

**A CATALOGUE OF STANDARDIZED
CHROMATOGRAPHIC DATA
AND
BIOSYNTHETIC RELATIONSHIPS
FOR LICHEN SUBSTANCES**

Fourth Edition

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Synopsis

The third edition of the *Catalogue* incorporates thin layer chromatographic and high performance liquid chromatographic data for 854 lichen substances (compared with the 605 substances included in the second edition published in 1993). The additional lichen substances have been reported and characterized in the intervening 20 year. Relative thin layer chromatographic R_F values in seven standard solvent systems, the colour of the developed TLC spots under visible and ultraviolet light, as well as the results of thalline spot tests are reported. Qualifying information includes a list of biosynthetically related compound for each substance, the molecular ion and three major peaks in the mass spectrum (where available), high performance liquid chromatographic RI values and the substance class. In addition, entries in this edition include a leading reference (or references) for each substance as well as a natural lichen source.

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Introduction

The application of chemical discriminators to lichen taxonomy began inadvertently when thallus colour was accepted as a valid generic or specific character. Hence, the grey genus *Physcia* (containing the colourless substance atranorin in the cortex) was segregated from the superficially similar yellow-orange genus *Xanthoria* (containing cortical parietin, an orange anthraquinone pigment). Similarly, *Parmeliopsis ambigua* (Wulfen.) Nyl. (with a yellow thallus due to the presence of usnic acid) was separated from *P. hyperopta* (Ach.) Arnold (grey with atranorin). Nevertheless, most lichen substances are colourless and can be detected only by indirect means.

The first chemical tests conducted on lichen thalli for taxonomic purposes were carried out by Nylander in the 1860s (Nylander 1866). He detected the presence of various lichen substances by spotting chemical reagents directly on the lichen thallus (spot tests) to produce characteristic colour changes: iodine solution (I; blue with certain polysaccharides), potassium hydroxide solution (K; distinctive colours with quinones, some depsides and depsidones) and calcium hypochlorite solution (C; pink or red with some depsides). Further test reagents followed: KC (K solution followed by C) and CK (with reverse addition). Nylander utilised the characteristic medullary and cortical reactions as a specific character, but the origin of these characteristic colour reactions remained unknown.

The first serious chemical investigations were conducted by Zopf, culminating in his publication of 'Die Flechtenstoffe' in 1907 (Zopf 1907) with the description of over 150 lichen compounds. However, the ultimate structural elucidation of many common lichen metabolites came from the meticulous pioneering work of Asahina and co-workers in Japan in the 1930s (see Asahina & Shibata 1954). This laid the foundation for further research on these compounds.

More recent workers in this field have included Huneck in Germany, C. F. & W. L. Culberson in the USA, Tabacchi in Switzerland, Elix and co-workers in Australia, Wilkins in New Zealand and Garbarino and colleagues in Chile (see Huneck & Yoshimura, 1996). Normal methods of organic structure determination are utilized, but the development of ^{13}C and ^1H n.m.r. spectroscopy, mass spectrometry and X-ray crystallography have greatly aided structural studies. However, from the viewpoint of most lichenologists, the development of microchemical detection methods has been far more important. Asahina developed an additional spot test reagent (P or PD, an alcoholic solution of *p*-phenylenediamine) and, more importantly, a microcrystallization technique for more definitive recognition of individual lichen acids on a routine basis. This involved extraction of a lichen fragment with acetone; evaporation of the solvent and recrystallization of the remaining residue from a suitable

solvent – all conducted on a microscope slide. A particular lichen substance crystallized in a distinctive shape and colour and was identified by comparison with photographs of authentic materials. This method has been superseded by more accurate and sensitive chromatographic methods.

Subsequently, the techniques of paper chromatography and, particularly, thin layer chromatography (TLC) have greatly improved the speed and certainty of recognition of lichen substances by means that are simple to use and relatively inexpensive. Standardised methodology and further refinements of analytical TLC procedures for detecting and comparing lichen metabolites have been reported by C. F. Culberson and colleagues (Culberson 1972; Culberson & Ammann, 1979; Culberson, Culberson & Johnson 1981; Culberson & Johnson 1982). Furthermore, two dimensional TLC has considerably improved R_F discrimination of structurally similar compounds and has enabled the identification of minor constituents present in complex mixtures (Culberson & Johnson 1976). More recently still, high performance liquid chromatography (HPLC) also has been employed as an effective analytical tool for the separation and identification of lichen substances. An added advantage of this technique is that it yields quantitative information about the components present in the total lichen extracts. At present, a disadvantage of the HPLC system is the expense of the equipment and purified solvents, placing it beyond the reach of more modest institutions and routine chemotaxonomic investigations. Consequently, TLC remains the most readily accessible and widely used method for identifying lichen metabolites routinely. As chemical investigations now form an integral part of all serious taxonomic studies on lichen-forming fungi, inevitably even the more experienced lichenologist encounters TLC spots that are unfamiliar and difficult to identify.

In an effort to make most of literature information on standardized TLC R_F values and spot colour characteristics more readily accessible, and to keep such a library of information current as many more lichen metabolites are identified and characterized, databases suitable for storing such information have been prepared. The data has been manipulated on the computer by search programs (Mactabolites: Elix, Johnston & Parker 1987; Wintabolites: Mietzsch, Lumbsch & Elix 1993) which operate on experimentally observed R_F values and TLC spot characteristics to search the database and generate a list of possible identities for the observed spot. The data presented in this *Catalogue* includes the information contained in those databases as well as information on more recently characterized lichen metabolites .

The Data Set

Listed along with the name of each lichen substance is the following information (where available and/or appropriate)

- 1) The R_F values of the compound in six or seven standard solvent systems
A, toluene/ dioxane/ acetic acid (180: 45: 5)
B, hexane/ diethyl ether/ formic acid (130: 80: 20)
B', hexane/ methyl tert-butyl ether/ formic acid (140: 72: 18)
C, toluene/ acetic acid (170: 30)
E, cyclohexane/ ethyl acetate (75: 25)
F, cyclohexane/ ethyl acetate (50: 50)
G, toluene/ ethyl acetate/ formic acid (139: 83: 8).
- 2) Whether the TLC spot is coloured in visible (natural) light and/or detectable in short wavelength ultraviolet light
- 3) The colour of the TLC spot in visible (natural) and long wavelength ultraviolet light after spraying with H_2SO_4 and charring
- 4) The colour of the TLC spot after spraying with Archer's solution
- 5) The results of medullary spot tests with K, C, KC, PD (when a compound gives a K^+ or C^+ reaction, then KC has been omitted, unless a different colour is produced by KC)
- 6) Three major peaks in the mass spectrum plus the molecular ion (if observed)
- 7) Up to ten biosynthetically related compounds
- 8) Notes: a one hundred long character message containing additional information regarding the characteristics of the particular substance.

The TLC Method

The basic methodology has been described in detail by Culberson and Kristinsson (1970), Culberson (1972), Culberson and Ammann (1978), and White and James (1985) and was used with minor modifications (detailed below). In particular, we have introduced new solvent systems (25% ethyl acetate/cyclohexane and 50% ethyl acetate/cyclohexane) and the measurement of relative R_F values (rather than absolute R_F values or R_F classes).

The Plates

Merck silica gel 60 F₂₅₄ pre-coated glass-backed TLC plates were used (layer thickness 0.25 mm) and were stored in a dry cupboard over self-indicating silica gel, but were not activated. Culberson (1972) recommended the trimming of 20 × 20 cm plates to 20 × 12.5 cm and only eluting to a height of 10 cm (the level of the solvent front). We consistently find that better

resolution of spots is obtained if the full 20 × 20 cm (or alternatively 10 × 20 cm) plate is used, and elution continued to the top of the plate (i.e. approximately 18 cm). For solvent E, elution to a height of 10 cm is quite adequate. In all solvent systems the spots were placed 1 cm apart, 2 cm above the base and beginning 2 cm from the edge of the plate (to avoid edge effects). After elution the plate is air-dried for approximately 30 minutes in a well-drafted fume cupboard before viewing under ultraviolet light, spraying, etc.

Extraction of the Lichen Material

Our normal procedure is to soak the lichen fragments in *c.* 1 ml of acetone for 5 minutes in a small test tube and then boil the solution to concentrate the original 1 ml of acetone to approximately 0.1 ml. This concentrated solution is then used for spotting on the TLC plate using a capillary tube – several times if necessary. It is advisable to view the plate under short wavelength ultraviolet light before proceeding in order to ascertain whether the spots are sufficiently intense; if not, further spotting may be necessary.

Solvents

Culberson's improved standardized method (Culberson 1972) used the three solvents A, B and C, constituted as detailed above, and these are still widely used in routine analyses.

We find that solvent C provides the best discrimination of lichen substances, and it is particularly stable and reliable.

Solvent A also is very useful, but as dioxane is hygroscopic, it gradually absorbs water, and R_F values obtained with 'aged' mixtures are unreliable and a secondary solvent front can develop.

The standard solvent B is reliable *provided* the solvent is replaced at frequent intervals, but the actual frequency depends on the atmospheric conditions and the number of chromatograms run.

In our experience the substitution of methyl *t*-butyl ether (solvent B') significantly improves the reliability and stability (lasting up to 4–5 days) of this comparable mixture. We now routinely use this in preference to standard solvent B (which rarely lasts beyond 6 hours).

Note: methyl *t*-butyl ether is a potent allergen.

Solvent C (Culberson, Culberson & Johnson 1981) is a very stable and reliable eluant and is particularly useful in separating compounds with relatively low R_F values in solvents A, B, B', and C (β -orcinol depsidones, secalonic acids and hopane triterpenoids).

Solvent E (25% ethyl acetate / 75% cyclohexane) and Solvent F (50% ethyl acetate / 50% cyclohexane) have been developed to discriminate non-polar derivatives and those compounds with very high R_F values in solvents A, B, B', and C (esters such as atranorin, chloroatranorin, pannarin, physciosporin, usnic acid, terpenes, xanthenes and other pigments).

These solvents are prepared fresh daily.

Equilibration and Elution

When using solvent A, B or B' a filter paper should be placed at the back of the tank and saturated with the solvent; the TLC plate is then placed in the tank with the silica-side facing the filter paper. This helps achieve uniform vapour saturation of the solvent throughout the tank and assures an even running of the solvent front. If a lower secondary solvent front is observed to develop, this indicates that the solvent mixture is wet and should be discarded and replaced.

When using solvents B, B' and C, it is important to 'preequilibrate' the plate with 60% formic acid vapour (for solvents B, B') or glacial acetic acid vapour (for solvent C) before proceeding with elution. Thus, after the plate has been spotted with the samples, it is placed in a tank saturated with acid vapour for the required time (5 minutes for B, B'; 10 minutes for C). The plate must not be wetted by the liquid acid. This is achieved by having a small quantity of liquid acid covering the base of a closed tank and supporting the dry plate to be pre-equilibrated on several glass islands (above the level of the liquid). Such pretreatment of the plates again ensures uniform travel of the solvent front and prevents the development of secondary solvent fronts.

Examination of the Developed Plates

The dried plates are examined initially in visible light (daylight) for pigments that appear as coloured spots. Their colour and position are recorded. Some pigments, such as the secalonic acids and related compounds (which are relatively pale and streak along the plate), are most easily seen if the plate is examined whilst being held in front of a strong (visible) light.

Next, the plates are examined under short wavelength (~ 254 nm) ultraviolet light, where all aromatic lichen substances are indicated by dark spots on a fluorescent background (fatty acids and terpenes are not observed under these conditions unless they are extremely concentrated). These spots should be marked for future reference. Several substances, such as alectoronic acid and α -collatolic acid, fluoresce bright blue under short wavelength ultraviolet light before spraying.

Subsequently, the plates are sprayed with water. When the wet plate is illuminated from above and viewed against a dark background, fatty acid spots show up as opaque white spots against a relatively dull background.

After brief drying the plates are sprayed with 10% sulfuric acid until wet (but with no run-off) or alternatively painted with 10% sulfuric acid using a soft pastry brush, and then heated at 110° in an oven or on a hotplate for 10 minutes to develop the spots. The various diagnostic colours of each lichen substance are well developed by this time and the R_F values and colour

(Acid Spray) should be recorded.

Note that colours should be recorded as soon as the plate has cooled, rather than later on, as they often alter with time. Extra purple or blue spots can also appear (which did not show up under ultraviolet light); these indicate lichen triterpenes and steroids.

Additional useful information can also be obtained by noting the colour of fluorescence of the developed spots under long wavelength (350 nm) ultraviolet light immediately after acid and heat treatment. Such colours become less prominent if the plates are stored.

The colours that develop after spraying and charring are concentration-dependent. Thus, a strong or intense spot (especially for depsides and depsidones) will appear as a spot of one colour with a ring or halo of a different colour. If the spot is weak, the compound being present in small quantities, it will appear as a uniform spot of the same colour as the halo of the corresponding intense spot. This phenomenon is observed in both visible light and under long wavelength ultraviolet light.

Other spray reagents can also be used. The use of 3-methyl-2-benzothiazolone hydrazone hydrochloride (MTBH or Archers Solution) has been developed by Archer (Archer 1978) as a complementary spray reagent to sulfuric acid/heat. This reagent develops characteristic colours with a number of depsides, depsidones and dibenzofurans.

Relative rather than Absolute R_F Values

The standardized method (Culberson 1972; Orange et al. 2010) utilized R_F classes determined on each plate by a control mixture (atranorin and norstictic acid), so that accurate reproducibility of the R_F values was not required. This method is very useful in limiting the number of possibilities for an 'unknown' spot, but often some ambiguity remains. Certainly, better resolution is usually observed, but the measured or absolute R_F value can fluctuate depending on the atmospheric conditions, the age of the solvent, etc. In practice we find that the most satisfactory method is to use relative R_F values, where one achieves maximum resolution as well as reproducibility. The key to this method is to use more than two compounds in the control mixture (a choice of those listed in Table 1). Although the absolute R_F values of the 'unknowns' can fluctuate, the R_F values of the controls will fluctuate in a parallel manner. Hence, the controls are assigned invariant R_F values, and all other spots are measured relative to them.

Confirmation of Identity

The identity of an 'unknown' substance can only be confirmed by comparative TLC in at least three of the solvent systems, that is, running the lichen extract adjacent to an extract containing this particular substance or, preferably, using a pure sample of the particular lichen compound. Then the R_F values as well as the fluorescent properties can be compared under

identical conditions. Even so, it is preferable to have independent confirmation of identity, e.g. via mass spectrometry or comparative HPLC.

Table 1. Standard RF values of control compounds.

Compound	RF in solvent					
	A	B	B'	C	E	G
Atranorin	75	78	73	79	57	—
Chloroatranorin	74	79	73	81	30	—
Usnic acid	70	70	65	71	23	—
4- <i>O</i> -Methylhypo- protocetraric acid	39	58	51	45	—	61
Notatic acid	34	49	44	38	—	55
Norstictic acid	40	29	32	30	—	57
Physodalic acid	10	30	33	19	—	46
Stictic acid	32	9	9	18	—	34
Salazinic acid	10	7	7	4	—	26

High performance thin layer chromatography (HPTLC)

High performance thin layer chromatography (HPTLC) is a method that can be used for screening lichen substances. It is as simple to use as standard TLC, but it is said to have many advantages. Although it is claimed to be more sensitive, I do not believe this to be the case and, in fact, is not as good at distinguishing the faster moving spots. However, it is possible to run more samples in a shorter period of time, and HPTLC requires less solvent. The detailed methodology is described in Arup *et al.* (1993).

HPLC Materials and Methods

Original HPLC Method (Feige *et al.* 1993)

A Kontron HPLC connected to a Data System 450 instrument with an UV-detector 430 and an autosampler 360 was used. Spherisorb 5 ODS 2 column (Kontron), 5 μm , 250 \times 4 mm was used. Two solvent systems were employed. Solvent system A is Aqua bidest, containing 1% orthophosphoric acid and solvent system B, methanol (Baker). The solvents were degassed for 30 minutes in an ultrasonic vibrator prior to use.

The substances were dissolved in acetone to which the two standards have been added (20 mg of benzoic acid and 20 mg of solorinic acid/1000 ml acetone) While benzoic acid elutes very rapidly, solorinic acid is very hypophobic. Only orsellinic acid, consalazinic acid and the phthalides elute more rapidly than benzoic acid and the RI values (detailed later) of these compounds are given as negative numbers.

The Programmed Run

Small volumes (20 μl) were chromatographed at 0.7ml/min. The run started with 30% B and continued isocratically for 1 minute. After 1 minute small volumes were injected and solvent system B increased to 70% within 14 minutes, then up to 100% in 30 minutes and then isocratically in 100% B for a further 18 minutes. The acquisition was then switched off, the solvent system B decreased to 30% within 1 minute and the column washed with 30% B/70% A for 16 minutes before a new chromatogram was started.

The compounds were detected at 245 nm wavelength, and UV spectra (200–400 nm) of each peak eluted were recorded automatically.

The RI Value

Benzoic and solorinic acids were used as internal standards by their addition to the extraction liquid (acetone). Solorinic acid was employed as a second internal standard. This compound is present in large quantities in the arctic-alpine lichen *Solorina crocea* and can be readily isolated because of its hydrophobicity. The RI value of an unknown peak is calculated as follows:

$$\text{RI} = \frac{\text{Rt of Peak} - \text{Rt of Benzoic acid}}{\text{Rt of Solorinic acid}} \times 100$$

The RI values as defined here are very stable during the lifetime of a column and are listed in the *Catalogue*.

Substances that are eluted at the same time often belong to different substance classes and can readily be distinguished by their UV spectra. Hence substance classes are specified for each compound in the *Catalogue*.

Modified HPLC Method (Elix et al. 2003)

Lichen fragments were extracted with warm methanol for high-performance liquid chromatography. Compounds were identified by HPLC with retention index values (RI) calculated from benzoic acid and solorinic acid controls.

For HPLC a Hewlett Packard HP 1050 Series System, a Phenomenex Hypersil 5 μ C18 column (250 \times 4.6 mm) and a spectrometric detector operating at 254 nm with a flow rate of 1 ml/min were used. Two solvent systems were employed: 1% aqueous orthophosphoric acid and methanol in the ratio 7:3 (A) and methanol (B). The run started with 100% A and was raised to 58% B within 15 min, then to 100% B within a further 15 min, followed by isocratic elution in 100% B for 10 min.

The HPLC was coupled to a photodiode array detector for ultraviolet spectroscopic comparisons. Thus, the ultraviolet spectra observed for the various components eluting in the HPLC chromatogram were recorded and computer-matched against a library of ultraviolet spectra recorded for 1060 authentic lichen metabolites under identical conditions. For each substance the correlation of ultraviolet spectra of the synthetic and natural material was greater than 99.9%.

Sample Layout of Data

2-Methoxypsoromic acid [Name of substance]

A: 35 B: x B': 44 C: 39 E: x G: x [R_F in standard solvent systems]

HPLC: 22 [RI value]

TLC: [R_F in other solvent systems]

V: - UV: + [Visibility in daylight and short wavelength ultraviolet light]

Acid Spray: Brown [Colour of spot after acid spray & charring] LW UV: Brown [Colour of charred spot under long- wavelength ultraviolet light]

Archers: No Result [colour after application of Archers solution]

K: No Result C: No Result KC: No Result PD: P.Yellow [Spot test results]

Mass spectrum: 388, 360, 359, 342

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: 2-Hydroxypsoromic acid

Reference: Elix, JA/ Wardlaw, JH/Archer, AW/Obermayer, W 1999: 2-Methoxypsoromic acid, a new lichen depsidone from *Pertusaria* and *Sulcaria* species. Australasian Lichenology 52: 717-719. [Relevant literature reference]

Notes: Occurs in *Sulcaria sulcata* (major) and *Pertusaria* sp. [Natural occurrence]

Additional notes - the terms **strong/weak** refer to the concentration of the substance. The terms **pale/bright/deep/dark** refer to the intensity of colour after development.

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Catalogue of Lichen Substances

Acaranoic acid

A: 43 B: x B': 24 C: 41 E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: No Result LW UV: Lilac

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 298, 280, 252, 157

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Acarenoic acid

Reference: Huneck, S/ Höfle, G 1980: Structure of acaranoic and acarenoic acids, *Phytochemistry* 19: 2713-2715.

Notes: Occurs in *Pleopsidium chlorophanum*

Acarenoic acid

A: 40 B: x B': 20 C: 36 E: x F: x G: x

HPLC: 30

V: – UV: –

Acid Spray: No Result LW UV: Lilac

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 296, 278, 260, 252

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Acaranoic acid

Reference: Huneck, S/ Höfle, G 1980: Structure of acaranoic and acarenoic acids, *Phytochemistry* 19: 2713-2715.

Notes: Occurs in *Pleopsidium chlorophanum*

3 β -Acetoxy-20,24-epoxydammarane-12 β ,25-diol [3-O-Acetylpyxinol]

A: x B: x B': x C: 47 E: 27 F: x G: 52

HPLC: x

V: – UV: –

Acid Spray: Purple LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 503, 500, 485

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β ,25-Diacetoxy-20,24-epoxydammarane, 3 β ,25-Diacetoxy-20,24-epoxydammarane-12 β -ol, 20,24-Epoxydammarane-3 β ,12 β ,25-triol, Methyl 3-*O*-acetoxypyxinate, Methyl pyxinate

Reference: Yosioka, I/ Yamauchi, H/ Kitagawa, I 1972: Lichen triterpenoids. V. On the neutral triterpenes of *Pyxine endochrysin* Nyl., Chemical and Pharmaceutical Bulletin (Tokyo) 20: 502-513.

Notes: Occurs in *Pyxine endochrysin*

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

A: x B: x B': x C: 52 E: 45 F: x G: 73

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 502, 487, 442, 398

Substance Class: Terpenoids

Biosynthetically Related Compounds: 25-Acetoxy-20,24-epoxydammarone-3-one, Methyl pyxinate

Reference: Huneck, S 1976: Inhaltsstoffe von *Pyxine coccifera*, Phytochemistry 15: 799-801.

Notes: Occurs in *Pyxine coccifera*

25-Acetoxy-20,24-epoxydammarane-3-one

A: x B: x B': x C: 52 E: 45 F: x G: 88

HPLC: x

V: – UV: –

Acid Spray: Purple LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 500, 485, 467, 425

Substance Class: Terpenoids

Biosynthetically Related Compounds: 25-Acetoxy-20,24-epoxydammarane-3 β -ol, Methyl pyxinate

Reference: Huneck, S 1976: Inhaltsstoffe von *Pyxine coccifera*, Phytochemistry 15: 799-801.

Notes: Occurs in *Pyxine coccifera*

3 β -Acetoxyfern-9(11)-ene-12 β -ol

A: 69 B: x B': 65 C: 41 E: 53 F: x G: 89

HPLC: x

V: – UV: –

Acid Spray: P. Brown LW UV: P. Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 484, 466, 451, 273

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxyfern-9(11)-ene-19 β -ol, 12 α -Acetoxyfern-9(11)-ene-3 β -ol, 3 β -Acetoxyfern-9(11)-ene-12-one, Fern-9(11)-ene-3,12-dione, Fern-9(11)-ene-3 β ,12 α -diol, Fern-9(11)-ene-12-one-3 β -ol

Reference: Wilkins, AL/ Elix, JA 1990: New fernene triterpenes from the lichen *Pseudocyphellaria aurata*: Australian Journal of Chemistry 43: 623-627.

Notes: Acid Spray: pale yellow-brown. LW UV: pale yellow, white halo. Occurs in *Pseudocyphellaria aurata*

3 β -Acetoxyfern-9(11)-ene-19 β -ol

A: 60 B: x B': 60 C: 56 E: 48 F: x G: 80

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 484, 469, 451, 409

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxyfern-9(11)-ene-12 β -ol, 12 α -Acetoxyfern-9(11)-ene-3 β -ol, 3 β -Acetoxyfern-9(11)-ene-12-one, Fern-9(11)-ene-3,12-dione, Fern-9(11)-ene-3 β ,12 α -diol, Fern-9(11)-ene-12-one-3 β -ol

Reference: Wilkins, AL/ Elix, JA 1990: New fernene triterpenes from the lichen *Pseudocyphellaria aurata*: Australian Journal of Chemistry 43: 623-627.

Notes: Acid Spray: fades to purple. LW UV: brown, orange halo. Occurs in *Pseudocyphellaria aurata*, *Pyxine berteriana*

12 α -Acetoxyfern-9(11)-ene-3 β -ol

A: 55 B: x B': 49 C: 45 E: 27 F: x G: 60

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 484, 442, 424, 391

Substance Class: Terpenoids

Biosynthetically Related Compounds: Fern-9(11)-ene-3,12-dione, Fern-9(11)-ene-3 β ,12 α -diol

Reference: Gonzales, AG/ Martin, LD, Pérez, C 1974: Three new triterpenes from the lichen *Xanthoria resendei*: Phytochemistry 13: 1547-1549.

Notes: Acid Spray: fades to purple. LW UV: brown, orange halo. Occurs in *Xanthoria resendei*

3 β -Acetoxyfern-9(11)-ene-12-one

A: 72 B: x B': 64 C: 56 E: 66 F: x G: 39

HPLC: x

V: – UV: –

Acid Spray: P. Brown L W UV: P. Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 482, 467, 397, 271

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxyfern-9(11)-ene-12 β -ol, 3 β -Acetoxyfern-9(11)-ene-19 β -ol, 12 α -Acetoxyfern-9(11)-ene-3 β -ol, Fern-9(11)-ene-3,12-dione, Fern-9(11)-ene-3 β ,12 α -diol, Fern-9(11)-ene-12-one-3 β -ol

Reference: Wilkins, AL/ Elix, JA 1990: New fernene triterpenes from the lichen *Pseudocyphellaria aurata*: Australian Journal of Chemistry 43: 623-627.

Notes: Acid Spray: pale yellow-brown. LW UV: pale yellow, white halo. Occurs in *Pseudocyphellaria aurata*

3 β -Acetoxyfern-9(11)-ene-19-one

A: 70 B: x B': x C: 60 E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: P. Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 482, 467, 407

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxyfern-9(11)-ene-19 β -ol, Fern-9(11)-ene-3.19-dione

Reference: Maier, MS/ Rosso, ML/ Fazio, AT/ Adler, MT/ Bertoni, MD 2009. Fernene triterpenoids from the lichen *Pyxine berteriana*. Journal of Natural Products 72: 1902-1904.

Notes: Occurs in *Pyxine berteriana*

3 β -Acetoxypopane-1 β ,22-diol

A: 51 B: x B': 34 C: 39 E: 23 F: x G: 53

HPLC: x

V: – UV: –

Acid Spray: P. Brown LW UV: Pink

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 502, 484, 466, 441

Substance Class: Terpenoids

Biosynthetically Related Compounds: x

Reference: Huneck, S/Preiss, A/Schmidt, J/ Morales Mendez, A 1983: 3 β -Acetoxypopane-1 β ,22-diol, a triterpene from the lichen *Pseudoparmelia texana*. *Phytochemistry* 22: 2027-2030.

Notes: Occurs in *Dirinaria* sp.

6 α -Acetoxypopane-7 β ,22-diol

A: 40 B: 24 B': x C: 34 E: 6 F: x G: x

HPLC: x

V: – UV: –

Acid Spray: P. Brown LW UV: P. Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: 7 β -Acetoxypopane-6 α ,22-diol, 7 β -Acetoxypopane-22-ol, Hopane-6 α ,22-diol [Zeorin], Hopane-7 β ,22-diol, Hopane-6 α ,7 β ,22-triol

Reference: Wilkins, AL/ James, PW 1979: The chemistry of *Pseudocypbellaria impressa* s. lat. in New Zealand. *Lichenologist* 11: 271-281.

Notes: Occurs in *Pseudocypbellaria crocata*

6 α -Acetoxypopane-16 β ,22-diol

A: 37 B: x B': 34 C: 34 E: 6 F: x G: 38

HPLC: x

V: – UV: –

Acid Spray: P. Brown LW UV: P. Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 502, 484, 442, 426

Substance Class: Terpenoids

Biosynthetically Related Compounds: 16 β -Acetoxypopane-6 α ,22-diol, 6 α -Acetoxypopane-22-ol, 6 α ,16 β -Diacetoxypopane-22-ol, Hopane-6 α ,22-diol [Zeorin], Hopane-16 β ,22-diol, Hopane-6 α ,16 β ,22-triol [Leucotylin]

Reference: Elix, JA/ Whitton, AA/ Jones, AJ 1982: Triterpenes from the lichen genus *Phycia*, *Australian Journal of Chemistry* 35: 641-647.

Notes: Occurs in *Parmelia [Myelochroa] entotheiochroa*, *Heterodermia tremulans*

7 β -Acetoxypopane-6 α ,22-diol

A: 47 B: 28 B': x C: 40 E: 10 F: x G: x

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: 6 α -Acetoxypopane-7 β ,22-diol, 7 β -Acetoxypopane-22-ol, Hopane-6 α ,22-diol [Zeorin], Hopane-7 β ,22-diol, Hopane-6 α ,7 β ,22-triol

Reference: Wilkins, AL/ James, PW 1979: The chemistry of *Pseudocyphellaria impressa* s. lat. in New Zealand. Lichenologist 11: 271-281.

Notes: Acid Spray: fades to purple. LW UV: fades to pale yellow. Occurs in *Pseudocyphellaria crocata*

16 β -Acetoxypopane-6 α ,22-diol

A: 41 B: x B': 29 C: 32 E: 8 F: x G: 36

HPLC: x

V: – UV: –

Acid Spray: P. Brown LW UV: P. Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 502, 484, 442, 424

Substance Class: Terpenoids

Biosynthetically Related Compounds: 6 α -Acetoxypopane-16 β ,22-diol, 6 α -Acetoxypopane-22-ol, 6 α ,16 β -Diacetoxypopane-22-ol, Hopane-6 α ,22-diol [Zeorin], Hopane-16 β ,22-diol, Hopane-6 α ,16 β ,22-triol [Leucotylin]

Reference: Elix, JA/ Whitton, AA/ Jones, AJ 1982: Triterpenes from the lichen genus *Physcia*, Australian Journal of Chemistry 35: 641-647.

Notes: Occurs in *Parmelia [Myelochroa] entotheiochroa*, *Heterodermia tremulans*

20 α -Acetoxypopane-6 α ,22-diol

A: x B: x B': 30 C: 36 E: 18 F: x G: x

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Pink

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 502, 484, 442, 424

Substance Class: Terpenoids

Biosynthetically Related Compounds: Hopane-6 α ,22-diol [Zeorin], Hopane-6 α ,20 α ,22-triol

Reference: Elix, JA/ Whitton, AA/ Jones, AJ 1982: Triterpenes from the lichen genus *Physcia*, Australian Journal of Chemistry 35: 641-647.

Notes: Occurs in *Physcia austrostellaris*

6 α -Acetoxypopane-22-ol [Acetylzeorin, Lesdainin]

A: 62 B: x B': 56 C: 53 E: 40 F: x G: 66

HPLC: x

V: –

UV: –

Acid Spray: Purple

LW UV: P.Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 484, 442, 0, 0

Substance Class: Terpenoids

Biosynthetically Related Compounds: 6 α -Acetoxypopane-16 β ,22-diol, 16 β -Acetoxypopane-6 α ,22-diol, 6 α ,16 β -Diacetoxypopane-22-ol, Hopane-6 α ,22-diol [Zeorin], Hopane-16 β ,22-diol, Hopane-6 α ,16 β ,22-triol [Leucotylin]

Reference: Wilkins, AL/ Elix, JA/ Gaul, KL/ Moberg, R 1989: New hopane triterpenoids from the lichen in the family Physciaceae, Austrian Journal of Chemistry 42: 1415-1422.

Notes: Occurs in *Botryolepraria lesdainii*

7 β -Acetoxypopane-22-ol [Peltidactylin]

A: 63 B: x B': 52 C: 49 E: 41 F: x G: 61

HPLC: x

V: –

UV: –

Acid Spray: P.Brown

LW UV: P.Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 486, 468, 426, 189

Substance Class: Terpenoids

Biosynthetically Related Compounds: 6 α -Acetoxypopane-7 β ,22-diol, 7 β -Acetoxypopane-6 α ,22-diol, Hopane-15 α ,22-diol, Hopane-7 β ,22-diol, Hopane-6 α ,7 β ,22-triol

Reference: Wilkins, AL/ James, PW 1979: The chemistry of *Pseudocyphellaria impressa* s. lat. in New Zealand. Lichenologist 11: 271-281.

Notes: Occurs in *Pseudocyphellaria billardieri*

15 α -Acetoxypopane-22-ol [Dolichorizin]

A: 61 B: x B': 52 C: 44 E: 30 F: x G: 58

HPLC: x

V: –

UV: –

Acid Spray: Brown

LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 486, 468, 426, 408

Substance Class: Terpenoids

Biosynthetically Related Compounds: Hopane-15 α ,22-diol

Reference: White, FJ/ James, PW 1987: A chemical checklist of British lichens: Part 2 (*Nephroma* and *Peltigera*), Bulletin of the British Lichen Society 60: 42-47.

Notes: LW UV: fades to pale yellow. Acid Spray: fades to purple. Occurs in *Peltigera aphthosa*

16 β -Acetoxyhopane-22-ol

A: x B: x B': x C: 55 E: 22 F: x G: x

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: P.Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 486, 468, 0, 0

Substance Class: Terpenoids

Biosynthetically Related Compounds: 6 α -Acetoxyhopane-16 β ,22-diol, 16 β -Acetoxyhopane-6 α ,22-diol, 6 α ,16 β -Diacetoxyhopane-22-ol, Hopane-6 α ,22-diol [Zeorin], Hopane-16 β ,22-diol, Hopane-6 α ,16 β ,22-triol [Leucotylin]

Reference: Yosioka, I/ Yamaki, M/ Kitagawa, I 1966: On the triterpenic constituents of a lichen *Parmelia entotheiochroa* Hue; zeorin, leucotylin, leucotylic acid, and five new related triterpenoids, Chemical and Pharmaceutical Bulletin (Tokyo) 14: 804-807.

Notes: Occurs in *Heterodermia spathulifera*

6 α -Acetoxy-22-hydroxyhopane-25-oic acid [Aipolic acid]

A: x B: x B': x C: 50 E: 10 F: x G: 50

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 498, 456, 454, 411

Substance Class: Terpenoids

Biosynthetically Related Compounds: 6 α -Acetoxyhopane-22-ol, Hopane-6 α ,22-diol [Zeorin]

Reference: Wilkins, AL/ Elix, JA/ Gaul, KL/ Moberg, R 1989: New hopane triterpenoids from the lichen in the family Physciaceae, Australian Journal of Chemistry 42: 1415-1422.

Notes: Occurs in *Physcia aipolia* from Kenya

16 β -Acetoxy-22-hydroxyhopane-4 α -oic acid [16-O-Acetylleucotylic acid]

A: x B: x B': x C: 39 E: 2 F: x G: 36

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: 16 β ,22-Dihydroxyhopane-4 α -oic acid [Leucotylic acid], Hopane-6 α ,22-diol [Zeorin], Hopane-16 β ,22-diol, Hopane-6 α ,16 β ,22-triol [Leucotylin]

Reference: Yosioka, I/ Nakanishi, T/ Yamauchi, H/ Kitagawa, I 1972: Lichen triterpenoids. IV. The structure of leucotylic acid and methyl isoleucotylate, an acid-induced isomer of methyl leucotylate, Chemical and Pharmaceutical Bulletin (Tokyo) 20: 487-501.

Notes: Occurs in *Parmelia [Myelochroa] entotheiochroa*

19-Acetoxylichesterinic acid

A: x B: x B': x C: 46 E: x F: x G: x

HPLC: 26

V: – UV: –

Acid Spray: No Result LW UV: Lilac

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 382, 364, 340, 322

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: 19-Acetoxyprotolichesterinic acid, protolichesterinic acid, lichesterinic acid

Reference: Ghogomu, RT/ Bodo, B 1982: Structural elucidation of 13-acetoxylichesterinic and 13-acetoxyprotolichesterinic acid, two aliphatic lichen metabolites from *Neoropogon trachycarpus*, Phytochemistry 21: 2355-2358.

Notes: LW UV: weak spot difficult to detect, often UV-quenching. Best seen as wet plate dries. Occurs in *Neoropogon trachycarpus [Usnea trachycarpa]*

19-Acetoxyprotolichesterinic acid

A: x B: x B': x C: 40 E: x F: x G: x

HPLC: 19

V: – UV: –

Acid Spray: No Result LW UV: Purple

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 382, 364, 340, 322

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: 19-Acetoxylichesterinic acid, protolichesterinic acid, lichesterinic acid

Reference: Ghogomu, RT/ Bodo, B 1982: Structural elucidation of 13-acetoxylichesterinic and 13-acetoxyprotolichesterinic acid, two aliphatic lichen metabolites from *Neoropogon trachycarpus*, Phytochemistry 21: 2355-2358.

Notes: LW UV: weak spot difficult to detect, often UV-quenching. Best seen as wet plate dries. Occurs in *Neoropogon trachycarpus [Usnea trachycarpa]*

2 α -Acetoxystictane-3 β ,22 α -diol

A: 45 B: x B': 33 C: 37 E: 19 F: x G: 44

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxystictane-2 α ,22 α -diol, 3 β -Acetoxystictane-22 α -ol, 22 α -Hydroxy-3,4-secostict-4(23)-enaldehyde, 22 α -Hydroxy-3,4-secostict-4(23)-enoic acid, Stictane-3 β ,22-diol

Reference: Chin, WJ/ Corbett, RE/ Heng, CK/ Wilkins, AL 1973: Lichen and fungi. Part XI. triterpenoids. IV.

Isolation and structural elucidation of a new group of triterpenes from *Sticta coronata*, *S. colensoi*, and *S. flavicans*, Journal of the Chemical Society, Perkin Transactions I: 1437-1446.Notes: Acid Spray: fades to purple. LW UV: fades to pink. Occurs in *Pseudocphellaria degelii* and *Ps. flavicans***3 β -Acetoxystictane-2 α ,22-diol**

A: 45 B: x B': 33 C: 40 E: 57 F: x G: 49

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: 2 α -Acetoxystictane-3 β ,22 α -diol, 3 β -Acetoxystictane-22 α -ol, 22 α -Hydroxy-3,4-secostict-4(23)-enaldehyde, 22 α -Hydroxy-3,4-secostict-4(23)-enoic acid, Stictane-3 β ,22-diol

Reference: Chin, WJ/ Corbett, RE/ Heng, CK/ Wilkins, AL 1973: Lichen and fungi. Part XI. triterpenoids. IV.

Isolation and structural elucidation of a new group of triterpenes from *Sticta coronata*, *S. colensoi*, and *S. flavicans*, Journal of the Chemical Society, Perkin Transactions I: 1437-1446.Notes: Acid Spray: fades to purple. LW UV: fades to pink. Occurs in *Pseudocphellaria degelii* and *Ps. flavicans* **α -Acetylconstictic acid**

A: 16 B: x B': 4 C: 11 E: x F: x G: 23

HPLC: x

V: – UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Yellow C: No Result KC: PD: Orange

Mass spectrum: 384, 370, 342, 314

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Connorstictic acid, Constictic acid, Cryptostictic acid, Menegazziaic acid, Methyl stictic acid, Norstictic acid, Stictic acid

Reference: Elix, JA/ Gaul, KL/ James, PW/ Purvis, OW 1987: Three New Lichen Depsidones. Australian Journal of Chemistry 40: 417-423.

Notes: Occurs in *Menegazzia platytrema*

α -Acetyl hypoconstictic acid

A: 34 B: x B': 14 C: 20 E: x F: x G: 46

HPLC: x

V: - UV: +

Acid Spray: P.Red LW UV: Pink

Archers: x

K: Yellow C: No Result KC: x PD: No Result

Mass spectrum: 430, 370, 354, 342

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Hypoconstictic acid, Hyposalazinic acid, Hypostictic acid, 4-*O*-Methylhypoprotocetraric acid

Reference: Elix, JA/ Gaul, KL/ James, PW 1985: α -Acetyl hypoconstictic acid, a new depsidone from the lichen *Menegazzia dispersa*. Australian Journal of Chemistry 38: 1735-1737.

Notes: Occurs in *Menegazzia dispersa*, *Xanthoparmelia metastrigosa*

5-*O*-Acetyl-4-*O*-methylhiascic acid

A: 30 B: x B': 34 C: 45 E: x F: x G: x

HPLC: x

V: - UV: +

Acid Spray: Yellow LW UV: Green

Archers: Red

K: No Result C: P.Red KC: Red PD: No Result

Mass spectrum: 1, 330, 304, 286

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: 4-*O*-Methylhiascic acid, Hiascic acid

Reference: Elix, JA/ Yu, J/ Tønnsberg, T 1991: 4-*O*-Methylhiascic acid and 5-*O*-acetyl-4-*O*-methylhiascic acid, two new lichen tridepsides. Australian Journal of Chemistry 44: 157-163.

Notes: Occurs in *Koerberiella wimmeriana*

2-*O*-Acetyltenuiorin

A: 63 B: 53 B': x C: 39 E: x F: x G: x

HPLC: x

V: – UV: +
Acid Spray: Yellow LW UV: Green

Archers: Red

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 1, 235, 224, 221

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Tenuiorin

Reference: Bryan, AJ/ Elix, JA 1976: 2-O-Acetyltenuiorin, a new tridepside from the lichen *Pseudocyphellaria australiensis*. Australian Journal of Chemistry 29: 1147-1151.

Notes: Reported to occur in *Pseudocyphellaria neglecta*

Acetyl- α -tocopherol [Tocopheryl acetate; vitamin E acetate]

A: 78 B: 90 B': x C: 77 E: x F: x G: x

HPLC: x

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 472, 430, 247, 207

Substance Class: Chromanes

Biosynthetically Related Compounds: α -Tocopherol [vitamin E]

Reference: Hamat, ALB/ Samsudin, MWB/ Din, LB/ Elix, JA 1993: Two new depsidones from the lichen *Erioderma phaeorhizum* Vainio *sensu lato*. Australian Journal of Chemistry 46: 153-156.

Notes: Occurs in *Erioderma tomentosum*

Acetylportentol

A: 65 B: 29 B': x C: 45 E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: No Result LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 352, 292, 277, 239

Substance Class: Aliphatic compound

Biosynthetically Related Compounds: Portentol

Reference: Aberhart, DJ/ Overton, KH/ Huneck, S 1970: Portentol: an unusual polypropionate from the lichen *Roccella portentosa*. Journal of the Chemical Society (C): 1612-1623.

Notes: Looks like fatty acid on plate. Occurs in *Roccella fuciformis*

Alectorialic acid

A: 36 B: 48 B': 50 C: 32 E: x F: x G: 60

HPLC: 18

V: + UV: +

Acid Spray: P.Brown LW UV: Brown

Archers: x

K: Yellow C: D.Red KC: PD: Yellow

Mass spectrum: -1, 332, 196, 150

Substance Class: Benzyl ester

Biosynthetically Related Compounds: Alectorialin, Barbatolic acid, Barbatolin, 5,7-Dihydroxy-6-methylphthalide

Reference: Persson, B/ Santesson, J 1970: Chemical studies on lichens. 27. The structure of the depside alectorialic acid. Acta Chemica Scandinavica 24: 345-346.

Notes: Occurs in *Alectoria nigricans*

Alectorialin

A: 37 B: x B': 34 C: 13 E: 10 F: x G: 49

HPLC: 13

V: - UV: +

Acid Spray: Grey LW UV: B.Blue

Archers: x

K: Yellow C: Red KC: PD: Yellow

Mass spectrum: 332, 314, 301, 137

Substance Class: Benzyl ester

Biosynthetically Related Compounds: Alectorialic acid, Barbatolic acid, Barbatolin, 5,7-Dihydroxy-6-methylphthalide

Reference: Elix, JA/ Jayanthi, VK 1987: Synthetic confirmation of the structure of the lichen benzyl esters alectorialic and barbatolic acids. Australian Journal of Chemistry 40: 1841-1850.

Notes: LW UV: strong dark blue, light blue halo. Occurs in *Alectoria nigricans*

Alectoronic acid [α -Alectoronic acid]

A: 33 B: 34 B': 31 C: 17 E: x F: x G: x

HPLC: 26

V: - UV: +

Acid Spray: P.Yellow LW UV: B.Blue

Archers: x

K: No Result C: No Result KC:P.Red PD: No Result

Mass spectrum: 494, 468, 450, 370

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: α -Collatolic acid, Lividic acid, Physodic acid, Oxyphysodic acid

Reference: Elix, JA/ Ferguson, BA/ Sargent, MV 1974: The structure of alectoronic acid and related lichen metabolites. Australian Journal of Chemistry 27: 2403-2411.

Notes: UV: fluoresces bright blue before spraying. Acid Spray: pale yellow, grey halo. Occurs in *Parmotrema rigidum*

β -Alectoronic acid

A: 7 B: 6 B': x C: 7 E: x F: x G: x

HPLC: 24

V: - UV: +

Acid Spray: P.Yellow LW UV: P.Blue

Archers: x

K: No Result C: Red KC: Red PD: No Result

Mass spectrum: -1, 495, 494, 468, 450

Substance Class: Diphenyl ether

Biosynthetically Related Compounds: Alectoronic acid, α -Collatolic acid, β -Collatolic acid

Reference: Stepanenko, LS/ Krivoshechekova, OA/ Mishchenko, NP 1985: Chemical variations of *Asahinea chrysantha*. Phytochemistry 24: 254-255.

Notes: Occurs in *Asahinea chrysantha*, *Parmelia birulae*

Alectosarmentin

A: 19 B: x B': x C: 12 E: x F: x G: x

HPLC: 5

V: - UV: +

Acid Spray: Grey LW UV: Purple

Archers: x

K: No Result C: Green KC: PD: No Result

Mass spectrum: 286, 240, 212, 184

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Di-*O*-methylstrepsilin, 7-*O*-Methylstrepsilin, Strepsilin

Reference: Gollapudi, SR/ Telikepalli, H/ Jampani, HB/ Mirhom, YW/ Drake, SD/ Bhattiprolu, KR/ van der Velde, D/ Mitscher, LA 1994: Alectosarmentin, a new antimicrobial dibenzofuran lactol from the lichen, *Alectoria sarmentosa*. Journal of Natural Products 57: 934-938.

Notes: Acid Spray: pale grey-blue. LW UV: strong purple, blue halo. Occurs in *Alectoria sarmentosa*, *Cladonia strepsilis*

Allorhizin

A: 57 B: 56 B': 52 C: 65 E: 32 F: x G: x

HPLC: x

V: - UV: -

Acid Spray: Yellow LW UV: Purple

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 398, 396, 361, 347

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Allorhizin methyl ether, Norvicanicin, Vicanicin

Reference: Elix, JA/ Lajide, L/ Galloway, DJ 1982: Metabolites from the lichen genus *Psoroma*. Australian Journal of Chemistry 35: 2325-2333.

Notes: Occurs in *Pannaria allorhiza*

Alternariol

A: 32 B: x B': 30 C: 10 E: x F: x G: x

HPLC: 11

V: - UV: +

Acid Spray: P.Yellow

LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 258

Substance Class: 3,4-Benzocoumarins

Biosynthetically Related Compounds: 9-O-Methylalternariol

Reference: Archer, AW/Elix, JA 1998: The lichen genus *Pertusaria* (Lichenised Ascomycotina) in Papua New Guinea: three new species and two new reports. Mycotaxon 69: 311-318.

Notes: Minor constituent of *Pertusaria praecipua*

Angardianic acid

A: 42 B: x B': 60 C: 48 E: x F: x G: x

HPLC: x

V: - UV: -

Acid Spray: No Result

LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 328, 310, 292, 282

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Roccellic acid

Reference: Leuckert, C/Kümmerling, H 1991: Chemotaxonomische Studien in der Gattung *Lepruloma* Nyl. ex Crombie (Lichenes). Nova Hedwigia 52: 17-32.

Notes: Occurs in *Lepraria alpina*

Anhydrofusarubin lactol

A: 40 B: x B': 11 C: 32 E: x F: x G: x

HPLC: 13

V: + UV: +

Acid Spray: Grey LW UV: Pink

Archers: x

K: Red C: No Result KC: PD: No Result

Mass spectrum: -1, 288

Substance Class: Naphthaquinone

Biosynthetically Related Compounds: Fusarubin

Reference: Elix, JA/Wardlaw, JH 2001: Anhydrofusarubin lactol from lichen sources. Australasia Lichenology 49: 10-11.

Notes: Violet pigment. Occurs in *Xanthoparmelia violacea*, *X. quinonella*

Anhydrofusarubin lactol methyl ketal

A: 54 B: x B': 23 C: 45 E: x F: x G: x

HPLC: 26

V: + UV: +

Acid Spray: Grey LW UV: Pink

Archers: x

K: Red C: No Result KC: PD: No Result

Mass spectrum: -1, 288

Substance Class: Naphthaquinone

Biosynthetically Related Compounds: Anhydrofusarubin lactol, Fusarubin

Reference: Elix, JA/Wardlaw, JH 2001: Anhydrofusarubin lactol from lichen sources. Australasia Lichenology 49: 10-11.

Notes: Violet pigment. Occurs in *Xanthoparmelia violacea*, *X. quinonella*

Anziaic acid

A: 40 B: 59 B': 55 C: 33 E: x F: x G: x

HPLC: 35

V: - UV: +

Acid Spray: P. Yellow LW UV: Green

Archers: Orange

K: No Result C: Red KC: Red PD: No Result

Mass spectrum: -1, 224, 206, 191

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*-Demethylmicrophyllinic acid, 2'-*O*-Methylanziaic acid, Olivetoric acid, Perlatolic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 114. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 237.

Notes: Acid Spray: strong-pale yellow, grey halo. LW UV: strong-purple, green halo. Occurs in *Anzia japonica*

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 300, 285, 268, 267

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Methyl ascomatate, 7-*O*-Methylnorascomatic acid, Norascomatic acid

Reference: Elix, JA/ Venables, D/ Wedin, M 1994: 70. New dibenzofurans and depsides from the lichen *Bunodophoron patagonicum*. Australian Journal of Chemistry 47: 1335-1344.

Notes: Occurs in *Bunodophoron patagonicum*

Asemone [4,5,7-Trichloronorlichexanthone]

A: 47 B: x B': 55 C: 38 E: 7 F: 20 G: x

HPLC: 37

V: + UV: +

Acid Spray: P.Yellow

LW UV: B.Blue

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass spectrum: 366, 364, 362, 360

Substance Class: Xanthones

Biosynthetically Related Compounds: 4,5-Dichloronorlichexanthone, 5,7-Dichloronorlichexanthone, 3-*O*-Methylasemone, 6-*O*-Methylasemone, Thiophanic acid,

Reference: Sundholm, EG 1979: Synthesis and ¹³C NMR Spectra of some 5-chloro substituted lichen xanthones. Acta Chemica Scandinavica 33B: 475-482.

Notes: Pale yellow pigment. Occurs in *Micarea isabellina*

Aspicilin

A: 20 B: x B': 14 C: 11 E: 7 F: x G: x

HPLC: 22

V: - UV: -

Acid Spray: No Result

LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 328, 310, 284, 227

Substance Class: Aliphatic compounds

Biosynthetically Related Compounds: x

Reference: Huneck, S/ Schreiber, K/ Steglich, W 1973: Flechteninhaltsstoffe- XCVIII. Struktur des Aspicilin. Tetrahedron 29: 3687-3693.

Notes: Occurs in *Aspicilia caesiocinerea*

Atranorin

A: 76 B: 78 B': 73 C: 79 E: 57 F: 85 G: x

HPLC: 38

V: – UV: +

Acid Spray: Orange LW UV: Orange

Archers: Orange

K: P.Yellow C: No Result KC: No Result PD: P.Yellow

Mass spectrum: 374, 196, 179, 178

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Chloroatranorin, 2'-O-Methylatranorin, Methyl 4-O-demethylbarbatate , Methyl 3 α -hydroxy-4-O-demethylbarbatate, Norbaeomycesic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 141. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 238.

Notes: Very common lichen metabolite. Occurs in *Physcia caesia*

Averantin

A: x B: x B': x C: x E: x F: x G: x

HPLC: x TLC: Rf 25 [benzene/ethyl formate/formic acid, 80/20/1]

V: + UV: +

Acid Spray: P.Red LW UV: Pink

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: -1, 354, 325, 311, 300

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 6-O-Methylaverythrin, Norsolorinic acid, Solorinic acid

Reference: Steglich, W/ Jedtke, K-F 1976: Neue Anthachinonfarbstoffe aus *Solorina crocea*. Zeitschrift für Naturforschung 31C: 197-198.

Notes: Yellow-orange pigment. Occurs in *Solorina crocea*

Averythrin

A: 42 B: x B': 53 C: 25 E: 9 F: x G: x

HPLC: x

V: + UV: +

Acid Spray: P.Red LW UV: Pink

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: 354, 325, 311, 300

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Averantin, 6-O-Methylaverythrin, Norsolorinic acid, Solorinic acid

Reference: Ebizuka, Y/ Sankawa, U/ Shibata, S 1970: The constituents of *Solorina crocea*: averythrin 6-monomethyl ether and methyl gyrophorate. Phytochemistry 9: 2061-2063.

Notes: Red-orange pigment. LW UV: bright pink initially. Occurs in *Solorina crocea*

Baeomycesic acid

A: 39 B: 40 B': 41 C: 42 E: 9 F: x G: x

HPLC: 28

V: – UV: +

Acid Spray: B.Yellow LW UV: Orange

Archers: Orange

K: Yellow C: No Result KC: PD: Yellow

Mass spectrum: 374, 194, 193, 182

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Barbatic acid, Haemathamnolic acid, 3 α -Hydroxybarbatic acid, Norbaeomycesic acid, Squamatic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 145. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 239.

Notes: Acid Spray: strong-yellow, grey halo. LW UV: orange, pale orange halo. Occurs in *Dibaeis* sp.

Barbatic acid

A: 44 B: 69 B': 67 C: 52 E: x F: x G: x

HPLC: 37

V: – UV: +

Acid Spray: Yellow LW UV: P.Yellow

Archers: D.Red

K: No Result C: No Result KC: Orange PD: No Result

Mass spectrum: 360, 196, 182, 179

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Baeomycesic acid, 4-*O*-Demethylbarbatic acid, Diffractaic acid, 3 α -Hydroxybarbatic acid, Methyl barbatate, Norobtusatic acid, Obtusatic acid, Squamatic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 145. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 239.

Notes: Acid Spray: strong to pale yellow, grey halo. LW UV: strong-purple, pale yellow halo. Widespread.

Barbatolic acid

A: 9 B: 48 B': 52 C: 26 E: x F: x G: 45

HPLC: 16

V: + UV: +

Acid Spray: P.Brown LW UV: P.Yellow

Archers: x

K: Yellow C: No Result KC: PD: Orange

Mass spectrum: -1, 346, 179, 177

Substance Class: Benzyl esters

Biosynthetically Related Compounds: Alectorialic acid, Alectorialin, Barbatolin, 6-Formyl-5,7-dihydroxyphthalide

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 166. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 312.

Notes: Visible: strong-very pale yellow. Acid Spray: pale yellow-brown. Occurs in *Bryoria capillaris*

Barbatolin

A: 46 B: 48 B': 43 C: 30 E: 13 F: x G: 60

HPLC: 10

V: – UV: +

Acid Spray: Yellow LW UV: Brown

Archers: x

K: Yellow C: No Result KC: PD: Orange

Mass spectrum: 346, 179, 177, 150

Substance Class: Benzyl esters

Biosynthetically Related Compounds: Alectorialic acid, Alectorialin, Barbatolic acid, 6-Formyl-5,7-dihydroxyphthalide

Reference: Elix, JA/ Jayanthi, VK 1987: Synthetic confirmation of the structure of the lichen benzyl esters alectorialic and barbatolic acids. Australian Journal of Chemistry 40: 1841-1850.

Notes: Minor constituent of *Bryoria nadvornikiana*

Biruloquinone

A: 80 B: 13 B': x C: 30 E: x F: x G: 45

HPLC: x

V: + UV: +

Acid Spray: Purple LW UV: No Result

Archers: x

K: No Result C: No Result KC: PD: No Result

Mass spectrum: 326, 298, 297, 280

Substance Class: Phenanthraquinones

Biosynthetically Related Compounds: x

Reference: Arnone, A/ Nasini, G/ Vajna de Pava, O 1991: A reinvestigation of the structure of biruloquinone, a 9,10-phenanthraquinone isolated from *Mycosphaerella rubella*. Phytochemistry 30: 2729-2731.

Notes: Violet pigment. Occurs in *Parmelia birulae*

7,7'-Bis(3-ethyl-2,5,6,8-tetrahydroxynaphtho-1,4-quinone) [Bisnorcristazarin]

A: 32 B: x B': x C: x E: x F: x G: x

HPLC: x

V: + UV: +

Acid Spray: Red LW UV: Magenta

K: Red C: No Result KC: PD: No Result

Mass spectrum: 499, 498, 497, 483

Substance Class: Naphthaquinones

Biosynthetically Related Compounds: 7-Demethylcristazarin, 6-Methylcristazarin, Cristazarin

Reference: Krivoshchekova, OE/ Maximov, OB/ Stepanenko, LS/ Mishchenko, NP 1982: Quinones of the lichen *Cetraria cucullata*. *Phytochemistry* 21: 193-196.

Notes: Occurs in *Flavocetraria cucullata*

Boninic acid

A: 44 B: 48 B': 41 C: 46 E: x F: x G: x

HPLC: 31

V: - UV: +

Acid Spray: P.Brown LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 416, 236, 224, 207

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4,4'-Di-O-methylcryptochlorophaeic acid, 2,4'-Di-O-methylnorsekikaic acid, Homosekikaic acid, 4'-O-Methylpaludolic acid, 2-O-Methylsekikaic acid, Paludolic acid, Sekikaic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 129. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 240.

Notes: Acid Spray: strong-pale yellow-brown, brown halo. Occurs in *Ramalina boninensis*

Boryquinone [3-Ethyl-2,5,7,8-tetrahydroxy-6-methylnaphtho-1,4-quinone, 6-Methylnorcristazarin]

A: 34 B: x B': 54 C: 16 E: x F: x G: x

HPLC: 26

V: + UV: +

Acid Spray: Purple LW UV: P.Brown

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 264, 249, 236, 221

Substance Class: Naphthaquinones

Biosynthetically Related Compounds: Hybocarpone

Reference: Huneck, S/ Ahti, T 1982: Lichen substances. Part 130. The chemistry of *Cladonia boryi*.

Pharmazie 37: 302.

Notes: Red pigment in *Cladonia boryi*

Bourgeanic acid

A: 54 B: 61 B': 62 C: 48 E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: No Result LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 387 [M+H], 287, 269, 258

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: x

Reference: Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 143.

Notes: Occurs in *Ramalina bourgeana*

Brialmontin 1

A: 72 B: x B': 75 C: 70 E: 76 F: x G: x

HPLC: 37

V: – UV: +

Acid Spray: P.Yellow LW UV: P.Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 372, 207, 193, 166

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Brialmontin 2, Nephroarctin, Phenarctin

Reference: Vinet, C/ Quilhot, W/ Gambaro, V/ Garbarino, JA 1990: Studies on Chilean Lichens. XIII.

Polysubstituted depsides from *Lecania brialmontii*. Journal of Natural Products 53: 500-502.

Notes: Occurs in *Lecania brialmontii*

Brialmontin 2

A: 78 B: x B': 85 C: 82 E: 84 F: x G: x

HPLC: 40

V: – UV: +

Acid Spray: P.Yellow LW UV: P.Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 358, 194, 193, 192

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Brialmontin 1, Nephroarctin, Phenarctin

Reference: Vinet, C/ Quilhot, W/ Gambaro, V/ Garbarino, JA 1990: Studies on Chilean Lichens. XIII.

Polysubstituted depsides from *Lecania brialmontii*. Journal of Natural Products 53: 500-502.

Notes: Occurs in *Lecania brialmontii*

Buellolide

A: 72 B: x B': 45 C: 63 E: 51 F: x G: x

HPLC: 23

V: - UV: +

Acid Spray: No Result

LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 436, 434, 432, 219

Substance Class: Diphenyl ethers

Biosynthetically Related Compounds: Canesolide, 3-Dechlorodiploicin, Dechloro-*O*-methyldiploicin, Diploicin

Reference: Sala, T/ Sargent, MV/ Elix, JA 1981: Depsidone Synthesis. Part 15. New Metabolites of the Lichen *Buellia canescens* (Dicks.) De Not: Novel Phthalide Catabolites of Depsidones. Journal of the Chemical Society, Perkin Transactions I: 849-854.

Notes: Best seen under SW UV before spraying. Occurs in *Diploicia cansescens*

Butlerin A

A: 76 B: x B': 45 C: 65 E: x F: x G: x

HPLC: 24

V: - UV: +

Acid Spray: P.Grey

LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 408, 367, 366

Substance Class: p-Terphenyls

Biosynthetically Related Compounds: Butlerin B, Butlerin C, Butlerin D, Butlerin E, Butlerin F

Reference: Elix, JA/ Gaul, KL/ Hockless, DRC/Wardlaw, JH 1995: Structure determination of butlerins A, B and C - three new lichen p-terphenyls. Australian Journal of Chemistry 48: 1049-1053.

Notes: Minor component in *Relicina connivens*

Butlerin B

A: 76 B: x B': 45 C: 65 E: x F: x G: x

HPLC: 24

V: - UV: +

Acid Spray: P.Grey

LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 408, 367, 366

Substance Class: p-Terphenyls

Biosynthetically Related Compounds: Butlerin A, Butlerin C, Butlerin D, Butlerin E, Butlerin F

Reference: Elix, JA/ Gaul, KL/ Hockless, DRC/Wardlaw, JH 1995: Structure determination of butlerins A, B and C - three new lichen p-terphenyls. Australian Journal of Chemistry 48: 1049-1053.

