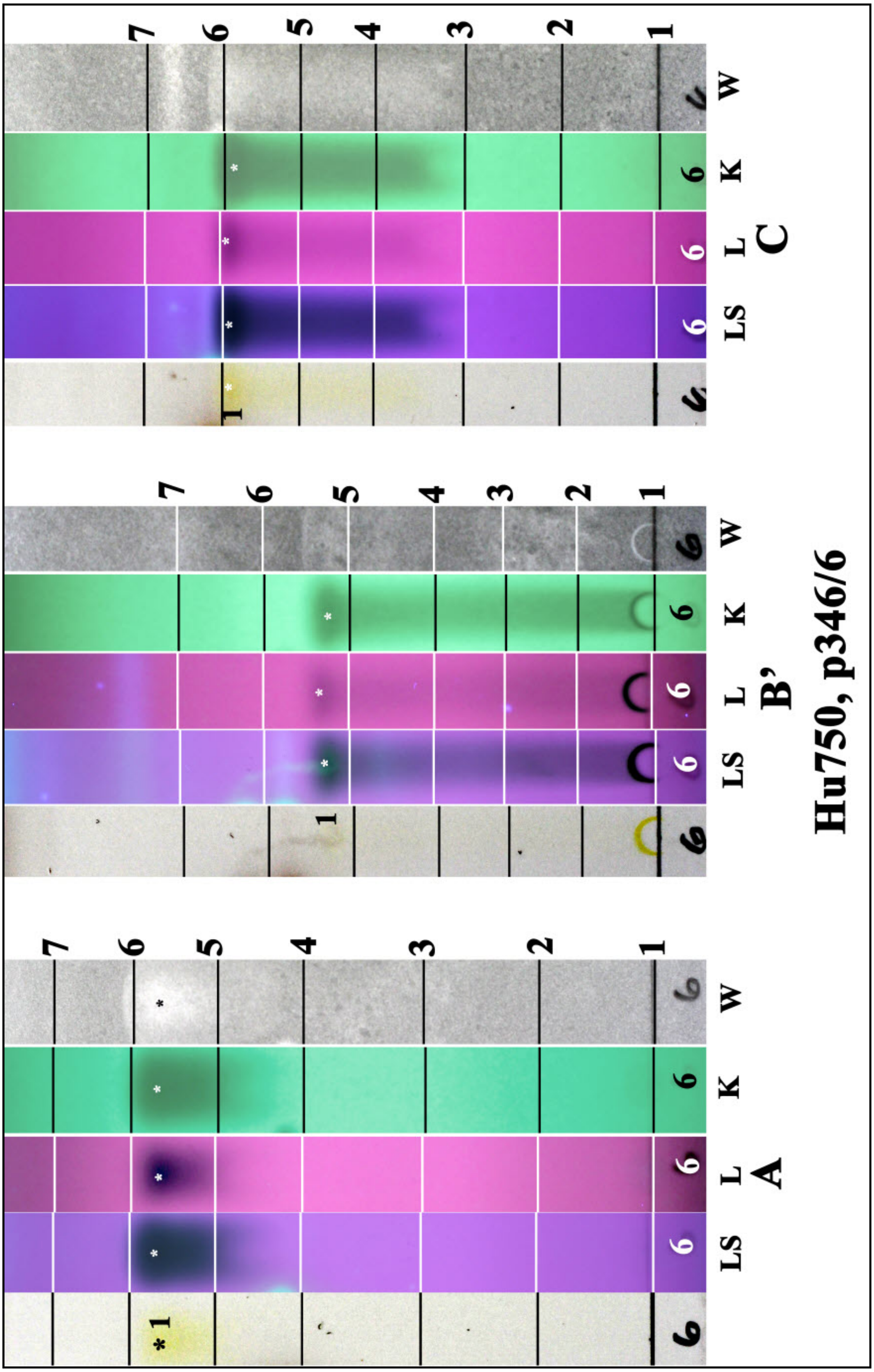
S. Huneck's collection of lichen substances No 888: skyrin
Botanisches Museum Berlin-Dahlem

skyrin



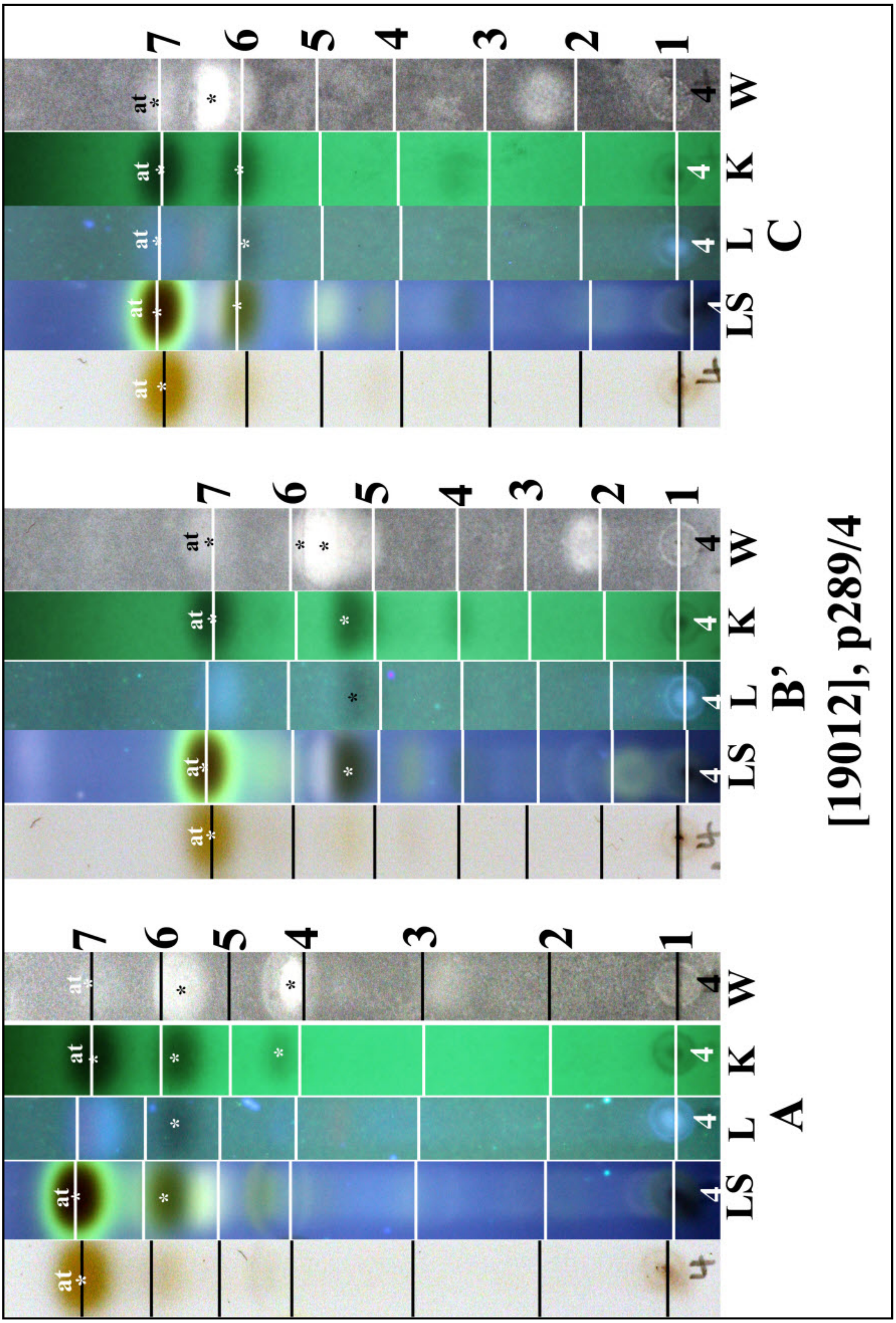
Phaeophyscia endococcinodes, [17046], USA, Hawaii, Maui, IAO-Valley, west of Wailuku, 20,87543° N, 156,54715° W, 300 m. Leg. F. Schumm & J.-P. Frahm, 15.02.2011, det. F. Schumm.

sordidone



S. Huneck’s collection of lichen substances No 750: sordidone, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

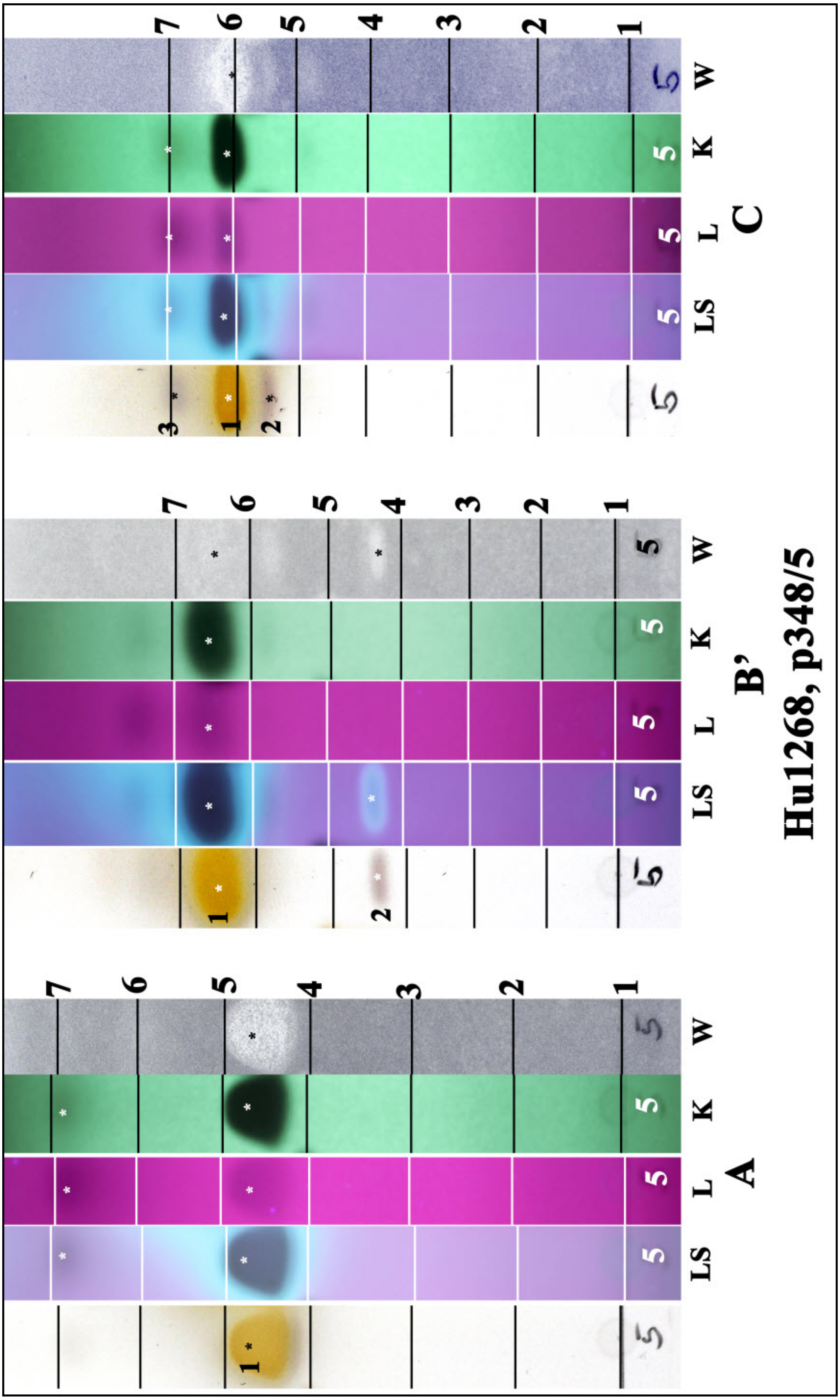
sordidone



at: atranorin, **sordidone** at position (5,7 | 5,45 | 6)

Lecanora carpinea [19012], Germany, Sachsen-Anhalt, Nationalpark-Harz, , Glashüttenwiese an Acer pseudoplatanus, 800 m. Leg. Kison (# 1381) 6.5.2011. Disc C+ yellow.

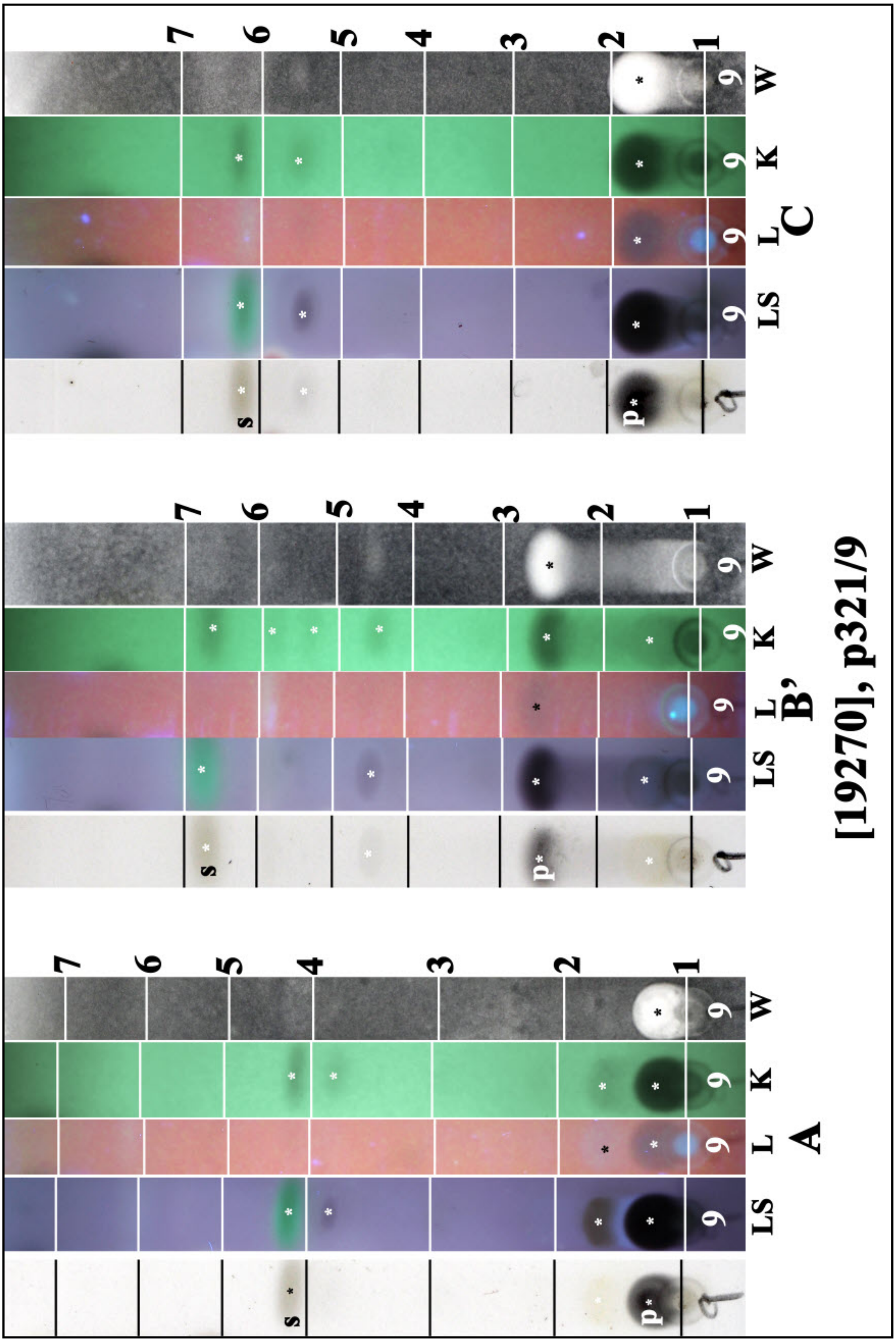
sphaerophorin



1: sphaerophorin, 2,3: unknown, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 1268: sphaerophorin aus *Sphaerophorus ramuligera.* Botanisches Museum Berlin-Dahlem

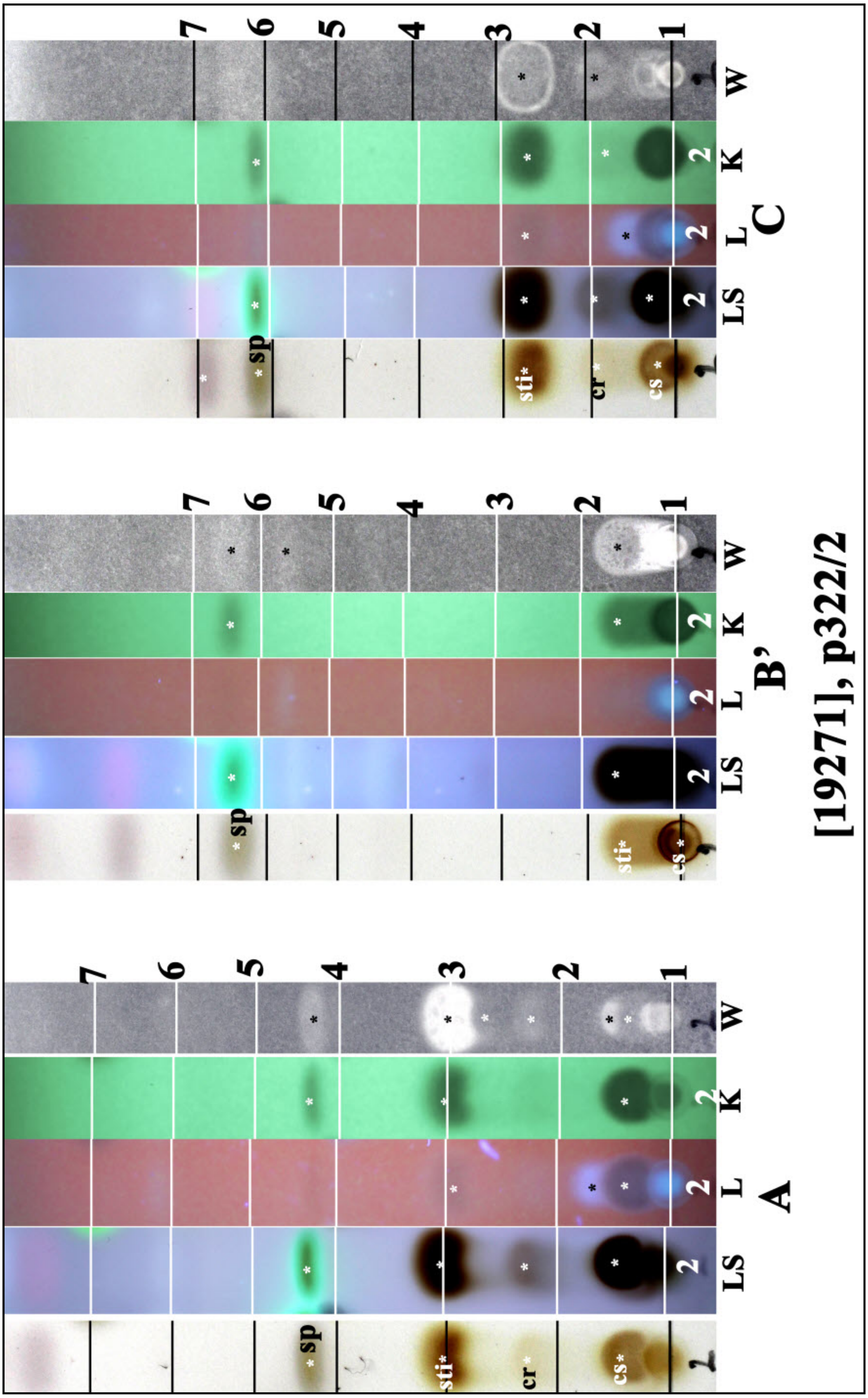
sphaerophorin



s: sphaerophorin, p: protocetraric acid

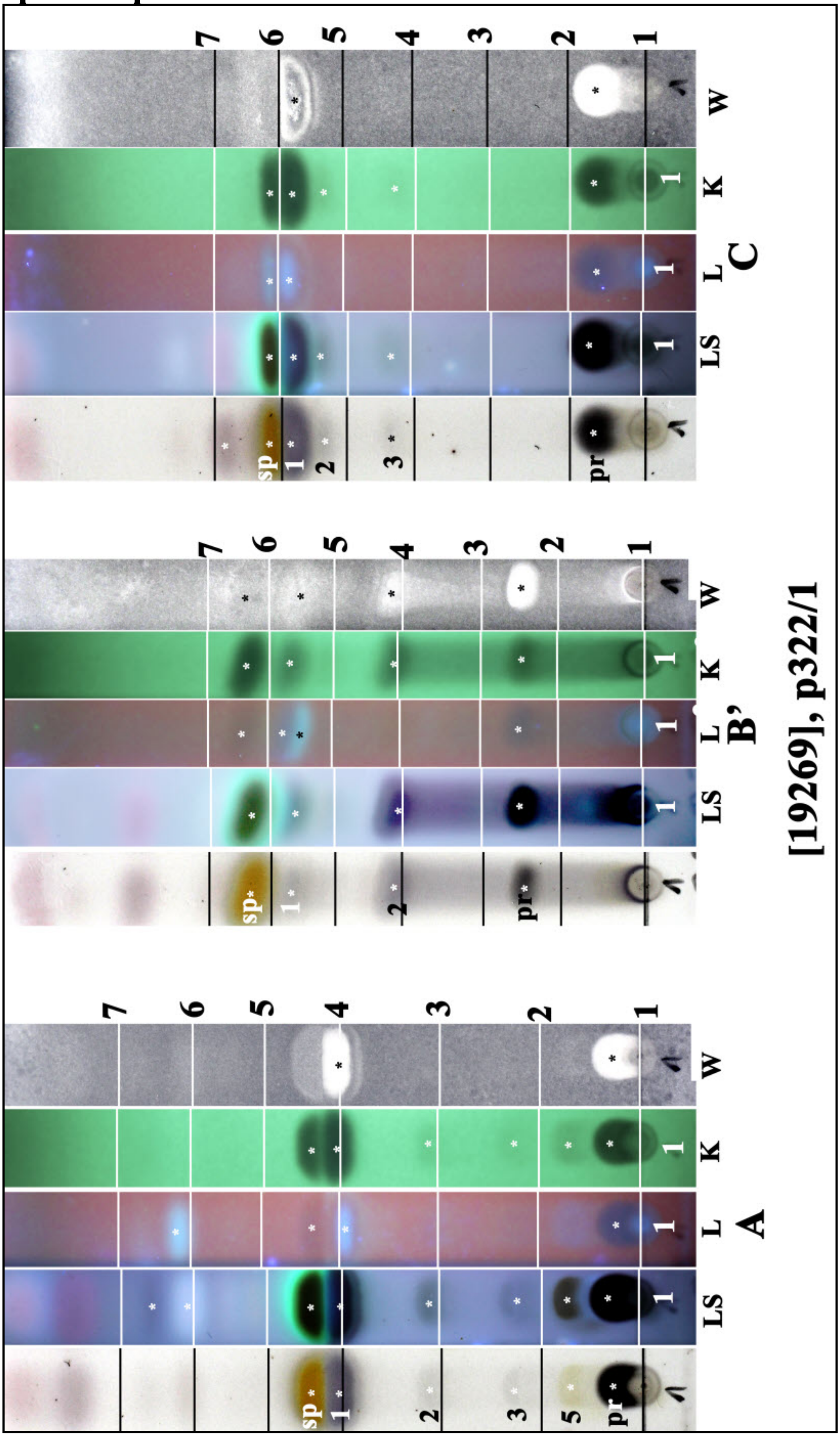
Bunodophoron insigne, [19270], Australia, Victoria, Goonmirk Rocks, Errinundra Flora Reserve, 14 km south of Bendoc, 37°17' S, 148°53' E, 1200 m.

sphaerophorin



Bunodophoron australe, [19271], Australia, Victoria, Errinundra River West Branch, Errinundra Plateau, 20 km south of Bendoc, 37°19' S, 148°50' E, 960 m.

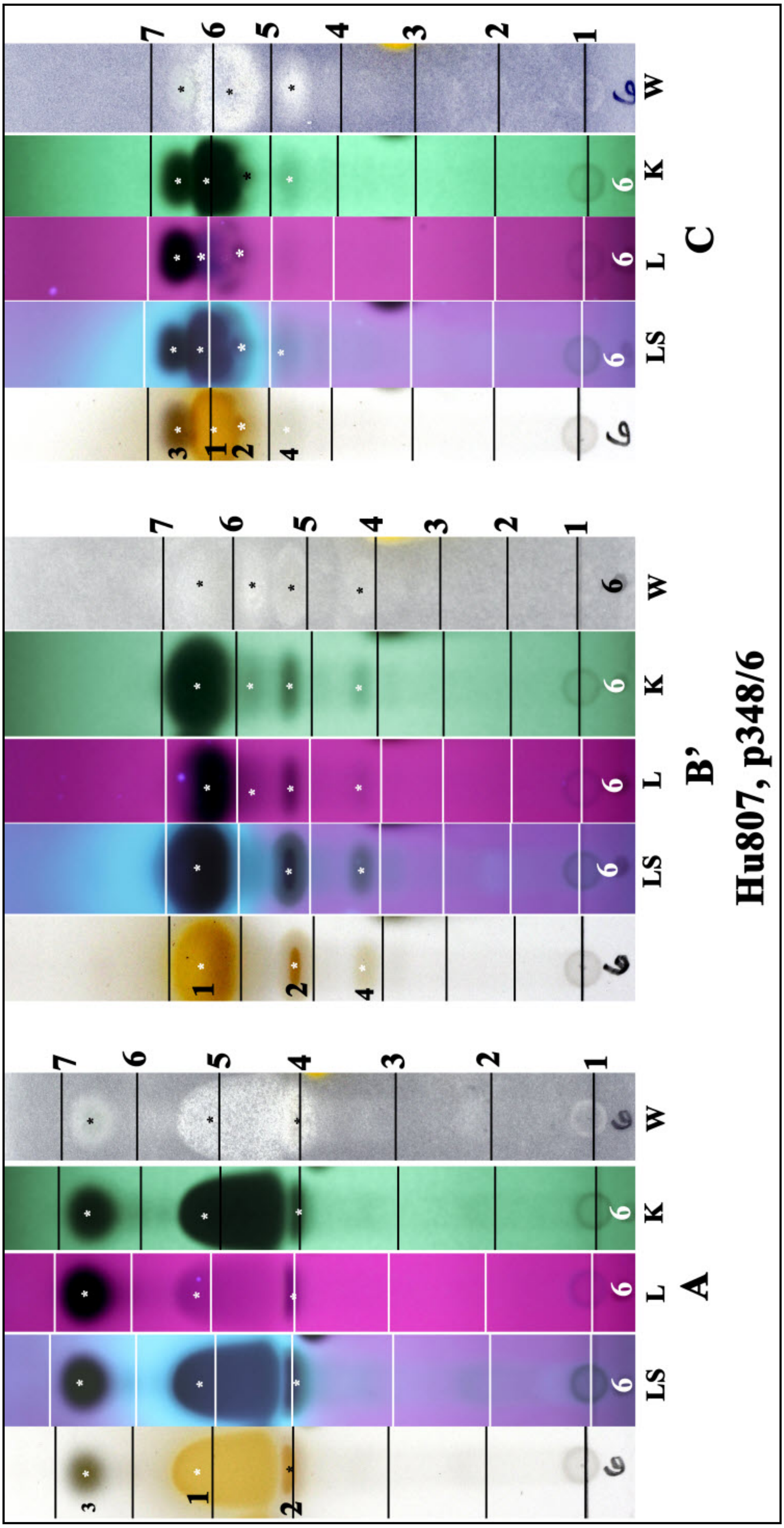
sphaerophorin



sp: sphaerophorin, pr: protocetraric acid, 1: ascomatic acid, 2,3,4: unknowns

Bunodophoron insigne , [19269], Australia, Victoria, Junction of Coast Range Road and Cabon Road, Errinundra Plateau, 18.5 km south-south-east of Bendoc, 37°18' S, 148°51' E, 980 m, growing on dead log in *Eucalyptus* forest.

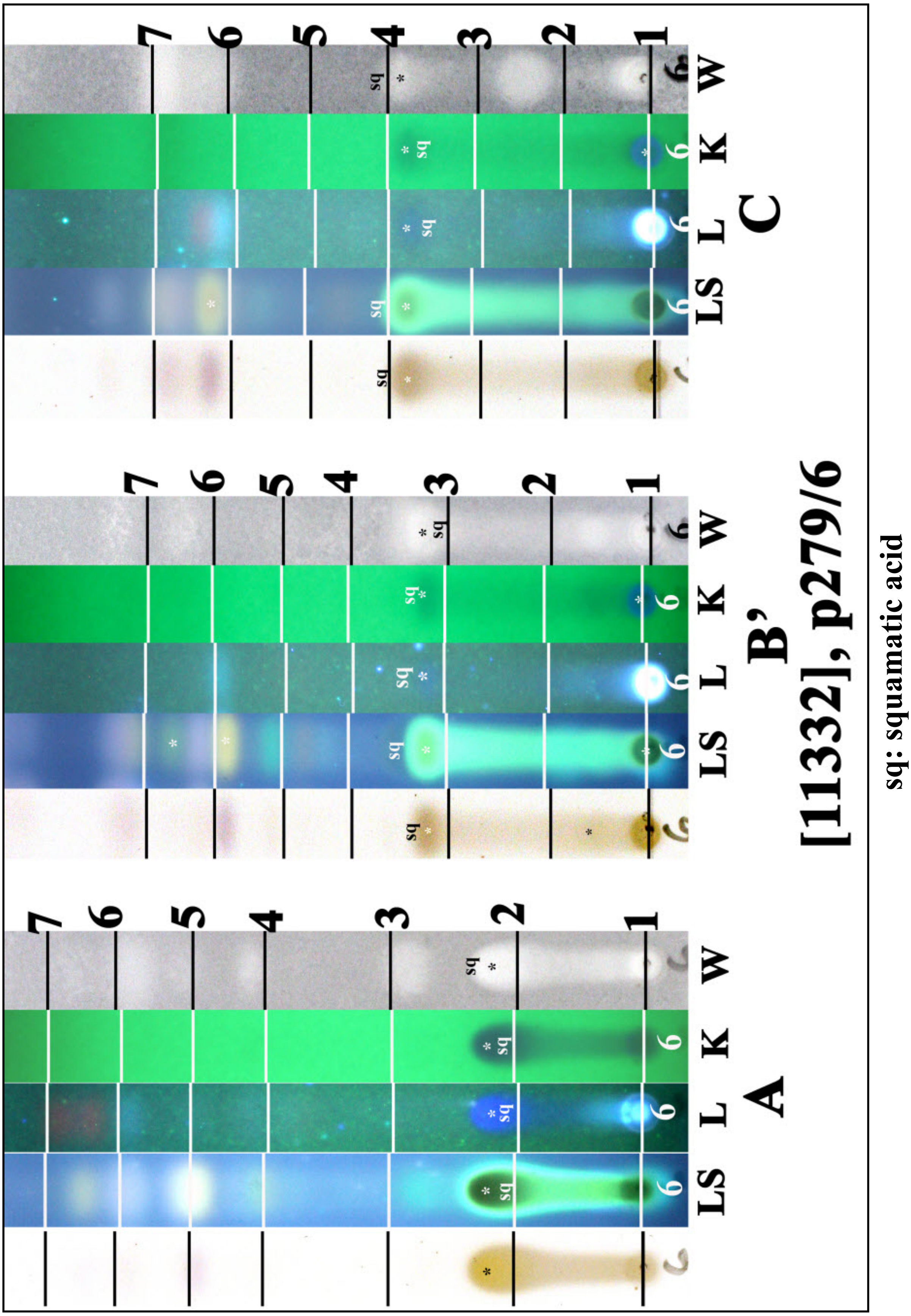
sphaerophorin + isosphaeric acid



1: probably a **mix of sphaerophorin and isosphaeric acid**, 2,3,4: unknowns, conf. J.A. Elix

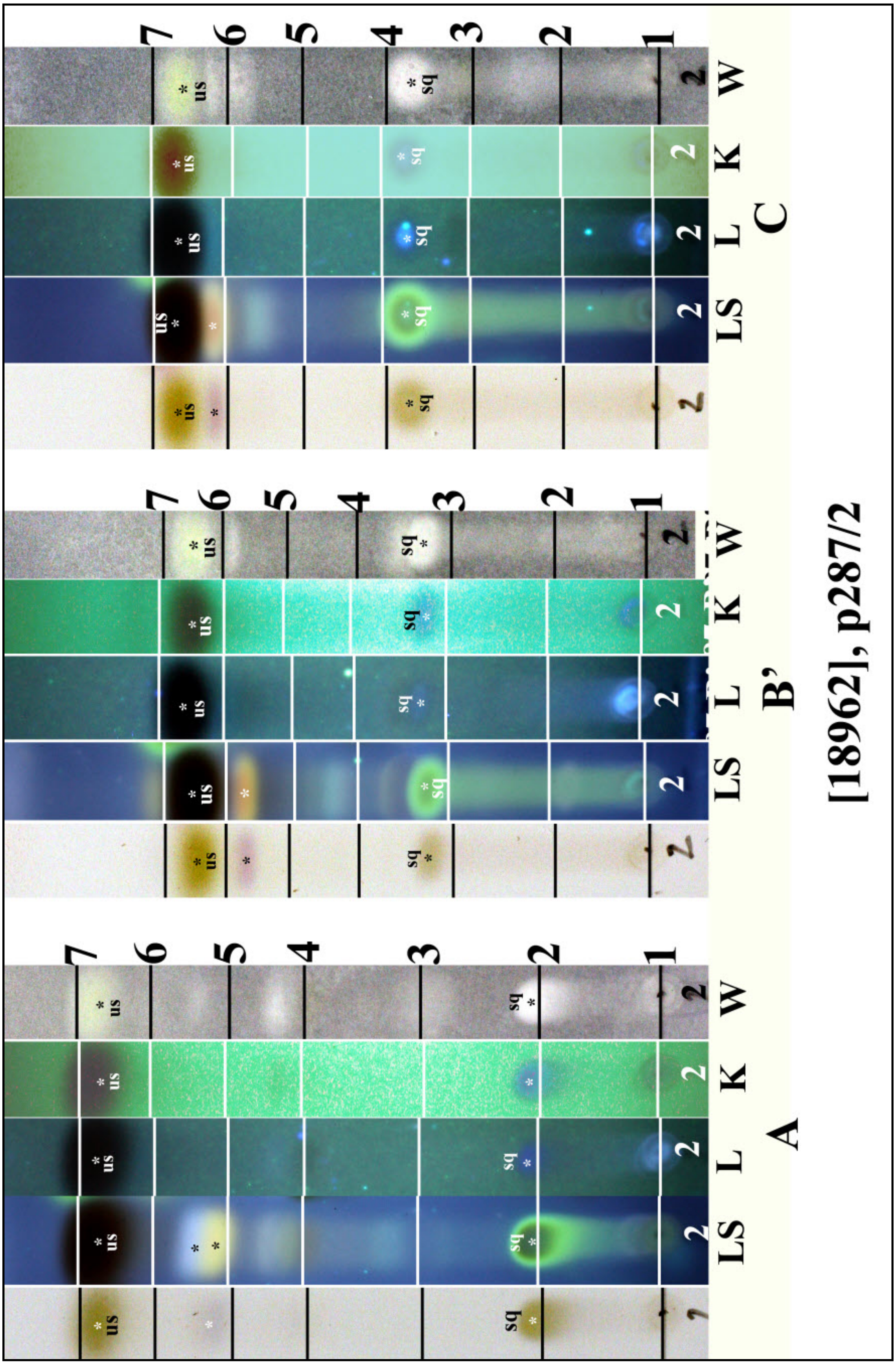
S. Huneck’s collection of lichen substances No 807: sphaerophorin
Botanisches Museum Berlin-Dahlem

squamatic acid



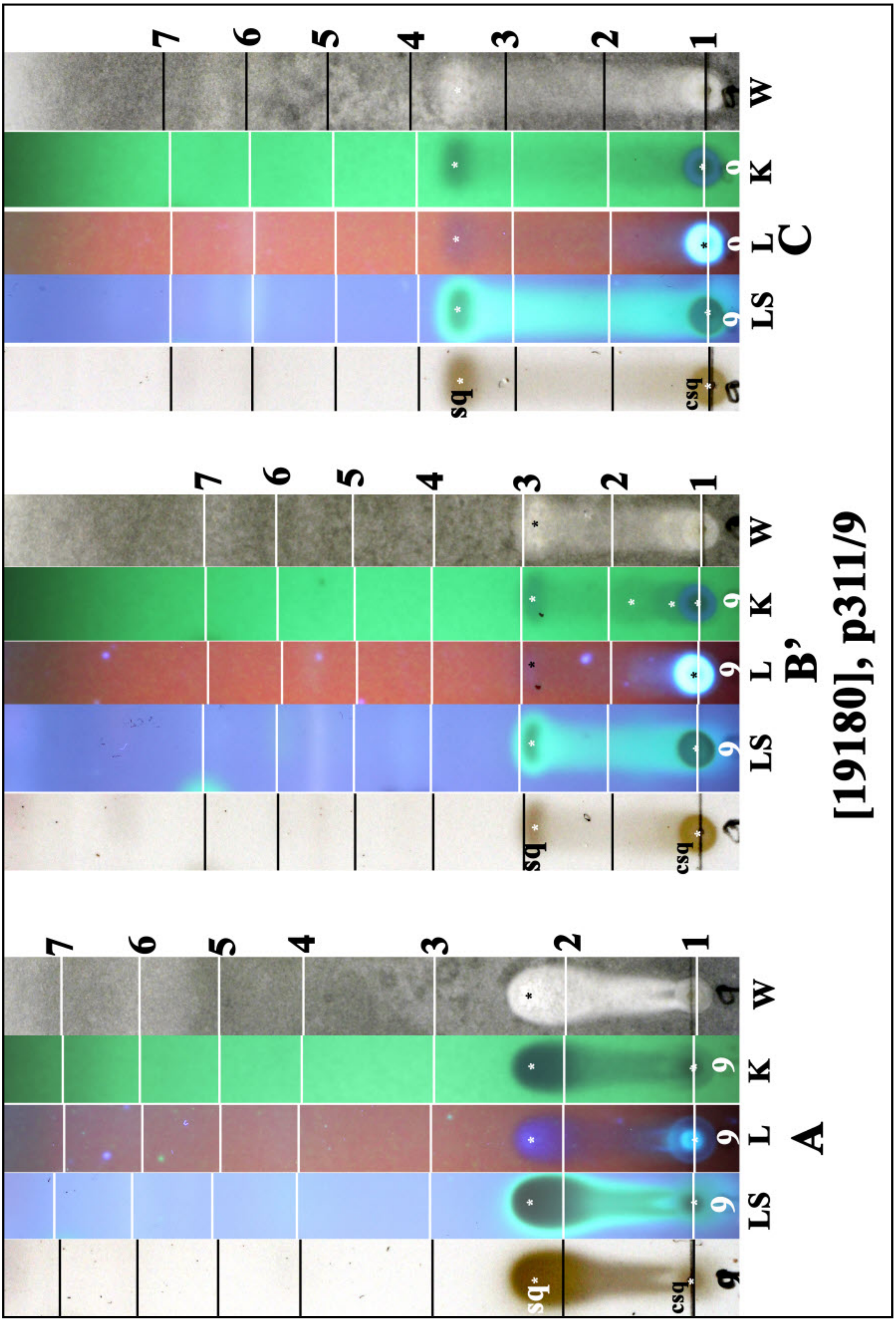
Cladonia squamosa, [11332], Portugal, Madeira, Posto Florestal do Fanal zwischen Paúl da Serra und Ribeira da Janela, 32°48.545' N, 17°08.489' W, 1175 m, an alten bemoosten Laubbäumen. Leg. et det. F. Schumm 26.12.2003.

squamatic acid



Cladonia capitellata var ***squamatica,*** [18962], Australia, New South Wales, Southern Tablelands, Tinderry Mountain.

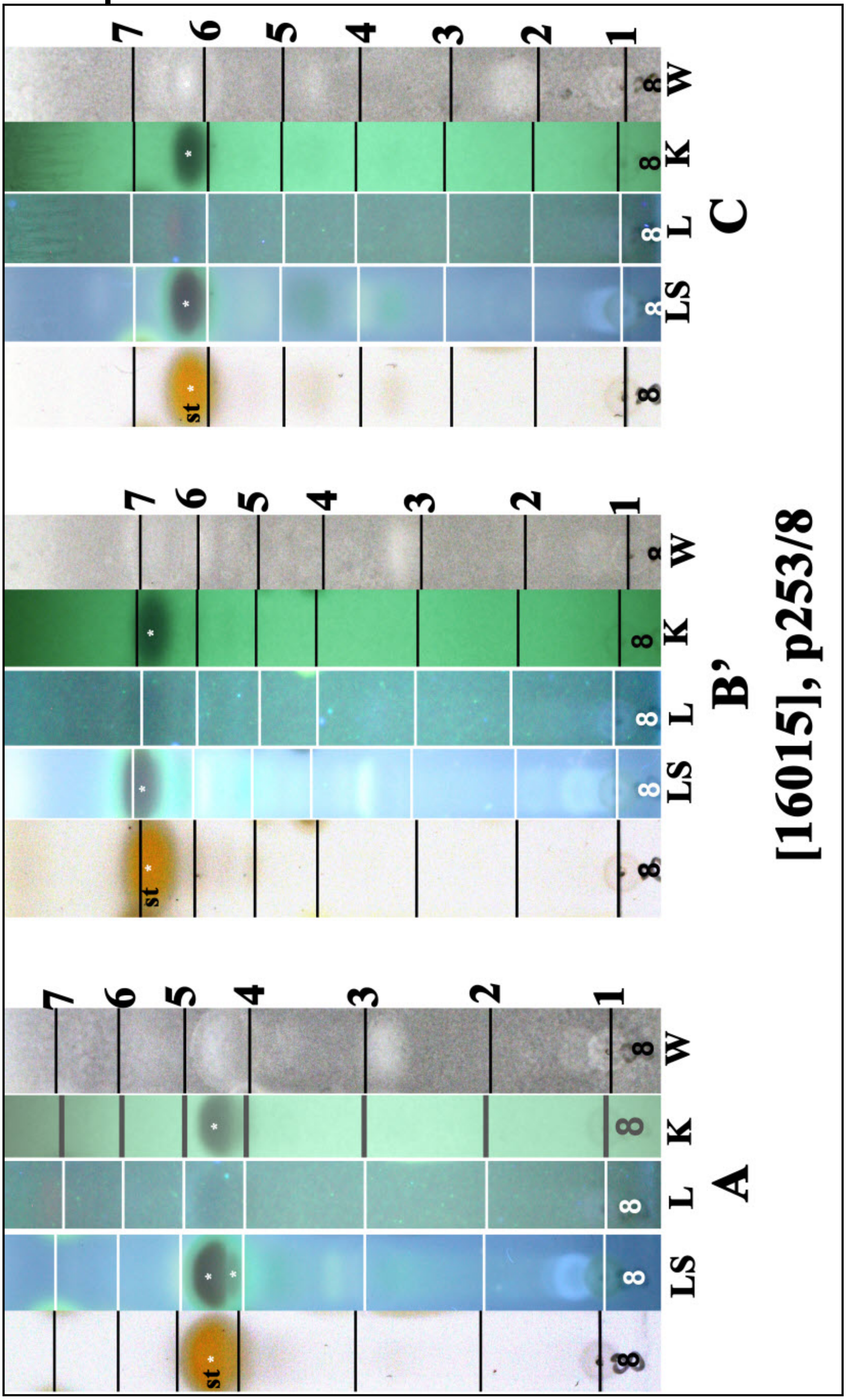
squamatic acid



sq: squamatic acid, csq: consquamatic acid

Cladonia pertricosa, [19180], Australia, New South Wales, Barrington Tops State Forest, Dilgry Circle Road, 40 km north-west of Gloucester, 31°52' S, 151°31' E, 1260 m

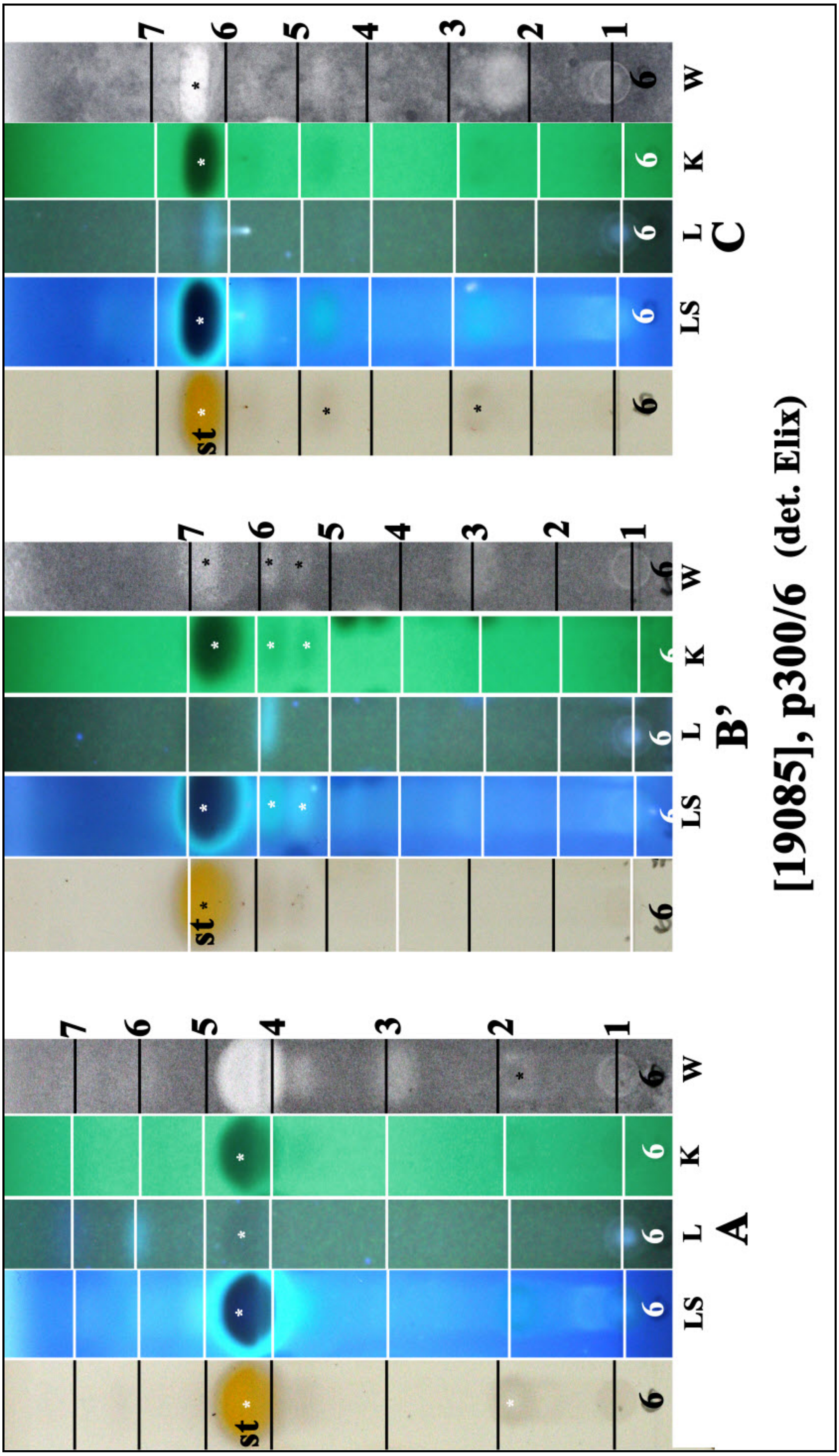
stenosporic acid



st: stenosporic acid

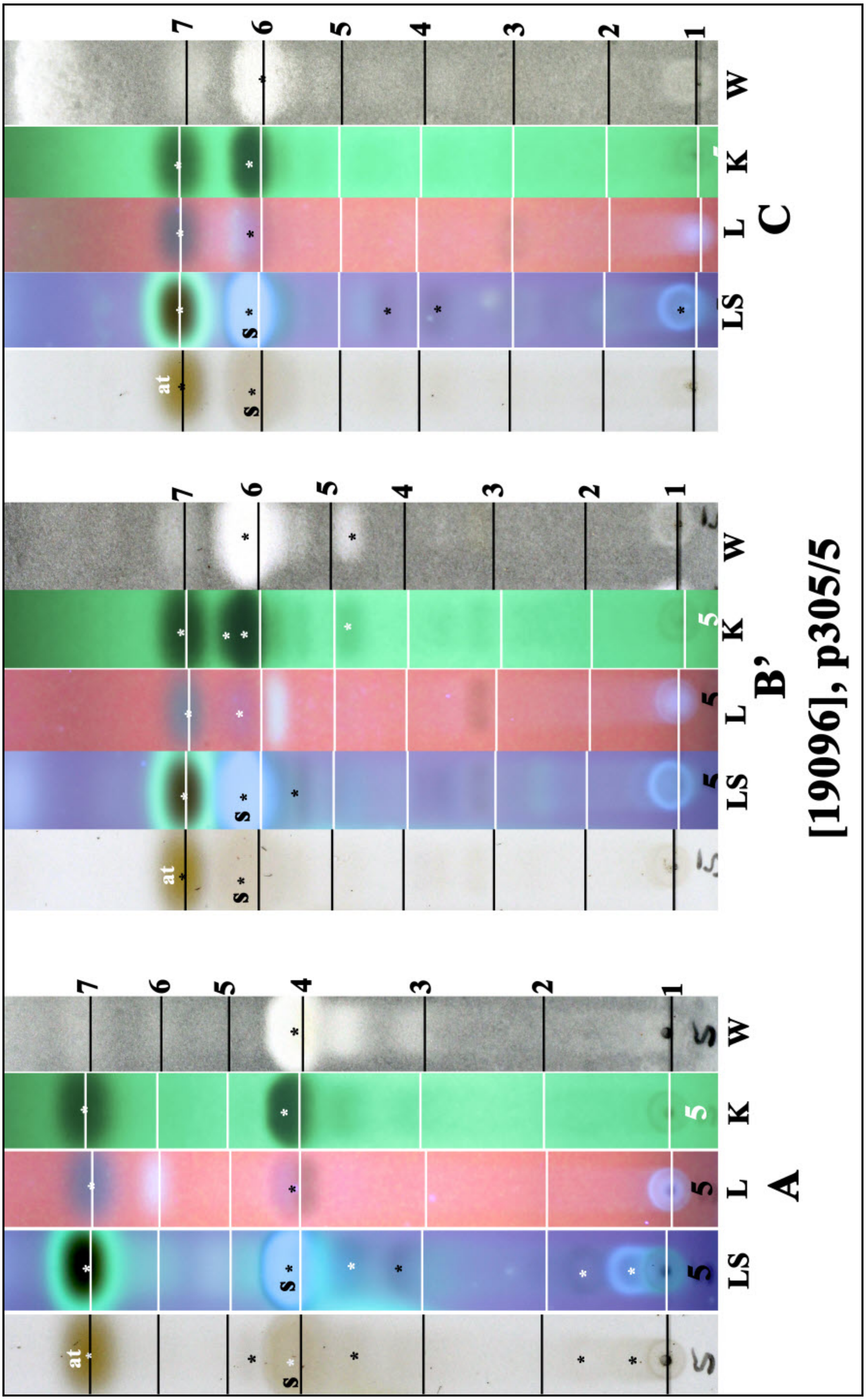
Xanthoparmelia pulla. [16015], Australia, Australian Capital Territory, Canberra, Black Mountains Reserve. 35,276° S, 149,094° E, 760 m, growing on rocks. Leg. J.A. Elix, F. Schumm & E. Stocker-Wörgötter, 07.11.2009, det. J.A. Elix. Chemistry: stenosporic acid by HPTLC and microcrystals, anal. F.Schumm.

stenosporic acid



Xanthoparmelia** (Neofuscelia)* ***pulla, [19085], Australia, Australian Capital Territory, Gudgenby River Gorge, 4.5 km south of Tharwa.