Notes: Minor component in *Relicina connivens*

Butlerin C

A: 72 B: x B': 36 C: 60 E: x F: x G: x

HPLC: 22

V: - UV: +

Acid Spray: P.Grey LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 436, 394, 352

Substance Class: p-Terphenyls

Biosynthetically Related Compounds: Butlerin A, Butlerin B, Butlerin D, Butlerin E, Butlerin F

Reference: Elix, JA/ Gaul, KL/ Hockless, DRC/Wardlaw, JH 1995: Structure determination of butlerins A, B and C- three new lichen p-terphenyls. Australian Journal of Chemistry 48: 1049-1053.

Notes: Minor component in *Relicina connivens*

Butlerin D

A: 72 B: x B': 42 C: 63 E: x F: x G: x

HPLC: -

V: - UV: +

Acid Spray: P.Grey LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 438, 396, 381

Substance Class: p-Terphenyls

Biosynthetically Related Compounds: Butlerin A, Butlerin B, Butlerin C, Butlerin E, Butlerin F

Reference: Elix, JA/ Ernst-Russell, MA 1996: Butlerins D, E and F-three new hexasubstituted lichen p-terphenyls. Australian Journal of Chemistry 49: 1247-1250.

Notes: Minor component in *Relicina connivens*

Butlerin E

A: 70 B: x B': 33 C: 58 E: x F: x G: x

HPLC: -

V: - UV: +

Acid Spray: P.Grey

LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 466, 424, 382

Substance Class: p-Terphenyls

Biosynthetically Related Compounds: Butlerin A, Butlerin B, Butlerin C, Butlerin D, Butlerin F

Reference: Elix, JA/ Ernst-Russell, MA 1996: Butlerins D, E and F-three new hexasubstituted lichen p-terphenyls. Australian Journal of Chemistry 49: 1247-1250.

Notes: Minor component in *Relicina connivens*

Butlerin F

A: 70 B: x B': 33 C: 58 E: x F: x G: x

HPLC: -

V: -

UV: +

Acid Spray: P.Grey

LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 466, 424, 382

Substance Class: p-Terphenyls

Biosynthetically Related Compounds: Butlerin A, Butlerin B, Butlerin C, Butlerin D, Butlerin E

Reference: Elix, JA/ Ernst-Russell, MA 1996: Butlerins D, E and F-three new hexasubstituted lichen p-terphenyls. Australian Journal of Chemistry 49: 1247-1250.

Notes: Minor component in *Relicina connivens*

Caloploicin

A: 65 B: x B': 69 C: 58 E: 29 F: x G: x

HPLC: 39

V: -

UV: +

Acid Spray: P.Grey

LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 406, 404, 402, 367

Substance Class: Orcinol β -Orcinol Depsidone

Biosynthetically Related Compounds: Diploicin, Fulgidin Fulgoicin, Isofulgidin, Vicanicin

Reference: Yosioka, I/ Hino, K/ Fujio, M/ Kitagawa, I 1971: A new trichlorodepsidone from a lichen of the genus *Caloplaca*. Chemical and Pharmaceutical Bulletin (Tokyo) 19: 1070-1073.

Notes: Acid Spray: pale grey; if weak, no result. LW UV: strong-purple. Occurs in *Caloplaca leptozona*

Calycin

A: 78 B: 81 B': 79 C: 88 E: 40 F: x G: x

HPLC: 47

V: +

UV: +

Acid Spray: Yellow

LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 306, 250, 161, 153

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Calycinic acid, Pulvinic acid, Pulvinic dilactone, Pulvinamide

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 210. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 399.

Notes: Yellow-orange pigment. Occurs in *Candelariella* spp. and *Pseudocyphellaria aurata*:

Calycinic acid

A: 8 B: 32 B': x C: x E: x F: x G: x

HPLC: x

V: +

UV: +

Acid Spray: Yellow

LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 324, 306, 161,

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Calycin, Pulvinic acid, Pulvinic dilactone

Reference: Maass, WSG 1970: Lichen substances IV. Incorporation of ¹⁴C-pulvinic acids into calycin by the lichen *Pseudocyphellaria crocata*. Canadian Journal of Biochemistry 48: 1241-1248.

Notes: Yellow pigment. Minor component in *Pseudocyphellaria crocata*

Canarione

A: 4 B: x B': 2 C: 3 E: x F: x G: x

HPLC: 4

TLC: R_F = 38 [formic acid/ethyl formate/benzene, 3/25/25].

V: +

UV: +

Acid Spray: Purple-brown

LW UV: Reddish purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 272, 244, 216, 203

Substance Class: Naphthaquinone

Biosynthetically Related Compounds: Calycinic acid, Pulvinic acid, Pulvinic dilactone, Pulvinamide

References: Huneck, S/ Steglich, W/ Höfle, G 1977: Canarion, ein neues Naphthachinon aus *Usnea canariensis*. Phytochemistry 16: 121-123.

Notes: Red pigment. Occurs in *Lethariella canariensis*

Canesolide

A: 73 B: x B': 63 C: 71 E: 45 F: x G: x

HPLC: 21

V: – UV: +

Acid Spray: No Result LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 472, 470, 468, 466

Substance Class: Diphenyl ethers

Biosynthetically Related Compounds: Buellolide, Diploicin, 3-Dechlorodiploicin, Dechloro-*O*-methyldiploicin

Reference: Sala, T/ Sargent, MV/ Elix, JA 1978: New metabolites of the lichen *Buellia canescens* (Dicks.) De

Not: novel phthalide catabolites of depsidones. Chemical Communications 1041-1042

Notes: Best seen under SW UV before spraying. Occurs in *Diploicia canescens*

Caperatic acid

A: 4 B: 27 B': 32 C: 6 E: x F: x G: 22

HPLC: x

V: – UV: –

Acid Spray: No Result LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 402, 384, 371, 366

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Methyl 3,4-dicarboxy-3-hydroxy-19oxoeicosanoate, Norcaperatic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press,

Chapel Hill: 101. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin,

Heidelberg, New York: 143.

Notes: LW UV: strong-white. Occurs in *Flavoparmelia caperata*, *F. haysomii*

Catenarin

A: 55 B: x B': 62 C: 40 E: 37 F: 67 G: x

HPLC: x

V: + UV: +

Acid Spray: Orange LW UV: Red

Archers: x

K: Red C: No Result KC: PD: No Result

Mass spectrum: 286, 258, 230

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chlorocatenarin, Emodin

Reference: Söchting, U/ Søgard, M/ Elix, JA/ Arup, U/ Elvebaak, D/ Sancho, LG 2014: *Catenarina* (Teloschistaceae, Ascomycota), a new Southern Hemisphere genus with 7-chlorocatenarin. Lichenologist 46: 175-188.

Notes: Red-orange pigment. Minor component in *Catenarina desolata*

Chiodectonic acid

A: 0 B: x B': 2 C: 1 E: x F: x G: 1

HPLC: 11

V: + UV: +

Acid Spray: Grey LW UV: Pink

Archers: x

K: P.Red C: No Result KC: x PD: No Result

Mass spectrum: 334, 319, 316, 291

Substance Class: Naphthaquinones

Biosynthetically Related Compounds: Rhodocladonic acid

References: Huneck, S 1976: Inhaltstoffe von *Pyxine coccifera*. Phytochemistry 15: 799-801

Notes: Purple-red pigment; turns bright crimson as soon as wet with H₂SO₄. Occurs in *Herpothallon rubrocincta*, *Pyxine coccifera*

Chalybaeizanic acid

A: 11 B: x B': 5 C: 10 E: x F: x G: x

HPLC: 10

V: - UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Red C: No Result KC: PD: Orange

Mass spectrum: 386, 341, 340

Substance Class: β-Orcinol Depsidones

Biosynthetically Related Compounds: Consalazinic acid, Salazinic acid

Reference: Elix, JA/ Wardlaw, JH 1999: The structure of chalybaeizanic acid and quaesitic acid, two new lichen depsidones related to salazinic acid. Australian Journal of Chemistry 52: 713-715.

Notes: Occurs in *Xanthoparmelia chalybaeizans*

Chloroatranorin

A: 74 B: 79 B': 73 C: 81 E: 30 F: 60 G: x

HPLC: 42

V: ± UV: +

Acid Spray: Orange LW UV: Orange

Archers: Orange

K: P. Yellow C: No Result KC: PD: Yellow

Mass spectrum: 408, 215, 213, 196

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Atranorin, Methyl 5-chloro-4-*O*-demethylbarbatate, Methyl 4-*O*-demethylbarbatate, Methyl 3 α -hydroxy-4-*O*-demethylbarbatate

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 146. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 241.

Notes: Visible (pale orange) in E; if very strong visible in all solvents. Widespread

7-Chlorocatenarin

A: 55 B: x B': 60 C: 48 E: 15 F: x G: x

HPLC: x TLC: Rf 20 [chloroform/acetone, 4/3]

V: + UV: +

Acid Spray: Orange LW UV: Red

Archers: x

K: Red C: No Result KC: PD: No Result

Mass spectrum: 322, 320

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Catenarin, 7-Chloroemodic acid, 7-Chloroemodin, 7-Chloroemodinal, 7-Citreorsein, Emodin

Reference: S \ddot{o} chting, U/ S \ddot{o} gard, M/ Elix, JA/ Arup, U/ Elvebaak, D/ Sancho, LG 2014: *Catenarina*

(Teloschistaceae, Ascomycota), a new Southern Hemisphere genus with 7-chlorocatenarin. Lichenologist 46: 175-188.

Notes: Red-orange pigment. Minor component in *Catenarina desolata*

7-Chlorocitreorsein

A: 18 B: x B': 22 C: 12 E: 1 F: x G: x

HPLC: 17

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 322, 320, 291, 264

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chloroemodin, 7-Chloroemodinal, 7-Chloroemodic acid, Emodin

Reference: Elix, JA/ Wardlaw, JH/ S \ddot{o} chting, U 2000: Two new anthraquinones from the lichen *Caloplaca spitsbergensis*. Herzogia 14: 27-30.

Notes: Intense yellow-orange pigment. Occurs in *Caloplaca spitsbergensis*

3-Chloro-4-O-demethylmicrophyllinic acid

A: 35 B: x B': 34 C: 22 E: x F: x G: x

HPLC: 25

V: – UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: Pink KC: Red PD: No Result

Mass spectrum: 284, 283, 282, 248

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-O-Demethylmicrophyllinic acid

Reference: Elix, JA/ Wardlaw, JH 2000: A new chloro-depside from the lichen *Hypotrachyna leiophylla*.

Australian Journal of Chemistry 53: 1007-1008.

Notes: Occurs in *Hypotrachyna leiophylla*

8-Chlorodioxocondidymic acid

A: 56 B: x B': 37 C: 44 E: x F: x G: x

HPLC: 17

V: – UV: +

Acid Spray: Blue LW UV: Purple

Archers: Green

K: No Result C: Green KC: PD: No Result

Mass spectrum: 462, 460, 444,

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: 8-Chlorodioxodidymic acid, 8-Chlorooxididymic acid, Dioxocondidymic acid, Dioxodidymic acid, Letrouitic acid, Oxodidymic acid

Reference: Johansson, S/ Sjøchting, U/ Elix, JA/ Wardlaw, JH 2005: Chemical variation in the lichen genus *Letrouitia* (Ascomycota, Letrouitiaceae). Mycological Progress 4: 139-148.

Notes: Minor component in *Letrouitia vulpina*

8-Chlorodioxodidymic acid

A: 44 B: x B': 27 C: 35 E: x F: x G: x

HPLC: 17

V: – UV: +

Acid Spray: Blue LW UV: Purple

Archers: Green

K: No Result C: Green KC: PD: No Result

Mass spectrum: 434, 432, 416

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: 8-Chlorodioxocondidymic acid, 8-Chlorooxididymic acid, Dioxocondidymic acid, Dioxodidymic acid, Letrouitic acid, Oxodidymic acid

Reference: Johansson, S/ Søchting, U/ Elix, JA/ Wardlaw, JH 2005: Chemical variation in the lichen genus *Letrouitia* (Ascomycota, Letrouitiaceae). *Mycological Progress* 4: 139-148.

Notes: Minor component in *Letrouitia vulpina*

7-Chloro-1,6-di-O-methylemodin [1-O-Methylfragilin]

A: 57 B: x B': 36 C: 47 E: 16 F: x G: x

HPLC: 35 TLC: Rf 20 [toluene]

V: + UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: 334, 332, 316, 314

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chloro-1-O-methylemodin, 7-Chloroemodin, Fragilin

Reference: Bendz, G/ Bohman, G/ Santesson, J 1967: Chemical studies on lichens 9. Chlorinated anthraquinones from *Nephroma laevigatum*. *Acta Chemica Scandinavica* 21: 2889-2891.

Notes: Orange pigment. Occurs in *Nephroma laevigatum* and *N. tangeriense*

7-Chloro-1,8-di-O-methylemodin [8-O-Methylfragilin]

A: x B: x B': x C: x E: 42 F: x G: x

HPLC: 37 TLC: Rf 54 [toluene]

V: + UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: 334, 332, 316, 314

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chloroemodin, Fragilin

Reference: Bohman, G 1968: Chemical studies on lichens 11. Anthraquinones from *Nephroma laevigatum*. *Arkiv för Kemi* 30: 217-223.

Notes: Yellow-orange pigment. Occurs in *Nephroma laevigatum* and *Caloplaca xanthaspis*

3-Chlorodivaricatic acid

A: 56 B: x B': 57 C: 46 E: x F: x G: x

HPLC: 32

V: - UV: +

Acid Spray: P. Yellow LW UV: Green

Archers: Orange

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 442, 244, 228, 226

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 3-Chloroperlatolic acid, 3-Chlorostenosporic acid, Divaricatic acid

Reference: Huneck, S/ Sundholm, G/ Follmann, G 1980: Chlorodivaricatsäure, ein neues Depsid aus *Thelomma mammosum*. *Phytochemistry* 19: 645-649.

Notes: Acid Spray: strong-pale yellow, grey halo. Occurs in *Thelomma mammosum*

5-Chlorodivaricatic acid

A: 42 B: x B': 62 C: 46 E: x G: x

HPLC: 33

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: Orange

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 334, 228, 226

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 3-Chlorodivaricatic acid, Divaricatic acid

Reference: Elix, JA/ Mayrhofer, H/Wippel, A 1995: 5-Chlorodivaricatic acid, a new depside from the lichen genus *Dimelaena*. *Australasian Lichenological Newsletter* 36: 25-26.

Notes: Minor component in *Dimelaena cf. radiata*

7-Chloroemodic acid

A: 46 B: x B': 37 C: 36 E: x F: x G: x

HPLC: 23

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 336, 334

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chloroemodin, 7-Chloroemodinal, 7-Chlorocitreorsein, Emodin

Reference: Elix, JA/ Wardlaw, JH/ Sjøchting, U 2000: Two new anthraquinones from the lichen *Caloplaca spitsbergensis*. *Herzogia* 14: 27-30.

Notes: Intense yellow-orange pigment. Occurs in *Caloplaca spitsbergensis*

4-Chloroemodin

A: 68 B: x B': 48 C: 54 E: 49 F: x G: x

HPLC: 36

V: + UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: 306, 304

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Emodin

Reference: Kondratyuk, SY/ Kärnefelt, I/ Elix, JA/ Thell, A 2009: Contributions to the Teloschistaceae, with particular reference to the Southern Hemisphere. *Bibliotheca Lichenologica* 100: 207-282.

Notes: Intense yellow pigment. Acid Spray: Yellow when cold, brown when hot. Occurs in *Caloplaca michelagoensis*

5-Chloroemodin

A: x B: x B': x C: 56 E: x F: x G: x

HPLC: 35

V: + UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: 306, 304,

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 5,7-Dichloroemodin, Emodin

Reference: Cohen, PA/ Towers, GHN 1995: The anthraquinones of *Heterodermia obscurata*.

Phytochemistry 40: 911-915.

Notes: Intense yellow pigment. Occurs in *Heterodermia obscurata*

7-Chloroemodin

A: 55 B: x B': 56 C: 47 E: 11 F: x G: x

HPLC: 38 TLC: Rf 50 [chloroform/methanol, 4/1], Rf 47 [chloroform/acetone, 4/1]

V: + UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: 306, 304,

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 5,7-Dichloroemodin, Emodin, Fragilin

Reference: Sargent, MV/ Smith, DO'N/ Elix, JA 1970: The minor anthraquinones of *Xanthoria parietina* (L.) Beltram, the chlorination of parietin and the synthesis of fragilin and 7-chloroemodin ("AO-1"). *Journal of the Chemical Society (C)*: 307-311.

Notes: Intense yellow pigment. Occurs in *Heterodermia obscurata*

7-Chloroemodin

A: 32 B: x B': x C: 27 E: 10 F: x G: x

HPLC: 19

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 320, 318, 289

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chloroemodin, 7-Chloroemodic acid, 7-Chlorocitreorsein, Emodin

Reference: Elix, JA/ Wardlaw, JH/ Søchting, U 2000: Two new anthraquinones from the lichen *Caloplaca spitsbergensis*. *Herzogia* 14: 27-30.

Notes: Intense yellow-orange pigment. Occurs in *Caloplaca spitsbergensis*

7-Chlorofallacinal

A: 63 B: x B': 50 C: 55 E: 20 F: x G: x

HPLC: 21 TLC: Rf 33 [oxalic acid-SiO₂/benzene]

V: + UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 334, 332, 303, 289

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chloroparietinic acid, Fallacinal, Fragilin

Reference: Nakano, H/ Komiya, T/ Shibata, S 1972: Anthraquinones of the lichens of *Xanthoria* and *Caloplaca* and their cultivated mycobionts. *Phytochemistry* 11: 3505-3508.

Notes: Yellow pigment. SW UV: bright orange before spraying. Minor constituent of *Caloplaca* sp., *Letrovitia leprolyta*

3-Chloroisosubdivaricatic acid

A: 36 B: x B': 45 C: 34 E: x F: x G: x

HPLC: 29

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: Orange

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 394, 229, 228, 227

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 3-Chlorodivaricatic acid, Subdivaricatic acid, 3-Chlorosubdivaricatic acid

Reference: Elix, JA/ Giralt, M/Wardlaw, JH 2003: New chloro-depsides from the lichen *Dimelaena radiata*.

Bibliotheca Lichenologica 86: 1-7.

Notes: Minor component in *Dimelaena radiata*

3-Chlorolecanoric acid

A: 34 B: x B': 41 C: 30 E: x F: x G: x

HPLC: 18

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: Orange

K: No Result C: Red KC: PD: No Result

Mass spectrum: 352, 187, 186, 185

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Lecanoric acid, 5-Chlorolecanoric acid, 3-Chloronordivarric acid

Reference: Elix, JA/ Giralt, M/Wardlaw, JH 2003: New chloro-depsides from the lichen *Dimelaena radiata*.

Bibliotheca Lichenologica 86: 1-7.

Notes: Minor component in *Dimelaena radiata*

5-Chlorolecanoric acid

A: 33 B: x B': 44 C: 29 E: x F: x G: x

HPLC: 18

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: 352, 187, 186, 185

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Lecanoric acid, 3,5-Dichlorolecanoric acid

Reference: Elix, JA/ Wardlaw, JH 2002: 5-Chlorolecanoric acid, a new depside from *Punctelia* species.

Australasian Lichenology 50: 6-9.

Notes: Minor constituent of *Punctelia pseudocoralloidea*, *P. subalbicans*, *P. subflava*

Chlorolecideoidin

A: 58 B: x B': 45 C: 48 E: x F: x G: x

HPLC: 28

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: Orange

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 436, 434, 432, 402

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: 3'-Dechlorolecideiodin, Lecideoidin, Leoidin

Reference: Lumbsch, HT/ Elix, JA 1993: Notes on the circumscription of the lichens *Lecanora leprosa* and *L. sulphurescens*. *Tropical Bryology* 7: 71-75.

Notes: Minor component in *Lecanora sulphurescens*, *Lecanora leprosa*

2-Chlorolichexanthone

A: 69 B: x B': 54 C: 70 E: 29 F: 80 G: x

HPLC: 47

V: + UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 322, 321, 320, 319

Substance Class: Xanthenes

Biosynthetically Related Compounds: 2-Chloro-6-*O*-methylnorlichexanthone, 2,4-Dichlorolichexanthone, 2,5-Dichlorolichexanthone, Lichexanthone

Reference: Elix, JA/ Musidlak, HW/ Sala, T/ Sargent, MV 1978: Structure and synthesis of some lichen xanthenes. *Australian Journal of Chemistry* 31: 145-155.

Notes: Pale yellow pigment. Acid Spray: sulphur yellow. LW UV: dull green. Occurs in *Pertusaria cicatricosa*

4-Chlorolichexanthone

A: 75 B: x B': 68 C: 78 E: 59 F: 88 G: x

HPLC: 50

V: + UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 322, 321, 320, 291

Substance Class: Xanthenes

Biosynthetically Related Compounds: 2-Chlorolichexanthone, 2,4-Dichlorolichexanthone, Lichexanthone

Reference: Elix, JA/ Musidlak, HW/ Sala, T/ Sargent, MV 1978: Structure and synthesis of some lichen xanthenes. *Australian Journal of Chemistry* 31: 145-155.

Notes: Pale yellow pigment. Occurs in *Sporopodium citrinum*

5-Chlorolichexanthone

A: 73 B: x B': 63 C: 77 E: 53 F: 83 G: x

HPLC: 48

V: + UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 322, 321, 320, 291

Substance Class: Xanthones

Biosynthetically Related Compounds: 5-Chloro-6-*O*-methylnorlichexanthone, 5-Chloronorlichexanthone, 2,5-Dichlorolichexanthone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. *Bryologist* 95: 52-64.

Notes: Pale yellow pigment. Occurs in *Lecanora contractula*

7-Chlorolichexanthone

A: 73 B: x B': 61 C: 77 E: 39 F: x G: x

HPLC: 52

V: + UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 322, 321, 320, 291

Substance Class: Xanthones

Biosynthetically Related Compounds: 7-Chloro-6-*O*-methylnorlichexanthone, 2,7-Dichlorolichexanthone, 2,7-Dichloro-6-*O*-methylnorlichexanthone,

Reference: Lumbsch, HT/ Elix, JA 1998: Five new species of *Lecanora* from Australia (lichenized Ascomycotina, Lecanoraceae). *Mycotaxon* 67: 391-403.

Notes: Pale yellow pigment. Minor component in *Lecanora contractuloides*

5-Chloro-2'-*O*-methylaniziaic acid

A: 39 B: x B': 38 C: 39 E: x F: x G: x

HPLC: 29

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers:

K: No Result C: P.Red KC: Red PD: No Result

Mass spectrum: -1, 242, 241, 240

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 3,5-Dichloro-2'-*O*-methylaniziaic acid, 3,5-Dichloro-2'-*O*-methylnordivarcatic acid, 3,5-Dichloro-2'-*O*-methylnorstenosporic acid

Reference: Elix, JA/ Barclay, CE/Lumbsch, HT/Wardlaw, JH 1997: New chloro depsides from the lichen *Lecanora lividocinerea*. *Australian Journal of Chemistry* 50: 971-975.

Notes: Minor component in *Lecanora lividocinerea*.

5-Chloro-1-*O*-methylcitreorosein [5-Chloro-1-*O*-methyl- ω -hydroxyemodin]

A: x B: x B': x C: x E: x F: x G: x
HPLC: x TLC: Rf 15 [chloroform/methanol, 9/1]
V: + UV: +

Acid Spray: Yellow-orange LW UV: Yellow

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: 336, 334

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 5-Chloroemodin, 5-Chloro-1-*O*-methylemodin, Emodin, 1-*O*-Methylemodin

Reference: Cohen, PA. 2002. Halogenated anthraquinones from the rare southern Illinois lichen *Lasallia papulosa*. Lichenologist 34: 521-525.

Notes: Intense yellow-orange pigment. Occurs in *Lasallia papulosa*

7-Chloro-1-*O*-methylcitreorosein [1-*O*-Methyl-7-chlorocitreorosein]

A: x B: x B': x C: 9 E: x F: x G: x
HPLC: 14 TLC: Rf 30 [chloroform/methanol, 9/1]
V: + UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 337, 335

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chlorocitreorosein

Reference: Reference: Cohen, PA/ Towers, GHN 1995: Anthraquinones and phenanthraperylenequinones from *Nephroma laevigatum*. Journal of Natural Products 58: 520-526.

Notes: Intense yellow pigment. Occurs in *Nephroma laevigatum*

5-Chloro-1-*O*-methylemodin

A: x B: x B': x C: x E: x F: x G: x
HPLC: x TLC: Rf 65 [chloroform/methanol, 9/1]
V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: 320, 318

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 5-Chloroemodin, 5-Chloro-1-*O*-methylcitreorosein, Emodin, 1-*O*-Methylemodin

Reference: Cohen, PA. 2002. Halogenated anthraquinones from the rare southern Illinois lichen *Lasallia papulosa*. Lichenologist 34: 521-525.

Notes: Intense yellow-orange pigment. Occurs in *Lasallia papulosa*

7-Chloro-1-O-methylemodin [1-O-methyl-7-chloroemodin]

A: x B: x B': x C: x E: 4 F: x G: x

HPLC: 35 TLC: Rf 70 [chloroform/methanol, 9/1], Rf 67 [chloroform/acetone, 4/1]

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: 318, 300, 290, 289

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chloroemodin, Emodin, 1-O-Methylemodin

Reference: Cohen, PA/ Towers, GHN 1995: Anthraquinones and phenanthraperylenequinones from *Nephroma laevigatum*. Journal of Natural Products 58: 520-526.

Notes: Intense yellow pigment. Occurs in *Nephroma laevigatum*

2-Chloro-6-O-methylnorlichexanthone

A: 56 B: x B': 53 C: 46 E: 20 F: 67 G: x

HPLC: 31

V: + UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass spectrum: 308, 307, 306, 305

Substance Class: Xanthenes

Biosynthetically Related Compounds: 2-Chlorolichexanthone, 4-Chloro-6-O-methylnorlichexanthone, 2-Chloronorlichexanthone, Lichexanthone, Thiophaninic acid

Reference: Elix, JA/ Musidlak, HW/ Sala, T/ Sargent, MV 1978: Structure and synthesis of some lichen xanthenes. Australian Journal of Chemistry 31: 145-155.

Notes: Pale yellow pigment. Occurs in *Pertusaria xanthoplaca*

4-Chloro-3-O-methylnorlichexanthone [Griseoxanthone B]

A: 54 B: x B': 62 C: 43 E: 36 F: 75 G: x

HPLC: 36

V: + UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass spectrum: 308, 307, 306, 305

Substance Class: Xanthones

Biosynthetically Related Compounds: 4-Chloro-6-*O*-methylnorlichexanthone, 4-Chlorolichexanthone, 4,5-Dichlorolichexanthone, 4,5-Dichloro-3-*O*-methylnorlichexanthone

Reference: Elix, JA/ Lumbsch, HT/ Lücking, R 1995: The chemistry of foliicolous lichens 2. Constituents of some *Byssoloma* and *Sporopodium* species. *Bibliotheca Lichenologica* 58: 81-96.

Notes: Occurs in *Sporopodium citrinum*

4-Chloro-6-*O*-methylnorlichexanthone

A: 56 B: x B': 55 C: 46 E: 30 F: 72 G: x

HPLC: 34

V: + UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass spectrum: 308, 307, 306, 305

Substance Class: Xanthones

Biosynthetically Related Compounds: 4-Chlorolichexanthone, 2-Chloro-6-*O*-methylnorlichexanthone, 4-Chloronorlichexanthone, Lichexanthone, Thiophaninic acid

Reference: Elix, JA/ Musidlak, HW/ Sala, T/ Sargent, MV 1978: Structure and synthesis of some lichen xanthones. *Australian Journal of Chemistry* 31: 145-155.

Notes: Yellow pigment. Occurs in *Pertusaria xanthoplaca*

5-Chloro-3-*O*-methylnorlichexanthone [Vinetorin]

A: 52 B: x B': 57 C: 48 E: 29 F: 69 G: x

HPLC: 35

V: + UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass spectrum: 308, 306, 279, 277

Substance Class: Xanthones

Biosynthetically Related Compounds: 5-Chlorolichexanthone, 5-Chloronorlichexanthone, 2,5-Dichloro-3-*O*-methylnorlichexanthone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. *Bryologist* 95: 52-64.

Notes: Yellow pigment. Occurs in *Lecanora vinetorum*

5-Chloro-6-*O*-methylnorlichexanthone

A: 50 B: x B': 45 C: 46 E: 31 F: 75 G: x

HPLC: 32

V: +

UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result C: Orange

KC: PD: No Result

Mass spectrum: 308, 306

Substance Class: Xanthones

Biosynthetically Related Compounds: 5-Chlorolichexanthone, 5-Chloronorlichexanthone, 2,5-Dichloro-6-O-methylnorlichexanthone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. Bryologist 95: 52-64.

Notes: Yellow pigment. Occurs in *Lecanora contractula*

7-Chloro-6-O-methylnorlichexanthone

A: 54 B: x B': 56 C: 36 E: 20 F: 61 G: x

HPLC: 40

V: +

UV: +

Acid Spray: Orange

LW UV: Yellow

Archers: x

K: No Result C: Orange

KC: PD: No Result

Mass spectrum: 308, 307, 306, 263

Substance Class: Xanthones

Biosynthetically Related Compounds: 7-Chlorolichexanthone, 7-Chloronorlichexanthone, 2,7-Dichloro-6-O-methylnorlichexanthone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. Bryologist 95: 52-64.

Notes: Yellow pigment. Occurs in *Lecanora populicola*, *L. salina*

1'-Chloronephroarctin

A: 69 B: 54 B': 52 C: 67 E: 17 F: x G: x

HPLC: 37

V: -

UV: +

Acid Spray: P.Yellow

LW UV: Brown

Archers: x

K: No Result C: No Result

KC: No Result

PD: Yellow

Mass spectrum: 406, 207, 202, 200

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Nephroarctin, Phenarctin

Reference: Elix, JA/ Wilkins, AL/Wardlaw, JH 1987: Five new fully substituted depsides from the lichen *Pseudocyphellaria pickeringii*. Australian Journal of Chemistry 40: 2023-2029.

Notes: Acid Spray: very pale yellow, grey halo. LW UV: orange-brown, fades to orange. Minor component in *Pseudocyphellaria pickeringii*

3-Chloronordivarcic acid

A: 37 B: x B': 50 C: 36 E: x F: x G: x

HPLC: 25

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: Orange

K: No Result C: P.Red KC: Red PD: No Result

Mass spectrum: -1, 213, 212, 195

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 3-Chlorolecanoric acid, Nordivarcic acid, 3-Chlorodivarcic acid

Reference: Elix, JA/ Giralt, M/Wardlaw, JH 2003: New chloro-depsides from the lichen *Dimelaena radiata*.

Bibliotheca Lichenologica 86: 1-7.

Notes: Minor component in *Dimelaena radiata*

2-Chloronorlichexanthone

A: 36 B: x B': 41 C: 19 E: 7 F: 44 G: x

HPLC: 28

V: + UV: +

Acid Spray: No Result LW UV: B.Blue

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass spectrum: 294, 293, 292, 291

Substance Class: Xanthones

Biosynthetically Related Compounds: 2-Chlororlichexanthone, 2-Chloro-6-O-methylnorlichexanthone, 2,7-Dichloronorlichexanthone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. *Bryologist* 95: 52-64.

Notes: Yellow pigment. Occurs in *Lecanora populicola*

4-Chloronorlichexanthone

A: 38 B: x B': 43 C: 23 E: 19 F: x G: x

HPLC: 21

V: + UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass spectrum: 294, 293, 292, 291

Substance Class: Xanthones

Biosynthetically Related Compounds: 4-Chlorolichexanthone, 4-Chloro-6-*O*-methylnorlichexanthone, 2,4-Dichloronorlichexanthone

Reference: Elix, JA/ Musidlak, HW/ Sala, T/ Sargent, MV 1978: Structure and synthesis of some lichen xanthones. Australian Journal of Chemistry 31: 145-155.

Notes: Yellow pigment. Occurs in *Lecanora straminea*

5-Chloronorlichexanthone

A: 40 B: x B': 46 C: 25 E: 17 F: x G: x

HPLC: 19

V: + UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass spectrum: 294, 292, 263, 257

Substance Class: Xanthones

Biosynthetically Related Compounds: 5-Chlorolichexanthone, 5-Chloro-3-*O*-methylnorlichexanthone, 5-Chloro-6-*O*-methylnorlichexanthone, 2,5-Dichloronorlichexanthone

Reference: Elix, JA/ Lumbsch, HT/ Lücking, R 1995: The chemistry of foliicolous lichens 2. Constituents of some *Byssoloma* and *Sporopodium* species. Bibliotheca Lichenologica 58: 81-96.

Notes: Yellow pigment. Occurs in *Lecanora straminea*

7-Chloronorlichexanthone

A: 42 B: x B': 47 C: 26 E: 42 F: 78 G: x

HPLC: 39

V: + UV: +

Acid Spray: P.Yellow LW UV: B.Blue

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: 294, 292, 257, 229

Substance Class: Xanthones

Biosynthetically Related Compounds: 7-Chlorolichexanthone, 7-Chloro-6-*O*-methylnorlichexanthone, 2,7-Dichloronorlichexanthone, 5,7-Dichloronorlichexanthone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. Bryologist 95: 52-64.

Notes: Yellow pigment. Occurs in *Lecanora populicola*

8-Chlorooxididymic acid

A: 60 B: x B': 55 C: 48 E: x G: x

HPLC: 37

V: – UV: +

Acid Spray: Blue LW UV: Purple

Archers: Green

K: No Result C: Green KC: PD: No Result

Mass spectrum: 420, 418, 400

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: 8-Chlorodioxocondidymic acid, 8-Chlorodioxodidymic acid, Dioxocondidymic acid, Dioxodidymic acid, Letrouitic acid, Oxodidymic acid

Reference: Johansson, S/Søchting, U/Elix, JA/ Wardlaw, JH 2005: Chemical variation in the lichen genus *Letrouitia* (Ascomycota, Letrouitiaceae). Mycological Progress 4: 139-148.

Notes: Minor component in *Letrouitia vulpina*

7-Chloroparietinic acid

A: 42 B: x B': 47 C: 47 E: 0 F: x G: x

HPLC: 32

V: + UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 350, 348

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chorofallacinal, 7-Choroteloschistin, Fragilin

Reference: Johansson, S/ Søchting, U/ Elix, JA/ Wardlaw, JH 2005: Chemical variation in the lichen genus *Letrouitia* (Ascomycota, Letrouitiaceae). Mycological Progress 4: 139-148.

Notes: Minor component in *Letrouitia leprolyta*

3-Chloroperlatolic acid

A: 47 B: x B': 66 C: 51 E: x F: x G: x

HPLC: 45

V: – UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: Orange

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 272, 256, 254

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 3- Chlorodivarcatic acid, 3-Chlorostenosporic acid, Perlatolic acid

Reference: Elix, JA/ Evans, JE/ Nash III, TH 1988: New depsides from *Dimelaena* lichens. Australian Journal of Chemistry 41: 1789-1796.

Notes: Acid Spray: pale yellow, grey halo. LW UV: strong-purple, green halo. Occurs in *Dimelaena californica*

Chlorophyllopsorin

A: 72 B: x B': 53 C: 73 E: 15 F: x G: x

HPLC: 28

V: - UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: Yellow

Mass Spectrum: 412, 410, 384, 382

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds Allorhizin, Argopsin, Methyl 2,7-dichloropsoromate, Methyl 2,7-dichloronorsoromate, Phyllopsorin

Reference: Elix, JA/ Venables, DA/ Brako, L 1990: New chlorine containing depsidones from the lichen *Phyllopsora corallina* var. *ochroxantha*. Australian Journal of Chemistry 43: 1953-1959.

Notes: Occurs in *Phyllopsora africana*

3-Chlorostenosporic acid

A: 44 B: x B': 61 C: 49 E: x F: x G: x

HPLC: 39

V: - UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: Orange

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 244, 228, 226

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 3- Chlorodivartic acid, 3-Chloroperlatolicc acid, Stenosporic acid

Reference: Elix, JA/ Evans, JE/ Nash III, TH 1988: New depsides from *Dimelaena* lichens. Australian Journal of Chemistry 41: 1789-1796.

Notes: Acid Spray: pale yellow, grey halo. LW UV: strong-purple, green halo. Occurs in *Dimelaena californica*

3-Chlorosubdivaricatic acid

A: 36 B: x B': 45 C: 34 E: x G: x

HPLC: 29

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers:

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 394, 216, 201, 200

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 3-Chlorodivartic acid, Subdivaricatic acid, 3-Chloroisosubdivaricatic acid

Reference: Elix, JA/ Giralt, M/Wardlaw, JH 2003: New chloro-depsides from the lichen *Dimelaena radiata*.
Bibliotheca Lichenologica 86: 1-7.

Notes: Minor component in *Dimelaena radiata*

7-Choroteloschistin

A: 43 B: x B': 30 C: 33 E: 11 F: x G: x

HPLC: 18

V: + UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 336, 334

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Choroparietinic acid, 7-Chorofallacinal, Fragilin

Reference: Johansson, S/ Søchting, U/ Elix, JA/ Wardlaw, JH 2005: Chemical variation in the lichen genus *Letrouitita* (Ascomycota, Letrouitiaceae). Mycological Progress 4: 139-148.

Notes: Orange pigment. SW UV: bright orange before spraying. Minor constituent of *Letrouitita leprolyta*

2-Chlorovirensic acid [5-Chlorovirensic acid]

A: 30 B: x B': 58 C: 38 E: x F: x G: x

HPLC: 33

V: - UV: +

Acid Spray: Green LW UV: Brown

Archers: x

K: No Result C: No Result KC: No Result PD: Orange

Mass spectrum: 394, 392, 376, 374

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Physciosporin, Virensic acid

Reference: New report

Notes: Minor accessory substance in *Pseudocyphellaria faveolata*

7-Chloro-1,6,8-trihydroxy-3-methyl-9-anthrone [AO1-Anthrone]

A: 55 B: x B': x C: 45 E: x F: x G: x

HPLC: 34

V: + UV: +

Acid Spray: P.Yellow LW UV: Yellow

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 292, 290

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chloroemodin, 5,7-Dichloroemodin, Emodin

Reference: Elix, JA/ Wardlaw, JH/ Søchting, U 2000: Two new anthraquinones from the lichen *Caloplaca spitsbergensis*. *Herzogia* 14: 27-30.

Notes: Pale yellow pigment. Occurs in *Caloplaca spitsbergensis*, *Heterodermia obscurata*

Chodatín

A: 66 B: x B': 64 C: 68 E: x F: x G: x

HPLC: 52

V: + UV: +

Acid Spray: Yellow LW UV: Orange

K: No Result C: Orange KC: PD: No Result

Archers: x

Mass spectrum: 408, 406, 404, 393

Substance Class: Xanthenes

Biosynthetically Related Compounds: Demethylchodatín, Isoarthothelin, 2,5,7-Trichloro-3-O-methylnorlichexanthone

Reference: Knoph, J-G 1990: Untersuchungen an gesteinbewohnenden xanthonhaltigen Sippen der Flechtengattung *Lecidella* (Lecanoraceae, Lecanorales) unter besonderer Berücksichtigung von aussereuropäischen Proben exclusive Amerika. *Bibliotheca Lichenologica* 36: 1-183.

Notes: Occurs in *Lecidella granulosa*

Chrysophanal

A: 58 B: x B': 51 C: 47 E: 10 F: x G: x

HPLC: 17

V: + UV: +

Acid Spray: Orange LW UV: Magenta

Archers: x

K: Red-violet C: No Result KC: PD: No Result

Mass spectrum: 268

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Chrysophanol, Rhein

Reference: Kondratyuk, SY/ Kärnefelt, I/ Elix, JA/ Thell, A 2007: New species of the genus *Caloplaca* in Australia. *Bibliotheca Lichenologica* 95: 341-386.

Notes: Yellow pigment. Occurs in *Caloplaca rheiniger*

Chrysophanol [Chrysophanic acid]

A: 75 B: x B': 80 C: 80 E: 80 F: 90 G: x

HPLC: 35

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: Red-violet C: No Result KC: PD: No Result

Mass spectrum: 254

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Chrysophanal, Rhein

Reference: Kondratyuk, SY/ Kärnefelt, I/ Elix, JA/ Thell, A 2007: New species of the genus *Caloplaca* in Australia. *Bibliotheca Lichenologica* 95: 341-386.

Notes: Intense yellow pigment. Occurs in *Caloplaca rheinigera*

Cinchonaric acid [3-*O*-Methylprotocetraric acid]

A: 2 B: x B': 6 C: 3 E: x F: x G: x

HPLC: 10

V: - UV: +

Acid Spray: Grey

LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: Red

Mass spectrum: x

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Protocetraric acid

Reference: Frisch, A/ Kalb, K/ Grube, M 2006: Contributions towards a new systematics of the lichen family Thelotemataceae. *Bibliotheca Lichenologica* 92: 1-556 [as chinconarum unknown].

Notes: Occurs in *Ocellularia cavata*

Citreorsein

A: 26 B: x B': 22 C: 11 E: 2 F: x G: x

HPLC: 14

V: + UV: +

Acid Spray: Yellow

LW UV: Yellow

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 286, 257

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Emodin, Emodinal, Emodic acid

Reference: Piatelli, M/ Giudici de Nicola, M 1968: Anthraquinone pigments from *Xanthoria parietina* (L.) Th. Fr. *Phytochemistry* 7: 1183-1187.

Notes: Yellow pigment. Occurs in *Caloplaca stewartensis*, *Xanthoria parietina*

Colensoic acid

A: 41 B: 73 B': 66 C: 47 E: x F: x G: x

HPLC: 41

V: – UV: +

Acid Spray: Orange-brown LW UV: Pink

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 442, 424, 398, 226

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Divaronic acid, Hydroxycolensoic acid, Lividic acid, Methoxycolensoic acid, Norcolensoic acid, Oxyphysodic acid Physodic acid, Stenosporonic acid

Reference: Fox, CH/ Klein, E/ Huneck, S 1970: Colensoinsäure, ein neues Depsidon aus *Stereocaulon colensoi*. *Phytochemistry* 9: 2567-2571.

Notes: Acid Spray: pale orange-brown, grey halo. LW UV: metallic purple-pink. Occurs in *Stereocaulon colensoi*

α -Collatolic acid

A: 40 B: 32 B': 35 C: 35 E: x F: x G: x

HPLC: 26

V: – UV: +

Acid Spray: P.Yellow LW UV: D.Blue

Archers: x

K: No Result C: No Result KC: P.Red PD: No Result

Mass spectrum: 508, 482, 263, 262

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Alectoronic acid, Dehydrocollatolic acid, 4-O-Methylphysodic acid, Physodic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 135. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 317

Notes: SW UV: fluoresces bright blue before spraying. Occurs in *Tephromela atra*

β -Collatolic acid

A: 32 B: 10 B': x C: 26 E: x F: x G: x

HPLC: 22

V: – UV: +

Acid Spray: P.Yellow LW UV: Blue

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: -1, 508, 483, 482

Substance Class: Diphenyl ethers

Biosynthetically Related Compounds: Alectoronic acid, β -Alectoronic acid, α -Collatolic acid

References: Stepanenko, NL/ Krivoshechekova, OA/ Mishchenko, NP 1985: Chemical variations of *Asahinea chrysantha*. *Phytochemistry* 24: 254-255.

Notes: Occurs in *Asahinea chrysantha*

Concinchonaric acid

A: 3 B: x B': 9 C: 5 E: x F: x G: x

HPLC: 12

V: - UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: x C: x KC: x PD: x

Mass spectrum:

Substance Class: unknown

Biosynthetically Related Compounds: Cinchonaric acid

Reference: Frisch, A/ Kalb, K/ Grube, M 2006: Contributions towards a new systematics of the lichen family Thelotemataceae. *Bibliotheca Lichenologica* 92: 1-556 [accessory to chinconarum unknown].

Notes: Occurs in *Ocellularia cavata*

Condidymic acid

A: 47 B: 77 B': 74 C: 52 E: x F: x G: x

HPLC: 40

V: - UV: +

Acid Spray: Blue-grey LW UV: Purple

Archers: x

K: No Result C: Green KC: No Result PD: No Result

Mass spectrum: 398, 380, 354, 298

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Didymic acid, Isodidymic acid, Subdidymic acid

Reference: Chester, DO/ Elix, JA 1981: Condidymic acid, a new dibenzofuran from the lichen *Cladonia squamulosa*. *Australian Journal of Chemistry* 34: 1501-1506.

Notes: Occurs in *Cladonia floerkeana*

Conechinocarpic acid

A: 18 B: 38 B': 37 C: 27 E: x F: x G: x

HPLC: 27

V: - UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: P.Yellow

Mass spectrum: -1, 299, 257, 196

Substance Class: Benzyl esters

Biosynthetically Related Compounds: Echinocarpic acid, Hirtifructic acid

Reference: Elix, JA/ Wardlaw, JH 1996: Hypolectorialic acid and conechinocarpic acid, two new benzyl esters from lichens. Australian Journal of Chemistry 49: 727-729.

Notes: Occurs in *Relicina samoensis*

Coneuplectin

A: 55 B: x B': 17 C: 47 E: 11 F: x G: x

HPLC: 25

V: + UV: +

Acid Spray: P.Yellow LW UV: P.Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 297, 296

Substance Class: Naphthopyrones

Biosynthetically Related Compounds: Euplectin

Reference: Ernst-Russell, MA/Chai, CLL/Wardlaw, JH /Elix, JA 2000: Euplectin and coneuplectin, new naphthopyrones from the lichen *Flavoparmelia euplecta*. Journal of Natural Products 63: 129-131.

Notes: Yellow-orange pigment. Occurs in *Flavoparmelia euplecta*

Confluent acid

A: 48 B: 32 B': 32 C: 46 E: x F: x G: x

HPLC: 29

V: - UV: +

Acid Spray: P.Yellow LW. UV: B.Blue

Archers: P.Red

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 280, 266, 262

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Hyperconfluent acid, 2'-O-Methylconfluent acid, 2'-O-Methylmicrophyllinic acid, 2'-O-Methylperlatolic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 114. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 244.

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Parapropidia leptocarpa*

Confriesii acid

A: 12 B: x B': 23 C: 17 E: x F: x G: x

HPLC: 24

V: - UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: Depsido-depsones

Biosynthetically Related Compounds: Friesiic acid

Reference: Elix, JA 2005: New species of sterile crustose lichens from Australasia. *Mycotaxon* 94: 219-224.

Notes: Occurs in *Xylographa isidiosa*

Confumarprotocetraric acid

A: 2 B: x B': 2 C: 2 E: x F: x G: 17

HPLC: 15

V: - UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 209, 151, 149, 135

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Fumarprotocetraric acid

Reference: Elix, JA/ Yu, J 1993: New lichen β -orcinol depsidones and their congeners. *Journal of the Hattori*

Botanical Laboratory 74: 317-323.

Notes: Occurs in *Cladonia phyllophora*

Congrayanic acid

A: 29 B: 47 B': 45 C: 34 E: x F: x G: x

HPLC: 37

V: - UV: +

Acid Spray: P.Orange LW UV: Pink

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: 432, 388, 370, 344

Substance Class: Diphenyl ethers

Biosynthetically Related Compounds: 4-O-Demethylgrayanic acid, Grayanic acid

Reference: Chester, DO/ Elix, JA 1980: A new dibenzofuran and diphenyl ether from the lichen *Gymmoderma melacarpum*. *Australian Journal of Chemistry* 33: 1153-1156.

Notes: Acid Spray: pale orange, grey halo. LW UV: purplish pink. Occurs in *Neophyllis melacarpa*

Conhirtifructic acid

A: 45 B: x B': 35 C: 33 E: x F: x G: x

HPLC: 22

V: - UV: +
Acid Spray: Orange LW UV: Orange
Archers: x
K: No Result C: No Result KC: No Result PD: No Result
Mass spectrum: x
Substance Class: unknown
Biosynthetically Related Compounds: Hirtifructic acid, Echinocarpic acid
Reference: Mangold, A/ Lumbsch, HT/ Elix, JA 2009: Thelotremaaceae. Flora of Australia 57: 195-420.
Notes: Occurs in *Ocellularia diacida*

Conhyprotocetraric acid

A: 4 B: x B': 12 C: 3 E: x F: x G: x
HPLC: 12
V: - UV: +
Acid Spray: P.Grey LW UV: Brown
Archers: x
K: No Result C: No Result KC: No Result PD: No Result
Mass spectrum: -1, 165, 149, 139
Substance Class: β -Orcinol Depsidones
Biosynthetically Related Compounds: Hypoprotocetraric acid, Conprotocetraric acid
Reference: Elix, JA/ Lumbsch, HT/Wardlaw, JH 1995: Conhyprotocetraric acid, a new lichen β -orcinol depsidone. Australian Journal of Chemistry 48: 1479-1483.
Notes: Occurs in *Lecanora myriocarpoides* (major) and *Relicina cf. incongrua* (minor)

Conhyposalazinic acid

A: 4 B: x B': 5 C: 1 E: x F: x G: 17
HPLC: 0
V: - UV: +
Acid Spray: Pink LW UV: P.Red
Archers: x
K: No Result C: No Result KC: No Result PD: No Result
Mass spectrum: x
Substance Class: β -Orcinol Depsidones
Biosynthetically Related Compounds: Hypoconstictic acid, Hyposalazinic acid, Hypostictic acid
Reference: Culberson, CF/ Culberson, WL/ Johnson, A1981: A standardized TLC analysis of β -orcinol depsidones. Bryologist 84: 16-29 [as unknown Xqn-6].
Notes: Minor component in *Xanthoparmelia quintaria*

Conloxodin

A: 50 B: 36 B': 31 C: 32 E: 18 F: x G: x

HPLC: 20

V: – UV: +

Acid Spray: Green LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: Pink PD: No Result

Mass spectrum: 428, 396, 384, 370

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Conorlobaridone, Loxodin, Norlobaridone

Reference: Begg, WR/ Chester, DO/ Elix, JA 1979: The structure of conorlobaridone and conloxodin. New depsidones from the lichen *Xanthoparmelia xanthosorediata*. Australian Journal of Chemistry 32: 927-929.

Notes: Occurs in *Xanthoparmelia xanthofarinosa*

Connorstictic acid

A: 11 B: 11 B': 11 C: 3 E: x F: x G: 26

HPLC: 3

V: – UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Red C: No Result KC: PD: No Result

Mass spectrum: 374, 356, 181, 179

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Consalazinic acid, Hyposalazinic acid, Norstictic acid, Subnorstictic acid

Reference: Elix, JA/ Lajide, L 1981: The structure of connorstictic acid. A depsidone from the lichen *Lecidea aspidula*. Australian Journal of Chemistry 34: 583-586.

Notes: Occurs in *Ramboldia petraeoides*

Conorlobaridone

A: 43 B: 30 B': 33 C: 14 E: 20 F: x G: x

HPLC: 17

V: – UV: +

Acid Spray: Green LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: Pink PD: No Result

Mass spectrum: 370, 342, 313, 286

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Conloxodin, Loxodin, Norlobaridone, Subnorlobaridone

Reference: Begg, WR/ Chester, DO/ Elix, JA 1979: The structure of conorlobaridone and conloxodin. New depsidones from the lichen *Xanthoparmelia xanthosorediata*. Australian Journal of Chemistry 32: 927-929.

Notes: Acid Spray: Green fades to grey. Occurs in *Xanthoparmelia xanthofarinosa*

Conphysodalic acid

A: 2 B: x B': 11 C: 2 E: x F: x G: 24

HPLC: 16

V: – UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 374, 356, 181, 179

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Physodalic acid, Protocetraric acid, Virensic acid

Reference: Elix, JA/ Gaul, KL/ James, PW/ Purvis, OW 1987: Three new lichen depsidones. Australian Journal of Chemistry 40: 417-423.

Notes: Minor component in *Flavoparmelia ferax*

Conporphyrylic acid

A: 4 B: x B': 6 C: 3 E: x F: x G: x

HPLC: 3

V: – UV: +

Acid Spray: No Result LW UV: Purple

Archers: x

K: No Result C: Green KC: PD: No Result

Mass spectrum: 330, 312

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Porphyrylic acid

Reference: New report

Notes: Minor component in *Lepraria atlantica*

Conprotocetraric acid

A: 2 B: x B': 7 C: 2 E: x F: x G: 9

HPLC: 12

V: – UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 149, 111, 97

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Protocetraric acid, Convirensic acid

Reference: Elix, JA/ Yu, J 1993: New lichen β -orcinol depsidones and their congenors. Journal of the Hattori Botanical Laboratory 74: 317-323.

Notes: Minor component in *Usnea trichodeoides*

Consalazinic acid

A: 2 B: 1 B': 1 C: 1 E: x F: x G: 6

HPLC: 0

V: – UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: P.Red C: No Result KC: PD: Orange

Mass spectrum: x

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Connorstictic acid, Norstictic acid, Salazinic acid

Reference: O'Donovan, DG/ Roberts, G/ Keogh, MF 1980: Structure of β -orcinol depsidones, connorstictic and consalazinic acids. *Phytochemistry* 19: 2497-2499.Notes: Minor component in *Xanthoparmelia tasmanica***Consalazinolide** [6 α -Deoxyconsalazinic acid]

A: 3 B: x B': 4 C: 2 E: x F: x G: x

HPLC: 7

V: – UV: +

Acid Spray: Yellow LW UV: Brown

Archers: x

K: D.Red C: No Result KC: PD: Orange

Mass spectrum: x

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Consalazinic acid, Norstictic acid, Salazinic acid

Reference: Elix, JA 2010: Two new species, a new combination and new chemical data for *Heterodermia* (Physciaceae: Ascomycota). *Australasian Lichenology* 67: 3-7.Notes: Acid Spray: blue-grey, yellow on standing. Minor component in *Heterodermia queenslandica***Constictic acid**

A: 7 B: 3 B': 1 C: 2 E: x F: x G: 9

HPLC: 1

V: – UV: +

Acid Spray: Orange-brown LW UV: Brown

Archers: x

K: Yellow C: No Result KC: PD: Orange

Mass spectrum: 402, 384, 356, 193

Substance Class: β -Orcinol DepsidonesBiosynthetically Related Compounds: α -Acetylconstictic acid, Cryptostictic acid, Hypoconstictic acid, Hypostictic acid, Menegazziaic acid, Norstictic acid, Peristictic acid, Stictic acid

Reference: Yosioka, I/ Morita, Y/ Ebihara, K 1970: The structure of constictic acid. Chemical and Parmaceutical Bulletin (Tokyo) 18: 2364-2366.

Notes: Minor component in *Xanthoparmelia conspersa*

Constipatic acid

A: 31 B: x B': 27 C: 29 E: x F: x G: x

HPLC: 33

V: - UV: -

Acid Spray: P.Brown LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 368, 353, 350, 324

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Dehydroconstipatic acid, Dehydroprotoconstipatic acid, Protoconstipatic acid

Reference: Chester, DO/ Elix, JA 1979: Three new aliphatic acids from lichens of genus *Parmelia* (subg. *Xanthoparmelia*). Australian Journal of Chemistry 32: 2566-2569.

Notes: Occurs in *Xanthoparmelia constipata*

Consuccinoprotocetraric acid

A: 2 B: x B': 2 C: 2 E: x F: x G: 15

HPLC: 15

V: - UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 121, 119, 117

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Conprotocetraric acid, Succinprotocetraric acid

Reference: Elix, JA/ Yu, J 1993: New lichen β -orcinol depsidones and their congenors. Journal of the Hattori Botanical Laboratory 74: 317-323.

Notes: Minor component in *Xanthoparmelia succinprotocetrarica*

Contortin

A: 67 B: x B': 41 C: 60 E: 34 F: x G: x

HPLC: 18

V: - UV: +

Acid Spray: Green LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 418, 403, 388, 387

Substance Class: Biphenyls

Biosynthetically Related Compounds: Usnic acid

Reference: Elix, JA/ Jayanthi, VK/ Jones, AJ/ Lennard, CJ 1984: A novel biphenyl from the lichen *Psoroma contortum*. Australian Journal of Chemistry 37: 1531-1538.

Notes: Occurs in *Pannaria contorta*

Convirensic acid [Hypovirensic acid]

A: 9 B: x B': 26 C: 7 E: x F: x G: 37

HPLC: 16

V: - UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 183, 168, 128

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Conprotocetraric acid, Virensic acid

Reference: Elix, JA/ Yu, J 1993: New lichen β -orcinol depsidones and their congeners. Journal of the Hattori Botanical Laboratory 74: 317-323.

Notes: Minor component in *Sulcaria virens*

Coronatoquinone

A: 38 B: x B': 11 C: 28 E: x F: x G: x

HPLC: 12

V: + UV: +

Acid Spray: Lilac LW UV: Pink

Archers: x

K: Red C: No Result KC: PD: No Result

Mass spectrum: 320, 318, 303, 302

Substance Class: Naphthaquinone

Biosynthetically Related Compounds: Anhydofusarubin lactol, Fusarubin

Reference: Ernst-Russell, MA/ Elix, JA /Chai, CLL/Rive, MJ/Wardlaw, JH 2000: The structure and stereochemistry of coronatoquinone, a new pyranonaphthazarin from the lichen *Pseudocyphellaria coronata*. Australian Journal of Chemistry 53: 303-306.

Notes: Reddish purple pigment. Occurs in *Pseudocyphellaria coronata*

Cristazarin [2-Ethyl-3,5,8-trihydroxy-6-methoxynaphtho-1,4-quinone]

A: 40 B: x B': x C: 33 E: x F: x G: x

HPLC: x

V: + UV: +

Acid Spray: Purple

LW UV: Magenta

Archers: x

K: Red

C: No Result

KC:

PD: No Result

Mass spectrum: 264, 249

Substance Class: Naphthaquinones

Biosynthetically Related Compounds: Boryquinone, 6-Methylcristazarin, Norcristazarin

Reference: Yamamoto, Y/ Matsubara, H/ Kinoshita, Y/ Kinoshita, K/ Koyama, K/ Takahashi, K/ Ahmadjian, V/ Kurokawa, T/ Yoshimura, I 1996: Naphthazarin derivatives from cultures of the lichen *Cladonia cristatella*.

Phytochemistry 43: 1239.

Notes: Purple pigment. Occurs in cultures of *Cladonia cristatella*

Crustinic acid

A: 24

B: 18

B': 34

C: 9

E: x

F: x

G: x

HPLC: 19

V: -

UV: +

Acid Spray: Black

LW UV: Black

Archers: x

K: No Result

C: Red

KC:

PD: No Result

Mass spectrum: -1, 301, 151

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid

Reference: Huneck, S/ Porzel, A/ Schmidt, J/ Feige, GB/ Posner, B 1993: Crustinic acid, a new tridepside from *Umbilicaria custulosa*. *Phytochemistry* 32: 475-477.

Notes: Minor component in *Umbilicaria crustulosa*

Cryptochlorophaeic acid

A: 46

B: 46

B': 45

C: 37

E: x

F: x

G: x

HPLC: 23

V: -

UV: +

Acid Spray: P.Brown

LW UV: P.Brown

Archers: Red-brown

K: Red

C: Red

KC:

PD: No Result

Mass spectrum: -1, 240, 238, 222

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4,4'-Di-O-methylcryptochlorophaeic acid, Merochlorophaeic acid, 4-O-Methylcryptochlorophaeic acid, 4'-O-Methylcryptochlorophaeic acid, Paludosic acid

Reference: Reference: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 129.

Notes: Occurs in *Cladonia cryptochlorophaea*

Cryptostictinolide

A: 28 B: x B': x C: 20 E: x F: x G: x

HPLC: 14

V: - UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 372, 354

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Constrictic acid, Cryptostictic acid, Hypostictic acid, Menegazziaic acid, Norstictic acid, Stictic acid

Reference: Lohézic-Le Dévéhat, F/ Tomasi, S/ Elix, JA/ Bernard, A/ Rouaud, I/ Uriac, P/ Boustie, J 2007: Stictic acid derivatives from the lichen *Usnea articulata* and their antioxidant activities. *Journal of Natural Products* 70: 1218-1220.

Notes: Minor component in *Usnea himantodes*

Cryptostictic acid

A: 14 B: 14 B': 10 C: 10 E: x F: x G: 27

HPLC: 4

V: - UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 388, 370, 177

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Connorstictic acid, Constrictic acid, Hypostictic acid, Menegazziaic acid, Norstictic acid, Stictic acid

Reference: Shimada, S/ Saitoh, T/ Sankawa, S/ Shibata, S 1980: New depsidones from *Lobaria oregana*.

Phytochemistry 19: 328-330.

Notes: Minor component in *Lobaria oregana*, *Xanthoparmelia conspersa*

Cryptothamnolic acid

A: 38 B: x B': 32 C: 40 E: x F: x G: x

HPLC: 25

V: - UV: +

Acid Spray: Brown LW UV: Brown

Archers: x

K: Yellow C: No Result KC:x PD: Yellow

Mass spectrum: -1, 346, 219, 194

Substance Class: β -Orcinol m-Depsidones

Biosynthetically Related Compounds: Hypothamnolic acid, Thamnolic acid, Lactothamnolic acid

Reference: Elix, JA/ Barclay, CE/ Wardlaw, JH/ Archer, AW/ Sen-hua Yu/ Kantvilas, G 1999: Four new β -orcinol *meta*-depsides from *Pertusaria* and *Siphula* lichens. Australian Journal of Chemistry 52: 837-840.

Notes: Occurs in *Pertusaria* sp.