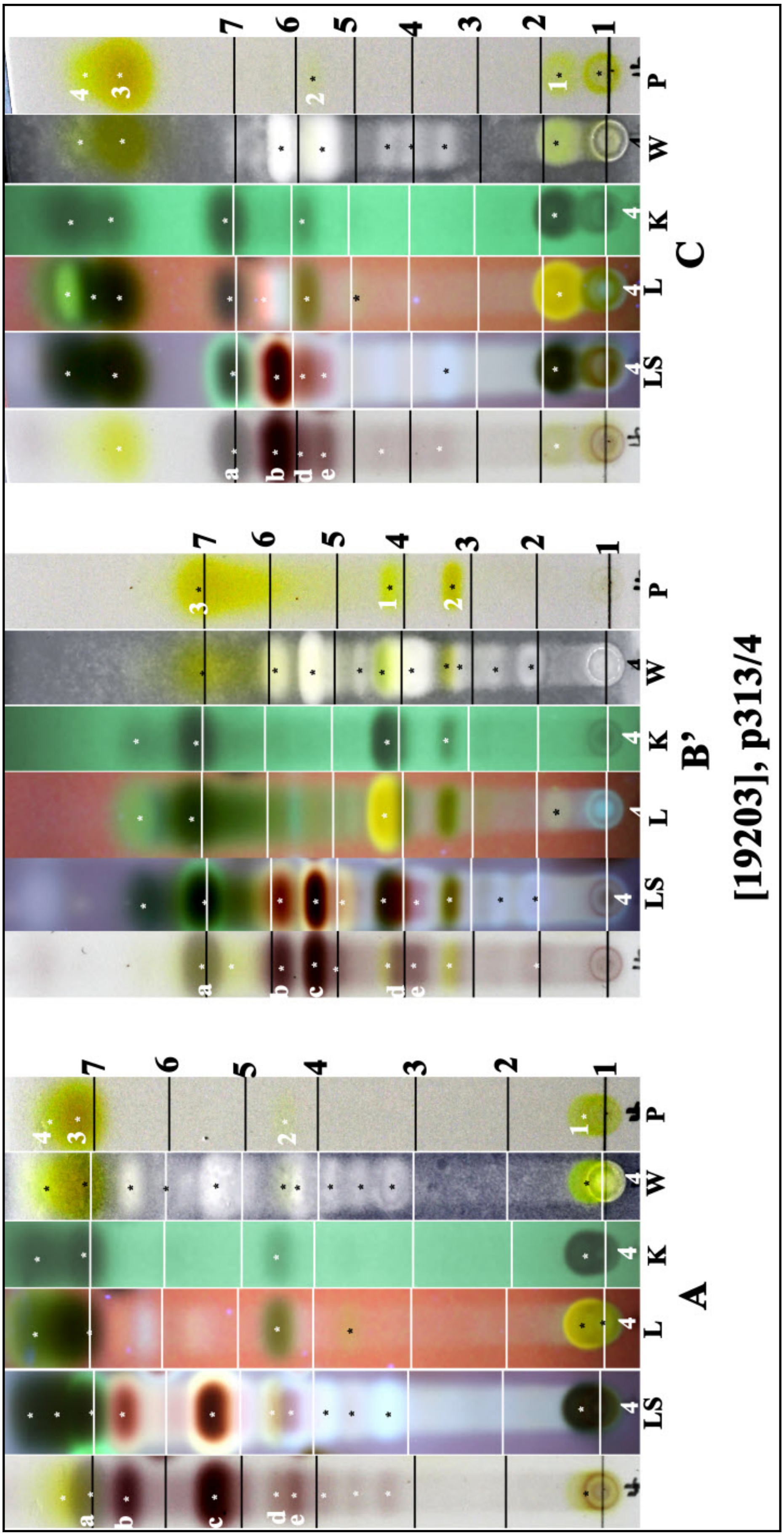
stenosporonic acid



at: atranorin, s: stenosporonic acid

Xanthoparmelia mongaensis, [19096], Australia, Queensland, Herberton-Petford road, 1 km south-west of Herberton.

stictane-3β,22-diol

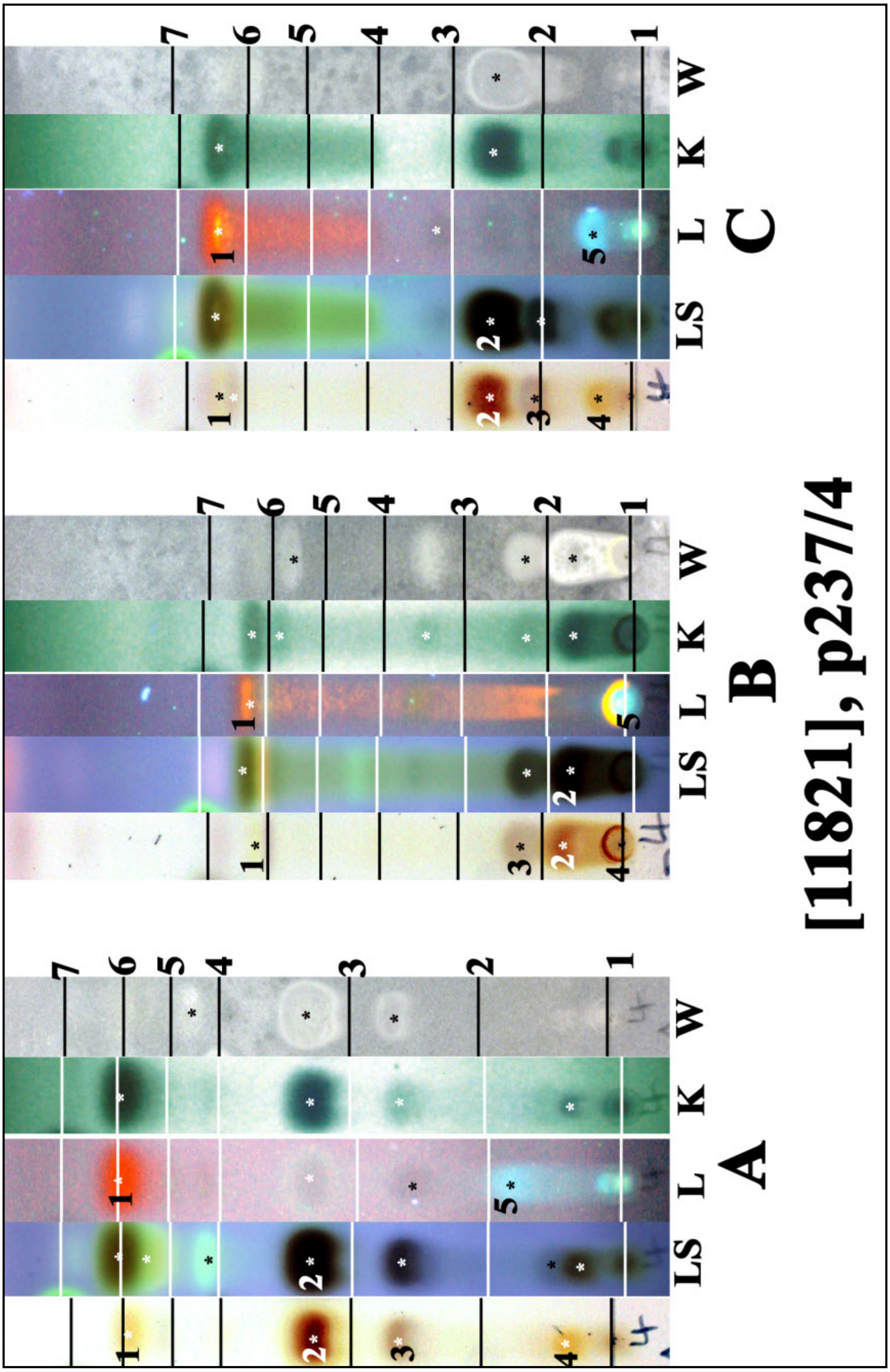


a: 22α-hydroxy-3,4-secostict-4(23)-enaldehyde
b: 22α-hydroxy-3,4-secostict-4(23)-enoic acid
c: **stictane-3β,22-diol**
d: 3β-acetoxystictane-2,22-diol
e: 2α-acetoxystictane-3β,22-diol

1: pulvinic acid
2: pulvinamide
3: pseudocyphellarin A
4: pulvinic dilactone + calycin

Pseudocyphellaria degelii, [19203], New Zealand, South Island, Canterbury, Porters Pass, south-west slopes of Foggy Peak, Torlesse Range, 1000 m, growing on soil and debris in subalpine heath.

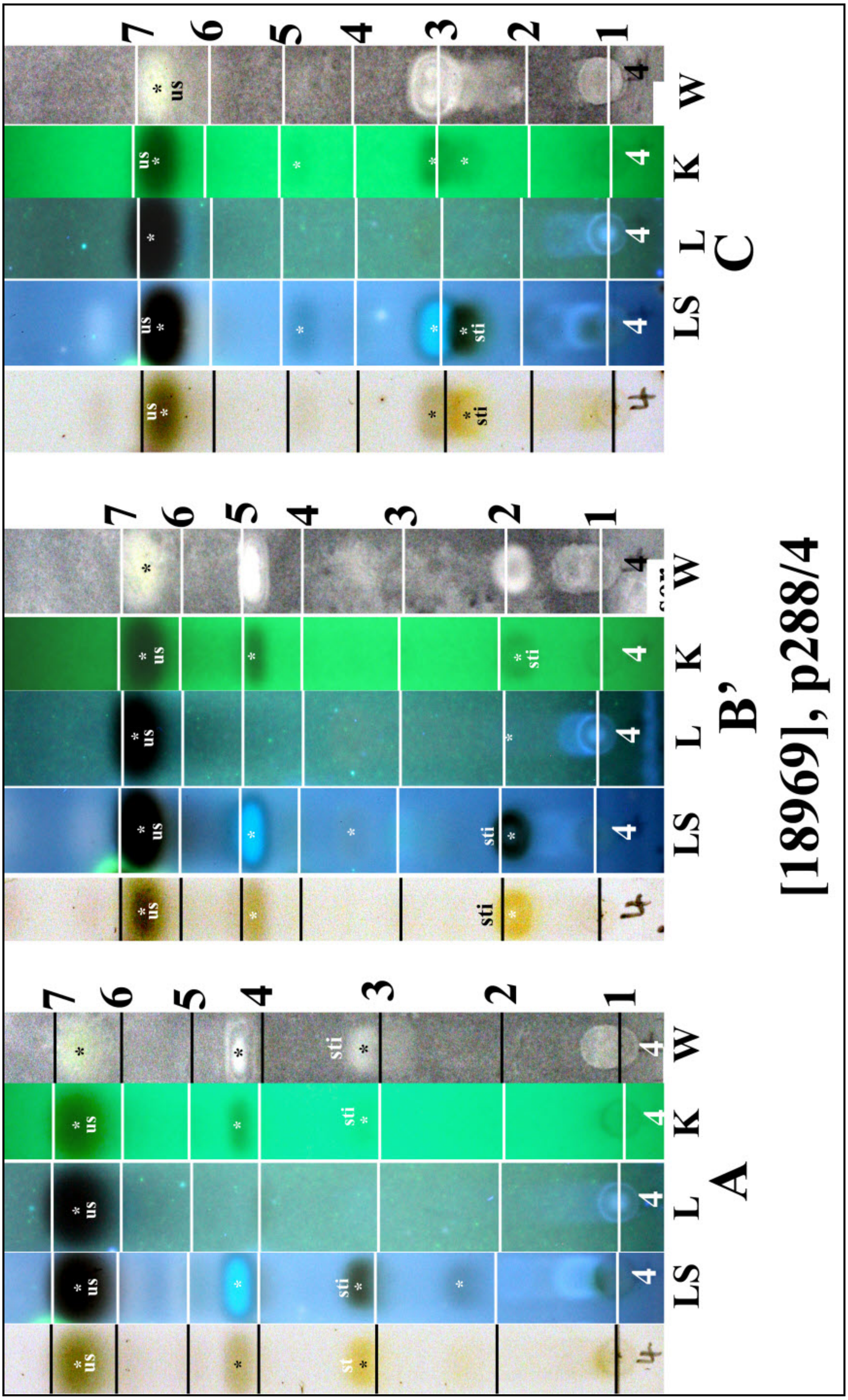
stictic acid



1: thiophaninic acid, **2: stictic acid**, 3: menegazziaic acid, 4: constictic acid, 5: unknown, conf. J.A. Elix

Pertusaria flavicunda, [11821], Mexico, Baja California, Guadalupe Island, east-facing rocky outcrops in grassland S of the east end of runway and E of the south peak, on basalt, 29°00'30" N, 118°15'20" W, 750 m. Leg. et det. T.H. Nash III 04. Jan. 1996 (Nr. 38508).

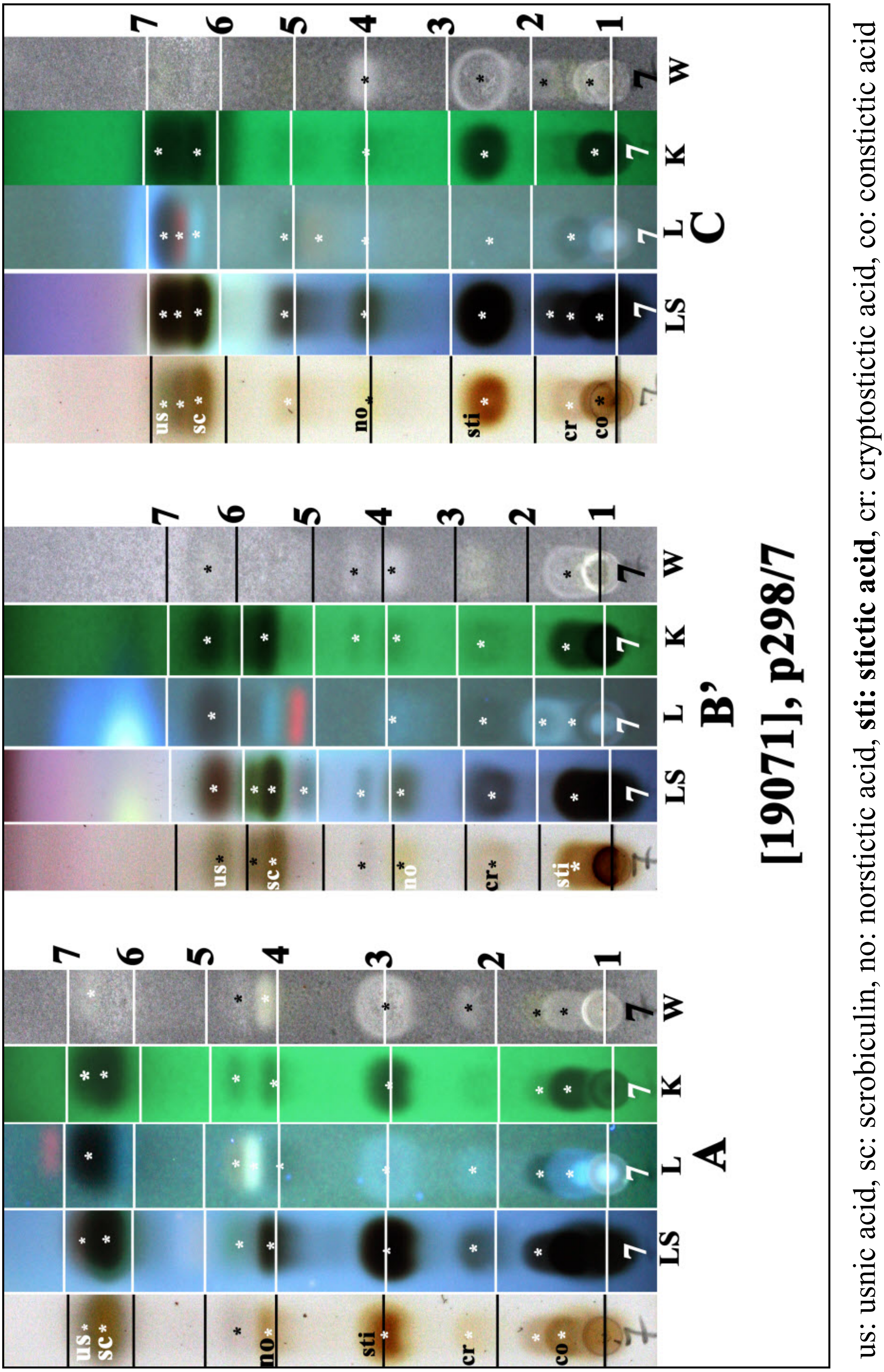
stictic acid



us: usnic acid, **sti: stictic acid**

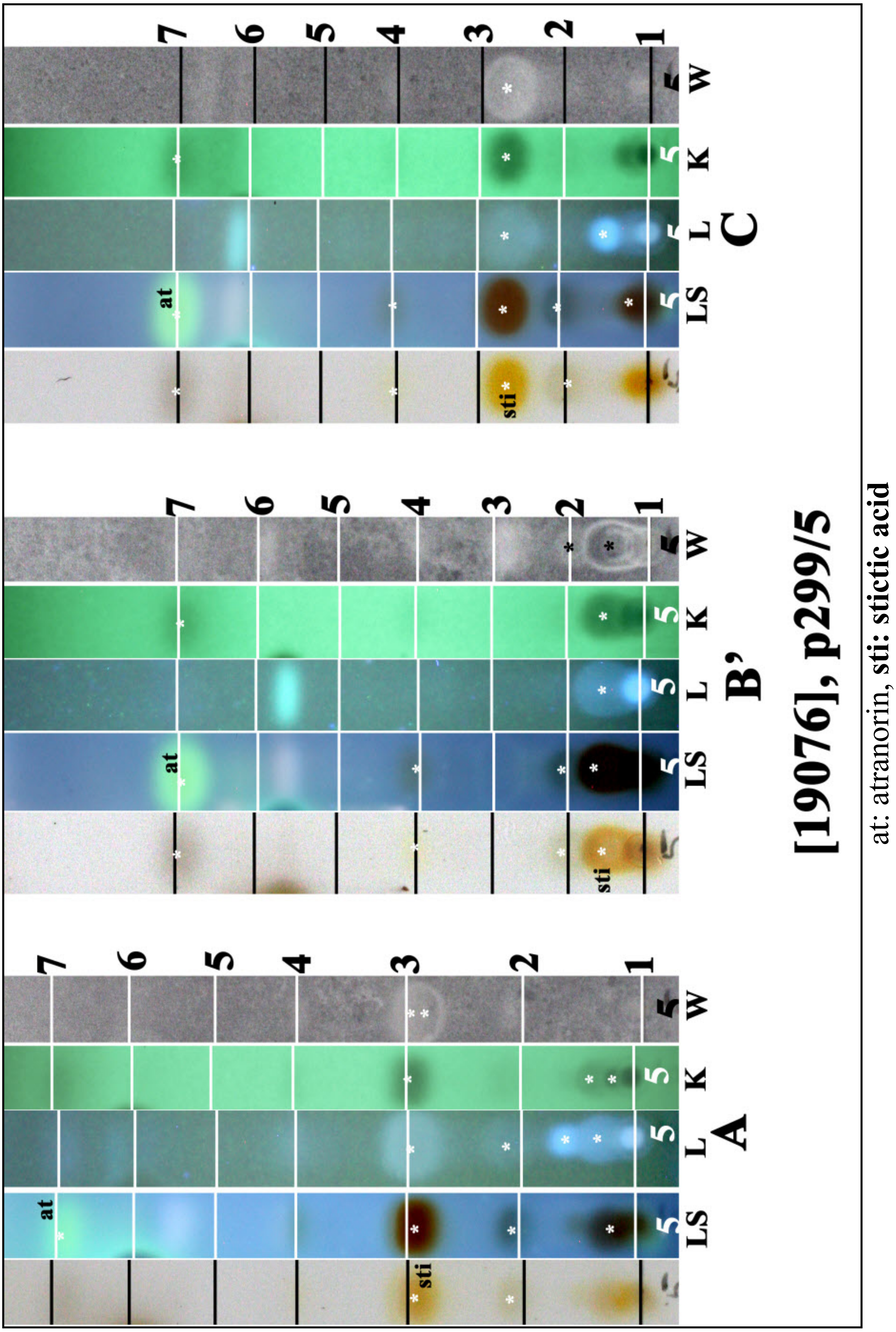
Cladonia mitis, [18969], Australia, Victoria, Basalt Hill, Alpine National Park, Bogong High Plains, 20 km south-east of Mt. Beauty.

stictic acid



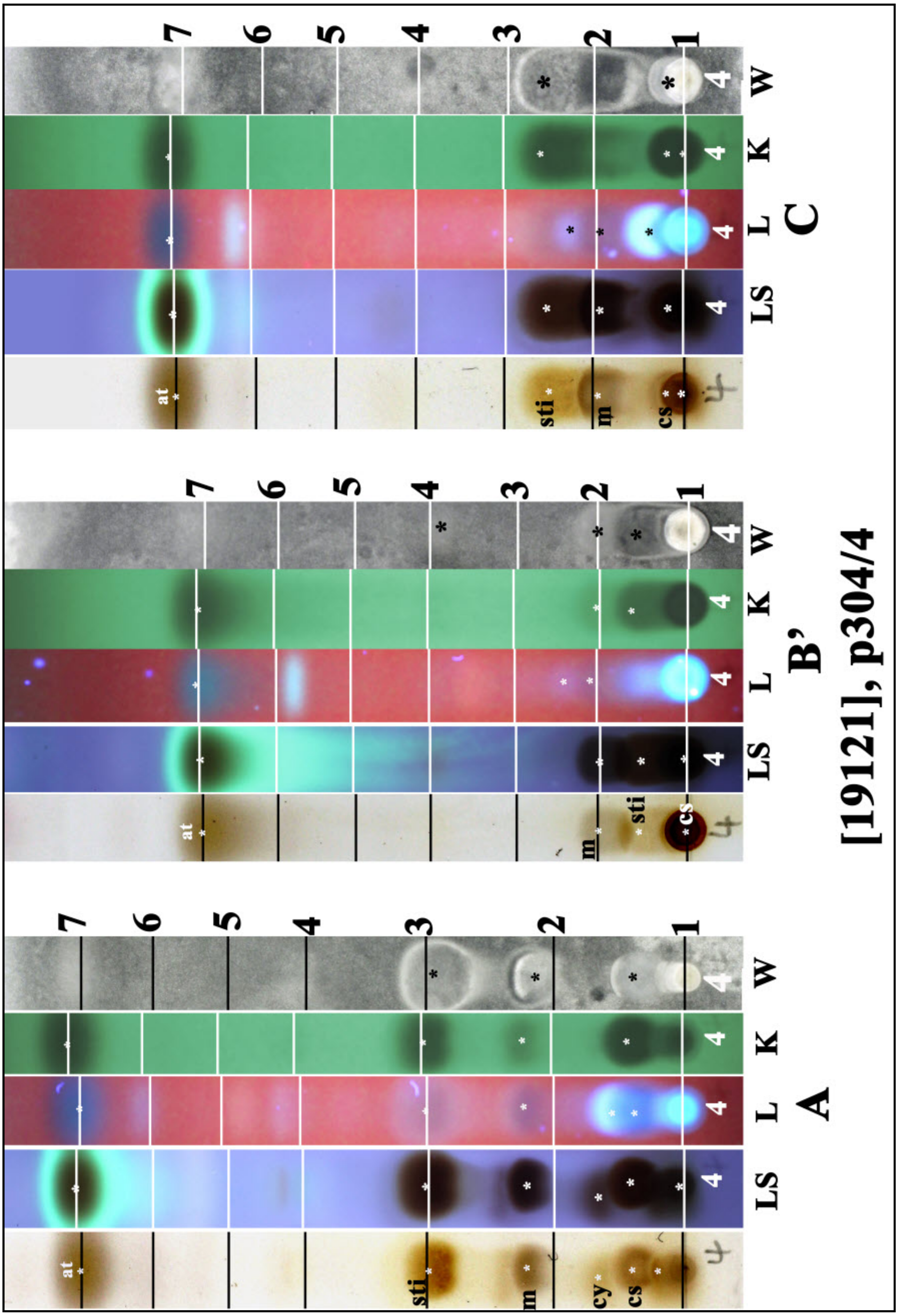
Lobaria scrobiculata, [19071], Australia, New South Wales, Great Dividing Range, Tallaganda State Forest, 10 km east of Captains Flat.

stictic acid



Menegazzia platyrema, [19076], Australia, New South Wales, Kosciusko National Park, northern face of Mount Stilwell.

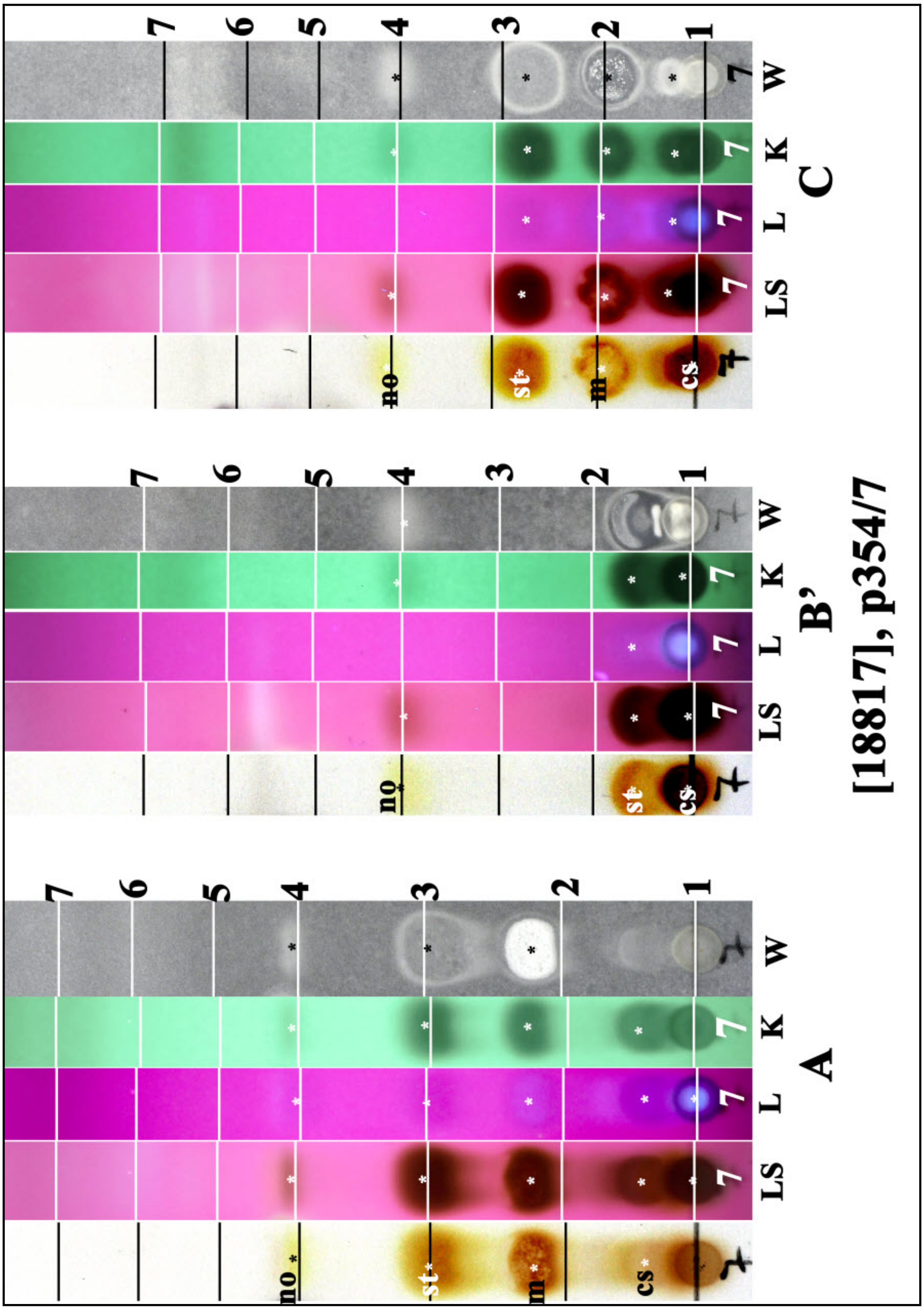
stictic acid



at: atranorin, **sti: stictic acid**, m: menegazziaic acid, cs: constictic acid, cy: cryptostictic acid

Parmotrema perlatum, [19121], New Zealand, North Island, South Auckland, adjacent to scenic reserve overlooking Lake Taupo, 1 km south of Wharewaka

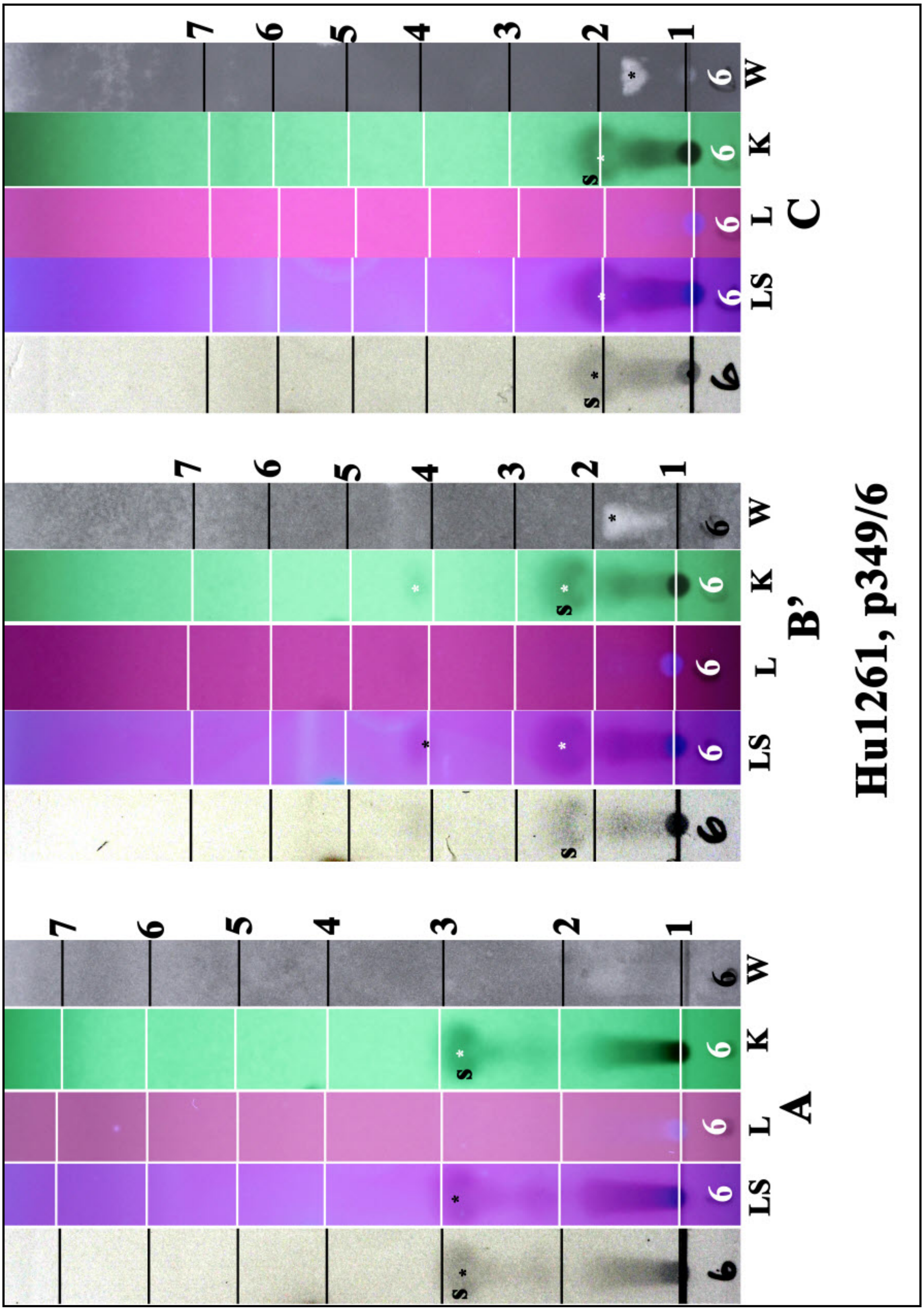
stictic acid



n: norstictic acid, **st: stictic acid**, m: substictic acid, cs: constictic acid, conf. J.A. Elix

Diorygma hieroglyphicum, [18817], India, Western Ghats, Prov. Karnataka, Distr. Coorg (Madikeri), Area Kabbinakad, W of Virajpet, Wasserfall unterhalb des Chingaara Estate House im Honey Valley, ca. 12.23188° N, 75.65520° E, ca. 950 m. Leg. F. Schumm & J.-P. Frahm 06.11.2012, det. F. Schumm 2015.

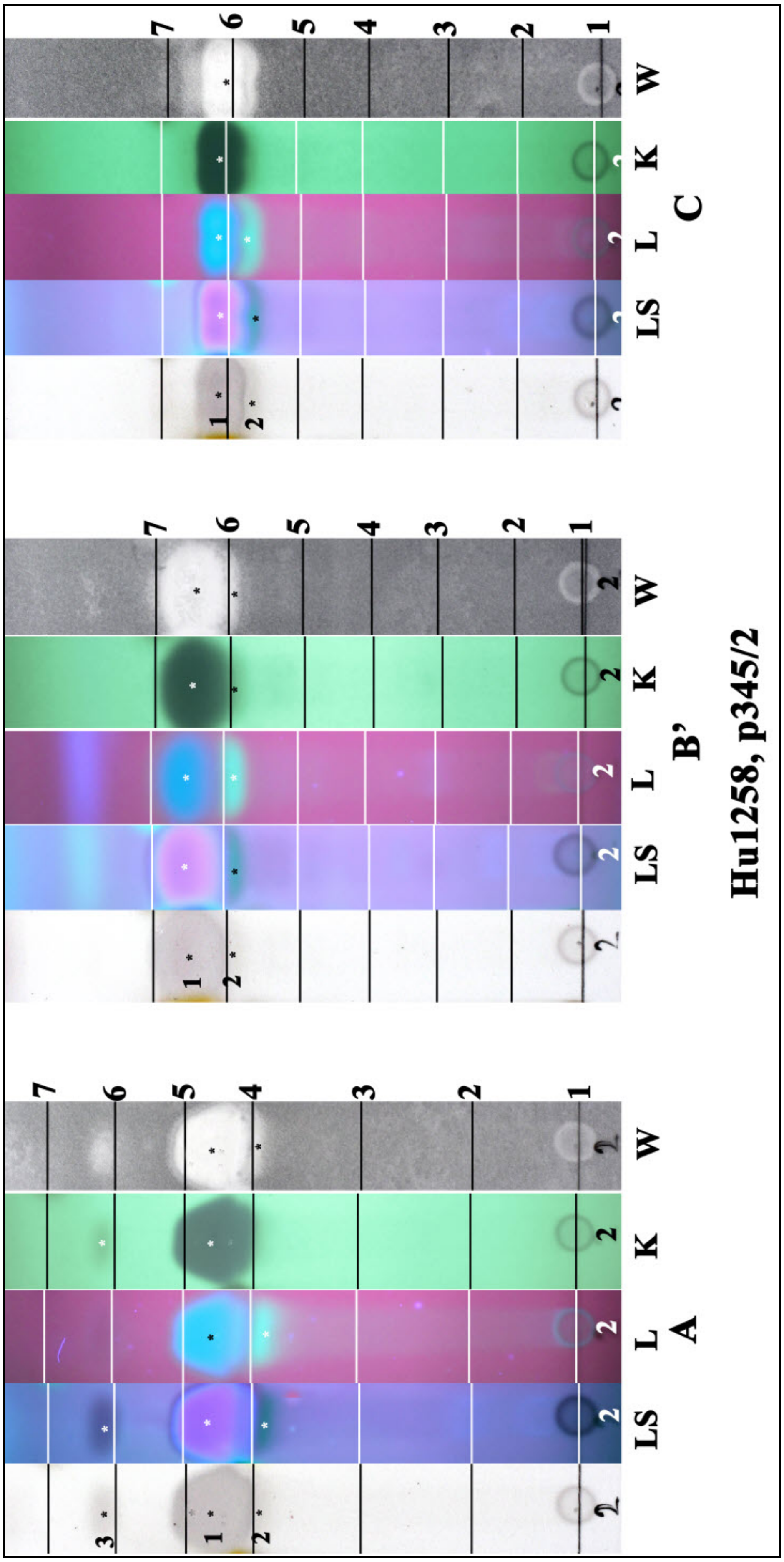
strepsilin



s: **strepsilin**, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 1261: strepsilin
Botanisches Museum Berlin-Dahlem

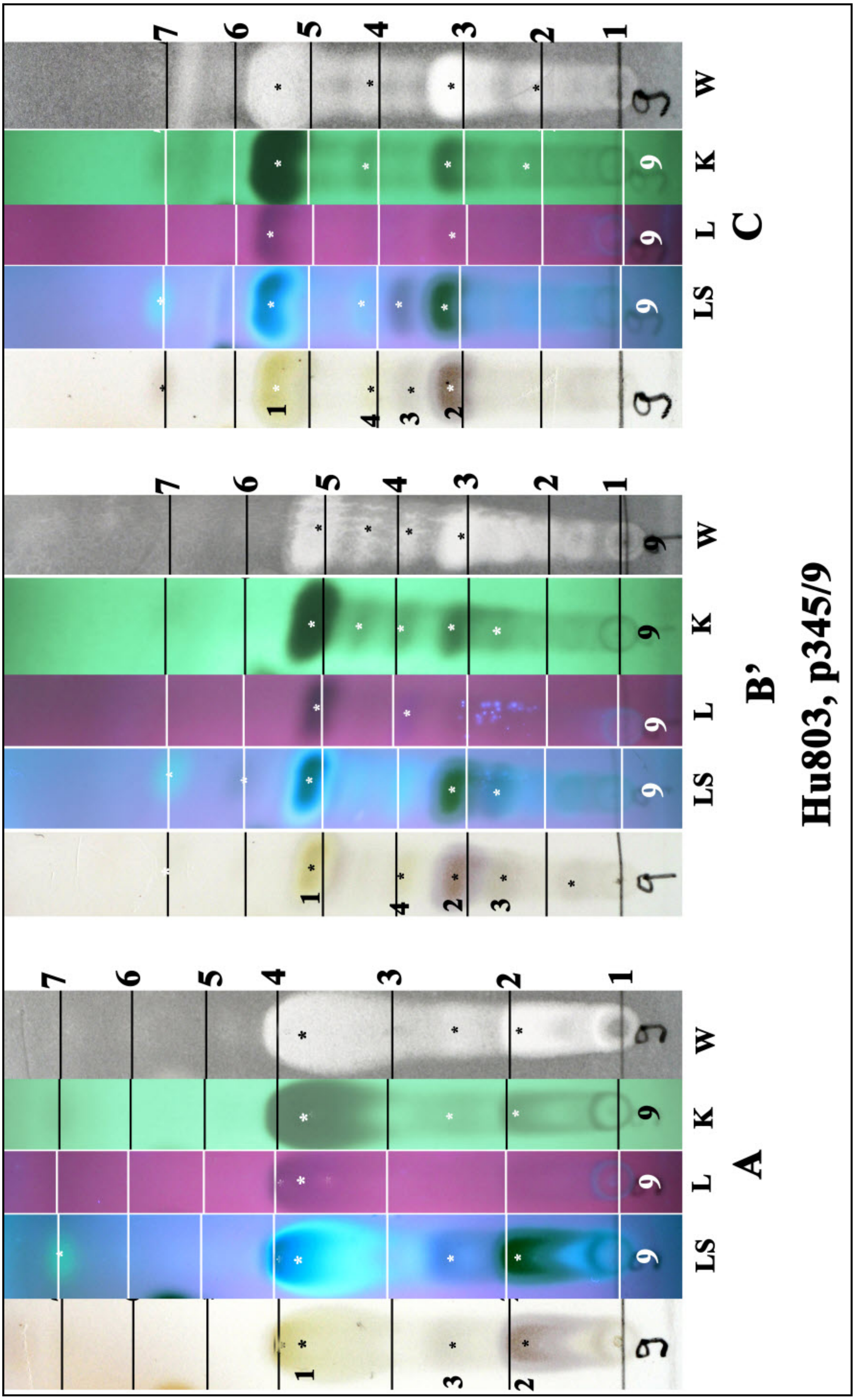
subdidymic acid



1: didymic acid, **2: subdidymic acid**, 3: condidymic acid, conf. J.A. Elix

S. Huneck's collection of lichen substances No 1258: didymic acid
Botanisches Museum Berlin-Dahlem

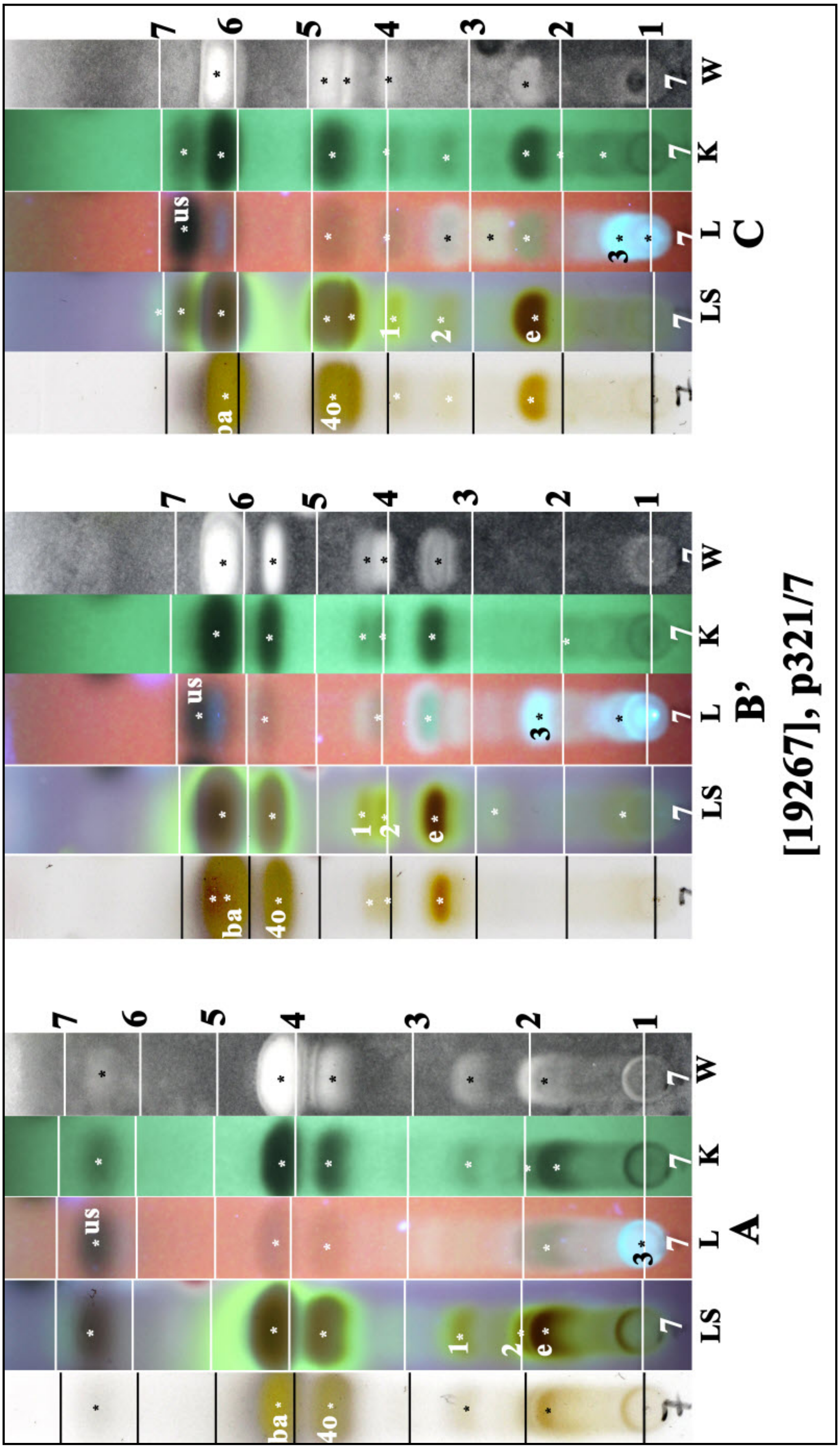
sublobaric acid



1: lobaric acid, 2: oxolobaric acid, **3: sublobaric acid**, 4: unknown, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 803: lobaric acid
Botanisches Museum Berlin-Dahlem

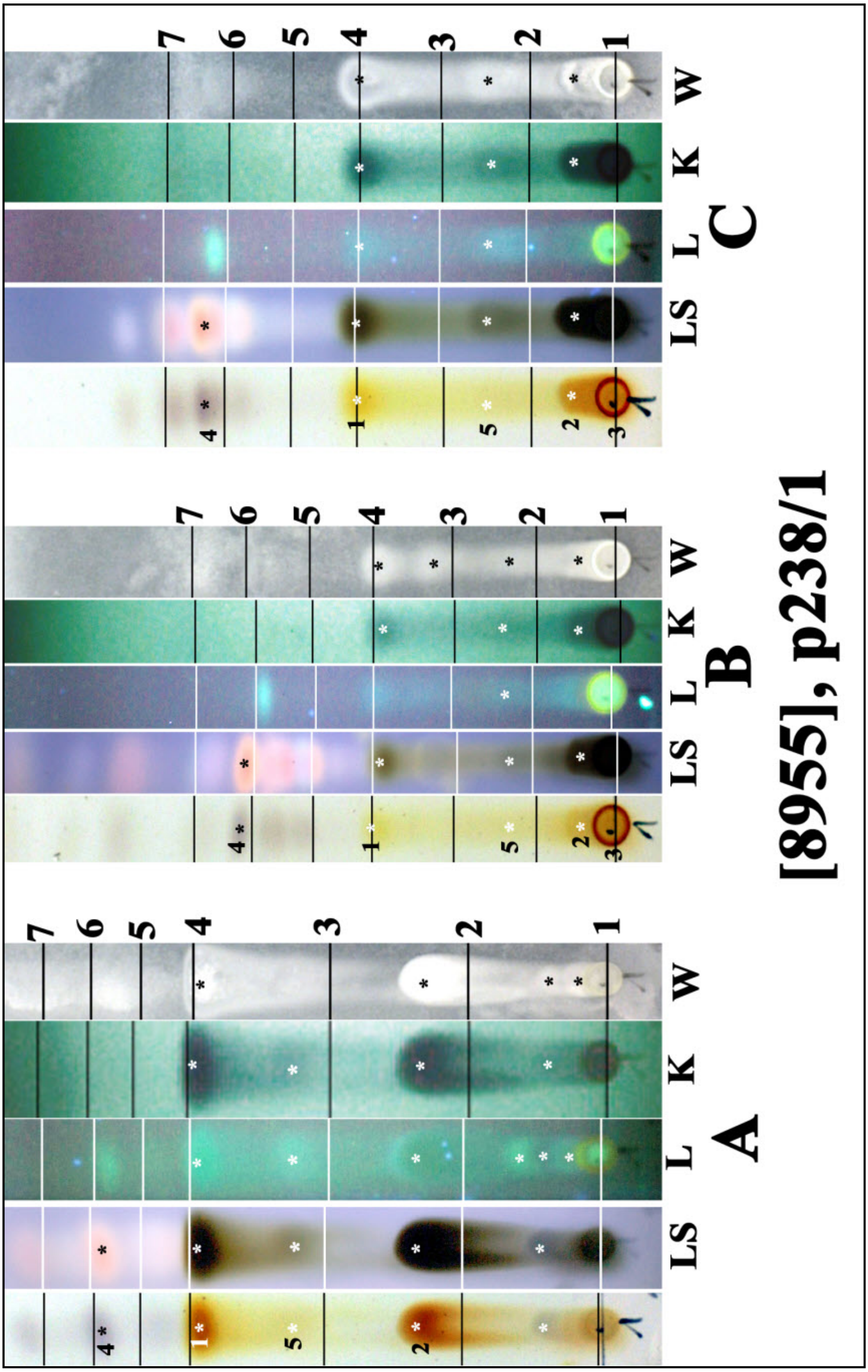
subechinocarpic acid



us: usnic acid, ba: barbatic acid, 4o: 4-*O*-demethylbarbatic acid, e: echinocarpic acid,
1: conechinocarpic acid, **2: subechinocarpic acid**, 3: unknown

Relicinopsis rahengensis, [19267], Australia, Queensland, Conway State Forest, 18 km east-north-east of Proserpine, 20°21' S, 148°45' E, 180 m

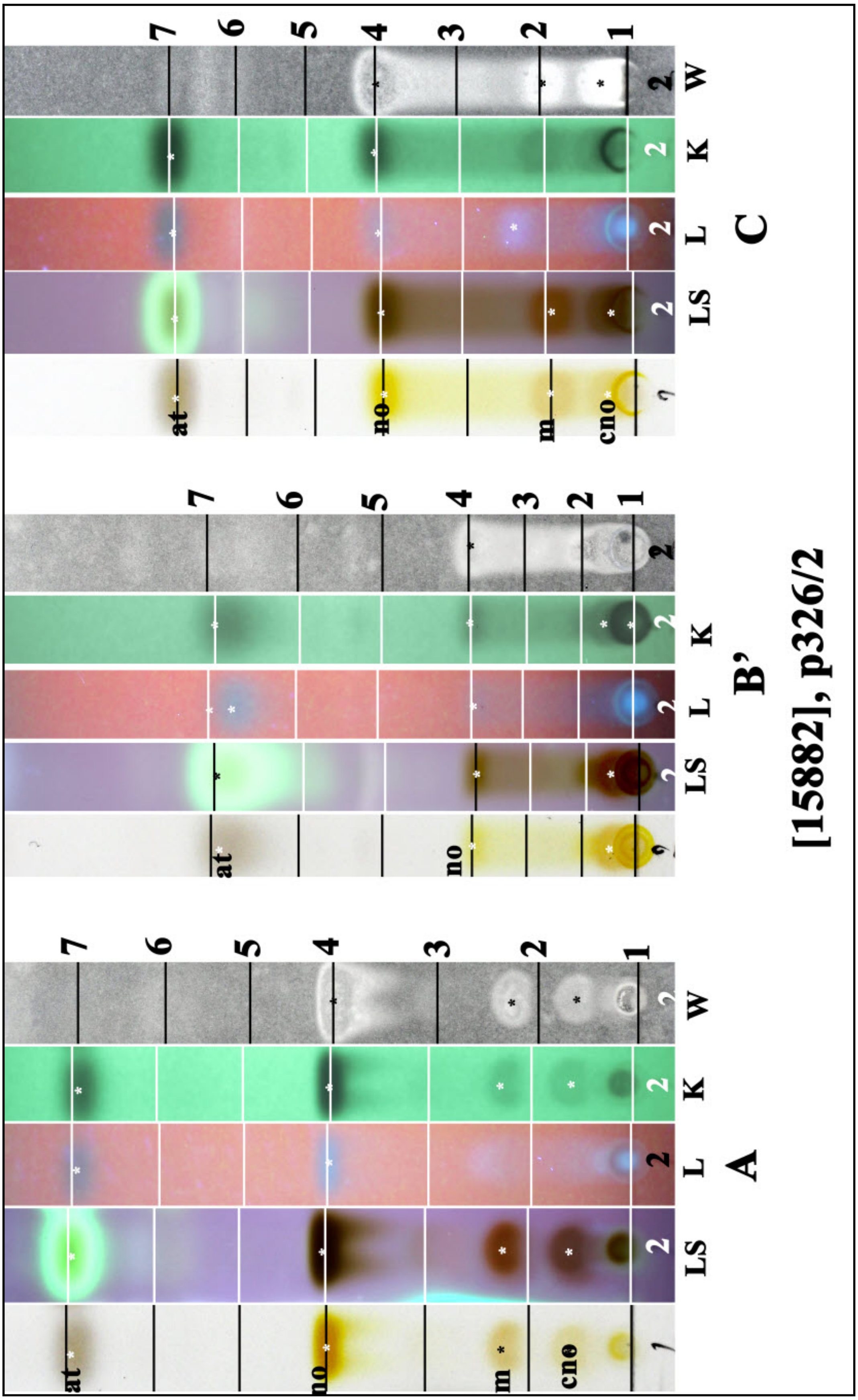
subnorstictic acid



1: norstictic acid , 2: connorstictic acid, 3: unknown, 4: terpene from bark,
5: subnorstictic acid, conf. J.A. Elix

Pertusaria waghornei, [8955], USA, Maine, Washington Co., Buchenwäldchen an der Straße Nr. 182 zwischen Franklin und Cherryfield, 44°36.560' N, 68°01.146' W, 60 m. Leg. et det. F. Schumm 23.08.2001.

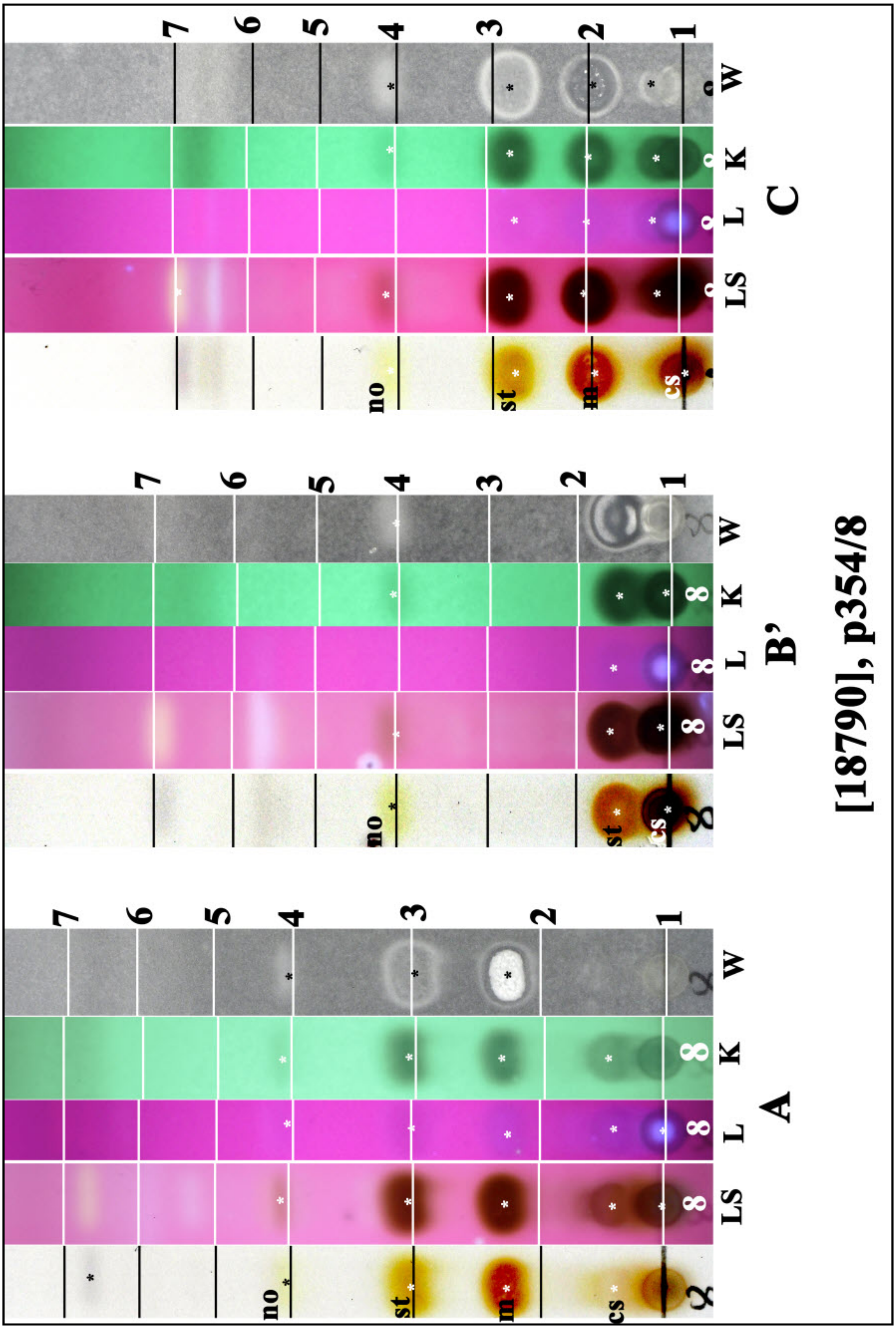
subnorstictic acid



at: atranorin, no: norstictic acid, **m: subnorstictic acid**, cno: connorstictic acid

Lecanora caesiorubella, [15882], Australia, Western Australia, Donnelly Well south of Yornup along SW Hwy, wetland associated with *Eucalyptus rudis* and *Melaleuca preissiana*, 34.073° S, 116.180° E, 260 m. Leg. F. Schumm & E. Stocker-Wörgötter, 25.10.2009. Chemistry anal. F. Schumm, vid. J.A.Elix.

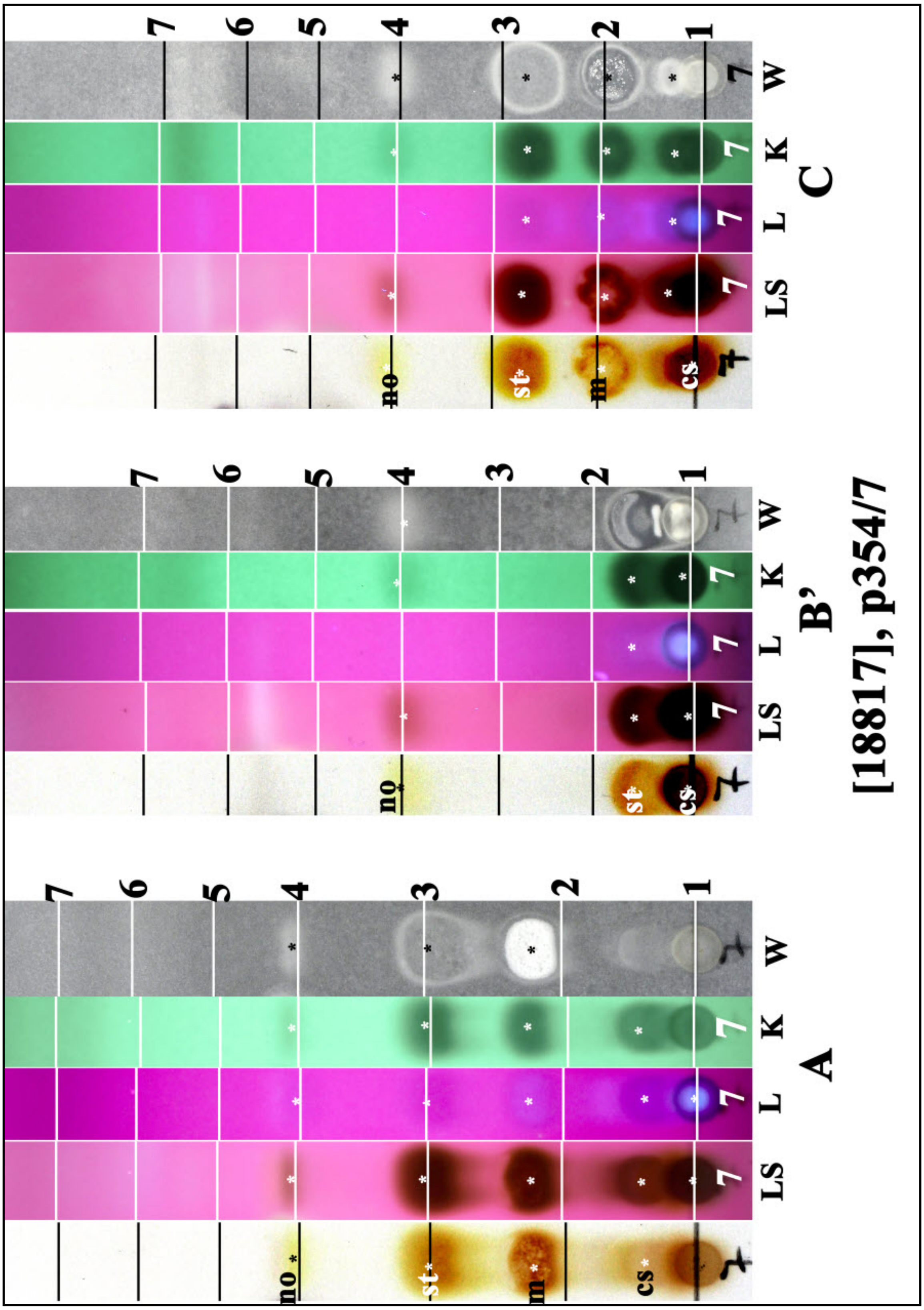
substictic acid



no: norstictic acid, st: stictic acid, **m: substictic acid**, cs: constictic acid, conf. J.A. Elix

Diorygma hieroglyphicum, [18790], India, Western Ghats, Prov. Karnataka, Distr. Coorg (Madikeri), Area Kabbinakad, W of Virajpet, ridge walk vom Chingaara Estate House im Honey Valley, ca. 12.21410° N, 75.65678° E, 1350 m. Leg. F. Schumm & J.-P. Frahm 05.11.2012.

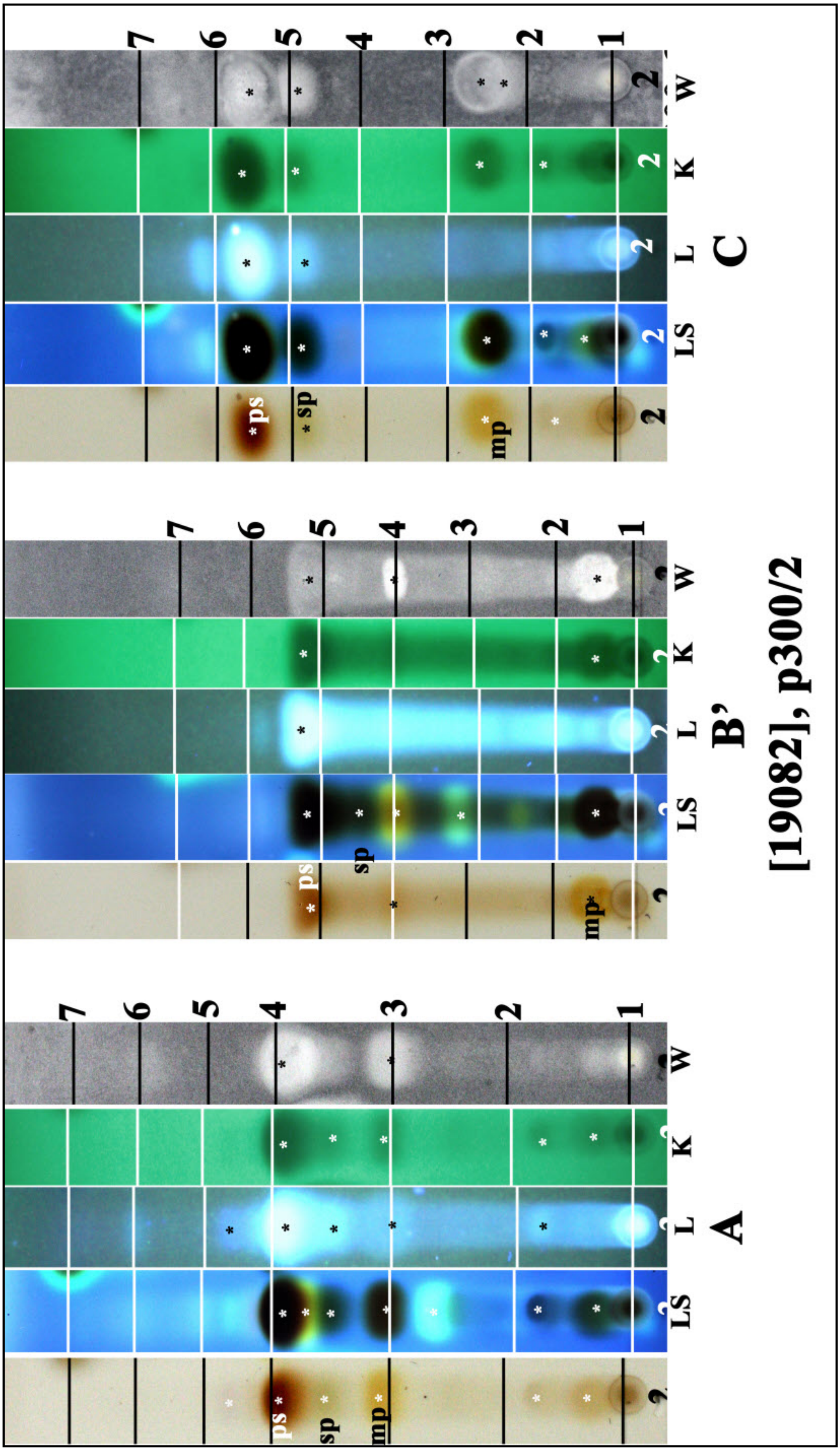
substictic acid



n: norstictic acid, st: stictic acid, **m: substictic acid**, cs: constictic acid, conf. J.A. Elix

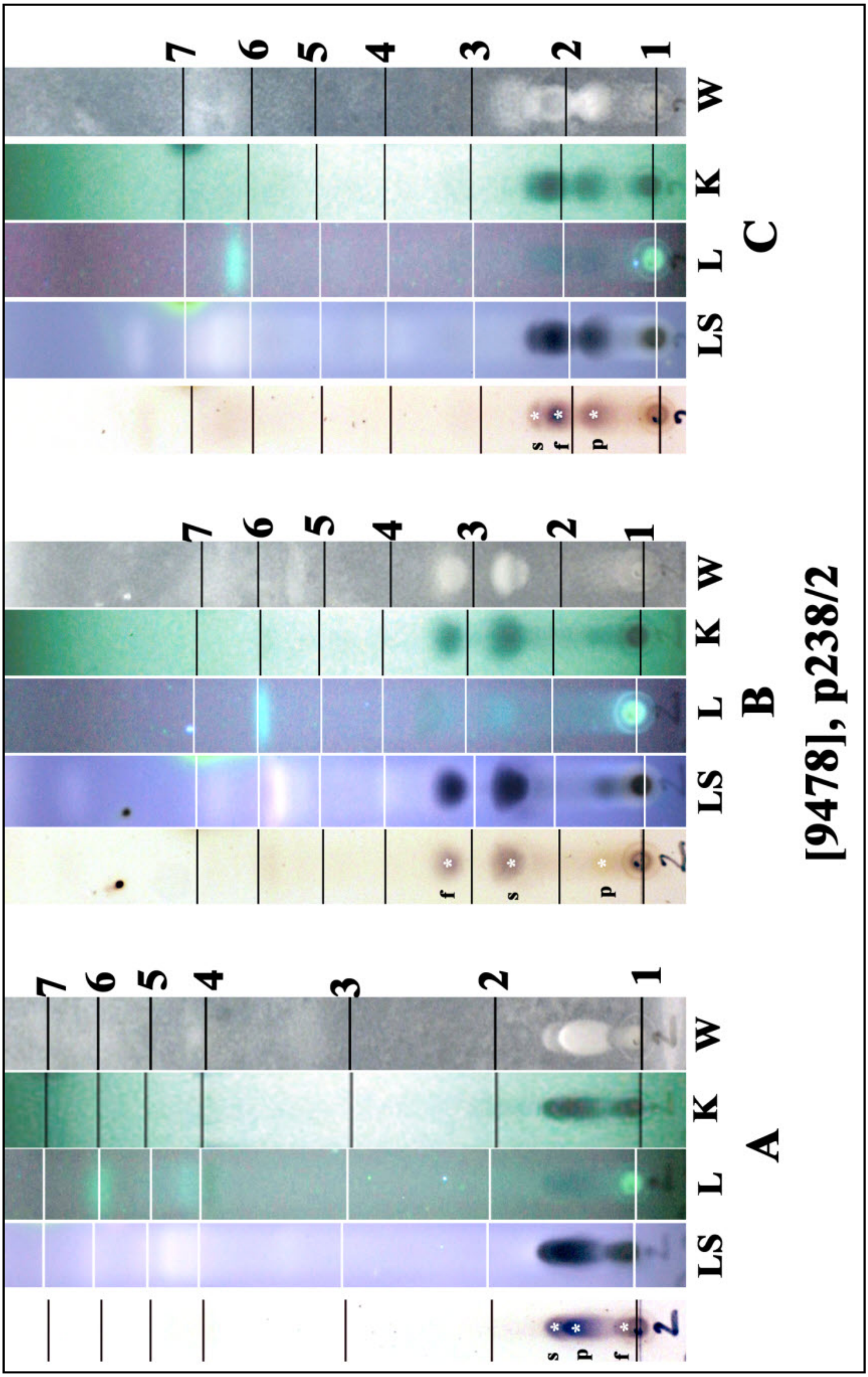
Diorygma hieroglyphicum, [18817], India, Western Ghats, Prov. Karnataka, Distr. Coorg (Madikeri), Area Kabbinakad, W of Virajpet, Wasserfall unterhalb des Chingaara Estate House im Honey Valley, ca. 12.23188° N, 75.65520° E, ca. 950 m. Leg. F. Schumm & J.-P. Frahm 06.11.2012, det. F. Schumm 2015.

subpsoromic acid



Myriotrema microporum, [19082], Australia, Queensland, Davies Creek Road c. 17 km south of Kennedy Highway, south of Davies Creek Falls National Park, east of Maree.

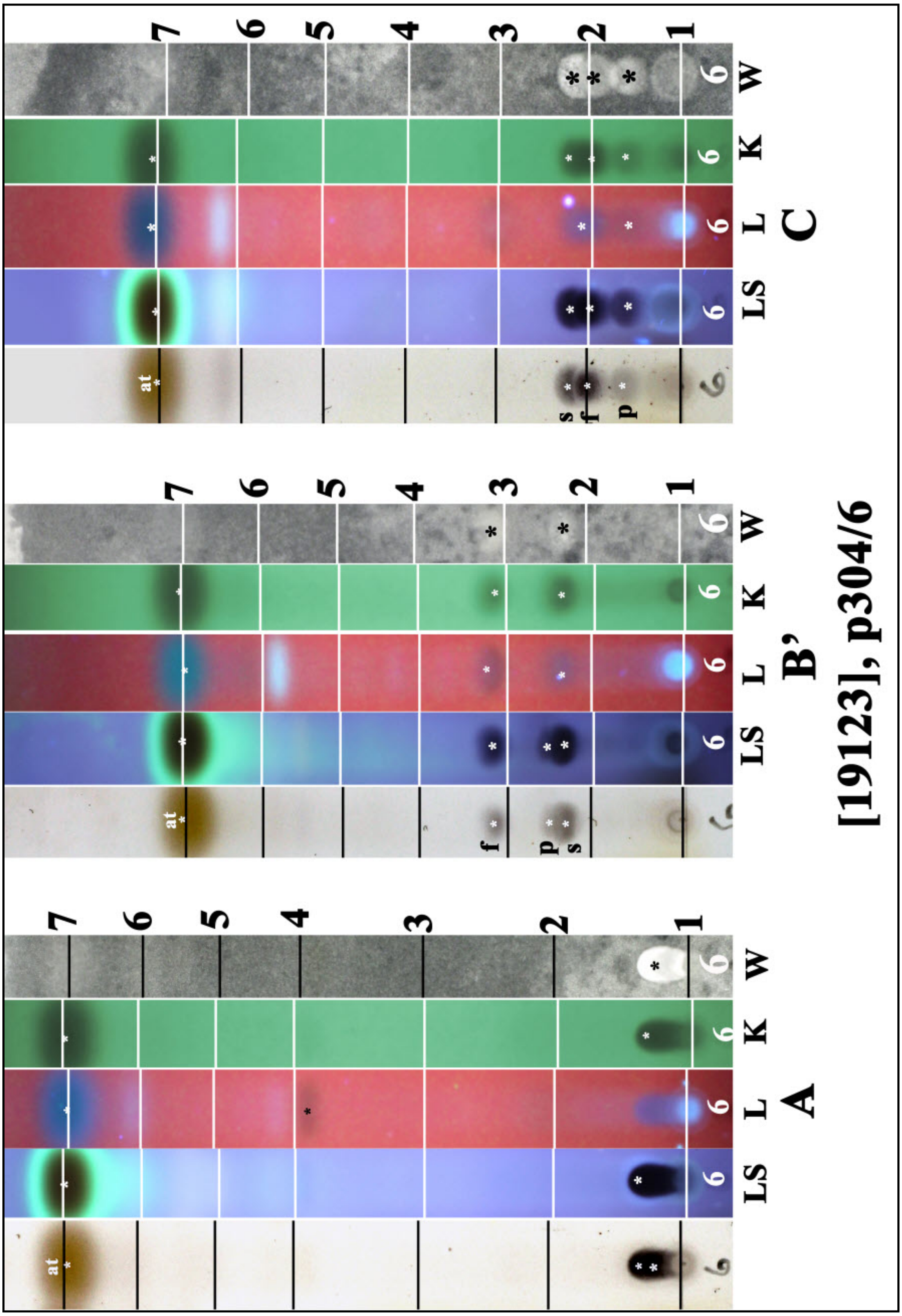
succinprotocetraric acid



f: fumarprotocetraric acid, p: protocetraric acid, s: **succinprotocetraric acid**, conf. J.A. Elix

Pertusaria subambigens, [9478], USA, WASHINGTON, Skagit County, Mt. Baker-Snoqualmie National Forest, along road 2600-012, S of road 26, mile 11-12, 48°17'30'' N, 121°25' W, 260 m. Leg. B. Ryan 6. Okt.1993 (Nr. 30630-c), det. B. Ryan.

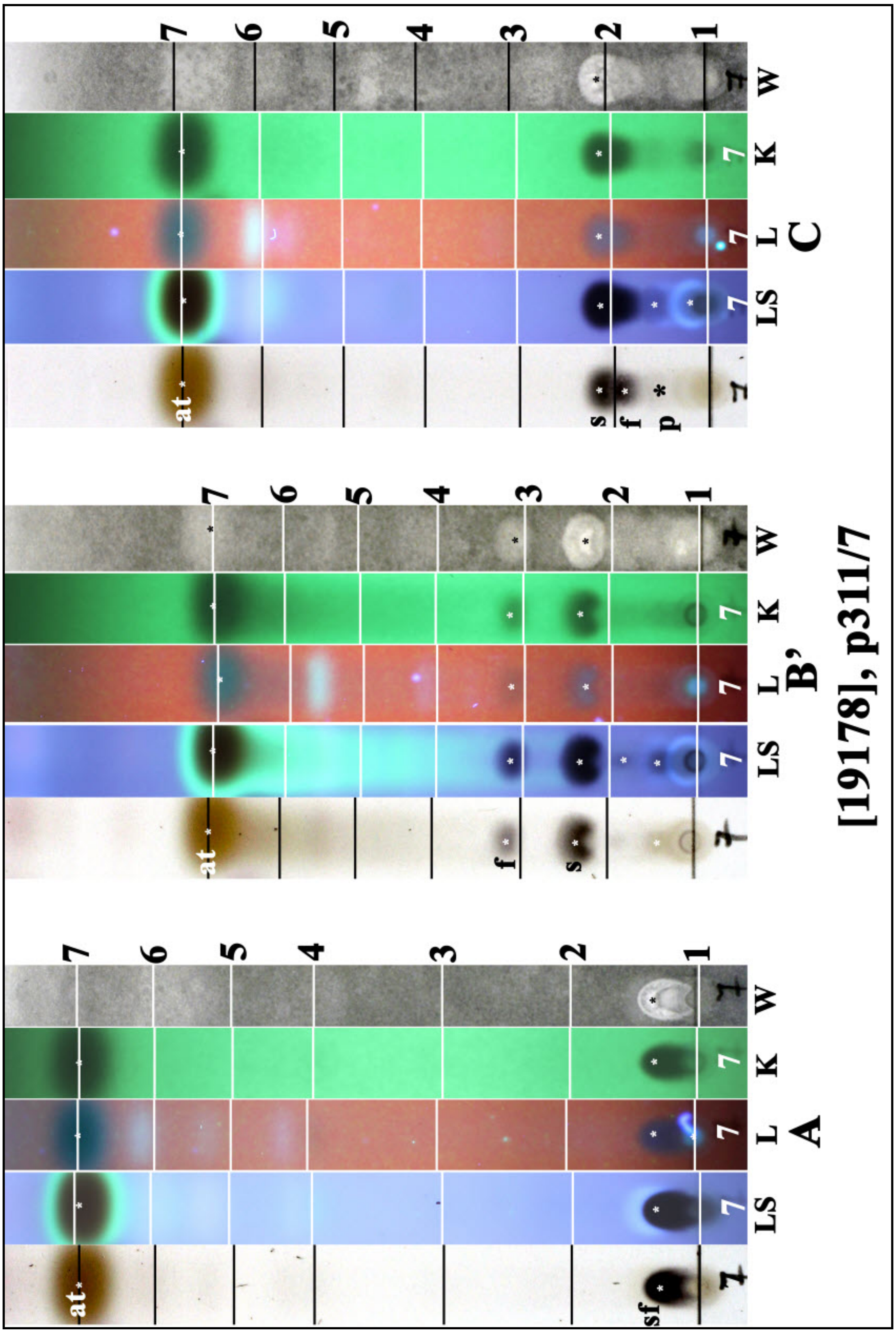
succinprotocetraric acid



at: atranorin, p: protocetraric acid, f:fumarprotocetraric acid, **s: succinprotocetraric acid**

Parmotrema queenslandense, [19123], Australia, Queensland, Mt. Catharina, 10 km north-east of Ingham.

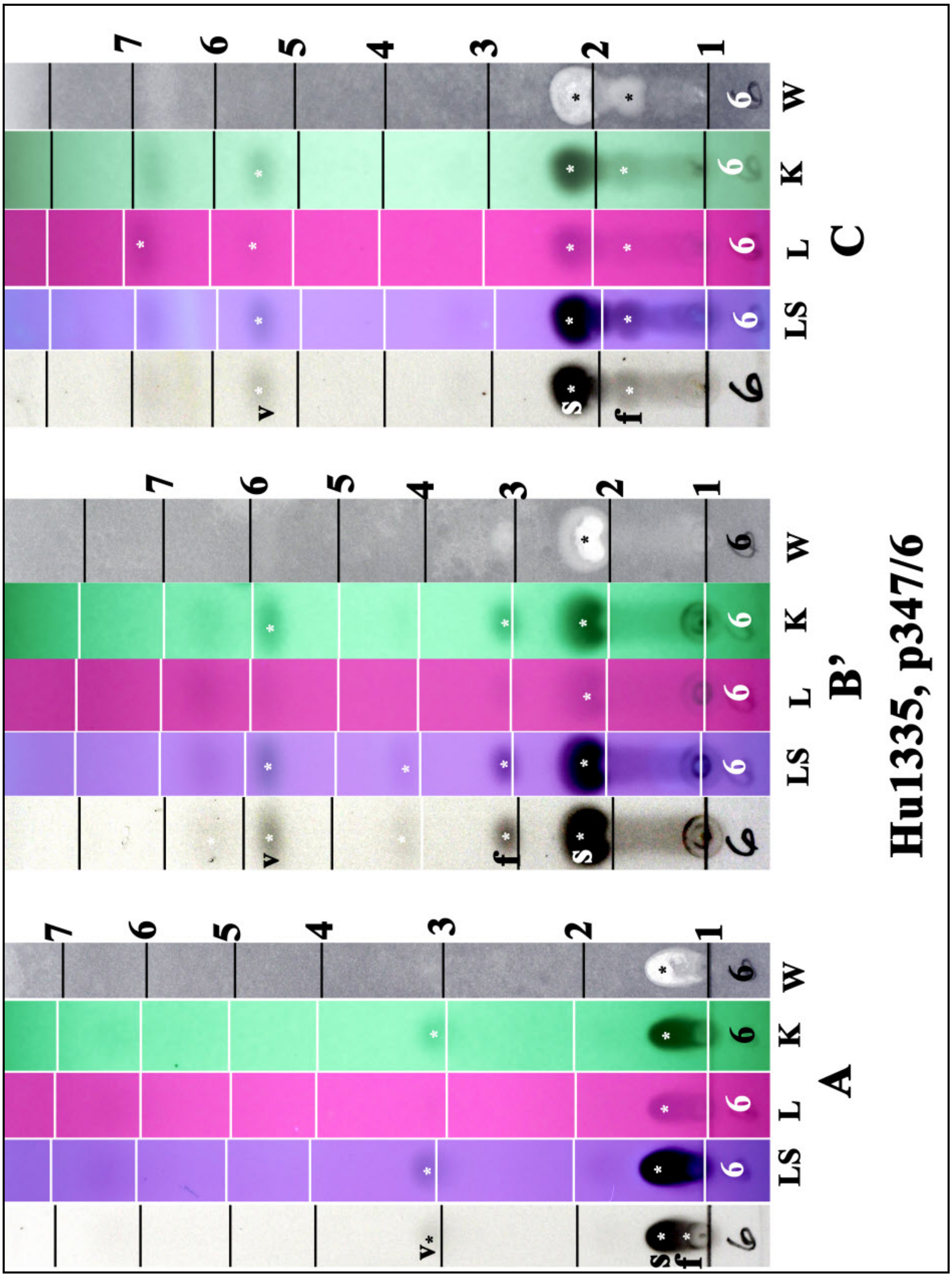
succinprotocetraric acid



at: atranorin, **s: succinprotocetraric acid**, f: fumarprotocetraric acid, p: protocetraric acid, conf. J.A. Elix

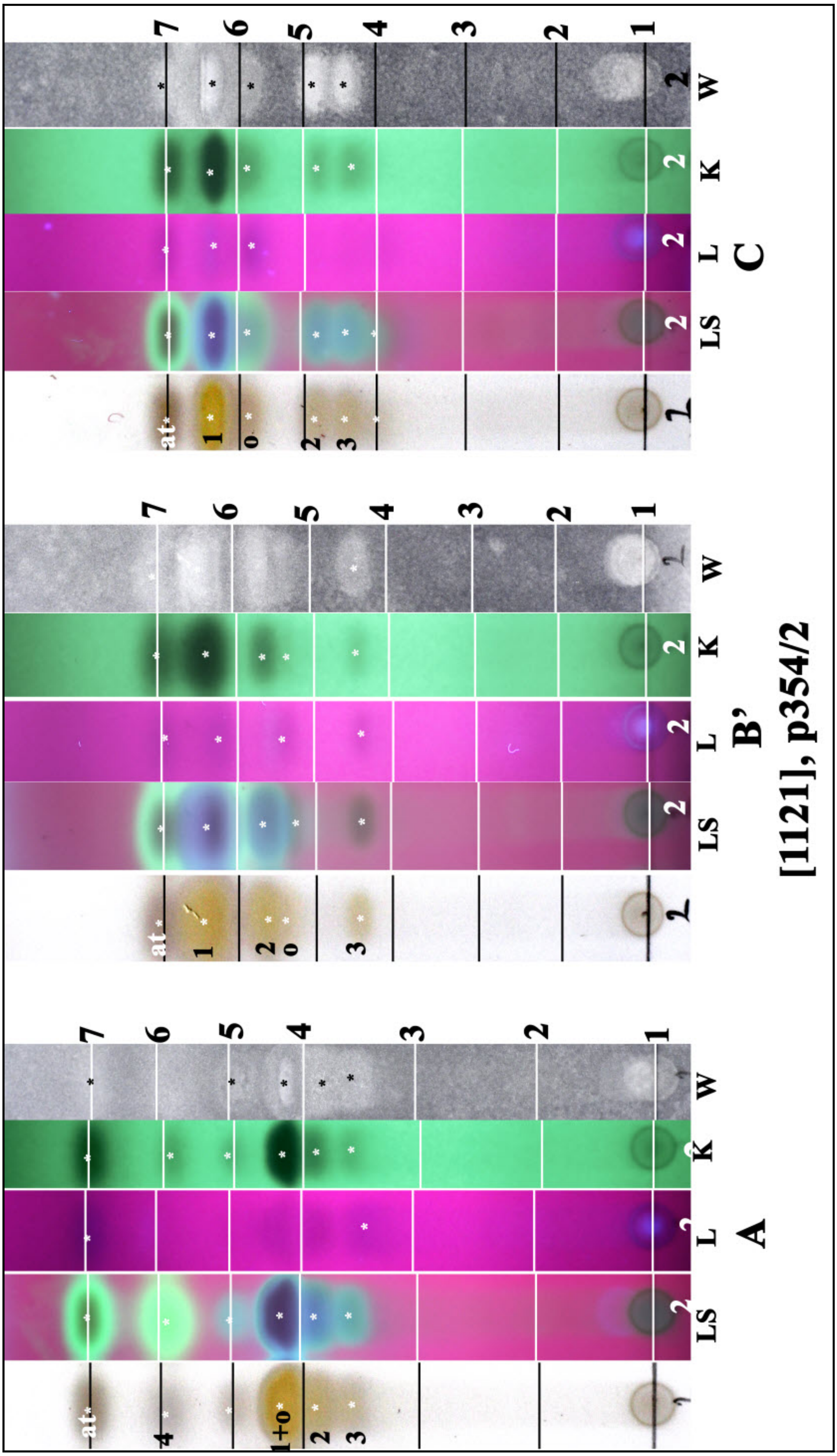
Parmotrema queenslandense, [19178], Australia, Queensland, near summit of Mount Leswell, 32 km south of Cooktown, 15°46' S, 145°15' E, 440 m, growing on granite rocks in *Eucalyptus* dominated woodland. **ISOTYPUS**. J.A. Elix (17365) & H. Streimann, 5.07.1984. Chemistry: atranorin, chloroatranorin, succinprotocetraric acid, fumarprotocetraric acid, protocetraric acid (trace), unknown fatty acid by TLC, anal. J. Johnston. LICHENES AUSTRALASICI EXSICCATI NO. 116.

succinprotocetraric acid



s: succinprotocetraric acid, f: fumarprotocetraric acid, v: may be virensic acid.
S. Huneck’s collection of lichen substances No 1335: succinprotocetraric acid, conf. J.A. Elix.
Botanisches Museum Berlin-Dahlem

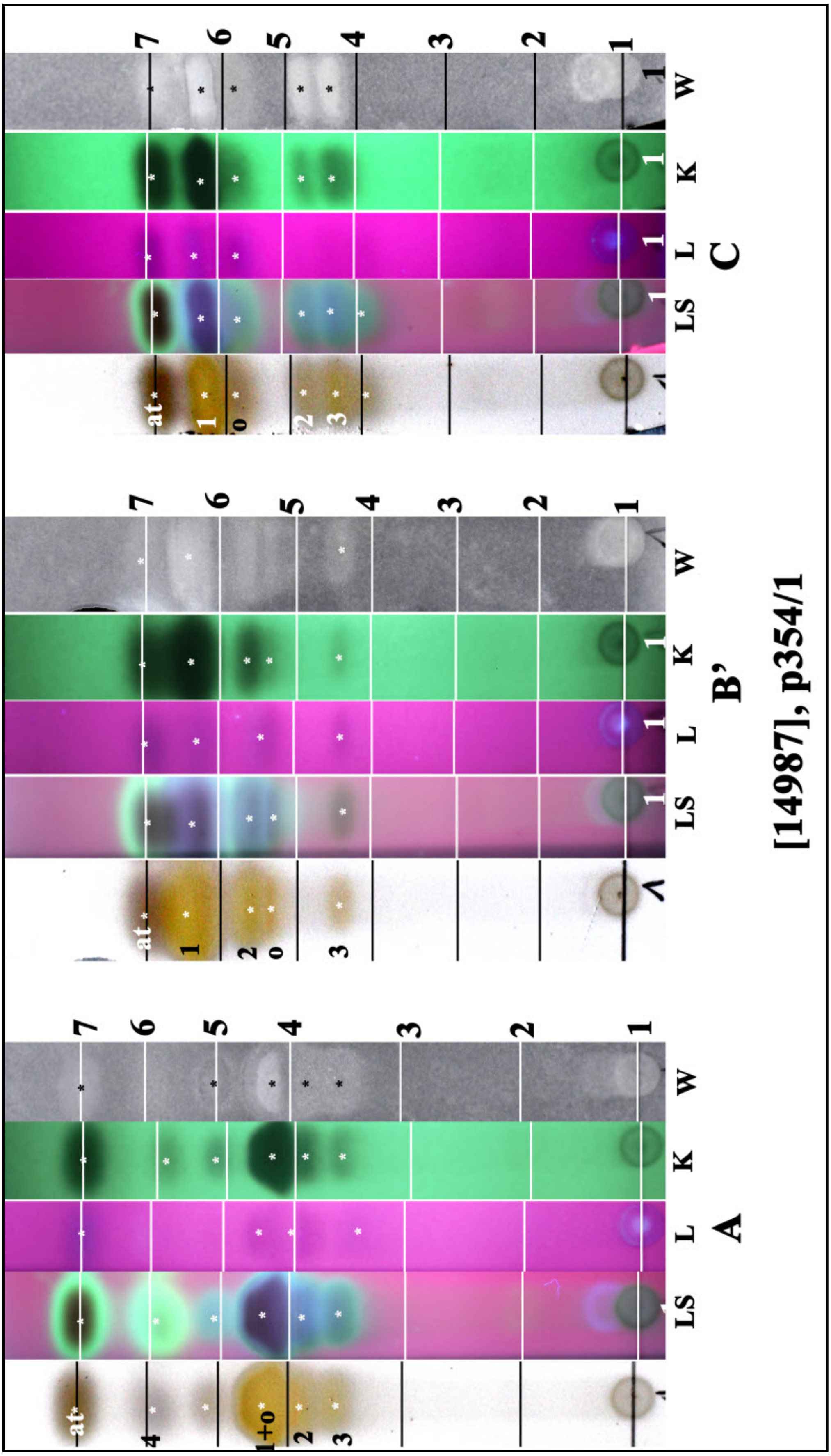
superlatolic acid



at: atranorin, 1: perlatolic acid, 2: anziaic acid, 3: olivetoric acid,
4: superlatolic acid, o: 4-*O*-methylolivetoric acid, conf J.A. Elix

Cetrelia cetrarioides, [1121], Germany, Baden-Württemberg, Stuttgart, Rotwildpark, an Fagus, TK: 7220/2. Leg. et det. E. Putzler 17.05.1950.

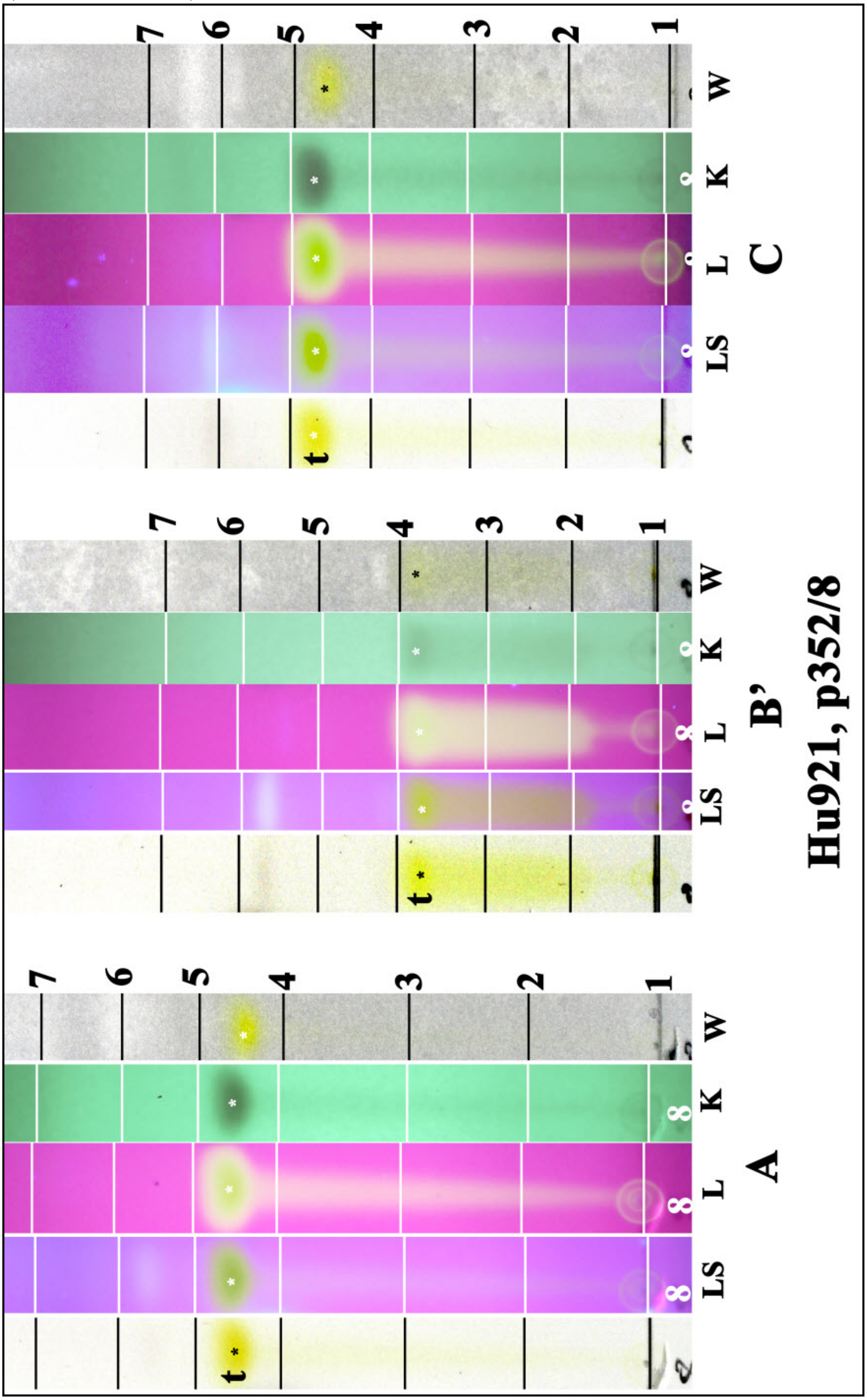
superlatolic acid



at: atranorin, 1: perlatolic acid, 2: anziaic acid, 3: olivetoric acid, **4: superlatolic acid**, o: 4-*O*-methylolivetoric acid, conf. J.A. Elix.

Cetrelia cetrarioides, [14987], Germany, Bayern, Kreis Traunstein, Chiemgauer Alpen, Hochfelln, Weg von der Mittelstation der Seilbahn (47,76966°N, 12,57550°E, 1090 m) zur Talstation, an Fagus bei 950 m. Leg. et det. F. Schumm 27.08.2009.