Cyclographin

A: 68 B: x B': 63 C: 70 E: 9 F: x G: x

HPLC: 25

V: - UV: +

Acid Spray: Grey LW UV: Grey

Archers: x

K: No Result C: No Result KC: No Result PD: Yellow

Mass spectrum: 408, 406, 374, 346

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Methyl virensate, Physciosporin

Reference: Elix, JA/ Naidu, R/ Thor, G 1995: Cyclographin, a new depsidone from the lichen *Catarraphia dictyoplaca*. Australian Journal of Chemistry 48: 635-649.

Notes: Occurs in *Catarraphia dictyoplaca*

Cynodontin

A: 78 B: x B': 85 C: 85 E: 57 F: 90 G: x

HPLC: 12

V: + UV: +

Acid Spray: Magenta LW UV: Purple

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 286, 270, 257, 229

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Asahinin, Islandicin

Reference: Mishchenko, NP/ Stepanenko, LS/ Kriovshchekova, OE/ Maximov, OB 1980: The anthrquinones from the lichen *Asahinea chrysantha*. Khimiya Prirodnykh Soedinenii: 160-165.

Notes: Reddish purple pigment. Occurs in *Asahinea chrysantha*

Decarboxyalectoronic acid

A: 40 B: x B': 28 C: 16 E: x F: x G: x

HPLC: 25

V: - UV: +

Acid Spray: P. Yellow LW UV: Blue

Archers: x

K: No Result C: No Result KC: Red PD: No Result

Mass spectrum: 468, 450, 371, 370

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Alecoronic acid

Reference: Elix, JA/ Adler, MT/ Wardlaw 1996: A further three new depsidones. Australian Journal of Chemistry 49: 1175-1178.

Notes: Occurs in *Hypotrachyna graciliescens*

Decarboxyanziaic acid

A: 48 B: x B': 46 C: 32 E: x F: x G: x

HPLC: 48

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: No Result PD: No Result

Mass spectrum: 448, 297

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Anziaic acid, Decarboxydivaricatic acid, Decarboxystenosporic acid, Depsidellin A, Depsidellin B, Depsidellin C

Reference: Elix, JA/ Wardlaw, JH 1997: New depsides from the lichen *Neofuscelia depsidella*. Australian Journal of Chemistry 50: 1145-1150.

Notes: Occurs in *Xanthoparmelia depsidella*

Decarboxydivaricatic acid

A: 60 B: x B': 56 C: 51 E: x F: x G: x

HPLC: 45

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 344, 194, 193, 192

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Decarboxyanziaic acid, Decarboxynorstenosporic acid, Decarboxystenosporic acid, Depsidellin A, Depsidellin B, Depsidellin C, Divaricatic acid

Reference: Elix, JA/ Wardlaw, JH 1997: New depsides from the lichen *Neofuscelia depsidella*. Australian Journal of Chemistry 50: 1145-1150.

Notes: Minor constituent of *Xanthoparmelia depsidella*

Decarboxyhypothamnolic acid

A: 5 B: x B': 15 C: 13 E: x F: x G: x

HPLC: 15

V: – UV: +

Acid Spray: Brown LW UV: Brown

Archers: x

K: Purple C: P.Red KC: PD: No Result

Mass spectrum: 362, 209, 192, 191

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Hypothamnolic acid, Thamnolic acid, Lactothamnolic acid

Reference: Elix, JA/ Barclay, CE/ Wardlaw, JH/ Archer, AW/ Sen-hua Yu/ Kantvilas, G 1999: Four new β -orcinol *meta*-depsides from *Pertusaria* and *Siphula* lichens. Australian Journal of Chemistry 52: 837-840.

Notes: Occurs in *Pertusaria* sp.

Decarboxy-2'-O-methyldivaricatic acid

A: 74 B: x B': 73 C: 88 E: x F: x G: x

HPLC: 53

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 358, 194, 193, 192

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Decarboxyanziaic acid, Decarboxynorstenosporic acid,

Decarboxystenosporic acid, Depsidellin A, Depsidellin B, Depsidellin C, 2'-O-Methyldivaricatic acid

Reference: Elix, JA/ Wardlaw, JH 1997: New depsides from the lichen *Neofuscelia depsidella*. Australian Journal of Chemistry 50: 1145-1150.

Notes: Minor constituent of *Xanthoparmelia depsidella*

Decarboxy-2'-O-methylnorimbricatic acid

A: 60 B: x B': 56 C: 48 E: x F: x G: x

HPLC: 51

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: No Result PD: No Result

Mass spectrum: 372, 208, 207, 166

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Decarboxyanziaic acid, Decarboxynorstenosporic acid,

Decarboxystenosporic acid, Depsidellin A, Depsidellin B, Depsidellin C, 2'-O-Methylnorimbricatic acid

Reference: Elix, JA/ Wardlaw, JH 1997: New depsides from the lichen *Neofuscelia depsidella*. Australian Journal of Chemistry 50: 1145-1150.

Notes: Minor constituent of *Xanthoparmelia depsidella*

Decarboxynorimbricaric acid

A: 46 B: x B': 53 C: 29 E: x F: x G: x

HPLC: 42

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: No Result PD: No Result

Mass spectrum: 358, 208, 207, 163

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Decarboxyanziaic acid, Decarboxydivaricatic acid, Decarboxystenosporic acid, Depsidellin A, Depsidellin B, Depsidellin C, Imbricaric acid

Reference: Elix, JA/ Wardlaw, JH 1997: New depsides from the lichen *Neofuscelia depsidella*. Australian Journal of Chemistry 50: 1145-1150.

Notes: Minor constituent of *Xanthoparmelia depsidella*

Decarboxynorstenosporic acid

A: 45 B: x B': 45 C: 27 E: x F: x G: x

HPLC: 43

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: No Result PD: No Result

Mass spectrum: 358, 180, 179, 178

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Decarboxyanziaic acid, Decarboxydivaricatic acid, Decarboxystenosporic acid, Depsidellin A, Depsidellin B, Depsidellin C, Stenosporic acid

Reference: Elix, JA/ Wardlaw, JH 1997: New depsides from the lichen *Neofuscelia depsidella*. Australian Journal of Chemistry 50: 1145-1150.

Notes: Minor constituent of *Xanthoparmelia depsidella*

Decarboxyperlatolic acid

A: 63 B: x B': 60 C: 56 E: x F: x G: x

HPLC: 55

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 400, 222, 221, 180

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Decarboxyanziaic acid, Decarboxynorstenosporic acid, Decarboxystenosporic acid, Depsidellin A, Depsidellin B, Depsidellin C, Perlatolic acid
Reference: Elix, JA/ Wardlaw, JH 1997: New depsides from the lichen *Neofuscelia depsidella*. Australian Journal of Chemistry 50: 1145-1150.

Notes: Minor constituent of *Xanthoparmelia depsidella*

Decarboxystenosporic acid

A: 63 B: x B': 57 C: 55 E: x F: x G: x

HPLC: 51

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 372, 194, 193, 124

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Decarboxyanziaic acid, Decarboxynorstenosporic acid, Stenosporic acid, Depsidellin A, Depsidellin B, Depsidellin C

Reference: Elix, JA/ Wardlaw, JH 1997: New depsides from the lichen *Neofuscelia depsidella*. Australian Journal of Chemistry 50: 1145-1150.

Notes: Minor constituent of *Xanthoparmelia depsidella*

Decarboxythamnolic acid

A: 5 B: 25 B': 18 C: 18 E: x F: x G: 38

HPLC: 7

V: - UV: +

Acid Spray: Brown LW UV: Brown

Archers: P.Red

K: Yellow C: No Result KC: PD: Orange

Mass spectrum: 376, 332, 226, 209

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Thamnolic acid

Reference: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 150.

Notes: Occurs in chemotypes of *Thamnotia vermicularis*

3-Dechlorodiploicin

A: 58 B: x B': 53 C: 62 E: 28 F: x G: x

HPLC: 37

V: - UV: +

Acid Spray: Grey LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 390, 388, 355, 353

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: 3-Dechloro-4-O-methyldiploicin, Diploicin, Scensidin

Reference: Sala, T/ Sargent, MV/ Elix, JA 1981: Depsidone Synthesis. Part 15. New Metabolites of the Lichen *Buellia canescens* (Dicks.) De Not: Novel Phthalide Catabolites of Depsidones. Journal of the Chemical Society, Perkin Transactions I: 849-854.

Notes: Occurs in *Diploicia canescens*

4-Dechlorogangaleoidin [3-Dechlorogangaleoidin]

A: 53 B: x B': 31 C: 40 E: x F: x G: x

HPLC: 23

V: - UV: +

Acid Spray: Orange LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 416, 414, 412

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Norangaleoidin, Gangaleoidin

Reference: Elix, JA/ Venables, DA/ Lumbsch, HT/ Brako, L 1994: Further new metabolites from lichens. Australian Journal of Chemistry 47: 1619-1623.

Notes: Minor component in *Lecanora argentata*

(+)-Dechlorogriseofulvin

A: 32 B: x B': 6 C: 19 E: x F: x G: x

HPLC: 5

V: - UV: +

Acid Spray: Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 318, 180, 138

Substance Class: Spirobenzofuranones

Biosynthetically Related Compounds: (+)-Griseofulvin

Elix, JA/ Øvstedal, DO 2004: A new *Lecanora* species from the Arctic with a remarkable chemistry. Graphis Scripta 15: 57-59.

Notes: Occurs in *Lecanora griseofulva*

3'-Dechlorolecideiodin

A: 56 B: 47 B': 40 C: 42 E: 17 F: x G: x

HPLC: 17

V: – UV: +

Acid Spray: Orange LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 366, 364, 334, 332

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Gangaleoidin, Lecideoidin

Reference: Chester, DO/ Elix, JA/ Jones, AJ 1979: Lecideoidin and 3'-dechlorolecideoidin, new depsidones from an Australian *Lecidea* (lichen). Australian Journal of Chemistry 32: 1857-1861.

Notes: Acid Spray: orange, grey halo. Minor component in *Tylothalia pahiensis*

2-Dechloro-8-O-methylthiomelin [1-Hydroxy-4-chloro-5,8-dimethoxy-6-methylxanthone]

A: 65 B: x B': 45 C: 53 E: 35 F: x G: x

HPLC: 64

V: + UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 322, 320, 307, 305

Substance Class: Xanthenes

Biosynthetically Related Compounds: 4-Dechloro-8-O-methylthiomelin, 4-Dechlorothiomelin, 8-O-Methylthiomelin, Thiomelin

Reference: Elix, JA/ Jiang, H/ Gaul, KL 1993: The structure and synthesis of some minor xanthenes from the lichen *Rinodina thiomela*. Australian Journal of Chemistry 46: 95-110.

Notes: Pale yellow pigment. Minor component in *Rinodina thiomela*

4-Dechloro-8-O-methylthiomelin [1-Hydroxy-2-chloro-5,8-dimethoxy-6-methylxanthone]

A: 64 B: x B': 39 C: 51 E: 29 F: x G: x

HPLC: 66

V: + UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 322, 320, 305, 302

Substance Class: Xanthenes

Biosynthetically Related Compounds: 2-Dechloro-8-O-methylthiomelin, 4-Dechlorothiomelin, 8-O-Methylthiomelin, Thiomelin

Reference: Elix, JA/ Jiang, H/ Gaul, KL 1993: The structure and synthesis of some minor xanthenes from the lichen *Rinodina thiomela*. Australian Journal of Chemistry 46: 95-110.

Notes: Pale yellow pigment. Minor component in *Rinodina thiomela*

3-Dechloro-4-O-methyldiploicin [Dechloro-*O*-methyldiploicin]

A: 74 B: x B': 58 C: 83 E: 55 F: x G: x

HPLC: 44

V: – UV: +

Acid Spray: P.Grey LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 404, 402, 369, 367

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: 3-Dechlorodiploicin, Diploicin, Scensidin

Reference: Sala, T/ Sargent, MV/ Elix, JA 1981: Depsidone Synthesis. Part 15. New Metabolites of the Lichen *Buellia canescens* (Dicks.) De Not: Novel Phthalide Catabolites of Depsidones. Journal of the Chemical Society, Perkin Transactions I: 849-854.

Notes: Best seen under SW UV before spraying. Minor component in *Diploicia canescens*

Dechloropannarin

A: 73 B: 73 B': 61 C: 75 E: 55 F: x G: x

HPLC: 29

V: – UV: +

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: Orange

Mass spectrum: 328, 300, 285, 284

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Nordechloropannarin, Norpannarin, Pannarin

Reference: Elix, JA/ Lajide, L/ Galloway, DJ 1982: Metabolites from the Lichen Genus *Psoroma*. Australian Journal of Chemistry. 35: 2325-2333.

Notes: Acid Spray: orange, fades to brown-grey. Occurs in *Phyllopsora beutneri*

2-Dechlorothiomelin [1,8-Dihydroxy-4-chloro-5-methoxy-6-methylxanthone]

A: 79 B: x B': 80 C: 85 E: 64 F: x G: x

HPLC: 44

V: + UV: +

Acid Spray: No Result LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 308, 306, 293, 292

Substance Class: Xanthones

Biosynthetically Related Compounds: 2-Dechloro-8-*O*-methylthiomelin, 4-Dechlorothiomelin, 8-*O*-Methylthiomelin, Thiomelin

Reference: Elix, JA/ Jiang, H/ Gaul, KL 1993: The structure and synthesis of some minor xanthenes from the lichen *Rinodina thiomela*. Australian Journal of Chemistry 46: 95-110.

Notes: Pale yellow pigment. Minor component in *Rinodina thiomela*

4-Dechlorothiomelin [1,8-Dihydroxy-2-chloro-5-methoxy-6-methylxanthone]

A: 78 B: x B': 86 C: 83 E: 61 F: x G: x

HPLC: 46

V: + UV: +

Acid Spray: No Result LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 308, 306, 293, 292

Substance Class: Xanthenes

Biosynthetically Related Compounds: 4-Dechloro-8-*O*-methylthiomelin, 2-Dechlorothiomelin, 8-*O*-Methylthiomelin, Thiomelin

Reference: Elix, JA/ Gaul, KL/ Sterns, M/ Samsudun, MW 1987: The structure of the novel lichen xanthone, thiomelin and its congeners. Australian Journal of Chemistry 40: 1169-1178.

Notes: Pale yellow pigment. Minor component in *Rinodina thiomela*

2-Dechlorovicanicin

A: 52 B: x B': 48 C: 40 E: 22 F: x G: x

HPLC: 34

V: - UV: +

Acid Spray: Blue LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 364, 362

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Dechloropannarin, 7-dechlorovicanicin, Hypopannarin, *O*-Methylvicanicin, Norvicanicin, Pannarin, Vicanicin

Reference: New report

Notes: Acid Spray: pale light blue, fades to blue-grey. Minor constituent in chemical race of *Pannaria sphinctrina*

7-Dechlorovicanicin

A: x B: x B': 64 C: 68 E: 61 F: x G: x

HPLC: 36

V: – UV: +
Acid Spray: Blue LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 364, 362

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Dechloropannarin, 7-dechlorovicanicin, Hypopannarin, *O*-Methylvicanicin, Norvicanicin, Pannarin, Vicanicin

Reference: New report

Notes: Minor constituent in *Lecanora margarodes*

Dehydrocollatolic acid

A: 54 B: x B': 35 C: 48 E: x F: x G: x

HPLC: 33

V: – UV: +

Acid Spray: P.Yellow LW UV: D.Blue

Archers: x

K: No Result C: No Result KC: P.Red PD: No Result

Mass spectrum: 524, 506, 488, 480

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Alectoronic acid, α -Collatolic acid, Dehydroalectoronic acid

Reference: Kharel, MK/ Rai, NP/ Manandhar, MD/ Elix, JA/ Wadrlaw, JH 2000: Dehydrocollatolic acid, a new depsidone from the lichen *Parmotrema nilgherrense*. Australian Journal of Chemistry 53: 891-892.

Notes: Minor component in *Parmotrema nilgherrense*

Dehydroconstipatic acid [Isomuronic acid, Neuropogonic acid]

A: 40 B: x B': 35 C: 35 E: x F: x G: x

HPLC: 33

V: – UV: –

Acid Spray: P.Brown LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 366, 348, 322, 309

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Constipatic acid, Muronic acid, Protoconstipatic acid

Reference: Chester, DO/ Elix, JA 1979: Three new aliphatic acids from lichens of genus *Parmelia* (subg. *Xanthoparmelia*). Australian Journal of Chemistry 32: 2566-2569.

Notes: Occurs in *Neuropogon trachycarpus*

4-O-Demethylbarbatic acid

A: 39 B: 60 B': 54 C: 36 E: x F: x G: x

HPLC: 24

V: – UV: +

Acid Spray: P.Yellow

LW UV: P.Yellow

Archers: Orange

K: Red C: No Result

KC: PD: No Result

Mass spectrum: 346, 182, 165, 164

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Barbatic acid, Norobtusatic acid, Obtusatic acid

Reference: Huneck, S/ Follmann, G/ Santesson, J 1968: 4-*O*-Desmethylbarbatinsäure, ein neues Depsid aus *Ramalina subdecepiens* Stein. Zeitschrift für Naturforschung 23b: 856-860.

Notes: Acid Spray: pale yellow, grey halo. LW UV: purple, pale yellow halo. Minor component in *Cladia aggregata*

Demethylchodatin

A: 46 B: x B': 40 C: 34 E: x F: x G: x

HPLC: 44

V: + UV: +

Acid Spray: Yellow

LW UV: Orange

K: No Result C: Orange

KC: No Result

PD: No Result

Mass spectrum: 394, 392, 390, 377

Substance Class: Xanthones

Biosynthetically Related Compounds: Chodatin, Isoarthonelin, 2,5,7-Trichloro-3-*O*-methylnorlichexanthone

Reference: Elix, JA/ Robertson, F/ Wardlaw, JH/ Willis, AC 1994: Isolation and structure determination of demethylchodatin - a new lichen xanthone. Australian Journal of Chemistry 47: 2291-2295.

Notes: Occurs in *Lecidella granulosa*

7-Demethylcristazarin [2-Ethyl-3,5,6,8-tetrahydroxynaphtho-1,4-quinone, Norcristazarin]

A: 32 B: x B': 48 C: 10 E: x F: x G: x

HPLC: x

V: + UV: +

Acid Spray: Purple

LW UV: Magenta

K: Red C: No Result

KC:

PD: No Result

Mass spectrum: 250, 235, 232, 217

Substance Class: Naphthaquinones

Biosynthetically Related Compounds: 6-Methylcristazarin, Cristazarin

Reference: Krivoshchekova, OE/ Maximov, OB/ Stepanenko, LS/ Mishchenko, NP 1982: Quinones of the lichen *Cetraria cucullata*. Phytochemistry 21: 193-196.

Notes: Occurs in *Flavocetraria cucullata*

4-O-Demethyldiffractaic acid

A: 34 B: x B': 44 C: 31 E: x F: x G: x

HPLC: 17

V: - UV: +

Acid Spray: P.Yellow LW UV: P.Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 360, 316, 269, 179

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Diffractaic acid

Reference: Elix, JA/ Chester, DO/ Gaul, KL/ Parker, JL/ Wardlaw, JH 1989: The identification of further lichen β -orcinol *para*-depsides, Australian Journal of Chemistry 42: 1191-1199.

Notes: Acid Spray: pale yellow, grey halo. LW UV: strong-purple, pale yellow halo. Minor component in *Xanthoparmelia duplicata*

4-O-Demethylglomellic acid

A: 22 B: x B': 20 C: 11 E: x F: x G: 48

HPLC: 12

V: - UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: -1, 238, 221, 220

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-O-Demethylglomelliferic acid, Glomellic acid, Glomelliferic acid

Reference: Elix, JA/ Whitton, AA 1989: Synthesis of the Lichen depsides, glomelliferic acid, loxodellic acid, glomellic acid, their 4-O-demethyl analogues and oxostenosporic acid. Australian Journal of Chemistry 42: 1969-1981.

Notes: Minor component in *Xanthoparmelia loxodella*

4-O-Demethylglomelliferic acid

A: 29 B: x B': 36 C: 21 E: x F: x G: 52

HPLC: 20

V: - UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: -1, 224, 221, 220

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-O-Demethylglomellic acid, Glomellic acid, Glomelliferic acid

Reference: Elix, JA/ Whitton, AA 1989: Synthesis of the Lichen depsides, glomelliferic acid, loxodellic acid, glomellic acid, their 4-*O*-demethyl analogues and oxostenosporic acid. Australian Journal of Chemistry 42: 1969-1981.

Notes: Minor component in *Xanthoparmelia loxodes*

4-*O*-Demethylgrayanic acid

A: 41 B: x B': 21 C: 18 E: x F: x G: x

HPLC: 41

V: - UV: +

Acid Spray: P.Brown LW UV: P.Brown

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 356, 328

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Congrayanic acid, Grayanic acid, Melacarpic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1985: Orcinol-type depsides and depsidones in the lichens of the *Cladonia chlorophea* group (Ascomycotina, Cladoniaceae). Bryologist 88: 380-387.

Notes: Acid Spray: pale orange brown, fades to pale orange. LW UV: strong-pale brown, bluish halo.

Minor component in *Cladonia grayi*, *Neophyllis melacarpa*

4-*O*-Demethylimbricatic acid

A: 35 B: x B': 57 C: 32 E: x F: x G: x

HPLC: 29

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: -1, 224, 196, 179

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Anziaic acid, Imbricatic acid

Reference: Culberson, CF/ Culberson, WL 1976: Chemosyndromic variation in lichens. Systematic Botany 1: 325-329.

Notes: Acid Spray: strong-pale yellow, grey halo. Minor component in *Cetrelia sanguinea*

Demethylleprapinic acid

A: x B: x B': x C: 7 E: 9 F: x G: x

HPLC: x TLC: Rf 48 [hexane/diethyl ether/formic acid, 30/20/6]

V: + UV: +

Acid Spray: P.Yellow LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 435, 290, 145

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Leprapinic acid

Reference: Appa Rao, AVN/ Rao, PS/ Huneck, S 1984: Isolation of demethyleprapinic acid from *Lepraria* spec.

Fitoterapia: 242-243.

Notes: Intense yellow pigment. Occurs in *Lepraria* sp.

4-O-Demethylloxodellic acid

A: 23 B: x B': 34 C: 18 E: x F: x G: 49

HPLC: 14

V: - UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: -1, 310, 221, 220

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-O- Demethylglomelliferic acid, Glomellic acid, Glomelliferic acid, Loxodellic acid

Reference: Elix, JA/ Whitton, AA 1989: Synthesis of the Lichen depsides, glomelliferic acid, loxodellic acid, glomellic acid, their 4-O-demethyl analogues and oxostenosporic acid. Australian Journal of Chemistry 42: 1969-1981.

Notes: Minor component in *Xanthoparmelia loxodes*

4-O-Demethylmicrophyllinic acid

A: 32 B: x B': 31 C: 16 E: x F: x G: 49

HPLC: 23

V: - UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: 478, 426, 338, 248

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Anziaic acid, Microphyllinic acid, Olivetoric acid

Reference: Elix, JA/ Jayanthi, VK 1987: The isolation and synthesis of the lichen depside, 4-O-demethylmicrophyllinic acid. Australian Journal of Chemistry 40: 1851-1859.

Notes: Acid Spray: pale orange, grey halo. SW UV: fluorescence bright blue before spraying.

Occurs in *Parmotrema demethylmicrophyllinicum*

4-O-Demethylnotatic acid [Normotatic acid]

A: 16 B: 38 B': 35 C: 14 E: x F: x G: 46

HPLC: 11

V: – UV: +

Acid Spray: Orange LW UV: D.Blue

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: 330, 312, 286, 284

Substance Class: Orcinol β -Orcinol Depsidones

Biosynthetically Related Compounds: Hypoprotocetraric acid, Norisonotatic acid, Notatic acid

Reference: Culberson, CF/ Hale, ME 1973: 4-*O*-Demethylnotatic acid, a new depsidone in some lichens producing hypoprotocetraric acid. *Bryologist* 76: 77-84.

Notes: Acid Spray: pale orange, grey halo. Occurs in *Ocellularia actinota*

4-*O*-Demethylplanaic acid [2,2'-Di-*O*-methylanziaic acid]

A: 42 B: 32 B': 29 C: 33 E: x F: x G: x

HPLC: 24

V: – UV: +

Acid Spray: Orange LW UV: Green

Archers: D.Red

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 238, 221, 196

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2'-*O*-Methylperlatolic acid, Planaic acid

Reference: Huneck, S/ Schmidt, J 1995: Neue Flechtenanalysen aus verschiedenen Verwandtschaftskreisen. In "Flechten Follmann", Geobotanical and Phytotaxonomical Study Group, University of Cologne, Germany: 24-41.

Notes: Acid Spray: pale orange, grey halo. LW UV: pale brown, green halo. Occurs in *Lecidea plana*

2'-*O*-Demethylpsoromic acid [Conpsoromic acid, Neopsoromic acid]

A: 15 B: 36 B': 39 C: 12 E: x F: x G: 46

HPLC: 13

V: – UV: +

Acid Spray: Brown LW UV: Brown

Archers: Red-violet

K: No Result C: No Result KC: No Result PD: Yellow

Mass spectrum: 344, 300, 272, 179

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Psoromic acid, Subpsoromic acid

Reference: Keogh, MF 1976: 2'-*O*-Demethylpsoromic acid from *Usnea* sp. *Phytochemistry* 15: 1801.

Notes: Minor component in *Usnea inermis*

3-*O*-Demethylscensidin

A: 60 B: x B': 52 C: 53 E: 28 F: x G: x

HPLC: 23

V: – UV: +

Acid Spray: No Result LW UV: D.Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 358, 356, 354, 328

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Dechloro-*O*-methyl diploicin, Diploicin, Isofulgidin, Scensidin

Reference: Elix, JA/ Jenkins, GA/ Venables, DA 1990: New chlorine-containing depsidones from lichens. Australian Journal of Chemistry 43: 197-201.

Notes: Best seen under SW UV before spraying. Minor component in *Diploicia canescens*

3-*O*-Demethylschizopeltic acid

A: 34 B: x B': 29 C: 41 E: x F: x G: x

HPLC: 14

V: – UV: +

Acid Spray: Blue-grey LW UV: D.Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 344, 312, 284, 156

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Pannaric acid, Schizopeltic acid

Reference: Huneck, S/ Elix, JA/ Naidu, R/ Follmann, G 1993: 3-*O*-Demethylschizopeltic acid, a new dibenzofuran from the lichen *Roccella hypomecha*. Australian Journal of Chemistry 46: 407-410.

Notes: Occurs in *Roccella hypomecha*

4'-*O*-Demethylsekikaic acid

A: 40 B: 41 B': 52 C: 36 E: x F: x G: x

HPLC: 21

V: – UV: +

Acid Spray: Orange-grey LW UV: Green

Archers: x

K: P.Red C: Red KC: PD: No Result

Mass spectrum: -1, 212, 210, 193

Substance Class: Orcinol m-Depsidones

Biosynthetically Related Compounds: Homosekikaic acid, Ramalinolic acid, Sekikaic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1990: The *Ramalina americana* complex (Ascomycotina, Ramalinaceae): chemical and geographical correlations. Bryologist 93: 167-186.

Notes: Acid Spray: strong-pale yellow-orange, grey halo. Occurs in *Ramalina americana*

4-O-Demethylsphaerophorin

A: 38 B: x B': 57 C: 33 E: x F: x G: x

HPLC: 33

V: – UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: -1, 208, 150, 137

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Isosphaeric acid, Sphaerophorin

Reference: Elix, JA/ Wardlaw, JH 1987: Synthesis of lichen *para*-sphaerophorol depsides. Australian Journal of Chemistry 40: 425-429.

Notes: Acid Spray: pale orange, grey halo. LW UV: purple, green halo. Occurs in *Bunodophoron melacarpum*

4-O-Demethylsquamatic acid [Consquamatic acid]

A: 3 B: x B': 1 C: 3 E: x F: x G: x

HPLC: x

V: – UV: +

Acid Spray: Grey LW UV: Green

Archers: Red

K: No Result C: Red KC: PD: No Result

Mass spectrum: -1, 240, 160, 138, 137

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Squamatic acid

Reference: Archer, AW 1992: Cladoniaceae. Flora of Australia 54: 107-151.

Notes: Occurs in *Cladonia capitellata* var. *squamatica*

4-O-Demethylstenosporic acid

A: 44 B: 54 B': x C: 32 E: x F: x G: x

HPLC: 28

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: -1, 224, 206, 196

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Anziaic acid, Divaricatic acid, Nordivaricatic acid, Stenosporic acid

Reference: Culberson, CK/ Culberson, WL/ Esslinger, TL 1977: Chemosyndromic variation in the *Parmelia*

pulla group. Bryologist 80: 125-135.

Notes: Occurs in *Xanthoparmelia pokornyi*

4-O-Demethylsuperconfluent acid

A: 41 B: x B': 37 C: 30 E: x F: x G: x

HPLC: 38

V: - UV: +

Acid Spray: Yellow LW UV: B.Blue

Archers: x

K: No Result C: Pink KC: Red PD: No Result

Mass spectrum: -1, 277, 276, 266

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Glaucophaeic acid, 2'-O-Methylnorsuperphyllinic acid, Insignin, Superconfluent acid

Reference: Elix, JA/Wardlaw, JH 1996: Synthesis of depsides present in the lichen *Porpidia glaucophaea*.

Australian Journal of Chemistry 49: 817-924.

Notes: Occurs in *Stirtonia ramosa*, *Porpidia glaucophaea*

Demethylvioxanthin

A: 25 B: x B': 4 C: 18 E: x F: x G: x

HPLC: 17

V: + UV: +

Acid Spray: Green-brown LW UV: Yellow

Archers: x

K: Red C: No Result KC: PD: No Result

Mass spectrum: x

Substance Class: Naphthpyrone

Biosynthetically Related Compounds: Pigmentosin A, Vioxanthin

Reference: New Report

Notes: Yellow-green pigment. Occurs in *Buellia vioxanthina*

Deoxylichesterinic acid

A: 55 B: x B': 50 C: 57 E: x F: x G: x

HPLC: 38

V: - UV: -

Acid Spray: P.Brown LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 308, 290, 264

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Lichesterinic acid

Reference: Mayrhofer, H/ Sheard, JW/ Grassier, MC/ Elix, JA 2001: *Rinodina intermedia* Bagl.

(Physciaceae, lichenized Ascomycetes): A well characterised species with submuriform ascospores.

Bryologist 104: 456-463.

Notes: Occurs in *Rinodina intermedia*

Deoxystictic acid [Stictinolide]

A: x B: x B': x C: 33 E: x F: x G: x

HPLC: 14

V: - UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Yellow C: No Result KC: PD: Orange

Mass spectrum: 370, 342

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Connorstictic acid, Constictic acid, Cryptostictic acid, Menegazziaic acid, Methyl stictic acid, Norstictic acid, Stictic acid

Reference: Papadopoulou, P/ Tzakou, O/ Vagias, C/ Kefalas, P/ Roussis, V 2007: β -Orcinol metabolites from the lichen *Hypotrachyna revoluta*. *Molecules* 12: 997-1005.

Notes: reported to occur in *Hypotrachyna revoluta* [but possibly a misdetermination of *Parmotrema perlatum*]

Depsidellin A

A: 77 B: x B': 69 C: 91 E: x F: x G: x

HPLC: 65

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 564, 194, 193, 124

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Decarboxyanziaic acid, Decarboxydivaricatic acid, Decarboxystenosporic acid, Depsidellin B, Depsidellin C

Reference: Elix, JA/Wardlaw, JH 1997: New depsides from the lichen *Neofuscelia depsidella*. *Australian Journal of Chemistry* 50: 1145-1150.

Notes: Occurs in *Xanthoparmelia depsidella*

Depsidellin B

A: 47 B: x B': 42 C: 32 E: x F: x G: x

HPLC: 60

V: - UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result

C: Red

KC:

PD: No Result

Mass spectrum: 592, 386, 208, 207

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Decarboxyanziaic acid, Decarboxydivaricatic acid, Decarboxystenosporic acid, Depsidellin A, Depsidellin C

Reference: Elix, JA/Wardlaw, JH 1997: New depsides from the lichen *Neofuscelia depsidella*. Australian Journal of Chemistry 50: 1145-1150.

Notes: Minor component in *Xanthoparmelia depsidella*

Depsidellin C

A: 59

B: x

B': 49

C: 53

E: x

F: x

G: x

HPLC: 63

V: -

UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result

C: P.Red

KC: No Result

PD: No Result

Mass spectrum: 578, 227, 208, 207

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Decarboxyanziaic acid, Decarboxydivaricatic acid, Decarboxystenosporic acid, Depsidellin A, Depsidellin B

Reference: Elix, JA/Wardlaw, JH 1997: New depsides from the lichen *Neofuscelia depsidella*. Australian Journal of Chemistry 50: 1145-1150.

Notes: Minor component in *Xanthoparmelia depsidella*

Desmethylhybocarpone [Norhybocarpone]

A: 6

B: x

B': 35

C: 5

E: x

F: x

G: x

HPLC: 22

V: +

UV: +

Acid Spray: Brown

LW UV: Brown

Archers: x

K: Red

C: No Result

KC:

PD: No Result

Mass spectrum: 516, 250

Substance Class: Naphthaquinone

Biosynthetically Related Compounds: Hybocarpone, Norcrystazarin

Reference: Ernst-Russell, MA/ Elix, JA/ Chai, CLL/ Willis, AC/ Nash, TH III 1999: Hybocarpone, a novel cytotoxic naphthazarin derivative from mycobiont cultures of the lichen *Lecanora hybocarpa*. Tetrahedron Letters 40: 6321-6324.

Notes: Orange pigment. Occurs in *Heterodermia hybocarponica*

3 β ,25-Diacetoxy-20,24-epoxydammarane [Diacyl-12-deoxypyxinol]

A: x B: x B': x C: 85 E: 70 F: x G: 90

HPLC: x

V: – UV: –

Acid Spray: Purple LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 529, 484, 383

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β ,25-Diacetoxy-20,24-epoxydammarane, 3 β ,25-Diacetoxy-20,24-epoxydammarane-12 β -ol, 20,24-Epoxydammarane-3 β ,12 β ,25-triol, Methyl 3-*O*-acetoxyppyxinate, Methyl pyxinate

Reference: Yosioaka, I/ Yamauchi, H/ Kitagawa, I 1972: Lichen triterpenoids. V. On the neutral triterpenes of *Pyxine endochrysin* Nyl., Chemical and Pharmaceutical Bulletin (Tokyo) 20: 502-513

Notes: Occurs in *Pyxine endochrysin*

3 β ,25-Diacetoxy-20,24-epoxydammarane-12 β -ol [Diacylpyxinol]

A: x B: x B': x C: 45 E: 19 F: x G: 48

HPLC: x

V: – UV: –

Acid Spray: Purple LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 545, 500, 485

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxy-20,24-epoxydammarane-12 β ,25-diol, 3 β ,25-Diacetoxy-20,24-epoxydammarane, 20,24-Epoxydammarane-3 β ,12 β ,25-triol, Methyl 3-*O*-acetoxyppyxinate, Methyl pyxinate

Reference: Yosioaka, I/ Yamauchi, H/ Kitagawa, I 1972: Lichen triterpenoids. V. On the neutral triterpenes of *Pyxine endochrysin* Nyl., Chemical and Pharmaceutical Bulletin (Tokyo) 20: 502-513

Notes: Occurs in *Pyxine endochrysin*, *P. soredata*

6 α ,16 β -Diacetoxypopan-22-ol

A: 50 B: x B': 37 C: 40 E: 4 F: x G: 45

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: P.Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 544, 484, 466, 426

Substance Class: Terpenoids

Biosynthetically Related Compounds: 6 α -Acetoxypopane-16 β ,22-diol, 16 β -Acetoxypopane-6 α ,22-diol Hopane-6 α ,22-diol [Zeorin], Hopane-6 α ,16 β ,22-triol [Leucotylin]

Reference: Elix, JA/ Whitton, AA/ Jones, AJ 1982: Triterpenes from the lichen genus *Physcia*, Australian Journal of Chemistry 35: 641-647.

Notes: Occurs in *Heterodermia tremulans*, *Myelochroa entotheiochroa*

3 β ,22 α -Diacetoxystictane

A: x B: x B': x C: 85 E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxystictane-22 α -ol, Stictane-3 β ,22 α -diol

Reference: Chin, WJ/ Corbett, RE/ Heng, CK/ Wilkins, AL 1973: Lichen and fungi. Part XI. triterpenoids. IV.

Isolation and structural elucidation of a new group of triterpenes from *Sticta coronata*, *S. colensoi*, and *S. flavicans*, Journal of the Chemical Society, Perkin Transactions I: 1437-1446.

Notes: Occurs in *Pseudocyphellaria coronata*

2 α ,3 β -Diacetoxystictane-22 α -ol

A: x B: x B': x C: x E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: 2 α -Acetoxystictane-3 β ,22 α -diol, 3 β -Acetoxystictane-22 α -ol, 2 α ,3 β -Diacetoxystictane-22-one, Stictane-2 α ,3 β ,22 α -triol, 2 α ,3 β ,22 α -Triacetoxystictane

Reference: Chin, WJ/ Corbett, RE/ Heng, CK/ Wilkins, AL 1973: Lichen and fungi. Part XI. triterpenoids. IV.

Isolation and structural elucidation of a new group of triterpenes from *Sticta coronata*, *S. colensoi*, and *S. flavicans*, Journal of the Chemical Society, Perkin Transactions I: 1437-1446.

Notes: Occurs in *Pseudocyphellaria coronata*

2 α ,3 β -Diacetoxystictane-22-one

A: x B: x B': x C: x E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: P.Brown

LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: 2 α -Acetoxystictane-3 β ,22 α -diol, 3 β -Acetoxystictane-22 α -ol, 2 α ,3 β -Diacetoxystictane-22 α -ol, Stictane-2 α ,3 β ,22 α -triol, 2 α ,3 β ,22 α -Triacetoxystictane

Reference: Chin, WJ/ Corbett, RE/ Heng, CK/ Wilkins, AL 1973: Lichen and fungi. Part XI. triterpenoids. IV. Isolation and structural elucidation of a new group of triterpenes from *Sticta coronata*, *S. colensoi*, and *S. flavicans*, Journal of the Chemical Society, Perkin Transactions I: 1437-1446.

Notes: Occurs in *Pseudocyphellaria coronata*

Diacetylgraciliformin

A: 40 B: x B': 34 C: 25 E: 1 F: x G: x

HPLC: 37

V: + UV: +

Acid Spray: Green

LW UV: Grey

Archers: x

K: Red C: No Result KC: PD: No Result

Mass spectrum: 626, 566, 506, 254

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Graciliformin, Monoacetylgraciliformin, Skyrin

Reference: Ejiri, H/ Sankawa, U/ Shibata, S 1975: Graciliformin and its acetates in *Cladonia graciliformis*. Phytochemistry 14: 277-279.

Notes: Yellow pigment. Acid Spray: colour like skyrin. Occurs in *Cladonia graciliformis*

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

A: 62 B: x B': 70 C: 65 E: 46 F: 83 G: x

HPLC: 58

V: + UV: +

Acid Spray: Orange

LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 328, 326, 324, 295

Substance Class: Xanthenes

Biosynthetically Related Compounds: 2-Dechloro-8-*O*-methylthiomelin, 4-Dechloro-8-*O*-methylthiomelin, 2-Dechlorothiomelin, 4-Dechlorothiomelin, 8-*O*-Methylthiomelin, Thiomelin

Reference: Elix, JA/ Jiang, H/ Gaul, KL 1993: The structure and synthesis of some minor xanthenes from the lichen *Rinodina thiomela*. Australian Journal of Chemistry 46: 95-110.

Notes: Pale yellow pigment. Occurs in *Rinodina thiomela*

5,7-Dichloroemodin

A: 50 B: x B': 63 C: 65 E: x F: x G: x

HPLC: 37 TLC: Rf 32 [chloroform/methanol, 4/1]

V: + UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 342, 340, 338

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 5-Chloroemodin, 7-Chloroemodin, Emodin

Reference: Cohen, PA/ Towers, GHN 1995: The anthraquinones of *Heterodermia obscurata*.

Phytochemistry 40: 911-915.

Notes: Yellow-orange pigment. Minor pigment in *Heterodermia obscurata*

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

A: 79 B: x B': 88 C: 86 E: 72 F: 90 G: x

HPLC: 70

V: + UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 342, 340, 338, 325

Substance Class: Xanthenes

Biosynthetically Related Compounds: 2-Dechloro-8-O-methylthiomelin, 4-Dechloro-8-O-methylthiomelin, 2-Dechlorothiomelin, 4-Dechlorothiomelin, 5,7-Dichloro-2,8-dihydroxy-1,3-dimethylxanthone, 8-O-Methylthiomelin, Thiomelin

Reference: Elix, JA/ Jiang, H/ Gaul, KL 1993: The structure and synthesis of some minor xanthenes from the lichen *Rinodina thiomela*. Australian Journal of Chemistry 46: 95-110.

Notes: Pale yellow pigment. Minor component in *Rinodina thiomela*

7,7'-Dichlorohypericin

A: x B: x B': x C: x E: x F: x G: x

HPLC: x TLC: Rf 30 [chloroform/methanol, 4/1]

V: + UV: +

Acid Spray: Blue-purple LW UV: Blue-purple

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 575, 573, 571

Substance Class: Phenanthroperylenequinones

Biosynthetically Related Compounds: 2,2',7,7'-Tetrachlorohypericin

Reference: Cohen, PA/ Towers, GHN 1995: The anthraquinones and phenanthroperylenequinones from *Nephroma laevigatum*. Journal of Natural Products 58: 520-526.

Notes: Indigo pigment. Minor pigment in *Nephroma laevigatum*

2,4-Dichlorolichexanthone

A: 78 B: x B': 76 C: 75 E: 55 F: 85 G: x

HPLC: 57

V: +

UV: +

Acid Spray: Orange

LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 358, 356, 354, 315

Substance Class: Xanthonen

Biosynthetically Related Compounds: 2-Chlorolichexanthone, 4-Chlorolichexanthone, 2,5-Dichlorolichexanthone, Thiophaninic acid, 2,4,5-Trichlorolichexanthone

Reference: Huneck, S/ Höfle, G 1978: Struktur und ¹³C-NMR-Spektroskopie von chlorhältigen Flechtenxanthonen. Tetrahedron 34: 2491-2502.

Notes: Pale yellow pigment. Minor component in *Pertusaria aleianta*

2,5-Dichlorolichexanthone

A: 73 B: x B': 59 C: 76 E: 43 F: 80 G: x

HPLC: 50

V: +

UV: +

Acid Spray: Orange

LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 358, 356, 354, 213

Substance Class: Xanthonen

Biosynthetically Related Compounds: 2-Chlorolichexanthone, 5-Chlorolichexanthone, 2,4-Dichlorolichexanthone, 4,5-Dichlorolichexanthone, 2,4,5-Trichlorolichexanthone

Reference: Huneck, S/ Höfle, G 1978: Struktur und ¹³C-NMR-Spektroskopie von chlorhältigen Flechtenxanthonen. Tetrahedron 34: 2491-2502.

Notes: Pale yellow pigment. Minor component in *Pertusaria aleianta*

2,7-Dichlorolichexanthone

A: 77 B: x B': 70 C: 80 E: 24 F: 57 G: x

HPLC: 53

V: +

UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 358, 356, 354, 213

Substance Class: Xanthenes

Biosynthetically Related Compounds: 2-Chlorolichexanthone, 7-Chlorolichexanthone, 2,7-Dichloro-3-*O*-methylnorlichexanthone, 2,7-Dichloro-6-*O*-methylnorlichexanthone, 2,5,7-Trichlorolichexanthone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthenes in lichens, and a further thirteen new lichen xanthenes. *Bryologist* 95: 52-64.

Notes: Pale yellow pigment. Occurs in *Lecanora salina*, *L. populicola*, *L. behringii*

4,5-Dichlorolichexanthone

A: 72 B: x B': 60 C: 76 E: 43 F: 77 G: x

HPLC: 55

V: +

UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 358, 356, 354, 313

Substance Class: Xanthenes

Biosynthetically Related Compounds: 2-Chlorolichexanthone, 7-Chlorolichexanthone, 2,4-Dichlorolichexanthone, 2,5-Dichlorolichexanthone, 4,5-Dichloro-3-*O*-methylnorlichexanthone, 4,5-Dichloro-6-*O*-methylnorlichexanthone, 2,4,5-Trichlorolichexanthone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthenes in lichens, and a further thirteen new lichen xanthenes. *Bryologist* 95: 52-64.

Notes: Pale yellow pigment. Occurs in *Buellia glaziouana*, *Pertusaria coronata*

5,7-Dichlorolichexanthone

A: 80 B: x B': 81 C: 90 E: 72 F: 77 G: x

HPLC: 55

V: +

UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 358, 356, 354, 329

Substance Class: Xanthenes

Biosynthetically Related Compounds: 5-Chlorolichexanthone, 7-Chlorolichexanthone, 2,4-Dichlorolichexanthone, 5,7-Dichloro-3-*O*-methylnorlichexanthone, Isoarthothelin, 2,5,7-Trichlorolichexanthone, 2,5,7-Trichloro-3-*O*-methylnorlichexanthone

Reference: Elix, JA/ Crook, CE/ Lumbsch, HT 1992: The chemistry of foliicolous lichens. 1. Constituents of *Sporopodium vezdeanum* and *S. xantholeucum*. *Mycotaxon* 44: 409-415.

Notes: Pale yellow pigment. Occurs in *Sporopodium flavescens*

3,5-Dichloro-2'-O-methylaniziaic acid

A: 43 B: x B': 46 C: 45 E: x F: x G: x

HPLC: 32

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: P.Red KC: PD: No Result

Mass spectrum: -1, 276, 274, 238

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 3,5-Dichloro-2'-O-methylnordivarcatic acid, 3,5-Dichloro-2'-O-methylnorhypertolic acid, 3,5-Dichloro-2'-O-methylnorstenosporic acid, 5-Chloro-2'-O-methylaniziaic acid

Reference: Huneck, S/Höfle, G/ Culberson, CF 1985: 3,5-Dichlor-2'-O-methylanziensäure, ein neues Depsid aus *Lecanora sulphurella*. *Phytochemistry* 16: 995-998.

Notes: Acid Spray: yellow, grey halo. Occurs in *Lecanora sulphurella*

3,5-Dichloro-2'-O-methylnordivarcatic acid

A: 40 B: x B': 35 C: 43 E: x F: x G: x

HPLC: 22

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers:

K: No Result C: P.Red KC: Red PD: No Result

Mass spectrum: -1, 249, 248, 247

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 3,5-Dichloro-2'-O-methylaniziaic acid, 3,5-Dichloro-2'-O-methylnorstenosporic acid, 5-Chloro-2'-O-methylaniziaic acid

References: Elix, JA/ Barclay, CE/Lumbsch, HT/Wardlaw, JH 1997: New chloro depsides from the lichen *Lecanora lividocinerea*. *Lichenologist* 50: 971-975. Rodrigues, SA/Terrón-Alfonso, A/Elix, JA/Pérez-Ortega, S/Tønsberg, T/Fernández-Salegui, AB/Soares, AMVM 2011: *Lecanora solediomarginata* a new epiphytic lichen species discovered along the Portuguese coast. *Lichenologist* 43: 99-111.

Notes: Minor component in *Lecanora solediomarginata*

3,5-Dichloro-2'-O-methylnorhypertolic acid

A: 44 B: x B': 51 C: 46 E: x F: x G: x

HPLC: 39

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers:

K: No Result C: P.Red KC: Red PD: No Result

Mass spectrum: -1, 292, 277, 276

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 3,5-Dichloro-2'-*O*-methylaniziaic acid, 3,5-Dichloro-2'-*O*-methylnordivaric acid, 3,5-Dichloro-2'-*O*-methylnorstenosporic acid, 5-Chloro-2'-*O*-methylaniziaic acid

Reference: Elix, JA/ Barclay, CE/Lumbsch, HT/Wardlaw, JH 1997: New chloro depsides from the lichen *Lecanora lividocinerea*. Australian Journal of Chemistry 50: 971-975.

Notes: Minor component in *Lecanora lividocinerea*

2,5-Dichloro-6-*O*-methylnorlichexanthone

A: 64 B: x B': 51 C: 51 E: 32 F: 67 G: x

HPLC: 36

V: + UV: +

Acid Spray: Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 344, 342, 340, 311

Substance Class: Xanthonnes

Biosynthetically Related Compounds: 2-Chloro-6-*O*-methylnorlichexanthone, 5-Chloro-6-*O*-methylnorlichexanthone, 2,5-Dichlorolichexanthone, 2,5-Dichloronorlichexanthone, 4,5-Dichloro-6-*O*-methylnorlichexanthone, 6-*O*-Methylarthothelin, Thiophanic acid, 2,4,5-Trichlorolichexanthone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthonnes in lichens, and a further thirteen new lichen xanthonnes. Bryologist 95: 52-64.

Notes: Pale yellow pigment. Minor component in *Dimelaena elevata*

2,7-Dichloro-3-*O*-methylnorlichexanthone

A: 53 B: x B': 51 C: 42 E: 11 F: 41 G: x

HPLC: 48

V: + UV: +

Acid Spray: Orange

LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 344, 342, 340, 306

Substance Class: Xanthonnes

Biosynthetically Related Compounds: 2-Chloronorlichexanthone, 7-Chloronorlichexanthone, 2,7-Dichlorolichexanthone, 2,7-Dichloronorlichexanthone, 2,7-Dichloro-6-*O*-methylnorlichexanthone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthonnes in lichens, and a further thirteen new lichen xanthonnes. Bryologist 95: 52-64.

Notes: Pale yellow pigment. Occurs in *Lecanora behringii*, *L. salina*

2,7-Dichloro-6-O-methylnorlichexanthone

A: 52 B: x B': 46 C: 46 E: 12 F: 44 G: x

HPLC: 46

V: + UV: +

Acid Spray: Orange LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 344, 342, 340, 306

Substance Class: Xanthones

Biosynthetically Related Compounds: 2-Chloro-6-O-methylnorlichexanthone, 7-Chloro-6-O-methylnorlichexanthone, 2-Chloronorlichexanthone, 7-Chloronorlichexanthone, 2,7-Dichlorolichexanthone, 2,7-Dichloronorlichexanthone, 2,7-Dichloro-3-O-methylnorlichexanthone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. *Bryologist* 95: 52-64.

Notes: Pale yellow pigment. Occurs in *Lecanora behringii*, *L. populicola*, *L. salina*

4,5-Dichloro-3-O-methylnorlichexanthone

A: 57 B: x B': 52 C: 58 E: 24 F: 50 G: x

HPLC: 37

V: + UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 344, 342, 340

Substance Class: Xanthones

Biosynthetically Related Compounds: Arthothelin, Asemone, 4,5-Dichlorolichexanthone, 4,5-Dichloronorlichexanthone, 3-O-Methylasemone, Thuringione

Reference: Sundholm, EG 1978: Total synthesis of lichen xanthones. Revision of structures. *Tetrahedron* 34: 577-586.

Notes: Pale yellow pigment. Occurs in *Lecidella carpathica*

4,5-Dichloro-6-O-methylnorlichexanthone

A: 60 B: x B': 51 C: 48 E: 30 F: 65 G: x

HPLC: 38

V: + UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 344, 342, 340, 309

Substance Class: Xanthones

Biosynthetically Related Compounds: Arthothelin, Asemone, 4,5-Dichlorolichexanthone, 4,5-Dichloronorlichexanthone, 6-*O*-Methylarthothelin, 6-*O*-Methylasemone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthonones in lichens, and a further thirteen new lichen xanthonones. *Bryologist* 95: 52-64.

Notes: Pale yellow pigment. Minor component in *Dimelaena elevata*

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

A: 67 B: x B': 67 C: 59 E: 16 F: 40 G: x

HPLC: 46

V: +

UV: +

Acid Spray: Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 344, 342, 340, 314

Substance Class: Xanthonones

Biosynthetically Related Compounds: 5,7-Dichlorolichexanthone, 5,7-Dichloronorlichexanthone, Isoarthothelin, 2,5,7-Trichloro-3-*O*-methylnorlichexanthone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthonones in lichens, and a further thirteen new lichen xanthonones. *Bryologist* 95: 52-64.

Notes: Pale yellow pigment. Occurs in *Lecanora epibryon* ssp. *broccha*

5,7-Dichloro-6-*O*-methylnorlichexanthone

A: 57 B: x B': 73 C: 46 E: 38 F: 79 G: x

HPLC: 45

V: +

UV: +

Acid Spray: Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 344, 342, 340

Substance Class: Xanthonones

Biosynthetically Related Compounds: 5,7-Dichlorolichexanthone, 5,7-Dichloronorlichexanthone, Isoarthothelin, 2,5,7-Trichloro-3-*O*-methylnorlichexanthone

Reference: Elix, JA/ Lumbsch, HT/ Lücking, R 1995: The chemistry of foliicolous lichens 2. Constituents of some *Byssoloma* and *Sporopodium* species. *Bibliotheca Lichenologica* 58: 81-96.

Notes: Pale yellow pigment. Occurs in *Byssoloma subdiscordans*

3,5-Dichloro-2'-*O*-methylnorstenosporic acid

A: 42 B: x B': 40 C: 45 E: x F: x G: x

HPLC: 24

V: -

UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result C: P.Red KC: Red PD: No Result

Mass spectrum: -1, 249, 248, 247

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 3,5-Dichloro-2'-*O*-methylanziaic acid, 3,5-Dichloro-2'-*O*-methylnordivarcatic acid, 3,5-Dichloro-2'-*O*-methylnorhypertolic acid, 5-Chloro-2'-*O*-methylanziaic acid

Reference: Elix, JA/ Barclay, CE/ Lumbsch, HT/Wardlaw, JH 1997: New chloro depsides from the lichen *Lecanora lividocinerea*. Australian Journal of Chemistry 50: 971-975.

Notes: Occurs in *Lecanora lividocinerea* and *L. sorediomarginata*

3,5-Dichloro-4-*O*-demethylplanaic acid [2-*O*-Methylsulphurellin]

A: 44 B: x B': 49 C: 46 E: x F: x G: x

HPLC: 34

V: - UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 291, 289, 239

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 5-Chloro-2'-*O*-methylanziaic acid, 3,5-Dichloro-2'-*O*-methylanziaic acid, 3,5-Dichloro-2'-*O*-methylnordivarcatic acid, 3,5-Dichloro-2'-*O*-methylnorhypertolic acid, 3,5-Dichloro-2'-*O*-methylnorstenosporic acid

Reference: Brodo, IW/ Elix, JA 1993: *Lecanora jamesii* and the relationship between *Lecanora s. str.* and *L. straminella*. Bibliotheca Lichenologica 53: 19-26.

Notes: Occurs in *Lecanora jamesii*

2,4-Dichloronorlichexanthone

A: 49 B: x B': 43 C: 30 E: 8 F: 30 G: x

HPLC: 29

V: + UV: +

Acid Spray: Yellow

LW UV: Green

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass spectrum: 330, 328, 326, 306

Substance Class: Xanthones

Biosynthetically Related Compounds: Arthothelin, 2-Chloronorlichexanthone, 4-Chloronorlichexanthone, Thiophanic acid, Thiophanic acid

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. Bryologist 95: 52-64.

Notes: Pale yellow pigment. Occurs in *Lecanora straminea*

2,5-Dichloronorlichexanthone

A: 42 B: x B': 40 C: 32 E: 9 F: 42 G: x

HPLC: 27

V: + UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Red-orange KC: PD: No Result

Mass spectrum: 328, 326, 294, 292

Substance Class: Xanthones

Biosynthetically Related Compounds: Arthothelin, 2-Chloronorlichexanthone, 5-Chloronorlichexanthone, 2,5-Dichloro-6-*O*-methylnorlichexanthone, Isoarthothelin

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. *Bryologist* 95: 52-64.

Notes: Pale yellow pigment. Occurs in *Lecanora epibryon* subsp. *broccha*

2,7-Dichloronorlichexanthone

A: 40 B: x B': 38 C: 27 E: 5 F: 26 G: x

HPLC: 28

V: + UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Red-orange KC: PD: No Result

Mass spectrum: 328, 326, 294, 292

Substance Class: Xanthones

Biosynthetically Related Compounds: 2-Chloronorlichexanthone, 7-Chloronorlichexanthone, 2,7-Dichloro-3-*O*-methylnorlichexanthone, 2,7-Dichloro-6-*O*-methylnorlichexanthone, 5,7-Dichloronorlichexanthone, Isoarthothelin

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. *Bryologist* 95: 52-64.

Notes: Pale yellow pigment. Occurs in *Lecanora dispersa*

4,5-Dichloronorlichexanthone

A: 44 B: x B': 48 C: 33 E: 14 F: 49 G: x

HPLC: 26

V: + UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: Red-orange KC: PD: No Result

Mass spectrum: 330, 328, 326

Substance Class: Xanthones

Biosynthetically Related Compounds: Arthothelin, Asemone, 4-Chloronorlichexanthone, 5-Chloronorlichexanthone, 4,5-Dichloro-3-*O*-methylnorlichexanthone, Thiophanic acid

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. *Bryologist* 95: 52-64.

Notes: Pale yellow pigment. Occurs in *Lecanora straminea*, *Micarea isabellina*

4,7-Dichloronorlichexanthone

A: 43 B: x B': 47 C: 32 E: 17 F: 52 G: x

HPLC: 30

V: + UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Red-orange KC: PD: No Result

Mass spectrum: 330, 328, 326, 292

Substance Class: Xanthones

Biosynthetically Related Compounds: 4-Chloronorlichexanthone, 7-Chloronorlichexanthone, 4,5-Dichloronorlichexanthone, Thiophanic acid

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. *Bryologist* 95: 52-64.

Notes: Pale yellow pigment. Occurs in *Lecanora epibryon* subsp. *broccha*

5,7-Dichloronorlichexanthone

A: 44 B: x B': 48 C: 33 E: 11 F: 43 G: x

HPLC: 30

V: + UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Red-orange KC: PD: No Result

Mass spectrum: 330, 328, 326, 292

Substance Class: Xanthones

Biosynthetically Related Compounds: Asemone, 5-Chloronorlichexanthone, 7-Chloronorlichexanthone, 5,7-Dichloro-3-*O*-methylnorlichexanthone, 4,7-Dichloronorlichexanthone, Isoarthothelin, Thiophanic acid

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. *Bryologist* 95: 52-64.

Notes: Pale yellow pigment. Occurs in *Lecanora epibryon* subsp. *broccha*

5,7-Dichloro-1,6,8-trihydroxy-3-methyl-9-anthrone [AO2-Anthrone]

A: x B: x B': x C: 40 E: x F: x G: x

HPLC: 35

V: + UV: +

Acid Spray: P.Yellow LW UV: P.Yellow

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 326, 324

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chloroemodin, 7-Chloro-1,6,8-trihydroxy-3-methyl-9-anthrone, 5,7-Dichloroemodin, Emodin

Reference: Yosioka, Y/ Morimoto, K/ Kitagawa, I 1968: The pigment constituents of some *Anaptychia* species. Journal of Japanese Botany 43: 343-348.

Notes: Pale yellow pigment. Occurs in *Heterodermia obscurata*

Didechlorolecideoidin

A: 44 B: x B': 29 C: 29 E: x F: x G: x

HPLC: 22

V: - UV: +

Acid Spray: P.Orange LW UV: D.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 330, 298, 270

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Norgangaleoidin, 3'-Dechlorolecideoidin, Lecideoidin

Reference: Elix, JA/ Venables, DA/Lumbsch, HT/Brako, L 1994: Further new metabolites from lichens. Australian Journal of Chemistry 47: 1619-1623.

Notes: Minor component in *Lecanora californica* and *Tylothallia verrucosa*

Didymic acid

A: 44 B: 77 B': 68 C: 52 E: x F: x G: x

HPLC: 35

V: - UV: +

Acid Spray: Blue LW UV: Purple

Archers: Green

K: No Result C: Green KC: PD: No Result

Mass spectrum: 370, 353, 352, 326

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Condidymic acid, Isodidymic acid, Subdidymic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 167. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 219.

Notes: Acid Spray: strong-purple with bright blue halo. Minor component in *Cladonia floerkeana*

Diffractaic acid

A: 44 B: 64 B': 55 C: 51 E: x F: x G: x

HPLC: 30

V: – UV: +

Acid Spray: P.Yellow LW UV: P.Yellow

Archers: D.Red

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 374, 193, 182, 164

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Barbatic acid, 4-*O*-Demethyldiffractaic acid, 2-*O*-Methylobtusatic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 148. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 251.

Notes: Acid Spray: pale yellow, grey halo. LW UV: deep purple, pale yellow halo. Occurs in *Cladia muelleri*

(-)-Dihydropertusaric acid

A: 42 B: 36 B': 36 C: 35 E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: No Result LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 368, 353, 326, 293

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: allo-Pertusaric acid

References: Huneck, S/ Tønsberg, T/ Bohlmann, F, I 1986: (-)-allo-Pertusaric acid and (-)-dihydropertusaric acid from the lichen *Pertusaria albescens*. *Phytochemistry* 25: 453-459.

Notes: Occurs in *Pertusaria albescens*

Dihydropicrolichenic acid [2-*O*-Methylanziaic acid]

A: 44 B: x B': 38 C: 33 E: x F: x G: x

HPLC: x

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 238, 224, 222

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Anziaic acid, 4-*O*-Demethylplanaic acid, Picrolichenic acid

Reference: Culberson, CK/ Culberson, WL/ Johnson, A 1990: The *Ramalina americana* complex (Ascomycotina, Ramalinaceae): chemical and geographical correlations. Bryologist 93: 167-186.

Notes: Occurs in *Ramalina americana* s. lat.