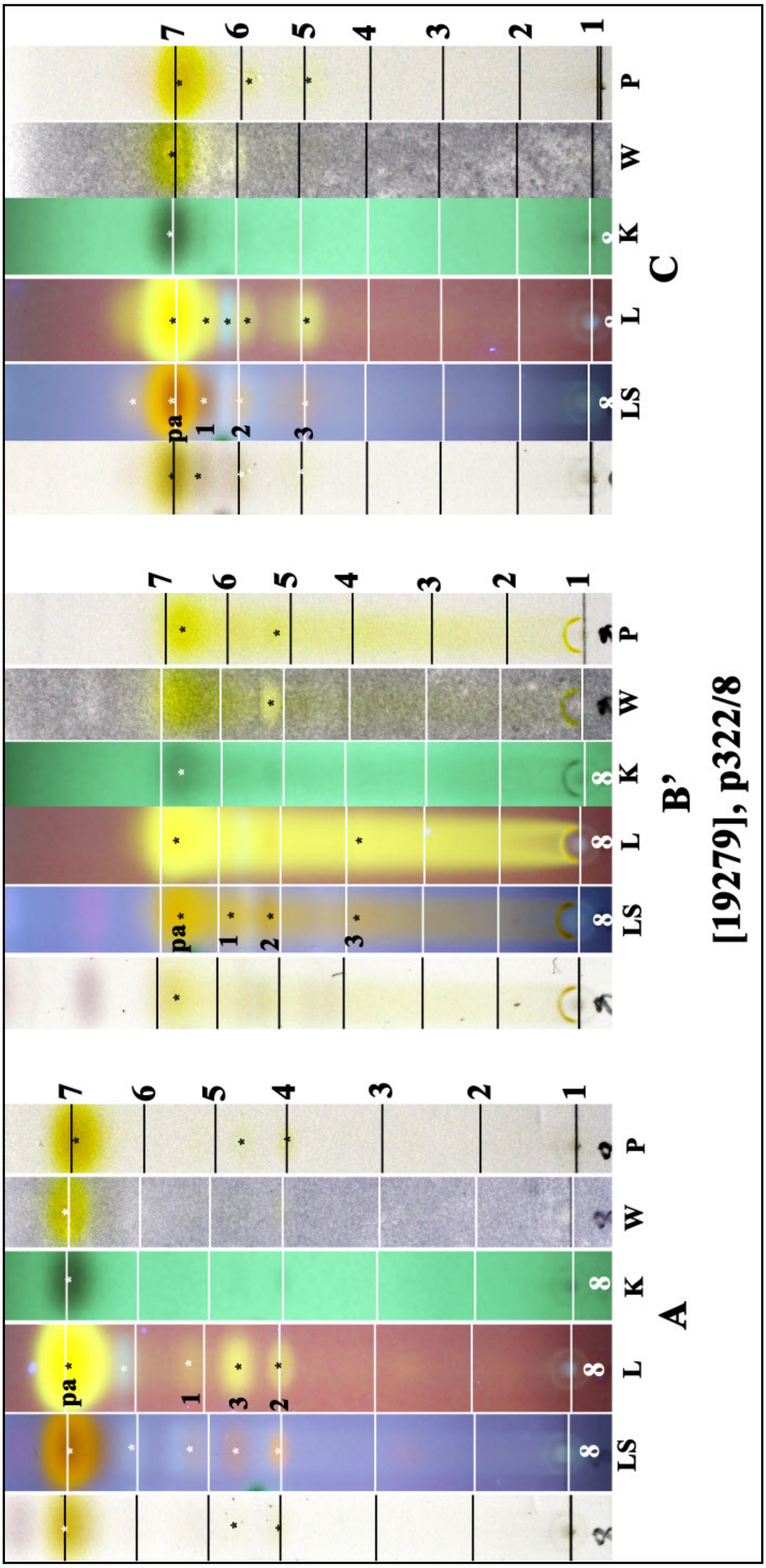
teloschistin
(= fallacinol)



t: teloschistin (= fallacinol), conf. J.A. Elix

S. Huneck's collection of lichen substances No 921: fallacinol
Botanisches Museum Berlin-Dahlem

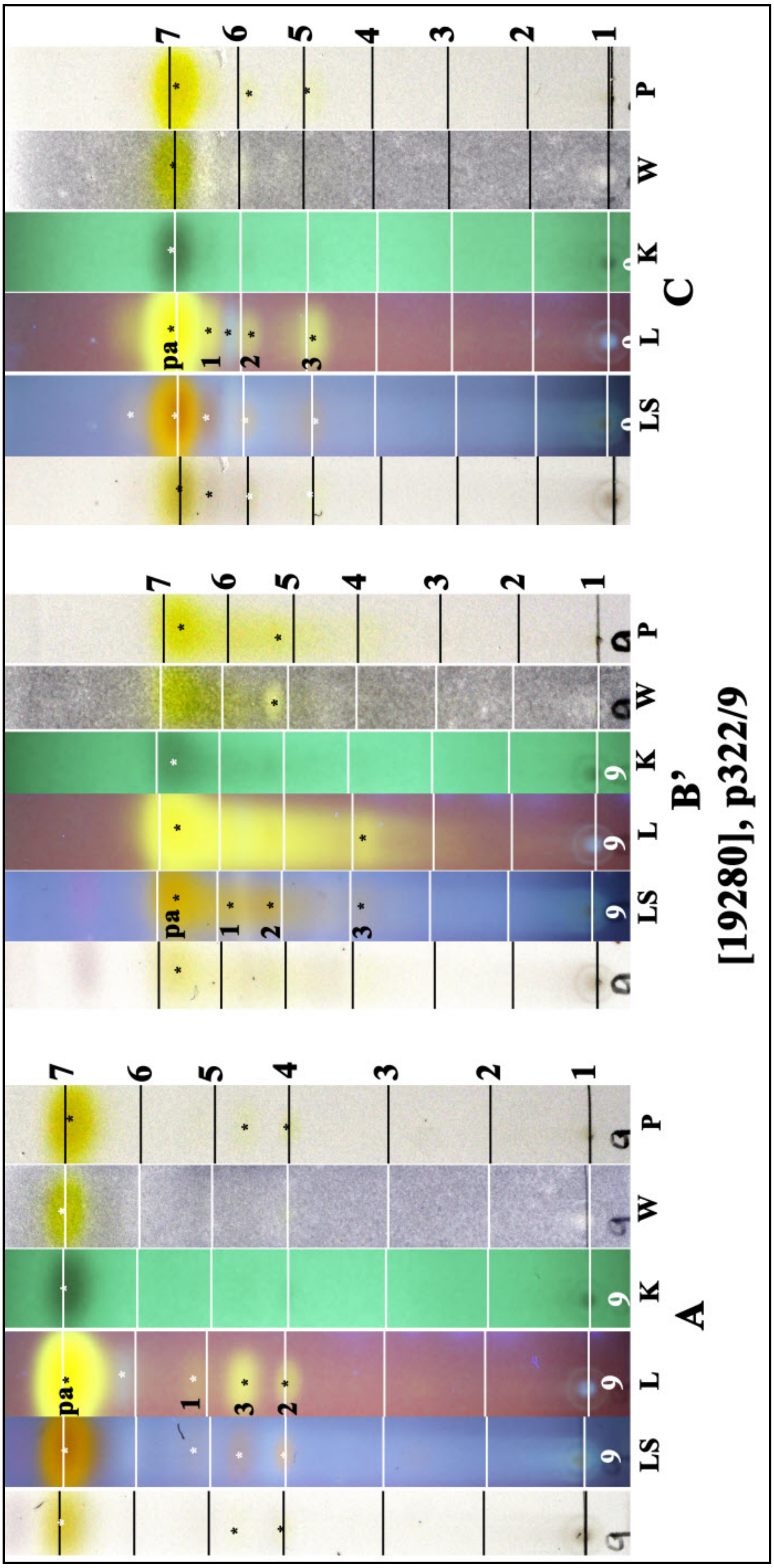
teloschistin (= fallacinol)



pa: parietin, 1: fallacinal, 2: parietinic acid, **3: teloschistin**

Teloschistes chrysophthalmus, [19279], Australia, South Australia, Kangaroo Island, King George Beach, 35°40' S, 137°04' E, 2 m.

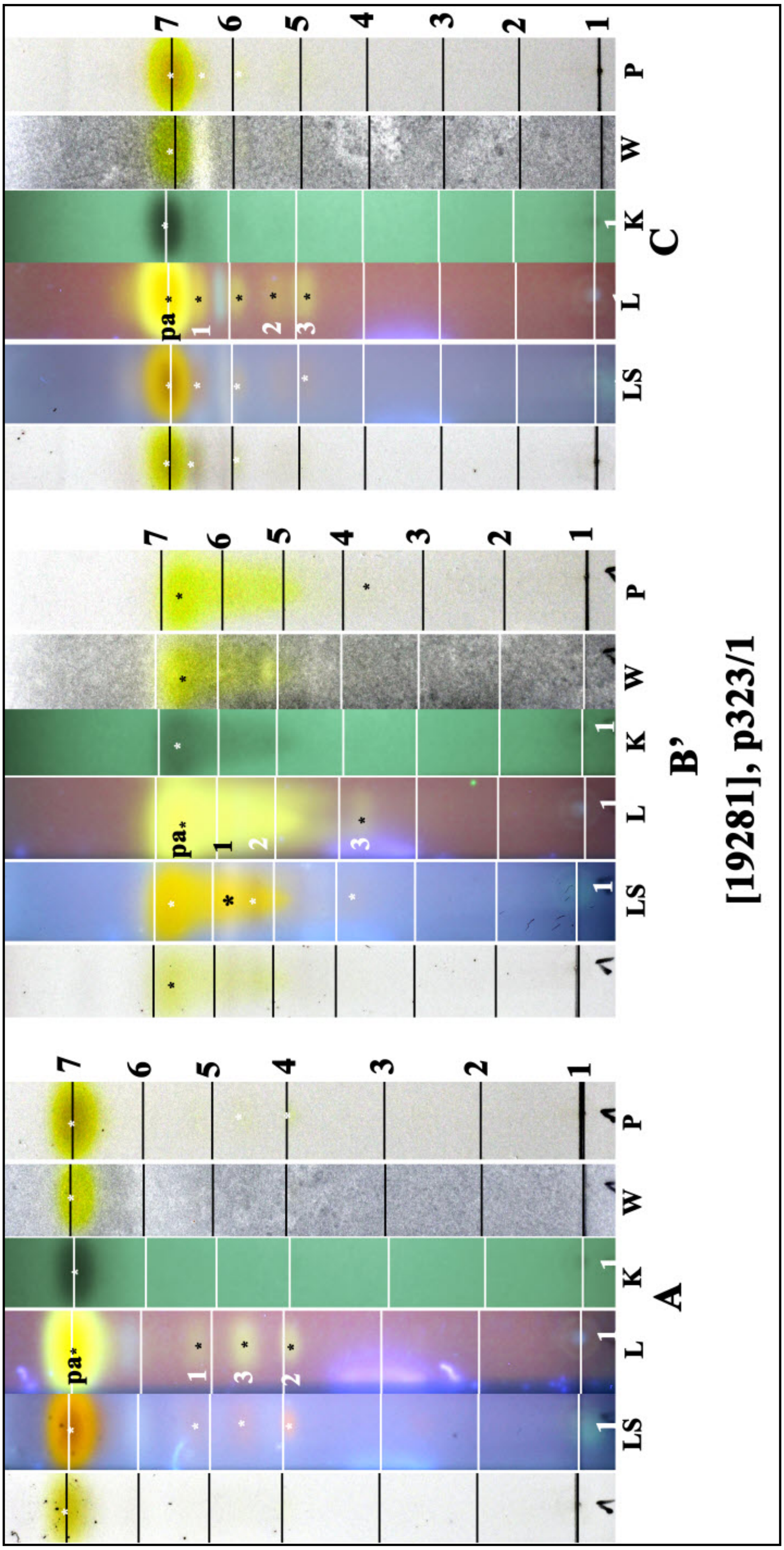
teloschistin (= fallacinol)



pa: parietin, 1: fallacinal, 2: parietinic acid, **3: teloschistin**

Teloschistes chrysophthalmus, [19280], Australia, South Australia, Kangaroo Island, Playford Highway, 1 km west of Kingscote Airport, 35°43' S, 137°31' E, 15 m.

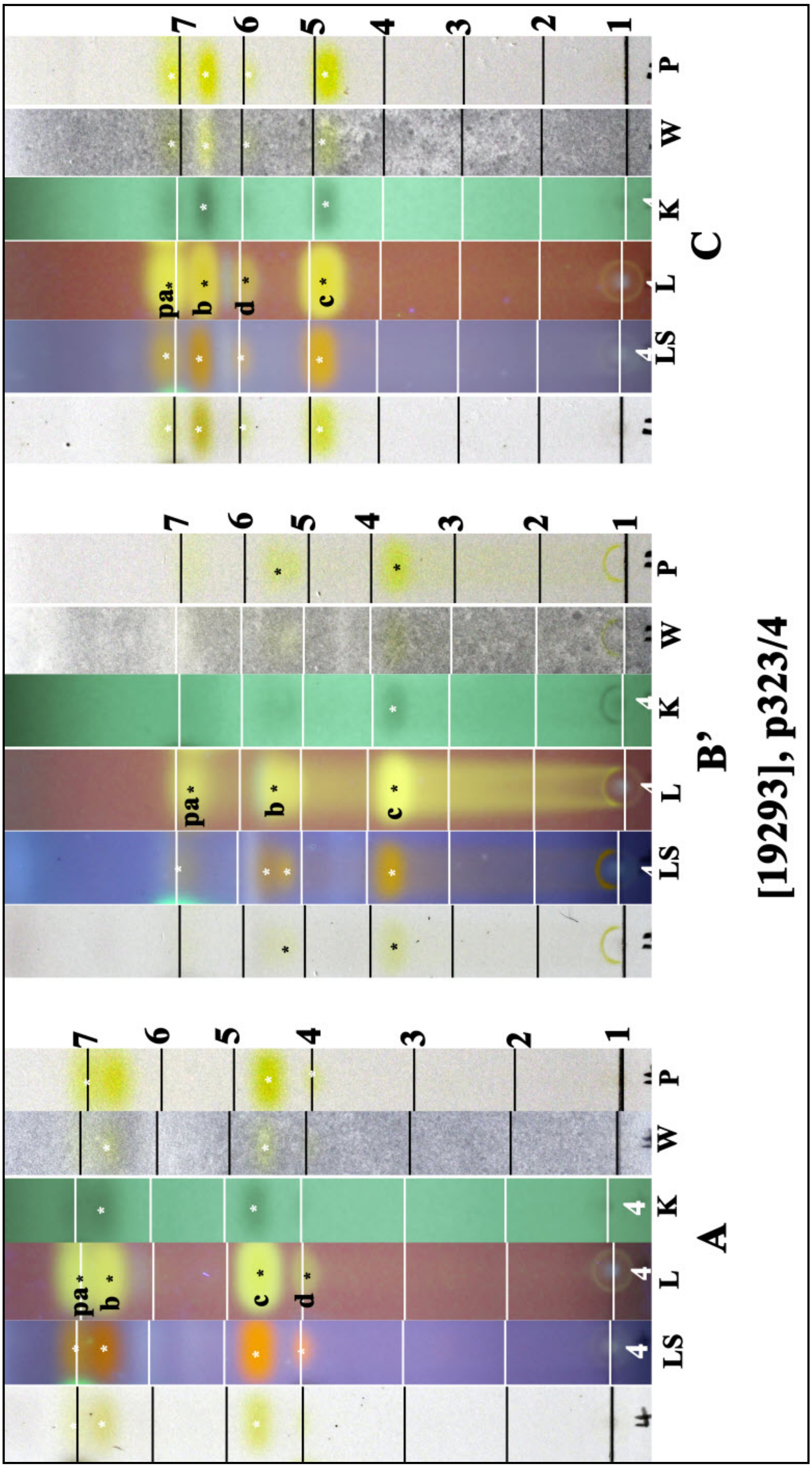
teloschistin (= fallacinol)



pa: parietin, 1: fallacinal, 2: parietinic acid, **3: teloschistin**

Teloschistes fasciculatus , [19281], Australia, Victoria, Basalt Hill, Alpine National Park, Bogong High Plains, 20 km south-east of Mt. Beauty, 36°53' S, 147°18' E, 1650 m.

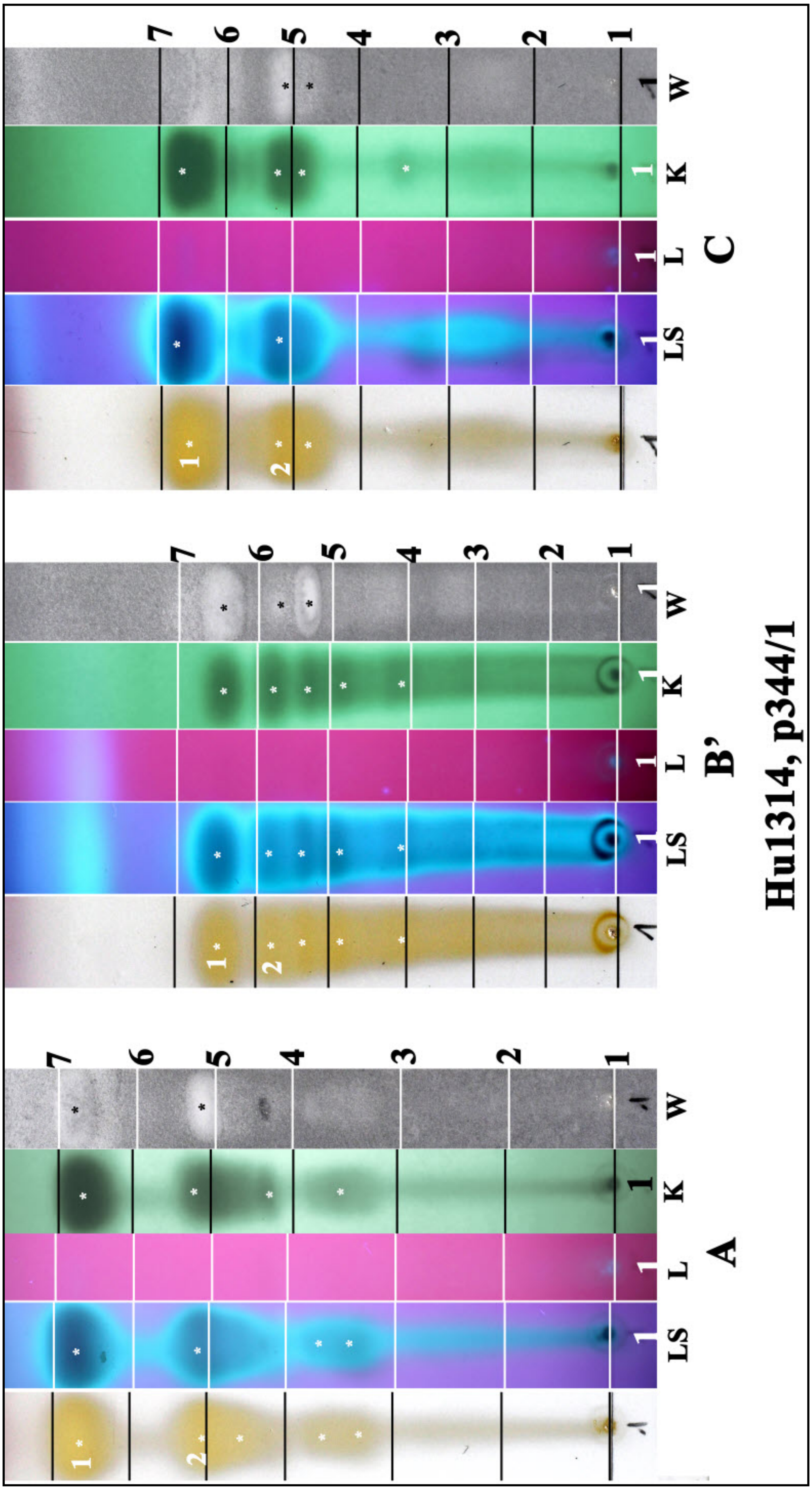
teloschistin (= fallacinol)



pa: parietin, b: fallacinal, **c: teloschistin**, d: parietinic acid

Xanthoria filsonii, [19293], Australia, Victoria, Hopetoun, Patchewollock Road, 5 km north-east of Hopetoun, 80 m, growing on *Rhagodia* along grazed roadside verge with *Rhagodia* and *Eucalyptus*..

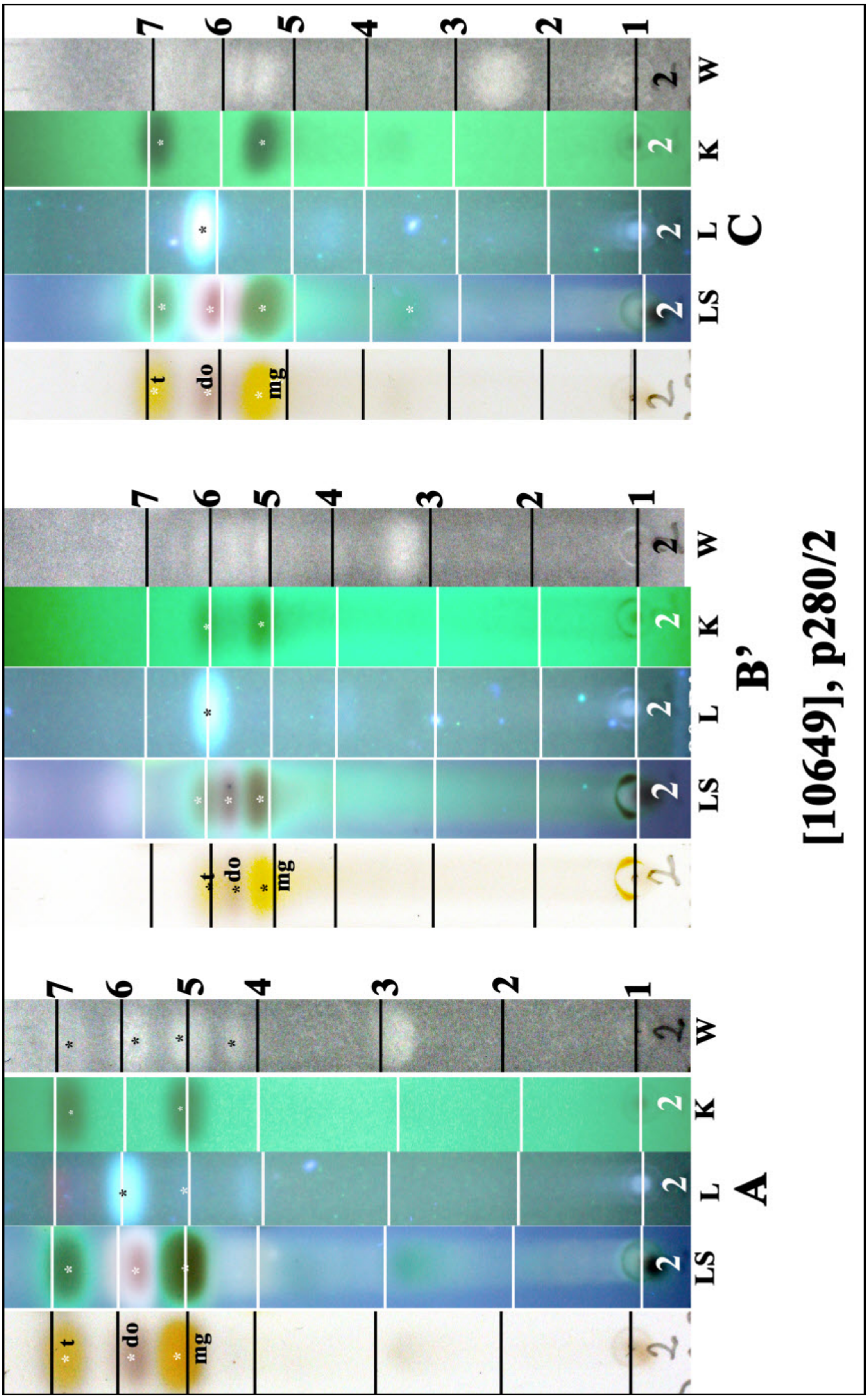
tenuiorin



1: tenuiorin, 2: methyl gyrophorate, conf. J.A. Elix

S. Huneck's collection of lichen substances No 1314: tenuiorin.
Botanisches Museum Berlin-Dahlem

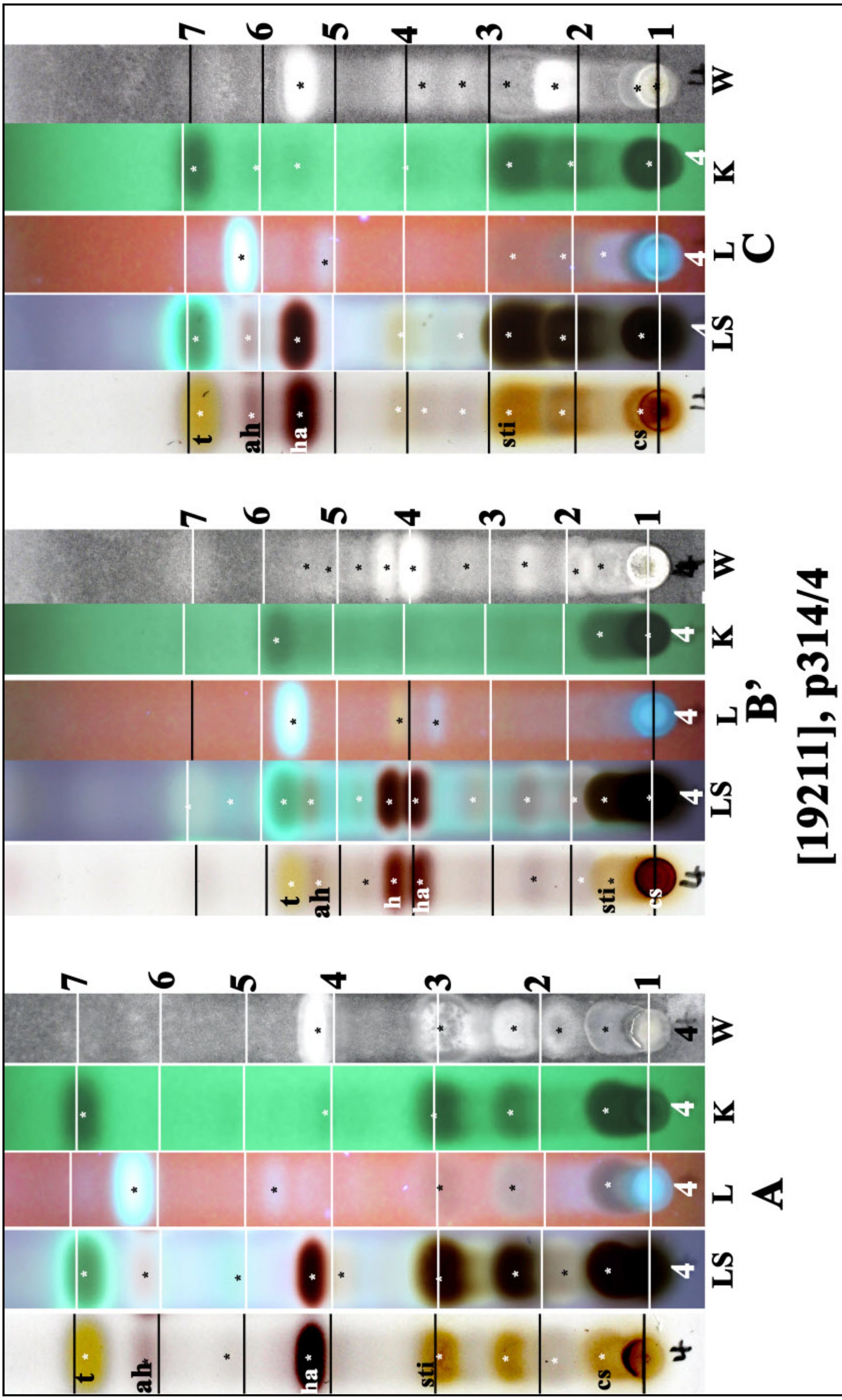
tenuiorin



do: 15α-acetoxyhopane-22-ol, **t: tenuiorin**, mg: methyl gyrophorate

Peltigera dissecta, [10649], Portugal, Azoren, Sao Miguel, NE from Lagoa do Fogo near Lombadas; Erica bewachsene steile Lavahänge, 37°46.863' N, 25°27.470' W, 640 m. Leg. F. Schumm 02.06.2003, det. A. Aptroot 2010.

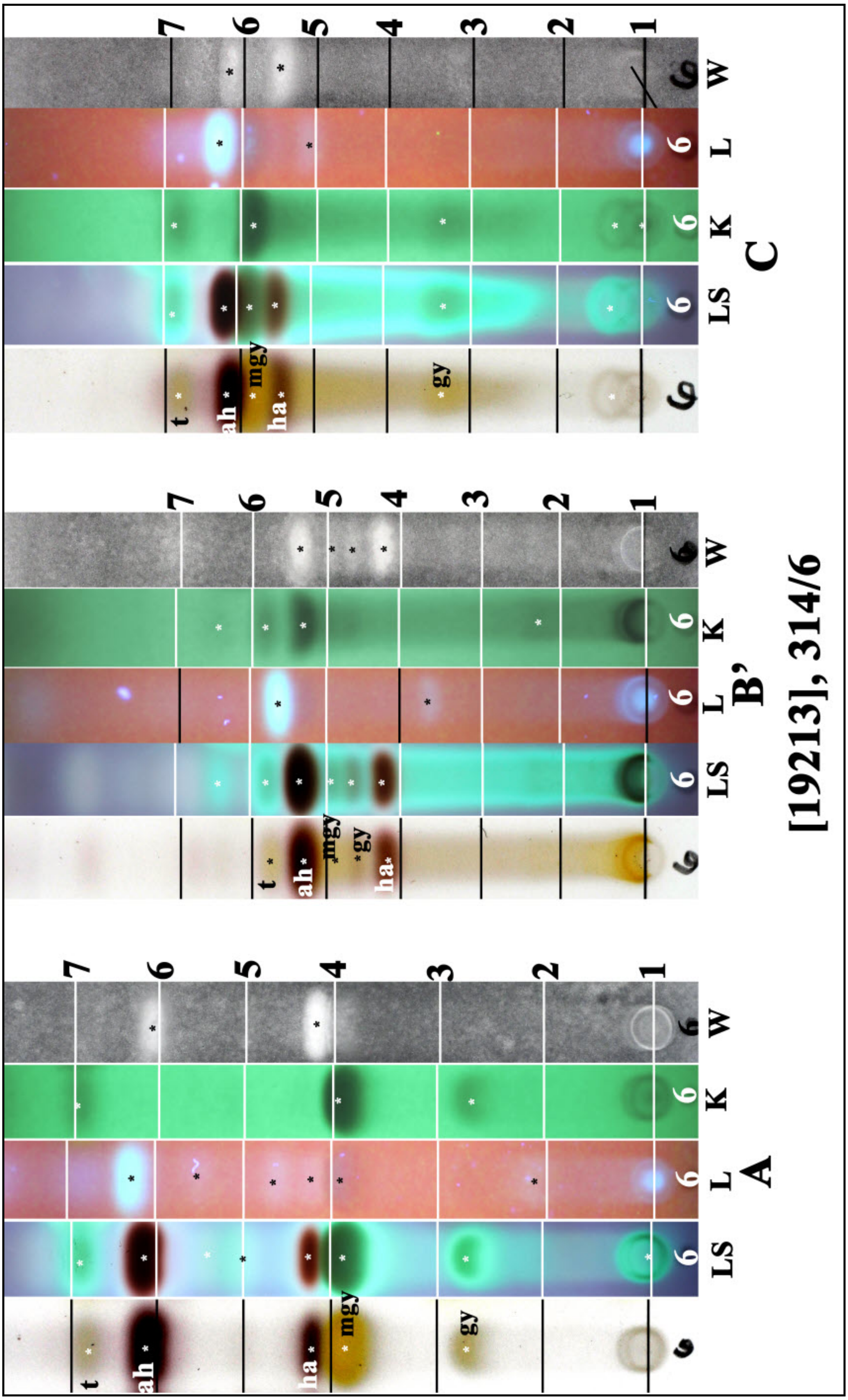
tenuiorin



t: tenuiorin, ah: 7β-acetoxyhopane-22-ol, ha: hopane-15α,22-diol, h: hopane-6α,7β,22-triol, sti: stictic acid,, cs: constictic acid.

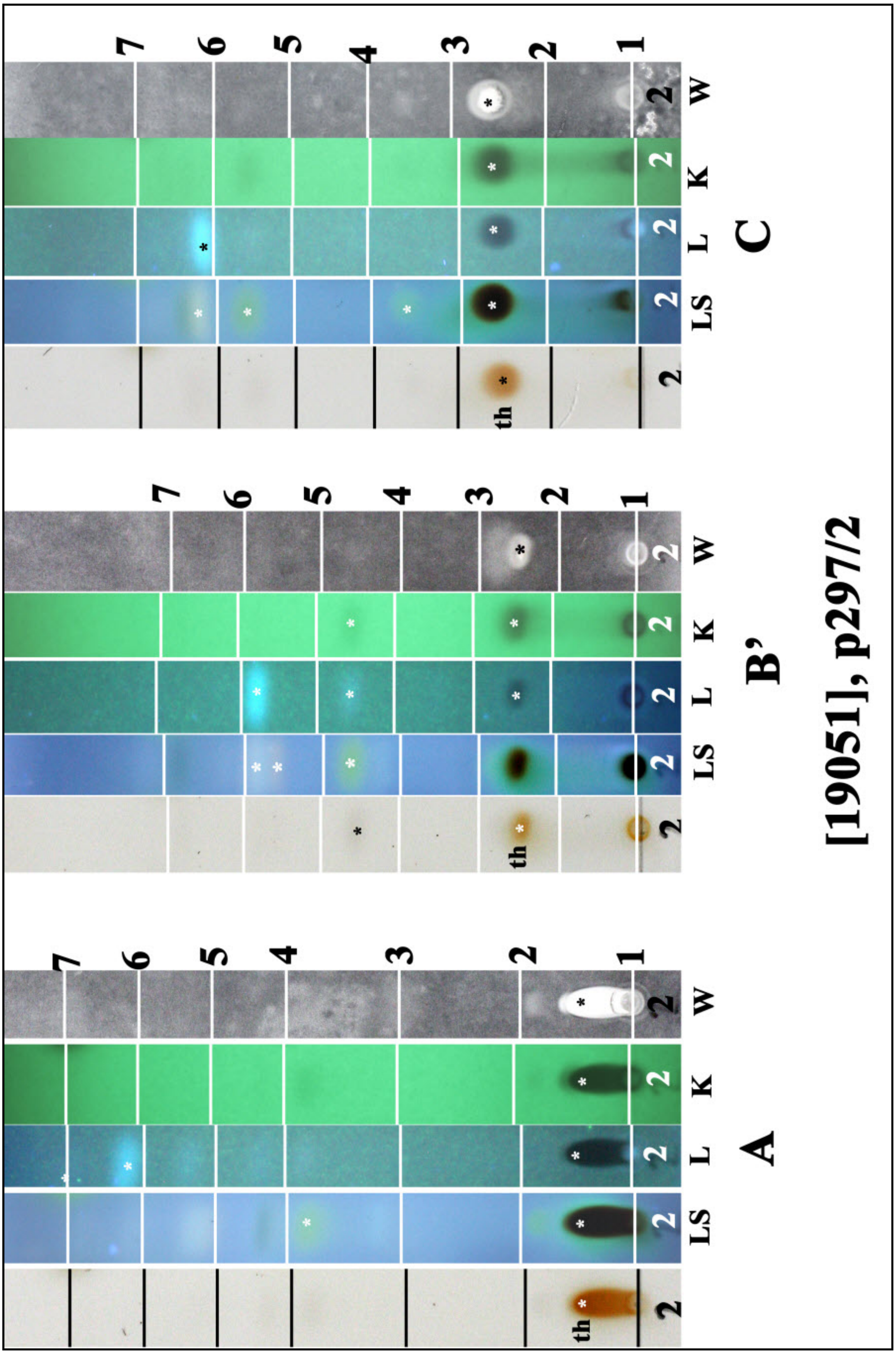
Pseudocyphellaria pubescens, [19211], New Zealand, South Island, Canterbury, eastern entrance to Arthurs Pass National Park, 670 m.

tenuiorin



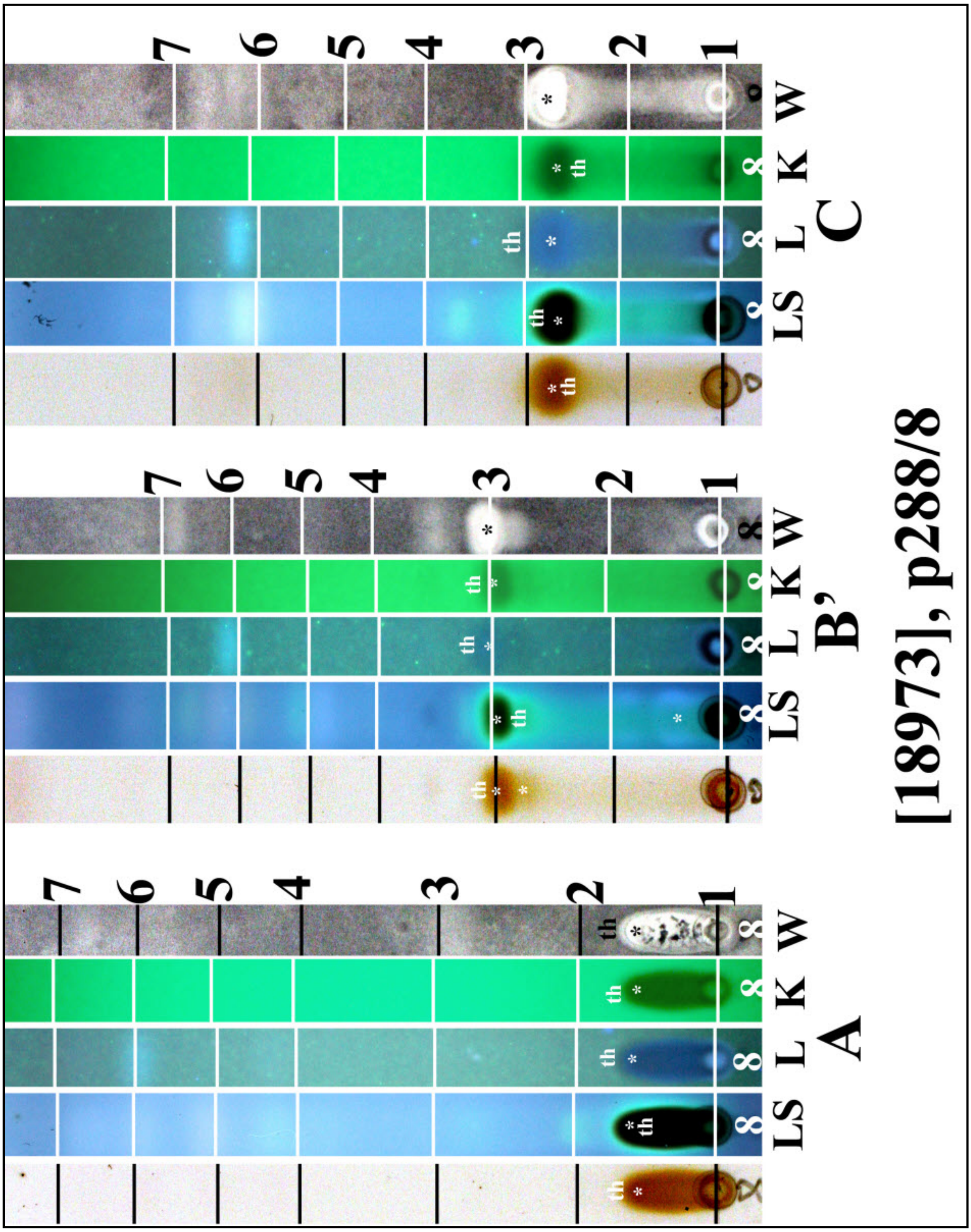
Pseudocyphellaria sulphurea, [19213], Australia, Queensland, Kirrima State Forest, Cardwell Range, 24 km west-north-west of Cardwell, 18°12' S, 145°48' E, 750 m.

thamnolic acid



Imshaugia aleurites, [19051], Australia, Victoria, Mount Delegate.

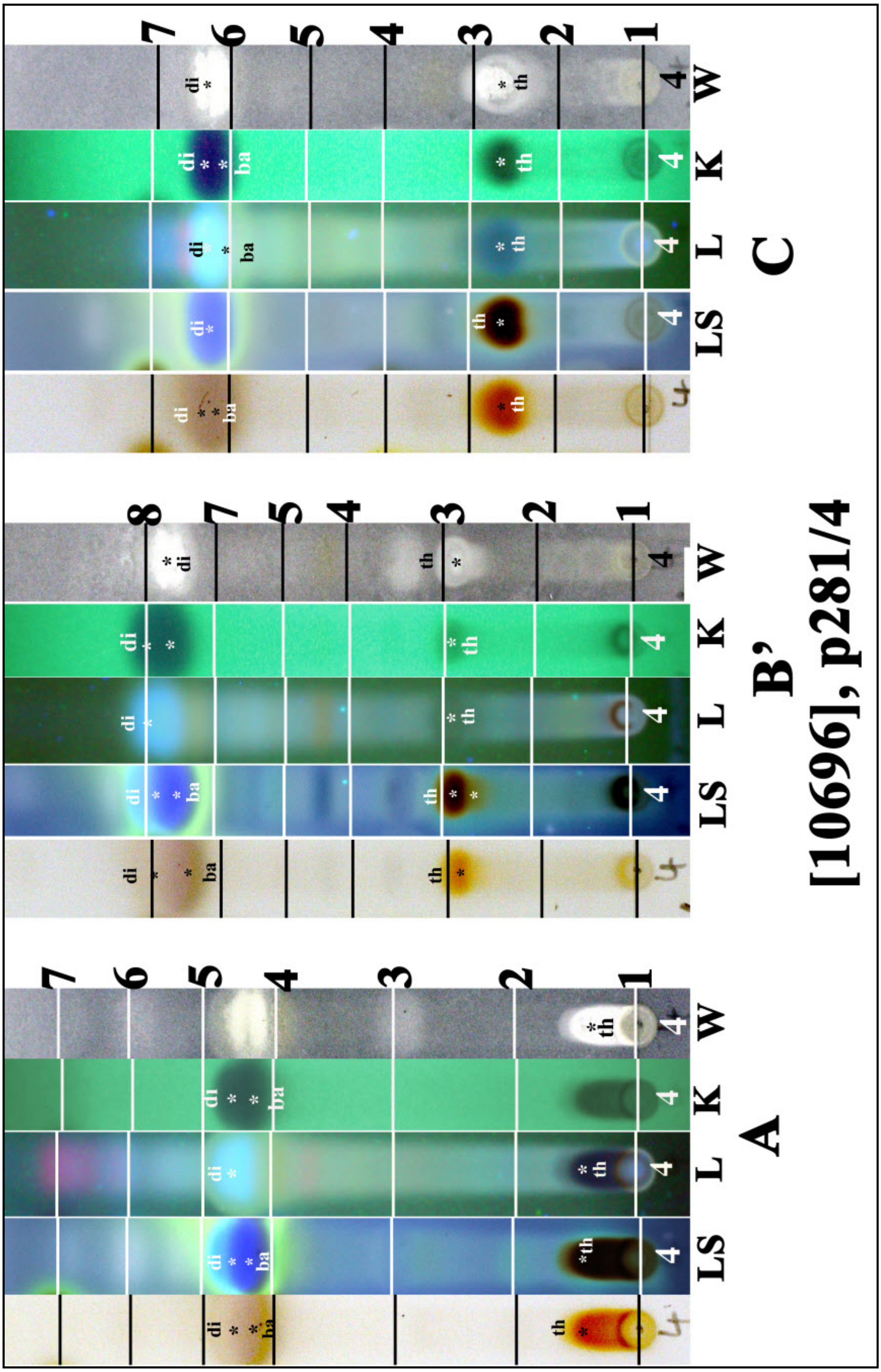
thamnolic acid



th: thamnolic acid

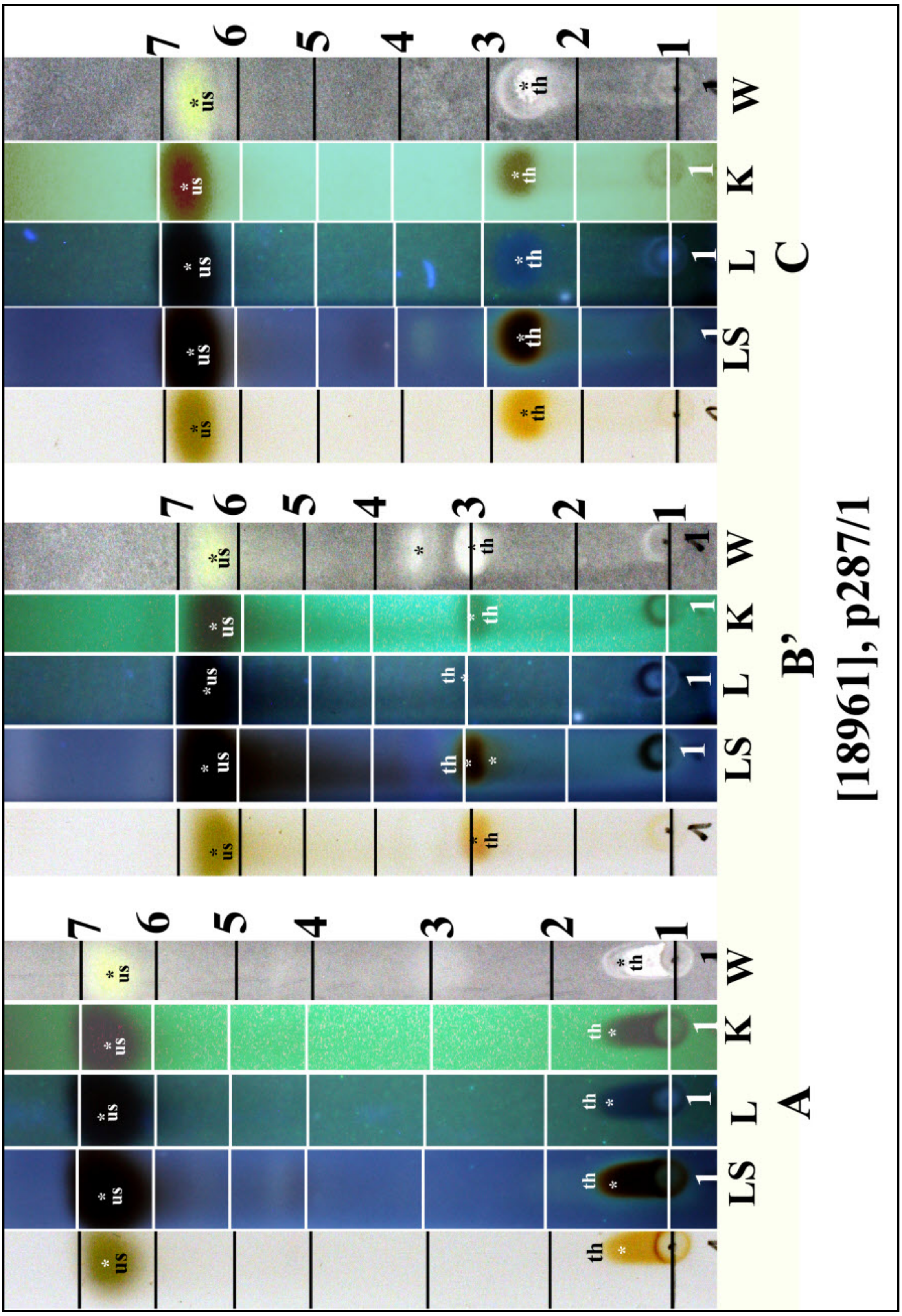
Cladonia rigida, [18973], Australia, New South Wales, Murphys Track, Dora Dora State Forest, 18 km south-east of Holbrook.

thamnolic acid



Cladonia didyma, [10696], Portugal, Azoren, Sao Miguel, an der Straße SW von Lagoa das Fumas beim Parkplatz Reservada Florestal de Recreiro do Cerrado Bezerros, 37°44.632' N, 25°21.939' W, 430 m, an Laubbaumrinde. Leg. F. Schumm 03.06.2003, det. A. Aptroot 2009. Chemistry: K+ yellow, C-, KC-, P+ orange, UV+ blue-white.

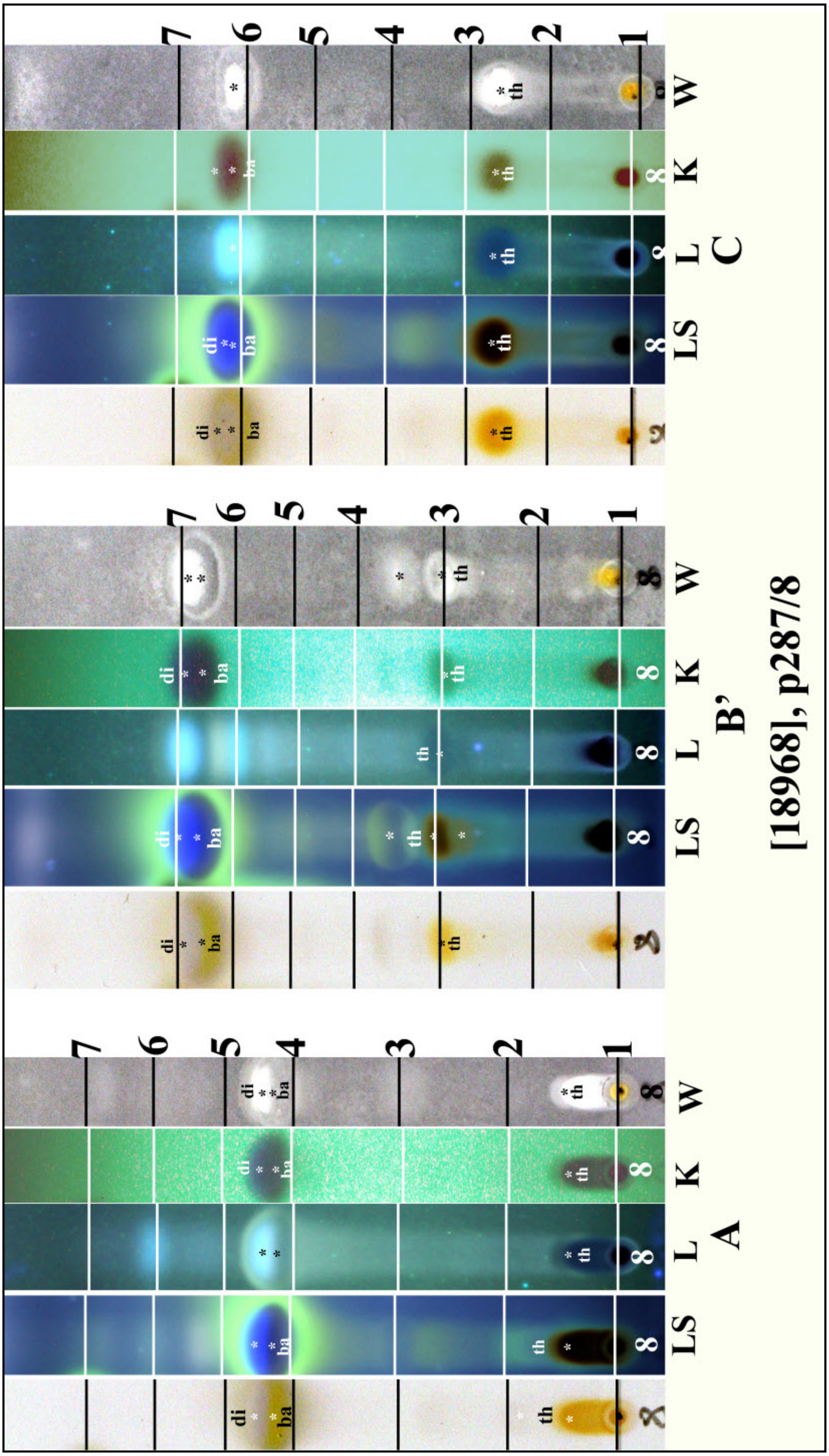
thamnolic acid



us: usnic acid, **th: thamnolic acid**

Cladonia capitellata var ***capitellata,*** [18961], New Zealand, South Island, Canterbury, SW slopes of Foggy Peak.