1,7-Dihydroxy-2,4-dichloro-6,8-dimethylxanthone

A: 62 B: x B': 70 C: 65 E: 46 F: 83 G: x

HPLC: 58

V: + UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 328, 326, 324, 295

Substance Class: Xanthones

Biosynthetically Related Compounds: 2-Dechlorothiomelin, 4-Dechlorothiomelin, Thiomelin

Reference: Elix, JA/ Jiang, H/ Gaul, KL 1993: The structure and synthesis of some minor xanthones from the lichen *Rinodina thiomela*. Australian Journal of Chemistry 46: 95-110.

Notes: Pale yellow pigment. Minor component in *Rinodina thiomela*

1,8-Dihydroxy-3,6-dimethoxyxanthone

A: 75 B: x B': 73 C: 78 E: x F: x G: x

HPLC: 48

V: + UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 288, 259, 245, 230

Substance Class: Xanthones

Biosynthetically Related Compounds: x

Reference: Elix, JA/ Gaul, KL/ Lumbsch, HT 1987: Isolation of a novel lichen xanthone from the genus *Diploschistes* s. lat. Australian Journal of Chemistry 40: 1031-1033.

Notes: Pale yellow pigment. Occurs in *Laurera meritospora*

3 β ,22-Dihydroxyhopane-29-oic acid [Pyxinic acid]

A: x B: x B': x C: 38 E: x F: x G: x

HPLC: x

V: - UV: +

Acid Spray: Pink LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: Methyl 3-*O*-acetoxypyxinate, Methyl pyxinate

Reference: Yosioka, I/ Matsuda, A/ Kitagawa, I 1966: Pyxinic acid, a novel lichen triterpene with a 3 β -hydroxyl function. Tetrahedron Letters 613-616.

Notes: Occurs in *Pyxine endochrycina*

6 α ,22-Dihydroxyhopan-23-oic acid

A: 18 B: x B': 31 C: 14 E: 7 F: x G: 32

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Pink

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 226, 210, 208

Substance Class: Terpenoids

Biosynthetically Related Compounds: Hopane-6 α ,22-diol [Zeorin]

Reference: Wilkins, AL/ James, PW 1979: The chemistry of *Pseudocyphellaria impressa* s. lat. in New Zealand. Lichenologist 11: 271-281.

Notes: Occurs in *Pseudocyphellaria billardieri*

16 β , 22-Dihydroxyhopan-4 α -oic acid [Leucotylic acid]

A: x B: x B': x C: 37 E: 2 F: x G: 32

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 488, 470, 452, 428

Substance Class: Terpenoids

Biosynthetically Related Compounds: 16 β -Acetoxy-22-hydroxyhopane-4 α -oic acid, Hopane-6 α ,22-diol [Zeorin], Hopane-6 α ,16 β ,22-triol [Leucotylin]

Reference: Yosioka, I/ Yamaki, M/ Kitagawa, I 1966: On the triterpenic constituents of a lichen *Parmelia entotheiochroa* Hue; zeorin, leucotylin, leucotylic acid, and five new related triterpenoids, Chemical and Pharmaceutical Bulletin (Tokyo) 14: 804-807.

Notes: Occurs in *Myelochroa aurulenta*

2,4-Dihydroxy-6-pentylbenzoic acid [Olivetolcarboxylic acid]

A: 45 B: 58 B': x C: 35 E: x F: x G: x

HPLC: 12

V: – UV: +

Acid Spray: Yellow LW UV: Grey

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: 224, 207, 206, 180

Substance Class: Monocyclic aromatic compounds

Biosynthetically Related Compounds: 2-Hydroxy-4-methoxy-6-pentylbenzoic acid, Perlatolic acid

Reference: Gonzáles, AG/ Barrera, JB/ Rodrigues Pérez, EM/ Hernández Padrón, CE 1991: Chemical constituents of the lichen *Cladina macronesica*. *Zeitschrift für Naturforschung* 46c: 12-18.

Notes: Possibly an artefact, reported to occur in *Cladonia macaronesica*

5,7-Dihydroxy-6-methylphthalide

A: 43 B: x B': 25 C: 15 E: 11 F: x G: 43

HPLC: –3

V: – UV: +

Acid Spray: No Result LW UV: P.Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 180, 162

Substance Class: Monocyclic aromatic compounds

Biosynthetically Related Compounds: Alectorialic acid, Alectorialin, Hypoalectorialic acid

Reference: Huneck, S/ Elix, JA 1993: The chemistry of the lichens *Anamylopsora pulcherrima* and *Tephromela armeniaca*. *Herzogia* 9: 647-651.

Notes: Occurs in *Anamylopsora pulcherrima*

4,4'-Di-O-methylcryptochlorophaeic acid

A: 50 B: 35 B': 44 C: 51 E: x F: x G: x

HPLC: 42

V: – UV: +

Acid Spray: P.Brown LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 252, 236, 235

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Boninic acid, 2,4'-Di-O-methylnorsekikaic acid, 4'-O-Methylcryptochlorophaeic acid, 4'-O-Methylpaludosic acid, 2-O-Methylsekikaic acid

Reference: Chester, DO/ Elix, JA 1978: The identification of four new *meta*-depsides in the lichen *Ramalina asahinae*. *Australian Journal of Chemistry* 31: 2745-2749.

Notes: Acid Spray: fades to pink. Occurs in *Ramalina asahinae*

2,2'-Di-O-Methyldivaricatic acid

A: 39 B: 35 B': 24 C: 44 E: x F: x G: x

HPLC: 22

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 223, 208, 207

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2,2'-Di-*O*-Methylstenosporic acid, Planaic acid

Reference: Elix, JA/ Barclay, CE/ David, F/ Griffin, FK/ Hill, AM/ McConnell, DB/ Wardlaw, JH 1993:

Synthesis of further lichen depsides. Australian Journal of Chemistry 46: 301-313.

Notes: Occurs in *Pertusaria subplanaica*

2,4-Di-*O*-methylgyrophoric acid

A: 44 B: 37 B': 35 C: 48 E: x F: x G: x

HPLC: 29

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 346, 196, 180

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, 3-Methoxy-2,4-di-*O*-methylgyrophoric acid, 5-*O*-Methylhiassic acid, 2,4,5-Tri-*O*-methylhiassic acid

Reference: Elix, JA/ Jayanthi, VK/ Leznoff, CC 1981: 2,4-Di-*O*-methylgyrophoric acid and 2,4,5-tri-*O*-methylhiassic acid. New tridepsides from *Parmelia damaziana*. Australian Journal of Chemistry 34: 1757-1761.

Notes: Acid Spray: strong yellow, grey halo. Occurs in *Hypotrachyna neodamaziana*

4,2''-Di-*O*-methylgyrophoric acid [2'',4-Di-*O*-methylgyrophoric acid]

A: 45 B: x B': 65 C: 51 E: x F: x G: x

HPLC: x

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 182, 165, 164

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Evernic acid, Lecanoric acid, 2'-*O*-Methylevernic acid

Reference: Nicollier, G/ Rebetez, M/ Tabacchi, R 1979: Identification et synthèse de nouveaux depsides isolés de la mousse de chêne. Helvetica Chimica Acta 62: 711-717.

Notes: Acid Spray: strong yellow, grey halo. Occurs in *Evernia prunastri*

2,4-Di-O-Methylhiassic acid

A: 28 B: x B': 22 C: 30 E: x F: x G: x

HPLC: 23

V: – UV: +

Acid Spray: P. Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: Pink PD: No Result

Mass spectrum: -1, 363, 212, 195

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Umbilicic acid, Lecanoric acid, Hiassic acid, 4-O-Methylhiassic acid, 2,4,5-Tri-O-Methylhiassic acid

Reference: Elix, JA/ Wardlaw, JH 2000: Four new tridedsides from *Hypotrachyna* species. Australasian Lichenology 47: 8-13.

Notes: Minor component in *Hypotrachyna spumosa*

2,5-Di-O-Methylhiassic acid

A: 30 B: x B': 24 C: 28 E: x F: x G: x

HPLC: 23

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 382, 212, 195

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Umbilicic acid, Lecanoric acid, Hiassic acid, 5-O-Methylhiassic acid, 2,4,5-Tri-O-Methylhiassic acid

Reference: Elix, JA/ Wardlaw, JH 2000: Four new tridedsides from *Hypotrachyna* species. Australasian Lichenology 47: 8-13.

Notes: Minor component in *Hypotrachyna neodamaziana*

4,5-Di-O-methylhiassic acid

A: 33 B: 36 B': 41 C: 40 E: x F: x G: x

HPLC: 31

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: Pink PD: No Result

Mass spectrum: -1, 212, 194, 178

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Hiassic acid, Lecanoric acid, 5-*O*-Methylhiassic acid, 2,4,5-Tri-*O*-Methylhiassic acid

Reference: Elix, JA/ Engkaninan, U 1976: 4,5-Di-*O*-methylhiassic acid, a new tridepside from the lichens *Parmelia pseudofatiscens* and *Parmelia horrescens*. Australian Journal of Chemistry 29: 2701-2705.

Notes: Acid Spray: bright blue initially; quickly fades to pale yellow, grey halo. Minor component in *Hypotrachyna horrescens*

2,2'-Di-*O*-methylimbricarinic acid

A: 42 B: 36 B': 29 C: 46 E: x F: x G: x

HPLC: x

V: - UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 236, 235, 151

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2,2'-Di-*O*-Methyldivaricatinic acid, 2,2'-Di-*O*-Methylstenosporic acid, Planaic acid

Reference: Elix, JA/ Barclay, CE/ David, F/ Griffin, FK/ Hill, AM/ McConnell, DB/ Wardlaw, JH 1993: Synthesis of further lichen depsides. Australian Journal of Chemistry 46: 301-313.

Notes: Minor component in *Pertusaria subplanaica*

2,4'-Di-*O*-methylnorsekikaic acid

A: 32 B: 29 B': 27 C: 18 E: x F: x G: x

HPLC: 16

V: - UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: x KC: x PD: x

Mass Spectrum: -1, 226, 210, 208

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Boninic acid, 4'-*O*-Methylcryptochlorophaeic acid, 4'-*O*-Methylpaludosic acid, 2-*O*-Methylsekikaic acid

Reference: Chester, DO/ Elix, JA 1978: The identification of four new *meta*-depsides in the lichen *Ramalina asahinae*. Australian Journal of Chemistry 31: 2745-2749.

Notes: Acid Spray: strong orange, grey halo. LW UV: strong purple, green halo. Minor component in *Ramalina asahinae*

2,4-Di-*O*-methylolivetic acid

A: 49 B: B': 57 C: 46 E: x F: x G: x

HPLC: 36

V: – UV: +

Acid Spray: Yellow LW UV: Blue

Archers: x

K: No Result C: No Result KC: x No Result PD: No Result

Mass Spectrum: x

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*-Methylolivetic acid, 2-*O*-Methylperlatolic acid, Olivetic acid

Reference: Elix, JA/ Archer, AW 2007. A new variety of *Pertusaria georgeana* (lichenized Ascomycota) containing a new depside. *Australasian Lichenology* 61: 26-29.

Notes: Occurs in *Pertusaria georgeana* var. *goonooensis*

2',4-Di-*O*-methylphysodic acid

A: 70 B: 29 B': 33 C: 45 E: x F: x G: x

HPLC: 25

V: – UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: x No Result PD: No Result

Mass Spectrum: 498, 454, 263, 262

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Physodic acid, 2'-*O*-Methylphysodic acid, 4-*O*-methylphysodic acid

Reference: Elix, JA/ Adler, MT/ Wardlaw 1996: A further three new depsidones. *Australian Journal of Chemistry* 49: 1175-1178.

Notes: Minor component in *Pseudevernia furfuracea*

6 α ,9 α -Di-*O*-Methylsalazinic acid

A: 48 B: x B': 24 C: 40 E: x F: x G: 51

HPLC: 27

V: – UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: P.Red C: No Result KC: PD: Yellow

Mass spectrum: 416, 385, 384, 370

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Salazinic acid, Quaesitic acid, 9 α -*O*-Methylsalazinic acid

Reference: Elix, JA/ Wardlaw, JH/ Liu, X-W 2002: A new depsidone from the lichen family Parmeliaceae. *Australasian Lichenology* 51: 4-6.

Notes: Minor component in *Cetrelia rhytidocarpa*, *Hypotrachyna quaesita*, *Xanthoparmelia subnuda*

2,2'-Di-O-Methylstenosporic acid

A: 44 B: x B': 29 C: 48 E: x F: x G: x

HPLC: 30

V: - UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 244, 208, 207

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2,2'-Di-O-Methyldivaricatic acid, 2,2'-Di-O-Methylimbricatic acid, Planaic acid

Reference: Elix, JA/ Barclay, CE/ David, F/ Griffin, FK/ Hill, AM/ McConnell, DB/ Wardlaw, JH 1993:

Synthesis of further lichen depsides. Australian Journal of Chemistry 46: 301-313.

Notes: Minor component in *Pertusaria subplanaica*

2',2''-Di-O-methyltenuiorin

A: 70 B: 44 B': 29 C: 63 E: 19 F: x G: x

HPLC: 31

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: x No Result PD: No Result

Mass Spectrum: -1, 361, 329, 196

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Methyl gyrophorate, 2'-O-Methyltenuiorin, 2''-O-Methyltenuiorin, Tenuiorin

Reference: Lajide, L/ Elix, JA 1981: 2'-O-Methyltenuiorin 2''-O-methyltenuiorin and 2',2''-di-O-methyltenuiorin.

Three new tridepsides from the lichen *Pseudocyphellaria faveolata*. Australian Journal of Chemistry 34: 2005-2011.

Notes: Minor component in *Pseudocyphellaria faveolata*

Dioxocondidymic acid

A: 56 B: x B': 37 C: 44 E: x F: x G: x

HPLC: 22

V: - UV: +

Acid Spray: Blue LW UV: Purple

Archers: Green

K: No Result C: Green KC: PD: No Result

Mass spectrum: 426, 409, 408

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: 8-Chlorodioxodidymic acid, 8-Chlorooxididymic acid, 8-Chlorodioxocondidymic acid, Dioxodidymic acid, Letrouitic acid, Oxodidymic acid

Reference: Johansson, S/ Sjøchting, U/ Elix, JA/ Wardlaw, JH 2005: Chemical variation in the lichen genus *Letrouitia* (Ascomycota, Letrouitiaceae). *Mycological Progress* 4: 139-148.

Notes: Minor component in *Letrouitia vulpina*

Dioxodidymic acid

A: 44 B: x B': 27 C: 35 E: x F: x G: x

HPLC: 17

V: – UV: +

Acid Spray: Blue LW UV: Purple

Archers: Green

K: No Result C: Green KC: PD: No Result

Mass spectrum: 398, 380, 354

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: 8-Chlorodioxocondidymic acid, 8-Chlorodioxodidymic acid, 8-Chlorooxididymic acid, Dioxocondidymic acid, Letrouitic acid, Oxodidymic acid

Reference: Johansson, S/ Sjøchting, U/ Elix, JA/ Wardlaw, JH 2005: Chemical variation in the lichen genus *Letrouitia* (Ascomycota, Letrouitiaceae). *Mycological Progress* 4: 139-148.

Notes: Minor component in *Letrouitia vulpina*

Diploicin

A: 65 B: 79 B': 65 C: 57 E: 23 F: 65 G: x

HPLC: 43

V: – UV: +

Acid Spray Grey LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 424, 422, 420, 390

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Buellolide, 3-Dechlorodiploicin, 3-Dechloro-*O*-methyldiploicin, Fulgidin, Fulgoicin, Isofulgidin, *O*-Methyldiploicin, Scensidin

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 135. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 325.

Notes: Occurs in *Buellia tetrapla*, *Diploicia canescens*

Diploschistesic acid

A: 21 B: 39 B': 37 C: 13 E: x F: x G: x

HPLC: 10

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: Yellow C: Red KC: PD: No Result

Mass Spectrum: 334, 184, 168, 166

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Lecanoric acid, Orsellinic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 115. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 254.

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Diploschistes scruposus*

4,4'-Disolorinic acid

A: x B: x B': x C: x E: x F: x G: x

HPLC: 59 TLC: Rf 95 [benzene/ethyl formate/formic acid, 80/20/1]

V: + UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 766

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Averantin, Averythrin, 6-O-Methylaverythrin, Norsolorinic acid, Solorinic acid

Reference: Steglich, W/ Jedtke, K-F 1976: Neue Anthrachinonfarbstoffe aus *Solorina crocea*. Zeitschrift für Naturforschung 31c: 197-198.

Notes: Orange-red pigment. Minor component in *Solorina crocea*

Dissectic acid

A: 59 B: x B': 51 C: 45 E: 29 F: x G: x

HPLC: 22

V: – UV: +

Acid Spray: P.Brown LW UV: Brown

Archers: x

K: Yellow C: Red KC: PD: Yellow

Mass spectrum: -1, 299, 257, 196

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Atranorin

Reference: Elix, JA/ Wardlaw, JH 1996: The structure of dissectic acid, a β -orcinol *meta*-depside from the lichen *Heterodermia dissecta*. Australian Journal of Chemistry 49: 539-540.

Notes: Occurs in *Heterodermia dissecta*

Divaricatic acid

A: 39 B: 75 B': 68 C: 51 E: x F: x G: x

HPLC: 33

V: – UV: +

Acid Spray: P. Yellow LW UV: Green

Archers: Orange

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 370, 193, 179

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Nordivaricatic acid, Perlatolic acid, Stenosporic acid, Subdivaricatic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 115. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 254.

Notes: Acid Spray: strong yellow, grey halo. LW UV: strong purple, green halo. Occurs in *Canoparmelia texana*, *Evernia divaricata*

Divaronic acid

A: 35 B: x B': 54 C: 42 E: x F: x G: x

HPLC: 30

V: – UV: +

Acid Spray: Pink LW UV: Pink

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 386, 368, 340, 193

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Colensoic acid, Grayanic acid, Stenosporonic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1985: Orcinol-type depsides and depsidones in the lichens of the *Cladonia chlorophaea* group (Ascomycotina, Cladoniaceae). Bryologist 88: 380-387.

Notes: LW UV: purplish pink, like colensoic acid. Occurs in *Cladonia grayi*

Echinocarpic acid

A: 11 B: 33 B': 27 C: 11 E: x F: x G: 32

HPLC: 16

V: – UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Yellow C: No Result KC: PD: Orange

Mass Spectrum: -1, 299, 257, 215, 196

Substance Class: Benzyl Esters

Biosynthetically Related Compounds: Conechinocarpic acid, Hirtifructic acid

Reference: Elix, JA/ Lajide, L/ Wardlaw, JH 1995: The structure of echinocarpic acid. A benzyl ester from the lichen *Parmelia norcrambidiocarpa*. Australian Journal of Chemistry 48: 1213-1216.

Notes: Occurs in *Parmelia norcrambidiocarpa*, *Relicina echinocarpa*

Elatinic acid

A: 32 B: 27 B': 25 C: 43 E: x F: x G: 52

HPLC: 25

V: - UV: +

Acid Spray: P. Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 404, 209, 196, 193

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Methyl barbatate, 2-O-Methylsquamatic acid, Squamatic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1986: Two new lichen products, elatinic acid and methyl barbatate, from the genus *Haematomma* (Ascomycotina, Haematommaceae). Mycologia 78: 888-891.

Notes: SW UV: bright blue before spraying. Occurs in *Loxospora elatina*, *Pertusaria tropica*

Emodic acid

A: 46 B: x B': 40 C: 33 E: x F: x G: x

HPLC: 20

V: + UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 300, 283, 255

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Emodin, Emodinal, Citreorosein

Reference: Steiner, M/ Hauschild, G 1970: Die Anthrachinone von Caloplacaceae und Teloschistaceae (Lichenes). Vorträge aus dem Gesamtgebiet der Botanik, N.F. 4: 23-34.

Notes: Orange pigment. Occurs in *Xanthoria calcicola*

Emodin

A: 52 B: 61 B': 58 C: 38 E: 27 F: x G: x

HPLC: 32 TLC: Rf 74 [chloroform/acetone, 4/1]

V: + UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: 270, 242, 214

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Emodic acid, Emodinal, 7-Chloroemodin, Citreorosein, Skyrin

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 182. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 172.

Notes: Acid Spray: bright orange, fades to dark yellow. Orange pigment. Occurs in *Nephroma laevigatum*

Emodinal [Emodinaldehyde]

A: 32 B: x B': 37 C: 25 E: 3 F: x G: x

HPLC: 28

V: + UV: +

Acid Spray: Orange

LW UV: Orange

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: 300, 283, 255

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Emodic acid, Emodin, Citreorosein

Reference: Hauschild, G/ Steiner, M/ Glombitza, K-W 1971: Emodinaldehyd und Erythroglaucon in Flechten. Planta Medica 19: 363-367.

Notes: Orange pigment. Occurs in *Xanthoria calcicola*, *Xanthoria karrooensis*

Endocrocin

A: 8 B: 33 B': 31 C: 6 E: x F: x G: x

HPLC: x

V: + UV: +

Acid Spray: Orange

LW UV: D.Red

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: 314, 296, 270

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Emodin

Reference: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 183.

Notes: Red-orange pigment. Occurs in *Nephromopsis endocrocea*

Epanorin

A: 68 B: 52 B': 47 C: 58 E: 34 F: x G: 83

HPLC: 36

V: + UV: +
Acid Spray: P.Yellow LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 435, 290, 145

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Pulvinic acid

Reference: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 213. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 400.

Notes: Intense yellow pigment. Occurs in *Lecanora epanora*

20,24-Epoxydammarane-3 β ,12 β ,25-triol [Pyxinol]

A: 37 B: x B': x C: 33 E: 6 F: x G: 32

HPLC: x

V: - UV: -

Acid Spray: Purple LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 463, 417, 400

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxy-20,24-epoxydammarane-12 β ,25-diol, 3 β ,25-Diacetoxy-20,24-epoxydammarane, 3 β ,25-Diacetoxy-20,24-epoxydammarane-12 β -ol, Methyl 3-*O*-acetoxypyxinate, Methyl pyxinate

Reference: Yosioka, I/ Yamauchi, H/ Kitagawa, I 1972: Lichen triterpenoids. V. On the neutral triterpenes of *Pyxine endochrysin* Nyl., Chemical and Pharmaceutical Bulletin (Tokyo) 20: 502-513.

Notes: Occurs in *Pyxine endochrysin*, *P. soredata*

Epiphorellic acid 1

A: 44 B: x B': 46 C: 35 E: x F: x G: x

HPLC: 40

V: - UV: +

Acid Spray: Orange LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 474, 456, 430, 399

Substance Class: Diphenyl ethers

Biosynthetically Related Compounds: Epiphorellic acid 2, Epiphorellic acid 3

Reference: Elix, JA/McCaffery, LF 1997: Epiphorellic acid 3, a new lichen diphenyl ether. Australian Journal of Chemistry 50: 1101-1103.

Notes: Occurs in *Coelopogon abraxas*, *Coelopogon epiphorellus*

Epiphorellic acid 2

A: 35 B: x B': 26 C: 23 E: x F: x G: x

HPLC: 13

V: – UV: +

Acid Spray: Brown LW UV: Brown

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 444, 413, 381, 355

Substance Class: Diphenyl ethers

Biosynthetically Related Compounds: Epiphorellic acid 1, Epiphorellic acid 3

Reference: Fiedler, P/ Gambaro, P/ Garbarino, JA/ Quilhot, W 1986: Epiphorellic acids 1 and 2, two diaryl ethers from the lichen *Cornicularia epiphorella*. *Phytochemistry* 25: 461-465.

Notes: Occurs in *Coelopogon epiphorellus*

Epiphorellic acid 3

A: 41 B: x B': 43 C: 32 E: x F: x G: x

HPLC: 32

V: – UV: +

Acid Spray: Orange LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 446, 428, 402, 371

Substance Class: Diphenyl ethers

Biosynthetically Related Compounds: Epiphorellic acid 1, Epiphorellic acid 2

Reference: Elix, JA/McCaffery, LF 1997: Epiphorellic acid 3, a new lichen diphenyl ether. *Australian Journal of Chemistry* 50: 1101-1103.

Notes: Minor component in *Coelopogon abraxas*

20,24-Epoxydammarane-3 β ,12 β ,25-triol [Pyxinol]

A: x B: x B': x C: 30 E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: Purple LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 463, 417, 400, 381

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxy-20,24-epoxydammarane-12 β ,25-diol, 3 β ,25-Diacetoxy-20,24-epoxydammarane, 3 β ,25-Diacetoxy-20,24-epoxydammarane-12 β -ol, Methyl 3-*O*-acetoxypyxinate, Methyl pyxinate

Reference: Yosioka, I/ Yamauchi, H/ Kitagawa, I 1972: Lichen triterpenoids. V. On the neutral triterpenes of *Pyxine endochrysin* Nyl., Chemical and Pharmaceutical Bulletin (Tokyo) 20: 502-513.

Notes: Occurs in *Pyxine endochrysin*

Ergochrome AA [Entothein, Secalonic acid A]

A: 39 B: 16 B': 13 C: 28 E: x F: x G: 37

HPLC: 34

V: + UV: +

Acid Spray: P.Brown LW UV: Purple

Archers: Brown

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 638, 620, 579, 260

Substance Class: Ergochromes

Biosynthetically Related Compounds: Ergochrome AC, Ergochrome BB, Eumitrin A₁, Eumitrin A₂, Eumitrin B

Reference: Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 206.

Notes: Yellow pigment. Visible: pale yellowish orange streak on plate; best seen by holding plate before strong light. Occurs in *Myelochroa entotheiochroa*

Ergochrome AB [Secalonic acid C]

A: 42 B: x B': 17 C: 32 E: x F: x G: 45

HPLC: 33

V: + UV: +

Acid Spray: P.Brown LW UV: Purple

Archers: Brown

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 638, 620, 579, 260

Substance Class: Ergochromes

Biosynthetically Related Compounds: Ergochrome AA, Ergochrome BB, Eumitrin A₁, Eumitrin A₂, Eumitrin B

Reference: Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 206.

Notes: Yellow pigment. Visible: pale yellowish orange streak on plate; best seen by holding plate before strong light. Occurs in *Nephromopsis ornata*

Ergochrome BB [Secalonic acid B]

A: 44 B: x B': 21 C: 37 E: x F: x G: 53

HPLC: 32

V: +

UV: +

Acid Spray: P.Brown

LW UV: Purple

Archers: Brown

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 638, 620, 579, 561

Substance Class: Ergochromes

Biosynthetically Related Compounds: Ergochrome AA, Ergochrome AB, Eumitrin A₁, Eumitrin A₂, Eumitrin B

Reference: Elix, JA/ Jenkins, GA/ Lumbsch, HT 1988: Chemical variation in the lichen genus *Diploicia* (Ascomycotina). Mycotaxon 33: 357-466.

Notes: Yellow pigment. Visible: pale yellowish orange streak on plate; best seen by holding plate before strong light. Occurs in *Diploicia canescens* subsp. *australasica*

Ergosterol

A: 56 B: 66 B': 66 C: 43 E: 41 F: x G: 59

HPLC: x

V: -

UV: -

Acid Spray: Purple

LW UV: Pink

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 396, 378, 363, 337

Substance Class: Steroids

Biosynthetically Related Compounds: Ergosterol peroxide

Reference: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 193. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 391.

Notes: Occurs in *Cladonia rangiferina*

Ergosterol peroxide

A: 56 B: 66 B': 66 C: 43 E: 38 F: x G: 59

HPLC: x

V: -

UV: -

Acid Spray: Purple

LW UV: Pink

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 428, 410, 396, 385

Substance Class: Steroids

Biosynthetically Related Compounds: Ergosterol peroxide

Reference: Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 392.

Notes: Occurs in *Peltigera aphthosa*

Eriodermin

A: 51 B: 66 B': 64 C: 82 E: 57 F: x G: x

HPLC: 35

V: – UV: +

Acid Spray: P.Yellow LW UV: P.Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: Orange

Mass Spectrum: 384, 382, 367, 347

Substance Class: Orcinol β -Orcinol Depsidones

Biosynthetically Related Compounds: Argopsin, Pannarin, Vicanicin

Reference: Connolly, JD/ Freer, AA/ Kalb, K/ Huneck, S 1984: Eriodermin, a dichlorodepsidone from the lichen *Erioderma physcioides* – crystal structure analysis. *Phytochemistry* 23: 857-858.

Notes: Occurs in *Erioderma solediatum*

Erythrin

A: 4 B: 5 B': 2 C: 1 E: x F: x G: x

HPLC: 7

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: x

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Lecanoric acid

Reference: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 116.

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Roccella physcopsis*

Erythroglauicin

A: 82 B: x B': x C: 87 E: 60 F: x G: x

HPLC: 72

V: + UV: +

Acid Spray: Orange LW UV: Red

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 300, 282, 270, 260

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Erythroglauicinic acid, Parietin, Xanthorin

Reference: Hauschild, G/ Steiner, M/ Glombitza, K-W 1971: Emodinaldehyd und Erythroglaucon in Flechten. *Planta Medica* 19: 363-367.

Notes: Red pigment. Occurs in *Xanthoria elegans*

Erythroglauconic acid [Erythroglauconcarboxylic acid]

A: x B: x B': x C: x E: 32 F: x G: x

HPLC: x TLC: Rf 40 [oxalic acid-SiO₂/benzene]

V: + UV: +

Acid Spray: Orange LW UV: Red

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 344, 300, 282, 270

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Erythroglaucon, Parietin

Reference: Nakano, H/ Komiya, T/ Shibata, S 1972: Anthraquinones of the lichens of *Xanthoria* and *Caloplaca* and their cultivated mycobionts. *Phytochemistry* 11: 3505-3508.

Notes: Red pigment. Occurs in *Xanthoria fallax*

Erythrommone [3,6-Di-*O*-acetyl-2,4,5-trichlorolichexanthone]

A: x B: x B': x C: x E: x F: x G: x

HPLC: x

V: + UV: +

Acid Spray: P. Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 448, 446, 444, 404

Substance Class: Xanthonones

Biosynthetically Related Compounds: Arthothelin

Reference: Huneck, S/ Follmann, G 1972: Mitteilung über Flechteninhaltsstoffe LXXIV. Zur Phytochemie und Chemotaxonomie der Lecanoraceengattung *Haematomma*. *Journal of the Hattori Botanical Laboratory* 35: 319-324.

Notes: Pale yellow pigment. Reported to occur in *Haematomma erythromma*

Ethyl everninate

A: x B: x B': x C: 77 E: 50 F: x G: x

HPLC: x

V: - UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 210, 165, 164

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: Evernic acid, Evernic acid

Reference: Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 157.

Notes: Possibly an artefact. Reported to occur in *Evernia prunastri*

Ethyl haematommate

A: 78 B: x B': x C: 77 E: 85 F: x G: x

HPLC: x

V: – UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: No Result C: Red KC: PD: Yellow

Mass Spectrum: 224, 195, 179, 178

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: Atranorin, Haematommic acid

Reference: Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 158.

Notes: Possibly an artefact. Reported to occur in *Pseudevernia furfuracea*

Ethyl 2-hydroxy-4-methoxy-6-pentylbenzoate [Ethyl 4-O-methylolivetolcarboxylate]

A: x B: x B': x C: 75 E: x F: x G: x

HPLC: x

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 266, 221, 220

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: 2-Hydroxy-4-methoxy-6-pentylbenzoic acid, Perlatolic acid

Reference: Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 158.

Notes: Possibly an artefact. Reported to occur in *Cladonia macaronesica*

Ethyl orsellinate

A: 62 B: 66 B': x C: 44 E: x F: x G: x

HPLC: x

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: Orange

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 196, 151, 150, 122

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: Lecanoric acid, Orsellinic acid

Reference: Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 158.

Notes: Acid Spray: pale yellow, grey halo. Possibly an artefact. Reported to occur in *Roccella fuciformis*

Eugenitin

A: x B: x B': x C: x E: x F: x G: x

HPLC: 19

V: – UV: +

Acid Spray: P.Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 220, 205, 202, 191

Substance Class: Chromones

Biosynthetically Related Compounds: Eugenitol, 6-Hydroxyeugenitol, Sordidone

Reference: Fox, CH/ Huneck, S 1969: The formation of roccellic acid, eugenitol, eugenitin and rupicolon by the mycobiont *Lecanora rupicola*. Phytochemistry 8: 1301-1304.

Notes: Occurs in *Lecanora rupicola* sens. lat.

Eugenitol

A: x B: x B': x C: x E: x F: x G: x

HPLC: 8

V: – UV: +

Acid Spray: P.Yellow LW UV: Yellow

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass Spectrum: 206, 191

Substance Class: Chromones

Biosynthetically Related Compounds: Eugenitin, 6-Hydroxyeugenitol, Sordidone

Reference: Fox, CH/ Huneck, S 1969: The formation of roccellic acid, eugenitol, eugenitin and rupicolon by the mycobiont *Lecanora rupicola*. Phytochemistry 8: 1301-1304.

Notes: Occurs in *Lecanora rupicola* sens. lat.

Eumitrin A₁

A: 47 B: x B': 22 C: 40 E: x F: x G: 48

HPLC: 24

V: + UV: +
Acid Spray: P.Brown LW UV: Purple

Archers: x

K: : No Result C: No Result KC: : No Result PD: No Result

Mass Spectrum: 680, 621, 561, 501

Substance Class: Ergochromes

Biosynthetically Related Compounds: Eumitrin A₂, Eumitrin B

Reference: Yang, D-M/ Takeda, N/ Iitaka, Y/ Sankawa, U/ Shibata, S 1973: The structure of eumitrins A₁, A₂ and B. The yellow pigments of the lichen *Usnea baileyi* (Stirt.) Zahlbr. Tetrahedron 29: 518-529.

Notes: Yellow pigment. Occurs in *Usnea baileyi*

Eumitrin A₂

A: 47 B: x B': 22 C: 40 E: x F: x G: 48

HPLC: 22

V: + UV: +

Acid Spray: P.Brown LW UV: Purple

Archers: x

K: : No Result C: No Result KC: : No Result PD: No Result

Mass Spectrum: 666, 607, 565, 547

Substance Class: Ergochromes

Biosynthetically Related Compounds: Eumitrin A₁, Eumitrin B

Reference: Yang, D-M/ Takeda, N/ Iitaka, Y/ Sankawa, U/ Shibata, S 1973: The structure of eumitrins A₁, A₂ and B. The yellow pigments of the lichen *Usnea baileyi* (Stirt.) Zahlbr. Tetrahedron 29: 518-529.

Notes: Yellow pigment. Not separated from Eumitrin A₁ in above solvents. Occurs in *Usnea baileyi*

Eumitrin B

A: 51 B: x B': 27 C: 44 E: x F: x G: 55

HPLC: 23

V: + UV: +

Acid Spray: P.Brown LW UV: Purple

Archers: x

K: : No Result C: No Result KC: : No Result PD: No Result

Mass Spectrum: 666, 607, 565, 547

Substance Class: Ergochromes

Biosynthetically Related Compounds: Eumitrin A₁, Eumitrin A₂

Reference: Yang, D-M/ Takeda, N/ Iitaka, Y/ Sankawa, U/ Shibata, S 1973: The structure of eumitrins A₁, A₂ and B. The yellow pigments of the lichen *Usnea baileyi* (Stirt.) Zahlbr. Tetrahedron 29: 518-529.

Notes: Yellow pigment. Occurs in *Usnea baileyi*

Euplectin

A: 53 B: x B': 17 C: 48 E: 15 F: x G: x

HPLC: 26

V: + UV: +

Acid Spray: P.Yellow LW UV: P.Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 295, 294, 266, 254

Substance Class: Naphthopyrones

Biosynthetically Related Compounds: Coneuplectin

Reference: Ernst-Russell, MA/ Chai, CLL/ Wardlaw, JH / Elix, JA 2000: Euplectin and coneuplectin, new naphthopyrones from the lichen *Flavoparmelia euplecta*. Journal of Natural Products 63: 129-131.

Notes: Red-orange pigment. Occurs in *Flavoparmelia euplecta*

Evernic acid

A: 38 B: 61 B': 60 C: 43 E: x F: x G: x

HPLC: 26

V: - UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 182, 168, 165

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Lecanoric acid, Methyl evernate

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 117. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 255.

Notes: Occurs in *Evernia prunastri*

Evernin [Evernine]

A: 74 B: x B': 71 C: 81 E: 60 F: x G: x

HPLC: 39

V: - UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 360, 196, 166, 165

Substance Class: Orcinol β -Orcinol Depsides

Biosynthetically Related Compounds: Atranorin, Evernic acid

Reference: Nicollier, G/ Tabacchi, R 1976: Isolement et identification de l' évernine dans la "mousse de chêne" [*Evernia prunastri* (L.) Ach.]. Helvetica Chimica Acta 59: 2979-2982.

Notes: Acid Spray: pale orange, grey halo. LW UV: purple, green halo. Occurs in *Evernia prunastri*

Exuviatic acid A

A: 53 B: x B': 42 C: 44 E: x F: x G: x

HPLC: 46

V: – UV: –

Acid Spray: Green LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Aliphatic acids [unknown structure]

Biosynthetically Related Compounds: Exuviatic acid B

Reference: Elix, JA/ Johnston, J/ Armstrong, PM 1986: A revision of the lichen genus *Xanthoparmelia* in Australasia. Bulletin of the British Museum (Natural History), Botany series 15: 163-362.

Notes: Occurs in *Xanthoparmelia exuviata*

Exuviatic acid B

A: 50 B: x B': 35 C: 40 E: x F: x G: x

HPLC: 44

V: – UV: –

Acid Spray: Green LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Aliphatic acids [unknown structure]

Biosynthetically Related Compounds: Exuviatic acid A

Reference: Elix, JA/ Johnston, J/ Armstrong, PM 1986: A revision of the lichen genus *Xanthoparmelia* in Australasia. Bulletin of the British Museum (Natural History), Botany series 15: 163-362.

Notes: Occurs in *Xanthoparmelia exuviata*

Fallacinal

A: 62 B: x B': 55 C: 57 E: 24 F: x G: 65

HPLC: 23

TLC: Rf 30 [oxalic acid-SiO₂/benzene]

V: + UV: +

Acid Spray: Pink LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 298, 284, 270, 252

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Parietin, Parietinic acid, Teloschistin

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 183. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 173.

Notes: Orange-yellow pigment. Occurs in *Xanthoria fallax*

Fern-9(11)-ene-3 β ,12 α -diol

A: 40 B: x B': 36 C: 35 E: 7 F: x G: 91

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 442, 424, 409, 273

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxyfern-9(11)-ene-12-one, 3 β -Acetoxy-12 β -hydroxyfern-9(11)-ene, 3 β -Acetoxy-19 β -hydroxyfern-9(11)-ene, 12 α -Acetoxy-3 β -hydroxyfern-9(11)-ene, Fern-9(11)-ene-3 β ,12 β -diol, Fern-9(11)-ene-3,12-dione, Fern-9(11)-ene-3,19-dione

Reference: Gonzales, AG/ Martin, LD, Pérez, C 1974: Three new triterpenes from the lichen *Xanthoria resendei*: Phytochemistry 13: 1547-1549.

Notes: Acid Spray: fades to purple. LW UV: brown, orange halo. Occurs in *Xanthoria resendei*

Fern-9(11)-ene-3 β ,12 β -diol

A: 45 B: x B': 41 C: 40 E: 15 F: x G: 50

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 442, 424, 409, 273

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxyfern-9(11)-ene-12-one, 3 β -Acetoxy-12 β -hydroxyfern-9(11)-ene, 3 β -Acetoxy-19 β -hydroxyfern-9(11)-ene, 12 α -Acetoxy-3 β -hydroxyfern-9(11)-ene, Fern-9(11)-ene-3 β ,12 α -diol, Fern-9(11)-ene-3,12-dione, Fern-9(11)-ene-3,19-dione

Reference: Wilkins, AL/ Elix, JA 1990: New fernene triterpenes from the lichen *Pseudocyphellaria aurata*: Australian Journal of Chemistry 43: 623-627.

Notes: Acid Spray: fades to purple. LW UV: brown, orange halo. Occurs in *Pseudocyphellaria aurata*

Fern-9(11)-ene-3,12-dione

A: 55 B: x B': 48 C: 53 E: 48 F: x G: 78

HPLC: x

V: –

UV: –

Acid Spray: Orange

LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 438, 423, 395, 273

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxyfern-9(11)-ene-12-one, 3 β -Acetoxy-12 β -hydroxyfern-9(11)-ene, 3 β -Acetoxy-19 β -hydroxyfern-9(11)-ene, 12 α -Acetoxy-3 β -hydroxyfern-9(11)-ene, Fern-9(11)-ene-3 β ,12 α -diol, Fern-9(11)-ene-3 β ,12 β -diol, Fern-9(11)-ene-3,19-dione

Reference: Gonzales, AG/ Martin, LD, Pérez, C 1974: Three new triterpenes from the lichen *Xanthoria resendei*: *Phytochemistry* 13: 1547-1549.

Notes: Acid Spray: fades to pink. LW UV: brown, orange halo. Occurs in *Xanthoria resendei*

Fern-9(11)-ene-3,19-dione

A: 80 B: x B': x C: 65 E: x F: x G: x

HPLC: x

V: –

UV: –

Acid Spray: Brown

LW UV: B.Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 438, 423, 405

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxyfern-9(11)-ene-12-one, 3 β -Acetoxy-12 β -hydroxyfern-9(11)-ene, 3 β -Acetoxy-19 β -hydroxyfern-9(11)-ene, 12 α -Acetoxy-3 β -hydroxyfern-9(11)-ene, Fern-9(11)-ene-3 β ,12 α -diol, Fern-9(11)-ene-3 β ,12 β -diol, Fern-9(11)-ene-3,12-dione

Reference: Maier, MS/ Rosso, ML/ Fazio, AT/ Adler, MT/ Bertoni, MD 2009. Fernene triterpenoids from the lichen *Pyxine berteriana*. *Journal of Natural Products* 72: 1902-1904.

Notes: Occurs in *Pyxine berteriana*

Flavo-obscurin A

A: x B: x B': x C: x E: x F: x G: x

HPLC: 51

TLC: Rf 42 [chloroform/methanol, 4/1]

V: +

UV: +

Acid Spray: Yellow

LW UV: Yellow

Archers: x

K: x C: No Result KC: x PD: No Result

Mass spectrum: -1, 326, 324, 292

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chloroemodin, 7-Chloro-3-methyl-1,6,8-trihydroxy-9-anthrone, 5,7-Dichloroemodin, Flavo-obscurin B₁, Flavo-obscurin B₂

Reference: Yosioka, I/ Yamauchi, H/ Morimoto, K/ Kitagawa, I 1968: Three new chlorine-containing bisanthronyls from a lichen, *Anaptychia obscurata*. Tetrahedron Letters 1968: 3749-3752.

Notes: Yellow pigment. Occurs in *Heterodermia obscurata*

Flavo-obscurin B₁

A: x B: x B': x C: x E: x F: x G: x

HPLC: 52 TLC: Rf 20 [chloroform/methanol, 4/1]

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: x C: No Result KC: x PD: No Result

Mass spectrum: -1, 328, 326, 324

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chloroemodin, 7-Chloro-3-methyl-1,6,8-trihydroxy-9-anthrone, 5,7-Dichloroemodin, Flavo-obscurin A, Flavo-obscurin B₂

Reference: Yosioka, I/ Yamauchi, H/ Morimoto, K/ Kitagawa, I 1968: Three new chlorine-containing bisanthronyls from a lichen, *Anaptychia obscurata*. Tetrahedron Letters 1968: 3749-3752.

Notes: Yellow pigment. Occurs in *Heterodermia obscurata*

Flavo-obscurin B₂

A: x B: x B': x C: x E: x F: x G: x

HPLC: 54 TLC: Rf 19 [chloroform/methanol, 4/1]

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: x C: No Result KC: x PD: No Result

Mass spectrum: -1, 328, 326, 324

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chloroemodin, 7-Chloro-3-methyl-1,6,8-trihydroxy-9-anthrone, 5,7-Dichloroemodin, Flavo-obscurin A, Flavo-obscurin B₂

Reference: Yosioka, I/ Yamauchi, H/ Morimoto, K/ Kitagawa, I 1968: Three new chlorine-containing bisanthronyls from a lichen, *Anaptychia obscurata*. Tetrahedron Letters 1968: 3749-3752.

Notes: Yellow pigment. Occurs in *Heterodermia obscurata*

6-Formyl-5,7-dihydroxyphthalide

A: 29 B: x B': 13 C: 26 E: 2 F: x G: 37

HPLC: 0

V: - UV: +

Acid Spray: Brown LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 194, 166

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: Barbatolic acid, Barbatolin

Reference: Elix, JA/ Jayanthi, VK 1987: Synthetic confirmation of the structure of the lichen benzyl esters alectorialic and barbatolic acids. Australian Journal of Chemistry 40: 1841-1850.

Notes: LW UV: purple, pale yellow halo. Occurs in *Bryoria nadvornikiana*

Fragilin

A: 75 B: 82 B': 67 C: 82 E: 54 F: x G: x

HPLC: 50 TLC: Rf 69 [toluene]

V: + UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 318, 284, 277, 275

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 7-Chlorocitreorsein, 7-Chloroemodin, 7-Chlorofallacinal, 1-O-Methylfragilin, 8-O-Methylfragilin, Parietin

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 184. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 175.

Notes: Orange pigment. SW UV: bright orange. Occurs in *Nephroma laevigatum*

Fragilin 9-anthrone

A: 73 B: x B': x C: 75 E: x F: x G: x

HPLC: 52

V: + UV: +

Acid Spray: Yellow LW UV: Brown

Archers: x

K: x C: No Result KC: x PD: No Result

Mass spectrum: x

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Fragilin, Parietin, Physcoin Bisanthrone

Reference: Johansson, S/Søchting, U/Elix, JA/ Wardlaw, JH 2005: Chemical variation in the lichen genus *Letrouitia* (Ascomycota, Letrouitiaceae). Mycological Progress 4: 139-148.

Notes: Pale yellow pigment. Occurs in *Letrouitia hafellneri*

Fragilin Bisanthrone

A: 67 B: x B': 47 C: 65 E: x F: x G: x

HPLC: 55

V: +

UV: +

Acid Spray: Yellow

LW UV: Brown

Archers: x

K: x

C: No Result

KC: x

PD: No Result

Mass spectrum: x

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Fragilin, Parietin, Physcoin Bisanthrone

Reference: Johansson, S/Søchting, U/Elix, JA/ Wardlaw, JH 2005: Chemical variation in the lichen genus *Letrouitia* (Ascomycota, Letrouitiaceae). *Mycological Progress* 4: 139-148.

Notes: Pale yellow pigment. Occurs in *Letrouitia hafellneri*

Friedelan-3 β -ol [Epifriedelinol]

A: x

B: x

B': x

C: x

E: x

F: x

G: x

HPLC: x

V: -

UV: -

Acid Spray: x

LW UV: x

Archers: x

K: No Result

C: No Result

KC: No Result

PD: No Result

Mass spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: Friedelin

Reference: Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 375.

Notes: Occurs in *Flavocetraria nivalis*

Friedelin

A: x

B: x

B': x

C: x

E: x

F: x

G: x

HPLC: x

V: -

UV: -

Acid Spray: x

LW UV: x

Archers: x

K: No Result

C: No Result

KC: No Result

PD: No Result

Mass spectrum: 426, 411, 302, 273

Substance Class: Terpenoids

Biosynthetically Related Compounds: Friedelan-3 β -ol

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 201. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 375.

Notes: Occurs in *Flavocetraria nivalis*

Friesiic acid

A: 19 B: x B': 28 C: 11 E: x F: x G: x

HPLC: 17

V: – UV: +

Acid Spray: Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 358, 196, 178

Substance Class: Depsido-depsones

Biosynthetically Related Compounds: Confriesiic acid

Reference: Elix, JA/ Tønsberg, T/ Wardlaw, JH 2004: The structure of friesiic acid, a novel lichen substance from *Hypocenomyce friesii*. *Bibliotheca Lichenologica* 88: 103-104.

Notes: Occurs in *Hypocenomyce friesii*

Fulgidin

A: 61 B: x B': 49 C: 54 E: 11 F: x G: x

HPLC: 30

V: – UV: +

Acid Spray: P.Yellow LW UV: Brown

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 392, 390, 388, 357

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Caloploicin, Diploicin, Fulgoicin, Isofulgidin

Reference: Birkbeck, AA/ Sargent, MV/ Elix, JA 1990: The structure of the lichen depsidones fulgidin and isofulgidin. *Australian Journal of Chemistry* 43: 419-425.

Notes: Best seen under SW UV before spraying. Occurs in *Fulgensia fulgida*

Fulgoicin

A: 66 B: x B': 60 C: 63 E: 14 F: x G: x

HPLC: 53

V: – UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 370, 368, 333, 325

Substance Class: Orcinol β -Orcinol Depsidones

Biosynthetically Related Compounds: Caloploicin, Diploicin, Fulgidin, Isofulgidin

Reference: Mahandru, MM/ Tajbakhsh, A 1983: Fulgoicin, a new depsidone from the lichen *Fulgensia fulgida*.
Journal of the Chemical Society, Perkin Transactions I: 2249-2251.

Notes: Best seen under SW UV before spraying. Occurs in *Fulgensia fulgida*

Fumarprotocetraric acid

A: 1 B: 25 B': 26 C: 7 E: x F: x G: 31

HPLC: 17

V: - UV: +

Acid Spray: Grey LW UV: Purple

Archers: x

K: P.Brown C: No Result KC: PD: D.Red

Mass spectrum: -1, 358, 356, 314

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Confumarprotocetraric acid, Physodalic acid, Protocetraric acid,
Subvirensic acid, Succinprotocetraric acid, Virensic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press,
Chapel Hill: 153. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin,
Heidelberg, New York: 427.

Notes: Occurs in *Cladonia phyllophora*

Furfuraceic acid [Haemophaein]

A: 46 B: x B': 35 C: 24 E: x F: x G: x

HPLC: 30

V: - UV: +

Acid Spray: Brown LW UV: B.Blue

Archers: Green

K: No Result C: Green KC: PD: No Result

Mass spectrum: 468, 450, 352

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Oxodidymic acid, Letrouitic acid, Dioxodidymic acid

Reference: Elix, JA/ Venables, DA/ Lumbsch, HT/ Brako, L 1994: Further new metabolites from lichens.
Australian Journal of Chemistry 47: 1619-1623.

Notes: Occurs in *Phyllopsora furfuracea*

Furfuric acid

A: 12 B: x B': 42 C: 28 E: x F: x G: 51

HPLC: 17

V: - UV: +

Acid Spray: P.Brown LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: Yellow

Mass spectrum: 552, 196, 164, 136

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Fumarprotocetraric acid

Reference: Elix, JA/ Evans, JE/ Parker, JL 1987: A one-step synthesis of the depsidone furfuric acid.

Evidence for an artifact in the isolation from a lichen. Australian Journal of Chemistry 40: 2129-2131.

Notes: Acid Spray: initially orange, quickly fades to grey-brown as plate cools. Probably an artefact.

Reported to occur in *Pseudevernia furfuracea*

Fusarubin

A: 36 B: x B': 9 C: 28 E: x F: x G: x

HPLC: 11

V: + UV: +

Acid Spray: Grey LW UV: Pink

Archers: x

K: Red C: No Result KC: PD: No Result

Mass spectrum: 306, 288, 273, 246

Substance Class: Naphthaquinones

Biosynthetically Related Compounds: Anhydrofusarubin lactol, Anhydrofusarubin lactol methyl ketal

Reference: Elix, JA/ Wardlaw, JH 2002: Fusarubin from a lichen source. Australasian Lichenology 51: 2-3.

Notes: Red pigment. Occurs in *Xanthoparmelia endomiltoides*

Galapagin

A: x B: x B': x C: x E: x F: x G: x

HPLC: 5

V: + UV: +

Acid Spray: x LW UV: x

Archers: x

K: Yellow C: No Result KC: PD: No Result

Mass spectrum: 466, 452, 424, 220

Substance Class: Chromones

Biosynthetically Related Compounds: Mollin, Roccellin

Reference: Huneck, S/ Jakupovic, J/ Follmann, G 1992: The final structures of the lichen chromones galapagin, lobodirin, mollin and roccellin. Zeitschrift für Naturforschung 47B: 449-451.

Notes: Pale yellow pigment. Occurs in *Roccella galapagoensis*

Galbinic acid [α -Acetylsalazinic acid]

A: 29 B: 12 B': 17 C: 19 E: x F: x G: 40

HPLC: 9

V: - UV: +

Acid Spray: Orange

LW UV: Brown

Archers: x

K: D.Red C: No Result

KC: PD: Orange

Mass spectrum: -1, 152, 151, 60

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Consalazinic acid, Norstictic acid, Salazinic acid

Reference: Elix, JA/ Engkaninan, U 1975: The structure of galbinic acid. A depsidone from the lichen *Usnea undulata* Stirt. Australian Journal of Chemistry 28: 1793-1797.

Notes: Spot test: K+ yellow then red. Occurs in *Usnea dasaea*

Gangaleoidin

A: 64 B: 43 B': 40 C: 54 E: 11 F: x G: x

HPLC: 21

V: -

UV: +

Acid Spray: P.Yellow

LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 414, 412, 397, 220

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: 3-Dechlorogangaleodin, Lecideoidin, Leoidin, Norgangaleoidin

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 154. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 328.

Notes: Occurs in *Lecanora gangaleoides*

Glaucophaeic acid

A: 15 B: x B': 10 C: 9 E: x F: x G: x

HPLC: 35

V: -

UV: +

Acid Spray: Pink

LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 291, 290, 206

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2'-O-Methylhyperphyllinic acid, 2'-O-Methylmicrophyllinic acid, 2'-O-Methylsuperphyllinic acid

Reference: Elix, JA/ Wardlaw, JH 1996: Synthesis of depsides present in the lichen *Porpidia glaucophaea*. Australian Journal of Chemistry 49: 817-924.

Notes: Occurs in *Porpidia glaucophaea*

Glomellic acid

A: 34 B: 30 B': 27 C: 33 E: x F: x G: x

HPLC: 18

V: – UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 252, 238, 234

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*-Demethylglomellic acid, Glomelliferic acid, Loxodellic acid, Oxostenosporic acid, Perlatolic acid, Stenosporic acid

Reference: Huneck, S/ Follmann, G 1973: Struktur der Glomellsäure. *Phytochemistry* 12: 2993-2994.

Notes: Acid Spray: pale orange, grey halo. Occurs in *Xanthoparmelia verruculifera*

Glomelliferic acid

A: 43 B: 47 B': 47 C: 50 E: x F: x G: x

HPLC: 27

V: – UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: Pink PD: P.Red

Mass spectrum: -1, 252, 235, 234

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*- Demethylglomelliferic acid, Glomellic acid, Loxodellic acid, Oxostenosporic acid, Perlatolic acid, Stenosporic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 118. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 257.

Notes: Acid Spray: pale orange, grey halo. Occurs in *Xanthoparmelia verruculifera*

Glomelliferonic acid

A: 43 B: x B': 40 C: 36 E: x F: x G: x

HPLC: 26

V: – UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 456, 412, 235, 234

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Glomellonic acid, Loxodellonic acid

Reference: Elix, JA/ Jenie, UA/ Jenkins, GA 1987: Three new depsidones from the lichen *Neofuscelia subincerta*. Australian Journal of Chemistry 40: 2031-2036..

Notes: Acid Spray: pale yellow, grey halo. LW UV: strong-dark blue, purple halo. Occurs in *Xanthoparmelia subincerta*

Glomellonic acid

A: 34 B: x B': 24 C: 28 E: x F: x G: x

HPLC: 18

V: - UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 453, 452, 234

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Glomelliferonic acid, Loxodellonic acid

Reference: Elix, JA/ Jenie, UA/ Jenkins, GA 1987: Three new depsidones from the lichen *Neofuscelia subincerta*. Australian Journal of Chemistry 40: 2031-2036..

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Xanthoparmelia subincerta*

Graciliformin

A: 35 B: x B': 10 C: 15 E: x F: x G: x

HPLC: 22

V: + UV: +

Acid Spray: Green LW UV: Grey

Archers: x

K: x C: x KC: x PD: x

Mass spectrum: 542, 270, 254

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Diacetylgraciliformin, Monoacetylgraciliformin, Skyrin

Reference: Ejiri, H/ Sankawa, U/ Shibata, S 1975: Graciliformin and its acetates in *Cladonia graciliformis*. Phytochemistry 14: 277-279.

Notes: Bright yellow pigment. Acid Spray: colour like skyrin. Occurs in *Cladonia graciliformis*

Graphislactone A

A: 47 B: x B': 26 C: 32 E: x F: x G: x

HPLC: 18

V: - UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: 3,4-Benzocoumarins

Biosynthetically Related Compounds: Alternariol, Graphislactone B

Reference: Tanahashi, T/ Kuroishi, M/ Kuwahara, A/ Nagakura, N/ Hamada, N 1997: Four phenolics from the cultured mycobiont of *Graphis scripta* var. *pulverulenta*. Chemical and Pharmaceutical Bulletin (Tokyo) 45: 1183.

Notes: Occurs in mycobiont culture of *Graphis scripta* var. *pulverulenta*

Graphislactone B

A: 18 B: x B': 4 C: 8 E: x F: x G: x

HPLC: 11

V: - UV: +

Acid Spray: P. Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: 3,4-Benzocoumarins

Biosynthetically Related Compounds: Grapislactone A

Reference: Tanahashi, T/ Kuroishi, M/ Kuwahara, A/ Nagakura, N/ Hamada, N 1997: Four phenolics from the cultured mycobiont of *Graphis scripta* var. *pulverulenta*. Chemical and Pharmaceutical Bulletin (Tokyo) 45: 1183.

Notes: Occurs in mycobiont culture of *Graphis scripta* var. *pulverulenta*

Graphisquinone

A: x B: x B': x C: x E: x F: x G: x

HPLC: x

V: + UV: +

Acid Spray: x LW UV: x

Archers: x

K: x C: x KC: x PD: x

Mass spectrum: Mass Spectrum: 222, 207, 193, 179

Substance Class: Furoquinones

Biosynthetically Related Compounds: x

Reference: Miyagawa, H/ Hamada, N/ Sato, M/ Ueno, T 1994: Pigments from the cultured lichen mycobionts of *Graphis scripta* and *Graphis desquamescens*. Phytochemistry 36: 1319-1322.

Notes: Red pigment. Occurs in mycobiont of *Graphis desquamescens*

Grayanic acid

A: 38 B: 62 B': 59 C: 44 E: x F: x G: x

HPLC: 37

V: – UV: +
Acid Spray: Orange-brown LW UV: Pink
Archers: Purple
K: No Result C: No Result KC: Yellow PD: No Result
Mass spectrum: 414, 396, 370, 165
Substance Class: Orcinol Depsidones
Biosynthetically Related Compounds: Colensoic acid, Congrayanic acid, 4-*O*-Demethylgrayanic acid, Melacarpic acid
Reference: Chester, DO/ Elix, JA 1980: A new dibenzofuran and diphenyl ether from the lichen *Gymnoderma melacarpum*. Australian Journal of Chemistry 33: 1153-1156.
Notes: LW UV: purplish-pink, same as colensoic acid. Occurs in *Cladonia grayi*, *Neophyllis melacarpa*

(+)-Griseofulvin

A: 30 B: x B': 6 C: 18 E: x F: x G: x
HPLC: 8
V: – UV: +
Acid Spray: Yellow LW UV: Purple
Archers: x
K: No Result C: No Result KC: No Result PD: No Result
Mass spectrum: 354, 352, 214, 138
Substance Class: Spirobenzofuranones
Biosynthetically Related Compounds: (+)-Dechlorogriseofulvin
Elix, JA/ Øvstedal, DO 2004: A new *Lecanora* species from the Arctic with a remarkable chemistry. Graphis Scripta 15: 57-59.
Notes: Occurs in *Lecanora griseofulva*

Griseoxanthone-C [3-*O*-Methylnorlichexanthone]

A: 56 B: x B': 55 C: 35 E: 29 F: 75 G: x
HPLC: 53
V: + UV: +
Acid Spray: Yellow LW UV: Yellow
Archers: x
K: No Result C: No Result KC: No Result PD: No Result
Mass Spectrum: 272, 257, 244, 200
Substance Class: Xanthonones
Biosynthetically Related Compounds: 4-Chloro-3-*O*-methylnorlichexanthone, Norlichexanthone
Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthonones in lichens, and a further thirteen new lichen xanthonones. Bryologist 95: 52-64.
Notes: Pale yellow pigment. Occurs in *Lecanora vinetorum*

Gyrophoric acid

A: 24 B: 42 B': 42 C: 24 E: x F: x G: x

HPLC: 25

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: Orange

K: No Result C: P.Red KC: PD: No Result

Mass Spectrum: -1, 318, 168, 150

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: 2,4-Di-*O*-methylgyrophoric acid, Lecanoric acid, Methyl gyrophorate, 4-*O*-Methylgyrophoric acid, 5-*O*-Methylhiassic acid, Orcinyl lecanorate, Ovoic acid, Umbilicaric acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 114. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 304.

Notes: Acid Spray: strong-pale yellow, grey halo. Occurs in *Punctelia borreri*

Haemathamnolic acid

A: 18 B: 35 B': 34 C: 32 E: x F: x G: 49

HPLC: 26

V: – UV: +

Acid Spray: Brown LW UV: Brown

Archers: x

K: Yellow C: No Result KC: PD: Yellow

Mass Spectrum: 360, 210, 193, 191

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Cryptothamnolic acid, Hypothamnolic acid, Thamnolic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 151. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 257.

Notes: LW UV: brown, purple halo. Occurs in *Pertusaria moreliensis*

Haematommic acid

A: 40 B: x B': 67 C: 43 E: x F: x G: x

HPLC: 15

V: – UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Yellow C: No Result KC: PD: Yellow

Mass Spectrum: 196, 179, 178, 152

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: Atranorin, Methyl haematommate

Reference: Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 158.