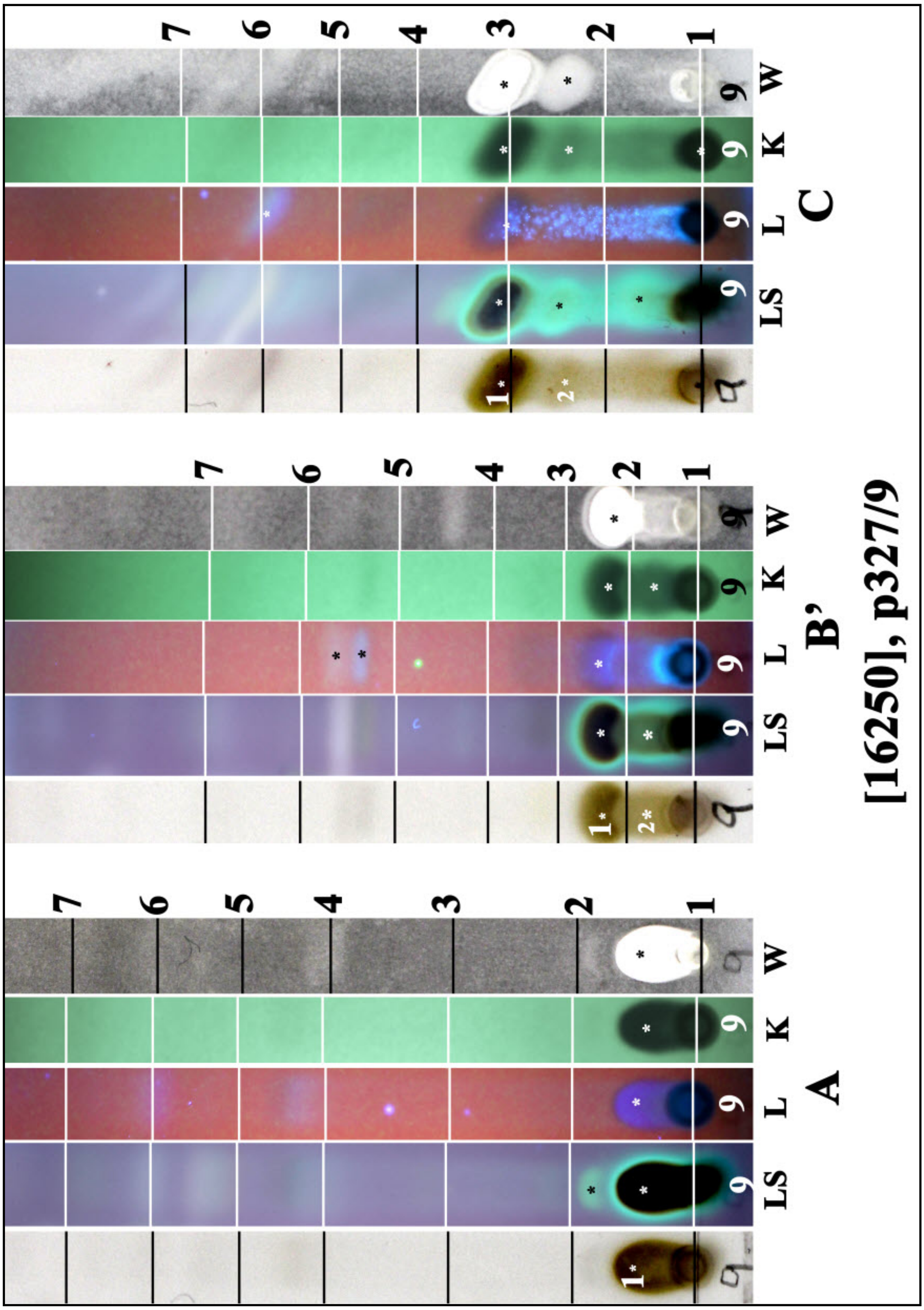
thamnolic acid



di: didymic acid, ba: barbatic acid, **th: thamnolic acid**

Cladonia macilenta [18968], Australia, Queensland, Crediton State Forest, 16 km south-west of Finch Hatton.

thamnolic acid

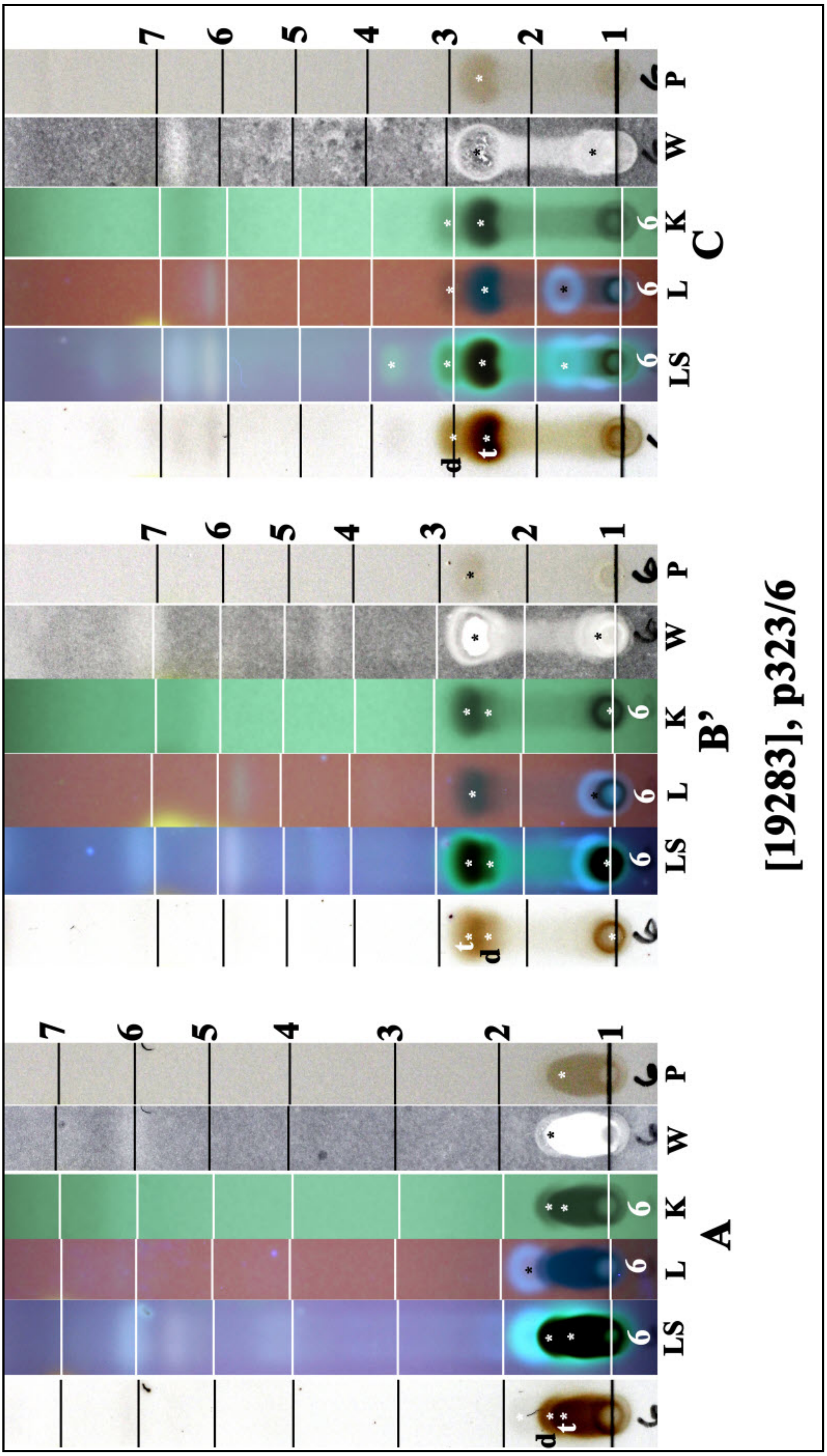


[16250], p327/9

1: hypothamnolic acid, 2: thamnolic acid

Pertusaria novaezelandiae, [16250], Australia, New South Wales, between Bermagui and Tathra, trail from Aragunnu Beach to Mimosa Rocks, 36.853° S, 150.562° E, 10 m, growing on bark. Leg. F. Schumm & E. Stocker-Wörgötter, 12.11.2009. Chemistry: soralia UV+ blue white, K+ purple, C ±orange, P± yellowish; hypothamnolic acid (major) by HPTLC, anal. F. Schumm.

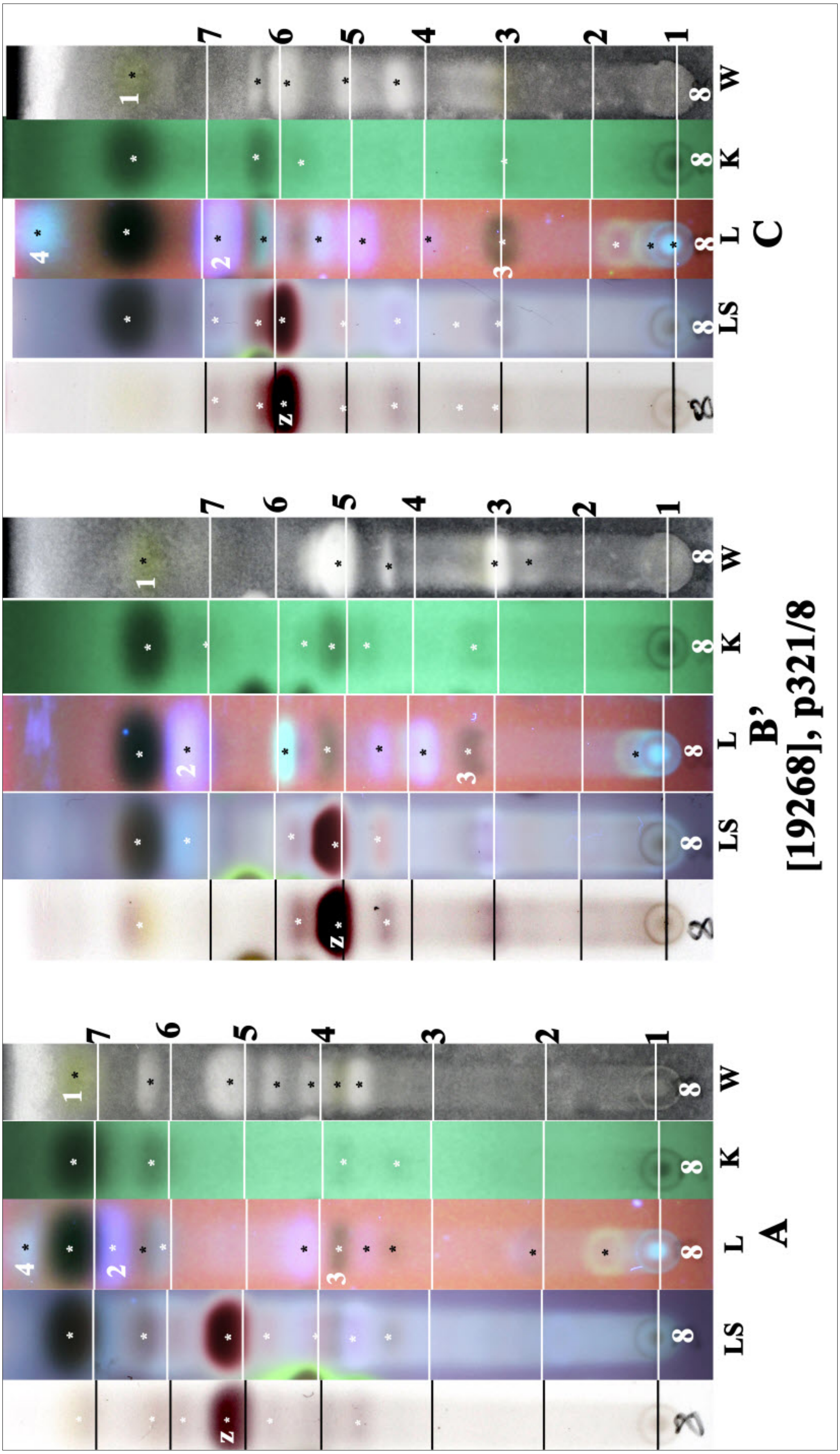
thamnolic acid



t: thamnolic acid, d: decarboxythamnolic acid

Thamnolia vermicularis, [19283], Australia, Victoria, Basalt Hill, Alpine National Park, Bogong High Plains, 20 km south-east of Mt. Beauty, 36°53' S, 147°18' E, 1650 m.

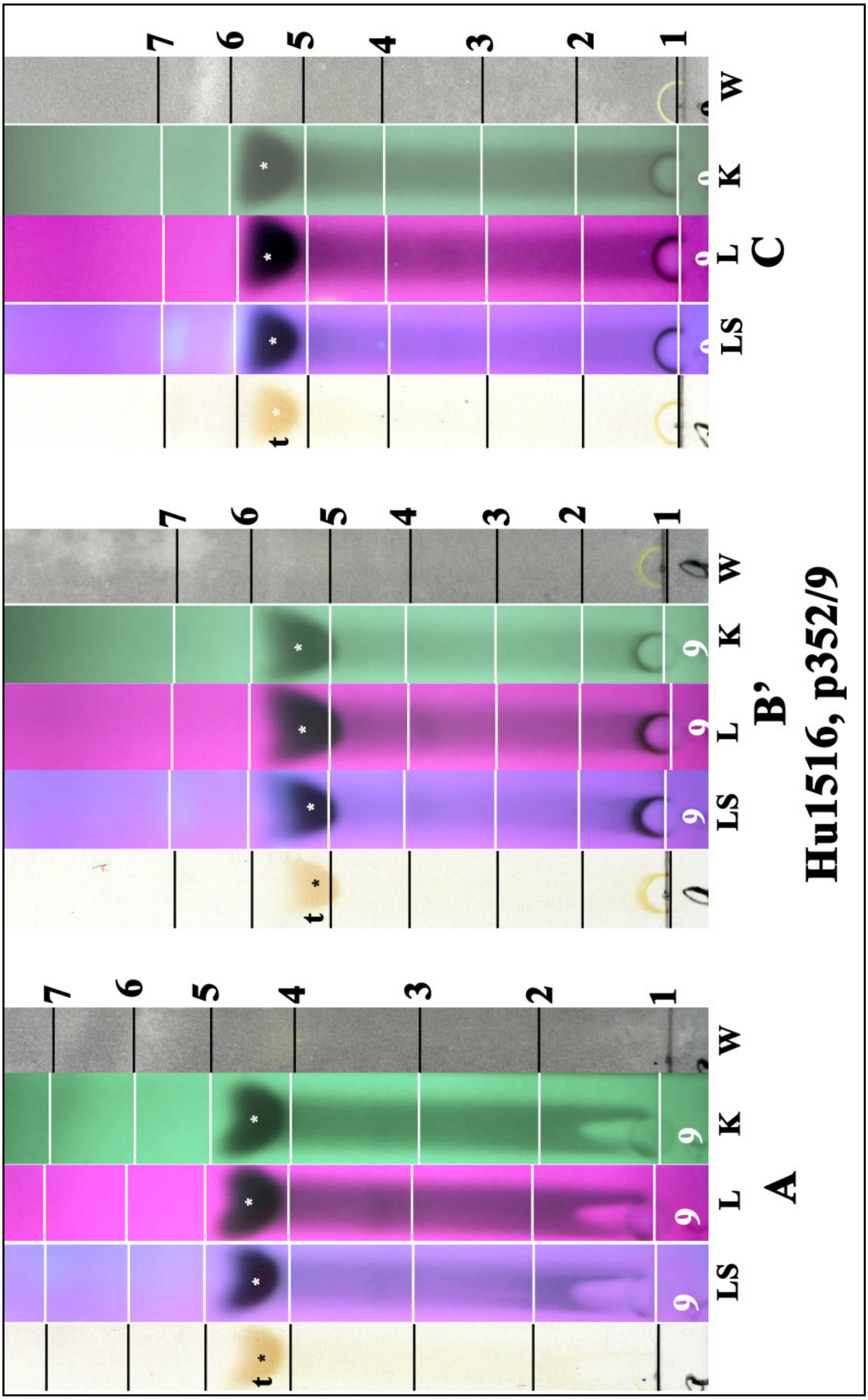
thiomelin



z: zeorin, **1: thiomelin (yellow pigment)**, 2: 5,7-dichloro-2,8-dihydroxy-1,3-dimethylxanthone, 3: unknown, 4: 5,7-dichloro-8-hydroxy-2-methoxy-1,3-dimethylxanthone

Rinodina thiomela, [19268], Australia, Australian Capital Territory, Mongolo Gorge Reserve, 15 km east of Canberra, 35°16' S, 149° 16' E, 650 m.

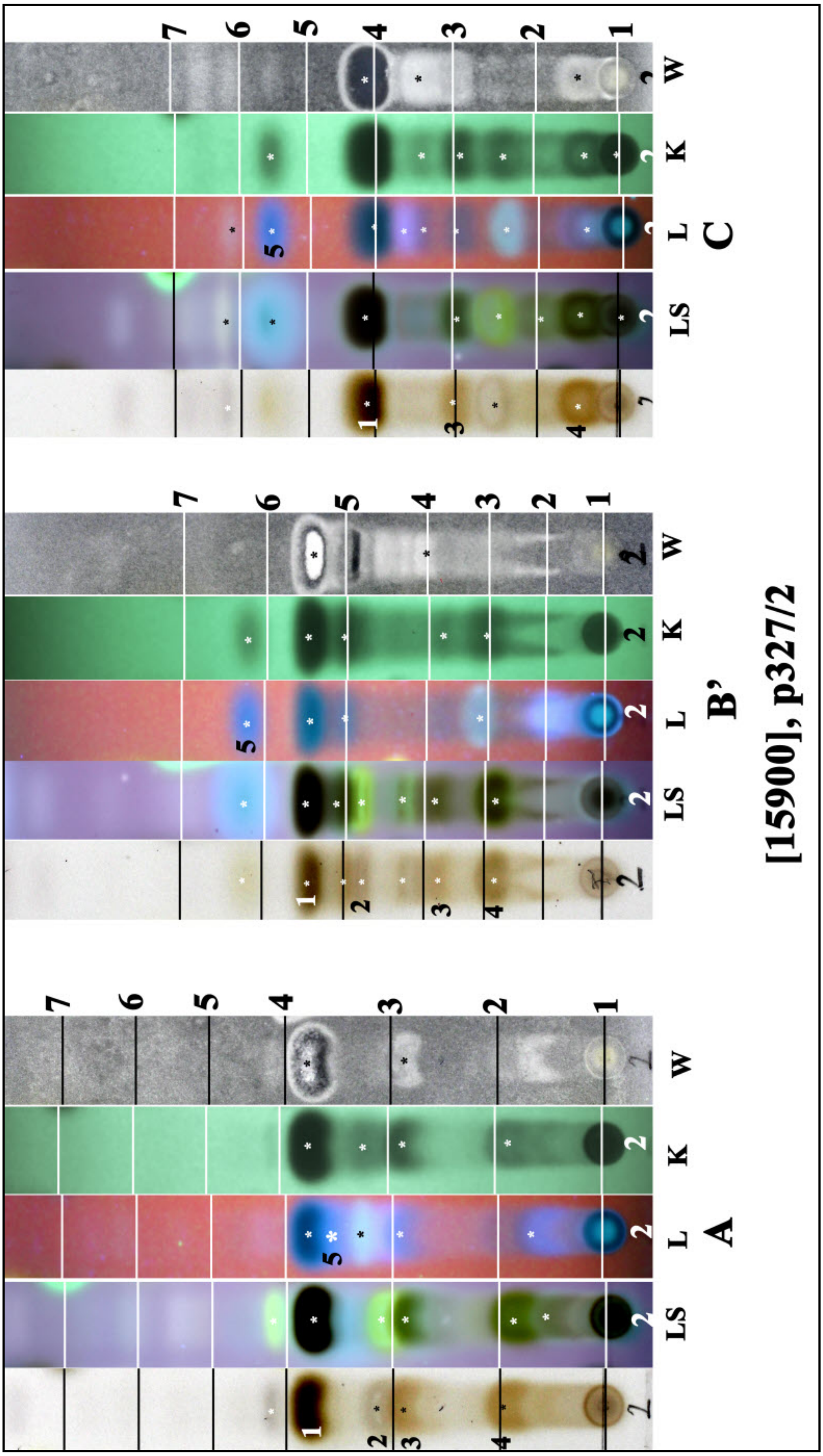
thiophanic acid



t: thiophanic acid, conf. J.A. Elix

S. Huneck's collection of lichen substances No 1516: thiophanic acid
Botanisches Museum Berlin-Dahlem

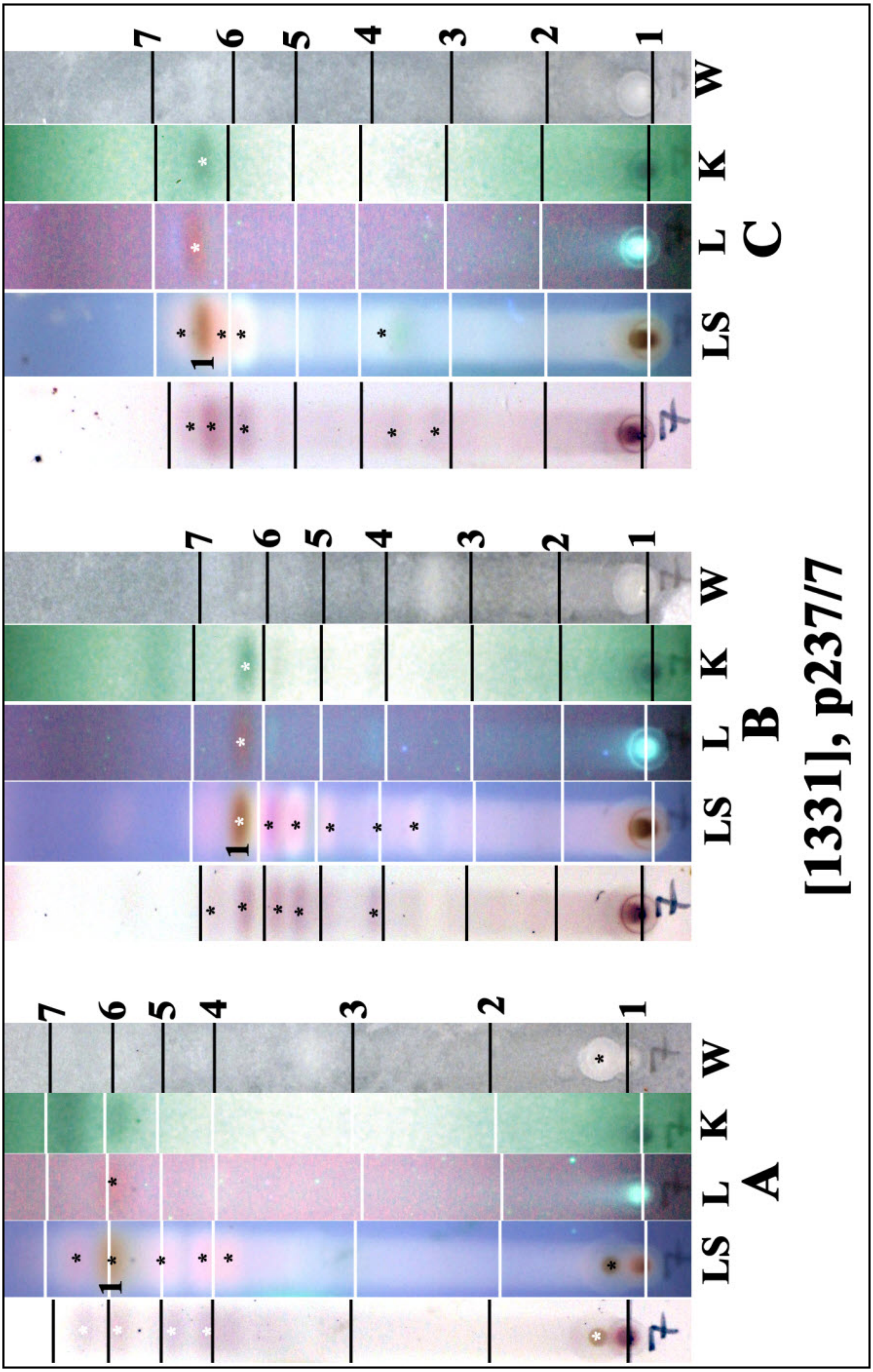
thiophanic acid



1: arthothelin, 3: 4,5-dichloronorlichexanthone, **5: thiophanic acid**, 2,4: unknown.

Calicium tricolor, [15900], Australia, Western Australia, north of Nornalup, Valley of the Giants, 34.970° S, 116.894° E, 177 m, growing on bark of *Eucalyptus*. Leg. F. Schumm & E. Stocker-Wörgötter, 26.10.2009.

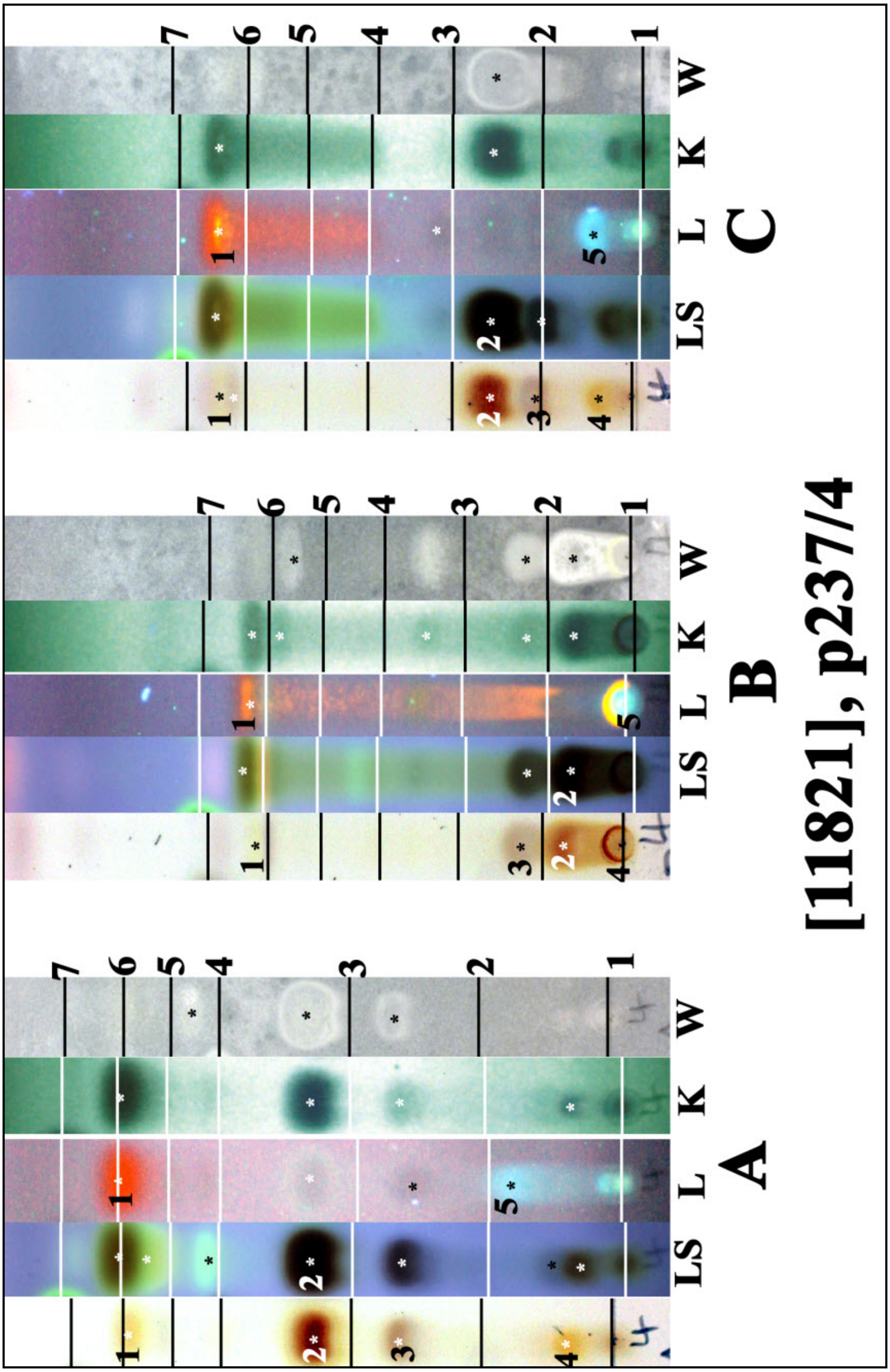
thiophaninic acid



1: thiophaninic acid, minor spots are due to terpenes in the *Fagus* bark, conf. J.A. Elix

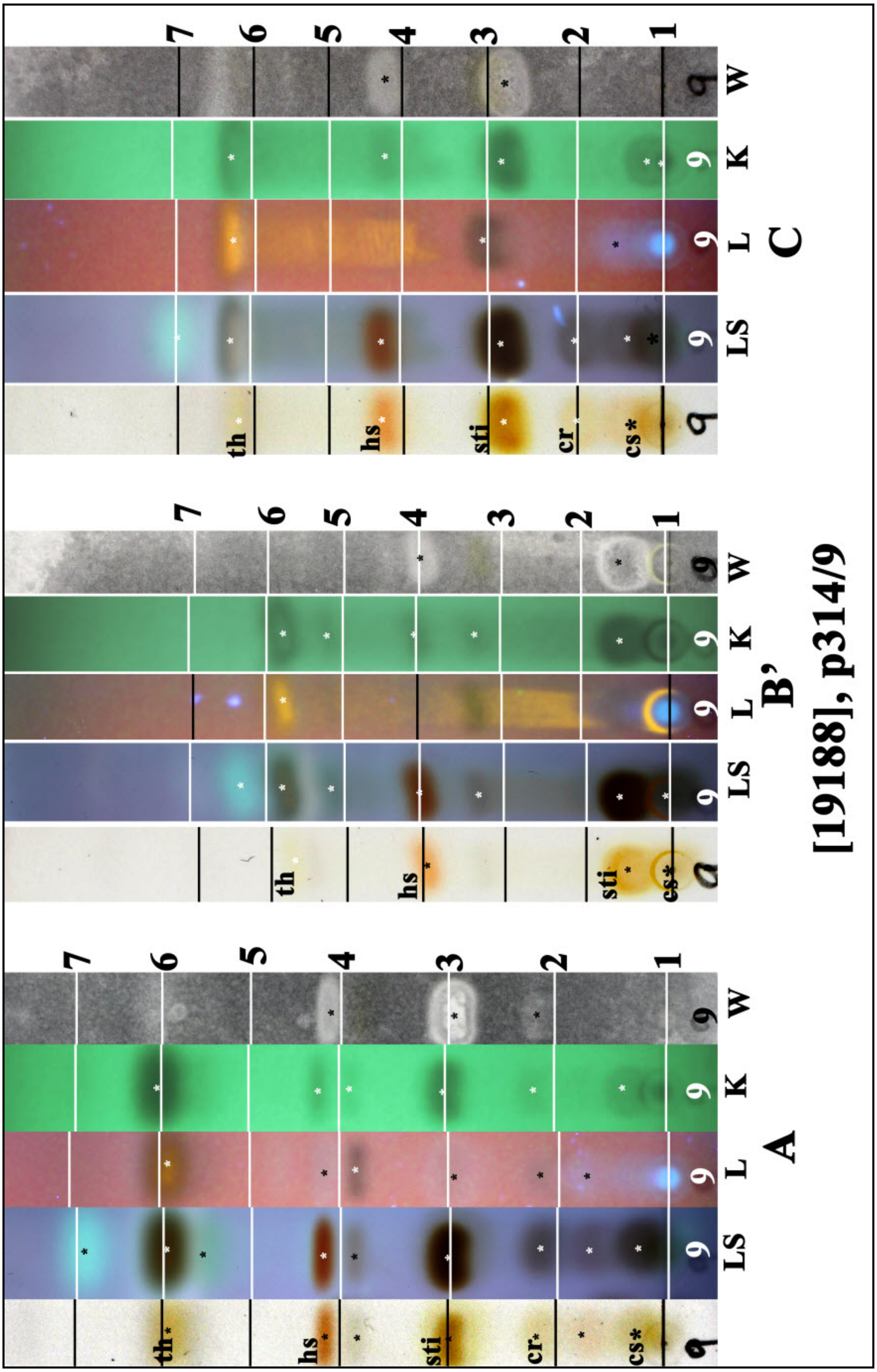
Pertusaria hymenea ,[1331], Frankreich, Korsika, Lichenes Corsicani, Distr. Vizzavona, inter Col de Vizzavona et Vizzavona, ca. 1100 m. Fagicola. Leg. J. Lambinon & A. Vezda 2.07.1969, det. A.Vezda.

thiophaninic acid



Pertusaria flavicunda, [11821], Mexico, Baja California, Guadalupe Island, east-facing rocky outcrops in grassland S of the east end of runway and E of the south peak, on basalt, 29°00'30" N, 118°15'20" W, 750 m. Leg. et det. T.H. Nash III 04. Jan. 1996 (Nr. 38508).

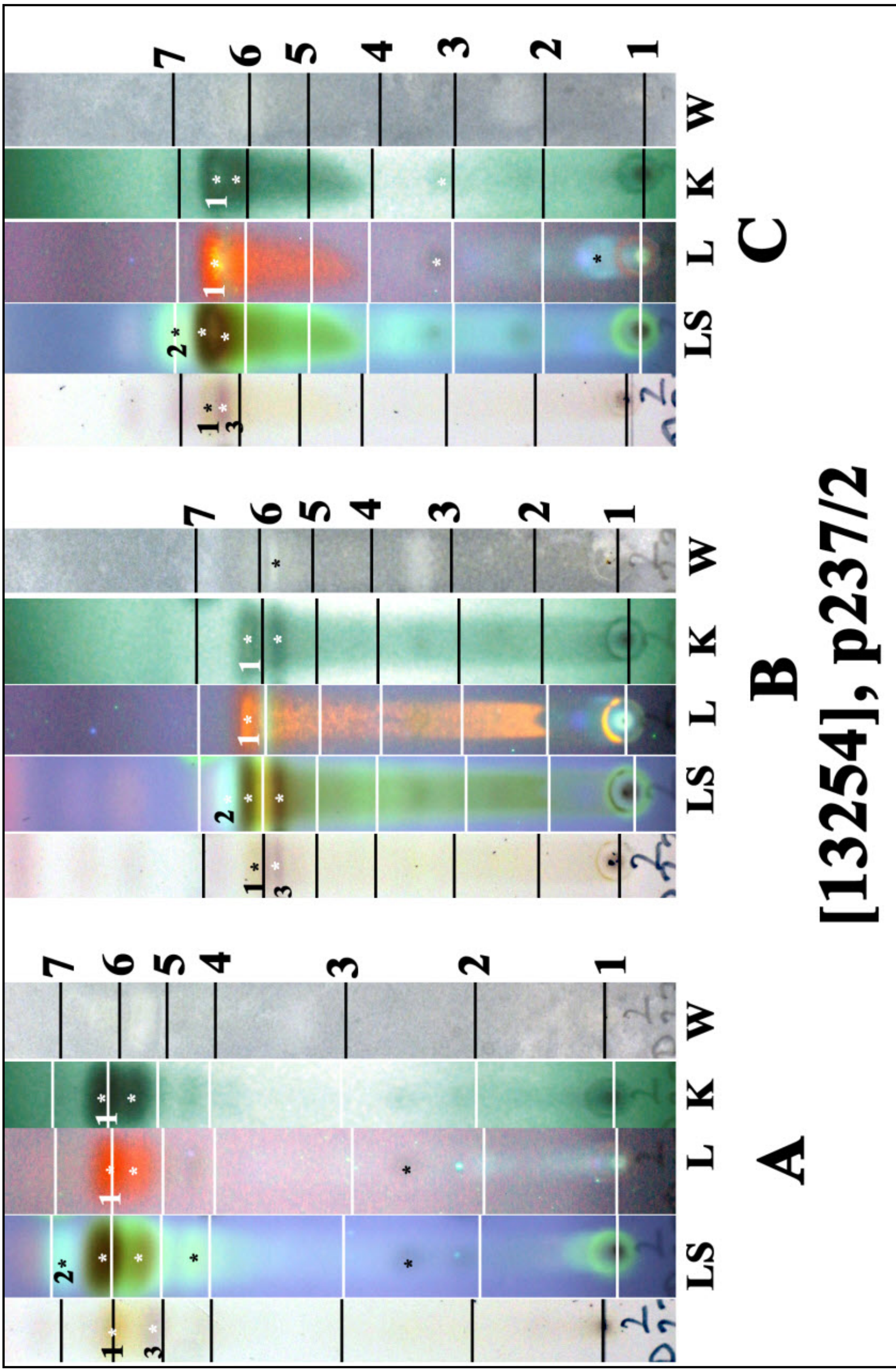
thiophaninic acid



th: thiophaninic acid, sti: stictic acid, hs: hypostictic acid, cr: cryptostictic acid, cs: constictic acid.

Pertusaria remota, [19188], Australia, Western Australia, Kununurra - Timber Creek Highway, 25 km south-east of Kununurra, 15°54' S, 128°56' E, 100 m.

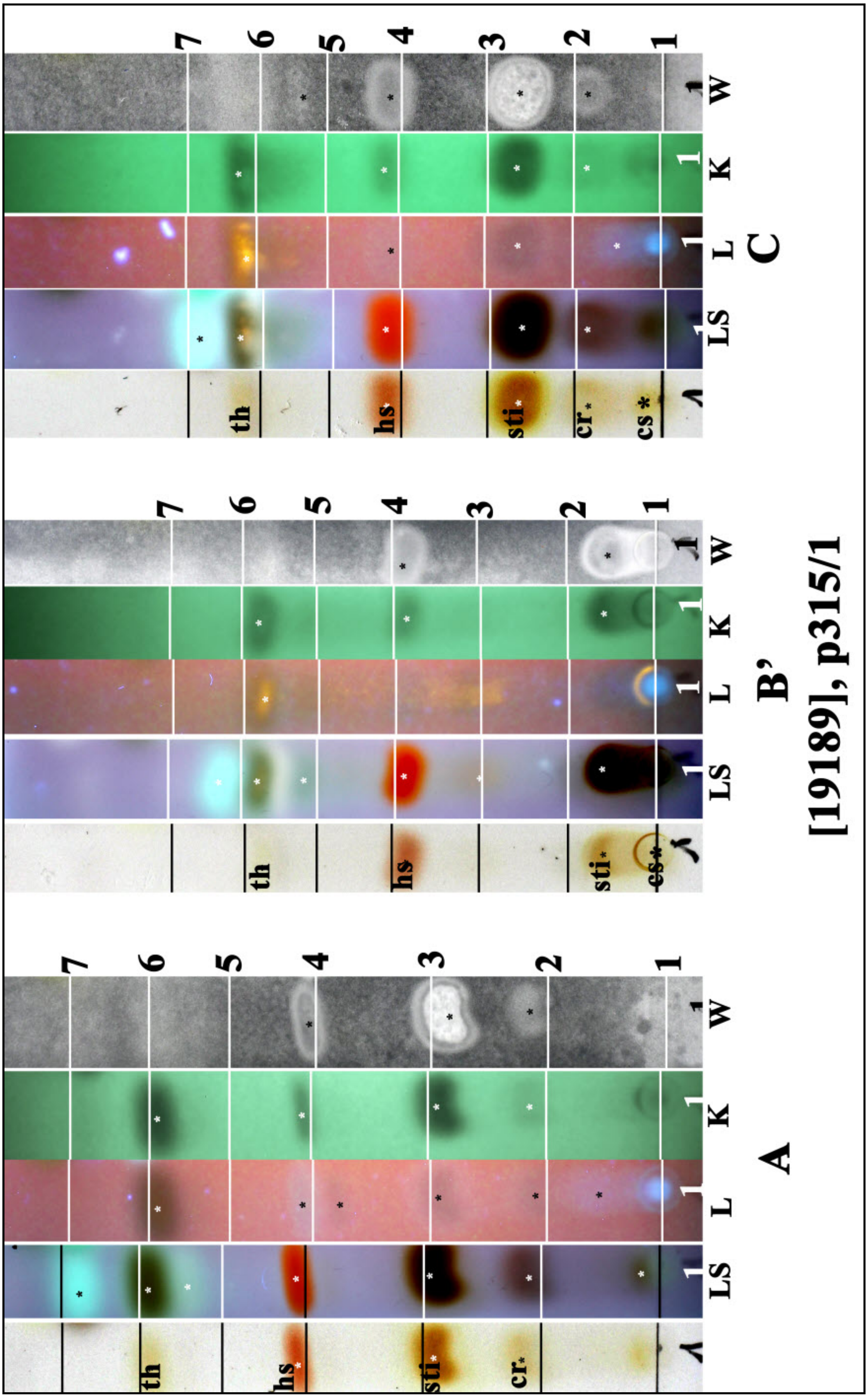
thiophaninic acid



1: thiophaninic acid, 2: lichexanthone, 3: 2-chloro-6-O-methylnorlichexanthone OR 4-chloro-6-O methylnorlichexanthone, conf. J.A. Elix

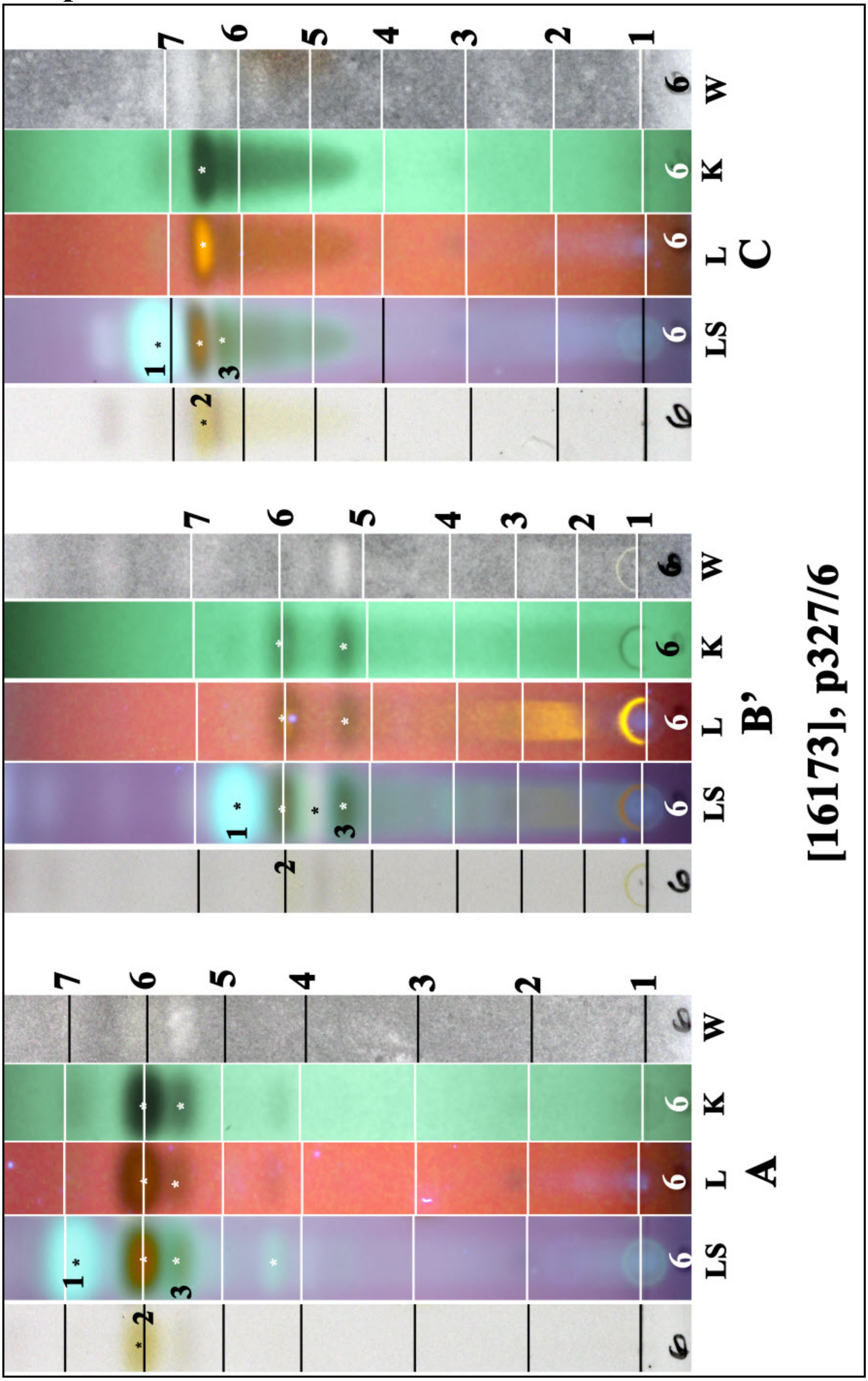
Pertusaria flavida, [13254], Germany, Baden-Württemberg, Kreis Göppingen, südwestlich Oberberken, Abzweigung zur Triebhütte an der Beckenschlagstr. nach Baiereck, an Querkus am Waldrand, ca. 500 m, TK 7223. Leg. et det. F. Schumm, 29.7.2007.

thiophaninic acid



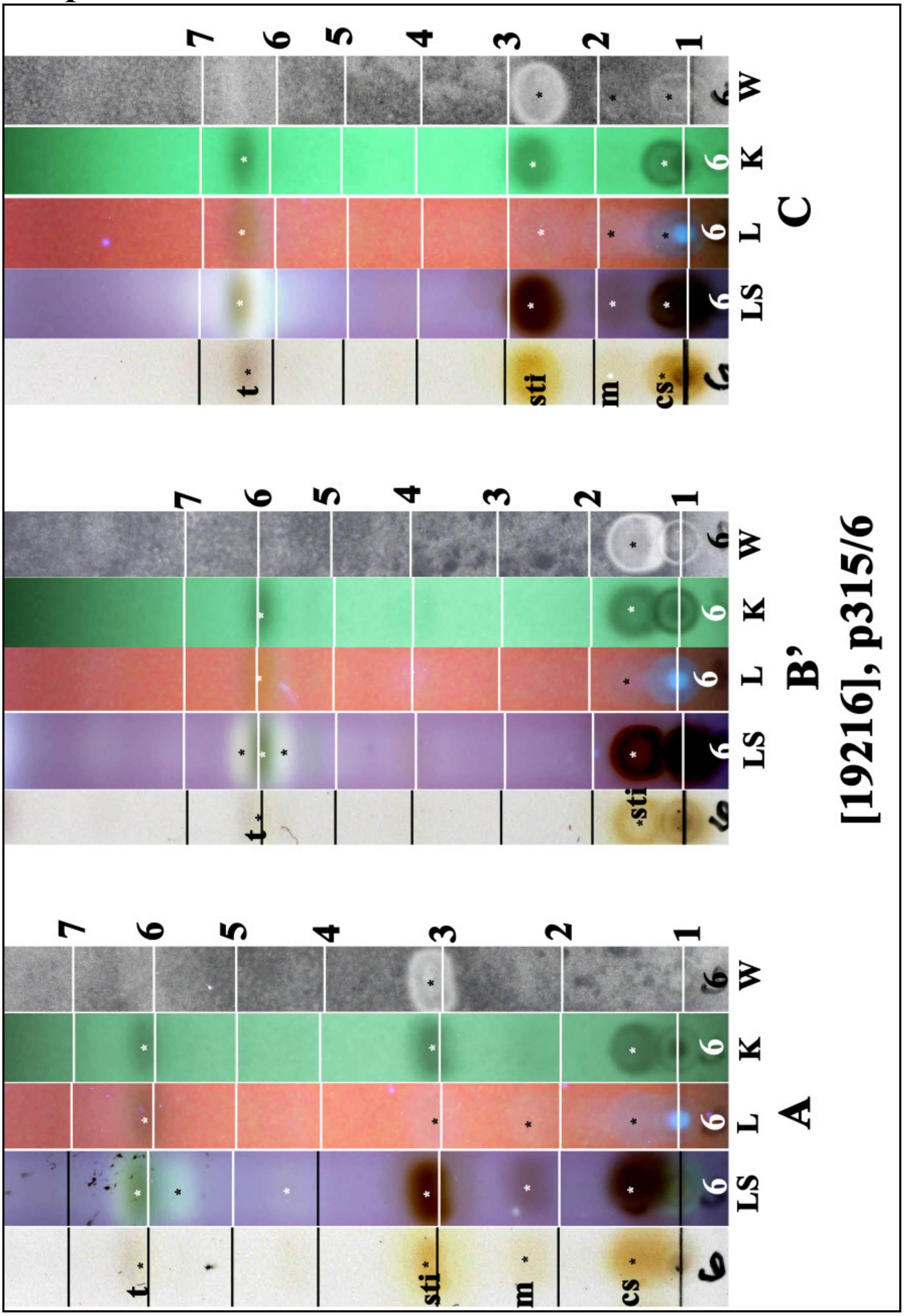
Pertusaria remota, [19189], Australia, Northern Territory, Jasper Gorge, Victoria River Downs Road, 52 km south-east of Timber Creek, 16°02' S, 130°46' E, 140 m, growing on semi-shaded rock faces.

thiophaninic acid



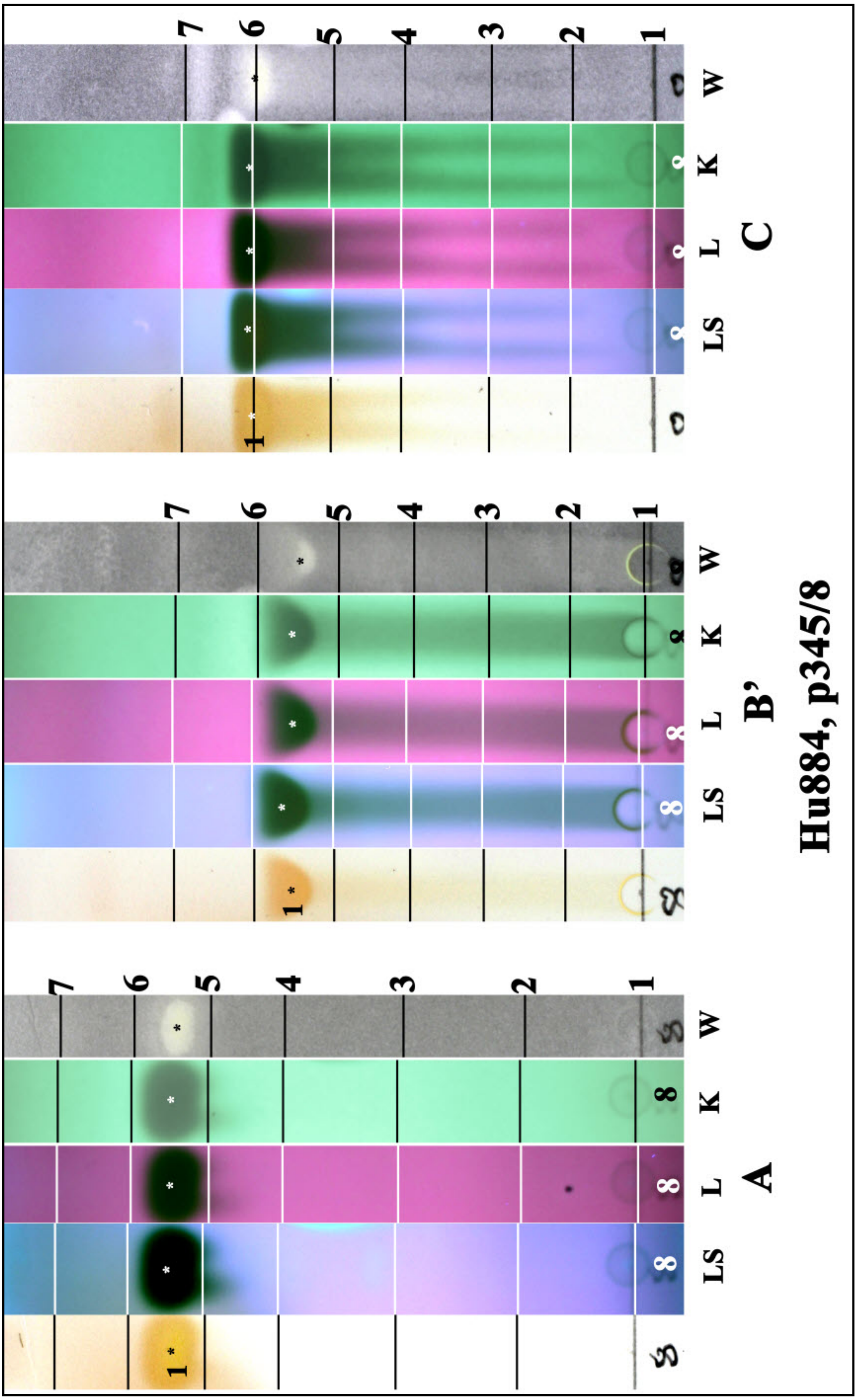
Pertusaria xanthoplaca, [16173], Australia, New South Wales, Tomakin, rocks near the sea, 35.830° S, 150.20554° E, 0 m. Leg. F. Schumm & E. Stocker-Wörgötter, 10.11.2009.