Notes: Possibly artefact, described from *Asahinea chrysantha*

Haematommone

A: 50 B: x B': 60 C: 40 E: x F: x G: x

HPLC: 38

V: + UV: +

Acid Spray: Orange LW UV: Pink

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 314, 299

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Russulone

Reference: Huneck, S/ Culberson, CF/ Culberson, WL/ Elix, JA 1991: Haematommone, the red pigment from the apothecia of *Haematomma puniceum*. Phytochemistry 30: 706-707.

Notes: Red pigment. Occurs in *Haematomma africanum*

Haemoventosin

A: 38 B: 2 B': 2 C: 20 E: 0 F: x G: x

HPLC: 5

V: + UV: +

Acid Spray: Purple LW UV: Pink

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 304, 302, 260

Substance Class: Naphthaquinones

Biosynthetically Related Compounds: Coronatoquinone

Reference: Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 166.

Notes: Red pigment. Occurs in *Ophioparma ventosa*

Hafellic acid

A: 50 B: x B': 32 C: 33 E: x F: x G: x

HPLC: 19

V: - UV: +

Acid Spray: P. Yellow LW UV: Sky Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: [structure not known]

Biosynthetically Related Compounds: x

Reference: Elix, JA/ McCarthy, PM 2008: A further new species of *Hafellia* (Physciaceae, Ascomycota) from Australia. Australasian Lichenology 62: 20-22.

Notes: Occurs in *Cratiria subtropica*

Hiassic acid

A: 18 B: x B': 8 C: 12 E: x F: x G: x

HPLC: 19

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: Red C: Red KC: PD: No Result

Mass Spectrum: -1, 318, 274, 184

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: 4,5-Di-O-methylhiassic acid, Gyrophoric acid, 5-O-Methylhiassic acid, 2,4,5-Tri-O-methylhiassic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 120. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 305.

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Cetrariella delisei*

Hierridin

A: 86 B: x B': x C: 90 E: x F: x G: x

HPLC: 84

V: - UV: +

Acid Spray: Yellow-brown LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 448, 168, 167, 153

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: x

Reference: González, AG/ Barrera, JB/ Rodrigues Pérez, EM 1992: Synthesis of hierridin, a phenol from the lichen *Ramalina hierrensis*. Phytochemistry 31: 1436-1439.

Notes: Occurs in *Ramalina hierrensis*

Hirtifructic acid

A: 52 B: x B': 38 C: 44 E: x F: x G: x

HPLC: 26

V: – UV: +
Acid Spray: Orange LW UV: Orange
Archers: x
K: No Result C: No Result KC: No Result PD: No Result
Mass spectrum: x
Substance Class: [structure not known]
Biosynthetically Related Compounds: Conechinocarpic acid, Conhirtifructic acid, Echinocarpic acid
Reference: Elix, JA 1995: A revision of the lichen genus *Relicina*. *Bibliotheca Lichenologica* 62: 1-150.
Notes: Occurs in *Relicina hirtifructa*

Homoheveadride

A: 77 B: 51 B': 52 C: 76 E: x F: x G: x
HPLC: 26
V: – UV: –
Acid Spray: No Result LW UV: No Result
Archers: x
K: No Result C: No Result KC: No Result PD: No Result
Mass Spectrum: 388, 342, 264, 194
Substance Class: Aliphatic acids
Biosynthetically Related Compounds: Heveadride
Reference: Archer, AW/ Taylor, WC 1987: Homoheviadride, a cyclononadiene bis-anhydride from *Cladonia polycarpoides*. *Phytochemistry* 26: 2117-2119.
Notes: Occurs in *Cladonia polycarpoides*

Homosekikaic acid

A: 45 B: 69 B': 65 C: 56 E: x F: x G: x
HPLC: 35
V: – UV: +
Acid Spray: Orange LW UV: Green
Archers: P.Red
K: No Result C: No Result KC: No Result PD: No Result
Mass Spectrum: -1, 254, 236, 210
Substance Class: Orcinol Depsides
Biosynthetically Related Compounds: Hyperhomosekikaic acid, 4'-O-Methylnorhomosekikaic acid, Paludosisic acid, Ramalinolic acid, Sekikaic acid
References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 130. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 258.
Notes: Acid Spray: orange, yellow halo, darker orange on standing. Occurs in *Relicina hirtifructa*

Hopane-6 α ,22-diol [Zeorin]

A: 52 B: 42 B': 43 C: 43 E: 19 F: 44 G: 50

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 444, 426, 207, 189

Substance Class: Terpenoids

Biosynthetically Related Compounds: 6 α -Acetoxypopane-16 β ,22-diol, 6 α -Acetoxypopane-22-ol, Hopane-6 α ,16 β ,22-triol, 22-Hydroxypopane-6-one

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 206. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 387.

Notes: Acid Spray: brown fades to purple on standing. Occurs in *Heterodermia speciosa*

Hopane-7 β ,22-diol

A: x B: x B': x C: 43 E: 15 F: x G: x

HPLC: x

V: – UV: –

Acid Spray: Purple LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 444, 426, 411, 191

Substance Class: Terpenoids

Biosynthetically Related Compounds: 7 β -Acetoxypopane-22-ol, Hopane-6 α ,7 β ,22-triol

Reference: Corbett, RE/ Wilkins, AL 1977: Lichens and fungi. XV. Revised structure for hopane triterpenoids isolated from the lichen *Pseudocyphellaria mougeotiana*. Australian Journal of Chemistry 30: 2329-2332.

Notes: Occurs in *Pseudocyphellaria crocata*

Hopane-11 β ,22-diol

A: x B: x B': x C: 40 E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: Purple LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 444, 426

Substance Class: Terpenoids

Biosynthetically Related Compounds: x

Reference: Corbett, RE/ Cumming, SD 1971: Lichens and fungi. Part VII. Extractives from the lichen *Sticta mougeotiana* var. *dissecta* Del. Journal of the Chemistry Society (C): 955-960.

Notes: Occurs in *Pseudocyphellaria crocata*

Hopane-15 α ,22-diol

A: 40 B: x B': 39 C: 36 E: 8 F: x G: 42

HPLC: x

V: – UV: –

Acid Spray: Purple LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 444, 426, 411, 191

Substance Class: Terpenoids

Biosynthetically Related Compounds: 15 α -Acetoxypopan-22-ol

Reference: Corbett, RE/ Young, H 1966: Lichens and fungi. Part III. Structural elucidation of Hopane-15 α ,22-diol from *Sticta billiardieri* Del. Journal of the Chemistry Society (C): 1564-1567.

Notes: Occurs in *Pseudocyphellaria billiardieri*

Hopane-16 β ,22-diol

A: x B: x B': x C: 36 E: 12 F: x G: x

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: 16 β -Acetoxy-22-hydroxyhopane-4 α -oic acid, 16 β ,22-Dihydroxyhopan-4 α -oic acid, Hopane-6 α ,16 β ,22-triol

Reference: Yosioka, I/ Yamaki, M/ Kitagawa, I 1966: On the triterpenic constituents of a lichen *Parmelia entotheiochroa* Hue; zeorin, leucotylin, leucotylic acid, and five new related triterpenoids, Chemical and Pharmaceutical Bulletin (Tokyo) 14: 804-807.

Notes: Occurs in *Myelochroa entotheiochroa*, *Septotrapelia usnica*

Hopane-6 α ,7 β ,22-triol

A: 38 B: x B': 58 C: 36 E: 6 F: x G: 38

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: 7 β -Acetoxypopane-6 α ,22-diol

Reference: Corbett, RE/ Cumming, SD 1971: Lichens and fungi. Part VII. Extractives from the lichen *Sticta mougeotiana* var. *dissecta* Del. Journal of the Chemistry Society (C): 955-960.

Notes: Acid Spray: fades to purple. Occurs in *Pseudocyphellaria neglecta*

Hopane-6 α ,16 β ,22-triol [Leucotylin]

A: 17 B: x B': 28 C: 21 E: 4 F: x G: 30

HPLC: x

V: – UV: –

Acid Spray: Brown

LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 460, 442, 409, 384

Substance Class: Terpenoids

Biosynthetically Related Compounds: 6 α -Acetoxypopane-16 β ,22-diol, 16 β -Acetoxypopane-6 α ,22-diol, 6 α ,16 β -Diacetoxypopane-22-ol

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 202. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 380.

Notes: Acid Spray: fades to purple. Occurs in *Heterodermia tremulans*

Hybocarpone

A: 16 B: x B': 44 C: 14 E: x F: x G: x

HPLC: 11

V: + UV: +

Acid Spray: Brown

LW UV: Brown

Archers: x

K: Red C: No Result KC: PD: No Result

Mass spectrum: 544, 264

Substance Class: Naphthaquinones

Biosynthetically Related Compounds: Boryquinone, Desmethylhybocarpone

Reference: Ernst-Russell, MA/Elix, JA/Chai, CLL/Willis, AC/Nash, TH III 1999: Hybocarpone, a novel cytotoxic naphthazarin derivative from mycobiont cultures of the lichen *Lecanora hybocarpa*. Tetrahedron Letters 40: 6321-6324.

Notes: Orange pigment. Occurs in *Heterodermia hybocarponica*

3 α -Hydroxybarbatic acid [8-Hydroxybarbatic acid]

A: 20 B: 29 B': 28 C: 24 E: x F: x G: x

HPLC: 20

V: – UV: +

Acid Spray: Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: Yellow PD: No Result

Mass Spectrum: -1, 195, 194, 182

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Baeomycesic acid, Barbatic acid, 4-*O*-Demethylbarbatic acid, Squamatic acid

References: Culberson, CF/ Nash, TH/ Johnson, A 1979: 3 α -Hydroxybarbatic acid, a new depside in chemosyndromes of some xanthoparmeliae with β -orcinol depsides. Bryologist 82: 154-156.

Notes: Acid Spray: yellow, grey halo. LW UV: purple, pale yellow halo. Occurs in *Xanthoparmelia moctezumensis*

3-Hydroxycolensoic acid

A: 39 B: 50 B': 50 C: 42 E: x F: x G: x

HPLC: 26

V: – UV: +

Acid Spray: P.Brown LW UV: Purple

Archers: x

K: No Result C: No Result KC: Yellow PD: No Result

Mass Spectrum: 458, 440, 414, 236

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Colensoic acid, Lividic acid, Methoxycolensoic acid, 4-*O*-Methylphysodic acid, Norcolensoic acid, Physodic acid

Reference: Djura, P/ Sargent, MV/ Elix, JA/ Engkaninan, U/ Huneck, S/ Culberson, CF 1977: Depsidone synthesis VIII. Isolation and structure determination of hydroxy- and methoxycolensoic acids. Synthesis of Methyl methoxy-*O*-methylcolensoate. Australian Journal of Chemistry 30: 599-607.

Notes: Occurs in *Hypotrachyna osseoalba*

2-Hydroxyconvirensic acid

A: 5 B: x B': 22 C: 4 E: x F: x G: 28

HPLC: 12

V: – UV: +

Acid Spray: Orange LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 273, 231, 200

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Virensic acid, 2-Hydroxyvirensic acid

Reference: Elix, JA/ Wardlaw, JH/ Obermayer, W 2003: 2-Hydroxyconvirensic acid, a new depsidone from the lichen *Sulcaria sulcata*. Australasian Lichenology 52: 6-8.

Notes: Minor component in *Sulcaria sulcata*

3 α -Hydroxydiffractaic acid [8-Hydroxydiffractaic acid]

A: 18 B: x B': x C: 20 E: x F: x G: x

HPLC: x

V: - UV: +

Acid Spray: Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Diffractaic acid

References: Nishitoba, Y/ Nishimura, H/ Nishiyama, T/ Mizutani, J 1987: Lichen acids, plant growth inhibitors from *Usnea longissima*. Phytochemistry 26: 3181-3185.

Notes: Occurs in *Usnea longissima*

3 β -Hydroxyfern-9(11)-ene-12-one

A: 50 B: x B': 39 C: 38 E: 19 F: x G: 51

HPLC: x

V: - UV: -

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 440, 425, 355, 271

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxyfern-9(11)-ene-12 β -ol, 3 β -Acetoxyfern-9(11)-ene-12-one, Fern-9(11)-ene-3 β ,12 β -diol, Fern-9(11)-ene-3,12-dione

Reference: Wilkins, AL/ Elix, JA 1990: New fernene triterpenes from the lichen *Pseudocyphellaria aurata*: Australian Journal of Chemistry 43: 623-627.

Notes: Acid Spray: fades to purple. LW UV: brown, orange halo. Occurs in *Pseudocyphellaria aurata*

3-Hydroxygyrophoric acid

A: 13 B: x B': 32 C: 16 E: x F: x G: x

HPLC: 20

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: x C: x KC:x PD: x

Mass spectrum: -1, 184, 168, 150

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid, 3-Hydroxy- 4-*O*-methylumbilicic acid, 3-Methoxy-2,4-di-*O*-methylgyrophoric acid

Reference: Elix, JA/ Wardlaw, JH 2000: Four new tridedsides from *Hypotrachyna* species. Australasian Lichenology 47: 8-13.

Notes: Minor component in *Hypotrachyna subfatiszens*

22-Hydroxyhopane-6-one [Zeorinone]

A: 54 B: x B': 53 C: 49 E: 40 F: x G: 64

HPLC: x

V: – UV: –

Acid Spray: P.Yellow-brown LW UV: P.Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 442, 424, 409, 189

Substance Class: Terpenoids

Biosynthetically Related Compounds: 6 α -Acetoxyhopane-22-ol, Hopane-6 α ,22-diol

Reference: Wilkins, AL/ Elix, JA/ Gaul, KL/ Moberg, R 1989: New hopane triterpenoids from the lichen in the family Physciaceae, Austrian Journal of Chemistry 42: 1415-1422.

Notes: Occurs in *Rinodina thiomela*

2-Hydroxyhypoprotocetraric acid

A: 15 B: x B': 29 C: 10 E: x F: x G: x

HPLC: 15

V: – UV: +

Acid Spray: D.Blue-grey LW UV: D.Blue

Archers: x

K: x C: x KC:x PD: x

Mass spectrum: x

Substance Class: β -Orcinol depsidones

Biosynthetically Related Compounds: 2-Hydroxynotatic acid, Hypoprotocetraric acid, Notatic acid

Reference: Mangold, A 2008. Taxonomic studies on members of the lotremoid Ostropales (lichenized Ascomycota) in Australia. Univ. Duisburg-Essen, p28.

Notes: Quenches in visible light like oxyphysodic acid. Occurs in *Ocellularia arecae*

5-Hydroxylecanoric acid

A: 21 B: 36 B': 33 C: 11 E: x F: x G: x

HPLC: 8

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: 334, 184, 168, 150

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Lecanoric acid

Reference: Elix, JA/ Jayanthi, VK1977: 5-O-Methylhiassic acid, a new tridepside from Australian lichens.

Australian Journal of Chemistry 30: 2695-2704.

Notes: Acid Spray: yellow, grey halo. LW UV: strong-purple, green halo. Minor component in *Hypotrachyna neodamaziana*

9 α -Hydroxymenegazziaic acid [8'-Hydroxymenegazziaic acid]

A: 2 B: x B': 2 C: 1 E: x F: x G: 13

HPLC: 2

V: – UV: +

Acid Spray: Grey LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: Orange

Mass spectrum: x

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: α -Acetylconstictic acid, Constictic acid, Cryptostictic acid, Menegazziaic acid, Norstictic acid, Stictic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A1981: A standardized TLC analysis of β -orcinol depsidones. Bryologist 84: 16-29 [as unknown Per-2].

Notes: Minor component in *Parmotrema crinitum*

2-Hydroxy-4-methoxy-6-pentylbenzoic acid [4-O-Methylolivetolcarboxylic acid]

A: 56 B: 78 B': x C: 60 E: x F: x G: x

HPLC: 12

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 238, 221, 220, 194

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: 2,4-Dihydroxy-6-pentylbenzoic acid, Perlatolic acid

Reference: Gonzáles, AG/ Barrera, JB/ Rodrigues Pérez, EM/ Hernández Padrón, CE 1991: Chemical constituents of the lichen *Cladina macronesica*. Zeitschrift für Naturforschung 46c: 12-18.

Notes: Possibly an artefact, reported from *Cladonia macaronesica*

6 α -Hydroxyeugenitin [6-Hydroxymethyleugenitin, 5-Hydroxy-6-hydroxymethyl-7-methoxy-2-methylchromone]

A: 31 B: x B': x C: 18 E: 16 F: x G: x

HPLC: 5

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass Spectrum: 236, 235, 221, 219

Substance Class: Chromones

Biosynthetically Related Compounds: Eugenitin, Eugenitol, Lepralic acid, Sordidone

Reference: Huneck, S 1972: 6-Hydroxymethyleugenitin, ein neues Chromon aus *Roccella fuciformis*.

Phytochemistry 11: 1489-1490.

Notes: Pale yellow pigment. Acid Spray: deep mustard yellow, brown halo, fades to orange. LW UV: brownish-yellow. Occurs in *Roccella fuciformis*

4-Hydroxyisovulpinic acid

A: 52 B: x B': 37 C: 39 E: x F: 42 G: x

HPLC: x

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Vulpinic acid, 4-Hydroxypulvinic dilactone

Reference: New report

Notes: Yellow pigment. Accessory substance in *Letharia vulpina*

3-Hydroxy-4-O-methylumbilic acid

A: 36 B: x B': 33 C: 35 E: x F: x G: x

HPLC: 24

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: x C: x KC: x PD: x

Mass spectrum: -1, 212, 195, 180

Substance Class: Orcinol Tripeptides

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid, 3-Hydroxygyrophoric acid, 3-Methoxy-2,4-di-*O*-methylgyrophoric acid

Reference: Elix, JA/ Wardlaw, JH 2000: Four new tridedsides from *Hypotrachyna* species. Australasian Lichenology 47: 8-13.

Notes: Minor component in *Hypotrachyna subfaticens*

2-Hydroxynornotatic acid

A: 9 B: x B': 25 C: 6 E: x F: x G: x

HPLC: 9

V: - UV: +

Acid Spray: D.Brown LW UV: Brown

Archers: x

K: x C: x KC: x PD: x

Mass spectrum: x

Substance Class: Orcinol β -Orcinol Depsidones

Biosynthetically Related Compounds: 2-Hydroxyhypoprotocetraric acid, Hypoprotocetraric acid, Notatic acid

Reference: Mangold, A 2008. Taxonomic studies on members of the lotremoid Ostropales (lichenized Ascomycota) in Australia. Univ. Duisburg-Essen, p28.

Notes: Quenches in visible light like oxyphysodic acid. Occurs in *Ocellularia arecae*

22 α -Hydroxy-3,4-secostict-4(23)-en-3-al

A: 67 B: x B': 70 C: 56 E: 52 F: x G: 76

HPLC: x

V: - UV: -

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 442

Substance Class: Terpenoids

Biosynthetically Related Compounds: 2 α -Acetoxystictane-3 β ,22 α -diol, 3 β -Acetoxystictane-2 α ,22-diols, 22 α -Hydroxy-3,4-secostict-4(23)-en-3-oic acid, Stictane-3 β ,22-diols

Reference: Goh, EM/ Wilkins, AL/ Holland, PT 1979: Structural elucidation of a new group of secostictane triterpenoids. Journal of the Chemical Society, Perkin Transactions I: 1560-1564.

Notes: Acid Spray: fades to purple. LW UV: fades to pink. Occurs in *Pseudocyphellaria degelii*

22 α -Hydroxy-3,4-secostict-4(23)-en-3-oic acid

A: 52 B: x B': 54 C: 51 E: 11 F: x G: 62

HPLC: x

V: - UV: -

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 458

Substance Class: Terpenoids

Biosynthetically Related Compounds: 2 α -Acetoxystictane-3 β ,22 α -diol, 3 β -Acetoxystictane-2 α ,22-diol, 22 α -Hydroxy-3,4-secostict-4(23)-en-3-al, Stictane-3 β ,22-diol

Reference: Goh, EM/ Wilkins, AL/ Holland, PT 1979: Structural elucidation of a new group of secostictane triterpenoids. Journal of the Chemical Society, Perkin Transactions I: 1560-1564.

Notes: Acid Spray: fades to purple. LW UV: fades to pink. Occurs in *Pseudocyphellaria degelii*

22 α -Hydroxystictane-3-one

A: x B: x B': x C: x E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 442, 427, 424, 409

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxystictane-2 α ,22-diol, Stictane-3 β ,22-diol

Reference: Wilkins, AL 1977: The structure of a triterpene ketol from *Cetraria nivalis*. Phytochemistry 16: 608-609.

Notes: Occurs in *Pseudocyphellaria norvegica*

3-Hydroxyumbilicic acid

A: 16 B: x B': 26 C: 11 E: x F: x G: 46

HPLC: 16

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: Pink PD: No Result

Mass spectrum: -1, 198, 181, 168, 150

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid, 3-Hydroxygyrophoric acid, 3-Methoxy-2,4-di-*O*-methylgyrophoric acid, 3-Methoxyumbilicic acid, Umbilicic acid

Reference: Elix, JA/ Yu, J/ Adler, MT 1989: 3-Hydroxyumbilicic acid and 3-methoxyumbilicic acid, new tridepsides from the lichen *Hypotrachyna bonariensis*. Australian Journal of Chemistry 42: 765-770.

Notes: Occurs in *Hypotrachyna bonariensis*

2-Hydroxyvirensic acid

A: 24 B: x B': 45 C: 27 E: x F: x G: x

HPLC: 16

V: – UV: +

Acid Spray: Brown LW UV: Brown

Archers: x

K: Brown C: No Result KC: PD: Red

Mass spectrum: 375, 374, 357, 356

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Convirensic acid, 2-Hydroxyconvirensic acid, Virensic acid,

Reference: Elix, JA/ Wardlaw, JH/ Obermayer, W 2000: 2-Hydroxyvirensic acid, a new depsidone from the lichen *Sulcaria sulcata*. Australian Journal of Chemistry 53: 233-235.

Notes: Occurs in *Sulcaria sulcata*

4-Hydroxyvulpinic acid

A: 48 B: x B': 34 C: 36 E: x F: 25 G: x

HPLC: 14

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum:

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Vulpinic acid, 4-Hydroxypulvinic dilactone

Reference Tabacchi, R/ Tsoupras, G 1987: The chemical composition of *Letharia vulpina* (L.) Hue. Bibliotheca Lichenologica 25: 475-480.

Notes: Yellow pigment. Minor component in *Letharia vulpina*

Hyperconfluent acid

A: 49 B: 45 B': 40 C: 59 E: x F: x G: x

HPLC: 35

V: – UV: +

Acid Spray: P.Yellow LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 280, 266, 262

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Confluentic acid, Insignin, Superconfluentic acid,

Reference: Culberson, CF/ Culberson, WL/ Gowan, S/ Johnson, A 1987: New depsides from lichens:

microchemical methodologies applied to the study of new natural products discovered in herbarium specimens.

American Journal of Botany 74: 403-414.

Notes: Occurs in *Pseudobaeomyces pachycarpus*

Hyperhomosekikaic acid

A: 56 B: x B': 64 C: 61 E: x F: x G: x

HPLC: 38

V: – UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 238, 236, 221

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Homosekikaic acid, Sekikaic acid,

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1985: Orcinol-type depsides and depsidones in the lichens of the *Cladonia chlorophea* group (Ascomycotina, Cladoniaceae). *Bryologist* 88: 380-387.

Notes: Occurs in *Physcidia wrightii*, *Phyllopsora homosekikaica*

Hyperlatolic acid

A: 53 B: x B': 74 C: 52 E: x F: x G: x

HPLC: 54

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 455, 454, 238

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Isohyperlatolic acid, Perlatolic acid, Superlatolic acid

Reference: Culberson, CF/ Hale, ME/ Tønsberg, T/ Johnson, A 1984: New depsides from the lichen *Dimelaena oreina* and *Fuscidia viridis*. *Mycologia* 76: 148-160.

Notes: Acid Spray: pale yellow, grey halo. LW UV: strong-purple, green halo. Occurs in *Rhopalospora viridis*

Hyperpicrolichenic acid

A: 41 B: x B': 49 C: 40 E: x F: x G: x

HPLC: 45

V: – UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: Red PD: No Result

Mass spectrum: 470, 426, 105, 88

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Isohyperpicrolichenic acid, Picrolichenic acid, Subpicrolichenic acid, Superpicrolichenic acid

Reference: Elix, JA/ Venables, D/ Archer, AW 1994: 70. Further new depsones from the lichen *Pertusaria truncata*. Australian Journal of Chemistry 47: 1345-1353.

Notes: Occurs in *Pertusaria truncata*

Hyperplanaic acid

A: 51 B: x B': 44 C: 59 E: x F: x G: x

HPLC: 51

V: - UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 236, 235

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Planaic acid, Isohyperplanaic acid, Superplanaic acid

Reference: Elix, JA/ Barclay, CE/ Lumbsch, HT 1994: New depsides from the lichen *Lecanora planaica*. Australian Journal of Chemistry 47: 1199-1203.

Notes: Occurs in *Lecanora planaica*

Hypoalectorialic acid

A: 35 B: x B': 40 C: 14 E: x F: x G: x

HPLC: 21

V: - UV: +

Acid Spray: P.Grey LW UV: Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 182, 181, 180

Substance Class: Benzyl esters

Biosynthetically Related Compounds: Alectorialic acid

Reference: Elix, JA/ Wardlaw, JH 1996: Hypoalectorialic acid and conechinocarpic acid, two new benzyl esters from lichens. Australian Journal of Chemistry 49: 727-729.

Notes: Occurs in *Hypotrachyna hypoalectorialica*

Hypoconstictic acid

A: 15 B: 7 B': 7 C: 4 E: x F: x G: 28

HPLC: 7

V: - UV: +

Acid Spray: D.Red LW UV: D.Red

Archers: x

K: Yellow C: No Result KC: PD: No Result

Mass spectrum: -1, 354, 336, 317

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: α -Acetylhyposcotic acid, Hyposalazinic acid, Hypostictic acid

Reference: Moroney, SE/ Ronaldson, KJ/ Wilkins, AL/ Green, TGA/ James, PW 1981: Depsidone

constituents from the *Quintaria* group of *Nephroma* species. *Phytochemistry* 20: 787-789.

Notes: Acid Spray: dull red. LW UV: dull red. Occurs in *Nephroma antarcticum*

Hyponephroarctin

A: x B: x B': x C: x E: x F: x G: x

HPLC: x

V: - UV: +

Acid Spray: x LW UV: x

Archers: x

K: No Result C: Red KC: PD: Yellow

Mass spectrum: 358, 193, 166, 151

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Nephroarctin

Reference: Kinoshita, K/ Matsubara, H/ Koyama, K/ Takahashi, K/ Yoshimura, I/ Yamamoto, Y/ Miura,

M/ Kinoshita, Y/ Kawai, K-I 1994: Topics in the chemistry of lichen compounds. *Journal of the Hattori*

Botanical Laboratory 76: 227-234.

Notes: Occurs in *Nephroma arcticum*

Hypopannarin

A: 42 B: x B': 35 C: 33 E: x F: x G: x

HPLC: 20

V: - UV: +

Acid Spray: Yellow-brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No result

Mass spectrum: 328, 300, 285, 284

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Dechloropannarin, Norpannarin, Pannarin

Reference: Knudsen, K/ Elix, JA/ Lendemer, JC 2007: *Lepraria adhaerens*: A new species from North

America. *Opuscula Philolichenum* 4: 5-10.

Notes: Occurs in *Leprocaulon adhaerens*

Hypophysciosporin

A: 63 B: x B': 58 C: 52 E: 34 F: x G: x

HPLC: 40

V: – UV: +
Acid Spray: Blue LW UV: D.Blue
Archers: x
K: No Result C: No Result KC: No Result PD: No Result
Mass spectrum: 394, 392, 362, 360
Substance Class: β -Orcinol Depsidones
Biosynthetically Related Compounds: Argopsin, Hypoprotocetraric acid, Isovicanicin, Methyl virensate, Norvicanicin, Physciosporin, Vicanicin
References: Hamat, ABL/ Din, LB/ Samsudin, LWB/ Elix, JA 1993: Two new depsidones from the lichen *Erioderma phaeorhizum* Vainio *sensu lato*. Australian Journal of Chemistry 46: 153-156.
Notes: Occurs in *Erioderma phaeorhizum*

Hypoprotocetraric acid

A: 22 B: 43 B': 37 C: 22 E: x F: x G: 48
HPLC: 19
V: – UV: +
Acid Spray: Blue LW UV: D.Blue
Archers: Brown
K: No Result C: No Result KC: No Result PD: No Result
Mass spectrum: 344, 326, 300
Substance Class: β -Orcinol Depsidones
Biosynthetically Related Compounds: Conhypoprotocetraric acid, Convirensic acid, 4-*O*-Demethylnotatic acid, 2-Hydroxyhypoprotocetraric acid, Isonotatic acid, 4-*O*-Methylhypoprotocetraric acid, Notatic acid
References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 155. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 331.
Notes: Acid Spray: initially bright blue; fades to pale orange, grey halo. Occurs in *Xanthoparmelia hypoprotocetrarica*

Hypopsoromic acid

A: 25 B: 32 B': x C: 17 E: x F: x G: x
HPLC: x
V: – UV: +
Acid Spray: Yellow LW UV: Yellow
Archers: x
K: No Result C: No Result KC: No Result PD: No Result
Mass spectrum: x
Substance Class: β -Orcinol Depsidones
Biosynthetically Related Compounds: Psoromic acid
Reference: Culberson, CF 1972: Improved conditions and new data for the identification of lichen products by a

standardized thin-layer chromatographic method. Journal of Chromatography 72: 113-125.

Notes: Occurs in *Lecanora novomexicana*

Hyposalazinic acid

A: 34 B: 27 B': 26 C: 8 E: x F: x G: 44

HPLC: 8

V: - UV: +

Acid Spray: P.Red LW UV: Pink

Archers: x

K: Yellow then reddish C: No Result KC: PD: No Result

Mass spectrum: -1, 314, 297, 286

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Connorstictic acid, Hypoconstictic acid, Hypoprotocetraric acid, Hypostictic acid

Reference: Keogh, MF 1978: New β -orcinol depsidones from the *Xanthoparmelia quintaria* and a *Thelotrema* species. Phytochemistry 17: 1192-1193.

Notes: Acid Spray: pale pink-red. LW UV: bright pink. Occurs in *Xanthoparmelia quintaria*

Hypostictic acid

A: 42 B: 33 B': 32 C: 32 E: x F: x G: 61

HPLC: 13

V: - UV: +

Acid Spray: P.Red LW UV: Pink

Archers: x

K: Yellow C: No Result KC: PD: No Result

Mass spectrum: 372, 354, 328, 327

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Connorstictic acid, Hypoconstictic acid, Hypoprotocetraric acid, Hyposalazinic acid, 4-O-Methylhypoprotocetraric acid

Reference: Keogh, MF 1978: New β -orcinol depsidones from the *Xanthoparmelia quintaria* and a *Thelotrema* species. Phytochemistry 17: 1192-1193.

Notes: Acid Spray: pale pink-red. LW UV: bright pink. Occurs in *Xanthoparmelia quintaria*

Hypostictolide [Hypostictinolide]

A: 58 B: x B': x C: 52 E: 30 F: x G: x

HPLC: 22

V: - UV: +

Acid Spray: P.Red LW UV: Pink

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 356, 328

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Hypoconstictic acid, Hypostictic acid

Reference: Giralt, M/ van den Boom, PG/ Elix, JA 2010: "*Buellia lindigeri*" and *Rinodina hallii* (Physciaceae), two closely related species. *Bryologist* 113: 99-105.

Notes: Minor component in *Buellia lindigeri*

Hypostrepsilic acid [Norascomatic acid]

A: 23 B: x B': 43 C: 25 E: x F: x G: x

HPLC: 17

V: - UV: +

Acid Spray: B.Blue LW UV: Purple

Archers: Green

K: No Result C: Green KC: PD: No Result

Mass spectrum: 272, 255, 254, 228

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Ascomatic acid, 7-O-Methylnorascomatic acid, Methyl ascomatate, Isostrepsilic acid, Strepsilin

Reference: Kon, Y/ Iwashina, T/ Kashiwadani, H/ Wardlaw, JH/ Elix, JA 1997: A new dibenzofuran, isostrepsilic acid, produced by cultured mycobiont of the lichenized Ascomycete *Usnea orientalis*. *Journal of Japanese Botany* 72: 67-71.

Notes: Occurs in *Bunodophoron patagonicum*

Hypothallin

A: x B: x B': x C: x E: x F: x G: x

HPLC: 20 TLC: Rf 55 [hexane/diethyl ether /formic acid, 20/30/6]

V: - UV: +

Acid Spray: x LW UV: x

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: Amino acid derivatives

Biosynthetically Related Compounds: x

Reference: Huneck, S/ Porzel, A/ Schmidt, J/ Follmann, G 1992: Hypothallin, ein weiterer Vertreter eines Aminosäure-aminoalkohol-esters aus der Krustenflechte *Schismatomma hypothallinum*. *Zeitschrift für Naturforschung* 47c: 785-790.

Notes: Occurs in *Schismatomma hypothallinum*

Hypothamnolic acid

A: 4 B: 25 B': 18 C: 23 E: x F: x G: 34

HPLC: 15

V: – UV: +

Acid Spray: Brown LW UV: Brown

Archers: x

K: Purple C: P.Red KC: PD: No Result

Mass spectrum: -1, 362, 209, 198, 191

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Cryptothamnolic acid, Haemathamnolic acid, Thamnolic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 151. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 260.

Notes: Occurs in *Pertusaria novaezelandiae*

Hypotrachynic acid [Dehydroisobutusatic acid]

A: x B: x B': x C: 18 E: x F: x G: x

HPLC: x

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 370, 342

Substance Class: Orcinol β -Orcinol Depsides

Biosynthetically Related Compounds: Connorstictic acid, Constictic acid, Cryptostictic acid, Menegazziaic acid, Methyl stictic acid, Norstictic acid, Stictic acid

Reference: Papadopoulou, P/ Tzakou, O/ Vagias, C/ Kefalas, P/ Roussis, V 2007: β -Orcinol Metabolites from the lichen *Hypotrachyna revoluta*. Molecules 12: 997-1005.

Notes: reported to occur in *Hypotrachyna revoluta* [but possibly a misdetermination of *Parmotrema perlatum*]

Imbricatic acid

A: 42 B: 75 B': 71 C: 50 E: x F: x G: x

HPLC: 34

V: – UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: : -1, 238, 220, 196

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*-Demethylimbricatic acid, Loxodellic acid, Perlatolic acid, Stenosporic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 121. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 261.

Notes: Acid Spray: pale orange, grey halo. LW UV: purple, green halo. Occur in *Cetrelia cetrarioides*

Insignin

A: 78 B: x B': 75 C: 80 E: x F: x G: x

HPLC: 45

V: - UV: +

Acid Spray: P.Yellow LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 380, 219, 206, 191

Substance Class: Isocoumarins

Biosynthetically Related Compounds: Confluentic acid, Glaucophaeic acid, Hyperconfluentic acid, Subconfluentic acid, Superconfluentic acid

Reference: Elix, JA/ Wardlaw, JH 1996: Synthesis of depsides present in the lichen *Porpidia glaucophaea*. Australian Journal of Chemistry 49: 817-924.

Notes: Occurs in *Pseudobaeomyces pachycarpus*, *Porpidia glaucophaea*

Islandicin

A: x B: x B': x C: x E: x F: x G: x

HPLC: x TLC: Rf 82 [benzene/hexane, 1/1]; Rf 85 [benzene/acetone, 4/1]

V: + UV: +

Acid Spray: Orange LW UV: Red

Archers: x

K: Violet C: No Result KC: No Result PD: No Result

Mass spectrum: 270, 253, 242, 213

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Asahinin, Cynodontin

References: Mishchenko, NP/ Stepanenko, NL/ Krivoshekova, OA/ Maximov, OB 1980: Anthraquinones of *Asahinea chrysantha*. Khimiya Prirodnikh Soedinenii 2: 160-165. Bentina, V [ed.] Chromatography of Mycotoxins: Techniques and Applications. 1993, p202

Notes: Red-orange pigment. Minor component in *Asahinea chrysantha*

Isoarthothelin [2,5,7-Trichloronorlichexanthone]

A: 45 B: x B': 44 C: 37 E: 6 F: 18 G: x

HPLC: 36

V: + UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass spectrum: 364, 362, 360, 331

Substance Class: Xanthones

Biosynthetically Related Compounds: 2,5-Dichloronorlichexanthone, 5,7-Dichloronorlichexanthone,

Thiophanic acid, 2,5,7-Trichlorolichexanthone, 2,5,7-Trichloro-3-O-methylnorlichexanthone

Reference: Elix, JA/ Jiang, H/ Portelli, VJ 1990: Structure and synthesis of the lichen xanthone isoarthothelin [2,5,7-trichloronorlichexanthone]. Australian Journal of Chemistry 43: 1291-1295.

Notes: Yellow pigment. Occurs in *Buellia aeruginosa*

Isodidymic acid

A: 42 B: x B': 66 C: 50 E: x F: x G: x

HPLC: 37

V: - UV: +

Acid Spray: D.Blue

LW UV: B.Blue

Archers: Green

K: No Result C: Green KC: PD: No Result

Mass spectrum: 370, 352, 326, 276

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Condidymic acid, Didymic acid, Subdidymic acid

Reference: Chester, DO/ Elix, JA/ Kennedy, JM 1986: Isodidymic acid, a new dibenzofuran from the lichen *Cladonia didyma*. Australian Journal of Chemistry 39: 1759-1764.

Notes: Occurs in chemical race of *Cladonia didyma*

Isofulgidin

A: 66 B: x B': 58 C: 52 E: 28 F: x G: x

HPLC: 37

V: - UV: +

Acid Spray: P.Yellow

LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: : 392, 390, 388, 357

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Caloploicin, Diploicin, Fulgidin, Fulgoicin

Reference: Birkbeck, AA/ Sargent, MV/ Elix, JA 1990: The structure of the lichen depsidones fulgidin and isofulgidin. Australian Journal of Chemistry 43: 419-425.

Notes: Best seen under SW UV before spraying. Acid Spray: very pale yellow. LW UV:strong brown.

Occurs in *Buellia tetrapla*

Isohyperlatolic acid

A: 48 B: x B': 79 C: 52 E: x F: x G: x

HPLC: 55

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: : -1, 454, 267, 266

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Hyperlatolic acid, Perlatolic acid, Superlatolic acid

Reference: Culberson, CF/ Hale, ME/ Tønsberg, T/ Johnson, A 1984: New depsides from the lichen *Dimelaena oreina* and *Fuscidia viridis*. Mycologia 76: 148-160.

Notes: Acid Spray: pale yellow, grey halo. LW UV: purple, green halo. Occurs in *Ropalospora viridis*

Isohyperpicrolichenic acid

A: 39 B: x B': 47 C: 38 E: x F: x G: x

HPLC: 46

V: - UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: Red PD: No Result

Mass spectrum: : 426, 426, 69, 55

Substance Class: Depsones

Biosynthetically Related Compounds: Hyperpicrolichenic acid, Picrolichenic acid, Superpicrolichenic acid

Reference: Elix, JA/ Venables, D/ Archer, AW 1994: 70. Further new depsones from the lichen *Pertusaria truncata*. Australian Journal of Chemistry 47: 1345-1353.

Notes: Occurs in *Pertusaria truncata*

Isohyperplanaic acid

A: 54 B: x B': 41 C: 58 E: x F: x G: x

HPLC: 51

V: - UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: : -1, 264, 263

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Planaic acid, Hyperplanaic acid, Superplanaic acid

Reference: Elix, JA/ Barclay, CE/ Lumbsch, HT 1994: New depsides from the lichen *Lecanora planaica*. Australian Journal of Chemistry 47: 1199-1203.

Notes: Occurs in *Lecanora planaica*

Isohypocrelline [Isohypocrellin]

A: 40 B: x B': 7 C: 32 E: x F: x G: x

HPLC: 50

V: + UV: +

Acid Spray: D.Red LW UV: D.Red

Archers: x

K: Green C: No Result KC: PD: No Result

Mass spectrum: : 546, 528, 485, 459

Substance Class: Perylenequinones

Biosynthetically Related Compounds: x

Reference: Mathey, A/ van Roy, W/ van Vaeck, L/ Eckhardt, G/ Steglich, W 1994: In situ analysis of a new perylene quinone in lichens by Fourier-transform laser microprobe mass spectrometry with external source. Rapid Communications in Mass Spectrometry 8: 46-52.

Notes: Deep red pigment. Occurs in *Thecaria montagnei***Isolecanoric acid**

A: 20 B: x B': 25 C: 6 E: x F: x G: x

HPLC: 5

V: - UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: x

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Lecanoric acid

Reference: Sakurai, A/ Goto, Y 1987: Chemical studies on the lichens. I. The structure of isolecanoric acid, a new ortho-depside from *Parmelia tinctoria* Despr. Bulletin of the Chemical Society of Japan 60: 1917-1918.

Notes: Occurs in *Parmotrema tinctorum***Isoleprapinic acid**

A: 67 B: x B': 35 C: 59 E: x F: 50 G: x

HPLC: 14

V: + UV: +

Acid Spray: Yellow LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 352, 320, 292, 264

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Leprapinic acid

References: new report

Notes: Yellow pigment. Accessory substance in *Chrsyothrix occidentalis*

Isomegapicrolichenic acid

A: 44 B: x B': 62 C: 44 E: x F: x G: x

HPLC: 55

V: – UV: +

Acid Spray: P. Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: Red PD: No Result

Mass spectrum: : 526, 483, 482, 355

Substance Class: Depsones

Biosynthetically Related Compounds: Hyperpicrolichenic acid, Isohyperpicrolichenic acid, Megapicrolichenic acid, Picrolichenic acid, Superpicrolichenic acid

Reference: Elix, JA/ Venables, D/ Archer, AW 1994: 70. Further new depsones from the lichen *Pertusaria truncata*. Australian Journal of Chemistry 47: 1345-1353.

Notes: Minor component in *Pertusaria truncata*

Isomerochlorophaeic acid

A: 49 B: x B': 56 C: 54 E: x F: x G: x

HPLC: 28

V: – UV: +

Acid Spray: Orange LW UV: Brown

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: : -1, 235, 196, 191

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Merochlorophaeic acid, 4-O-Methylcryptochlorophaeic acid

Reference: Elix, JA/ Barclay, CE/ David, F/ Griffin, FK/ Hill, AM/ McConnell, DB/ Wardlaw, JH 1993: Synthesis of further lichen depsides. Australian Journal of Chemistry 46: 301-313.

Notes: Occurs in *Ramalina cf. leiodea*

Isonephrosterinic acid

A: 43 B: x B': 55 C: 40 E: x F: x G: x

HPLC: 36

V: – UV: –

Acid Spray: No Result LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: : x

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Lichesterinic acid, Nephrosterinic acid, Protolichesterinic acid

Reference: new report

Notes: Occurs in *Nephromopsis endocrocea*

Isonorlobaridone

A: 31 B: x B': 14 C: 5 E: x F: x G: x

HPLC: 20

V: – UV: +

Acid Spray: Grey LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: : 398, 370, 342, 221

Substance Class: Diphenyl ethers

Biosynthetically Related Compounds: Norlobaridone, Norlobariol, Norlobariol methyl ester

Reference: Gream, GE/ Riggs, NV 1960: Chemistry of Australian lichens II. A new depsidone from *Parmelia conspersa* (Ehrh.) Ach.. Australian Journal of Chemistry 13: 285-295.

Notes: Occurs in *Xanthoparmelia amplexula*

Isonorobtusatic acid [Norisoobtusatic acid]

A: 30 B: x B': 53 C: 28 E: x F: x G: x

HPLC: 36

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: Orange

K: No Result C: Red KC: PD: No Result

Mass spectrum: 332, 182, 168, 165

Substance Class: Orcinol β -Orcinol Depsides

Biosynthetically Related Compounds: Isoobtusatic acid, Norobtusatic acid, Obtusatic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1990: The *Ramalina americana* complex (Ascomycotina, Ramalinaceae): chemical and geographical correlations. Bryologist 93: 167-186.

Notes: Occurs in *Ramalina americana* s.lat.

Isonorpannarin [Norisopannarin]

A: 73 B: x B': 63 C: 65 E: 38 F: 80 G: x

HPLC: 25

V: – UV: +

Acid Spray: Yellow-brown LW UV: Brown

Archers: x

K: No Result C: No Result KC: No Result PD: Yellow-orange

Mass spectrum: 350, 348

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Norpannarin, Pannarin

Reference: Rosa, IN 2013. Las especies del género *Lecanora* sensu lato en la Argentina, Universidad Nacional del Comahue, 213pp

Notes: Occurs in *Lecanora dispersa*, *L. torrida*

Isonotatic acid

A: 38 B: x B': 42 C: 43 E: x F: x G: 56

HPLC: 24

V: – UV: +

Acid Spray: Yellow LW UV: D.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 344, 326, 300, 298

Substance Class: Orcinol β -Orcinol Depsidones

Biosynthetically Related Compounds: 4-*O*-Methylhypoprotocetraric acid, Norisonotatic acid, Notatic acid, Subnotatic acid

Reference: Elix, JA/ Lajide, L 1984: The identification of further new depsidones in the lichen *Parmelia notata* Kurok. Australian Journal of Chemistry 37: 857-866.

Notes: Occurs in *Xanthoparmelia notata*

Isoobtusatic acid [3'-Methylevernic acid]

A: 43 B: x B': 62 C: 50 E: x F: x G: x

HPLC: 32

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 346, 182, 165, 164

Substance Class: Orcinol β -Orcinol Depsides

Biosynthetically Related Compounds: Isonorobtusatic acid, Norobtusatic acid, Obtusatic acid, Methyl 3'-methyllecanorate

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1990: The *Ramalina americana* complex (Ascomycotina, Ramalinaceae): chemical and geographical correlations. Bryologist 93: 167-186.

Notes: Acid Spray: strong-pale orange, grey halo. LW UV: strong purple, green halo. Occurs in *Ramalina americana* s.lat.

Isopatagonic acid

A: 38 B: x B': 33 C: 42 E: x F: x G: x

HPLC: 44

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 290, 206, 191, 177

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Isosphaeric acid, 2-O-Methylpatagonic acid, Patagonic acid, Sphaerophorin

Reference: Elix, JA/ Venables, D/ Wedin, M 1994: New dibenzofurans and depsides from the lichen *Bunodophoron patagonicum*. Australian Journal of Chemistry 47: 1335-1344.

Notes: Occurs in *Bunodophoron patagonicum*

Isoplacodiolic acid [Mycousnine]

A: 49 B: x B': 63 C: 65 E: x F: x G: x

HPLC: 27

V: – UV: +

Acid Spray: P.Orange LW UV: Purple

Archers: x

K: Yellow C: No Result KC: Yellow PD: No Result

Mass spectrum: 376, 344, 260, 250

Substance Class: Usnic acid derivatives

Biosynthetically Related Compounds: Isousnic acid, Isopseudoplacodiolic acid, Placodioilic acid, Pseudoplacodiolic acid, Usnic acid

References: Elix, JA/ Senanayake, BS/ Kalb, K 1998: The structure of isoplacodiolic acid and isopseudoplacodiolic acid, two new dibenzofuran derivatives from the lichen genus *Haematomma*. *Herzogia* 13: 145-149. Sassa, T/ Igarashi, M 1990: Structure of (-)-mycousnine and, (+)-isomycousnine and (+)-Oxymycousnine, new usnic acid derivatives from pathogenic *Mycosphaerella nawae*. *Agricultural and Biological Chemistry* 54: 2231.

Notes: Occurs in *Haematomma flexuosum*, *H. mattogrossense*

Isopseudocyphellarin A

A: 73 B: x B': 65 C: 78 E: 54 F: x G: x

HPLC: 44

V: – UV: +

Acid Spray: P.Yellow LW UV: P.Brown

Archers: x

K: No Result C: Red KC: PD: Yellow

Mass Spectrum: 402, 210, 194, 193

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: 2'-O-Methylphenarctin, 2'-O-Methylisopseudocyphellarin A, 2'-O-Methylpseudocyphellarin A, Phenarctin, Pseudocyphellarin A, Pseudocyphellarin B

Reference: Elix, JA/ Wardlaw, JH/ Wilkins, AL 1987: Five new fully substituted depsides from the lichen *Pseudocyphellaria pickeringii*. Australian Journal of Chemistry 40: 2023-2029.

Notes: Acid Spray: pale yellow, blue-grey halo. LW UV: pale yellow-brown, fades to orange. Occurs in *Pseudocyphellaria pickeringii*

Isopseudoplacodiolic acid [Isomycousnine]

A: 44 B: x B': 48 C: 53 E: x F: x G: x

HPLC: 25

V: - UV: +

Acid Spray: P.Orange LW UV: Purple

Archers: x

K: Yellow C: No Result KC: Yellow PD: No Result

Mass spectrum: 376, 344, 260, 250

Substance Class: Usnic acid derivatives

Biosynthetically Related Compounds: Isousnic acid, Isoplacodiolic acid, Placodioilic acid, Pseudoplacodiolic acid, Usnic acid

Reference: Elix, JA/ Senanayake, BS/Kalb, K 1998: The structure of isoplacodiolic acid and isopseudoplacodiolic acid, two new dibenzofuran derivatives from the lichen genus *Haematomma*. Herzogia 13: 145-149.

Notes: Occurs in *Haematomma flexuosum*, *H. mattogrossense*

Isorangiformic acid

A: 38 B: x B': 43 C: 42 E: x F: x G: x

HPLC: x

V: - UV: -

Acid Spray: No Result LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 368, 350, 336, 322

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Norrangiformic acid, Rangiformic acid

Reference: Huneck, S 1982: (+)-Isorangiformic acid, a lichen substance from *Lecanora stenotropa*.

Phytochemistry 21: 2407-2408.

Notes: Occurs in *Lecanora stenotropa*

Isoschizopeltic acid

A: 31 B: x B': 19 C: 36 E: x F: x G: x

HPLC: 15

V: – UV: +

Acid Spray: Purple LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 358, 343, 327, 325

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Pannaric acid, Pannaric acid 6-methylester, Schizopeltic acid

Reference: Elix, JA/ Naidu, R 1995: Identification of some minor dibenzofurans in the lichen *Schizopelte californica*. *Bibliotheca Lichenologica* 57: 117-126.

Notes: Minor component in *Schizopelte californica*

Isosphaeric acid

A: 43 B: x B': 69 C: 53 E: x F: x G: x

HPLC: 46

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 267, 266, 249

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-O-Demethylsphaerophorin, Sphaerophorin

Reference: Culberson, CF/ Hale, ME/ Tønsberg, T/ Johnson, A 1984: New depsides from the lichen *Dimelaena oreina* and *Fuscidia viridis*. *Mycologia* 76: 148-160.

Notes: Acid Spray: pale yellow, grey halo. LW UV: strong-purple, green halo. Occurs in a chemotype of *Dimelaena oreina*

Isostrepsilic acid

A: 10 B: x B': 11 C: 3 E: x F: x G: x

HPLC: 7

V: – UV: +

Acid Spray: Blue LW UV: Purple

Archers: Green

K: No Result C: Green KC: PD: No Result

Mass spectrum: 270, 241, 228, 227

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Hypostepsilic acid, Strepsilin

Reference: Kon, Y/ Iwashina, T/ Kashiwadani, H/ Wardlaw, JH/ Elix, JA 1997: A new dibenzofuran, isostrepsilic acid, produced by cultured mycobiont of the lichenized Ascomycete *Usnea orientalis* *Journal of Japanese Botany* 72: 67-71.

Notes: Occurs in *Usnea orientalis* mycobiont

Isosubpicrolichenic acid

A: 34 B: x B': 37 C: 34 E: x F: x G: x

HPLC: x

V: – UV: +

Acid Spray: Grey LW UV: Purple

Archers: x

K: No Result C: No Result KC: Red PD: No Result

Mass Spectrum: 414, 380, 378, 370

Substance Class: Depsones

Biosynthetically Related Compounds: Hyperpicrolichenic acid, Isohyperpicrolichenic acid, Picrolichenic acid, Subpicrolichenic acid, Superpicrolichenic acid

Reference: Elix, JA/ Calanasan, CA/ Archer, AW 1991: Subpicrolichenic acid and superpicrolichenic acid, two new depsones from *Pertusaria* lichens. Australian Journal of Chemistry 44: 1487-1493.

Notes: Occurs in *Pertusaria amara*

Isousnic acid

A: 75 B: x B': 76 C: 79 E: 28 F: x G: 93

HPLC: 41

V: – UV: +

Acid Spray: Green LW UV: Green

Archers: x

K: No Result C: No Result KC: Yellow PD: No Result

Mass Spectrum: 344, 326, 300

Substance Class: Usnic acid derivatives

Biosynthetically Related Compounds: Placodiolic acid, Pseudoplacodiolic acid, Usnic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 170. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 221.

Notes: Pale yellow pigment. Occurs in *Cladonia pleurota*

Isovicanicin

A: 68 B: 77 B': 68 C: 70 E: 55 F: x G: x

HPLC: 35

V: – UV: +

Acid Spray: Green LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 384, 382, 349, 347

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: *O*-Methylvicanicin, Norvicanicin, Vicanicin

Reference: Elix, JA/ Lajide, L/ Galloway, DJ 1982: Metabolites from the lichen genus *Psoroma*. Australian Journal of Chemistry 35: 2325-2333.

Notes: Occurs in *Pannaria atrophylla*

Jackinic acid

A: 38 B: x B': 35 C: 37 E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: No Result LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 340, 322, 309, 294

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Norjackinic acid, Toensbergianic acid

Reference: Kümmerling, H/ Leuckert, C/ Wirth, V 1994: Chemische Flechtenanalysen. *Lepraria jackii* Tønsberg. Nova Hedwigia 60: 457-465.

Notes: Occurs in *Lepraria jackii*

Japonene [Japonin]

A: 36 B: x B': 29 C: 32 E: 5 F: x G: 36

HPLC: x

V: – UV: –

Acid Spray: P. Brown LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: 6 α -Acetoxypopane-16 β ,22-diol, 16 β -Acetoxypopane-6 α ,22-diol, 6 α ,16 β -Diacetoxypopane-22-ol, Hopane-6 α ,22-diol [Zeorin], Hopane-6 α ,16 β ,22-triol [Leucotylin]

Reference: Elix, JA 2011: Further new species of *Heterodermia* (Physciaceae, Ascomycota) from Australia. Australasian Lichenology 69: 12-24.

Notes: Occurs in *Heterodermia japonica*

Lactothamnolic acid

A: 5 B: x B': 20 C: 16 E: x F: x G: x

HPLC: 12

V: – UV: +

Acid Spray: Brown LW UV: Brown

Archers: x

K: Yellow C: No Result KC: PD: Orange

Mass spectrum: -1, 226, 209, 198

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Hypothamnolic acid, Thamnic acid, Neothamnolic acid

Reference: Elix, JA/ Barclay, CE/ Wardlaw, JH/ Archer, AW/ Sen-hua Yu/ Kantvilas, G 1999: Four new β -orcinol *meta*-depsides from *Pertusaria* and *Siphula* lichens. Australian Journal of Chemistry 52: 837-840.

Notes: Occurs in *Siphula ramalinoides*

Lanosterol

A: x B: x B': x C: 43 E: x F: x G: x

HPLC: x

V: - UV: -

Acid Spray: P. Brown

LW UV: Brown

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 468, 454, 453, 394

Substance Class: Terpenoids

Biosynthetically Related Compounds: x

Reference: Nicollier, G/ Tabacchi, R/ Gavin, J/ Breton, JL/ Gonzales, AG 1979: Triterpenes de la 'mousse de chêne' (*Evernia prunastri* ((L.) Ach.). Helvetica Chimica Acta 62: 807-810.

Notes: Occurs in *Evernia prunastri*

Lasallic acid

A: 27 B: x B': 37 C: 13 E: x F: x G: x

HPLC: 21

V: - UV: +

Acid Spray: P. Yellow

LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: x

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid

Reference: Narui, T/ Takatsuki, S/ Sawada, K/ Okuyama, T/ Culberson, CF/ Culberson, WL/ Shibata, S 1996: Lasallic acid, a tridepside from the lichen *Lasallia asiae-orientalis*. Phytochemistry 42: 839-844.

Notes: Occurs in *Lasallia asiae-orientalis*

Lecanoric acid

A: 28 B: 44 B': 44 C: 22 E: x F: x G: 56

HPLC: 14

V: – UV: +
Acid Spray: Yellow LW UV: Green
Archers: Orange
K: No Result C: Red KC: PD: No Result

Mass Spectrum: 318, 168, 151, 150

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Diploschistesic acid, Evernic acid, Gyrophoric acid, Methyl lecanorate

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 121. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 264.

Notes: Acid Spray: yellow, grey halo. Occurs in *Parmotrema tinctorum*

Lecideoidin

A: 48 B: 47 B': 35 C: 40 E: 4 F: x G: x

HPLC: 24

V: – UV: +

Acid Spray: No Result LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 400, 398, 368, 366

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Chlorolecideoidin, 3'-Dechlorolecideiodin, Gangaleoidin, Norgangaleoidin

Reference: Chester, DO/ Elix, JA/ Jones, AJ 1979: Lecideoidin and 3'-dechlorolecideoidin, new depsidones from an Australian *Lecidea* (lichen). Australian Journal of Chemistry 32: 1857-1861.

Notes: Occurs in *Tylothallia verrucosa*

Leoidin

A: 62 B: x B': 54 C: 52 E: x F: x G: x

HPLC: 36

V: – UV: +

Acid Spray: No Result LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 414, 412

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Gangaleoidin, Norgangaleoidin

Reference: Devlin, JP/ Mahandru, MM/ Ollis, WD/ Smith, C 1986: Phytochemical examination of the lichen, *Lecanora gangaleoides* Nyl. Journal of the Chemistry Society, Perkin Transactions 1: 1491-1494.

Notes: Occurs in *Lecanora gangaleoides*, *L. sulphurescens*

Lepranthin

A: 52 B: x B': x C: 28 E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: No Result LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 642, 600, 582, 572

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: x

Reference: Polborn, K/ Steglich, W/ Connelly, JD/ Huneck, S 1995: Structure of the macrocyclic bis lactone lepranthin from the lichen *Arthonia impolita*: an X-ray analysis. *Zeitschrift für Naturforschung* 50b: 1111-1114.

Notes: Occurs in *Arthonia pruinata*

Leprapinic acid

A: 71 B: 59 B': 53 C: 78 E: 35 F: x G: x

HPLC: 28

V: + UV: +

Acid Spray: Yellow LW UV: Brown

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 352, 320, 292, 264

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Isoleprapinic acid, Leprapinic acid methyl ether

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 211. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 401.

Notes: Yellow pigment. LW UV: orange-brown. Occurs in *Chrysothrix chlorina*

Leprapinic acid methyl ether

A: 62 B: x B': 32 C: 54 E: 20 F: x G: x

HPLC: 14

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 366, 334

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Leprapinic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 212. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 401.

Notes: Yellow pigment. LW UV: brownish yellow. Occurs in *Chrsyothrix chlorina*

Lepraric acid

A: 25 B: 11 B': 8 C: 24 E: x F: x G: x

HPLC: 10

V: - UV: +

Acid Spray: P.Brown LW UV: P.Brown

Archers: x

K: Yellow C: Green KC: PD: No Result

Mass Spectrum: 362, 235, 220, 219

Substance Class: Chromones

Biosynthetically Related Compounds: 6 α -Hydroxyeugenitin

Reference: Aberhart, DJ/ Overton, KH/ Huneck, S 1969: Studies on lichen substances. Part LXII. Aromatic constituents of the lichen *Roccella portentosa*. Journal of the Chemical Society (C): 704-707.

Notes: Acid Spray: dull yellowish brown; fades to pale red-brown. LW UV: pale green-brown. Occurs in *Roccella fuciformis*

Leprolomin

A: 63 B: 55 B': 49 C: 54 E: 35 F: x G: x

HPLC: 19

V: - UV: +

Acid Spray: Green LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 390, 348, 194, 181

Substance Class: Diphenyl ethers

Biosynthetically Related Compounds: Ontortin, O-methylleprolomin, Usnic acid

Reference: Elix, JA/ Engkaninan, U/ Jones, AJ/ Raston, CL/ Sargent, MV/ White, AH 1978: Chemistry and crystal structure of leprolomin, a novel diphenyl ether from the lichen *Psoroma leprolomum* (Nyl.) Ras. Australian Journal of Chemistry 31: 2057-2068.

Notes: Acid Spray: pea-green, eventually fades to dull yellow. LW UV: brown, green halo. Occurs in *Pannaria farinosa*

Letrouitic acid

A: 58 B: x B': 50 C: 46 E: x F: x G: x

HPLC: 26

V: - UV: +

Acid Spray: Blue

LW UV: Purple

Archers: Green

K: No Result

C: Green

KC:

PD: No Result

Mass spectrum: 390, 374, 372

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: 8-Chlorodioxocondidymic acid, 8-Chlorodioxodidymic acid, 8-Chlorooxididymic acid, Dioxocondidymic acid, Dioxodidymic acid, Oxodidymic acid

Reference: Johansson, S/ Søjting, U/ Elix, JA/ Wardlaw, JH 2005: Chemical variation in the lichen genus *Letrouitia* (Ascomycota, Letrouitiaceae). *Mycological Progress* 4: 139-148.

Notes: Minor component in *Letrouitia vulpina*

Lichesterinic acid

A: 44

B: 63

B': 58

C: 43

E: x

F: x

G: x

HPLC: 42

V: -

UV: -

Acid Spray: No Result

LW UV: Lilac

Archers: x

K: No Result

C: No Result

KC: No Result

PD: No Result

Mass Spectrum: 324, 306, 280, 279

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Constipatic acid, Isonephrosterinic acid, Protolichesterinic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 102. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 146.

Notes: Occurs in *Cetraria islandica*

Lichexanthone

A: 72

B: 72

B': 66

C: 75

E: 52

F: x

G: x

HPLC: 45

V: -

UV: +

Acid Spray: P.Yellow

LW UV: B.Blue

Archers: No Result

K: No Result

C: No Result

KC: No Result

PD: No Result

Mass Spectrum: 286, 257, 243, 200

Substance Class: Xanthenes

Biosynthetically Related Compounds: Griseoxanthone-C, Norlichexanthone

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 179. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 208.

Notes: Occurs in *Hypotrachyna osseoalba*

Lividic acid

A: 32 B: 35 B': 37 C: 31 E: x F: x G: x

HPLC: 20

V: – UV: +

Acid Spray: Green LW UV: Purple

Archers: x

K: P.Yellow C: No Result KC: Red-brown PD: No Result

Mass Spectrum: 456, 279, 278, 262

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Colensoic acid, 4-*O*-Methylphysodic acid, Oxyphysodic acid, Physodic acid

Reference: Elix, JA/ Engkaninan, U 1976. The structure of lividic acid. A depsidone from the lichen *Parmelia formosana*. Australian Journal of Chemistry 29: 203-207.

Notes: Acid Spray: pea-green, same as oxyphysodic acid. Occurs in *Hypotrachyna osseoalba*

Lobaric acid

A: 30 B: 46 B': 47 C: 38 E: x F: x G: x

HPLC: 30

V: – UV: +

Acid Spray: Grey LW UV: B.Blue

Archers: x

K: P.Yellow C: No Result KC: PD: No Result

Mass Spectrum: 456, 438, 412, 235

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Oxolobaric acid, Norlobaridone, Sublobaric acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 137. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 335.

Notes: Acid Spray: weak-grey; strong-green. Medulla fluoresces blue if large amount present. Occurs in *Protoparmelia badia*

Lobodirin

A: x B: x B': x C: x E: x F: x G: x

HPLC: x

V: + UV: +

Acid Spray: P.Brown LW UV: P.Brown

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 494, 452, 331, 289

Substance Class: Chromones

Biosynthetically Related Compounds: 6 α -Hydroxyeugenitin

Reference: Huneck, S/ Jakupovic, J/ Follmann, G 1992: The final structures of the lichen chromones galapagin, lobodirin, mollin and roccellin. Zeitschrift für Naturforschung 47B: 449-451.

Notes: Pale yellow pigment. Occurs in Occurs in *Roccellina cerebriformis*

Loxodellic acid

A: 39 B: 42 B': 42 C: 38 E: x F: x G: x

HPLC: 22

V: – UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: Pink PD: No Result

Mass Spectrum: -1, 252, 235, 234

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*-Demethylloxodellic acid, Glomellic acid, Glomelliferic acid, Perlatolic acid

Reference: Culberson, CF/ Esslinger, TL 1976: 4-*O*-Methylolivetic and loxodellic acids: new depsides from new species of brown Parmeliae. Bryologist 79: 42-46.

Notes: Acid Spray: pale orange, grey halo. LW UV: pale blue. Occurs in *Xanthoparmelia loxodella*

Loxodellonic acid

A: 38 B: x B': 35 C: 35 E: x F: x G: x

HPLC: 19

V: – UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 384, 235, 234

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Glomelliferonic acid, Glomellonic acid

Reference: Elix, JA/ Jenie, UA/ Jenkins, GA 1987: Three new depsidones from the lichen *Neofuscelia subincerta*. Australian Journal of Chemistry 40: 2031-2036..

Notes: Acid Spray: pale yellow, grey halo. LW UV: strong-dark blue, purple halo. Occurs in *Xanthoparmelia subincerta*

Loxodin [Methyl norlobariate]

A: 50 B: 40 B': 40 C: 36 E: 28 F: x G: x

HPLC: 28

V: – UV: +

Acid Spray: Green

LW UV: B.Blue

Archers: x

K: No Result C: No Result

KC: Pink PD: No Result

Mass Spectrum: 456, 424

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Conloxodin, Conorlobaridone, Norlobaridone

Reference: Komiya, T/ Kurokawa, S 1970: Loxodin, a depsidone of lichens of *Parmelia* species.

Phytochemistry 9: 1139-1140.

Notes: Occurs in *Xanthoparmelia flavescens*

Lupeol

A: 60 B: x B': 70 C: 56 E: 52 F: x G: 70

HPLC: x

V: -

UV: -

Acid Spray: P.Purple

LW UV: Orange

Archers: x

K: No Result C: No Result

KC: No Result PD: No Result

Mass Spectrum: 426, 411, 383, 218

Substance Class: Terpenoids

Biosynthetically Related Compounds: Lupeone

Reference: Bruun, T 1969: Triterpenoids in *Cetraria nivalis* (L.) Ach. Acta Chemica Scandinavica 23: 3038-3042.

Notes: LW UV: pale orange, fades to pale pink. Occurs in *Flavocetraria nivalis*

Lupeone [Lup-20(29)-ene-3-one]

A: x B: x B': x C: x E: x F: x G: x

HPLC: x

V: -

UV: -

Acid Spray: x

LW UV: x

Archers: x

K: No Result C: No Result

KC: No Result PD: No Result

Mass Spectrum: -1, 242, 204, 203, 189

Substance Class: Terpenoids

Biosynthetically Related Compounds: Lupeol

Reference: Gonzáles, AG/ Barrera, JB/ Rodrigues Pérez, EM/ Hernández Padrón, CE 1991: Chemical constituents of the lichen *Cladonia macronesica*. Zeitschrift für Naturforschung 46c: 12-18.

Notes: Occurs in *Claonia macronesica*

Lusitanic acid

A: 39 B: x B': 7 C: 26 E: x F: x G: 49

HPLC: 12

V: – UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: x C: x KC: x PD: x

Mass spectrum: 416, 372, 224, 191

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Constictic acid, Cryptostictic acid, Verrucigeric acid, Norstictic acid, Stictic acid, Methyl stictic acid

Reference: Elix, JA/Wardlaw, JH 2000: Lusitanic acid, peristictic acid and verrucigeric acid, three new β -orcinol depsidones from the lichens *Relicina sydneyensis* and *Xanthoparmelia verrucigera*. Australian Journal of Chemistry 53: 815-818.

Notes: Minor component in *Xanthoparmelia verrucigera*

Malonprotocetraric acid

A: 2 B: x B': 16 C: 4 E: x F: x G: 21

HPLC: 17

V: – UV: +

Acid Spray: Grey LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: Red

Mass Spectrum: -1, 356, 314, 312

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Fumarprotocetraric acid, Protocetraric acid, Succinprotocetraric acid

Reference: Keogh, MF 1977: Malonprotocetraric acid from *Parmotrema conformatum*. Phytochemistry 16: 1102.

Notes: Occurs in *Parmotrema conformatum*

Megapicrolichenic acid

A: 46 B: x B': 65 C: 46 E: x F: x G: x

HPLC: 53

V: – UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: Red PD: No Result

Mass spectrum: : 527, 526, 498, 483

Substance Class: Depsones

Biosynthetically Related Compounds: Hyperpicrolichenic acid, Isohyperpicrolichenic acid, Isomegapicrolichenic acid, Picrolichenic acid, Superpicrolichenic acid

Reference: Elix, JA/ Venables, D/ Archer, AW 1994: 70. Further new depsones from the lichen *Pertusaria truncata*. Australian Journal of Chemistry 47: 1345-1353.

Notes: Minor component in *Pertusaria truncata*

Melacarpic acid

A: 48 B: 75 B': 54 C: 49 E: x F: x G: x

HPLC: 40

V: - UV: +

Acid Spray: Grey LW UV: Lilac

Archers: Green

K: No Result C: Green KC: PD: No Result

Mass Spectrum: 370, 353, 352, 326

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Congrayanic acid, 4-O-Demethylgrayanic acid, Grayanic acid

Reference: Chester, DO/ Elix, JA 1980: A new dibenzofuran and diphenyl ether from the lichen *Gymnoderma melacarpum*. Australian Journal of Chemistry 33: 1153-1156.

Notes: Acid Spray: blue-grey. LW UV: dark purple, bright violet halo. Occurs in *Neophyllis melacarpa*

Menegazziaic acid

A: 19 B: x B': 14 C: 12 E: x F: x G: 36

HPLC: 5

V: - UV: +

Acid Spray: Grey LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 374, 356, 328, 180

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Constrictic acid, Cryptostictic acid, Norstictic acid, Peristictic acid, Stictic acid

Reference: Hirayama, T/ Fujikawa, F/ Yosioka, I/ Kitagawa, I 1976: On the constituents of the lichen in the genus *Menegazzia*. Menegazziaic acid, a new depsidone from *Menegazzia asahinae* (Yas. ex Zahlbr.) Sant. and *Menegazzia terebrata* (Hoffm.) Mass. Chemical and Pharmaceutical Bulletin (Tokyo) 24: 2340-2344.

Notes: Occurs in *Menegazzia terebrata*

Meritosporic acid

A: 36 B: x B': x C: 40 E: x F: x G: x

HPLC: 10

V: - UV: +

Acid Spray: Blue-green LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: unknown

Biosynthetically Related Compounds: x

Reference: New report

Notes: Occurs in *Laurera meritospora*

Merochlorophaeic acid

A: 52 B: 56 B': 50 C: 53 E: x F: x G: x

HPLC: 26

V: - UV: +

Acid Spray: P.Brown LW UV: Purple

Archers: Orange

K: D.Red C: Red KC: PD: No Result

Mass Spectrum: -1, 240, 224, 208

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Boninic acid, Cryptochlorophaeic acid, Homosekikaic acid 4-O-Methylcryptochlorophaeic acid, Paludosic acid, Ramalinolic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 131. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 265.

Notes: Acid Spray: fades to pink. Occurs in *Cladonia merochlorophaea*

3-Methoxycolensoic acid

A: 44 B: x B': 61 C: 47 E: x F: x G: x

HPLC: 50

V: - UV: +

Acid Spray: P.Yellow LW UV: Pink

Archers: x

K: No Result C: No Result KC: Red-brown PD: No Result

Mass Spectrum: 472, 454, 428, 250

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Colensoic acid, Hydroxycolensoic acid, Lividic acid, Oxyphysodic acid Physodic acid

Reference: Djura, P/ Sargent, MV/ Elix, JA/ Engkaninan, U/ Huneck, S/ Culberson, CF 1977: Depsidone synthesis VIII. Isolation and structure determination of hydroxy- and methoxycolensoic acids. Synthesis of Methyl methoxy-O-methylcolensoate. Australian Journal of Chemistry 30: 599-607.

Notes: Acid Spray: pale yellow, fades to yellow-brown. LW UV: purple-pink. Occurs in *Hypotrachyna livida*

3-Methoxy-2,4-di-O-methylgyrophoric acid

A: 30 B: 33 B': 37 C: 39 E: x F: x G: x

HPLC: 26

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: D.Red C: Red KC: PD: No Result

Mass Spectrum: -1, 482, 226, 209

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: 2,4-Di-*O*-methylgyrophoric acid, Gyrophoric acid, 3-Hydroxyumbilicic acid, 3-Methoxyumbilicic acid, 5-*O*-Methylhiascic acid, Umbilicic acid

Reference: Elix, JA/ Jayanthi, VK 1981: 3-Methoxy-2,4-di-*O*-methylgyrophoric acid: a novel tridepside from the lichen *Parmelia subfatiszens*. Australian Journal of Chemistry 34: 1153-1156.

Notes: Acid Spray: strong yellow, grey halo. Occurs in *Hypotrachyna subfatiszens*

5-Methoxylecanoric acid

A: 33 B: x B': 40 C: 29 E: x F: x G: x

HPLC: 18

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD:No Result

Mass spectrum: 348, 198, 181, 180

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Lecanoric acid, 5-*O*-Methylhiascic acid

Reference: Elix, JA/ Jayanthi, VK 2003: 5-Methoxylecanoric acid, a new depside from *Melanelia glabratula*. Australasian Lichenology 53: 10-13.

Notes: Minor component in *Melanelia glabratula*

Methoxymicareic acid

A: 45 B: x B': 69 C: 54 E: x F: x G: x

HPLC: 50

V: – UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 530, 486, 452, 248

Substance Class: Diphenyl ethers

Biosynthetically Related Compounds: Micareic acid, Superlatolic acid

Reference: Elix, JA/ Lajide, L/ Coppins, BJ/ James, PW 1984: Two new diphenyl ethers and a new depside from the lichen *Micarea prasina* Fr. Australian Journal of Chemistry 37: 2397-2402.

Notes: Occurs in *Micarea micrococca*

3-Methoxy-5-pentylphenol

A: 65 B: 70 B': x C: 53 E: x F: x G: x

HPLC: x

V: - UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 194

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: 2-Hydroxy-4-methoxy-6-pentylbenzoic acid, Olivetol, Perlatolic acid

Reference: Gonzáles, AG/ Barrera, JB/ Rodrigues Pérez, EM/ Hernández Padrón, CE 1991: Chemical constituents of the lichen *Cladina macronesica*. *Zeitschrift für Naturforschung* 46c: 12-18.

Notes: Possibly an artefact, reported to occur in *Cladonia macronesica*

2-Methoxypsoromic acid

A: 35 B: x B': 44 C: 39 E: x F: x G: x

HPLC: 22

V: - UV: +

Acid Spray: Brown LW UV: Brown

Archers: No Result

K: No Result C: No Result KC: No Result PD: P.Yellow

Mass spectrum: 388, 360, 359, 342

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: 2-Hydroxypsoromic acid

Reference: Elix, JA/ Wardlaw, JH/ Archer, AW/ Obermayer, W 1999: 2-Methoxypsoromic acid, a new lichen depsidone from *Pertusaria* and *Sulcaria* species. *Australasian Lichenology* 52: 717-719.

Notes: Occurs in *Sulcaria sulcata*

3-Methoxyumbilicic acid

A: 28 B: x B': 32 C: 32 E: x F: x G: 52

HPLC: 21

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 212, 195, 180

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid, 3-Hydroxygyrophoric acid, 3-Methoxy-2,4-di-*O*-methylgyrophoric acid, 3-Hydroxyumbilicinic acid, Umbilicinic acid

Reference: Elix, JA/ Yu, J/ Adler, MT 1989: 3-Hydroxyumbilicinic acid and 3-methoxyumbilicinic acid, new tridepsides from the lichen *Hypotrachyna bonariensis*. Australian Journal of Chemistry 42: 765-770.

Notes: Occurs in *Hypotrachyna bonariensis*

Methyl 3-*O*-acetoxyppyxinate

A: x B: x B': x C: 38 E: 19 F: x G: 44

HPLC: x

V: – UV: –

Acid Spray: Pink LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 530, 515, 470, 455

Substance Class: Terpenoids

Biosynthetically Related Compounds: 3 β -Acetoxy-20,24-epoxydammarane-12 β ,25-diol, 3 β ,25-Diacetoxy-20,24-epoxydammarane, 3 β ,25-Diacetoxy-20,24-epoxydammarane-12 β -ol, 20,24-Epoxydammarane-3 β ,12 β ,25-triol, Methyl pyxinate

Reference: Yosioka, I/ Yamauchi, H/ Kitagawa, I 1972: Lichen triterpenoids. V. On the neutral triterpenes of *Pyxine endochrysin* Nyl., Chemical and Pharmaceutical Bulletin (Tokyo) 20: 502-513.

Notes: Occurs in *Pyxine endochrysin*

9-*O*-Methylalternariol [Alternariol monomethyl ether]

A: 45 B: x B': 37 C: 32 E: x F: x G: x

HPLC: 17

V: – UV: +

Acid Spray: P. Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 272

Substance Class: 3,4-Benzocoumarins

Biosynthetically Related Compounds: Alternariol

Reference: Archer, AW/Elix, JA 1998: The lichen genus *Pertusaria* (Lichenised Ascomycotina) in Papua New Guinea: three new species and two new reports. Mycotaxon 69: 311-318.

Notes: Occurs in *Pertusaria praecipua*

2'-*O*-Methylanziaic acid

A: 46 B: 40 B': 42 C: 34 E: x F: x G: x

HPLC: 29

V: – UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result

C: Red

KC:

PD: No Result

Mass Spectrum: -1, 238, 224, 207

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Anziaic acid, 2'-O-Methylperlatolic acid

Reference: Culberson, CF/ Hertel, H 1972: 2'-O-Methylanziaic acid, a new depside from *Lecidea diducens* and *Lecidea spierodes*. Bryologist 75: 372-376.

Notes: Acid Spray: strong yellow, grey halo. Occurs in *Lecidea diducens*. *L. spierodes*

6-O-Methylarthothelin [Granulosin, 2,4,5-Trichloro-6-O-methylnorlichexanthone]

A: 63 B: x B': 56 C: 60 E: 8 F: 36 G: x

HPLC: 48

V: +

UV: +

Acid Spray: Orange

LW UV: Yellow

Archers: x

K: No Result

C: Orange

KC:

PD: No Result

Mass Spectrum: 380, 378, 376, 374

Substance Class: Xanthenes

Biosynthetically Related Compounds: Arthothelin, 2,5-Dichloro-6-O-methylnorlichexanthone, 4,5-Dichloro-6-O-methylnorlichexanthone, Thiophaninic acid, 2,4,5-Trichlorolichexanthone

Reference: Elix, JA/ Bennett, SA 1990: 6-O-Methylarthothelin and 1,3,6-tri-O-methylarthothelin, two new xanthenes from a *Dimelaena* lichen. Australian Journal of Chemistry 43: 1587-1590.

Notes: Pale yellow pigment. Occurs in *Dimelaena elevata*

Methyl ascomatate

A: 67 B: x B': 53 C: 53 E: 48 F: 86 G: x

HPLC: 42

V: -

UV: +

Acid Spray: B.Blue

LW UV: Purple

Archers: x

K: No Result

C: No Result

KC: No Result

PD: No Result

Mass Spectrum: 314, 299, 284, 283

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Ascomatic acid, 7-O-Methylnorascomatic acid, Norascomatic acid

Reference: Elix, JA/ Venables, D/ Wedin, M 1994: 70. New dibenzofurans and depsides from the lichen *Bunodophoron patagonicum*. Australian Journal of Chemistry 47: 1335-1344.

Notes: Occurs in *Bunodophoron patagonicum*

3-O-Methylasemone [4,5,7-Trichloro-3-O-methylnorlichexanthone]

A: 66 B: x B': 64 C: 65 E: 11 F: 32 G: x

HPLC: 51

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 380, 378, 376, 374

Substance Class: Xanthones

Biosynthetically Related Compounds: Asemone, 5,7-Dichloro-3-*O*-methylnorlichexanthone, 3-*O*-Methylthiophanic acid, Thiophanic acid, 4,5,7-Trichlorolichexanthone

Reference: Sundholm, EG 1979: Synthesis and ¹³C NMR Spectra of some 5-chloro substituted lichen xanthones.

Acta Chemica Scandinavica 33B: 475-482.

Notes: Pale yellow pigment. Occurs in *Lecidella asema*

6-*O*-Methylasemone [4,5,7-Trichloro-6-*O*-methylnorlichexanthone]

A: 64 B: x B': 74 C: 49 E: 27 F: 39 G: x

HPLC: 49

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass Spectrum: 378, 376, 374, 340

Substance Class: Xanthones

Biosynthetically Related Compounds: Asemone, 6-*O*-Methylthiophanic acid, Thiophanic acid, 4,5,7-Trichlorolichexanthone

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. Bryologist 95: 52-64.

Notes: Pale yellow pigment. Occurs in *Pertusaria pycnothelia*

2'-*O*-Methylatranorin

A: 73 B: 53 B': 51 C: 72 E: 43 F: x G: x

HPLC: x

V: - UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Yellow C: No Result KC: PD: Yellow

Mass Spectrum: 388, 210, 179, 178

Substance Class: β-Orcinol Depsides

Biosynthetically Related Compounds: Atranorin

Reference: Culberson, CF/ Culberson, WL 1978: β -Orcinol derivatives in lichens: biogenetic evidence from *Oropogon loxensis*. *Experimental Mycology* 2: 245-247.

Notes: LW UV: orange, pale yellow halo. Occurs in *Oropogon loxensis*

6-O-Methylaverantin

A: x B: x B': x C: x E: x F: x G: x

HPLC: x TLC: Rf 74 [benzene/ethyl formate/formic acid, 80/20/1]

V: + UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 368, 339, 325, 311

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Averythrin, 6-O-Methylaverythrin, Norsolorinic acid, Solorinic acid

Reference: Steglich, W/ Jedtke, K-F 1976: Neue Anthachinonfarbstoffe aus *Solorina crocea*. *Zeitschrift für Naturforschung* 31C: 197-198.

Notes: Yellow-orange pigment. Occurs in *Solorina crocea*

6-O-Methylaverythrin

A: 62 B: x B': 61 C: 49 E: 31 F: x G: x

HPLC: 57 TLC: Rf 74 [benzene/ethyl formate/formic acid, 80/20/1]

V: + UV: +

Acid Spray: P.Red LW UV: Pink

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 368, 353, 339, 325

Substance Class: Anthraquinones

Biosynthetically Related Compounds: : Averythrin, 6-O-Methylaverantin, Norsolorinic acid, Solorinic acid

Reference: Ebizuka, Y/ Sankawa, U/ Shibata, S 1970: The constituents of *Solorina crocea*: averythrin 6-monomethyl ether and methyl gyrophorate. *Phytochemistry* 9: 2061-2063.

Notes: Red-orange pigment. Occurs in *Solorina crocea*

Methyl barbatate

A: 77 B: x B': 73 C: 86 E: 61 F: x G: x

HPLC: 47

V: - UV: +

Acid Spray: P.Yellow LW UV: P.Yellow

Archers: x

K: No Result C: No Result KC: Yellow PD: No Result

Mass Spectrum: 374, 196, 179, 178

HPLC: 32

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 380, 201, 200, 199

Substance Class: Orcinol β -Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*-Demethylbarbatic acid, Methyl barbatate, Methyl 5-chloro-4-*O*-demethylbarbatate, Methyl 4-*O*-demethylbarbatate, Methyl eriodermate

Reference: Elix, JA/ Chester, DO/ Gaul, KL/ Parker, JL/ Wardlaw, JH 1989: The identification of further lichen β -orcinol *para*-depsides. Australian Journal of Chemistry 42: 1191-1199.

Notes: Acid Spray: pale yellow, grey halo. LW UV: strong-purple, green halo. Occurs in a chemotype of *Erioderma pycnidiferum*

2-*O*-Methylconfluentic acid

A: 43 B: x B': 25 C: 44 E: x F: x G: x

HPLC: 28

V: – UV: +

Acid Spray: P.Yellow LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 276, 247, 238

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Confluentic acid, 2-*O*-Methylperlatolic acid, Planaic acid

Reference: Huneck, S/ Schreiber, K 1974: 2-*O*-Methylconfluentinsäure: ein neues Depsid aus *Lecidea fuscoatra*. Phytochemistry 13: 221-224.

Notes: Acid Spray: strong yellow, grey halo. Occurs in an *Lecidea fuscoatra*

3-*O*-Methylconsalazinic acid [Cryptoconstictic acid]

A: 1 B: 1 B': 1 C: 1 E: x F: x G: 6

HPLC: 0

V: – UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Consalazinic acid, Constictic acid, Stictic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A1981: A standardized TLC analysis of β -orcinol depsidones. Bryologist 84: 16-29 [as unknown Pcr-3].

Notes: Minor component in *Parmotrema crinitum*

8'-Methylconstictic acid [Methyl pseudoconstictate]

A: x B: x B': x C: x E: x F: x G: x

HPLC: x

V: - UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Yellow C: No Result KC: PD: Orange

Mass spectrum: 370, 342

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Connorstictic acid, Constictic acid, Cryptostictic acid, Menegazziaic acid, Methyl stictic acid, Norstictic acid, Stictic acid

Reference: Papadopoulou, P/ Tzakou, O/ Vagias, C/ Kefalas, P/ Roussis, V 2007: β -Orcinol Metabolites from the lichen *Hypotrachyna revoluta*. *Molecules* 12: 997-1005.

Notes: reported to occur in *Hypotrachyna revoluta* [but probably a misdetermination of *Parmotrema perlatum*]

6-Methylcristazarin [2-Ethyl-3,5,8-trihydroxy-6-methoxy-7-methylnaphtho-1,4-quinone]

A: 44 B: x B': 50 C: 35 E: 4 F: x G: x

HPLC: x

V: + UV: +

Acid Spray: Purple LW UV: Magenta

Archers: x

K: Red C: No Result KC: PD: No Result

Mass Spectrum: 278, 263

Substance Class: Naphthaquinones

Biosynthetically Related Compounds: Boryquinone, Cristazarin, Norcristazarin

Reference: Yamamoto, Y/ Matsubara, H/ Kinoshita, Y/ Kinoshita, K/ Koyama, K/ Takahashi, K/ Ahmadjian, V/ Kurokawa, T/ Yoshimura, I 1996: Naphthazarin derivatives from cultures of the lichen *Cladonia cristatella*.

Phytochemistry 43: 1239.

Notes: Purple pigment. Occurs in cultures of *Cladonia cristatella*

4'-O-Methylcryptochlorophaeic acid

A: 32 B: x B': 18 C: 27 E: x F: x G: x

HPLC: 26

V: - UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: No Result KC: x PD: No Result

Mass Spectrum: -1, 254, 238, 210

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Cryptochlorophaeic acid, 2,4'-Di-*O*-methylnorsekikaic acid, 4'-*O*-Methylnorhomosekikaic acid, 4'-*O*-Methylnorsekikaic acid, 4'-*O*-Methylpaludosic acid

Reference: Elix, JA/ Wardlaw, JH 1986: The synthesis of new *meta*-depsides from *Ramalina* lichens. Australian Journal of Chemistry 39: 227-231.

Notes: Acid Spray: pale orange. LW UV: strong-purple, green halo. Occurs in *Ramalina asahinae*

4-*O*-Methylcryptochlorophaeic acid

A: 54 B: x B': 56 C: 66 E: x F: x G: x

HPLC: 32

V: - UV: +

Acid Spray: Pink LW UV: Brown

Archers: Red-brown

K: No Result C: No Result KC: x PD: No Result

Mass Spectrum: -1, 252, 235, 222

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Cryptochlorophaeic acid, Homosekikaic acid, Merochlorophaeic acid, Paludosic acid

Reference: Culberson, CF/ Kristinsson, H 1969: Studies on the *Cladonia chlorophaea* group.: a new species, a new *meta*-depside, and the identity of 'novochlorophaeic acid'. Bryologist 72: 431-442.

Notes: Occurs in *Cladonia merochlorophaea*

Methyl 4-*O*-demethylbarbatate

A: 59 B: 57 B': 59 C: 47 E: 43 F: x G: x

HPLC: 31

V: - UV: +

Acid Spray: Yellow LW UV: P.Yellow

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 360, 196, 195, 165

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Atranorin, 4-*O*-Demethylbarbatic acid, Methyl barbatate, Methyl 5-chloro-4-*O*-demethylbarbatate, Methyl 3 α -hydroxy-4-*O*-demethylbarbatate

Reference: Culberson, CF/ Culberson, WL 1978: β -Orcinol derivatives in lichens: biogenetic evidence from *Oropogon loxensis*. Experimental Mycology 2: 245-247.

Notes: Acid Spray: yellow, grey halo. LW UV: strong-purple, grey halo. Occurs in an *Oropogon loxensis*

Methyl 2'-*O*-demethylpsoromate

A: 52 B: x B': 44 C: 42 E: 15 F: x G: x

HPLC: 39

V: - UV: +

Acid Spray: Brown

LW UV: Brown

Archers: x

K: No Result C: No Result KC: No Result PD: P.Yellow

Mass spectrum: 358

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Psoromic acid, 2'-O-Demethylpsoromic acid, Methyl psoromate

Reference: Elix, JA/ Wardlaw, JH/ Archer, AW/Lumbsch, HT/ Plümper, M 1997: Four new lichen depsidones from *Pertusaria* and *Lecanora* lichens. *Australasian Lichenology* 41: 22-27.

Notes: Minor component in *Lecanora intumescens*

Methyl 3,4-dicarboxy-3-hydroxy-19-oxoeicosanoate

A: 10 B: x B': x C: x E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: No Result LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 408, 377, 350, 323

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Caperatic acid, Norcaperatic acid

Reference: Keogh, MF/ Duran, I 1977: A new fatty acid from *Usnea meridensis*. *Phytochemistry* 16: 1605-1606.

Notes: Best seen on wet plate after spraying but before charring. Occurs in *Usnea meridensis*

Methyl 3,5-dichlorolecanorate [Tumidulin]

A: 67 B: 62 B': 57 C: 58 E: 21 F: x G: x

HPLC: 24

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 404, 402, 400, 370

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 3,5-Dichlorolecanoric acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 123. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 269.

Notes: Acid Spray: yellow, grey halo. Occurs in *Ramalina timidula*

Methyl 2,7-dichloronorpsoromate [Methyl 5,1'-dichloronorpsoromate]

A: 55 B: 47 B': x C: 50 E: 17 F: x G: x

HPLC: 22

V: – UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: P.Yellow

Mass Spectrum: 430, 428, 426, 393

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Methyl 2,7-dichloropsoromate, Methyl psoromate

Reference: Elix, JA/ Venables, DA/ Brako, L 1990: New chlorine-containing depsidones from the lichen *Phyllopsora corallina* var. *ochroxantha*. Australian Journal of Chemistry 43: 1953-1959.

Notes: Occurs in *Phyllopsora swinscowii*

Methyl 2,7-dichloropsoromate [Methyl 5,1'-dichloropsoromate]

A: 73 B: x B': 60 C: 78 E: 27 F: x G: x

HPLC: 32

V: – UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: P.Yellow

Mass Spectrum: 444, 442, 440, 414

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Methyl 2,7-dichloronorporsoromate, Methyl psoromate

Reference: Elix, JA/ Venables, DA/ Brako, L 1990: New chlorine-containing depsidones from the lichen *Phyllopsora corallina* var. *ochroxantha*. Australian Journal of Chemistry 43: 1953-1959.

Notes: Occurs in *Phyllopsora swinscowii*

Methyl 2,2'-di-O-methyldivaricatatate

A: 64 B: x B': 42 C: 64 E: 50 F: x G: x

HPLC: 27

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 430, 208, 207

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2-O-Methyldivaricatic acid, Methyl 2-O-methyldivaricatatate

Reference: Elix, JA/ Wardlaw, JH/ Archer, AW 1999: New depsides from *Pertusaria* lichens. Australasian Lichenology 44: 9-15.

Notes: Minor component in *Pertusaria oraraensis*

Methyl 2,2'-di-O-methyleriodermate

A: 63 B: x B': 47 C: 58 E: 35 F: x G: x

HPLC: 25

V: – UV: +

Acid Spray: P.Yellow LW UV: P.Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 436, 215, 214, 213

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Methyl barbatate, Methyl 5-chloro-4-*O*-demethylbarbatate, Methyl 5-chloronorobtusate, Methyl eriodermate, Methyl 2'-*O*-methyleriodermate, Methyl 2-*O*-methyleriodermate, Methyl 4-*O*-methyleriodermate

Reference: Elix, JA/ Mahadevan, I/ Wardlaw, JH/ Arvidsson, L/ Jørgensen, PM 1987: New depsides from *Erioderma* lichens. Australian Journal of Chemistry 40: 1581-1590.

Notes: Acid Spray: pale yellow, grey halo. LW UV: strong-purple, pale yellow halo. Minor component in *Erioderma pycnidiferum*

Methyl 2',2''-di-O-methylgyrophorate

A: 47 B: x B': 22 C: 32 E: 20 F: x G: x

HPLC: 28

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 360, 329, 196, 165

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Methyl gyrophorate, Tenuiorin, Methyl ovoate, 2''-*O*-Methyltenuiorin, 2'-*O*-Methyltenuiorin, 2',2''-Di-*O*-Methyltenuiorin, Methyl 2''-*O*-methylgyrophorate

Reference: Elix, JA/ McCaffery, LF 1999: Three new tridepsides in the lichen *Pseudocyphellaria billardieri*. Australasian Lichenology 45: 12-14.

Notes: Minor component in *Pseudocyphellaria billardierei*

Methyl 2,2'-di-O-methylstenosporate

A: 66 B: x B': 44 C: 66 E: 50 F: x G: x

HPLC: 36

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 458, 208, 207

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2,2'-Di-*O*-methylstenosporic acid, 2,2'-Di-*O*-methyldivaricatic acid, Planaic acid, 2'-*O*-methylstenosporic acid

Reference: Elix, JA/ Wardlaw, JH/ Archer, AW 1999: New depsides from *Pertusaria* lichens. Australasian Lichenology 44: 9-15.

Notes: Minor component in *Pertusaria subplanaica*

2'-*O*-Methyldivaricatic acid

A: 45 B: x B': 48 C: 50 E: x F: x G: x

HPLC: 28

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 210, 194, 193, 192

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2,2'-Di-*O*-methyldivaricatic acid, 2'-*O*-Methylstenosporic acid

Reference: Elix, JA/ Barclay, CE/ Archer, AW 1995: New depsides in *Pertusaria* lichens (Pertusariaceae, lichenized Ascomycotina) and a new species from Australia. pp 15-26 in "Flechten Follmann", Geobotanical and Phytotaxonomical Study Group, University of Cologne, Germany.

Notes: Occurs in *Pertusaria velloziae*

2-*O*-Methyldivaricatic acid

A: 44 B: 52 B': 51 C: 47 E: x F: x G: x

HPLC: 28

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 224, 208, 207

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Divaricatic acid, 2-*O*-Methylperlatolic acid, 2-*O*-Methylstenosporic acid

Reference: Culberson, WL/ Culberson, CF 1981: A new *Ramalina* with two new depsides. Occasional Papers of the Farlow Herbarium 16: 37-41.

Notes: Acid Spray: strong yellow, grey halo. LW UV: strong purple, green halo. SW UV: bright blue.

Occurs in *Ramalina sayreana*

3-*O*-Methyldiploicin [4-*O*-Methyldiploicin]

A: 84 B: x B': 85 C: 90 E: 68 F: x G: x

HPLC: 59

V: – UV: +

Acid Spray: No Result LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 440, 438, 436, 403

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Caloploicin, Diploicin, 3-Dechloro-4-*O*-methylploploicin

Reference: Spillane, PA/ Keane, J/ Nolan, TJ 1936: The chemical constituents of lichens found in Ireland.

Buellia canescens – Part 2. Scientific Proceedings of the Royal Dublin Society 21: 333-343.

Notes: LW UV: strong-dark purple. Best seen under SW UV before spraying. Occurs in *Diploicia canescens* ssp. *australasica*

(-)-2-Methylene-3(R)-carboxy-18(R)-hydroxynonadecanoic acid [α -(15-Hydroxyhexadecyl)itaconic acid, apinnatic acid]

A: 27 B: x B': x C: 33 E: x F: x G: x

HPLC: 32

V: – UV: –

Acid Spray: Brown or No Result LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 337, 334, 308, 290

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Murolic acid

Reference: Keogh, MF/ Zurita, ME 1977: α -(15-Hydroxyhexadecyl)itaconic acid from *Usnea aliphatica*.

Phytochemistry 16: 134-135.

Notes: Occurs in *Parmotrema xanthinum*, *Hypogymnia apinnata*, *Usnea aliphatica*

Methyl eriodermate

A: 69 B: x B': 71 C: 77 E: 57 F: x G: x

HPLC: 39

V: – UV: +

Acid Spray: Grey LW UV: P.Yellow

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 408, 210, 201, 200

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Methyl barbatate, Methyl 5-chloro-4-*O*-demethylbarbatate, Methyl 5-chloronorobtusate, Methyl 2,2'-di-*O*-methyleriodermate, Methyl 2'-*O*-methyleriodermate, Methyl 2-*O*-methyleriodermate, Methyl 4-*O*-methyleriodermate

Reference: Elix, JA/ Mahadevan, I/ Wardlaw, JH/ Arvidsson, L/ Jørgensen, PM 1987: New depsides from *Erioderma* lichens. Australian Journal of Chemistry 40: 1581-1590.

Notes: Acid Spray: pale yellow-orange, grey halo. Minor component in *Erioderma pycnidiferum*

Methyl evernate

A: 71 B: x B': 64 C: 76 E: 52 F: x G: x

HPLC: 16

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 346, 182, 165, 150

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Evernic acid, Lecanoric acid, Methyl gyrophorate, Methyl lecanorate, Tenuiorin

Reference: Maass, WSG 1975: The phenolic constituents of *Peltigera apthosa*. Phytochemistry 14: 2487-2489.

Notes: Acid Spray: blue-grey fades to yellow. Minor component in *Peltigera apthosa*

2'-O-Methylevernic acid

A: 38 B: x B': 33 C: 43 E: x F: x G: x

HPLC: x

V: – UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 302, 182, 165

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Evernic acid, 4,2"-Di-O-methylgyrophoric acid, Lecanoric acid

Reference: Nicollier, G/ Rebetez, M/ Tabacchi, R 1979: Identification et synthèse de nouveaux depsides isolés de la mousse de chêne. Helvetica Chimica Acta 62: 711-717.

Notes: Acid Spray: pale orange, grey halo. Minor component in *Evernia prunastri*

Methyl everninate [Methyl 4-O-methylorsellinate]

A: 70 B: 70 B': x C: 74 E: 50 F: x G: x

HPLC: 8

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 196, 165, 164, 136

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: Ethyl everminate, Evernic acid, Evernic acid

Reference: González, AG / Barrera, JB / Marante, FJT/ Costellanto, AG 2002: The chemistry and allelopathic effects of phenolic compounds from the lichen *Evernia prunastri* (L.) Ach. Proceedings of the Phytochemical Society of Europe 47: 195-210.

Notes: Possibly an artefact. Reported to occur in *Evernia prunastri*

2-O-Methylglomelliferic acid

A: 42 B: x B': 42 C: 52 E: x F: x G: x

HPLC: x

V: – UV: +

Acid Spray: Yellow LW UV: Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Glomelliferic acid, 2-O-Methylperlatolic acid, 2-O-Methylstenosporic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1990: The *Ramalina americana* complex (Ascomycotina, Ramalinaceae): chemical and geographical correlations. Bryologist 93: 167-186.

Notes: Occurs in *Ramalina americana* s. lat.

Methyl gyrophorate

A: 52 B: 44 B': 42 C: 43 E: 17 F: x G: x

HPLC: 30

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: Orange

K: No Result C: P.Red KC: PD: No Result

Mass Spectrum: -1, 332, 182, 151

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid, 4-O-Methylgyrophoric acid, Methyl lecanorate, Tenuiorin

Reference: Ebizuka, Y/ Sankawa, U/ Shibata, S 1970: The constituents of *Solorina crocea*: averythrin 6-monomethyl ether and methyl gyrophorate. Phytochemistry 9: 2061-2063.

Notes: Acid Spray: yellow, grey halo. Occurs in *Solorina crocea*

2''-O-Methylgyrophoric acid

A: 25 B: x B': 33 C: 22 E: x F: x G: x

HPLC: 22

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: Orange

K: No Result C: P.Red KC: PD: No Result

Mass spectrum: -1, 348, 182, 165

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Umbilicic acid, Lecanoric acid

Reference: Elix, JA/ Barbero, M/Giralt, M/Lumbsch, HT/ McCaffery, LF 1995: 2''-O-Methylgyrophoric acid, a new lichen tridepside. Australian Journal of Chemistry 48: 1761-1765.

Notes: Occurs in *Diploschistes gyrophoricus*, *Rinodina alba*

4-O-Methylgyrophoric acid

A: 32 B: 56 B': 50 C: 46 E: x F: x G: x

HPLC: 34

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: P.Red KC: PD: No Result

Mass Spectrum: -1, 182, 168, 164

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: 2,4-Di-O-methylgyrophoric acid, Gyrophoric acid, Lecanoric acid, Methyl gyrophorate, Methyl lecanorate, Tenuiorin

Reference: Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 306.

Notes: Acid Spray: strong yellow, grey halo. Occurs in *Lobaria dissecta*

Methyl haematommate

A: 78 B: x B': 85 C: 77 E: 85 F: x G: x

HPLC: 23

V: – UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Yellow C: No result KC: PD: Yellow

Mass Spectrum: 210, 179, 178

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: Atranorin, Haematommic acid

Reference: Hickey, BJ/ Lumsden, AJ/ Cole, ALJ/ Walker, JRL 1990: Antibiotic compounds from New Zealand plants: methyl haematommate, an anti-fungal agent from *Stereocaulon ramulosum*. New Zealand Natural Sciences 17: 49-53.

Notes: Possibly an artefact, described from *Stereocaulon ramulosum*

O-Methylhaematommone

A: 41 B: x B': 36 C: 20 E: 6 F: x G: x

HPLC: 43

V: + UV: +

Acid Spray: Yellow-green LW UV: Pink

Archers: x

K: Violet C: No result KC: PD: No Result

Mass Spectrum: 328, 213

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Haematommone

Reference: new report

Notes: Orange pigment. Occurs in *Ramboldia aurea*

2'-O-Methylhiassic acid

A: 10 B: x B': 28 C: 12 E: x F: x G: x

HPLC: 18

V: - UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: -1, 255, 199, 165

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid, Hiassic acid

Reference: Elix, JA/ Wardlaw, JH 2001: 2'-O-Methylhiassic acid, a tridepside from the lichen *Melanelia pseudoglabra*. Australasian Lichenology 48: 6-9.

Notes: Minor component in *Melanelia pseudoglabra*

2-O-Methylhiassic acid

A: 11 B: x B': 20 C: 8 E: x F: x G: 39

HPLC: 17

V: - UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 413, 383, 196, 168

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid, Hiassic acid, Umbilicic acid

Reference: Elix, JA/ Jayanthi, VK/ Wardlaw, JH 1989: 2-O-Methylhiassic acid, a new tridepside in the lichen *Parmelinopsis neodamaziana*. Australian Journal of Chemistry 42: 1423-1426.

Notes: Acid Spray: pale orange, grey halo. Minor component in *Hypotrachyna neodamaziana*

4-*O*-Methylhiassic acid

A: 26 B: 26 B': 19 C: 35 E: x F: x G: x

HPLC: 19

V: – UV: +

Acid Spray: B.Blue LW UV: Green

Archers: x

K: No Result C: P.Red KC: Red PD: No Result

Mass Spectrum: -1, 198, 196, 180

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: 4,5-Di-*O*-methylhiassic acid, Gyrophoric acid, Hiassic acid, Lecanoric acid, 5-*O*-Methylhiassic acid, 2,4,5-Tri-*O*-methylhiassic acid

Reference: Elix, JA/ Yu, J/ Tønsberg, T 1991: 4-*O*-Methylhiassic acid and 5-*O*-acetyl-4-*O*-methylhiassic acid, two new lichen tridepsides. Australian Journal of Chemistry 44: 157-163.

Notes: Acid Spray: pale bright blue initially; fades to pale yellow, grey halo. Minor component in *Hypotrachyna schindleri*

5-*O*-Methylhiassic acid

A: 21 B: 35 B': 36 C: 29 E: x F: x G: x

HPLC: 24

V: – UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: -1, 348, 318, 198

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: 4,5-Di-*O*-methylhiassic acid, Gyrophoric acid, Hiassic acid, Lecanoric acid, 4-*O*-Methylhiassic acid, 2,4,5-Tri-*O*-methylhiassic acid

Reference: Elix, JA/ Jayanthi, VK 1977: 5-*O*-Methylhiassic acid, a new tridepside from Australian lichens. Australian Journal of Chemistry 30: 2695-2704.

Notes: Acid Spray: pale orange, grey halo. Occurs in *Hypotrachyna horrescens*

Methyl 3 α -hydroxy-4-*O*-demethylbarbatate [Methyl 8-hydroxy-4-*O*-demethylbarbatate]

A: 46 B: 36 B': 35 C: 35 E: x F: x G: x

HPLC: 27

V: – UV: +

Acid Spray: Orange LW UV: Yellow

Archers: Orange

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 376, 243, 196, 164

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Atranorin, 3 α -Hydroxy-4-*O*-demethylbarbatatic acid, Methyl barbatate, Methyl 4-*O*-demethylbarbatate,

Reference: Culberson, CF/ Culberson, WL 1978: β -Orcinol derivatives in lichens: biogenetic evidence from *Oropogon loxensis*. *Experimental Mycology* 2: 245-247.

Notes: Occurs in *Oropogon loxensis*

Methyl 3 α -hydroxybarbatate [Methyl 8-hydroxybarbatate]

A: 63 B: x B': 38 C: 47 E: x F: x G: x

HPLC: 31

V: – UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: Orange PD: No Result

Mass Spectrum: -1, 372, 196, 195

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Atranorin, Elatinic acid, Methyl barbatate, Methyl 4-*O*-demethylbarbatate, Methyl 3 α -hydroxy-4-*O*-demethylbarbatate

Reference: Elix, JA/ Mahadevan, I/ Wardlaw, JH/ Arvidsson, L/ Jørgensen, PM 1987: New depsides from *Erioderma* lichens. *Australian Journal of Chemistry* 40: 1581-1590.

Notes: Occurs in an *Erioderma pycnidiferum*

2'-*O*-Methylhyperlatolic acid

A: 59 B: x B': 62 C: 55 E: x F: x G: x

HPLC: 44

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 266, 183, 182

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2'-*O*-Methylisohyperlatolic acid, 2'-*O*-Methylperlatolic acid, 2'-*O*-Methylstenosporic acid, 2'-*O*-Methylsuperlatolic acid

Reference: Culberson, CF/ Culberson, WL/ Gowan, S/ Johnson, A 1987: New depsides from lichens: microchemical methodologies applied to the study of new natural products discovered in herbarium specimens. *American Journal of Botany* 74: 403-414.

Notes: Occurs in *Lecanora helva*, *L. pseudistera*

2-*O*-Methylhyperlatolic acid

A: 45 B: x B': 58 C: 63 E: x F: x G: x

HPLC: 45

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 235, 91

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2-*O*-Methylisohyperlatolic acid, 2-*O*-Methylperlatolic acid, 2-*O*-Methylstenosporic acid, 2-*O*-Methylsuperlatolic acid

Reference: Elix, JA/ Barclay, CE/ Archer, AW 1995: New depsides in *Pertusaria* lichens (Pertusariaceae, lichenized Ascomycotina) and a new species from Australia. pp 15-26 in "Flechten Follmann", Geobotanical and Phytotaxonomical Study Group, University of Cologne, Germany.

Notes: Occurs in *Pertusaria follmanniana*

4-*O*-Methylhyperolivivetic acid

A: 50 B: x B': 53 C: 58 E: x F: x G: x

HPLC: 34

V: – UV: +

Acid Spray: Yellow LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*-Methylolivivetic acid, 4-*O*-Methylsuperolivivetic acid, Olivivetic acid

References: Culberson, CF/ Culberson, WL/ Gowan, S/ Johnson, A 1987: New depsides from lichens: microchemical methodologies applied to the study of new natural products discovered in herbarium specimens. *American Journal of Botany* 74: 403-414. Elix, JA/ Wardlaw, JH 1997: Synthesis of further β -ketoalkyl lichen depsides. *Australian Journal of Chemistry* 50: 479-486.

Notes: Occurs in *Pseudobaeomyces pachycarpus*

2'-*O*-Methylhyperphyllinic acid [2'-*O*-Methylhyperphyllinic acid B]

A: 46 B: x B': 33 C: 41 E: x F: x G: x

HPLC: 31

V: – UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 291, 290, 206, 165

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Glaucophaeic acid, 2'-*O*-Methylmicrophyllinic acid, 2'-*O*-Methylsuperphyllinic acid

References: Culberson, CF/ Culberson, WL/ Gowan, S/ Johnson, A 1987: New depsides from lichens: microchemical methodologies applied to the study of new natural products discovered in herbarium specimens. *American Journal of Botany* 74: 403-414. Elix, JA/ Wardlaw, JH 1997: Synthesis of further β -ketoalkyl lichen depsides. *Australian Journal of Chemistry* 50: 479-486.

Notes: Occurs in *Pseudobaeomyces pachycarpus*

Methyl Hyperplaniate

A: 72 B: x B': 49 C: 72 E: 55 F: x G: x

HPLC: 50

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 514, 236, 235

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Planaic acid, Isohyperplanaic acid, Methyl planaiate, Methyl isohyperplanaiate, Hyperplanaic acid

Reference: Elix, JA/ Wardlaw, JH/Archer, AW 1999: New depsides from *Pertusaria* lichens. *Australasian Lichenology* 44: 9-15.

Notes: Occurs in *Pertusaria manamensis*

4-O-Methylhypophysciosporin

A: 72 B: x B': 67 C: 76 E: 49 F: x G: x

HPLC: 55

V: - UV: +

Acid Spray: Grey LW UV: D.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 408, 406, 376, 374

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Argopsin, Hypophysciosporin, Isovicanicin, Methyl virensate, Norvicanicin, Physciosporin, Vicanicin

Reference: Hamat, ALB/ Samsudin, MWB/ Din, LB/ Elix, JA 1993: Two new depsidones from the lichen *Erioderma phaeorhizum* Vainio *sensu lato*. *Australian Journal of Chemistry* 46: 153-156.

Notes: Occurs in *Erioderma phaeorhizum*

4-O-Methylhypoprotocetraric acid

A: 35 B: 58 B': 51 C: 45 E: x F: x G: 61

HPLC: 28

V: – UV: +

Acid Spray: Grey LW UV: D.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 358, 340, 314, 179

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Hypoconstictic acid, Hypoprotocetraric acid, Hypostictic acid, Isonotatic acid, Notatic acid, Subnotatic acid

Reference: Cresp, TM/ Elix, JA/ Kurokawa, S/ Sargent, MV 1972: The structure of two new depsidones from the lichen *Parmelia notata*. Australian Journal of Chemistry 25: 2167-2184.

Notes: Occurs in *Xanthoparmelia notata*

1'-Methyl Hypothamnolate

A: 28 B: x B': 20 C: 33 E: x F: x G: x

HPLC: 25

V: – UV: +

Acid Spray: Brown LW UV: Brown

Archers: x

K: Purple C: P.Red KC: PD: No Result

Mass spectrum: -1, 377, 362, 223

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Hypothamnolic acid, Thamnolic acid

Reference: Elix, JA/ Wardlaw, JH/Archer, AW 2002: 1'-Methyl hypothamnolate, a new β -orcinol *meta*-depside from a chemical race of the lichen *Pertusaria tropica* (Ascomycotina, Pertusariaceae). Mitteilungen aus dem Institut für Allgemeine Botanik Hamburg 30-32: 35-40.

Notes: Minor component in *Pertusaria tropica*

2'-O-Methylimbricarinic acid

A: 46 B: x B': 50 C: 59 E: x F: x G: x

HPLC: 36

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 430, 238, 222, 221

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2'-O-Methylhyperlatolic acid, 2'-O-Methylisohyperlatolic acid, 2'-O-Methylperlatolic acid, 2'-O-Methylstenosporic acid, 2'-O-Methylsuperlatolic acid

Reference: Culberson, CF/ Culberson, WL/ Gowan, S/ Johnson, A 1987: New depsides from lichens: microchemical methodologies applied to the study of new natural products discovered in herbarium specimens. American Journal of Botany 74: 403-414.

Notes: Occurs in *Lecidella cf. cyanosarca*

4-O-Methylisocryptochlorophaeic acid

A: 43 B: x B': 54 C: 48 E: x F: x G: x

HPLC: 30

V: - UV: +

Acid Spray: Grey LW UV: Brown

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: -1, 252, 251, 236, 235

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Cryptochlorophaeic acid, 4'-O-Methylcryptochlorophaeic acid, 4-O-Methylcryptochlorophaeic acid, 4'-O-Methylnorcryptochlorophaeic acid

Reference: Elix, JA/ Barclay, CE/ David, F/ Griffin, FK/ Hill, AM/ McConnell, DB/ Wardlaw, JH 1993:

Synthesis of further lichen depsides. Australian Journal of Chemistry 46: 301-313.

Notes: Occurs in *Pertusaria paradoxica*

2'-O-Methylisohyperlatolic acid

A: 51 B: x B': 58 C: 63 E: x F: x G: x

HPLC: 44

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

Mass Spectrum: -1, 238, 221, 182

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2'-O-Methylhyperlatolic acid, 2'-O-Methylimbricaric acid, 2'-O-Methylperlatolic acid, 2'-O-Methylstenosporic acid, 2'-O-Methylsuperlatolic acid

Reference: Culberson, CF/ Culberson, WL/ Gowan, S/ Johnson, A 1987: New depsides from lichens: microchemical methodologies applied to the study of new natural products discovered in herbarium specimens. American Journal of Botany 74: 403-414.

Notes: Occurs in *Pseudobaeomyces pachycarpus*, *Lecanora austrosorediosa*, *L. pseudistera*

2-O-Methylisohyperlatolic acid

A: 44 B: x B': 63 C: 60 E: x F: x G: x

HPLC: 45

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

Mass Spectrum: -1, 264, 263, 91

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2-*O*-Methylhyperlatolic acid, 2-*O*-Methylperlatolic acid, 2-*O*-Methylstenosporic acid, 2-*O*-Methylsuperlatolic acid

Reference: Elix, JA/ Barclay, CE/ Archer, AW 1995: New depsides in *Pertusaria* lichens (Pertusariaceae, lichenized Ascomycotina) and a new species from Australia. pp 15-26 in "Flechten Follmann", Geobotanical and Phytotaxonomical Study Group, University of Cologne, Germany.

Notes: Occurs in *Pertusaria follmanniana*

2'-*O*-Methylisohyperphyllinic acid [2'-*O*-Methylhyperphyllinic acid A]

A: 42 B: x B': 27 C: 41 E: x F: x G: x

HPLC: 32

V: - UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 308, 206, 165

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Glaucophaeic acid, 2'-*O*-Methylhyperphyllinic acid, 2'-*O*-Methylmicrophyllinic acid, 2'-*O*-Methylsuperphyllinic acid

References: Culberson, CF/ Culberson, WL/ Gowan, S/ Johnson, A 1987: New depsides from lichens: microchemical methodologies applied to the study of new natural products discovered in herbarium specimens. American Journal of Botany 74: 403-414. Elix, JA/ Wardlaw, JH 1997: Synthesis of further β -ketoalkyl lichen depsides. Australian Journal of Chemistry 50: 479-486.

Notes: Occurs in *Pseudobaeomyces pachycarpus*

Methyl Isohyperplaniate

A: 74 B: x B': 51 C: 72 E: 58 F: x G: x

HPLC: 50

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 514, 264, 263

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Planaic acid, Hyperplanaic acid, Methyl hyperplaniate, Methyl planaite, Isohyperplanaic acid

Reference: Elix, JA/ Wardlaw, JH/ Archer, AW 1999: New depsides from *Pertusaria* lichens. Australasian Lichenology 44: 9-15.

Notes: Occurs in *Pertusaria manamensis*

Methyl isoplacodiolic acid

A: 50 B: x B': 55 C: 61 E: x F: x G: x

HPLC: 30

V: – UV: +

Acid Spray: Grey LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: Usnic acid derivatives

Biosynthetically Related Compounds: Isoplacodiolic acid, Isopseudoplacodiolic acid, Methyl placodiolic acid, Placodiolic acid, Pseudoplacodiolic acid

Reference: Staiger, B/ Kalb, K 1995: *Haematomma*-Studien. I. Die Flechtengattung *Haematomma*. Bibliotheca Lichenologica 59: 3-198.

Notes: Occurs in *Haematomma matogrossense*

2'-O-Methylisopseudocyphellarin A

A: 69 B: x B': 49 C: 65 E: 40 F: x G: x

HPLC: x

V: – UV: +

Acid Spray: P. Yellow LW UV: P. Brown

Archers: No Result

K: No Result C: Red KC: PD: Yellow

Cortex: Medulla:

Mass Spectrum: 416, 224, 194, 193

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Isopseudocyphellarin A, 2'-O-Methylphenarctin, 2'-O-Methylpseudocyphellarin A, Nephroarctin, Phenarctin, Pseudocyphellarin A, Pseudocyphellarin B

Reference: Elix, JA/ Wilkins, AL/ Wardlaw, JH 1987: Five new fully substituted depsides from the lichen *Pseudocyphellaria pickeringii*. Australian Journal of Chemistry 40: 2023-2029.

Notes: Acid Spray: pale green, fades to pale yellow, grey halo. LW UV: pale purple-brown, fades to orange.

Occurs in *Pseudocyphellaria pickeringii*

Methyl lecanorate

A: 52 B: x B': 48 C: 39 E: 30 F: x G: x

HPLC: 18

V: – UV: +

Acid Spray: P. Yellow LW UV: Green

Archers: No Result

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 332, 182, 150, 122

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Lecanoric acid, Methyl gyrophorate, Methyl orsellinate, Tenuiorin

Reference: Maass, WSG 1975: Lichen substances. V. Methylated derivatives of orsellinic acid, lecanoric acid, and gyrophoric acid from *Pseudocyphellaria crocata*. Canadian Journal of Botany 53: 1031-1039.

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Pseudocyphellaria crocata*

2'-O-Methyllecanoric acid

A: 26 B: x B': 24 C: 20 E: x F: x G: x

HPLC: 10

V: - UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: -1, 331, 210, 182

Substance Class: Orcinol depsides

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid, Ovoic acid, 2-O-Methyllecanoric acid

Reference: Elix, JA/ McCaffery, LF 2004: 2'-O-Methyllecanoric acid and 2-O-methyllecanoric acid, two new depsides from *Hypotrachyna everniiformis*. Australasian Lichenology 54: 4-7.

Notes: Minor component in *Hypotrachyna everniiformis*

2-O-Methyllecanoric acid

A: 23 B: x B': 30 C: 18 E: x F: x G: x

HPLC: 12

V: - UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 332, 182, 168, 165

Substance Class: Orcinol depsides

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid, Ovoic acid, 2'-O-Methyllecanoric acid

Reference: Elix, JA/ McCaffery, LF 2004: 2'-O-Methyllecanoric acid and 2-O-methyllecanoric acid, two new depsides from *Hypotrachyna everniiformis*. Australasian Lichenology 54: 4-7.

Notes: Minor component in *Hypotrachyna everniiformis*

4-O-Methylividic acid [3-O-Methylividic acid]

A: 41 B: x B': 46 C: 39 E: x F: x G: x

HPLC: 34

V: - UV: +

Acid Spray: P.Yellow

LW UV: Purple

Archers: x

K: No Result C: No Result KC: Red PD: No Result

Mass Spectrum: 470, 293, 292, 277

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Hydroxycolensoic acid, Lividic acid, Methoxycolensoic acid, 4-*O*-Methylphysodic acid, Oxyphysodic acid

Reference: Elix, JA/ Venables, DA 1993: 4-*O*-Methylividic acid, a new lichen depsidone. *Mycotaxon* 47: 275-281.

Notes: Occurs in *Hypotrachyna immaculata*

8'-Methylmenegazziaic acid [Methyl pseudomenegazziaiate]

A: x B: x B': x C: x E: x F: x G: x

HPLC: x

V: - UV: +

Acid Spray: Orange

LW UV: Orange

Archers: x

K: Yellow C: No Result KC: No Result PD: No Result

Mass spectrum: 370, 342

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Connorstictic acid, Constictic acid, Cryptostictic acid, Menegazziaic acid, Methyl stictic acid, Norstictic acid, Stictic acid

Reference: Papadopoulou, P/ Tzakou, O/ Vagias, C/ Kefalas, P/ Roussis, V 2007: β -Orcinol Metabolites from the lichen *Hypotrachyna revoluta*. *Molecules* 12: 997-1005.

Notes: reported to occur in *Hypotrachyna revoluta* [probably a misdetermination of *Parmotrema perlatum*]

Methyl 2-*O*-Methyldivaricate

A: 75 B: x B': 54 C: 70 E: 60 F: x G: x

HPLC: 28

V: - UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: Orange

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 416, 208, 207

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2-*O*-Methyldivaricatic acid, Methyl 2,2'-di-*O*-methyldivaricate

Reference: Elix, JA/ Wardlaw, JH/ Archer, AW 1999: New depsides from *Pertusaria* lichens. *Australasian Lichenology* 44: 9-15.

Notes: A minor component in *Pertusaria oraraensis*

Methyl 2-*O*-methyleriodermate

A: 66 B: x B': 61 C: 66 E: 46 F: x G: x

HPLC: 31

V: – UV: +

Acid Spray: Grey LW UV: Brown

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 422, 215, 214, 213

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Methyl barbatate, Methyl 5-chloro-4-*O*-demethylbarbatate, Methyl 5-chloronorobtusate, Methyl 2,2'-di-*O*-methyleriodermate, Methyl eriodermate, Methyl 2'-*O*-methyleriodermate, Methyl 4-*O*-methyleriodermate

Reference: Elix, JA/ Mahadevan, I/ Wardlaw, JH/ Arvidsson, L/ Jørgensen, PM 1987: New depsides from *Erioderma* lichens. Australian Journal of Chemistry 40: 1581-1590.

Notes: Acid Spray: pale blue-grey, fades to pale yellow. LW UV: purple-brown, fades to orange. Occurs in a chemotype of *Erioderma pycnidiferum*

Methyl 2'-*O*-methyleriodermate

A: 67 B: x B': 58 C: 65 E: 47 F: x G: x

HPLC: 30

V: – UV: +

Acid Spray: Grey LW UV: Brown

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 422, 225, 224, 201

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Methyl barbatate, Methyl 5-chloro-4-*O*-demethylbarbatate, Methyl 5-chloronorobtusate, Methyl 2,2'-di-*O*-methyleriodermate, Methyl eriodermate, Methyl 2-*O*-methyleriodermate, Methyl 4-*O*-methyleriodermate

Reference: Elix, JA/ Mahadevan, I/ Wardlaw, JH/ Arvidsson, L/ Jørgensen, PM 1987: New depsides from *Erioderma* lichens. Australian Journal of Chemistry 40: 1581-1590.