thiophaninic acid



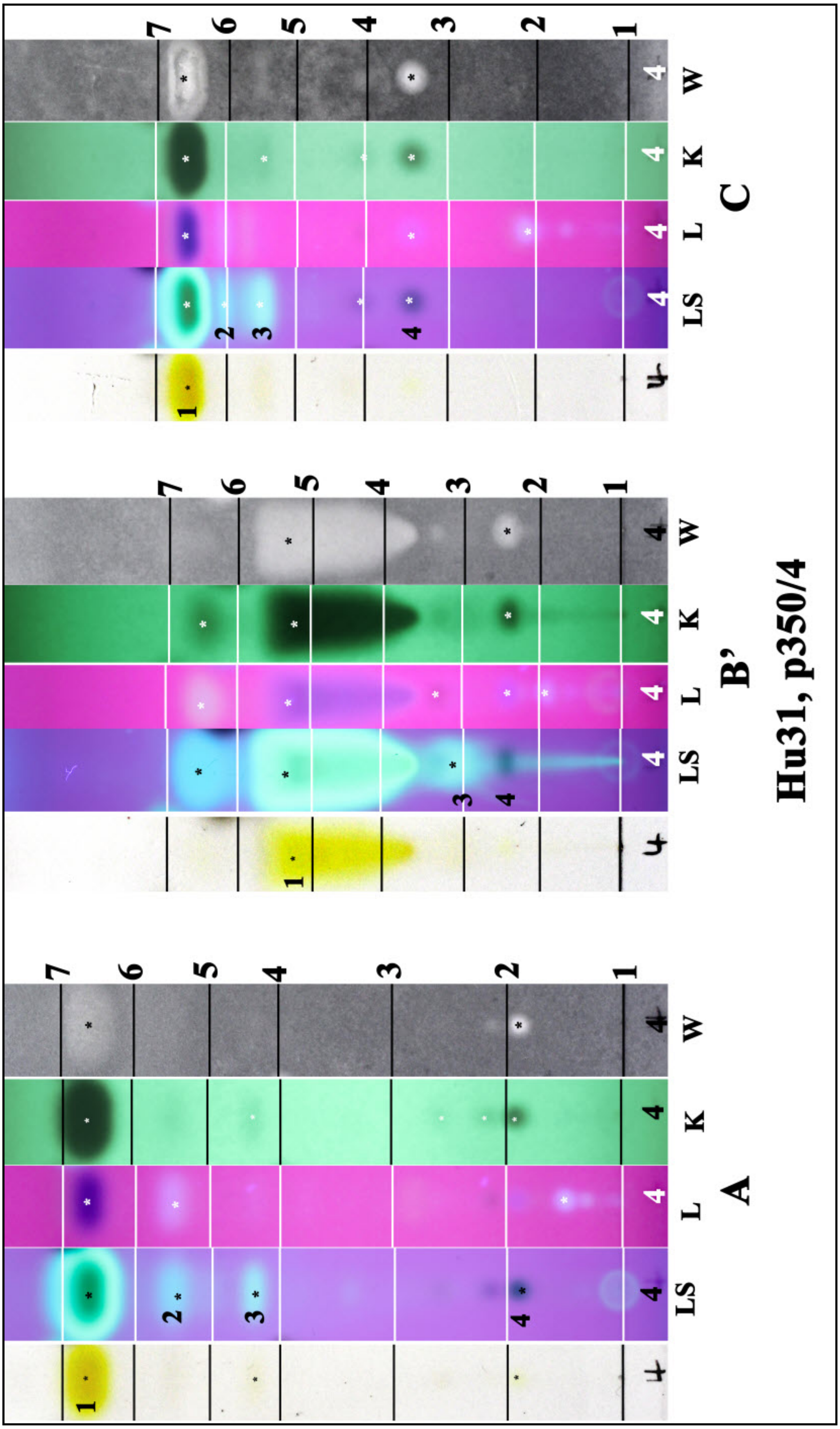
Pertusaria thiospoda, [19216], Australia, New South Wales, Hawkesbury River, ca. 1 km north of Spencer, 47 km north-north-west of Sydney, 33°27' S, 151°08' E, sea level.

thuringione
(= 2,4,5-trichloro-3-*O*-methylnorlichexanthone)



S. Huneck's collection of lichen substances No 884: thuringione
Botanisches Museum Berlin-Dahlem

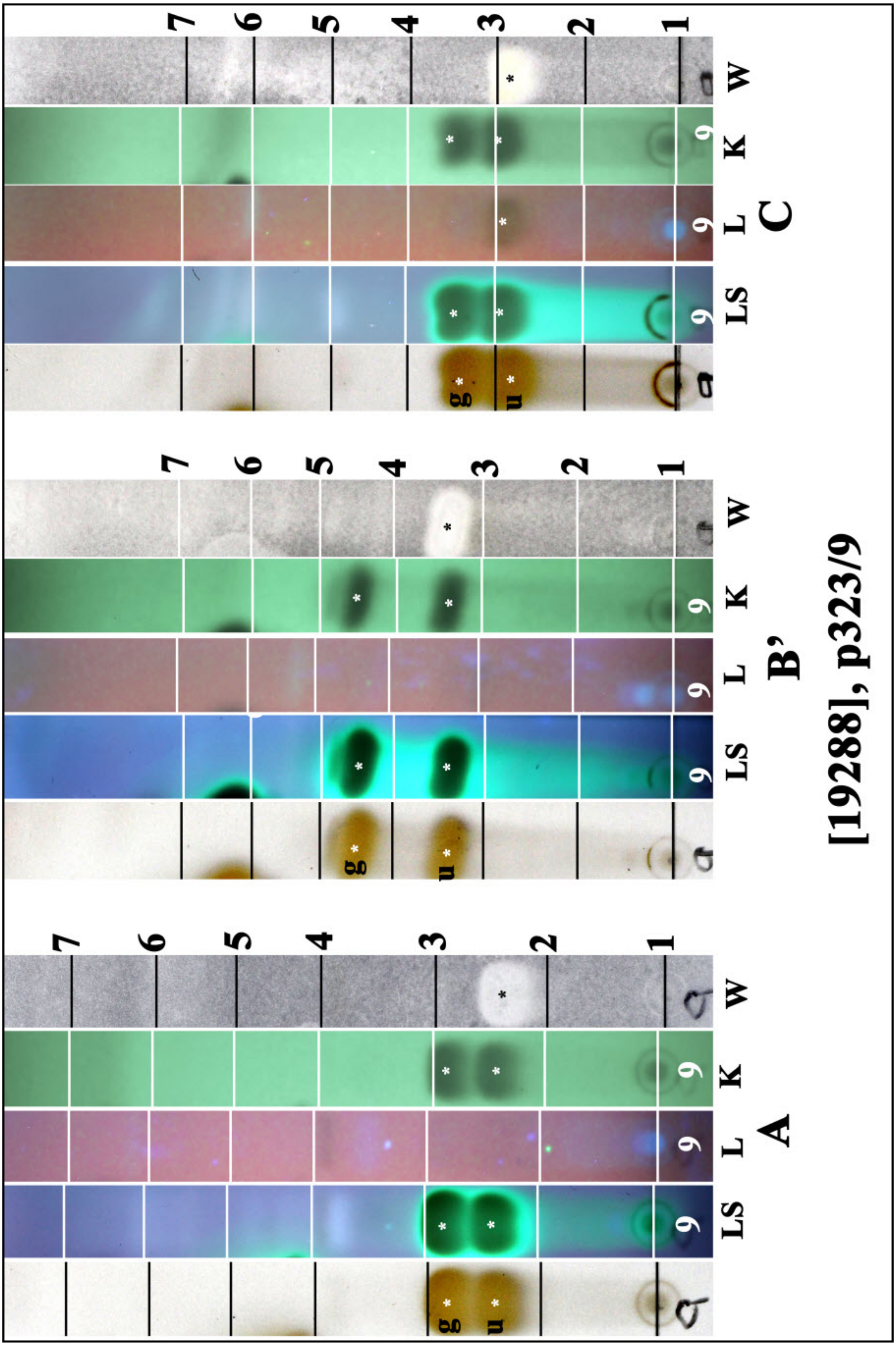
thuringione
(= 2,4,5-trichloro-3-*O*-methylnorlichexanthone)



1: thuringione (= 2,4,5-trichloro-3-*O*-methylnorlichexanthone), 2,3,4: unknown, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 31: 2,4,5-trichloro-3-*O*-methylnorlichexanthone. Botanisches Museum Berlin-Dahlem

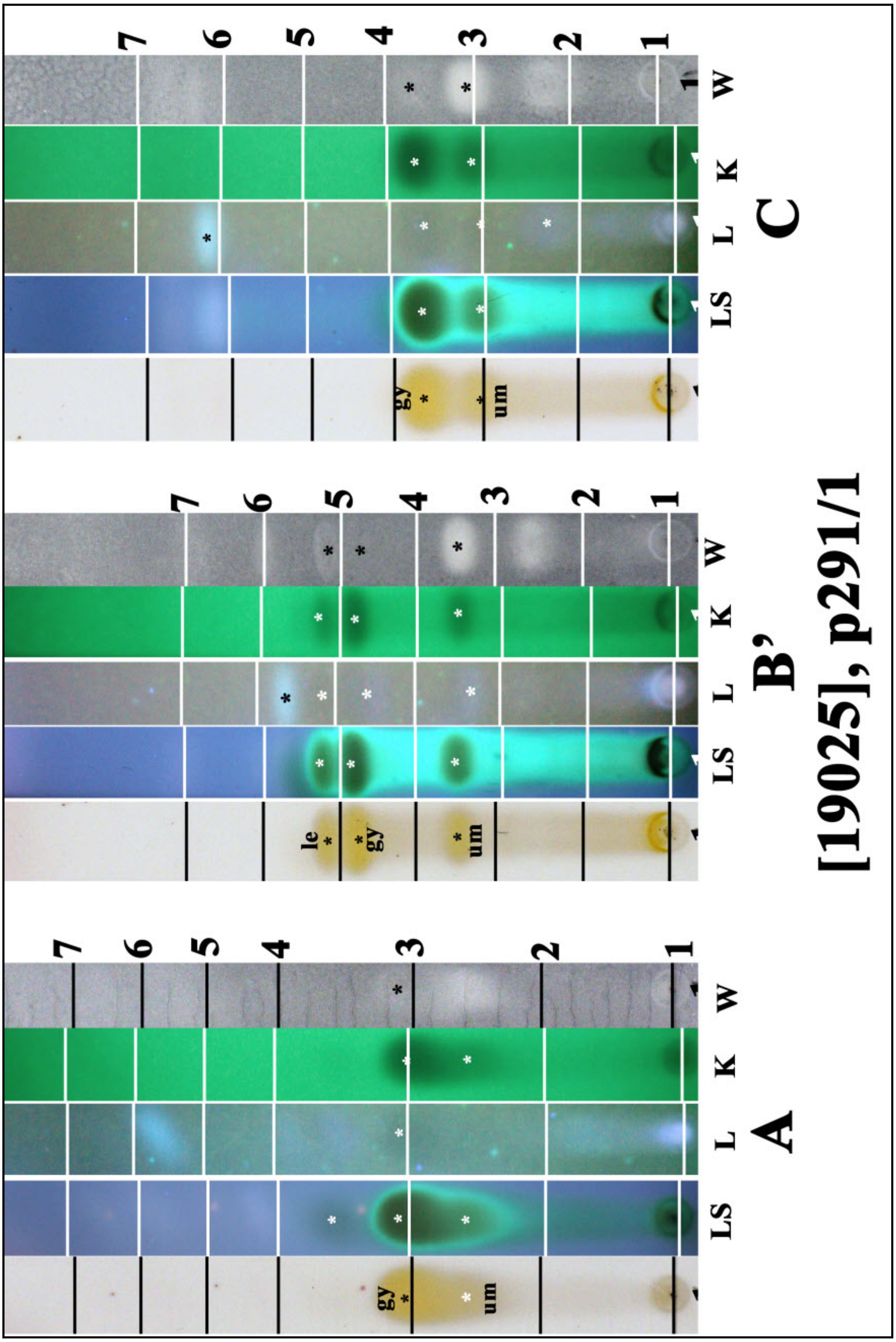
umbilicaric acid



g: gyrophoric acid, **u: umbilicaric acid**

Umbilicaria hyperborea, [19288], Australia, Victoria, Mt. McKay, Alpine National Park, Bogong High Plains, 16 km south-east of Mt. Beauty, 36°52' S, 147°14' E, 1840 m.

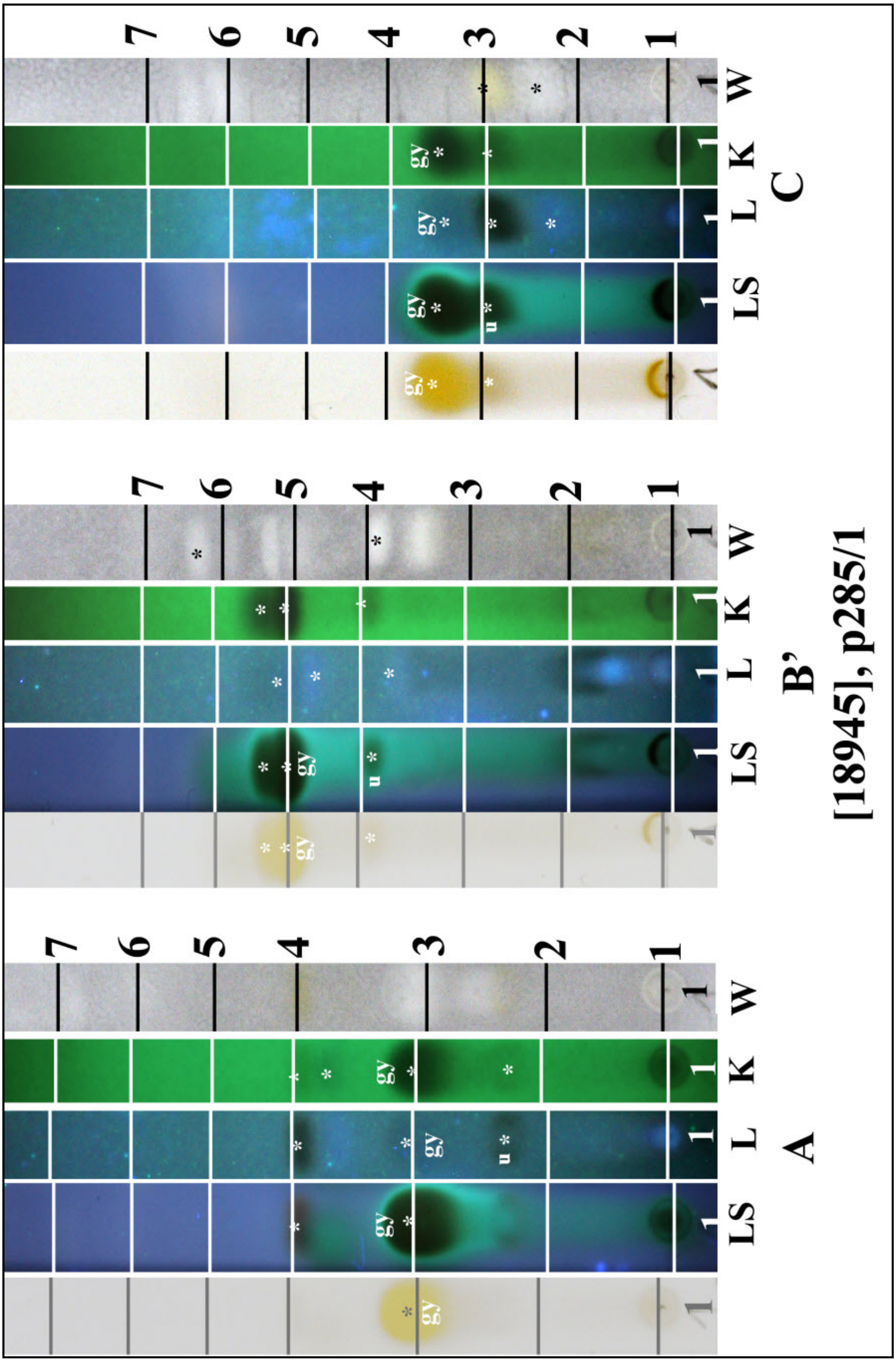
umbilicaric acid



gy: gyrophoric acid (major); **um: umbilicaric acid** (minor); le: lecanoric acid (minor) in A/C with gy

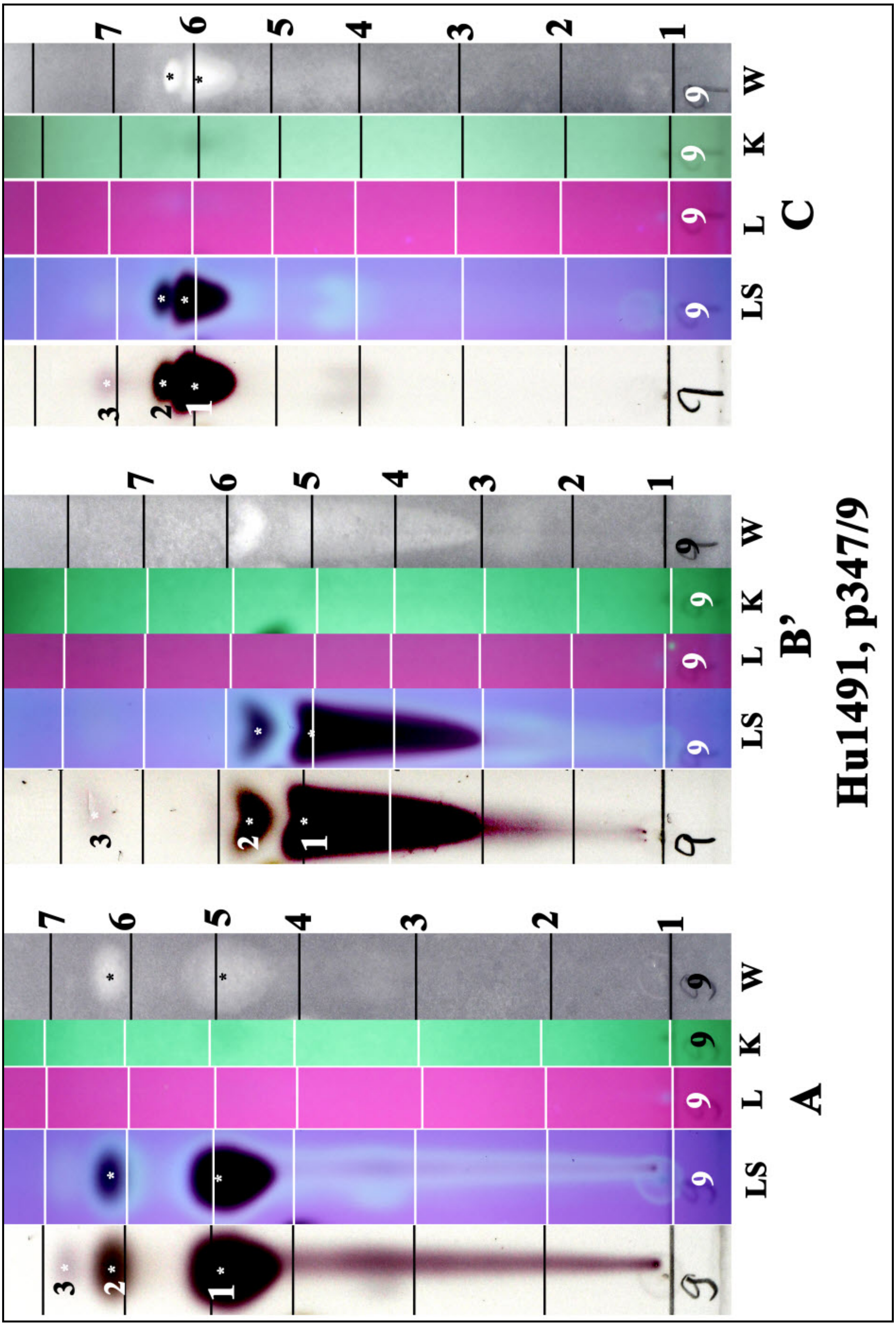
Umbilicaria nylanderiana, Germany, Niedersachsen, Nationalpark Harz, Gebirgskamm "Auf dem Acker", Kanapeeklippe, auf Quarzit, ca. 750 m. Leg. Hans Ullrich 12.06.1960.

umbilicaric acid



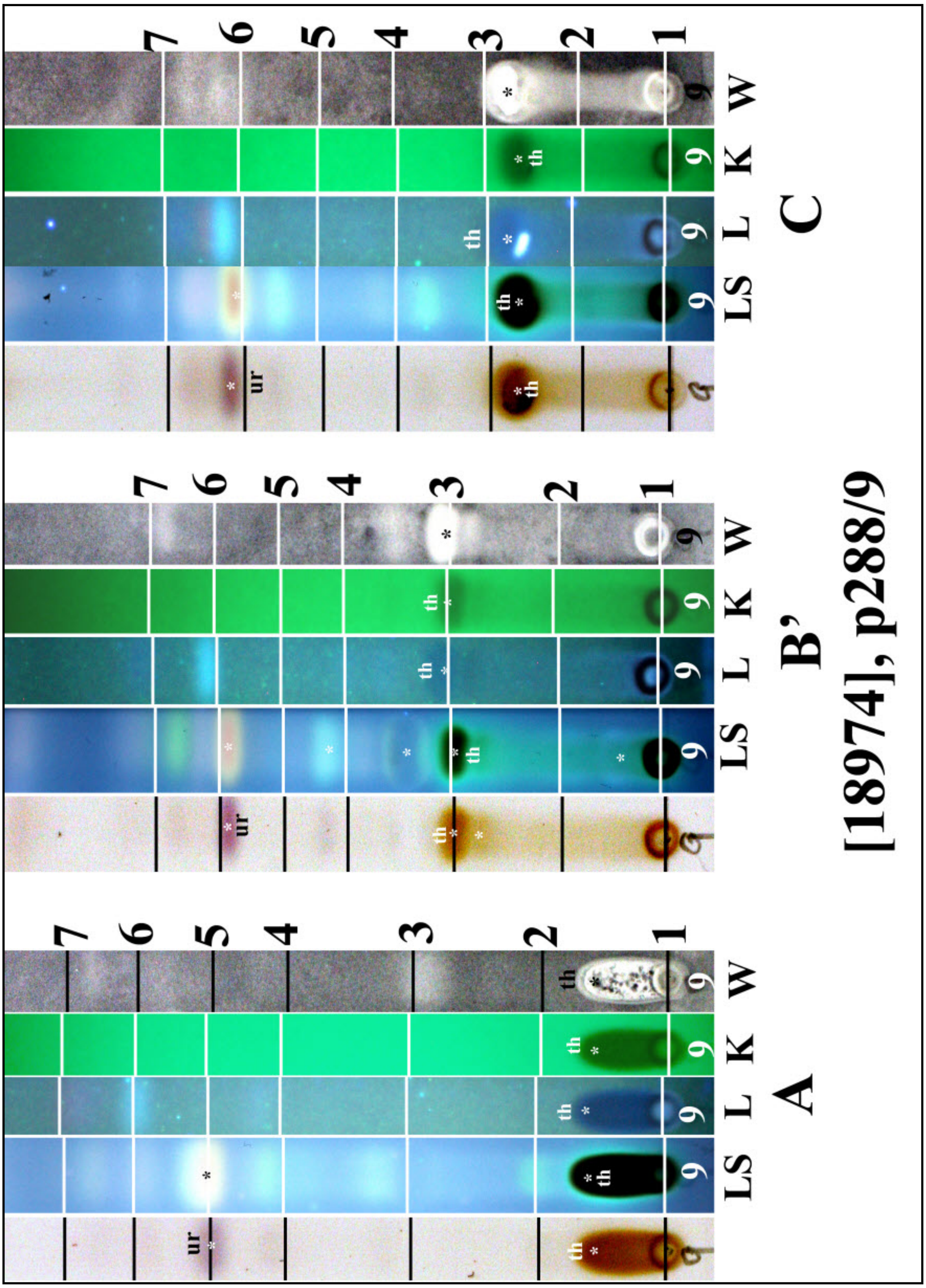
Umbilicaria subglabra [18945], Australia, Australian Capital Territory

ursolic acid



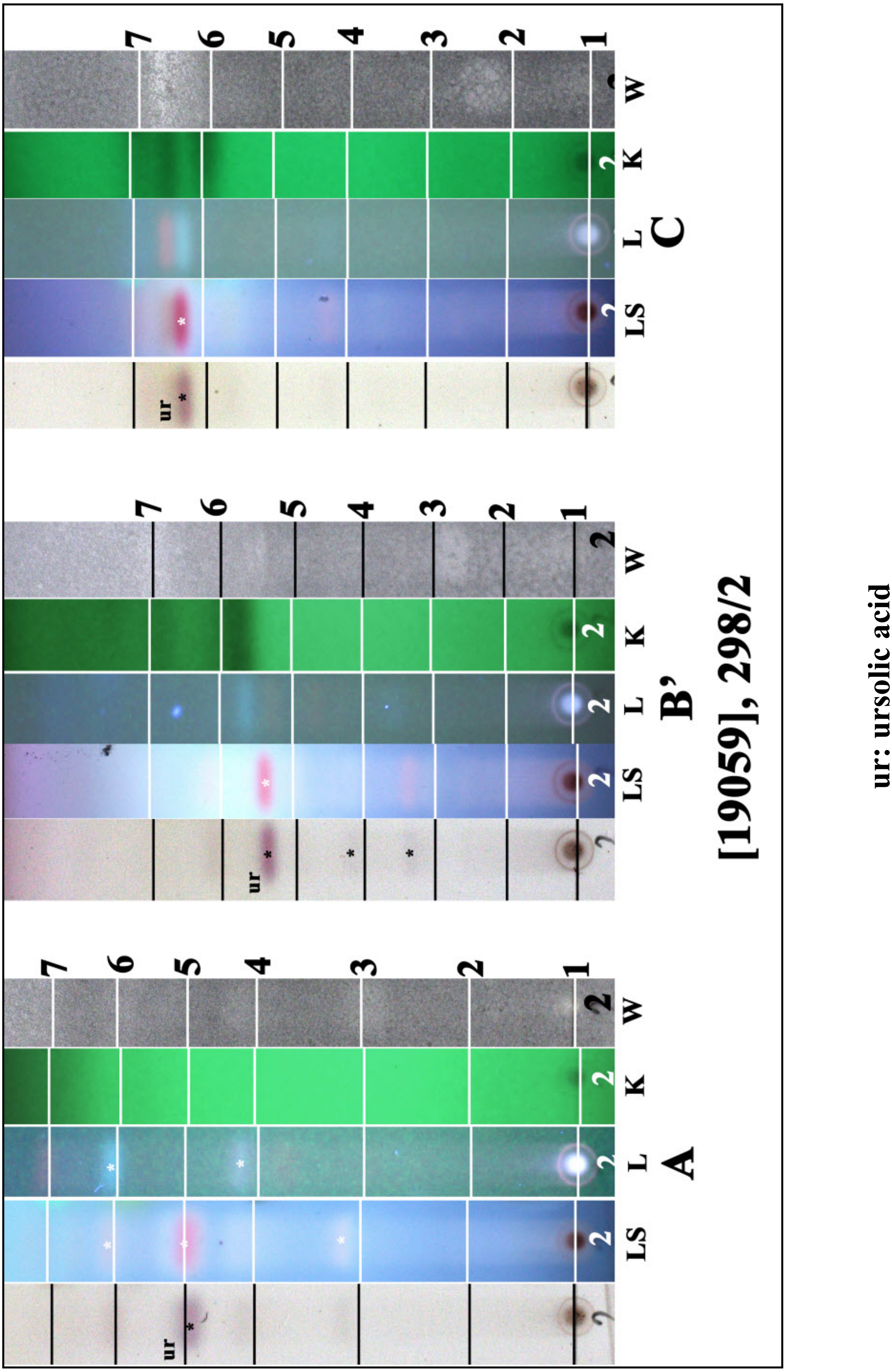
1: ursolic acid, 2,3: unknown, conf. J.A. Elix
S. Huneck's collection of lichen substances No 1491: ursolic acid.
Botanisches Museum Berlin-Dahlem

ursolic acid



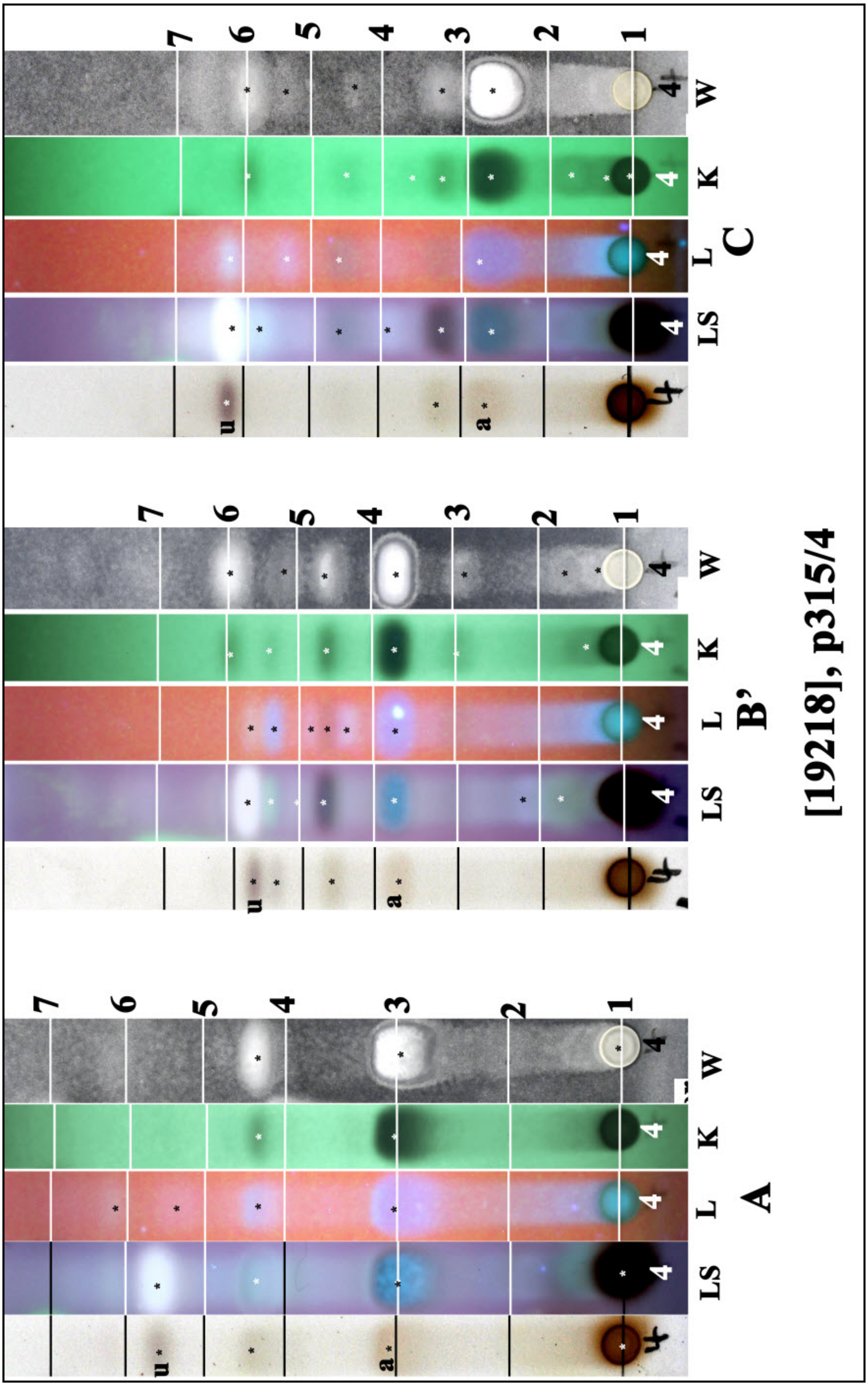
Cladonia rigida, [18974], Australia, New South Wales, Great Dividing Range, Tuena.Binda road, 30 km north-west of Crookwell.

ursolic acid



Leioderma duplicatum, [19059], Australia, New South Wales, Coal Mine Falls, Morton National Park, 2.5 km south-south-east of Bundanoon.

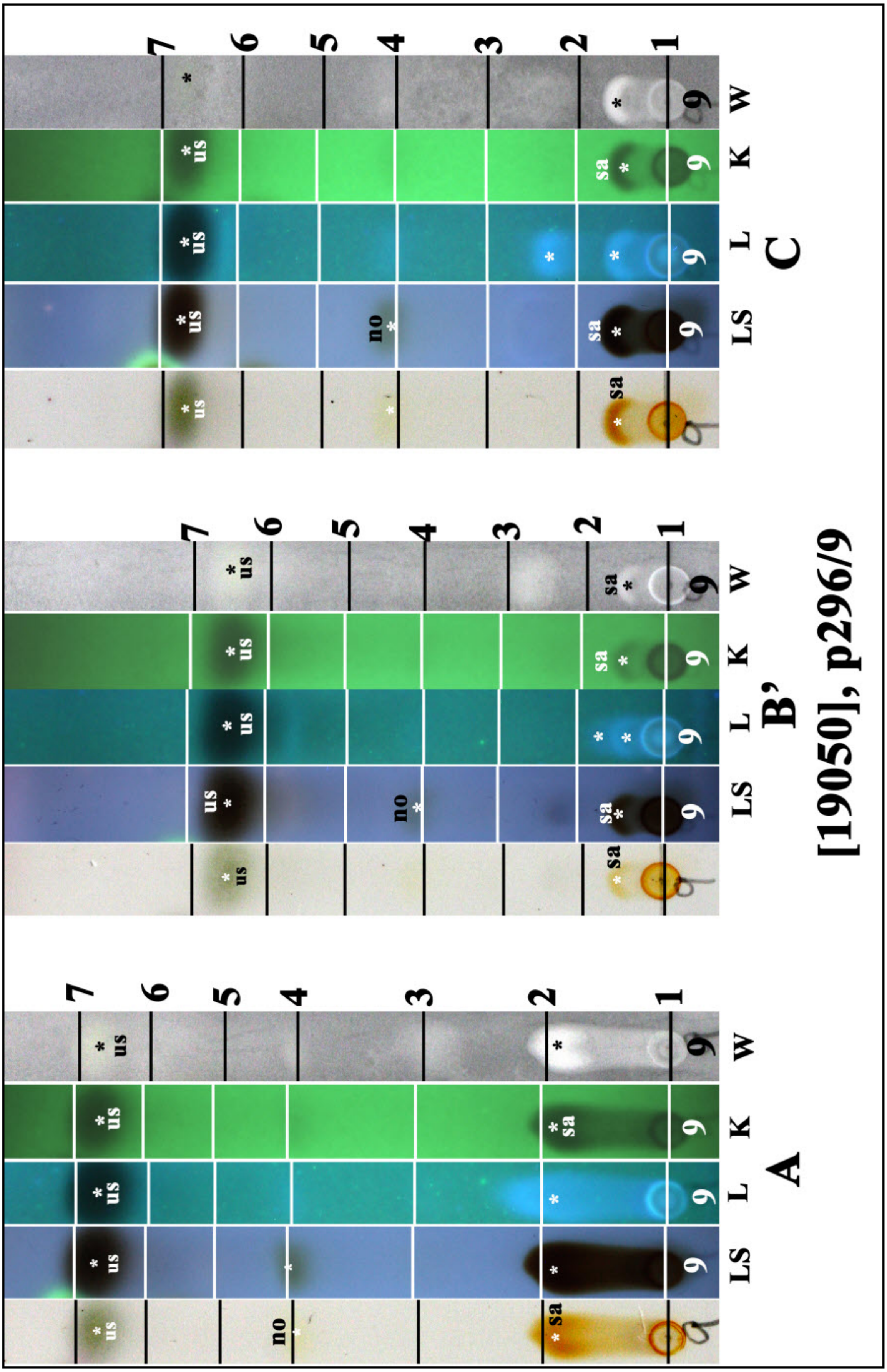
ursolic acid



u: ursolic acid, a: alectoronic acid

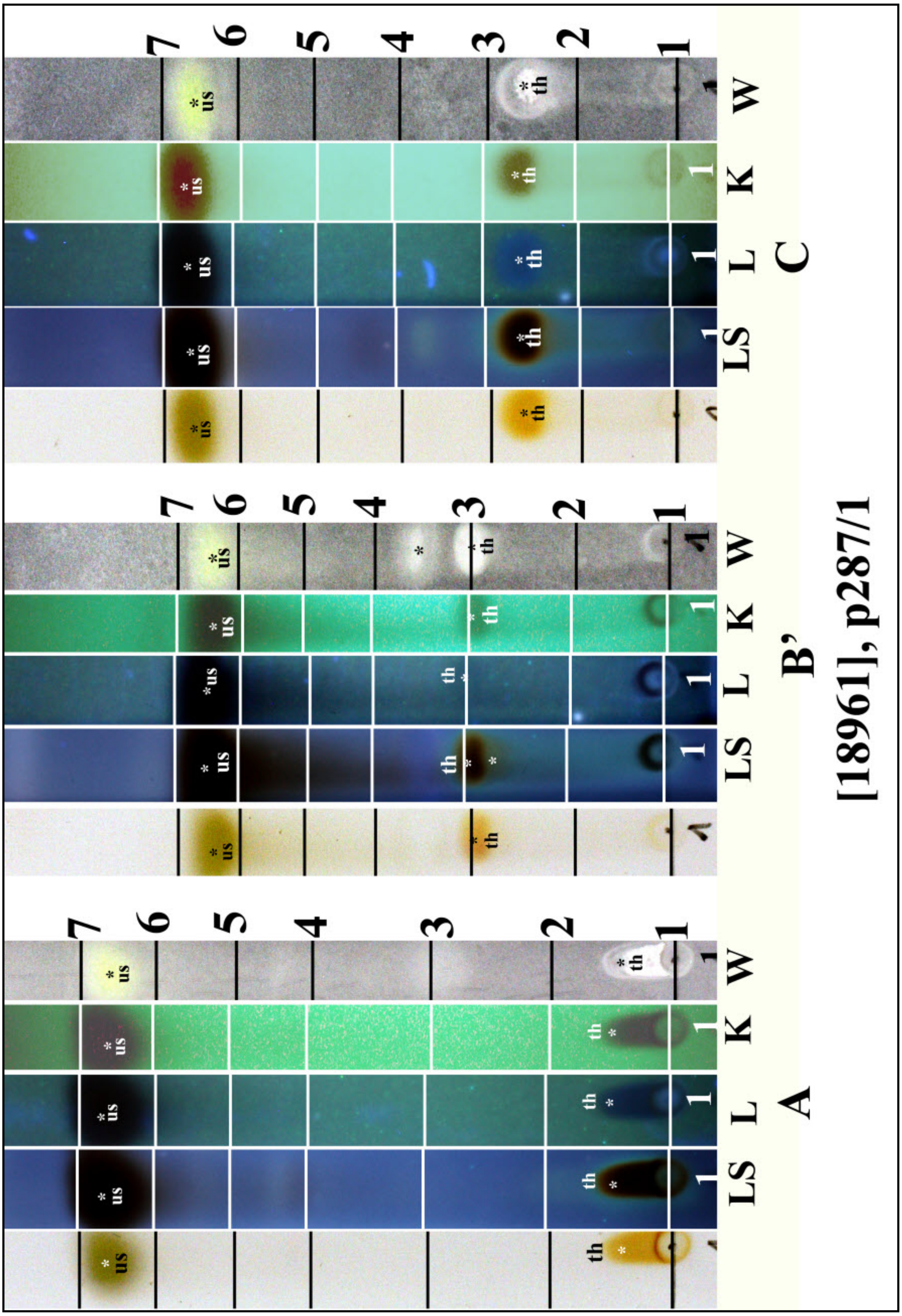
Ochrolechia xanthostoma, [19218], New Zealand, South Island, Canterbury, Porters Pass, south-west slopes of Foggy Peak, Torlesse Range.

usnic acid



Hypotrachyna sinuosa, [19050], New Zealand, North Island, Wellington, Tongario National Park

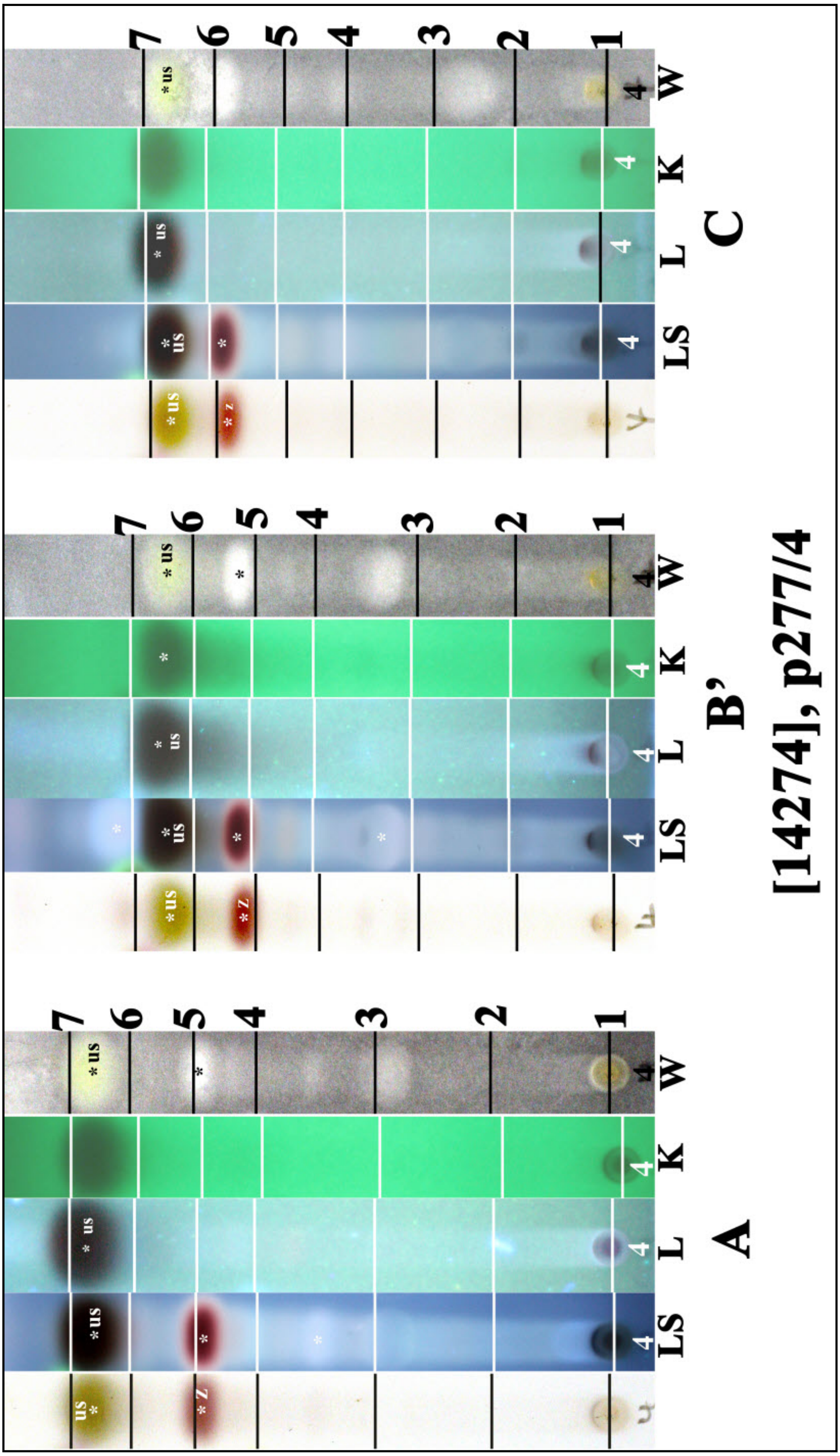
usnic acid



us: usnic acid, th: thamnolic acid

Cladonia capitellata var ***capitellata,*** [18961], New Zealand, South Island, Canterbury, SW slopes of Foggy Peak.

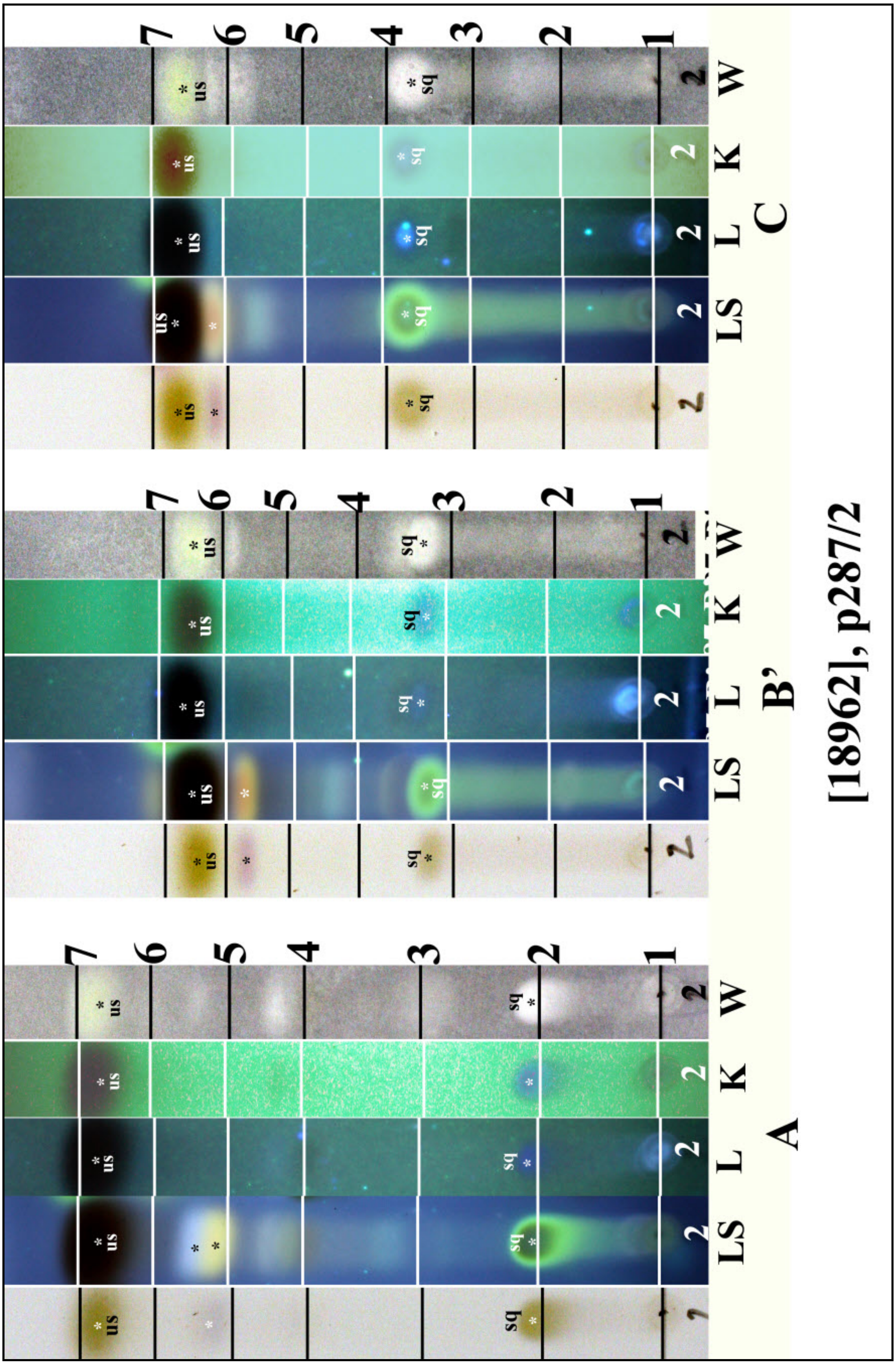
usnic acid



us: usnic acid, z: zeorin

Cladonia coccifera, [14274], Portugal, Azoren, W-Terceira, Serra do Cume, 38°42.417' N, 27°6.581' W, 500-550 m. Leg. Aptroot & Schumm 11.07.2008.

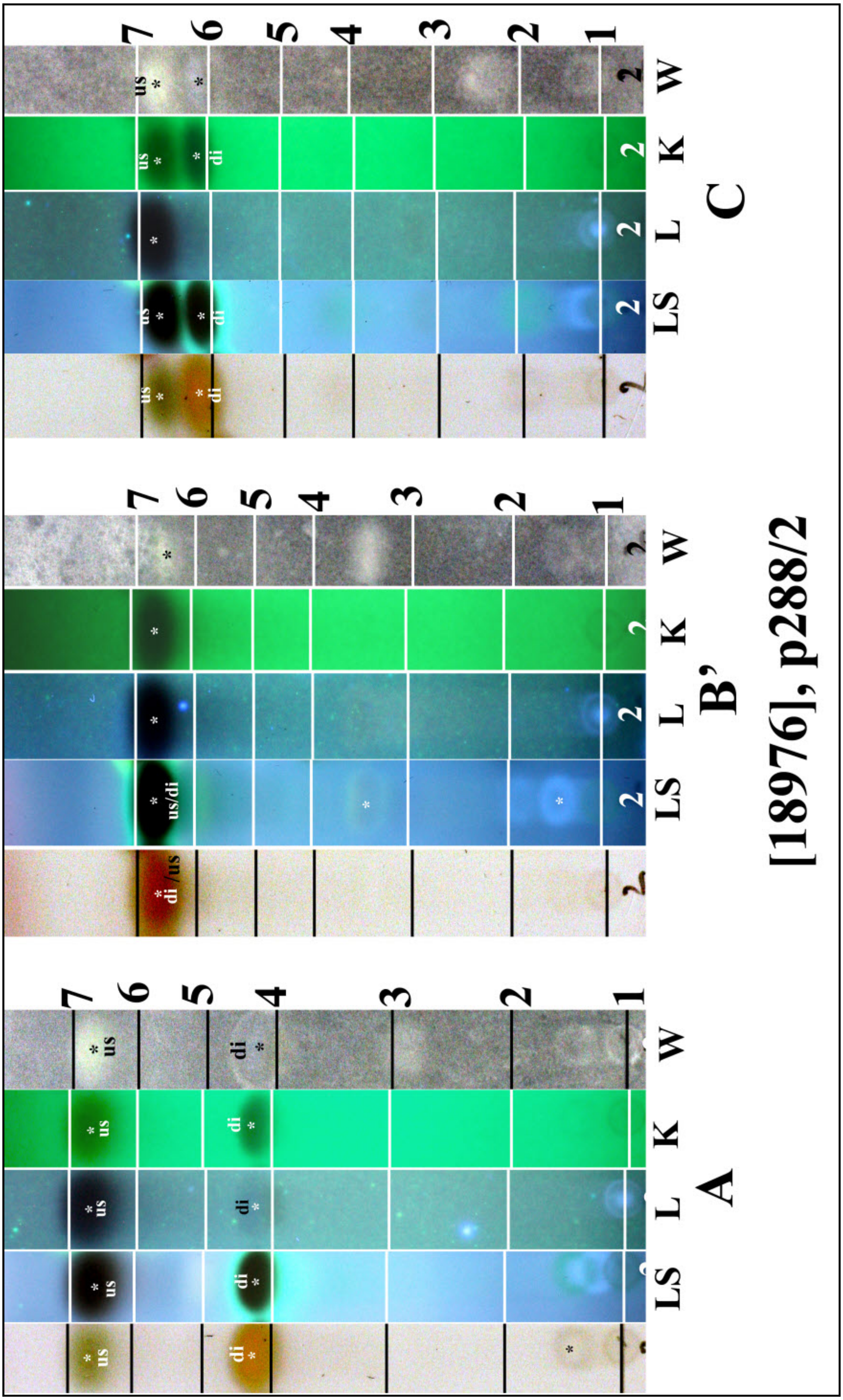
usnic acid



us: usnic acid, sq: squamatic acid

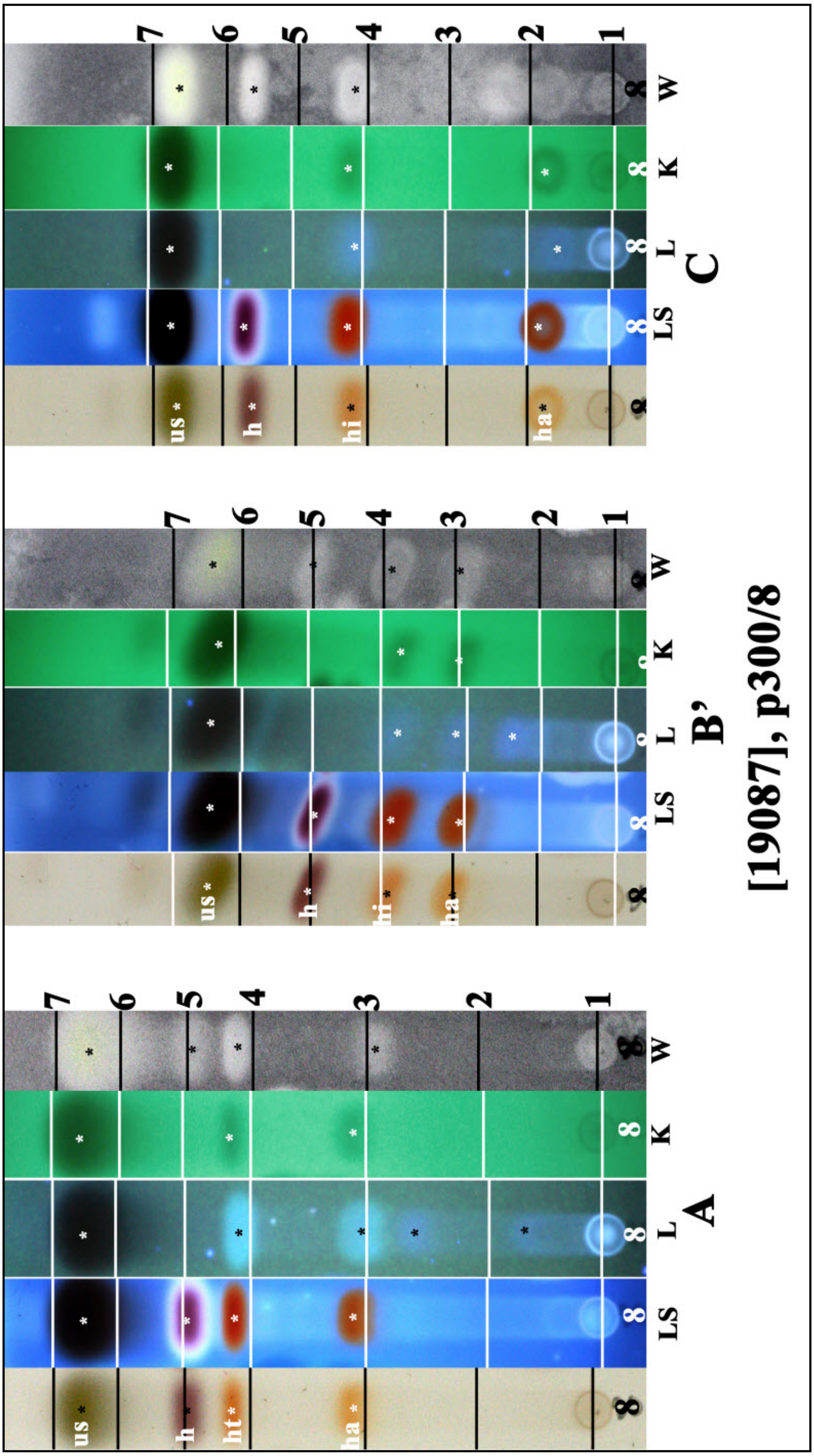
Cladonia capitellata var ***squamatica,*** [18962], Australia, New South Wales, Southern Tablelands, Tinderry Mountain.

usnic acid



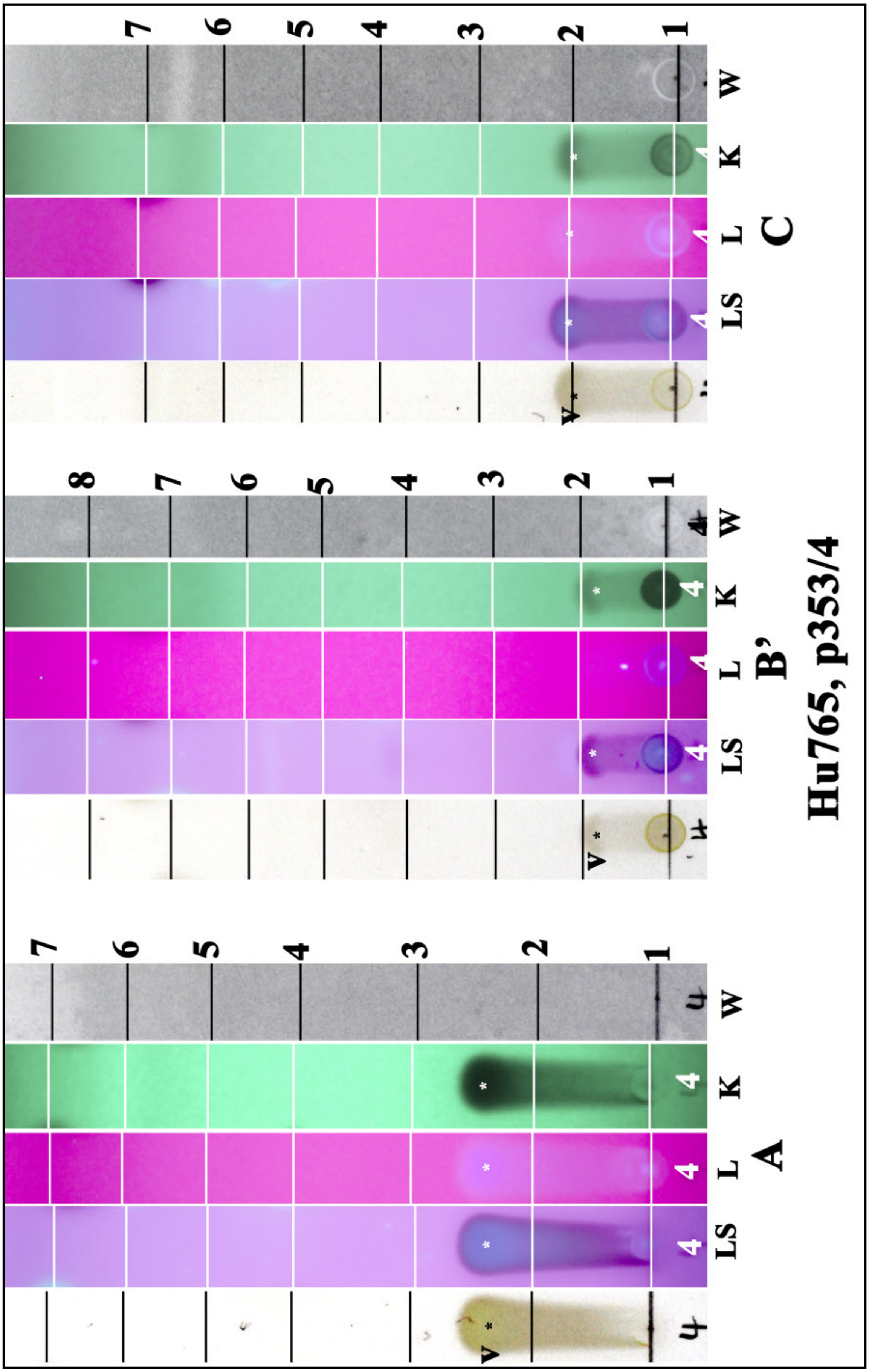
Cladia sullivanii, [18976], Australia, New South Wales, Morton National Park.

usnic acid



Nephroma australe, [19087], New Zealand, South Island, Fiordland, Mackay Creek, 21.6 km north of Te Anau Downs, growing in open silver beech forest along the road.

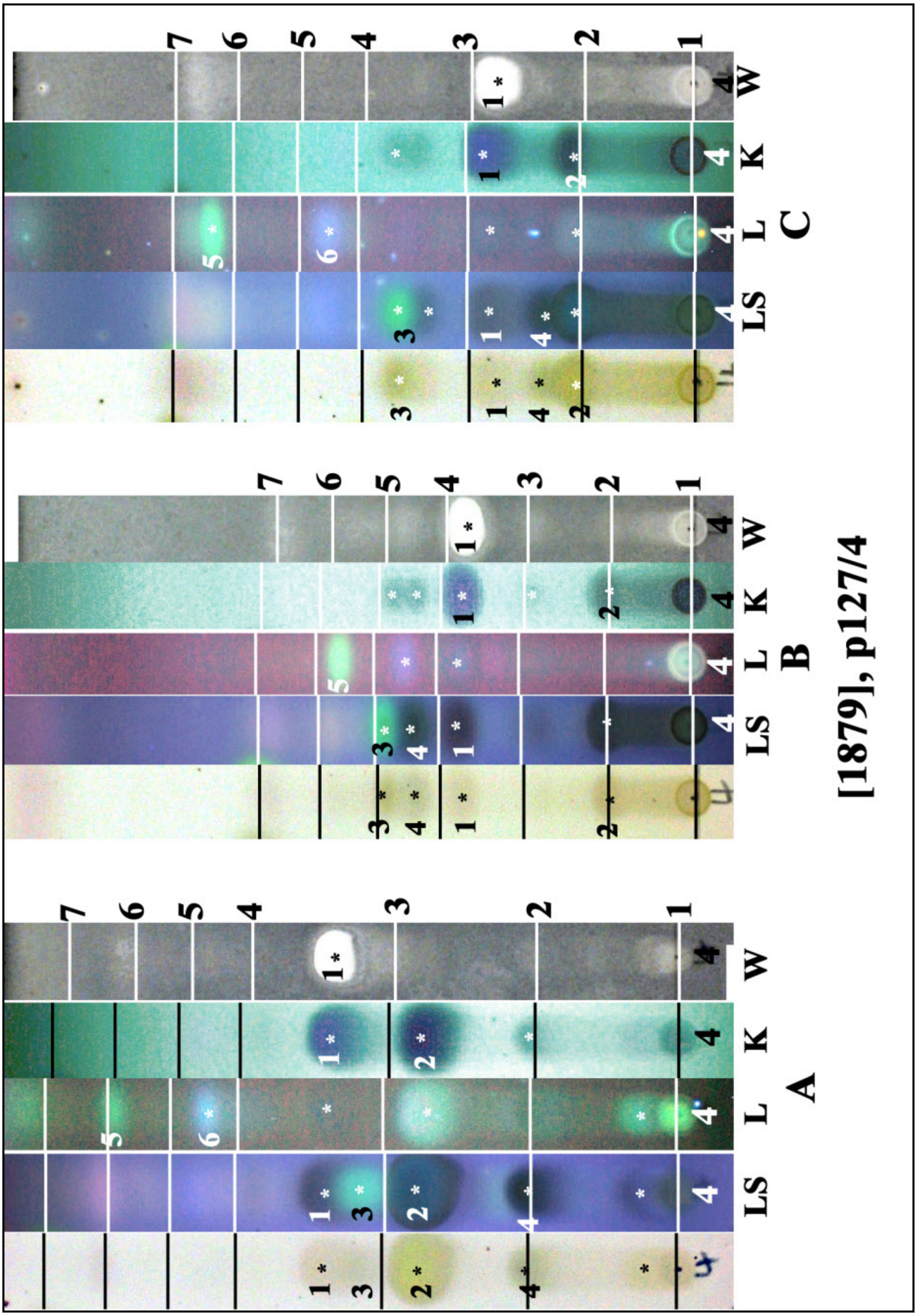
variolaric acid



v: variolaric acid, conf. J.A. Elix

S. Huneck's collection of lichen substances No 765: variolaric acid
Botanisches Museum Berlin-Dahlem

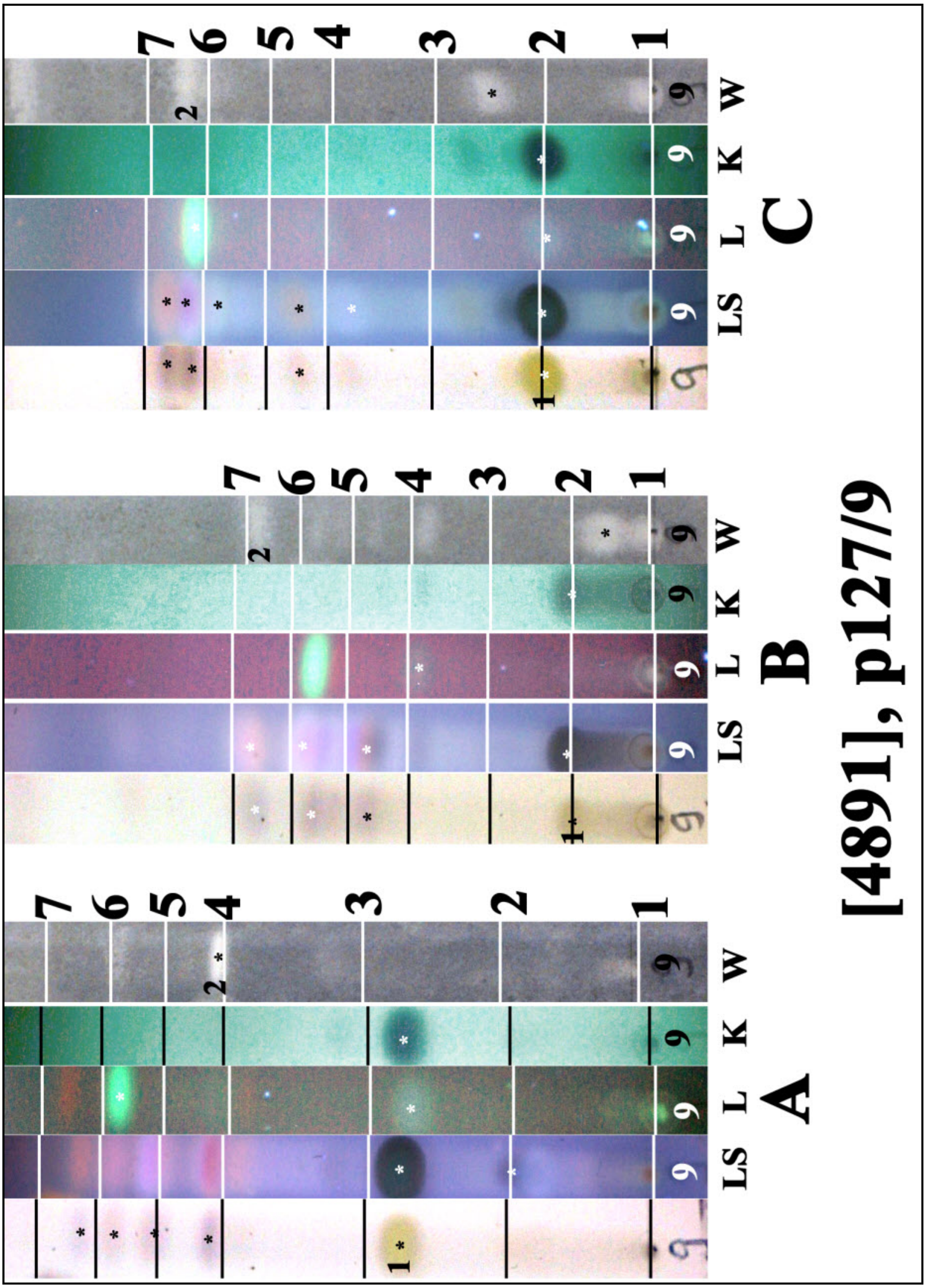
variolaric acid



1: alectoronic acid, **2: variolaric acid**, 3: gyrophoric acid, 4,5,6: unknown, conf. J.A. Elix

Ochrolechia parella, [1879], Frankreich, Bretagne, Pointe de Saint Mathieu, westlich von Brest, auf Feldmäuerchen aus Urgestein. Leg. F. Schumm & Claude Comte, 22.08.1971

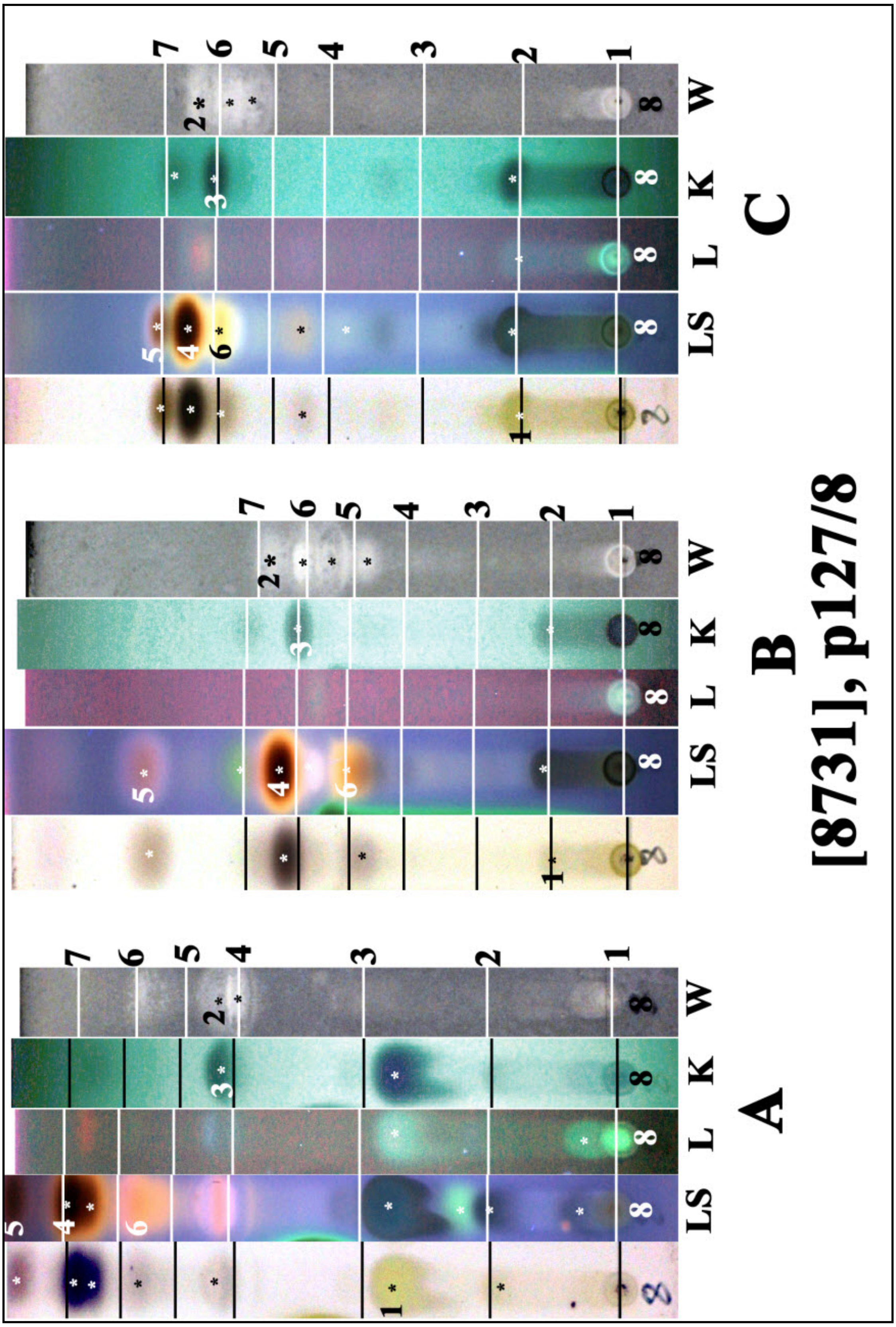
variolaric acid



1: variolaric acid, 2: lichesterinic acid,
other minor spots are terpenes from the Carpinus, conf. J.A. Elix

Ochrolechia microstictoides, [4891], Germany, Baden-Württemberg, Kreis Biberach, Kloster Heiligkreuztal westlich von Riedlingen, auf *Carpinus* im Klostergarten, TK 7822/SW. Leg. F. Schumm, L. Krause & Gebert, det. F. Schumm 02.08.1998.

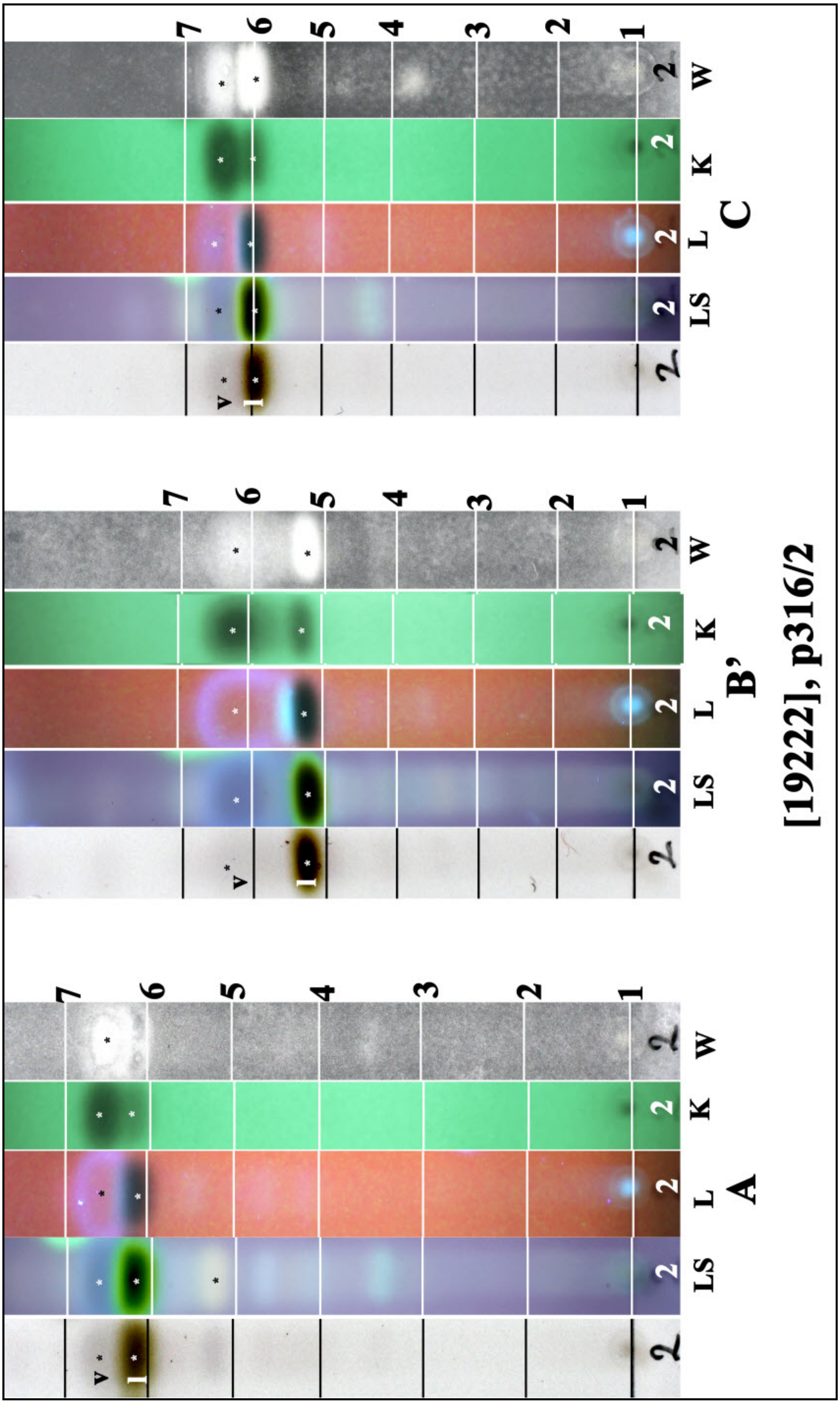
variolaric acid



1: variolaric acid, 2: lichesterinic acid,
4,5,6: terpenes from the picea, conf. J.A. Elix

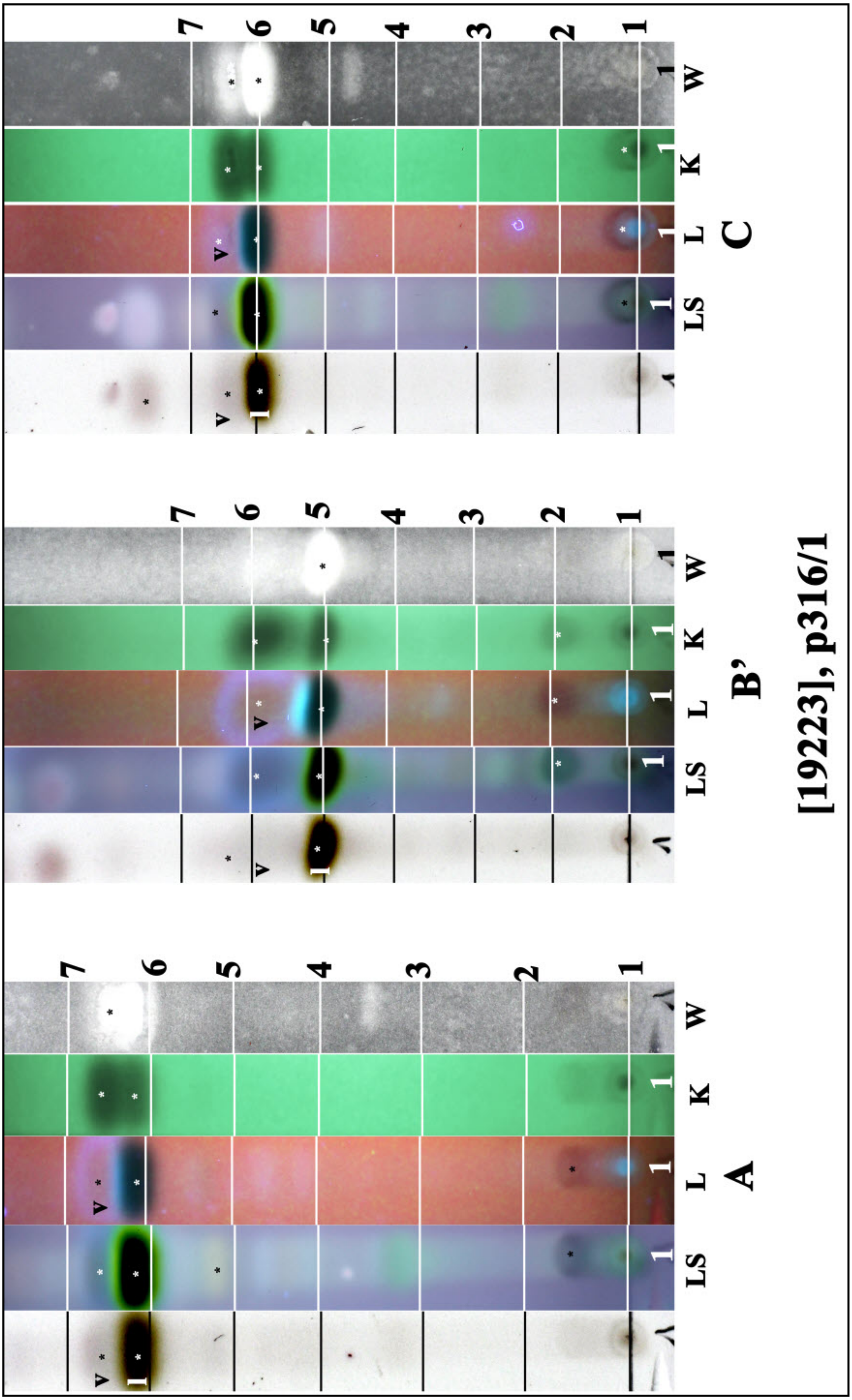
Ochrolechia microstictoides, [8731], Germany, Baden-Württemberg, Kreis Calw, Meistern südlich von Wildbad, 48°41.564' N, 8°32.517' E, 780 m, an Fichten, TK 7317. Leg. F. Schumm, 31.05.2001, det. F. Schumm

vicanicin



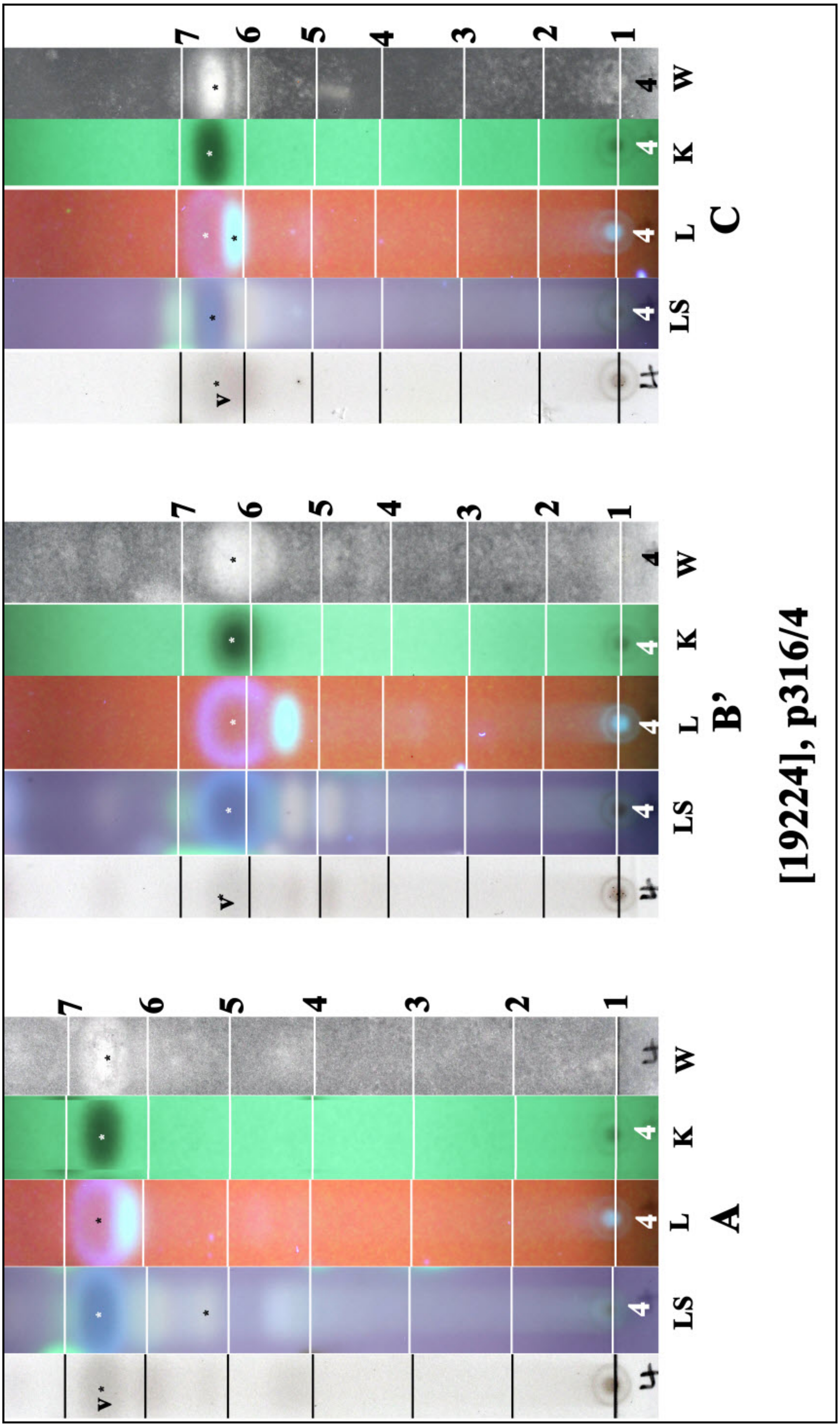
Pannaria farinosa, [19222], Australia, New South Wales, Great Dividing Range, 6 km east of Captains Flat, 2 km north of Parkers Gap, 35°37' S, 149°30' E, 1260 m.

vicanicin



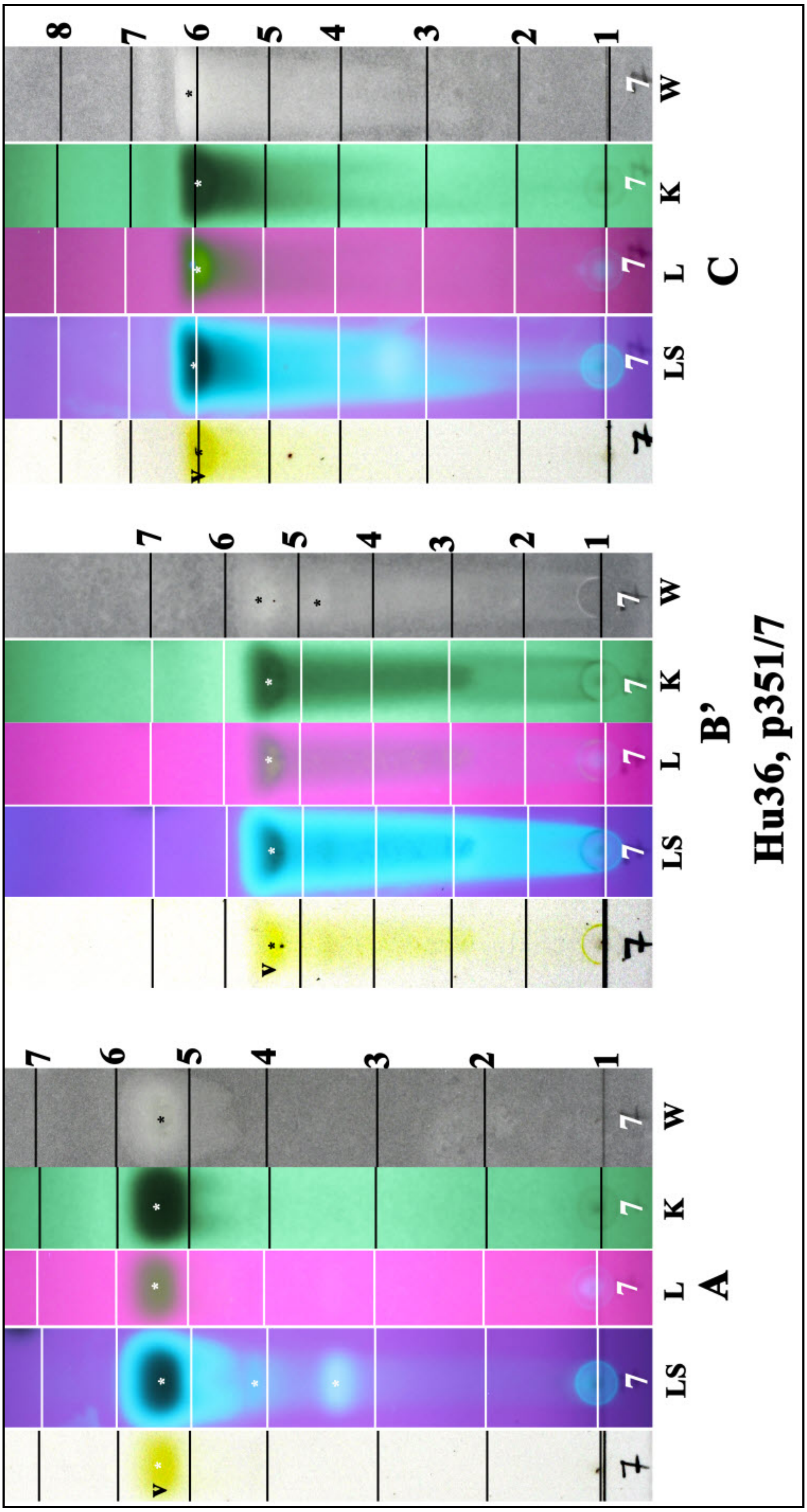
Pannaria farinosa, [19223], Australia, New South Wales, Big Badja Hill, 44 km south-west of Araluen, 36°00' S, 149°34' E, 1250 m.

vicanicin



Pannaria phyllidiata, [19224], Australia, New South Wales, Big Badja Hill, 44 km south-west of Araluen, 36°00' S, 149°34' E, 1250 m.

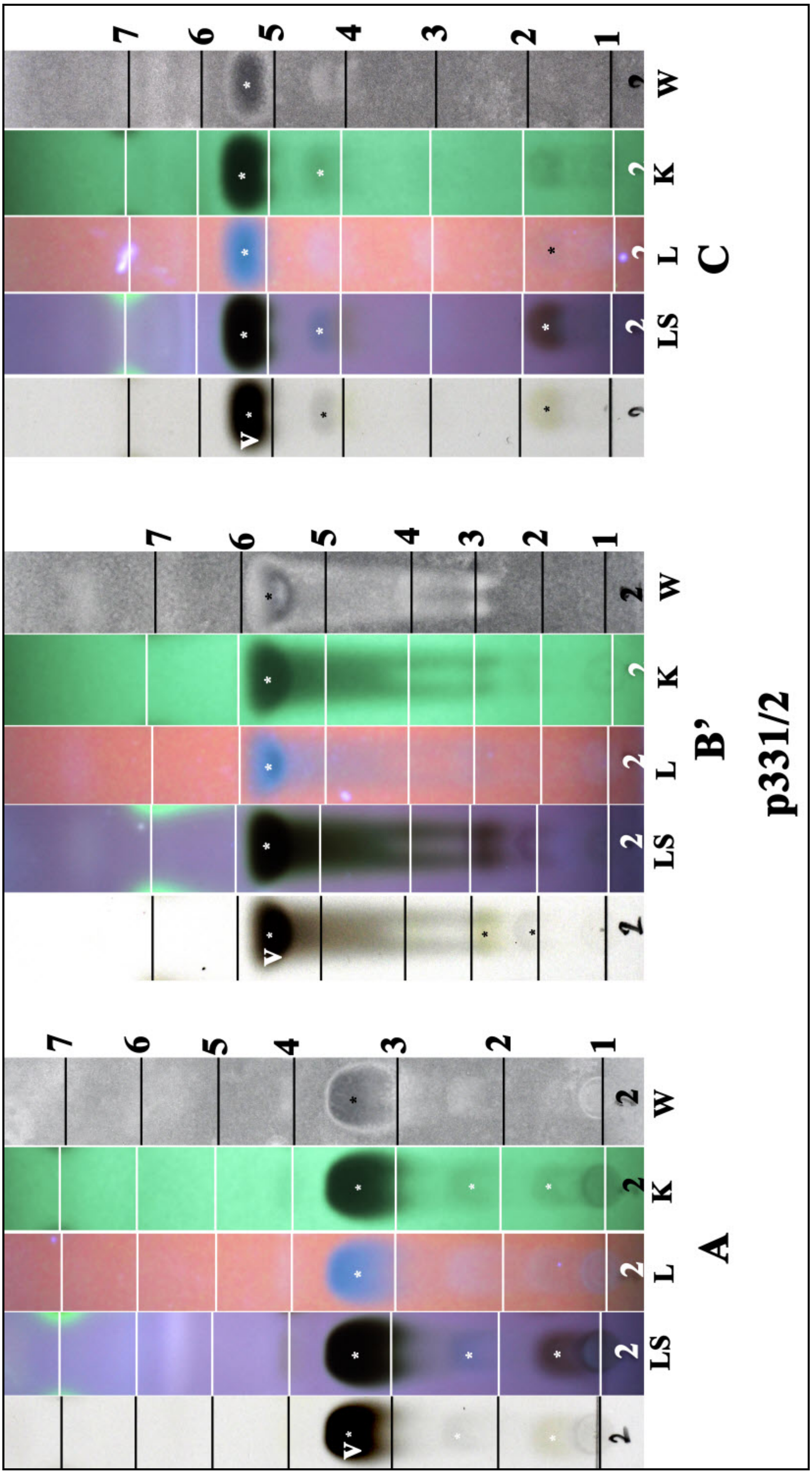
vinetorin
(= 5-chloro-3-*O*-methylnorlichexanthone)