Notes: Acid Spray: pale blue-grey, fades to pale yellow. LW UV: purple-brown, fades to orange. Occurs in a chemotype of *Erioderma pycnidiferum*

Methyl 4-*O*-methyleriodermate

A: 77 B: x B': 78 C: 87 E: 71 F: x G: x

HPLC: 37

V: – UV: +

Acid Spray: Grey LW UV: P. Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 422, 215, 214, 213

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Methyl barbatate, Methyl 5-chloro-4-*O*-demethylbarbatate, Methyl 5-chloronorobtusate, Methyl 2,2'-*O*-methyleriodermate, Methyl eriodermate, Methyl 2-*O*-methyleriodermate, Methyl 2'-*O*-methyleriodermate

Reference: Elix, JA/ Mahadevan, I/ Wardlaw, JH/ Arvidsson, L/ Jørgensen, PM 1987: New depsides from *Erioderma* lichens. Australian Journal of Chemistry 40: 1581-1590.

Notes: Acid Spray: pale blue-grey, fades to pale yellow. LW UV: strong-purple, pale yellow halo. Occurs in a chemotype of *Erioderma pycnidiferum*

Methyl 2''-*O*-methylgyrophorate

A: 50 B: x B': 30 C: 35 E: 32 F: x G: x

HPLC: 29

V: – UV: +

Acid Spray: P. Yellow LW UV: Green

Archers: No Result

K: No Result C: Red KC: PD: No Result

Mass spectrum: 346, 256, 196, 165

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Methyl gyrophorate, Tenuiorin, Methyl ovoate, 2''-*O*-Methyltenuiorin, 2'-*O*-Methyltenuiorin, 2',2''-Di-*O*-Methyltenuiorin, Methyl 2',2''-di-*O*-methylgyrophorate

Reference: Elix, JA/ McCaffery, LF 1999: Three new tridepsides in the lichen *Pseudocyphellaria billardieri*. Australasian Lichenology 45: 12-14.

Notes: Minor component in *Pseudocyphellaria billardieri*

Methyl 3'-methyllecanorate [Methyl isonorobtusate]

A: 55 B: x B': 53 C: 40 E: 30 G: x

HPLC: x

V: – UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

Mass Spectrum: 346, 196, 164, 151

Substance Class: Orcinol β -Orcinol Depsides

Biosynthetically Related Compounds: Isonorobtusatic acid, Isoobtusatic acid, Norobtusatic acid, Obtusatic acid,

Reference: Nicollier, G/ Rebetz, M/ Tabacchi, R 1979: Identification et synthèse de nouveaux depsides isolés de la mousse de chêne. Helvetica Chimica Acta 62: 711-717.

Notes: Acid Spray: yellow, grey halo. LW UV: strong orange, green halo. Minor component in *Evernia prunastri*

Methyl 2'-*O*-methylmicrophyllinate

A: 68 B: x B': 42 C: 69 E: x F: x G: x

HPLC: x

V: - UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 294, 262, 206, 196

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2'-O-Methylhyperphyllinic acid, 2'-O-Methylmicrophyllinic acid, 2'-O-Methylsuperphyllinic acid

Reference: Gowan, SP 1989: A character analysis of the secondary products of the Porpidiaceae (lichenized Ascomycotina). Systematic Botany 14; 77-90.

Notes: Occurs in *Porpidia contraponenda*

Methyl 7-O-methylnorascomate

A: 70 B: x B': 55 C: 55 E: 60 F: x G: x

HPLC: 39

V: - UV: +

Acid Spray: B.Blue LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 300, 269, 268, 169

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Ascomatic acid, Methyl ascomatate, 7-O-Methylnorascomatic acid, Norascomatic acid

Reference: Elix, JA/ Venables, D/ Wedin, M 1994: 70. New dibenzofurans and depsides from the lichen *Bunodophoron patagonicum*. Australian Journal of Chemistry 47: 1335-1344.

Notes: Occurs in *Bunodophoron patagonicum*

Methyl 2-O-methylperlatolate

A: 76 B: x B': 60 C: 75 E: 68 F: x G: x

HPLC: 45

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: Orange

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 472, 236, 235

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2-O-Methylperlatolic acid, Planaic acid, Methyl planiate

Reference: Elix, JA/ Wardlaw, JH/ Archer, AW 1999: New depsides from *Pertusaria* lichens. Australasian Lichenology 44: 9-15.

Notes: Minor component in *Pertusaria xenismota*

2'-O-Methylmicrophyllinic acid

A: 41 B: 29 B': 19 C: 36 E: x F: x G: x

HPLC: 25

V: - UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 262, 236, 207

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Confluentic acid, Glaucophaeic acid, 2'-O-Methylhyperphyllinic acid, Methyl 2'-O-methylmicrophyllinate, 2'-O-Methylperlatolic acid, 2'-O-Methylsuperphyllinic acid

Reference: Chester, DO/ Elix, JA 1981: New metabolites from Australian lichens. Australian Journal of Chemistry 34: 1507-1511.

Notes: Acid Spray: pale orange, grey halo. Occurs in *Paraporpidia leptocarpa*

7-O-Methylnorascomatic acid

A: 39 B: x B': 63 C: 47 E: x F: x G: x

HPLC: 35

V: - UV: +

Acid Spray: B.Blue LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 286, 268, 243, 242

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Ascomatic acid, Methyl ascomatate, Methyl 7-O-Methylnorascomatate, Norascomatic acid

Reference: Elix, JA/ Venables, D/ Wedin, M 1994: 70. New dibenzofurans and depsides from the lichen *Bunodophoron patagonicum*. Australian Journal of Chemistry 47: 1335-1344.

Notes: Occurs in *Bunodophoron patagonicum*

2'-O-Methylnorbarbatic acid

A: 39 B: x B': 54 C: 36 E: x F: x G: 51

HPLC: x

V: - UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 360, 197, 196, 180

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Barbatic acid, 4-*O*-Demethylbarbatic acid, 4-*O*-Demethyldiffractaic acid, 2'-*O*-Methylnorobtusatic acid

Reference: Elix, JA/ Chester, DO/ Wardlaw, JH/ Wilkins, AL 1990: Synthesis of two new β -orcinol *para*-depsides in the lichen *Pseudocyphellaria norvegica*. Australian Journal of Chemistry 43: 191-196.

Notes: Minor component in *Pseudocyphellaria norvegica*.

4'-*O*-Methylnorcryptochlorophaeic acid

A: 36 B: x B': 48 C: 34 E: x F: x G: x

HPLC: 34

V: - UV: +

Acid Spray: P.Yellow

LW UV: P.Yellow

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: -1, 252, 210, 180

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Cryptochlorophaeic acid, 4'-*O*-Methylnorhomosekikaic acid, 4'-*O*-Methylnorsekikaic acid

Reference: Elix, JA/ Wardlaw, JH 1986: The synthesis of new *meta*-depsides from *Ramalina* lichens. Australian Journal of Chemistry 39: 227-231.

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Cladonia merochlorophaea*

2-*O*-Methylnordivaricatic acid

A: 28 B: x B': 33 C: 27 E: x F: x G: x

HPLC: x

V: - UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2-*O*-Methylnorstenosporic acid, Nordivaricatic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1990: The *Ramalina americana* complex (Ascomycotina, Ramalinaceae): chemical and geographical correlations. Bryologist 93: 167-186.

Notes: Occurs in *Ramalina americana* s. lat.

4'-*O*-Methylnorhomosekikaic acid

A: 39 B: x B': 46 C: 32 E: x F: x G: x

HPLC: 24

V: – UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: -1, 254, 236, 210

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Homosekikaic acid, 4'-O-Methylnorsekikaic acid, Sekikaic acid

Reference: Elix, JA/ Wardlaw, JH 1986: The synthesis of new *meta*-depsides from *Ramalina* lichens. Australian Journal of Chemistry 39: 227-231.

Notes: Occurs in *Ramalina luciae*

2'-O-Methylnorobtusatic acid

A: 27 B: x B': 48 C: 30 E: x F: x G: 48

HPLC: x

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 183, 182, 165, 164

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: 2'-O-Methylnorbarbatic acid, Norobtusatic acid, Obtusatic acid

Reference: Elix, JA/ Chester, DO/ Wardlaw, JH/ Wilkins, AL 1990: Synthesis of two new β -orcinol *para*-depsides in the lichen *Pseudocyphellaria norvegica*. Australian Journal of Chemistry 43: 191-196.

Notes: Minor component in *Pseudocyphellaria norvegica*.

4'-O-Methylnorsekikaic acid

A: 35 B: x B': 29 C: 27 E: x F: x G: x

HPLC: 20

V: – UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 404, 258, 226, 208

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Homosekikaic acid, 4'-O-Methylnorhomosekikaic acid, Sekikaic acid

Reference: Elix, JA/ Wardlaw, JH 1986: The synthesis of new *meta*-depsides from *Ramalina* lichens. Australian Journal of Chemistry 39: 227-231.

Notes: Acid Spray: pale orange, grey halo; fades to deep orange. LW UV: strong-purple, green halo.

Occurs in *Ramalina luciae*

2-O-Methylnorstenosporic acid

A: 34 B: x B': 43 C: 29 E: x F: x G: x

HPLC: 26

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 224, 210, 206, 193

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-O-Demethylstenosporic acid, 2-O-Methylnordivaricatic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1990: The *Ramalina americana* complex (Ascomycotina, Ramalinaceae): chemical and geographical correlations. Bryologist 93: 167-186.

Notes: Occurs in *Ramalina americana* s. lat.

2'-O-Methylnorsuperphyllinic acid

A: 34 B: x B': 43 C: 29 E: x F: x G: x

HPLC: 26

V: – UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: -1, 291, 290, 192, 164

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2'-O-Methylsuperphyllinic acid

References: Culberson, CF/ Johnson, A/ Patwardhan, PG/ Makhija, U 1990: New depsides in *Stirtonia ramosa* (Ascomycotina, Arthoniaceae). Bryologist 93: 279-282. Elix, JA/ Wardlaw, JH 1997: Synthesis of further β -ketoalkyl lichen depsides. Australian Journal of Chemistry 50: 479-486.

Notes: Occurs in *Sirtonia ramosa*

2-O-Methylobtusic acid

A: 42 B: 56 B': 52 C: 45 E: x F: x G: x

HPLC: 22

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 360, 193, 150

Substance Class: Orcinol β -Orcinol Depsides

Biosynthetically Related Compounds: Barbatic acid, Diffractaic acid, Obtusic acid

Reference: Chester, DO/ Elix, JA 1979: 2-*O*-Methylobtusic acid, a new depside from the lichen *Xanthoparmelia tucsonensis*. Australian Journal of Chemistry 32: 1399-1400.

Notes: Acid Spray: yellow, grey halo. LW UV: strong-purple, green halo. Occurs in *Xanthoparmelia tucsonensis*

4-*O*-Methylolivivetic acid

A: 44 B: 51 B': 49 C: 48 E: x F: x G: x

HPLC: 33

V: – UV: +

Acid Spray: P.Yellow

LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: Pink PD: No Result

Mass Spectrum: -1, 280, 262, 224

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*-Methylhyperolivivetic acid, 4-*O*-Methylsuperolivivetic acid, Microphyllinic acid, Olivivetic acid, Perlatolic acid

Reference: Culberson, CF/ Esslinger, TL 1976: 4-*O*-Methylolivivetic and loxodellic acids: new depsides from new species of brown Parmeliae. Bryologist 79: 42-46.

Notes: SW UV: fluoresces bright blue before spraying. Occurs in *Xanthoparmelia brattii*

Methyl orsellinate

A: 54 B: x B': 56 C: 37 E: 41 F: x G: x

HPLC: 5

V: – UV: +

: P.Yellow

LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Cortex: No Result Medulla: No Result

Mass Spectrum: 180, 150, 122

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid, Methyl gyrophorate, Methyl lecanorate, Orsellinic acid, Tenuiorin

Reference: Maass, WSG 1975: Lichen substances. V. Methylated derivatives of orsellinic acid, lecanoric acid, and gyrophoric acid from *Pseudocyphellaria crocata*. Canadian Journal of Botany 53: 1031-1039.

Notes: Acid Spray: pale yellow-orange, grey halo. Occurs in *Pseudocyphellaria crocata*

Methyl β -orsellinate [Methyl β -orcinolcarboxylate]

A: 64 B: 70 B': x C: 52 E: 51 F: x G: x

HPLC: 10

V: – UV: +

: P.Yellow

LW UV: Green

Archers: x

K: No Result

C: Orange

KC:

PD: No Result

Mass Spectrum: 196, 179, 164, 150

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: Atranorin, Chloroatranorin, Methyl 4-*O*-demethylbarbatate, Methyl eriodermate

Reference: Gavin, J/ Tabacchi, R 1975: Isolement et identification de composés phénoliques et monoterpéniques de la 'mousse de chêne' (*Evernia prunastri* (L.) Ach.). Helvetica Chimica Acta 58: 190-194.

Notes: Occurs in *Evernia prunastri*

Methyl Ovoate

A: 50 B: x B': 40 C: 35 E: 32 F: x G: x

HPLC: 29

V: -

UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: Orange

K: No Result

C: P.Red

KC:

PD: No Result

Mass spectrum: 346, 182, 165, 151

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Methyl gyrophorate, Tenuiorin, 2'-*O*-Methyltenuiorin, 2,2'-*Di-O*-methyltenuiorin, Ovoic acid, Methyl 2''-*O*-methylgyrophorate, Methyl 2',2''-*Di-O*-methylgyrophorate

Reference: Elix, JA/ McCaffery, LF 1999: Three new tridepsides in the lichen *Pseudocyphellaria billardieri*.

Australasian Lichenology 45: 12-14.

Notes: Minor component in *Pseudocyphellaria billardieri*

4-*O*-Methyloxocryptochlorophaeic acid

A: 46 B: x B': 41 C: 48 E: x F: x G: x

HPLC: 19

V: -

UV: +

Acid Spray: Orange

LW UV: Brown

Archers: x

K: No Result

C: P.Red

KC:

PD: No Result

Mass spectrum: x

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*-Methylcryptochlorophaeic acid, Merochlorophaeic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1990: A novel meta-depsides from the *Ramalina subfraxinea* complex (Ascomycotina, Ramalinaceae). Bryologist 93: 193-196.

Notes: Occurs in *Ramalina subfraxinea* sens. lat.

4'-O-Methylpaludosic acid

A: 35 B: 30 B': 30 C: 22 E: x F: x G: x

HPLC: 22

V: – UV: +

Acid Spray: Orange LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 254, 236, 210

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Boninic acid, 2,4'-Di-O-methylnorsekikaic acid, 4'-O-Methylcryptochlorophaeic acid, Paludosic acid

Reference: Chester, DO/ Elix, JA 1978: The identification of four new *meta*-depsides in the lichen *Ramalina asahinae*. Australian Journal of Chemistry 31: 2745-2749.

Notes: Acid Spray: pale orange, grey halo. LW UV: purple, green halo. Occurs in *Ramalina asahinae*

3-O-Methylpannaric acid

A: 10 B: x B': 14 C: 10 E: x F: x G: 28

HPLC: 5

V: – UV: +

Acid Spray: Purple LW UV: B.Blue

Archers: x

K: No Result C: Green KC: PD: No Result

Mass Spectrum: -1, 286, 268, 253

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Isoschizopeltic acid, Pannaric acid, Pannaric acid 2-methyl ester, Pannaric acid 6-methyl ester, Schizopeltic acid

Reference: Elix, JA/ Naidu, R/ Laundon, JR 1992: A synthesis of the lichen dibenzofuran pannaric acid 2-methyl ester and its isomer 3-O-methylpannaric acid. Australian Journal of Chemistry 45: 785-791.

Notes: Occurs in *Schizopelte californica*

1-O-Methylparietin

A: 60 B: x B': 36 C: 49 E: 28 F: x G: x

HPLC: 36

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass spectrum: 298, 280, 269, 252

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 1-O-Methylemodin, Parietin

Reference: Manojlovic, NT / Novakovic, M/ Stevovic, V/ Solujic, S 2005. Antimicrobial metabolites from three Serbian *Caloplaca*. *Pharmaceutical Biology* 43: 718-722.

Notes: Yellow-orange pigment. Acid Spray: Yellow when cold, magenta when hot. Occurs in *Protoblastenia lilacina*

8-O-Methylparietin

A: x B: x B': x C: x E: x F: x G: x

HPLC: 37

V: +

UV: +

Acid Spray: Yellow

LW UV: Yellow

Archers: x

K: Violet

C: No Result

KC:

PD: No Result

Mass spectrum: 298, 280, 269, 252

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 8-O-Methylemodin, Parietin

Reference: Manojlovic, NT / Novakovic, M/ Stevovic, V/ Solujic, S 2005. Antimicrobial metabolites from three Serbian *Caloplaca*. *Pharmaceutical Biology* 43: 718-722.

Notes: Yellow-orange pigment. Occurs in *Caloplaca sp.*

Methyl parietinate

A: 75 B: x B': 55 C: 72 E: 25 F: x G: x

HPLC: x

V: +

UV: +

Acid Spray: Orange

LW UV: Orange

Archers: x

K: Violet

C: No Result

KC:

PD: No Result

Mass Spectrum: 342

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Fallacinal, Parietin, Parietinic acid, Teloschistin

Reference: Søchting, U 2004: *Caloplaca kamezatica* and *C. obesimarginata* sp. nov., two new species of temperate, Pacific North America. *Symbolae Botanicae Uppsaliensis* 34: 399-403.

Notes: Orange pigment. Occurs in *Caloplaca obesimarginata*

2-O-Methylpatagonic acid

A: 38 B: x B': 33 C: 42 E: x F: x G: x

HPLC: 41

V: -

UV: +

Acid Spray: P. Yellow

LW UV: Green

Archers: x

K: No Result

C: No Result

KC: No Result

PD: No Result

Mass spectrum: -1, 277, 276, 193

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Patagonic acid, Isopatagonic acid

Reference: new report

Notes: Occurs in *Bunodophoron patagonicum*

2'-O-Methylperlatolic acid

A: 52 B: 50 B': 48 C: 53 E: x F: x G: x

HPLC: 39

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: Orange

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 238, 221, 182

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Confluentic acid, 2'-O-Methylhyperlatolic acid, 2'-O-Methylisohyperlatolic acid, 2'-O-Methylmicrophyllinic acid, 2'-O-Methylstenosporic acid, 2'-O-Methylsuperlatolic acid

Reference: Culberson, CF/ Dibben, MJ 1972: 2-O-Methylperlatolic and 2'-O-methylperlatolic acids: two new lichen depsides from *Pertusaria*. Bryologist 75: 362-365.

Notes: Acid Spray: strong-pale yellow, grey halo. LW UV: strong-purple, green halo. Occurs in *Pertusaria pertractata*

2-O-Methylperlatolic acid

A: 44 B: 60 B': 58 C: 52 E: x F: x G: x

HPLC: 42

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: Orange

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 252, 235, 224

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2-O-Methyldivaricatic acid, 2-O-Methylhyperlatolic acid, 2-O-Methylisohyperlatolic acid, 2-O-Methylstenosporic acid, 2-O-Methylsuperlatolic acid, Planaic acid

Reference: Culberson, CF/ Dibben, MJ 1972: 2-O-Methylperlatolic and 2'-O-methylperlatolic acids: two new lichen depsides from *Pertusaria*. Bryologist 75: 362-365.

Notes: Acid Spray: strong-pale yellow, grey halo. LW UV: strong-purple, green halo. SW UV bright blue.

Occurs in *Pertusaria gergeana* var. *georgeana*

2'-O-Methylphenarctin

Biosynthetically Related Compounds: Colensoic acid, Lividic acid, Oxyphysodic acid, Physodic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 138. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 340.

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Hypotrachyna livida*

Methyl placodiolic acid

A: 65 B: x B': 44 C: 50 E: x F: x G: x

HPLC: 26

V: – UV: +

Acid Spray: Grey LW UV: P.Brown

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Usnic acid derivatives

Biosynthetically Related Compounds: Isoplacodiolic acid, Isopseudoplacodiolic acid, Methyl isoplacodiolic acid, Placodiolic acid, Pseudoplacodiolic acid

Reference: Staiger, B/ Kalb, K 1995: *Haematomma*-Studien. I. Die Flechtengattung *Haematomma*. Bibliotheca Lichenologica 59: 3-198.

Notes: Occurs in *Haematomma hilare*

Methyl Planiate

A: 70 B: x B': 47 C: 70 E: 50 F: x G: x

HPLC: 40

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 486, 236, 235

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Methyl hyperplaniate, Methyl isohyperplaniate, Hyperplanaic acid, Isohyperplanaic acid, Planaic acid

Reference: Elix, JA/ Wardlaw, JH/Archer, AW 1999: New depsides from *Pertusaria* lichens. Australasian Lichenology 44: 9-15.

Notes: Minor component in *Pertusaria manamensis*

Methyl porphyrlate

A: 23 B: x B': 17 C: 11 E: 5 F: x G: 38

HPLC: 13

V: – UV: +

Acid Spray: No Result

LW UV: Purple

Archers: x

K: No Result

C: Green

KC:

PD: No Result

Mass Spectrum: 328, 299, 270, 241

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Porphyrilic acid

Reference: Renner, B/ Henssen, A/Gerstner, E 1981: Pannarsäure und Porphyrilsäuremethylester –
Sakundärstoffe der Flechtengattung *Psoroma*. Zeitschrift für Naturforschung 36c: 893-895.

Notes: LW UV: dark purple, UV quenching. Occurs in *Psoroma tenue*

Methyl pseudoalectoronate

A: 54 B: x B': 35 C: 38 E: 31 F: x G: x

HPLC: 33

V: –

UV: +

Acid Spray: P.Yellow

LW UV: B.Blue

Archers: x

K: No Result

C: No Result

KC: P.Red

PD: No Result

Mass spectrum: 508, 482, 476

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Alectoronic acid, α -Collatolic acid, Dehydrocollatolic acid, 4-*O*-
Methylphysodic acid

Reference: Elix, JA/ Wardlaw, JH 1998: Methylpseudoalectoronate, a new depsidone from the lichen
Parmotrema poolii. Australasian Lichenology 42: 12-15.

Notes: Minor component in *Parmotrema poolii*

2'-*O*-Methylpseudocyphellarin A

A: 71 B: x B': 59 C: 66 E: 52 F: x G: x

HPLC: 41

V: –

UV: +

Acid Spray: P.Yellow

LW UV: Brown

Archers: x

K: No Result

C: Red

KC:

PD: Yellow

Mass Spectrum: 416, 224, 193, 192

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: 1'-Chloronephroarctin, Isopseudocyphellarin A, 2'-*O*-Methylphenarctin,
2'-*O*-Methylisopseudocyphellarin A, Phenarctin, Pseudocyphellarin A, Pseudocyphellarin B

Reference: Elix, JA/ Wardlaw, JH/ Wilkins, AL 1987: Five new fully substituted depsides from the lichen
Pseudocyphellaria pickeringii. Australian Journal of Chemistry 40: 2023-2029.

Notes: Acid Spray: pale yellow, grey halo; fades to orange. LW UV: orange-brown, fades to orange.

Occurs in *Pseudocyphellaria pickeringii*

Methyl pseudonorstictate

A: 70 B: x B': 32 C: 54 E: 14 F: x G: x

HPLC: 29

V: – UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Red C: No Result KC: PD: Orange

Mass spectrum: 387, 386, 383

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Norstictic acid, Salazinic acid, Connorstictic acid

Reference: Elix, JA/ Wardlaw, JH/ Archer, AW/ Lumbsch, HT/ Plümper, M 1997: Four new lichen depsidones from *Pertusaria* and *Lecanora* lichens. Australasian Lichenology 41: 22-27.

Notes: Minor component in *Pertusaria falklandica*

Methyl pseudosalazinate

A: 28 B: x B': 14 C: 17 E: 2 F: x G: x

HPLC: 19

V: – UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Red C: No Result KC: PD: Orange

Mass spectrum: 402, 384, 369

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Norstictic acid, Salazinic acid, Consalazinic acid

Reference: Elix, JA/ Wardlaw, JH/ Archer, AW/ Lumbsch, HT/ Plümper, M 1997: Four new lichen depsidones from *Pertusaria* and *Lecanora* lichens. Australasian Lichenology 41: 22-27.

Notes: Occurs in *Pertusaria* sp.

Methyl psoromate

A: 70 B: x B': 47 C: 67 E: 46 F: x G: x

HPLC: 42

V: – UV: +

Acid Spray: Brown LW UV: Brown

Archers: x

K: No Result C: No Result KC: No Result PD: P.Yellow

Mass spectrum: 372, 357, 342

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Psoromic acid, 2'-O-Demethylpsoromic acid, Methyl 2'-O-demethylpsoromate

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 432, 240, 208, 193

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Sekikaic acid

Reference: Titze, A 1987: Sekikaic acid methyl ester found in *Protousnea* (Mot.) Krog. *Bibliotheca Lichenologica* 25: 469-473.

Notes: Acid Spray: pale orange, grey halo; fades to dark orange. LW UV: purple, green halo.

Occurs in *Usnea dusenii*

2-O-Methylsekikaic acid

A: 41 B: 31 B': 40 C: 43 E: x F: x G: x

HPLC: 25

V: - UV: +

Acid Spray: P. Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 227, 224, 208

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Boninic acid, 4,4'-Di-O-methylcryptochlorophaeic acid, 2,4'-Di-O-methylnorsekikaic acid, Homosekikaic acid, 4-O-Methylcryptochlorophaeic acid, Sekikaic acid

Reference: Chester, DO/ Elix, JA 1978: The identification of four new *meta*-depsides in the lichen *Ramalina asahinae*. *Australian Journal of Chemistry* 31: 2745-2749.

Notes: Acid Spray: pale yellow-orange, grey halo. LW UV: strong-purple, green halo. Occurs in *Ramalina asahinae*

2-O-Methylsquamatic acid

A: 15 B: x B': 25 C: 23 E: x F: x G: 37

HPLC: 13

V: - UV: +

Acid Spray: Grey

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 365, 223, 209, 193

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Elatinic acid, Squamatic acid

Reference: Garbarino, JA/ Chamy, MC/ Gambaro, V/ Quilhot, W/ Naranjo, O/ Bolt, E 1987: Studies on Chilean Lichens. X. The phenolic constituents of *Protousnea magellanica*. *Journal of Natural Products* 50: 745-747.

Notes: SW UV: bright blue before spraying. Occurs in *Usnea magellanica*

2'-O-Methylstenosporic acid

A: 47 B: x B': 53 C: 53 E: x F: x G: x

HPLC: 35

V: – UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 430, 239, 238, 221

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2'-O-Methylhyperlatolic acid, 2'-O-Methylisohyperlatolic acid, 2'-O-Methylperlatolic acid, 2'-O-Methylsuperlatolic acid

Reference: Elix, JA/ Barclay, CE/ David, F/ Griffin, FK/ Hill, AM/ McConnell, DB/ Wardlaw, JH 1993:

Synthesis of further lichen depsides. Australian Journal of Chemistry 46: 301-313.

Notes: Occurs in *Physcidia cylindrophora*

2-O-Methylstenosporic acid

A: 49 B: 56 B': 56 C: 49 E: x F: x G: x

HPLC: 35

V: – UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 224, 208, 207

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2-O-Methyldivaricatic acid, 2-O-Methylperlatolic acid, Stenosporic acid

Reference: Culberson, WL/ Culberson, CF 1981: A new *Ramalina* with two new depsides. Occasional Papers of the Farlow Herbarium 16: 37-41.

Notes: Acid Spray: strong-pale yellow, grey halo. LW UV: strong-purple, green halo. SW UV bright blue

Occurs in *Ramalina sayreana*

Methyl stictic acid

A: 50 B: x B': 15 C: 38 E: x F: x G: 49

HPLC: 14

V: – UV: +

Acid Spray: Orange

LW UV: Orange

Archers: x

K: Yellow C: No Result KC: PD: Orange

Mass Spectrum: 400, 368

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Constictic acid, Cryptostictic acid, Hypostictic acid, Menegazziaic acid, Norstictic acid, Stictic acid

Reference: Shimada, S/ Saitoh, T/ Sankawa, S/ Shibata, S 1980: New depsidones from *Lobaria oregana*.
Phytochemistry 19: 328-330.

Notes: Minor component in *Lobaria oregana*

2'-O-Methylsuperlatolic acid

A: 62 B: x B': 65 C: 58 E: x F: x G: x

HPLC: 48

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 266, 222, 182, 181

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2'-O-Methylhyperlatolic acid, 2'-O-Methylimbricatic acid, 2'-O-Methylisohyperlatolic acid, 2'-O-Methylperlatolic acid, 2'-O-Methylstenosporic acid

Reference: Elix, JA/ David, F 1991: New depsides from the lichen *Biatora solediosa*. Australian Journal of Chemistry 44: 1643-1647.

Notes: Occurs in *Lecanora austrosorediosa*, *L. pseudistera*

2-O-Methylsuperlatolic acid

A: 46 B: x B': 66 C: 64 E: x F: x G: x

HPLC: 50

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 264, 263, 91

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2-O-Methylhyperlatolic acid, 2-O-Methylisohyperlatolic acid, 2-O-Methylperlatolic acid, 2-O-Methylstenosporic acid

Reference: Elix, JA/ Barclay, CE/ Archer, AW 1995: New depsides in *Pertusaria* lichens (Pertusariaceae, lichenized Ascomycotina) and a new species from Australia. pp 15-26 in "Flechten Follmann", Geobotanical and Phytotaxonomical Study Group, University of Cologne, Germany.

Notes: Occurs in *Pertusaria follmanniana*

4-O-Methylsuperolivetoric acid

A: 54 B: x B': 57 C: 60 E: x F: x G: x

HPLC: 42

V: - UV: +

Acid Spray: P.Yellow LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 291, 290, 164, 137

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*-Methylhyperolivetic acid, 4-*O*-Methylolivetic acid, Olivetic acid

References: Culberson, CF/ Culberson, WL/ Gowan, S/ Johnson, A 1987: New depsides from lichens: microchemical methodologies applied to the study of new natural products discovered in herbarium specimens. American Journal of Botany 74: 403-414. Elix, JA/ Wardlaw, JH 1997: Synthesis of further β -ketoalkyl lichen depsides. Australian Journal of Chemistry 50: 479-486.

Notes: Occurs in *Pseudobaeomyces pachycarpus*

2'-*O*-Methylsuperphyllinic acid

A: 43 B: x B': 32 C: 44 E: x F: x G: x

HPLC: 41

V: - UV: +

Acid Spray: Pink LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 292, 291, 290

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 2'-*O*-Methylhyperphyllinic acid, 2'-*O*-Methylmicrophyllinic acid, Glaucophaeic acid

References: Culberson, CF/ Culberson, WL/ Gowan, S/ Johnson, A 1987: New depsides from lichens: microchemical methodologies applied to the study of new natural products discovered in herbarium specimens. American Journal of Botany 74: 403-414. Elix, JA/Wardlaw, JH 1996: Synthesis of depsides present in the lichen *Porpidia glaucophaea*. Australian Journal of Chemistry 49: 817-924.

Notes: Occurs in *Pseudobaeomyces pachycarpus*, *Porpidia glaucophaea*

2'-*O*-Methyltenuiorin

A: 70 B: x B': 44 C: 72 E: 31 F: x G: x

HPLC: 37

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 347, 182, 165

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: 4,2''-Di-*O*-methylgyrophoric acid, 2',2''-Di-*O*-Methyltenuiorin, Methyl gyrophorate, 2''-*O*-Methyltenuiorin, Tenuiorin

Reference: Lajide, L/ Elix, JA 1981: 2'-*O*-Methyltenuiorin 2''-*O*-methyltenuiorin and 2',2''-di-*O*-methyltenuiorin. Three new tridepsides from the lichen *Pseudocyphellaria faveolata*. Australian Journal of Chemistry 34: 2005-2011.

Notes: Minor component in *Pseudocyphellaria faveolata*

2''-*O*-Methyltenuiorin

A: 73 B: 44 B': 38 C: 66 E: 26 F: x G: x

HPLC: 33

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 331, 328, 196

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: 4,2''-Di-*O*-methylgyrophoric acid, 2',2''-Di-*O*-Methyltenuiorin, Methylgyrophorate, 2'-*O*-Methyltenuiorin, Tenuiorin

Reference: Lajide, L/ Elix, JA 1981: 2'-*O*-Methyltenuiorin 2''-*O*-methyltenuiorin and 2',2''-di-*O*-methyltenuiorin. Three new tridepsides from the lichen *Pseudocyphellaria faveolata*. Australian Journal of Chemistry 34: 2005-2011.

Notes: Minor component in *Pseudocyphellaria faveolata*

8-*O*-Methylthiomelin

A: 66 B: x B': 47 C: 56 E: 34 F: x G: x

HPLC: 43

V: + UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 356, 354, 336, 324

Substance Class: Xanthones

Biosynthetically Related Compounds: 2-Dechloro-8-*O*-methylthiomelin, 4-Dechloro-8-*O*-methylthiomelin, 4-Dechlorothiomelin, Thiomelin

Reference: Elix, JA/ Gaul, KL/ Sterns, M/ Samsudun, MW 1987: The structure of the novel lichen xanthone, thiomelin and its congeners. Australian Journal of Chemistry 40: 1169-1178.

Notes: Pale yellow pigment. Minor component in *Rinodina thiomela*

3-*O*-Methylthiophanic acid

A: 65 B: x B': 69 C: 61 E: 3 F: 8 G: x

HPLC: 53

V: + UV: +

Acid Spray: Orange

LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 414, 412, 410, 408

Substance Class: Xanthones

Biosynthetically Related Compounds: 5,7-Dichloro-3-*O*-methylnorlichexanthone, 3-*O*-Methylasemone, 2,5,7-Trichloro-3-*O*-methylnorlichexanthone, Thiophanic acid, Thuringione

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. *Bryologist* 95: 52-64.

Notes: Yellow pigment. Minor component in *Lecidella meiococca*

6-*O*-Methylthiophanic acid

A: 65 B: x B': 71 C: 60 E: 3 F: 13 G: x

HPLC: 56

V: +

UV: +

Acid Spray: Orange

LW UV: Orange

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass Spectrum: 414, 412, 410, 408

Substance Class: Xanthones

Biosynthetically Related Compounds: 6-*O*-Methylarthothelin, 6-*O*-Methylasemone, Thiophanic acid

Reference: Elix, JA/ Crook, CE 1992: The joint occurrence of chloroxanthones in lichens, and a further thirteen new lichen xanthones. *Bryologist* 95: 52-64.

Notes: Yellow pigment. Occurs in *Micarea isabellina*

4-*O*-Methylvicanicin [Vicanicin methyl ether]

A: 77 B: x B': 65 C: 84 E: 70 F: x G: x

HPLC: 54

V: -

UV: +

Acid Spray: Green

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 398, 396, 363, 361

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: 7-Dechlorovicanicin, Isovicanicin, Norvicanicin, Vicanicin

Reference: Elix, JA/ Lajide, L/ Galloway, DJ 1982: Metabolites from the lichen genus *Psoroma*. *Australian Journal of Chemistry* 35: 2325-2333.

Notes: Acid Spray: pale dull brownish-green. Minor component in *Lecidella sublapicida*

Methyl virensate

A: 72 B: x B': 55 C: 77 E: 50 F: x G: x

HPLC: 30

V: – UV: +

Acid Spray: Purple LW UV: Grey

Archers: x

K: No Result C: No Result KC: No Result PD: Orange

Mass Spectrum: 372, 340, 312, 285

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Hypophysciosporin, Physciosporin, Virensic acid

Reference: Renner, B/ Henssen, A/Gerstner, E 1978: Methylvirensat und 5-Clor Methylvirensat aus Arten der Flechtengattung *Pseudocyphellaria*. Zeitschrift für Naturforschung 33c: 826-830.

Notes: Minor component in *Pseudocyphellaria faveolata*

Micareic acid

A: 44 B: x B': 69 C: 52 E: x F: x G: x

HPLC: 65

V: – UV: +

Acid Spray: P.Yellow LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 500, 456, 372, 249

Substance Class: Diphenyl ethers

Biosynthetically Related Compounds: Methoxymicareic acid, Superlatolic acid

Reference: Elix, JA/ Lajide, L/ Coppins, BJ/ James, PW 1984: Two new diphenyl ethers and a new depside from the lichen *Micarea prasina* Fr. Australian Journal of Chemistry 37: 2397-2402.

Notes: LW UV: bright turquoise, fades to bright light blue then orange. Occurs in *Micarea prasina*

Microphyllinic acid

A: 41 B: 39 B': 39 C: 41 E: x F: x G: x

HPLC: 30

V: – UV: +

Acid Spray: Pink LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 280, 262, 244

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-O-Demethylmicrophyllinic acid, Hyperphyllinic acid, 4-O-Methylolivetic acid, Olivetic acid, Superphyllinic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 124. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 287.

Notes: SW UV: fluoresces bright blue before spraying. Occurs in *Cetrelia japonica*

Miriquidic acid

A: 42 B: 48 B': 46 C: 44 E: x F: x G: x

HPLC: 30

V: - UV: +

Acid Spray: Green LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 252, 234, 224

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Normiriquidic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 124. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 287.

Notes: Acid Spray: bright yellow-green, eventually fades to bright turquoise. Occurs in *Lecidea leucophaea*

Reference: Huneck, S/ Schreiber, K/ Snatzke, G/ Fehlhaber, H-W 1971: 85. Mitteilung über Flechteninhaltsstoffe.

Miriquidsäure, ein neues Depsid aus *Lecidea liliestroemii* und *Lecidea leucophaea*. Zeitschrift für

Naturforschung 26b: 1357-1364.

Notes: Acid Spray: bright yellow-green, fades to bright turquoise. Occurs in *Lecidea leucophaea*

Mollin

A: x B: x B': x C: x E: x F: x G: x

HPLC: x

V: + UV: +

Acid Spray: x LW UV: x

Archers: x

K: Yellow C: No Result KC: PD: No Result

Mass spectrum: x

Substance Class: Chromones

Biosynthetically Related Compounds: Galapagin, Roccellin

Reference: Huneck, S/ Jakupovic, J/ Follmann, G 1992: The final structures of the lichen chromones galapagin, lobodirin, mollin and roccellin. Zeitschrift für Naturforschung 47B: 449-451.

Notes: Pale yellow pigment. Occurs in *Roccellaria mollis*

Monoacetylgraciliformin [Acetylgraciliformin]

A: 46 B: x B': 12 C: 36 E: 7 F: x G: x

HPLC: 29

V: + UV: +

Acid Spray: Green LW UV: Grey

Archers: x

K: Red C: No Result KC: PD: No Result

Mass Spectrum: 584, 524, 254

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Diacetylgraciliformin, Graciliformin, Skyrin

Reference: Ejiri, H/ Sankawa, U/ Shibata, S 1975: Graciliformin and its acetates in *Cladonia graciliformis*.

Phytochemistry 14: 277-279.

Notes: Bright yellow pigment. Acid Spray: colour like skyrin. Occurs in *Cladonia graciliformis*

(+)-Montagnetol

A: x B: x B': x C: x E: x F: x G: x

HPLC: 2

V: - UV: +

Acid Spray: Green LW UV: Green

Archers: x

K: No Result C: D.Red KC: PD: No Result

Mass Spectrum: 272, 256, 254, 236

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: Erythrin

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 112. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 160.

Notes: Occurs in *Roccella montagnei*

Moretenone [Hop-22(29)-en-3-one]

A: 60 B: x B': 75 C: x E: x F: x G: x

HPLC: x

V: - UV: -

Acid Spray: Brown LW UV: Pink

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 424, 409, 368, 204

Substance Class: Terpenoids

Biosynthetically Related Compounds: 29-Nor-21 α -hopane-3,22-dione

Reference: Nicollier, G/ Tabacchi, R/ Gavin, J/ Breton, JL/ Gonzales, AG 1979: Triterpenes de la 'mousse de chêne' (*Evernia prunastri* ((L.) Ach.). Helvetica Chimica Acta 62: 807-810.

Notes: Occurs in *Evernia prunastri*

Murolic acid

A: 23 B: x B': 27 C: 24 E: x F: x G: x

HPLC: 30

V: – UV: –

Acid Spray: Purple LW UV: White

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 368, 353, 350, 324

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Isomurolic acid, Neodihydromurolic acid, Neuropogolic acid

Reference: Huneck, S/ Schreiber, K/ Höfle, G/ Snatzke, G 1979: Neodihydromurolic- und Murolicsäure, zwei neue γ -Lactoncarbonsäure aus *Lecanora muralis*. Journal of the Hattori Botanical Laboratory 45: 1-23.

Notes: Optical antipode of protoconstipatic acid. Occurs in *Lecanora muralis*

Muronic acid [Dehydroprotoconstipatic acid]

A: 32 B: x B': 30 C: 28 E: x F: x G: x

HPLC: 29

V: – UV: –

Acid Spray: P.Brown LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 366, 348, 308, 306

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Constipatic acid, Dehydroconstipatic acid, Protoconstipatic acid

Reference: Reference: Ghogomu, RT/ Bodo, B 1982: Structural elucidation of 13-acetoxylichesteric and 13-acetoxyprotolichesterinic acid, two aliphatic lichen metabolites from *Neoropogon trachycarpus*, Phytochemistry 21: 2355-2358.

Notes: Occurs in *Neuropogon trachycarpus*

Myeloconone A1

A: 5 B: x B': 12 C: 10 E: x F: x G: 30

HPLC: 17

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 338, 336, 320, 318

Substance Class: Phenalenones

Biosynthetically Related Compounds: Myeloconone A2

Reference: McCarthy, PM/ Elix, JA 1996: *Myeloconis*, a new genus of pyrenocarpous lichens from the tropics. Lichenologist 28: 401-404.

Notes: Yellow-orange pigment. Occurs in *Myeloconis erumpens*, *M. guyanensis*

Myeloconone A2

A: 5 B: x B': 12 C: 10 E: x F: x G: 30

HPLC: 17

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 302, 284, 274

Substance Class: Phenalenones

Biosynthetically Related Compounds: Myeloconone A1

References: McCarthy, PM/ Elix, JA 1996: *Myeloconis*, a new genus of pyrenocarpous lichens from the tropics. Lichenologist 28: 401-404. Ernst-Russell, MA/ Chai, CLL/Elix, JA/ McCarthy, PM 2000: Myeloconone A2, a new phenalenone from the lichen *Myeloconis erumpens*. Australian Journal of Chemistry 53: 1011-1013.

Notes: Yellow pigment. Occurs in *Myeloconis erumpens*, *M. guyanensis*

Myeloconone B

A: 30 B: x B': 9 C: 15 E: x F: x G: 32

HPLC: 4

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 290, 263, 262, 247

Substance Class: Phenalenones

Biosynthetically Related Compounds: Myeloconone C

Reference: McCarthy, PM/Elix, JA 1996: *Myeloconis*, a new genus of pyrenocarpous lichens from the tropics. Lichenologist 28: 401-404.

Notes: Yellow pigment. Occurs in *Myeloconis fecunda*

Myeloconone C

A: 30 B: x B': 2 C: 13 E: x F: x G: 33

HPLC: 9

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 290, 261, 247, 245

Substance Class: Phenalenones

Biosynthetically Related Compounds: Myeloconone B

Reference: McCarthy, PM/Elix, JA 1996: *Myeloconis*, a new genus of pyrenocarpous lichens from the tropics. Lichenologist 28: 401-404.

Notes: Yellow pigment. Occurs in *Myeloconis parva*

Neodihydromurolic acid

A: 30 B: x B': 29 C: 29 E: x F: x G: x

HPLC: x

V: - UV: -

Acid Spray: No Result

LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 370, 355, 334, 326

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Isomuronic acid, Murolic acid, Neuropogolic acid

Reference: Huneck, S/ Schreiber, K/ Höfle, G/ Snatzke, G 1979: Neodihydromurolic- und Murolicsäure, zwei neue γ -Lactoncarbonsäure aus *Lecanora muralis*. Journal of the Hattori Botanical Laboratory 45: 1-23.

Notes: Occurs in *Lecanora muralis*

Neothamnolic acid

A: 5 B: x B': 20 C: 16 E: x F: x G: x

HPLC: 13

V: - UV: +

Acid Spray: Brown

LW UV: Brown

Archers: x

K: Purple C: P.Red KC: PD: No Result

Mass spectrum: -1, 226, 209, 198

Substance Class: Orcinol m-depsides

Biosynthetically Related Compounds: Hypothamnolic acid, Thamnolic acid, Lactothamnolic acid

Reference: Elix, JA/ Barclay, CE/Wardlaw, JH/Archer, AW/Sen-hua Yu/ Kantvilas, G 1999: Four new β -orcinol *meta*-depsides from *Pertusaria* and *Siphula* lichens. Australian Journal of Chemistry 52: 837-840.

Notes: Occurs in *Siphula ramalinoides*

Neotricone

A: 4 B: x B': 26 C: 7 E: x F: x G: x

HPLC: 11

V: - UV: +

Acid Spray: Yellow

LW UV: Yellow

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 372, 328, 313, 300

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Norperistic acid, Norstictic acid, Peristic acid

Reference: Elix, JA/ Kalb, K/ Wardlaw, JH 2003: Neotricone and norperistic acid, two new depsidones from the lichen genus *Phaeographis*. Australian Journal of Chemistry 56: 315-317.

Notes: Occurs in *Phaeographis neotricosa*, *Ph. syngraphizans*

Nephroarctin

A: 70 B: 53 B': 52 C: 63 E: 21 F: x G: x

HPLC: 34

V: - UV: +

Acid Spray: P.Yellow

LW UV: P.Brown

Archers: x

K: Yellow C: Red KC: PD: Yellow

Mass spectrum: 372, 207, 166, 151

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: 1'-Chloronephroarctin, 2'-O-Methylisopseudocyphellarin A, 2'-O-Methylphenarctin, 2'-O-Methylpseudocyphellarin A, Isopseudocyphellarin A, Phenarctin, Pseudocyphellarin A, Pseudocyphellarin B

Reference: Nuno, M/ Kuwada, Y/ Kamiya, K 1969: The structure of nephroarctin. Chemical Communications: 78.

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Nephroma arcticum*

Nephromopsis acid

A: x B: x B': x C: 47 E: x F: x G: x

HPLC: x TLC: Rf 70 [diethyl ether/butanoic acid, 30/1]

V: - UV: -

Acid Spray: No Result

LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 326, 117, 99, 56

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: *allo*-Protolichesterinic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 103. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 149.

Notes: Occurs in *Nephromopsis stracheyi*

Nephrosteranic acid

A: 42 B: x B': 48 C: 46 E: x F: x G: x

HPLC: x TLC: Rf 82 [diethyl ether/butanoic acid, 20/1]

V: – UV: –

Acid Spray: No Result LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Isonephrosterinic acid, Nephrosterinic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 104. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 149.

Notes: Occurs in *Lepraria rigidula*

Nephrosterinic acid

A: 33 B: x B': 42 C: 35 E: x F: x G: x

HPLC: 33 TLC: Rf 61 [diethyl ether/butanoic acid, 20/1]

V: – UV: –

Acid Spray: No Result LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Isonephrosterinic acid, Lichesterinic acid, Nephrosteranic acid, Protolichesterinic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 104. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 150.

Notes: Occurs in *Nephromopsis endocrocea*

Neuropogolic acid

A: 31 B: x B': 27 C: 29 E: x F: x G: x

HPLC: 33

V: – UV: –

Acid Spray: No Result LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 368, 353, 350, 324

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Isomuronic acid, Murolic acid

Reference: Bodo, B/ Molho, D 1980: Structure des acides isomuronique et neuropologique, nouveaux acides aliphatiques du lichen *Neuropogon trachycarpus*. *Phytochemistry* 19: 1117-1120.

Notes: Isomer of constipatic acid. Occurs in *Neuropogon trachycarpus*

Norargopsin

A: 62 B: x B': 63 C: 63 E: 29 F: x G: x

HPLC: 30

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: Yellow

Mass Spectrum: 384, 382, 347, 215

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Argopsin, Isovicanicin, Nordechloropannarin, Norpannarin, Norvicanicin, Pannarin, Vicanicin

Reference: Elix, JA/ Jenie, UA/ Arvidsson, L/ Jørgensen, PM 1986: New depsidones from the lichen genus *Erioderma*. *Australian Journal of Chemistry* 39: 719-722.

Notes: Acid Spray: pale yellow, grey halo. LW UV: pale green. Occurs in *Erioderma chilense*

Norbaeomycesic acid [4-O-Demethylbaeomycesic acid]

A: 38 B: x B': 35 C: 30 E: x F: x G: 57

HPLC: 26

V: - UV: +

Acid Spray: Orange LW UV: Orange

Archers: Orange

K: P.Yellow C: No Result KC: PD: P.Yellow

Mass spectrum: 316, 194, 182

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: 4-O-Demethylbarbatic acid, Atranorin, Baeomycesic acid

Reference: Elix, JA/ Giffin, FK/Louwhoff, SHJJ 2000: Norbaeomycesic acid, a new depside from the lichen *Hypotrachyna orientalis*. *Australasian Lichenology* 46: 25-28.

Notes: Occurs in *Hypotrachyna orientalis*

Norcaperatic acid

A: 0 B: 26 B': x C: 1 E: x F: x G: x

HPLC: x

V: - UV: -

Acid Spray: No Result LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Caperatic acid

Reference: Culberson, CF 1972: Improved conditions and new data for the identification of lichen products by a standardized thin-layer chromatographic method. *Journal of Chromatography* 72: 113-125.

Notes: Occurs in *Melanelia stygia*

Norcolensoic acid

A: 28 B: 54 B': 53 C: 31 E: x F: x G: x

HPLC: 28

V: – UV: +

Acid Spray: P.Brown LW UV: Purple

Archers: x

K: No Result C: No Result KC: Red PD: No Result

Mass Spectrum: 384, 356, 343, 341

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Colensoic acid

Reference: Chester, DO/ Elix, JA 1981: New metabolites from Australian lichens. *Australian Journal of Chemistry* 34: 1507-1511.

Notes: LW UV: fades to bright violet. Occurs in *Hypotrachyna dactylifera*

Nordechloropannarin

A: 51 B: x B': 46 C: 40 E: 28 F: x G: x

HPLC: 18

V: – UV: +

Acid Spray: Brown LW UV: Brown

Archers: x

K: No Result C: No Result KC: No Result PD: Yellow

Mass Spectrum: 314, 286, 179, 177

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Argopsin, Dechloropannarin, Norargopsin, Norpannarin, Pannarin, Virensic acid

Reference: Leuckert, C/ Ahmadjian, V/ Culberson, CF/ Johnson, A 1990: Xanthonenes and depsidones of the lichen *Lecanora dispersa* in nature and its mycobiont in culture. *Mycologia* 82: 370-378.

Notes: Acid Spray: fades to green. Occurs in *Lecanora dispersa*

Nordivartic acid

A: 33 B: 55 B': 52 C: 29 E: x F: x G: x

HPLC: 22

V: – UV: +

Acid Spray: Grey LW UV: Green

Archers: Orange

K: No Result C: Red KC: Red PD: No Result

Mass Spectrum: -1, 196, 179, 178

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Anziaic acid, 4-*O*-Demethylstenosporic acid, Divaricatic acid

Reference: Elix, JA/ Tearne, PD 1977: Nordivaricatic acid, a new depside from the lichen *Heterodea beaugleholei*. Australian Journal of Chemistry 30: 2333-2335.

Notes: Acid Spray: pale orange, grey halo. LW UV: strong-purple, green halo. Occurs in *Cladia beaugleholei*

Norgangaleoidin

A: 59 B: x B': 40 C: 47 E: x F: x G: x

HPLC: 15

V: – UV: +

Acid Spray: P.Yellow LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 402, 400, 398, 366

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Gangaleoidin, Lecideoidin, Leoidin

Reference: Mahandru, MM/ Gilbert, A 1979: Norgangaleoidin, a dichlorodepsidone from *Lecanora chlarotera*. Bryologist 82: 292-295.

Notes: Occurs in *Lecanora chlarotera*

29-Nor-21 α -hopane-3,22-dione

A: 70 B: x B': 59 C: 59 E: 58 F: x G: 54

HPLC: x

V: – UV: –

Acid Spray: Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 426, 411, 265, 205

Substance Class: Terpenoids

Biosynthetically Related Compounds: Moretenone

Reference: Nicollier, G/ Tabacchi, R/ Gavin, J/ Breton, JL/ Gonzales, AG 1979: Triterpenes de la 'mousse de chêne' (*Evernia prunastri* (L.) Ach.). Helvetica Chimica Acta 62: 807-810.

Notes: Acid Spray: brown, fades to purple. LW UV: pale orange, fades to pale pink. Occurs in *Evernia prunastri*

Norisonotatic acid [*?O*-Methylolivaceic acid]

A: 12 B: x B': 23 C: 14 E: x F: x G: x

HPLC: 15

V: – UV: +

Acid Spray: Brown LW UV: Blue

Archers: x

K: No Result C: No Result KC: Red PD: No Result

Mass Spectrum: 330, 312, 286

Substance Class: Orcinol β -Orcinol Depsidones

Biosynthetically Related Compounds: Isonotatic acid, Notatic acid, Olivaceic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1990: The *Ramalina americana* complex (Ascomycotina, Ramalinaceae): chemical and geographical correlations. Bryologist 93: 167-186.

Notes: Occurs in *Ramalina americana*, ?*Myriotrema olivaceum*

Norjackinic acid

A: 10 B: x B': 38 C: x E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: No Result LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Jackinic acid

Reference: New report.

Notes: Occurs in *Lepraria jackii*

Norlichexanthone

A: 35 B: x B': 40 C: 11 E: 14 F: x G: x

HPLC: 15

V: – UV: +

Acid Spray: P.Yellow LW UV: B.Blue

Archers: x

K: No Result C: Orange-red KC: PD: No Result

Mass Spectrum: 258, 257, 229, 201

Substance Class: Xanthones

Biosynthetically Related Compounds: Griseoxanthone-C, Lichexanthone

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 179. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 211.

Notes: Occurs in *Lecanora reuteri*

Norlobaridone

A: 40 B: 36 B': 36 C: 20 E: 18 F: x G: x

HPLC: 26

V: – UV: +

Acid Spray: P. Green LW UV: B.Blue

Archers: Lilac

K: No Result C: No Result KC: Pink PD: No Result

Mass Spectrum: 398

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Conorlobaridone, Isonorlobaridone, Loxodin, Norlobariol, Norlobariol methyl ester

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 138. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 343.

Notes: Acid Spray: dull green, fades to grey; weak-grey. Occurs in *Xanthoparmelia scabrosa***Norlobariol**

A: 12 B: x B': 18 C: 1 E: 5 F: x G: x

HPLC: 11

V: – UV: +

Acid Spray: Grey LW UV: B.Blue

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 416, 398, 372, 330

Substance Class: Diphenyl ethers

Biosynthetically Related Compounds: Isonorlobaridone, Norlobaridone, Norlobariol methyl ester

References: Gream, GE/ Riggs, NV 1960: Chemistry of Australian lichens II. A new depsidone from *Parmelia conspersa* (Ehrh.) Ach.. Australian Journal of Chemistry 13: 285-295. Foo, LY/ Gwyn, SA 1978: The identification of norlobariol, a new lichen constituent from *Xanthoparmelia scabrosa* (Taylor) Hale. Experientia 34: 970-971.Notes: Acid Spray: pale grey fades to strong-dull green. Occurs in *Xanthoparmelia scabrosa***Norlobariol methyl ester** [Norlobariol methyl pseudoester]

A: 28 B: x B': 23 C: 3 E: 10 F: x G: x

HPLC: 16

V: – UV: +

Acid Spray: Grey LW UV: B.Blue

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 430, 398, 370, 342

Substance Class: Diphenyl ethers

Biosynthetically Related Compounds: Isonorlobaridone, Norlobaridone, Norlobariol

References: Gream, GE/ Riggs, NV 1960: Chemistry of Australian lichens II. A new depsidone from *Parmelia conspersa* (Ehrh.) Ach.. Australian Journal of Chemistry 13: 285-295. Elix, JA/ Johnston, J/ Armstrong, PM 1986: A revision of the lichen genus *Xanthoparmelia* in Australasia. Bulletin of the British Museum (Natural History), Botany series 15: 163-362.

Notes: Acid Spray: pale grey fades to strong-dull green. Occurs in *Xanthoparmelia scabrosa*

Normiriquidic acid

A: 31 B: x B': 38 C: 23 E: x F: x G: x

HPLC: 21

V: - UV: +

Acid Spray: Green LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: -1, 220, 207, 180

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Miriquidic acid

Reference: Elix, JA/ Jayanthi, VK 1986: Synthesis of the lichen depsides miriquidic acid and normiriquidic acid. Australian Journal of Chemistry 39: 791-797.

Notes: Acid Spray: light yellow-green, grey halo; eventually fades to bright turquoise. Occurs in *Lecidea leucophaea*

Norobtusatic acid

A: 27 B: 50 B': 48 C: 30 E: x F: x G: x

HPLC: 18

V: - UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 332, 182, 168, 165

Substance Class: Orcinol β -Orcinol Depsides

Biosynthetically Related Compounds: Barbatic acid, 4-O-Demethylbarbatic acid, Obtusatic acid

Reference: Culberson, CF/ Hale, ME 1973: Chemical and morphological evolution in *Parmelia* sect. *Hypotrachyna*: product of ancient hybridization? Brittonia 25: 162-163.

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Hypotrachyna chicitae*

Norpannarin

A: 51 B: x B': 48 C: 42 E: 21 F: x G: x

HPLC: 27

V: - UV: +

Acid Spray: Grey LW UV: Brown

Archers: x

K: No Result C: No Result KC: No Result PD: Orange

Mass Spectrum: 350, 348, 215, 213

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Argopsin, Dechloropannarin, Norargopsin, Nordechloropannarin, Pannarin

Reference: Elix, JA/ Jenie, UA/ Arvidsson, L/ Jørgensen, PM 1986: New depsidones from the lichen genus *Erioderma*. Australian Journal of Chemistry 39: 719-722.

Notes: Occurs in *Erioderma chilense*

Norperistic acid

A: 2 B: x B': 12 C: 3 E: x F: x G: x

HPLC: 4

V: - UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 388, 370, 357, 344

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Neotricone, Norstictic acid, Peristic acid

Reference: Elix, JA/ Kalb, K/ Wardlaw, JH 2003: Neotricone and norperistic acid, two new depsidones from the lichen genus *Phaeographis*. Australian Journal of Chemistry 56: 315-317.

Notes: Occurs in *Phaeographis neotricosa*, *Ph. syngraphizans*

Norringiformic acid

A: 10 B: x B': 36 C: x E: x F: x G: x

HPLC: x

V: - UV: -

Acid Spray: No Result LW UV: No Result

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 354, 336, 318, 308

Substance Class: Aliphatic acids

Reference: Huneck, S 1982: (+)-Isorangiformic acid, a lichen substance from *Lecanora stenotropa*.

Phytochemistry 21: 2407-2408.

Notes: Best seen on plate after spraying but before charring. Occurs in *Cladonia mitis*

Norrussulone

A: x B: x B': x C: 30 E: x F: x G: x

HPLC: 29

V: + UV: +

Acid Spray: P.Red LW UV: Pink

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass spectrum: 338, 323, 309

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Russulone

Reference: New report

Notes: Red pigment. Occurs in *Ramboldia laeta*

Norsolorinic acid

A: 55 B: x B': 66 C: 41 E: 19 F: x G: x

HPLC: 46

V: + UV: +

Acid Spray: Orange LW UV: Pink

Archers: x

K: Purple C: No Result KC: PD: No Result

Mass Spectrum: 370, 352, 327, 299

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Averythrin, 6-O-Methylaverythrin, Solorinic acid

Reference: Steglich, W/ Jedtke, K-F 1976: Neue Anthachinonfarbstoffe aus *Solorina crocea*. Zeitschrift für Naturforschung 31C: 197-198.

Notes: Orange-red pigment. Occurs in *Solorina crocea*

Norstictic acid

A: 40 B: 29 B': 32 C: 30 E: x F: x G: 57

HPLC: 12

V: - UV: +

Acid Spray: Yellow LW UV: Orange

Archers: No Result

K: Red C: No Result KC: PD: No Result

Mass Spectrum: 372, 354, 179, 177

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Connorstictic acid, Consalazinic acid, Hyposalazinic acid, Peristictic acid, Protocetraric acid, Salazinic acid, Stictic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 156. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 343.

Notes: Occurs in *Xanthoparmelia substrigosa*

Northiomelin

A: 69 B: x B': 70 C: 72 E: 47 F: 85 G: x

HPLC: 34

V: +

UV: +

Acid Spray: Yellow

LW UV: Yellow

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 330, 328, 326, 205

Substance Class: Xanthenes

Biosynthetically Related Compounds: 2-Dechloro-8-*O*-methylthiomelin, 2-Dechlorothiomelin, 4-Dechlorothiomelin, 8-*O*-Methylthiomelin, Thiomelin

Reference: Elix, JA/ Jiang, H/ Gaul, KL 1993: The structure and synthesis of some minor xanthenes from the lichen *Rinodina thiomela*. Australian Journal of Chemistry 46: 95-110.

Notes: Pale yellow pigment. Minor component in *Rinodina thiomela*

Norvicanicin

A: 68 B: 55 B': 58 C: 63 E: 36 F: x G: x

HPLC: 23

V: -

UV: +

Acid Spray: Green

LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 370, 368, 335, 333

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Isovicanicin, Norpannarin, Vicanicin

Reference: Sargent, MV/ Vogel, P/ Elix, JA/ Ferguson, BA 1976: Depsidone synthesis VII. Vicanicin and norvicanicin, Australian Journal of Chemistry 29, 2263-2269.