v: vinetorin (= **5-chloro-3-*O*-methylnorlichexanthone**), conf. J.A. Elix

S. Huneck’s collection of lichen substances No 36: vinetorin
Botanisches Museum Berlin-Dahlem

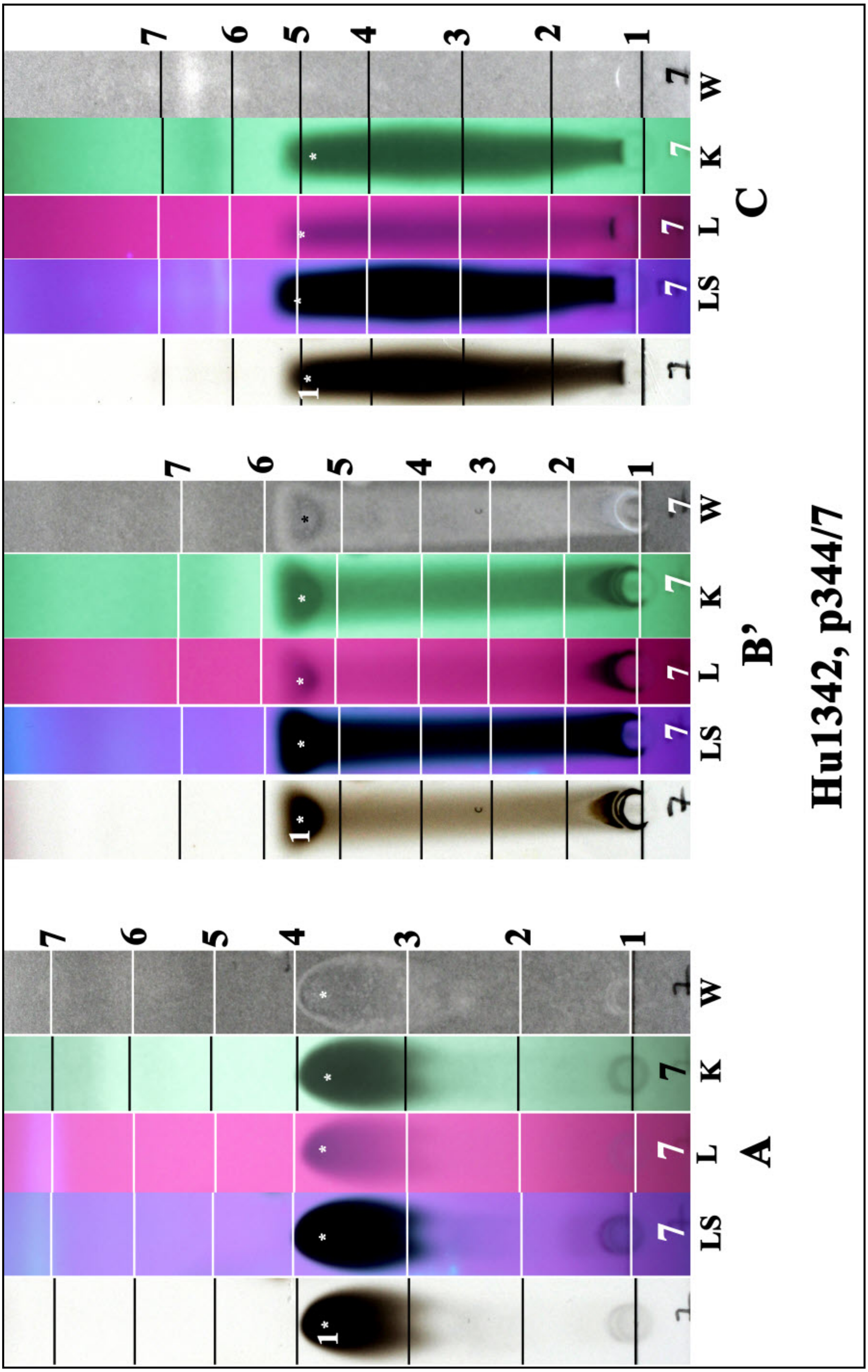
virensic acid



v: virensic acid

pure acid from J.A. Elix received by K. Kalb

virensic acid

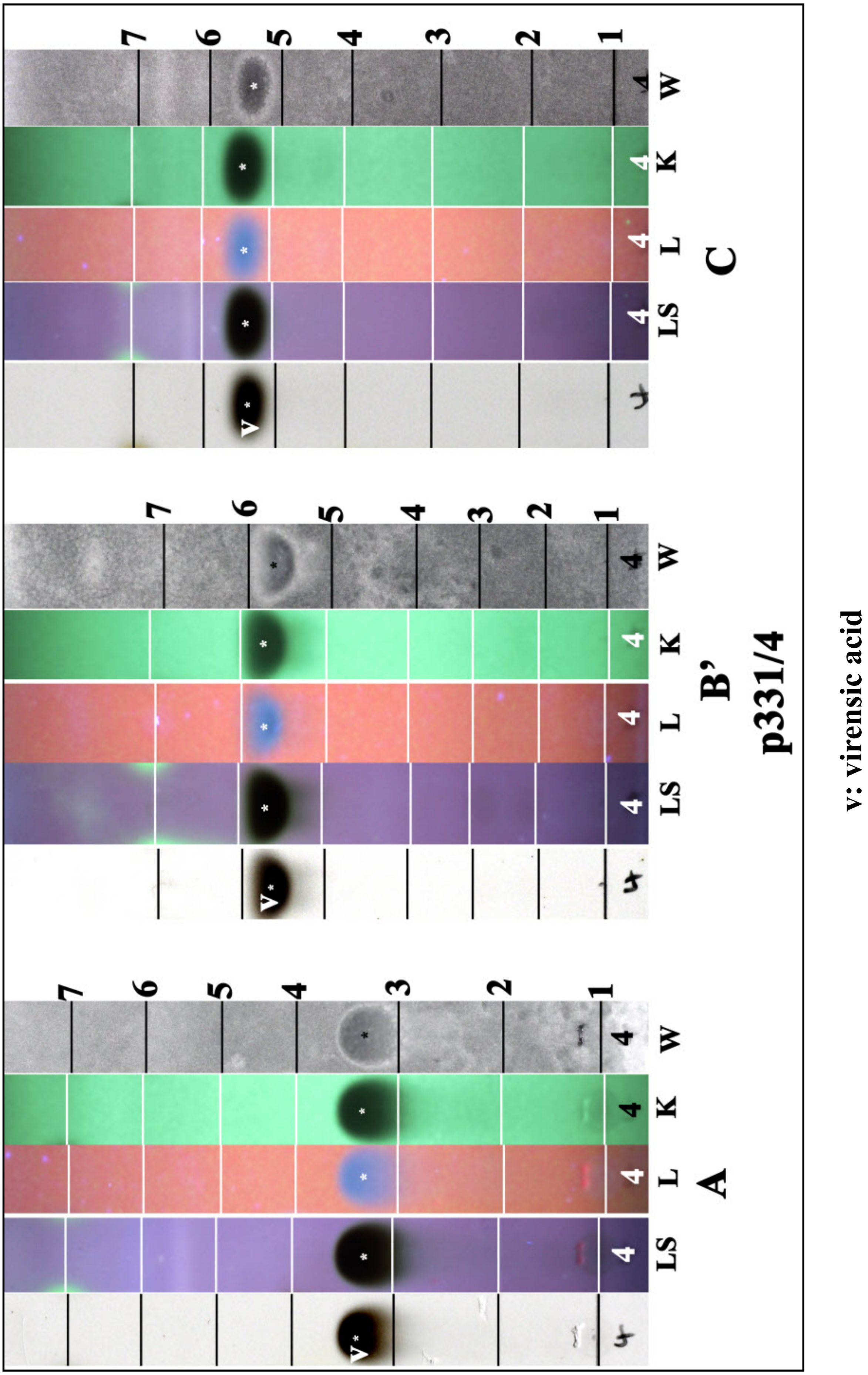


1: virensic acid, conf. J.A. Elix

S. Huneck's collection of lichen substances No 1342: virensic acid

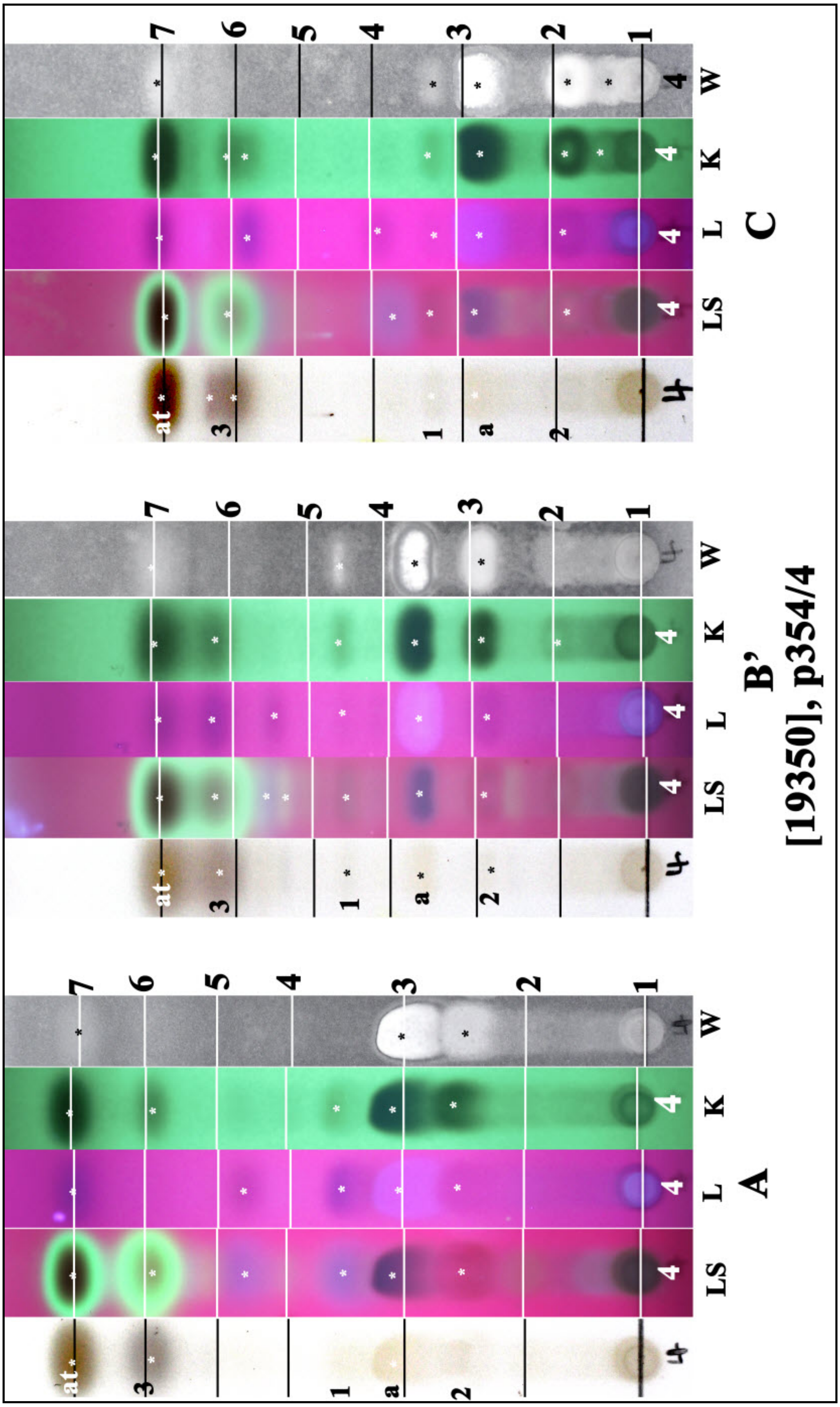
Botanisches Museum Berlin-Dahlem

virensic acid



pure acid from S. Huneck received by K. Kalb

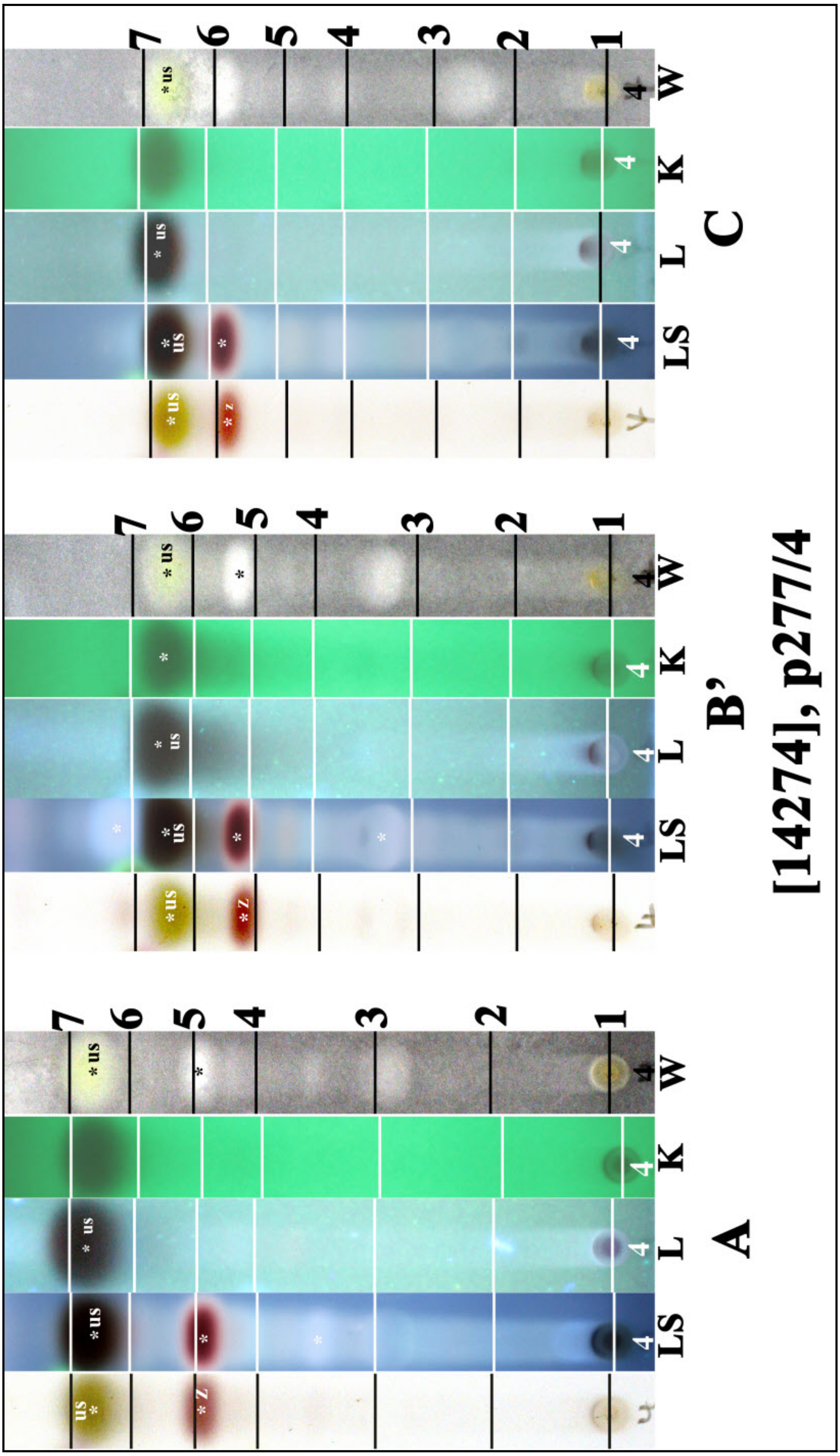
vittatolic acid



at: atranorin, a: alectoronic acid, 1: physodic acid, **2: vittatolic acid**, 3: colensoic acid ,conf. J.A. Elix.

Tephromela aff. ***alectoronica*** [19350], Australia, Queensland, Kennedy Highway c. 12 km SSE of Kuranda, on roadside trees at the edge of a disturbed tropical rainforest, 420 m, 16°54'40" S, 145°36'04"E. Leg. K. & D. Kalb, 21.08.2015 (Nr. 40535).

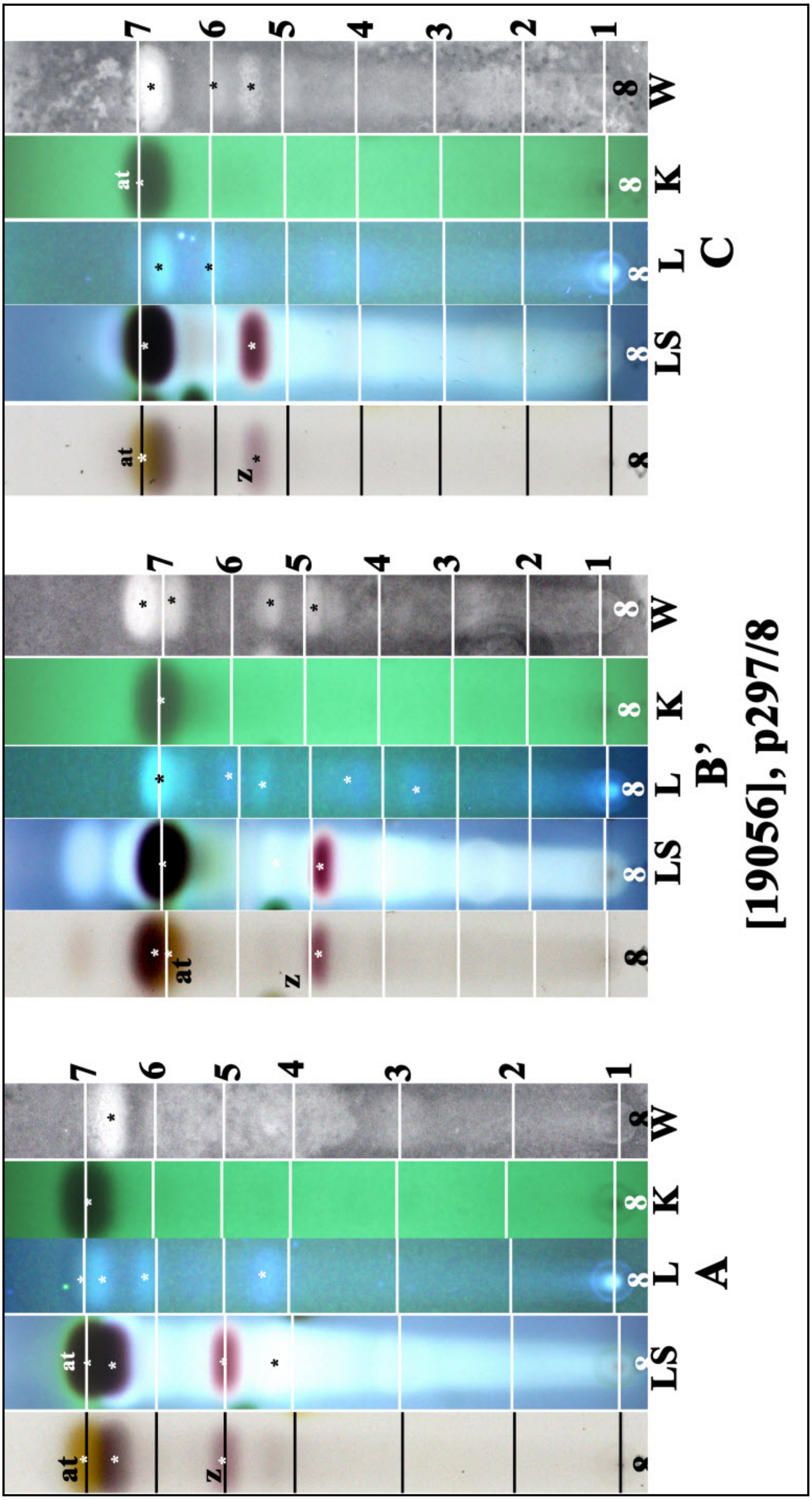
zeorin (= hopane-6α,22-diol)



us: usnic acid, **z: zeorin (= hopane-6α,22-diol)**

Cladonia coccifera, [14274], Portugal, Azoren, W-Terceira, Serra do Cume, 38°42.417' N, 27°6.581' W, 500-550 m. Leg. Aptroot & Schumm 11.07.2008.

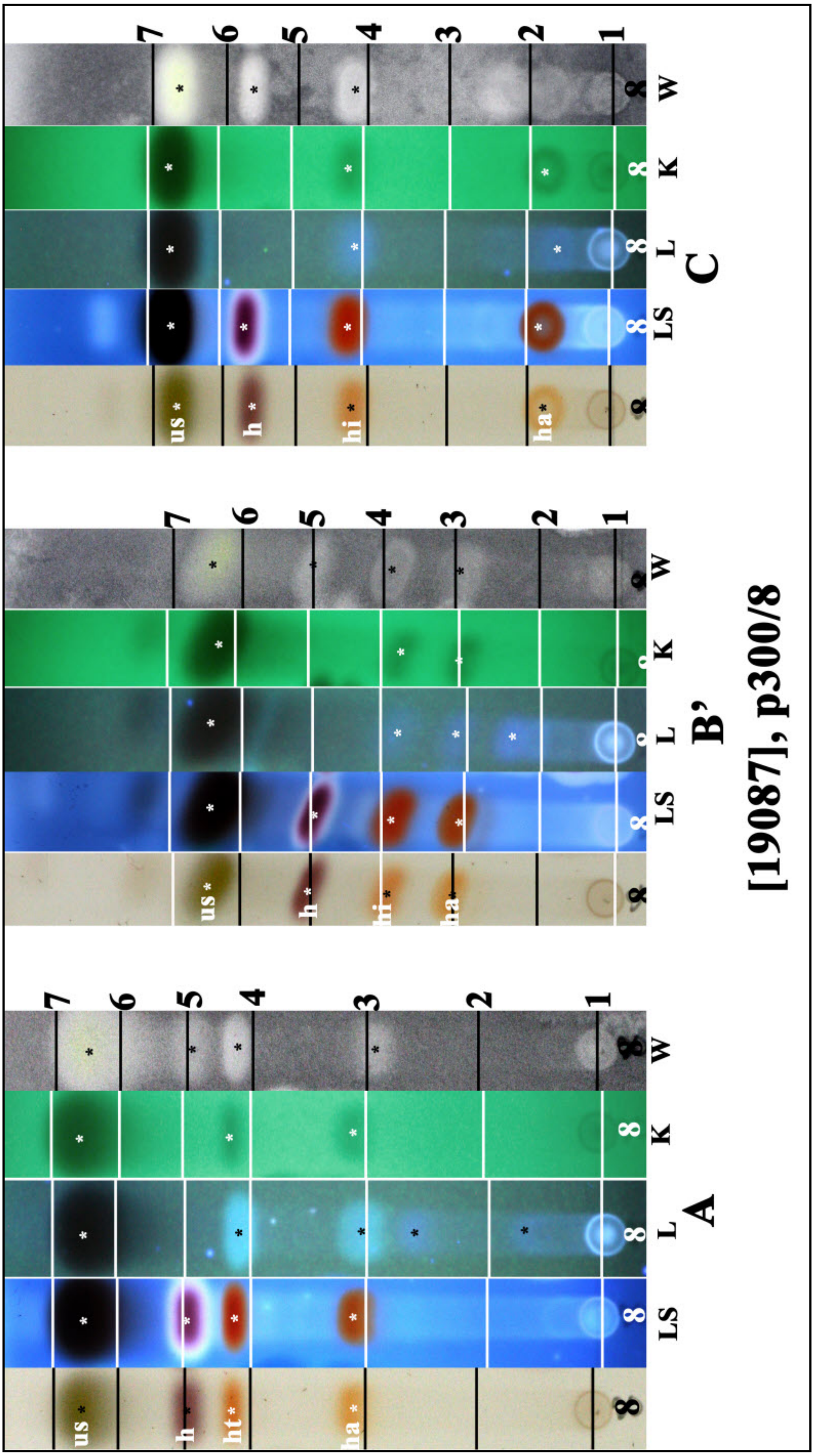
zeorin (= hopane-6α,22-diol)



at: atranorin, z: zeorin (= hopane-6α,22-diol)

Lecanora melacarpella, [19056], Australia, New South Wales, Lord Howe Island.

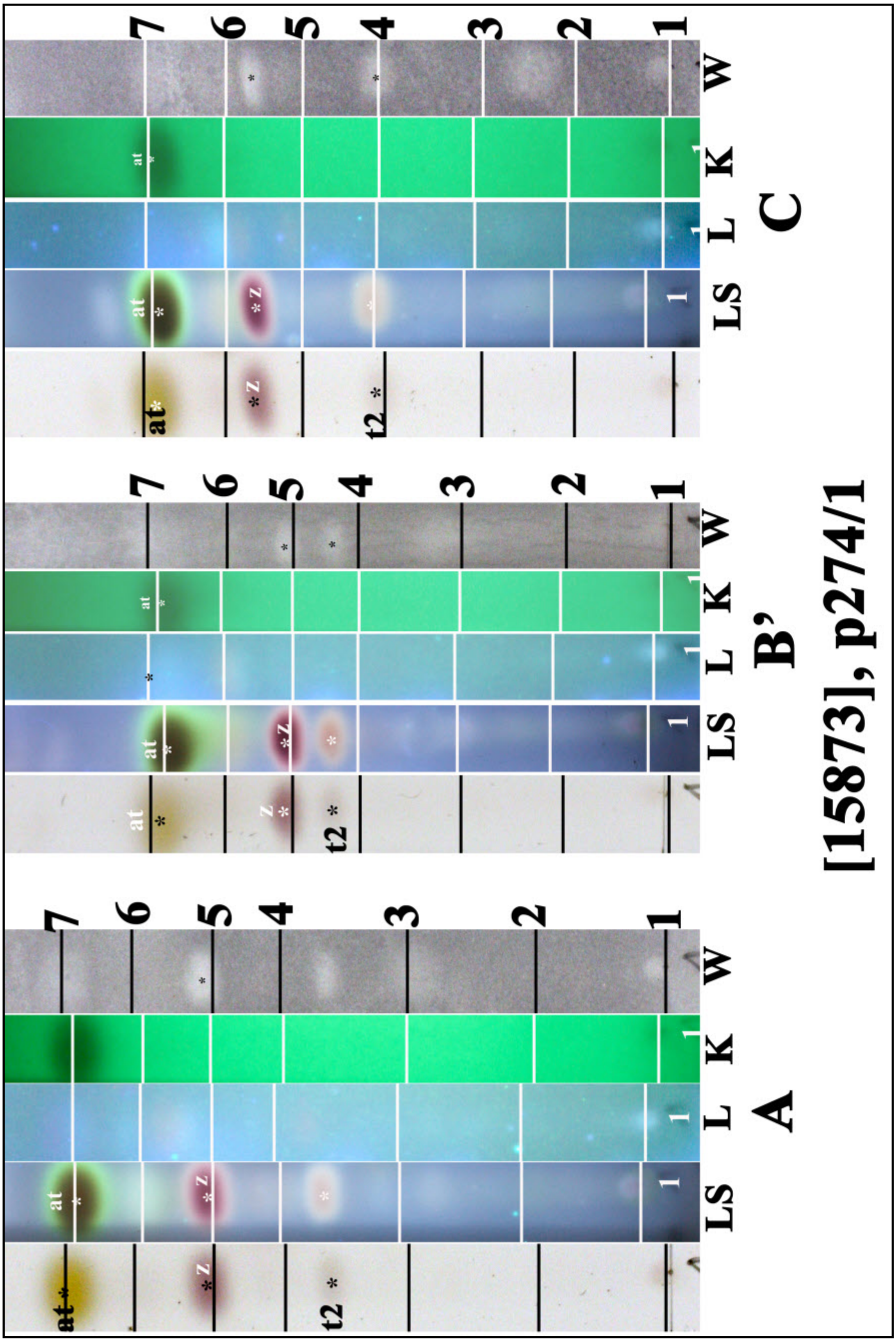
zeorin (= hopane-6α,22-diol)



us: usnic acid, **h: zeorin (= hopane-6α,22-diol)**, hi: hypostictic acid, ha: hyposalazinic acid

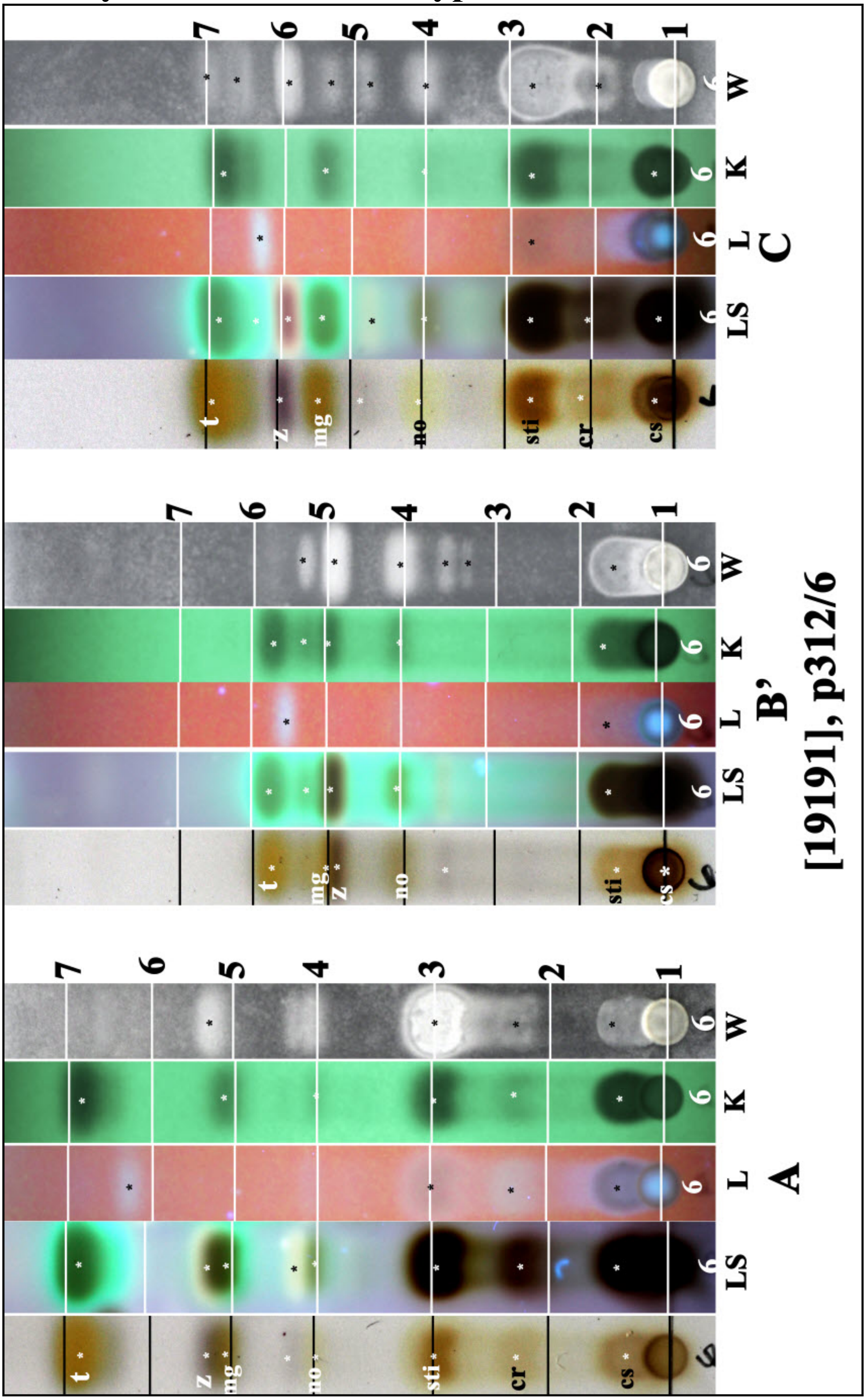
Nephroma australe, [19087], New Zealand, South Island, Fiordland, Mackay Creek, 21.6 km north of Te Anau Downs, growing in open silver beech forest along the road.

zeorin (= hopane-6α,22-diol)



Heterodermia subneglecta, [15873], Australia, Western Australia, Donnelly Well south of Yornup along SW Highway, wetland associated with *Eucalyptus rudis* and *Melaleuca preissiana,* 34.073° S, 116,180° E, 260 m. Leg. F. Schumm & E. Stocker-Wörgötter, 25.19 2009.

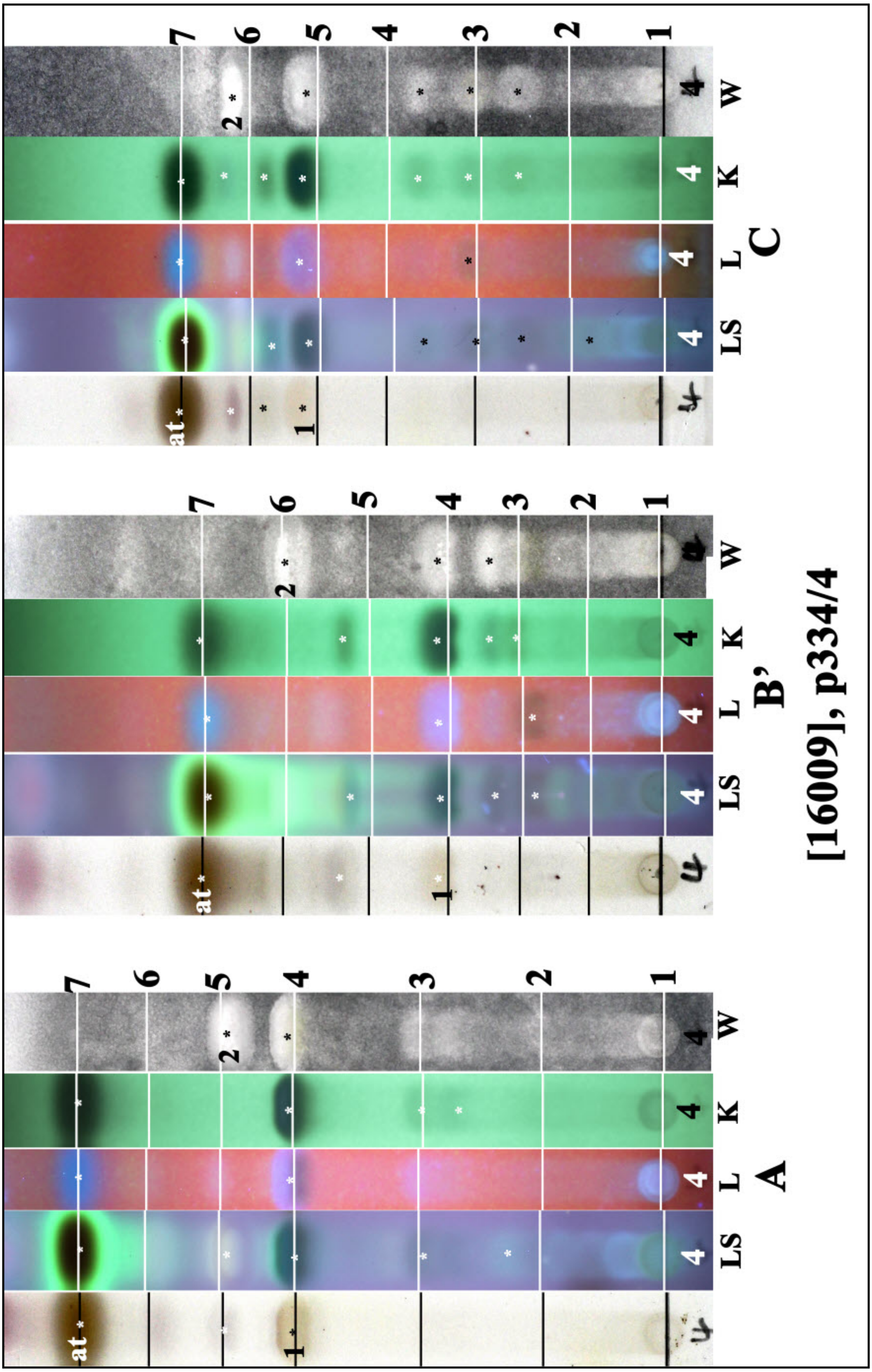
α-acetylconstictic acid + cryptostictic acid



t: tenuiorin, z: zeorin, mg: methyl gyrophorate, no: norstictic acid, sti: stictic acid, cs: constictic acid, **cr: α-acetylconstictic acid + cryptostictic acid**

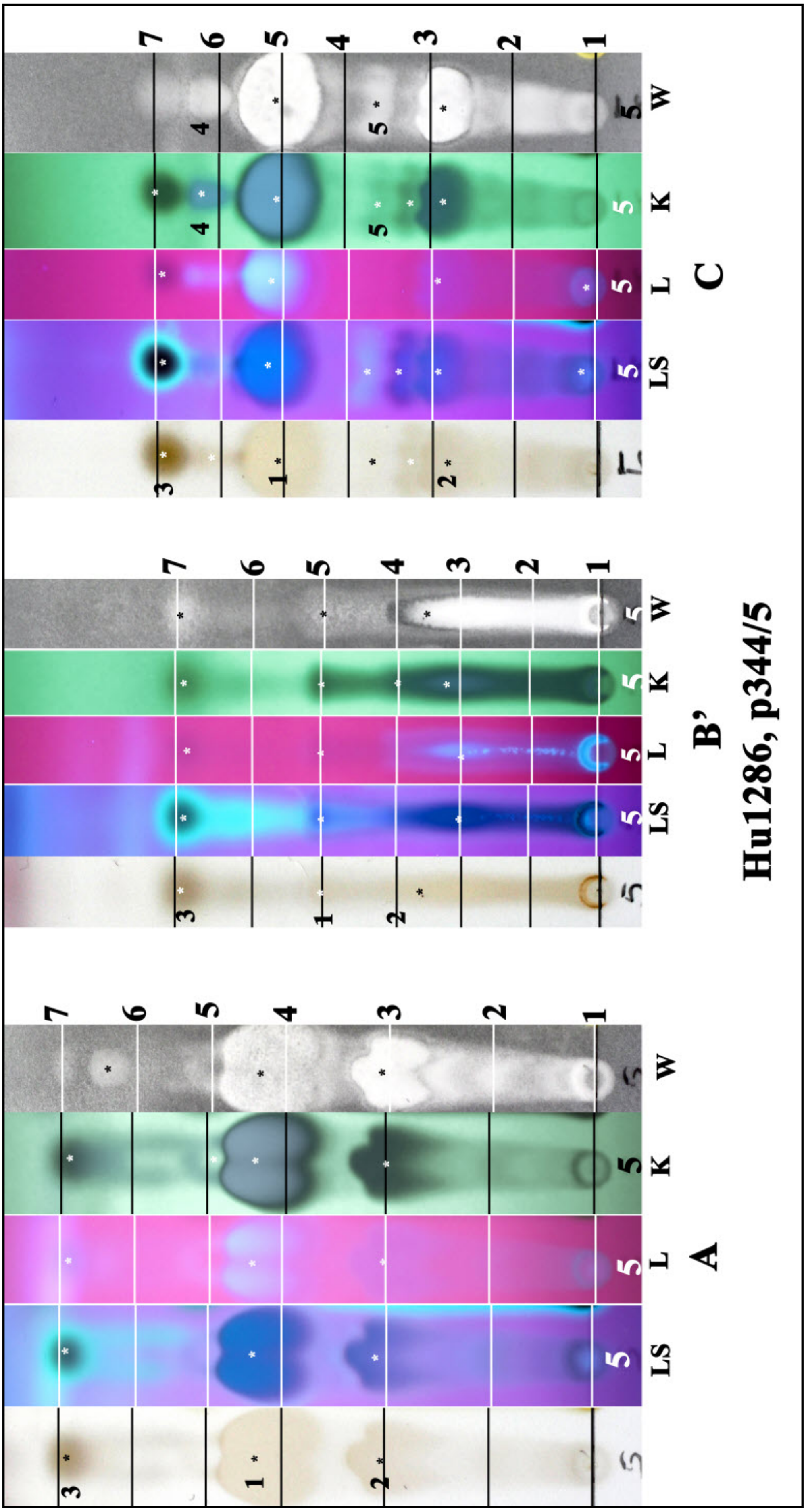
Pseudocyphellaria billardierei , 19191], Australia, Victoria, Errinundra River (West Branch), 20 km south of Bendoc, 37°19' S, 148°50' E, 960 m.

α-collatolic acid



Tephromela atra, [16009], Australia, Australian Capital Territory, Canberra, Hackett, Mt. Majura Nature Park, Casuarina trail, 35.24560° S, 149.17621° E, 790 m, on stone. Leg. F. Schumm & E. Stocker-Wörgötter, 03.11.2009

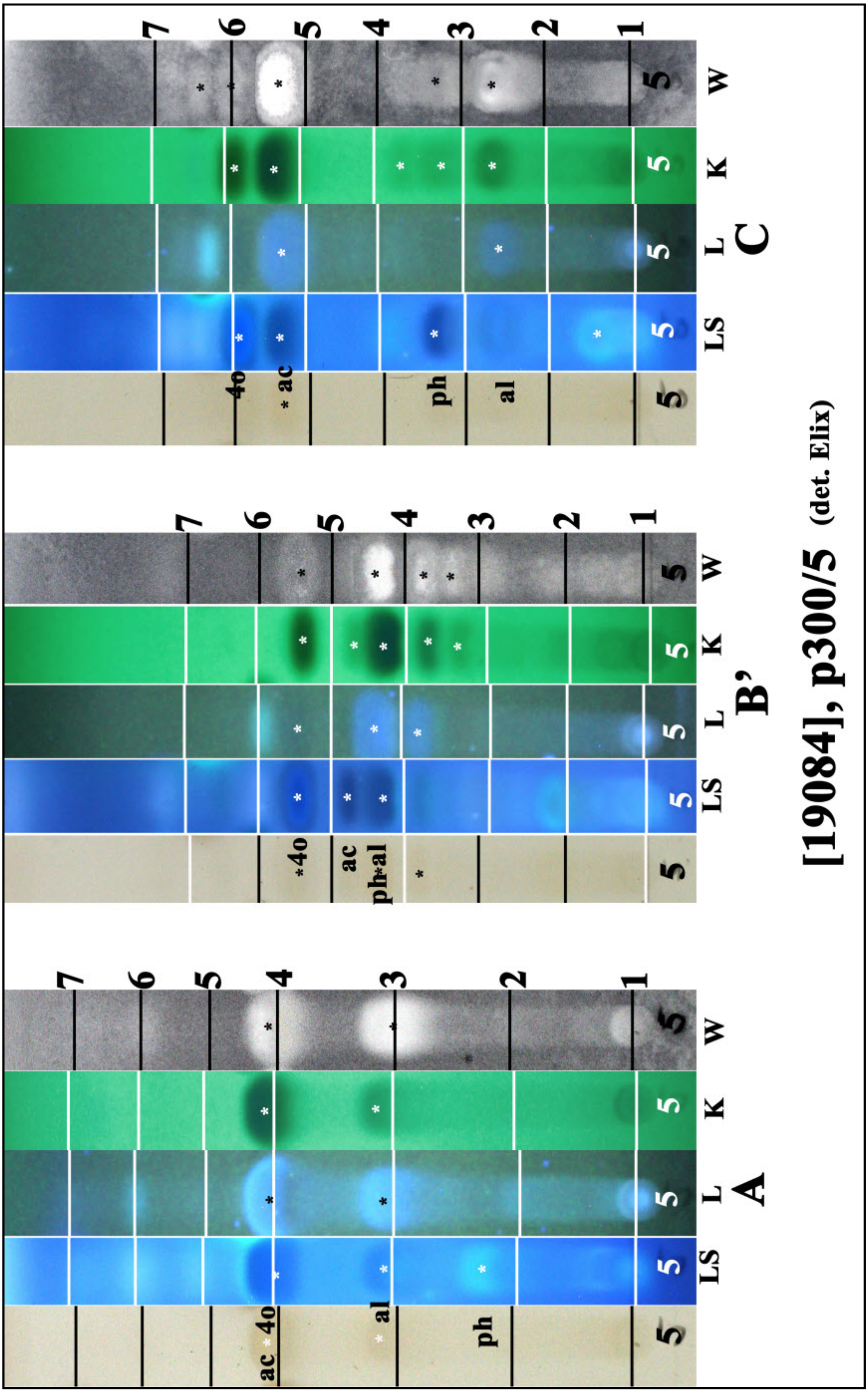
α-collatolic acid



1: **α-collatolic acid,** 2: alectoronic acid, 3: atranorin, 4: 4-*O*-methylphysodic acid, 5: physodic acid, conf. J.A. Elix

S. Huneck’s collection of lichen substances No 1286: α-collatolic acid
Botanisches Museum Berlin-Dahlem

α-collatolic acid



ac: **α-collatolic acid**, al: alectoronic acid, 4o: 4-O-methylphysodic acid, ph: physodic acid

Xanthoparmelia *(Neofuscelia)* ***imitatricoides***, [19084], Australia, New South Wales, Morton National Park, 8 km north-east of Nerriga, 35°07' S, 150°08' E, 760 m, growing on sandstone rocks in open *Eucalyptus* woodland. TOPOTYPE. Leg. J.A. Elix

Literature

Arup, U., Ekman, S., Lindblom, L. & Mattson, J-E. (1993): High performance thin layer chromatography (HPTLC), an improved technique for screening lichen substances. - Lichenologist 25: 61-71.

Asahina Y. & Shibata, S. (1954): Chemistry of Lichen Substances. - Japan Society for Promotion of Science, Tokyo.

Culberson, C.F. & Kristinsson, H.-D. (1970): A standardized method for the identification of lichen products. - J. Chromatogr. 46: 85-93.

Culberson, C.F. (1972): Improved conditions and new data for the identification of lichen products by a standardized thin-layer chromatographic method. - J. Chromatogr. 72: 113-125.

Dibben, M.J. (1980): The chemosystematics of the lichen genus *Pertusaria* in North America north of Mexico. - Milwaukee Public Museum No. 5: 1-162.

Elix, J.A. (2014): A catalogue of standardized chromatographic data and biosynthetic relationships for lichen substances. 3rd Edition. - Canberra.

Elix, J.A. & Tearne, P.D. (1977): Nordivaricatic acid, a new depside from the lichen *Heterodea beauleholei*. - Australian Journal of Chemistry 30: 2333-2335.

Huneck, S. & Yoshimura, I. (1996): Identification of Lichen Substances. - Springer, 1-493.

Kraus, L. (1994): Kleines Praktikumsbuch der Dünnschicht-Chromatographie. - Desaga, 1-96.

Mietsch, E., Lumbsch, H.T. & Elix, J.A. (1993): A new computer program for the identification of lichen substances. - Mycotaxon 47: 475-479.

Orange, A., James, P.W. & White, F.J. (2001): Microchemical methods for the identification of lichens. - British Lichen Society, 1-101.

Schumm, F. (2002): Dünnschichtchromatogramme - auch für den Amateur möglich. - Aktuelle Lichenologische Mitteilungen NF 9: 8-22.

Schumm, F. & Elix, J.A. (2014): Images from Lichenes Australasici Exsiccati and of other characteristic Australasian Lichens. - 1-1327, BoD Norderstedt, Germany.

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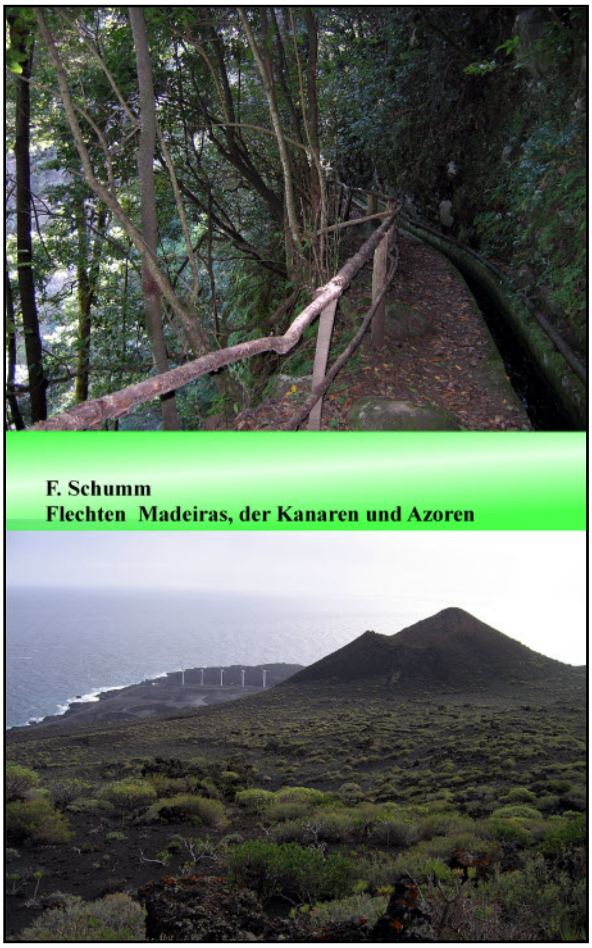
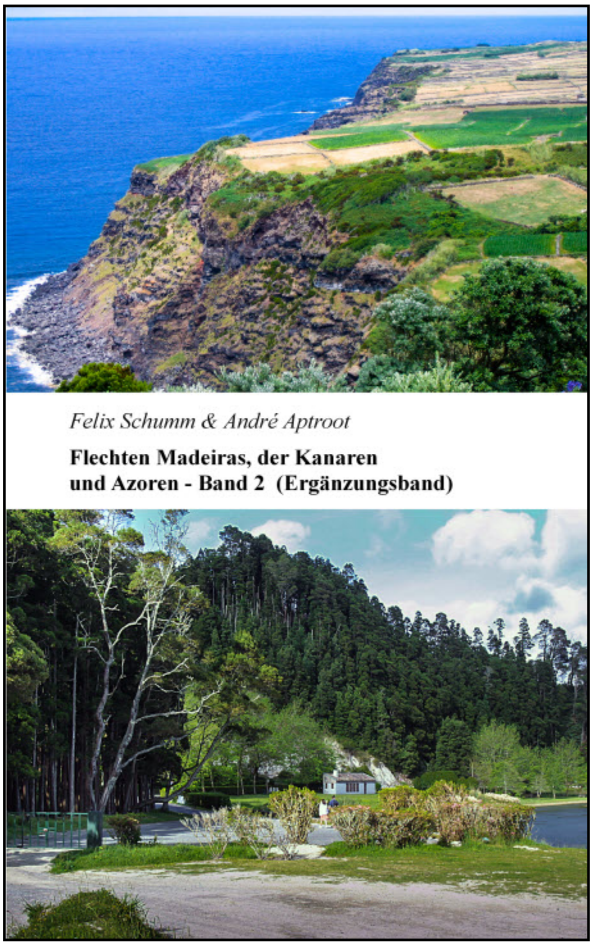
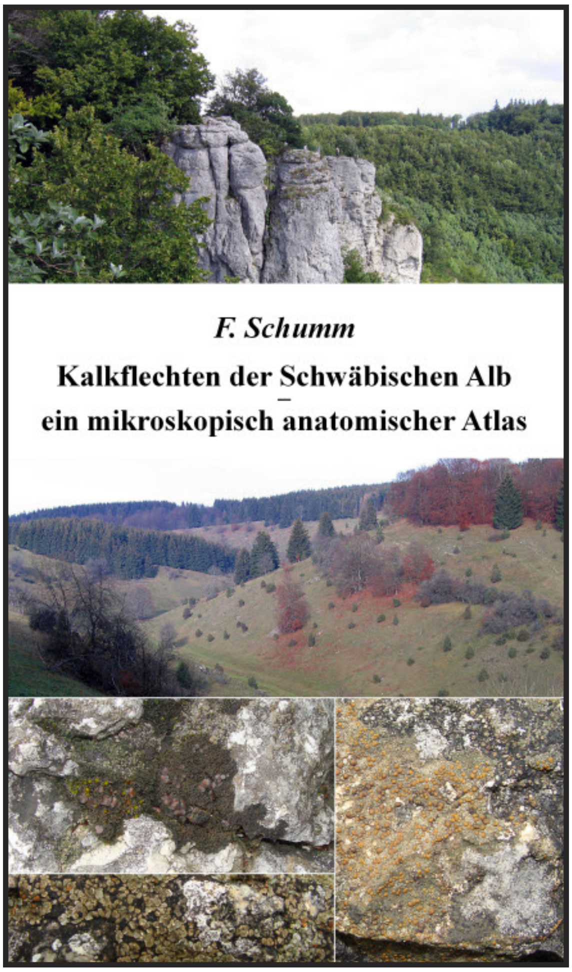
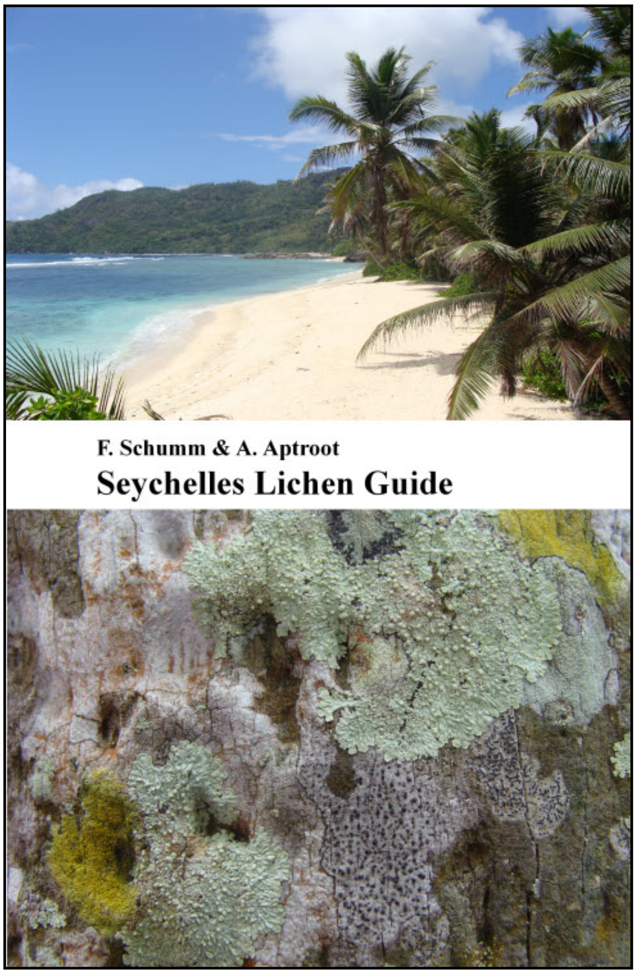






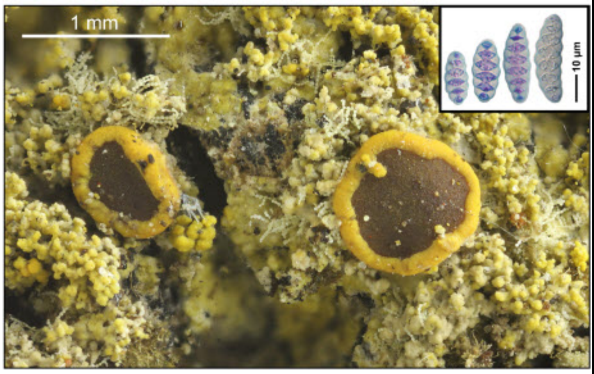


F. Schumm & A. Aptroot

A microscopical Atlas of some tropical Lichens from SE-Asia

(Thailand, Cambodia, Philippines,Vietnam)

VOLUME ONE



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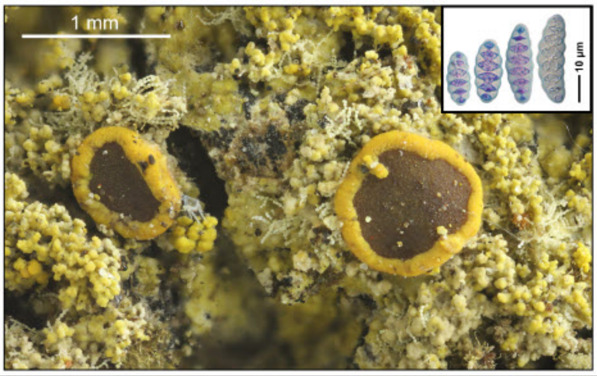
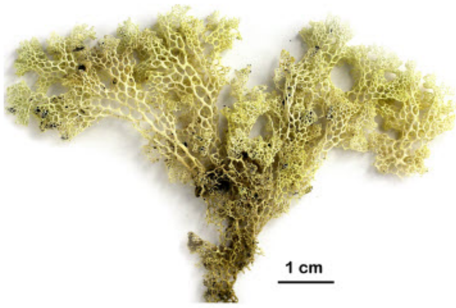


A. Aptroot & F. Schumm

Fruticose Roccellaceae
-
an anatomical-microscopical Atlas and Guide with a worldwide Key and further Notes on some crustose Roccellaceae or similar Lichens

Felix Schumm & John A. Elix

Images from Lichenes Australasici Exsiccati and of other characteristic Australasian Lichens



VOLUME ONE

The book contains a collection of coloured images of plates obtained by thin layer chromatography of many lichen substances as an aid for their determination. The images show mounted runs obtained in solvents A, B/B' and C commonly used in lichenology. They show results obtained using 5 x 5 cm HPTLC plates in daylight and under UV light, before and after treating with sulfuric acid. The origin of each lichen substance (or substances) is recorded.

Das Buch enthält eine Sammlung farbiger Bildtafeln von Dünnschicht-Chromatogrammen von vielen Flechteninhaltsstoffen und soll als Hilfe zu deren Bestimmung dienen. Die Bilder zeigen montierte Laufbahnen zu den in der Lichenologie üblichen Laufmitteln A, B/B' und C. Sie zeigen die Ergebnisse auf 5 x 5 cm HPTLC-Platten bei Tageslicht und UV-Licht vor und nach der Behandlung mit Schwefelsäure. Die Herkunft jeder Flechtensubstanz (oder Substanzen) ist angegeben.