Notes: Acid Spray: pale blue-green, fades to grey. LW UV: purple, green halo. Occurs in a chemical race of *Pannaria sphinctrina*

Notatic acid

A: 34 B: 49 B': 44 C: 38 E: x F: x G: 55

HPLC: 19

V: -

UV: +

Acid Spray: P.Yellow

LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 344, 326, 300, 298

Substance Class: Orcinol β -Orcinol Depsidones

Biosynthetically Related Compounds: 4-*O*-Demethylnotatic acid, Hypoprotocetraric acid, Isonotatic acid, 4-*O*-Methylhypoprotocetraric acid, Subnotatic acid

Reference: Cresp, TM/ Elix, JA/ Kurokawa, S/ Sargent, MV 1972: The structure of two new depsidones from the lichen *Parmelia notata*. Australian Journal of Chemistry 25: 2167-2184.

Notes: Acid Spray: pale yellow, grey halo. LW UV: violet, purple halo, fades to deep blue. Occurs in *Xanthoparmelia notata*

Obtusatic acid

A: 40 B: 64 B': 61 C: 47 E: x F: x G: x

HPLC: 32

V: - UV: +

Acid Spray: Grey LW UV: Green

Archers: x

K: No Result C: No Result KC: P.Yellow PD: No Result

Mass Spectrum: 346, 196, 179, 178

Substance Class: Orcinol β -Orcinol Depsides

Biosynthetically Related Compounds: Barbatic acid, 4-*O*-Demethylbarbatic acid, 2-*O*-Methylobtusatic acid, Norobtusatic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 124. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 290.

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Ramalina obtusata*

Olivaceic acid

A: 3 B: x B': 14 C: 3 E: x F: x G: x

HPLC: 12

V: - UV: +

Acid Spray: Brown LW UV: Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Depsidones

Biosynthetically Related Compounds: Isonotatic acid, Norisonotatic acid

Reference: Mangold, A 2008. Taxonomic studies on members of the lotremoid Ostropales (lichenized Ascomycota) in Australia. Univ. Duisburg-Essen, p28.

Notes: Occurs in *Myriotrema olivaceum*

Olivetoric acid

A: 29 B: 37 B': 39 C: 25 E: x F: x G: x

HPLC: 27

V: – UV: +

Acid Spray: Orange LW UV: B.Blue

Archers: x

K: No Result C: Pink KC: D.Red PD: No Result

Mass Spectrum: -1, 266, 248, 224

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Anziaic acid, 4-*O*-Demethylmicrophyllinic acid, Hyperolivetoric acid, 4-*O*-Methylolivetoric acid, Microphyllinic acid, Superolivetoric acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 125. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 290.

Notes: Acid Spray: pale orange, grey halo. SW UV fluoresces bright blue before spraying. Occurs in *Cetrelia olivetorum*

Olivetol [3-Hydroxy-5-pentylphenol]

A: 65 B: 70 B': x C: 53 E: x F: x G: x

HPLC: 6

V: – UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: 180, 165, 151, 138

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: 2,4-Dihydroxy-6-pentylbenzoic acid, Perlatolic acid

Reference: Gonzáles, AG/ Barrera, JB/ Rodrigues Pérez, EM/ Hernández Padrón, CE 1991: Chemical constituents of the lichen *Cladina macronesica*. Zeitschrift für Naturforschung 46c: 12-18.

Notes: Possibly an artefact, reported from *Cladonia macaronesica*

Orcinyl lecanorate [Decarboxygyrophoric acid]

A: 30 B: 37 B': 38 C: 20 E: 11 F: x G: x

HPLC: 20

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: Red PD: No Result

Mass Spectrum: -1, 275, 274, 152

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid, Orsellinic acid

Reference: Chester, DO/ Elix, JA 1981: New metabolites from Australian lichens. Australian Journal of Chemistry 34: 1507-1511.

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Punctelia borreri*

Orsellinic acid

A: 37 B: x B': 49 C: 22 E: x F: x G: x

HPLC: 0

V: - UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: Red KC: Red PD: No Result

Mass Spectrum: 168, 150, 124, 122

Substance Class: Monocyclic aromatic derivatives

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid, Methyl gyrophorate, Methyl lecanorate

Reference: Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 163.

Notes: Acid Spray yellow-orange, grey halo. Occurs in *Pseudocyphellaria crocata*

Ovoic acid

A: 25 B: x B': 34 C: 23 E: 11 F: x G: x

HPLC: 23

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: P.Red KC: Red PD: No Result

Cortex: No Result Medulla: No Result

Mass Spectrum: -1, 182, 165, 151

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: Gyrophoric acid, Lecanoric acid, Orsellinic acid

Reference: Huneck, S/ Schrieber, K/ Sundholm, G 1980: Ovosäure, ein neues Tridepsid aus der Flechte *Parmelia substygia*. Phytochemistry 19: 885-887.

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Melanelia substygia*

Oxodidymic acid

A: 60 B: x B': 55 C: 48 E: x F: x G: x

HPLC: 37

V: - UV: +

Acid Spray: Blue LW UV: Purple

Archers: x

K: No Result C: Green KC: PD: No Result

Mass spectrum: 384, 366, 340

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: 8-Chlorodioxocondidymic acid, 8-Chlorodioxodidymic acid, 8-Chlorooxididymic acid, Dioxocondidymic acid, Dioxodidymic acid, Letrouitic acid,

Reference: Johansson, S/Søchting, U/Elix, JA/ Wardlaw, JH 2005: Chemical variation in the lichen genus *Letrouitia* (Ascomycota, Letrouitiaceae). *Mycological Progress* 4: 139-148.

Notes: Occurs in *Letrouitia vulpina*

Oxolobaric acid

A: 19 B: x B': 23 C: 23 E: x F: x G: x

HPLC: 36

V: – UV: +

Acid Spray: Grey LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: D.Red PD: No Result

Mass spectrum: 470, 453, 452, 428

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Lobaric acid, Sublobaric acid, Norlobaridone

Reference: Elix, JA/ Wardlaw, JH/Yoshimura, I 1997: Sublobaric acid and oxolobaric acid, two new depsidones from the lichen *Lobaria hypoleuroides*. *Australian Journal of Chemistry* 50: 763-765.

Notes: Minor component in *Lobaria hypoleuroides*

Oxostenosporic acid

A: 41 B: 43 B': 46 C: 41 E: x F: x G: x

HPLC: 28

V: – UV: +

Acid Spray: P.Yellow LW UV: B.Blue

Archers: P.Red

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 262, 238, 220

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-O-Demethylstenosporic acid, Divaricatic acid, Glomelliferic acid, Perlatolic acid, Stenosporic acid

Reference: Culberson, CK/ Culberson, WL/ Esslinger, TL 1977: Chemosyndromic variation in the *Parmelia pulla* group. *Bryologist* 80: 125-135.

Notes: Acid Spray: pale yellow, grey halo. Occurs in *Xanthoparmelia pulla*.

4-Oxypannaric acid 2-methyl ester [9-Methyl 4-hydroxypannarate]

A: 15 B: x B': x C: 19 E: x F: x G: 21

HPLC: 5

V: – UV: +

Acid Spray: Blue

LW UV: Purple

Archers: x

K: No Result C: Green KC: PD: No Result

Mass spectrum: 346, 314, 302

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: 4-Oxypannaric acid 6-methyl ester, Pannaric acid, Pannaric acid 2-methyl ester, Porphyrilic acid

Reference: Elix, JA/ Naidu, R/ Laundon, JR 1994: The structure and synthesis of 4-oxypannaric acid 2-methyl ester, a dibenzofuran from the lichen *Leproloma diffusum*. Australian Journal of Chemistry 47: 703-714.

Notes: Occurs in *Lepraria diffusa*

4-Oxypannaric acid 6-methyl ester

A: 5 B: x B': x C: 4 E: x F: x G: x

HPLC: 10

V: – UV: +

Acid Spray: Blue

LW UV: Purple

Archers: x

K: No Result C: Green KC: PD: No Result

Mass Spectrum: 346, 328, 302

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: 4-Oxypannaric acid 2-methyl ester, Pannaric acid, Pannaric acid 2-methyl ester, Pannaric acid 6-methyl ester, Porphyrilic acid

Reference: Leuckert, C/Kümmerling, H 1991: Chemotanomische Studien in der Gattung *Leproloma* Nyl. ex Crombie (Lichenes). Nova Hedwigia 52: 17-32.

Notes: Occurs in *Lepraria vouauxii*, *L. sipmaniana*

Oxyphysodic acid [3-Hydroxyphysodic acid]

A: 15 B: 36 B': 34 C: 13 E: x F: x G: x

HPLC: 17

V: + UV: +

Acid Spray: Green

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 468, 442, 265, 264

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Colensoic acid, Hydroxycolensoic acid, Lividic acid, Methoxycolensoic acid, 2'-O-Methylphysodic acid, 4-O-Methylphysodic acid, Physodic acid

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Boninic acid, Cryptochlorophaeic acid, Homosekikaic acid, Merochlorophaeic acid, 4'-*O*-Methylpaludosic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 131. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 291.

Notes: Acid Spray: pale orange, grey halo. LW UV: strong green, fades to bright blue. Occurs in *Ramalina paludosa*

Pannaric acid

A: 5 B: 28 B': 23 C: 10 E: x F: x G: x

HPLC: 6

V: – UV: +

Acid Spray: Purple LW UV: B.Blue

Archers: x

K: No Result C: Green KC: PD: No Result

Mass Spectrum: 316, 298, 272, 254

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: 4-Oxypannaric acid 6-methyl ester, Pannaric acid 2-methyl ester, Pannaric acid 6-methyl ester, Porphyrilic acid, Schizopeltic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 168. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 225.

Notes: LW UV: dark purple, blue halo. Occurs in *Lepraria membranacea*

Pannaric acid 2-methyl ester [9-Methyl pannarate]

A: 25 B: x B': 28 C: 21 E: x F: x G: x

HPLC: 8

V: – UV: +

Acid Spray: Purple LW UV: B.Blue

Archers: x

K: No Result C: Green KC: PD: No Result

Mass Spectrum: 330, 312, 298, 286

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: 4-Oxypannaric acid 2-methyl ester, 4-Oxypannaric acid 6-methyl ester, Pannaric acid, Pannaric acid 6-methyl ester, Porphyrilic acid, Schizopeltic acid

Reference: Elix, JA/ Naidu, R/ Laundon, JR 1992: A synthesis of the lichen dibenzofuran pannaric acid 2-methyl ester and its isomer 3-*O*-methylpannaric acid. Australian Journal of Chemistry 45: 785-791.

Notes: Occurs in *Roccella capensis*

Pannaric acid 6-methyl ester [15-Methyl pannarate]

A: 23 B: x B': 33 C: 17 E: x F: x G: x

HPLC: 11

V: – UV: +

Acid Spray: Purple LW UV: B.Blue

Archers: x

K: No Result C: Green KC: PD: No Result

Cortex: Medulla:

Mass Spectrum: 330, 312, 302, 286

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: 4-Oxypannaric acid 2-methyl ester, 4-Oxypannaric acid 6-methyl ester, Pannaric acid, Pannaric acid 2-methyl ester, Porphyrilic acid, Schizopeltic acid

Reference: Leuckert, C/Kümmerling, H 1989: Chemische Flechtenanalysen V. Pannsäure-6-methylester in einer Art der Gattung *Lepraria* und in *Leprocaulon tenellum*. Herzogia 8: 141-147.

Notes: Acid Spray: strong purple-grey. LW UV: strong-dark purple. Occurs in *Lepraria vouauxii*

Pannarin

A: 73 B: 68 B': 63 C: 79 E: 40 F: 64 G: x

HPLC: 36

V: – UV: +

Acid Spray: B.Blue LW UV: Brown

Archers: No Result

K: No Result C: No Result KC: No Result PD: Orange

Mass Spectrum: 364, 362, 213, 211

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Argopsin, Dechloropannarin, Isonorpannarin, Nordechloropannarin, Norargopsin, Norpannarin, Vicanicin

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 158. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 345.

Notes: Acid Spray: purple-blue, brown halo if strong. Occurs in *Pannaria conoplea*

Parietin [Physcoin]

A: 75 B: 72 B': 71 C: 82 E: 59 F: x G: 90

HPLC: 50

V: + UV: +

Acid Spray: Yellow LW UV: Orange

Archers: No Result

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 284, 269, 256, 255

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Emodin, Fallacinal, Fragilin, Parietic acid, Parietin bisanthrone, Teloschistin

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 186. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 179.

Notes: Yellow-orange pigment. Occurs in *Xanthoria parietina*

Parietin bisanthrone [Physcoin bisanthrone]

A: 67 B: x B': 38 C: 65 E: x F: x G: x

HPLC: 55

V: + UV: +

Acid Spray: Grey LW UV: Brown

Archers: No Result

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: x

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Fallacinal, Fragilin, Parietic acid, Parietin, Teloschistin

Reference: Johansson, S/ Sjøchting, U/ Elix, JA/ Wardlaw, JH 2005: Chemical variation in the lichen genus *Letrouitia* (Ascomycota, Letrouitiaceae). Mycological Progress 4: 139-148.

Notes: Minor component in *Letrouitia corallina*

Parietic acid

A: 40 B: x B': 45 C: 47 E: x F: x G: x

HPLC: 22

V: + UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 328, 284

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Emodin, Fallacinal, Fragilin, Parietin, Parietin bisanthrone, Teloschistin

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 187. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 180.

Notes: Yellow-orange pigment. Occurs in *Xanthoria parietina*

Patagonic acid

A: 38 B: x B': 47 C: 42 E: x F: x G: x

HPLC: 42

V: –

UV: +

Acid Spray: Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 277, 276, 193, 192

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Isopatagonic acid, Isosphaeric acid, 2-O-Methylpatagonic acid, Sphaerophorin

Reference: Elix, JA/ Venables, D/ Wedin, M 1994: New dibenzofurans and depsides from the lichen *Bunodophoron patagonicum*. Australian Journal of Chemistry 47: 1335-1344.

Notes: Occurs in *Bunodophoron patagonicum*

Peristictic acid

A: 4 B: x B': 11 C: 3 E: x F: x G: 23

HPLC: 4

V: –

UV: +

Acid Spray: Yellow

LW UV: Yellow

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 402, 385, 384, 370

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Constictic acid, Cryptostictic acid, Neotricone, Norstictic acid, Stictic acid

Reference: Elix, JA/Wardlaw, JH 2000: Lusitanic acid, peristictic acid and verrucigeric acid, three new β -orcinol depsidones from the lichens *Relicina sydneyensis* and *Xanthoparmelia verrucigera*. – Australian Journal of Chemistry 53: 815-818.

Notes: Minor component in *Relicina sydneyensis*

Perlatolic acid

A: 44 B: 77 B': 75 C: 54 E: x F: x G: x

HPLC: 47

V: –

UV: +

Acid Spray: Yellow

LW UV: Green

Archers: Orange

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 238, 224, 220

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Anziaic acid, Divaricatic acid, Glomelliferic acid, Hyperlatolic acid, Imbricaric acid, Isohyperlatolic acid, Stenosporic acid, Superlatolic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 126. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 292.

Notes: Acid Spray: pale yellow, grey halo. LW UV: deep purple, bright green halo. Occurs in *Cetraria cetrarioides*, *Stereocaulon ramulosum*

(-)-allo-Pertusaric acid

A: 37 B: 31 B': 33 C: 32 E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: Lilac

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 366, 348, 309, 290

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: *allo*-Dihydropertusaric acid, *allo*-Protolichesterinic acid

Reference: Huneck, S/ TønsbergT/ Bohlmann, F 1986: (-)-*allo*-Pertusaric acid and (-)-dihydropertusaric acid from the lichen *Pertusaria albescens*. *Phytochemistry* 25: 453-459.

Notes: Acid Spray: pale pink-brown, fades to mauve. Occurs in *Pertusaria albescens*

Phenarctin

A: 66 B: x B': 42 C: 61 E: 21 F: x G: x

HPLC: 34

V: – UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Yellow C: Red KC: PD: Yellow

Mass Spectrum: 416, 210, 207, 178

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: 1'-Chloronephroarctin, 2'-*O*-Methylisopseudocyphellarin A, 2'-*O*-Methylphenarctin, 2'-*O*-Methylpseudocyphellarin A, Isopseudocyphellarin A, Nephroarctin, Pseudocyphellarin A, Pseudocyphellarin B

Reference: Bruun, T 1971: Phenarctin, a fully substituted depside from *Nephroma arcticum*. *Acta Chemica Scandinavica* 25: 2831-2836.

Notes: Visible: pale orange. Acid Spray: dark orange, dark yellow halo; weak yellow, grey halo. Occurs in *Nephroma arcticum*

Phlebic acid A

A: 38 B: x B': 35 C: 40 E: 8 F: x G: 45

HPLC: x

V: –

UV: –

Acid Spray: P.Brown

LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 516, 498, 456, 443

Substance Class: Terpenoids

Biosynthetically Related Compounds: Phlebic acid B, Phlebic acid C, Phlebic acid D

Reference: Takahashi, R/ Tanaka, O/ Shibata, S 1969: Occurrence of 15 α -acetoxy-22-hydroxyhopane and phlebic acid A in the lichen, *Peltigera aphthosa*. *Phytochemistry* 8: 2345-2349.

Notes: Acid Spray: fades to purple. Occurs in *Peltigera aphthosa*

Phlebic acid B

A: 44 B: x B': 42 C: 48 E: 26 F: x G: 50

HPLC: x

V: –

UV: –

Acid Spray: P.Brown

LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 458, 440, 415, 387

Substance Class: Terpenoids

Biosynthetically Related Compounds: Phlebic acid A, Phlebic acid C, Phlebic acid D

Reference: Takahashi, R/ Tanaka, O/ Shibata, S 1970: The structure of phlebic acid B, a constituent of the lichen *Peltigera aphthosa*, and the occurrence of 15 α -acetoxy- and β -acetoxy-22-hydroxyhopane in *P. dolichorrhiza*. *Phytochemistry* 9: 2037-2040.

Notes: Acid Spray: fades to purple. Occurs in *Peltigera aphthosa*

Phlebic acid C

A: x B: x B': x C: 46 E: x F: x G: x

HPLC: x

V: –

UV: –

Acid Spray: P.Brown

LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 458, 443, 440, 425

Substance Class: Terpenoids

Biosynthetically Related Compounds: Phlebic acid A, Phlebic acid B, Phlebic acid D

Reference: Batchelor, FW/ King, GG/ Richardson, J 1990: Phlebic acids C and D, lichen acids from *Peltigera aphthosa*. *Phytochemistry* 29: 601-604.

Notes: Acid Spray: fades to purple. Occurs in *Peltigera aphthosa*

Phlebic acid D

A: x B: x B': x C: 38 E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 516, 498, 474, 456

Substance Class: Terpenoids

Biosynthetically Related Compounds: Phlebic acid A, Phlebic acid B, Phlebic acid C

Reference: Batchelor, FW/ King, GG/ Richardson, J 1990: Phlebic acids C and D, lichen acids from *Peltigera aphthosa*. *Phytochemistry* 29: 601-604.

Notes: Acid Spray: fades to purple. Occurs in *Peltigera aphthosa*

Phyllopsorin

A: 66 B: x B': 45 C: 64 E: 8 F: x G: x

HPLC: 22

V: – UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: Orange

Mass Spectrum: 378, 376, 350, 348

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Allorhizin, Argopsin, Chlorophyllopsorin, Methyl 2,7-dichloronorporsoromate, Methyl 2,7-dichloropsoromate, Pannarin

Reference: Elix, JA/ Venables, DA/ Brako, L 1990: New chlorine containing depsidones from the lichen *Phyllopsora corallina* var. *ochroxantha*. *Australian Journal of Chemistry* 43: 1953-1959.

Notes: Occurs in *Phyllopsora ochroxantha*

Physciosporin

A: 73 B: x B': 59 C: 78 E: 37 F: x G: x

HPLC: 38

V: – UV: +

Acid Spray: P.Brown LW UV: Brown

Archers: P.Red

K: No Result C: No Result KC: No Result PD: Orange

Mass Spectrum: 408, 406, 374, 346

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: 2-Chlorovirensic acid, Hypophysciosporin, Methyl virensate, Virensic acid

Reference: Maass, WSG/ McInnes, AG/ Smith, DG/ Tayloe, A 1977: Lichen substances. X. Physciosporin, a new chlorinated depsidone. Canadian Journal of Chemistry 55: 2839-2844.

Notes: Acid Spray: fades to purple-blue. Visible: strong, pale orange. Occurs in *Pseudocyphellaria faveolata*

Physodalic acid

A: 10 B: 31 B': 33 C: 19 E: x F: x G: 46

HPLC: 18

V: - UV: +

Acid Spray: Grey LW UV: Purple

Archers: No Result

K: P.Brown C: No Result KC: PD: Orange

Mass Spectrum: -1, 356, 314, 312

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Conphysodalic acid, Fumarprotocetraric acid, Malonprotocetraric acid, Protocetraric acid, Succinprotocetraric acid, Virensic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 158. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 346.

Notes: Occurs in *Hypogymnia physodes*

Physodic acid

A: 25 B: 35 B': 35 C: 18 E: x F: x G: x

HPLC: 25

V: - UV: +

Acid Spray: P.Orange LW UV: Purple

Archers: No Result

K: No Result C: No Result KC: P.Red PD: No Result

Mass Spectrum: 452, 426, 249, 248

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Colensoic acid, Lividic acid 2'-O-Methylphysodic acid, 4-O-Methylphysodic acid, Oxyphysodic acid, Vittatolic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 139. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 346.

Notes: Acid Spray: very pale orange, fades to grey. Occurs in *Hypogymnia physodes*

Picrolichenic acid

A: 38 B: 39 B': 45 C: 36 E: x F: x G: x

HPLC: 22

V: - UV: +

Acid Spray: P. Yellow

LW UV: Purple

Archers: x

K Mass Spectrum: 442, 424, 398, 384

Substance Class: Depsones

Biosynthetically Related Compounds: Hyperpicrolichenic acid, Isohyperpicrolichenic acid, Isosubpicrolichenic acid, Subpicrolichenic acid, Superpicrolichenic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 140. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 355.

Notes: Occurs in *Pertusaria amara*

Pigmentosin A

A: 54 B: x B': 13 C: 55 E: x F: x G: x

HPLC: 26

V: +

UV: +

Acid Spray: Brown

LW UV: Yellow

Archers: x

K: Red

C: No Result

KC:

PD: No Result

Mass spectrum: 547, 546, 528, 249

Substance Class: Naphthopyrones

Biosynthetically Related Compounds: Vioxanthin

Reference: Elix, JA/Wardlaw, JH 2004: Pigmentosin A, a new naphthopyrone from the lichen *Hypotrachyna immaculata*. Australian Journal of Chemistry 57: 681-683.

Notes: Yellow-green pigment. Minor component in *Hypotrachyna immaculata*

Pinastric acid

A: 70 B: 57 B': 55 C: 78 E: 22 F: x G: x

HPLC: 29

V: +

UV: +

Acid Spray: Yellow

LW UV: Yellow

Archers: x

K: No Result

C: No Result

KC: No Result

PD: No Result

Mass Spectrum: 352, 322, 320

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Calycin, Pulvinic acid, Pulvinic dilactone, Leprapinic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 212. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 401.

Notes: Yellow pigment. LW UV: deep mustard yellow. Occurs in *Vulpicida pinastris*

Placodiolic acid

A: 65 B: 63 B': 60 C: 67 E: 21 F: x G: x

HPLC: 27

V: – UV: +

Acid Spray: Orange LW UV: Purple

Archers: x

K: Yellow C: No Result KC: D. Yellow PD: No Result

Mass Spectrum: 376, 361, 235, 233

Substance Class: Usnic acid derivatives

Biosynthetically Related Compounds: Isoplacodiolic acid, Isopseudoplacodiolic acid, Isousnic acid,

Methylplacodiolic acid, Pseudoplacodiolic acid, Usnic acid

Reference: Huneck, S 1972: Flechteninhaltsstoffe – XCIII. Struktur der (-)-Placodiolsäure. Tetrahedron 28: 4011-4017.

Notes: Yellow pigment. LW UV: deep mustard yellow. Occurs in *Rhizoplaca chrysoleuca*

Planaic acid

A: 47 B: 38 B': 36 C: 50 E: x F: x G: x

HPLC: 34

V: – UV: +

Acid Spray: P. Yellow LW UV: Purple

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 236, 235

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*-Demethylplanaic acid, Hyperplanaic acid, 2-*O*-Methylconfluentic acid, 2-*O*-Methylperlatolic acid, Methyl planate, Isohyperplanaic acid, Superplanaic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 127. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 293.

Notes: Acid Spray: pale yellow, grey halo. LW UV spray: purple, green halo. Occurs in *Lecidea plana*

Platysporic acid [Platysporum unknown]

A: 55 B: x B': 51 C: 60 E: x F: x G: x

HPLC: x

V: – UV: +

Acid Spray: D. Brown LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Unknown [Depside?]

Biosynthetically Related Compounds: Psoromic acid

Reference: Frisch, A 2006. The lichen family Thelotremataceae in Africa. *Bibliotheca Lichenologica* 92: 1-367.

Notes: Occurs in *Fibrillithecis halei*

Polyporic acid

A: 29 B: 28 B': 29 C: 19 E: 22 F: x G: x

HPLC: 11

V: + UV: +

Acid Spray: P.Red LW UV: D.Red

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 292, 290, 149, 145

Substance Class: Terphenyl quinones

Biosynthetically Related Compounds:

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 208. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 184.

Notes: Deep red pigment. Occurs in *Pseudocyphellaria coronata*

Porphyritic acid

A: 9 B: 11 B': 11 C: 5 E: 27 F: x G: x

HPLC: 7

V: - UV: +

Acid Spray: P.Grey LW UV: Purple

Archers: x

K: No Result C: Green KC: PD: No Result

Mass Spectrum: 314, 298, 270, 241

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Methyl porphyrylate. Pannaric acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 168. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 226.

Notes: Occurs in *Haematomma ochroleucum*

Portentol

A: x B: x B': x C: x E: x F: x G: x

V: - UV: -

Acid Spray: x LW UV: x

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 310, 197, 181, 141

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Acetylportentol

Reference: Aberhart, DJ/ Overton, KH/ Huneck, S 1970: Portentol: an unusual polypropionate from the lichen *Roccella portentosa*. Journal of the Chemical Society (C): 1612-1623.

Notes: Occurs in *Roccella galapagoensis*

Praesorediosic acid

A: 30 B: x B': 39 C: 35 E: x F: x G: x

HPLC: 32

V: – UV: –

Acid Spray: P.Brown LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 364, 350, 346

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Protopraesorediosic acid

Reference: David, F/ Elix, J.A/ Samsudin, MW 1990: Two new aliphatic acids from the lichen *Parmotrema praesorediosum*. Australian Journal of Chemistry 43: 1297-1300.

Notes: Occurs in *Parmotrema praesorediosum*

Protocetraric acid

A: 3 B: 19 B': 19 C: 5 E: x F: x G: 27

HPLC: 13

V: – UV: +

Acid Spray: Grey LW UV: Purple

Archers: x

K: P.Brown C: No Result KC: PD: Red

Mass Spectrum: -1, 358, 314, 312

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Conprotocetraric acid, Fumarprotocetraric acid, Malonprotocetraric acid, Physodalic acid, Salazinic acid, Subvirensic acid, Succinprotocetraric acid, Virensic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 159. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 347.

Notes: Lichen spot test: K+ pale dingy yellowish brown. Occurs in *Flavoparmelia caperata*

Protoconstipatic acid

A: 26 B: x B': 17 C: 26 E: x F: x G: x

HPLC: 27

V: –

UV: –

Acid Spray: P.Brown

LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 368, 353, 350, 324

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Constipatic acid, Dehydroconstipatic acid, Lichesterinic acid, Murolic acid, Protolichesterinic acid

Reference: Chester, DO/ Elix, JA 1979: Three new aliphatic acids from lichens of genus *Parmelia* (subg. *Xanthoparmelia*). Australian Journal of Chemistry 32: 2566-2569.

Notes: Optical antipode of murolic acid. Occurs in *Xanthoparmelia constipata*

allo-Protolichesterinic acid

A: 42 B: x B': x C: 44 E: x F: x G: x

HPLC: x

V: –

UV: –

Acid Spray: P.Brown

LW UV: P.Lilac

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 324, 306, 280, 279

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: *allo*-Pertusaric acid

Reference: Huneck, S/ Schreiber, K/ Höfle, G/ Snatzke, G 1979: Neodihydromurol- und Murolsäure, zwei neue γ -Lactoncarbonsäure aus *Lecanora muralis*. Journal of the Hattori Botanical Laboratory 45: 1-23.

Notes: Occurs in *Cetraria ericetorum*

Protolichesterinic acid

A: 35 B: 47 B': 46 C: 37 E: x F: x G: x

HPLC: 48

V: –

UV: –

Acid Spray: No Result

LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 324, 306, 280, 279

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Constipatic acid, Dehydroconstipatic acid, Lichesterinic acid, Murolic acid, Protoconstipatic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 159. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 347.

Notes: LW UV: weak spot difficult to detect, often UV-quenching. Best seen as wet plate dries.

Occurs in *Cetraria islandica*

Protoneuropogolic acid

A: 26 B: x B': 17 C: 26 E: x F: x G: x

HPLC: 30

V: – UV: –

Acid Spray: No Result

LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 368, 353, 350

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Neuropogolic acid

Reference: New report

Notes: LW UV: weak spot difficult to detect, often UV-quenching. Best seen as wet plate dries.

Isomer of protoconstipatic acid. Occurs in *Neuropogon trachycarpus*

Protopraesorediosic acid

A: 26 B: x B': 32 C: 31 E: x F: x G: x

HPLC: 29

V: – UV: –

Acid Spray: No Result

LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 365, 364, 350

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Praesorediosic acid

Reference: David, F/ Elix, J.A/ Samsudin, MW 1990: Two new aliphatic acids from the lichen *Parmotrema praesorediosum*. Australian Journal of Chemistry 43: 1297-1300.

Notes: Occurs in *Parmotrema praesorediosum*

Protosiphulin

A: x B: x B': x C: x E: x F: x G: x

HPLC: 11

V: – UV: +

Acid Spray: Yellow

LW UV: Yellow

Archers: x

K: No Result C: Red KC: Red PD: No Result

Mass Spectrum: 382, 339, 325, 311

Substance Class: Chromones

Biosynthetically Related Compounds: Oxysiphulin, Siphulin

Reference: Shimada, S/ Saitoh, T/ Namiki, Y/ Sankawa, U/ Shibata, S 1980: New siphulin derivatives from the lichen *Siphula ceratites*. *Phytochemistry* 19: 467-469.

Notes: Occurs in *Siphula ceratites*

Pseudocyphellarin A

A: 75 B: 67 B': 74 C: 80 E: 66 F: x G: x

HPLC: 44

V: - UV: +

Acid Spray: P.Brown

LW UV: Brown

Archers: x

K: Yellow C: Red KC: PD: Yellow

Mass Spectrum: 402, 210, 193, 178

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Isopseudocyphellarin A, 2'-O-Methylisopseudocyphellarin A, 2'-O-Methylpseudocyphellarin A, Pseudocyphellarin B

Reference: Huneck, S 1984: Pseudocyphellarins A and B, two fully substituted depsides from the lichen *Pseudocyphellaria endochrysea*. *Phytochemistry* 23: 431-434.

Notes: Acid Spray: pale brown, grey halo. Occurs in *Pseudocyphellaria endochrysea*

Pseudocyphellarin B

A: 55 B: x B': 54 C: 48 E: 32 F: x G: x

HPLC: 30

V: - UV: +

Acid Spray: P.Brown

LW UV: Brown

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: -1, 210, 178, 150

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Isopseudocyphellarin A, 2'-O-Methylisopseudocyphellarin A, 2'-O-Methylpseudocyphellarin A, Pseudocyphellarin A

Reference: Huneck, S 1984: Pseudocyphellarins A and B, two fully substituted depsides from the lichen *Pseudocyphellaria endochrysea*. *Phytochemistry* 23: 431-434.

Notes: Acid Spray: pale brown, grey halo. Occurs in *Pseudocyphellaria endochrysea*

Pseudoplacodiolic acid

A: 58 B: 52 B': 46 C: 57 E: 22 F: x G: x

HPLC: 25

V: - UV: +

K: Yellow C: No Result KC: D.Yellow PD: No Result

Archers: x

Mass Spectrum: 376, 361, 235, 233

Substance Class: Usnic acid derivatives

Biosynthetically Related Compounds: Isoplacodiolic acid, Isopseudoplacodiolic acid, Isousnic acid, Methyl isoplacodiolic acid, Methylplacodiolic acid, Placodiolic acid, Usnic acid

Reference: Huneck, S/ Akinniyi, JA/ Cameron, AF/ Connolly, JD/ Mulholland, AG 1981: The absolute configuration of (+)-usnic acid and (+)-isousnic acids. X-Ray analyses of the (-)- α -phenylethylamine derivative of (+)-usnic acid and (-)-pseudoplacodiolic acid, a new dibenzofuran from the lichen *Rhizoplaca chrysoleuca*. Tetrahedron Letters 22: 351-352.

Notes: Occurs in *Rhizoplaca chrysoleuca*

Psoromic acid

A: 36 B: 41 B': 46 C: 41 E: x F: x G: 57

HPLC: 21

V: - UV: +

Acid Spray: Brown LW UV: Brown

Archers: No Result

K: Yellow C: Yellow KC: PD: Yellow

Mass Spectrum: 358, 330, 314, 179

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: 2'-O-Demethylpsoromic acid, Methyl psoromate, Subpsoromic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 160. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 347.

Notes: Occurs in *Usnea inermis*

Pulvinamide

A: 43 B: x B': 31 C: 43 E: 13 F: x G: x

HPLC: 18

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 307, 290, 261, 234

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Calycin, Pulvinic acid, Pulvinic dilactone

Reference: Maass, WSG 1970: Pulvinamide and possible biosynthetic relationships with pulvinic acid. Phytochemistry 9: 2477-2481.

Notes: Yellow pigment. LW UV: deep brownish yellow. Occurs in *Pseudocyphellaria crocata*

Pulvinic acid

A: 9 B: 36 B': 42 C: 7 E: 10 F: x G: x

HPLC: 6

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 308, 290, 262, 234

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Calycin, Pulvinamide, Pulvinic dilactone, Vulpinic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 213. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 402.

Notes: Yellow pigment. LW UV: deep brownish yellow. Occurs in *Pseudocyphellaria crocata*

Pulvinic dilactone [Pulvinic acid lactone]

A: 80 B: 82 B': 82 C: 90 E: 81 F: x G: x

HPLC: 43

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 290, 261, 234, 178

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Calycin, Pulvinamide, Pulvinic acid, Vulpinic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 214. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 402.

Notes: Yellow pigment. LW UV: deep brownish yellow. Occurs in *Pseudocyphellaria crocata*

Quaesitic acid

A: 6 B: x B': 9 C: 6 E: x F: x G: x

HPLC: 10

V: - UV: +

Acid Spray: Orange LW UV: Orange

Archers: No Result

K: Red C: No Result KC: PD: Orange

Mass spectrum: -1, 305, 205, 149

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Consalazinic acid, Galbinic acid, Salazinic acid, Succinsalazinic acid

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 368, 350, 336, 322

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Isorangiformic acid, Norrangiformic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 107. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 153.

Notes: Occurs in *Caldonia rangiformis*

Retigeranic acid A

A: 73 B: x B': 95 C: 83 E: 81 F: x G: x

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: P.Yellow

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 370, 325

Substance Class: Terpenoids

Biosynthetically Related Compounds: Retigeranic acid B

Reference: Sugawara, H/ Kasuya, A/ Iitaka, Y/ Shibata, S 1991: Further studies on the structure of retigeranic acid. Chemical and Pharmaceutical Bulletin (Tokyo) 39: 3051-3054.

Notes: Acid Spray: pale brown, grey halo; fades to purple, violet halo. LW UV: fades to pale pink. Occurs in *Lobaria isidiosa*

Retigeranic acid B

A: 73 B: x B': 95 C: 80 E: 78 F: x G: x

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: P.Yellow

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 370, 325

Substance Class: Terpenoids

Biosynthetically Related Compounds: Retigeranic acid A

Reference: Sugawara, H/ Kasuya, A/ Iitaka, Y/ Shibata, S 1991: Further studies on the structure of retigeranic acid. Chemical and Pharmaceutical Bulletin (Tokyo) 39: 3051-3054.

Notes: Acid Spray: pale brown, grey halo; fades to purple, violet halo. LW UV: fades to pale pink. Occurs in *Lobaria isidiosa*

Retigeric acid A

A: 17 B: x B': 22 C: 19 E: x F: x G: 68

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: Pink

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 486, 471, 453, 435

Substance Class: Terpenoids

Biosynthetically Related Compounds: Retigeric acid B

Reference: Takahashi, R/ Chiang, H-C/ Aimi, N/ Tanaka, O/ Shibata, S 1972: The structures of retigeric acids A and B from lichens of the *Lobaria retigera* group. *Phytochemistry* 11: 2039-2045.

Notes: Acid Spray: pale pinkish brown. LW UV: pale pink with whitish halo. Occurs in *Lobaria retigera*

Retigeric acid B

A: 4 B: x B': 13 C: 10 E: x F: x G: 12

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: Pink

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: Terpenoids

Biosynthetically Related Compounds: Retigeric acid A

Reference: Takahashi, R/ Chiang, H-C/ Aimi, N/ Tanaka, O/ Shibata, S 1972: The structures of retigeric acids A and B from lichens of the *Lobaria retigera* group. *Phytochemistry* 11: 2039-2045.

Notes: Acid Spray: pale pinkish brown. LW UV: pale pink with whitish halo. Occurs in *Lobaria retigera*

Rhein

A: 61 B: x B': 62 C: 47 E: x F: x G: x

HPLC: 22

V: + UV: +

Acid Spray: Red-orange LW UV: Magenta

Archers: x

K: Red-violet C: No Result KC: PD: No Result

Mass spectrum: 268

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Chrysophanal, Chrysophanol

Reference: Kondratyuk, SY/ Kärnefelt, I/ Elix, JA/ Thell, A 2007: New species of the genus *Caloplaca* in Australia. *Bibliotheca Lichenologica* 95: 341-386.

Notes: Yellow pigment. Occurs in *Caloplaca rheinigera*

Rhizocarpic acid

A: 67 B: 41 B': 41 C: 65 E: 22 F: x G: x

HPLC: 34

V: +

UV: +

Acid Spray: Yellow

LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 469, 290, 234, 145

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Epanorin, Pulvinic acid, Pulvinic dilactone

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 215. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 402.

Notes: Yellow pigment. Occurs in *Rhizocarpon geographicum*

Rhodocladonic acid

A: 0 B: x B': 1 C: 0 E: x F: x G: x

HPLC: 8

V: +

UV: +

Acid Spray: Red

LW UV: Red

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 318, 272, 257, 247

Substance Class: Naphthaquinones

Biosynthetically Related Compounds: Chiodectonic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 187. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 167.

Notes: Red-purple pigment. Occurs in *Cladonia floerkeana*

Roccellaric acid

A: 50 B: x B': x C: x E: x F: x G: x

HPLC: x

V: -

UV: -

Acid Spray: No Result

LW UV: No Result

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 326, 325, 308, 281

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: x

Reference: Huneck, S/ Follmann, G 1967: Über die Inhaltstoffe von *Roccellaria mollis* (Hampe) Zahlbr. und die struktur sowie absolute Konfiguration der Roccellarsäure. Zeitschrift für Naturforschung 22b: 666-670.

Notes: Occurs in *Roccellaria mollis*

Roccellic acid

A: 42 B: 60 B': 60 C: 48 E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: No Result LW UV: No Result

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 300, 282, 264, 254

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Angardianic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 108. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 154.

Notes: Occurs in *Roccella phycopsis*

Roccellin

A: x B: x B': x C: x E: x F: x G: x

HPLC: 8

V: + UV: +

Acid Spray: x LW UV: x

Archers: No Result

K: Yellow C: No Result KC: PD: No Result

Mass Spectrum: 452, 410, 247, 206

Substance Class: Chromones

Biosynthetically Related Compounds: Galapagin, Mollin

Reference: Huneck, S/ Jakupovic, J/ Follmann, G 1992: The final structures of the lichen chromones galapagin, lobodirin, mollin and roccellin. Zeitschrift für Naturforschung 47B: 449-451.

Notes: Pale yellow pigment. Occurs in *Roccellaria mollis*

Rugulosin

A: 30 B: x B': 14 C: 14 E: 3 F: x G: x

HPLC: 15

V: + UV: +

Acid Spray: Red-brown LW UV: Brown

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 542, 270, 256

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Emodin, Graciliformin, Skyrin

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 188. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 180.

Notes: Bright yellow pigment. Occurs in *Acroscyphus sphaerophoroides*

Russulone [Nemetzone]

A: 60 B: x B': 61 C: 50 E: x F: x G: x

HPLC: 42

V: + UV: +

Acid Spray: P.Red

LW UV: Pink

Archers: x

K: Purple C: No Result

KC: PD: No Result

Mass spectrum: 352, 338, 323, 309

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Endocrocin, Norrussulone

Reference: Staiger, B/ Kalb, K 1995: *Haematomma*-Studien. I. Die Flechtengattung *Haematomma*. Bibliotheca Lichenologica 59: 3-198.

Notes: Red pigment. Occurs in *Ramboldia russula*

Salazinic acid

A: 10 B: 7 B': 7 C: 4 E: x F: x G: 26

HPLC: 5

V: - UV: +

Acid Spray: Orange

LW UV: Orange

Archers: x

K: D.Red C: No Result

KC: PD: Orange

Mass Spectrum: 388, 370, 354, 179

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Connorstictic acid, Consalazinic acid, Galbinic acid, Hyposalazinic acid, Norstictic acid, Protocetraric acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 161. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 348.

Notes: Occurs in *Xanthoparmelia tasmanica*

Salazinolide [6α -Deoxysalazinic acid]

A: 18 B: x B': 12 C: 8 E: x F: x G: x

HPLC: 13

V: – UV: +

Acid Spray: Yellow LW UV: Brown

Archers: x

K: D.Red C: No Result KC: PD: Orange

Mass spectrum: x

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Consalazinolide, Norstictic acid, Salazinic acid

Reference: Elix, JA 2010: Two new species, a new combination and new chemical data for *Heterodermia* (Physciaceae: Ascomycota). Australasian Lichenology 67: 3-7.

Notes: Acid Spray: blue-grey, yellow on standing. Minor component in *Heterodermia queenslandica*

Scabrosin acetate butanoate [4-Acetyl-4'-butyrylscabrosin]

A: 57 B: x B': 7 C: 40 E: 12 F: x G: 56

HPLC: x

V: – UV: –

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 468, 408, 380, 318

Substance Class: Amino-acid derivatives

Biosynthetically Related Compounds: Scabrosin acetate hexanoate, Scabrosin diacetate, Scabrosin dibutanoate

Reference: Ernst-Russell, MA/ Chai, CLL/ Hurne, AM/ Waring, P/ Hockless, DCR/ Elix, JA 1999: Structural revision and cytotoxic activity of the scabrosin esters, epidthiopiperazinediones from the lichen *Xanthoparmelia scabrosa*. Australian Journal of Chemistry 52: 279-283.

Notes: SW UV: may detected if concentrated. Occurs in *Xanthoparmelia scabrosa*

Scabrosin acetate hexanoate [4-Acetyl-4'-hexanoylscabrosin]

A: 61 B: x B': 13 C: 43 E: 15 F: x G: 61

HPLC: x

V: – UV: –

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 496, 436, 380, 318

Substance Class: Amino-acid derivatives

Biosynthetically Related Compounds: Scabrosin acetate butanoate, Scabrosin diacetate, Scabrosin dibutanoate

Reference: Ernst-Russell, MA/ Chai, CLL/ Hurne, AM/ Waring, P/ Hockless, DCR/ Elix, JA 1999: Structural revision and cytotoxic activity of the scabrosin esters, epidthiopiperazinediones from the lichen *Xanthoparmelia scabrosa*. Australian Journal of Chemistry 52: 279-283.

Notes: SW UV: may detected if concentrated. Occurs in *Xanthoparmelia scabrosa*

Scabrosin diacetate [4,4'-Diacetylscabrosin]

A: 50 B: x B': 3 C: 33 E: x F: x G: 48

HPLC: x

V: – UV: –

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 440, 380, 320, 318

Substance Class: Amino-acid derivatives

Biosynthetically Related Compounds: Scabrosin acetate butanoate, Scabrosin acetate hexanoate, Scabrosin dibutanoate

Reference: Ernst-Russell, MA/ Chai, CLL/ Hurne, AM/ Waring, P/ Hockless, DCR/ Elix, JA 1999: Structural revision and cytotoxic activity of the scabrosin esters, epidthiopiperazinediones from the lichen *Xanthoparmelia scabrosa*. Australian Journal of Chemistry 52: 279-283.

Notes: SW UV: may detected if concentrated. Occurs in *Xanthoparmelia scabrosa*

Scabrosin dibutanoate [4,4'-Dibutyrylscabrosin]

A: 65 B: x B': 19 C: 46 E: 22 F: x G: 67

HPLC: x

V: – UV: –

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 496, 408, 320, 318

Substance Class: Amino-acid derivatives

Biosynthetically Related Compounds: Scabrosin acetate butanoate, Scabrosin acetate hexanoate, Scabrosin dibutanoate

Reference: Ernst-Russell, MA/ Chai, CLL/ Hurne, AM/ Waring, P/ Hockless, DCR/ Elix, JA 1999: Structural revision and cytotoxic activity of the scabrosin esters, epidthiopiperazinediones from the lichen *Xanthoparmelia scabrosa*. Australian Journal of Chemistry 52: 279-283.

Notes: SW UV: may detected if concentrated. Occurs in *Xanthoparmelia scabrosa*

Scensidin

A: 75 B: x B': 64 C: 80 E: 44 F: x G: x

HPLC: 41

V: – UV: +

Acid Spray: No Result LW UV: D.Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 372, 370, 368, 335

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Dechloro-*O*-methyldiploicin, 3-*O*-Demethylscensidin, Diploicin, Isofulgidin

Reference: Mahandru, MM/ Tajbakhsh, A 1983: Fulgoicin, a new depsidone from the lichen *Fulgensia fulgida*. Journal of the Chemical Society, Perkin Transactions I: 2249-2251.

Notes: Best seen under SW UV before spraying. Minor component in *Diploicia canescens*

Schizopeltic acid

A: 42 B: 27 B': 22 C: 46 E: 44 F: x G: x

HPLC: 16

V: – UV: +

Acid Spray: Purple LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 358, 343, 327, 311

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Pannaric acid, Pannaric acid 2-methyl ester, Pannaric acid 6-methyl ester

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 169. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 227.

Notes: Acid Spray: purple, blue halo; fades to grey. LW UV: dark purple, violet halo. Occurs in *Schizopelte californica*

m-Scrobiculin

A: 64 B: 55 B': 54 C: 49 E: 39 F: x G: x

HPLC: 29

V: + UV: +

Acid Spray: P.Brown LW UV: Purple

Archers: Brown

K: Yellow C: Red KC: D.Red PD: No Result

Mass Spectrum: 418, 226, 195, 194

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4'-*O*-Demethylsekikaic acid, p-Scrobiculin

Reference: Elix, JA/ Gaul, KL 1986: The interconversion of the lichen depsides *para*- and *meta*-scrobiculin, and the biosynthetic implications. Australian Journal of Chemistry 39: 613-624.

Notes: Visible: pale dull yellow. Acid Spray: fades to pale orange. LW UV: purple, pale green halo. Occurs in *Lobaria scrobiculata*

p-Scrobiculin

A: 66 B: x B': 58 C: 52 E: 44 F: x G: x

HPLC: 31

V: – UV: +

Acid Spray: P.Brown LW UV: Purple

Archers: Brown

K: Yellow C: Red KC: D.Red PD: No Result

Mass Spectrum: 418, 226, 195, 194

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4'-*O*-Demethylsekikaic acid, m-Scrobiculin

Reference: Elix, JA/ Gaul, KL 1986: The interconversion of the lichen depsides *para*- and *meta*-scrobiculin, and the biosynthetic implications. Australian Journal of Chemistry 39: 613-624.

Notes: Acid Spray: fades to pale orange. LW UV: purple, pale green halo. Occurs in *Lobaria scrobiculata*

Sekikaic acid

A: 45 B: 57 B': 57 C: 51 E: x F: x G: x

HPLC: 28

V: – UV: +

Acid Spray: Orange LW UV: Green

Archers: P.Red

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 418, 226, 210, 208

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Boninic acid, 4'-*O*-Demethylsekikaic acid, 2,4'-*Di-O*-methylnorsekikaic acid, Homosekikaic acid, 4'-*O*-Methylnorsekikaic acid, 2-*O*-Methylsekikaic acid, Ramalinolic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 133. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 296.

Notes: Acid Spray: pale orange, grey halo; fades to dark orange. LW UV: strong-orange, green halo. Occurs in *Canoparmelia pustulescens*

Semivioxanthin

A: 62 B: x B': 42 C: 52 E: 20 F: x G: x

HPLC: 20

V: + UV: +

Acid Spray: Green LW UV: Sky Blue

Archers: x

K: Red C: No Result KC: PD: No Result

Mass spectrum: 547, 546, 528, 249

Substance Class: Naphthopyrones

Biosynthetically Related Compounds: Demethylvioxanthin, Pigmentosin A, Vioxanthin

Reference: Elix, JA 2004: Vioxanthin from a lichen source. Australasian Lichenology 55: 14-15.

Notes: Yellow-green pigment. Occurs in *Buellia vioxanthina*

Simonyellin

A: 65 B: x B': 44 C: 55 E: x F: x G: x

HPLC: 28

V: + UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 274, 259, 256, 231

Substance Class: Naphthopyrone

Biosynthetically Related Compounds: x

Reference: Elix, JA/ Feige, GB/ Lumbsch, HT/ Mies, B/Wardlaw, JH/ Willis, AC 1995: The structure determination of simonyellin-a new lichen naphthopyran. Australian Journal of Chemistry 48: 2035-2039.

Notes: Yellow pigment. Occurs in *Simonyella variegata*

Siphulellic acid

A: 12 B: x B': 24 C: 8 E: x F: x G: 35

HPLC: 10

V: - UV: +

Acid Spray: Brown LW UV: Brown

Archers: x

K: No Result C: No Result KC: No Result PD: Yellow

Mass Spectrum: 342, 298, 152, 151

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Psoromic acid

Reference: Elix, JA/ Gaul, KL/ Kantvilas, G/ James, PW 1993: Siphulellic acid, a new depsidone from the lichen *Siphulella coralloidea*. Bibliotheca Lichenologica 53: 67-74.

Notes: Occurs in *Siphulella coralloidea*

Siphulin

A: 14 B: 27 B': 24 C: 4 E: x F: x G: 35

HPLC: 22

V: - UV: +

Acid Spray: Brown LW UV: Brown

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: 382, 339, 325, 311

Substance Class: Chromones

Biosynthetically Related Compounds: Oxysiphulin, Protosiphulin

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 176. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 189.

Notes: Occurs in *Siphula ceratites*

Skyrin

A: 37 B: 32 B': 35 C: 23 E: 4 F: x G: 66

HPLC: 31

V: + UV: +

Acid Spray: Grey LW UV: Grey

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 410, 398, 370, 342

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Diacetylgraciliformin, Emodin, Graciliformin, Monoacetylgraciliformin, Oxyskyrin, Rugulosin, Skyrinol

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 188. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 181.

Notes: Orange-yellow pigment. Acid Spray: dull green when plate still hot, cools to grey. Occurs in *Flavoparmelia haysomii*

Skyrinol

A: x B: x B': x C: x E: x F: x G: x

HPLC: x Rf 30 [chloroform/acetone, 2:1]

V: + UV: +

Acid Spray: Grey LW UV: Grey

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: x

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Emodin, Graciliformin, Oxyskyrin, Rugulosin, Skyrin

Reference: Santesson, J 1970: Chemical studies on lichens. 30. Anthraquinoid pigments of *Trypetheliopsis boninensis* and *Ocellularia domingensis*. Acta Chemica Scandinavica 24: 3331-3334.

Notes: Orange pigment in *Trypetheliopsis boninensis*

Solorinic acid

A: 80 B: x B': 78 C: 85 E: 61 F: x G: x

HPLC: 75

V: + UV: +

Acid Spray: Orange LW UV: Pink

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 384, 366, 341, 313

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Averythrin, 6-O-Methylaverythrin, Norsolorinic acid

Reference: Santesson, J 1970: Chemical studies on lichens. 30. Anthraquinoid pigments of *Trypetheliopsis boninensis* and *Ocellularia domingensis*. Acta Chemica Scandinavica 24: 3331-3334.

Notes: Orange-red pigment. Acid Spray: orange, fades to bright pink. LW UV: bright pink. Occurs in *Solorina crocea*

Sordidone

A: 59 B: x B': 42 C: 42 E: 22 F: x G: x

HPLC: 13

V: + UV: +

Acid Spray: P.Yellow LW UV: Yellow

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass Spectrum: 242, 241, 240, 223

Substance Class: Chromones

Biosynthetically Related Compounds: Eugenitin, Eugenitol

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 177. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 189.

Notes: Pale yellow pigment. Occurs in *Lecanora rupicola*

Sphaerophorin

A: 45 B: 76 B': 74 C: 55 E: x F: x G: x

HPLC: 46

V: - UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: Orange

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 252, 234, 182

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*-Demethylsphaerophorin, Isosphaeric acid, Subsphaeric acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 127. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 297.

Notes: Acid Spray: pale orange-yellow, grey halo. LW UV: strong-purple, green halo. Occurs in *Sphaerophorus fragilis*

Squamarone [2,6,8-Trihydroxy-7-ethyl-3-methylnaphtho-1,4-quinone]

A: x B: 45 B': x C: x E: x F: x G: x

HPLC: 16

V: + UV: +

Acid Spray: Purple LW UV: P.Brown

Archers: x

K: Blue-violet C: No Result KC: PD: No Result

Mass spectrum: 248, 233, 220, 205

Substance Class: Naphthaquinones

Biosynthetically Related Compounds: Boryquinone

Reference: Himmelreich, U/ Huneck, S/ Feige, GB/ Lumbsch, HT 1994: Squamaron, ein Naphthachinon aus der Flechte *Squamarina cartilaginea*. Zeitschrift für Naturforschung 49b: 1289-1291.

Notes: Orange-red pigment in lichenicolous fungus on *Squamarina cartilaginea*

Squamatic acid

A: 13 B: 25 B': 23 C: 28 E: x F: x G: 39

HPLC: 22

V: - UV: +

Acid Spray: Grey LW UV: Green

Archers: D.Red

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 346, 226, 209

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Baeomycesic acid, Barbatic acid, 4-*O*-Demethylbarbatic acid, Elatinic acid, 3 α -Hydroxybarbatic acid, 2-*O*-Methylsquamic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 149. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 297.

Notes: SW UV: fluoresces bright blue before spraying. Occurs in *Cladonia squamosa*

Stenosporic acid

A: 44 B: 73 B': 72 C: 52 E: x F: x G: x

HPLC: 40

V: – UV: +

Acid Spray: Orange LW UV: Green

Archers: D.Red

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 224, 210, 206

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: 4-*O*-Demethylstenosporic acid, Divaricatic acid, Glomelliferic acid, 2-*O*-Methylstenosporic acid, Oxostenosporic acid, Perlatolic acid

Reference: Culberson, CF 1970: Stenosporic acid, a new depside in *Ramalina stenospora*. *Phytochemistry* 9: 841-844

Notes: Acid Spray: pale yellow-orange, grey halo. LW UV: strong-purple, green halo. Occurs in *Ramalina stenospora*

Stenosporonic acid

A: 40 B: x B': 62 C: 46 E: x F: x G: x

HPLC: 35

V: – UV: +

Acid Spray: Orange LW UV: Pink

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 414, 396, 370, 193

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Colensoic acid, Divaronic acid, Glomelliferic acid, 2-*O*-Methylstenosporic acid, Oxostenosporic acid, Perlatolic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1985: Orcinol-type depsides and depsidones in the lichens of the *Cladonia chlorophaea* group (Ascomycotina, Cladoniaceae). *Bryologist* 88: 380-387.

Notes: Acid Spray: pale orange, grey halo. LW UV: purplish pink; same as colensoic acid. Occurs in *Cladonia grayi*

Stictane-3 β ,22-diol [Retigeradiol]

A: 44 B: x B': 47 C: 43 E: 29 F: x G: 62

HPLC: x

V: – UV: –

Acid Spray: P.Brown LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 444, 440, 429, 426

Substance Class: Terpenoids

Biosynthetically Related Compounds: 2 α -Acetoxystictane-3 β ,22 α -diol, 3 β -Acetoxystictane-2 α ,22 α -diol, 22 α -Hydroxy-3,4-secostict-4(23)-enaldehyde, 22 α -Hydroxy-3,4-secostict-4(23)-enoic acid

V: – UV: +
Acid Spray: Grey LW UV: Purple

Archers: x

K: No Result C: Green KC: PD: No Result

Mass Spectrum: 270, 241, 213, 185

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Alectosarmentin, Di-*O*-methylstrepsilin, Norascomatic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 170. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 227.

Notes: Acid Spray: pale grey. LW UV: weak-pale blue; strong-purple, blue halo. Occurs in *Cladonia strepsilis*

Subconfluent acid

A: 46 B: x B': 31 C: 47 E: x F: x G: x

HPLC: 26

V: – UV: +

Acid Spray: P.Yellow LW UV: Blue

Archers: P.Red

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 238, 235, 234

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Confluent acid, 2'-*O*-Methylperlatolic acid, 2'-*O*-Methylhyperlatolic acid, 2'-*O*-Methylisohyperlatolic acid, 2'-*O*-Methylimbricatic acid

Reference: Elix, JA/ Wardlaw, JH 1996: The structure of subconfluent acid, a depside from the lichen *Lecidella* cf. *cyanosarca*. Australian Journal of Chemistry 49: 159-161.

Notes: Occurs in *Lecidella* cf. *cyanosarca*

Subdidymic acid

A: 42 B: 21 B': 65 C: 47 E: x F: x G: x

HPLC: 28

V: – UV: +

Acid Spray: P.Blue LW UV: Purple

Archers: x

K: No Result C: Green KC: PD: No Result

Mass Spectrum: 342, 324, 298, 295

Substance Class: Dibenzofurans

Biosynthetically Related Compounds: Condidymic acid, Didymic acid, Isodidymic acid

Reference: Elix, JA/ Kennedy, JM 1985: Synthesis of the Lichen Dibenzofuran, Subdidymic Acid. Australian Journal of Chemistry 38: 1857-1861

Notes: Acid Spray: pale blue. LW UV: dark purple, violet halo. Occurs in *Cladonia strepsilis*

Subdivaricatic acid

A: 38 B: x B': 65 C: 49 E: x F: x G: x

HPLC: 32

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: P.Red

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 196, 182, 178, 164

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Divaricatic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1990: The *Ramalina americana* complex (Ascomycotina, Ramalinaceae): chemical and geographical correlations. *Bryologist* 93: 167-186.

Notes: Occurs in *Ramalina americana* s.lat.

Sublobaric acid

A: 30 B: x B': 36 C: 33 E: x F: x G: x

HPLC: 39

V: – UV: +

Acid Spray: Grey LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: D.Red PD: No Result

Mass spectrum: 428, 411, 410, 355

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Lobaric acid, Oxolobaric acid, Norlobaridone

Reference: Elix, JA/ Wardlaw, JH/Yoshimura, I 1997: Sublobaric acid and oxolobaric acid, two new depsidones from the lichen *Lobaria hypoleucooides*. *Australian Journal of Chemistry* 50: 763-765.

Notes: Occurs in *Lobaria hypoleucooides*

Submerochlorophaeic acid

A: 44 B: x B': 47 C: 62 E: x F: x G: x

HPLC: 19

V: – UV: +

Acid Spray: Red-brown LW UV: Brown

Archers: x

K: No Result C: Red KC: PD: No Result

Mass spectrum: -1, 224, 208, 207, 191

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Cryptochlorophaeic acid, Merochlorophaeic acid, 4-O-Methylcryptochlorophaeic acid, Paludolic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1985: Orcinol-type depsides and depsidones in the lichens of the *Cladonia chlorophaea* group (Ascomycotina, Cladoniaceae). *Bryologist* 88: 380-387.

Notes: Occurs in *Cladonia merochlorophaea*

Subnorstictic acid

A: 30 B: x B': 16 C: 12 E: x F: x G: x

HPLC: 6

V: - UV: +

Acid Spray: Yellow LW UV: Yellow

Archers: No Result

K: Red C: No Result KC: PD: P.Orange

Mass spectrum: 358, 354, 341, 340

Substance Class: Orcinol β -Orcinol Depsidones

Biosynthetically Related Compounds: Connorstictic acid, Norstictic acid

Reference: Elix, JA/ Adler, MT/Wardlaw 1996: A further three new depsidones. *Australian Journal of Chemistry* 49: 1175-1178.

Notes: Minor component in *Diploschistes ocellatus*

Subnotatic acid

A: 25 B: x B': 37 C: 36 E: x F: x G: 48

HPLC: 15

V: - UV: +

Acid Spray: P.Yellow LW UV: D.Blue

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 330, 315, 286, 150

Substance Class: Orcinol β -Orcinol Depsidones

Biosynthetically Related Compounds: 4-O-Demethylnotatic acid, Hypoprotocetraric acid, Isonotatic acid, 4-O-Demethylnotatic acid, Notatic acid

Reference: Elix, JA/ Lajide, L 1984: The identification of further new depsidones in the lichen *Parmelia notata* Kurok. *Australian Journal of Chemistry* 37: 857-866.

Notes: Occurs in *Xanthoparmelia notata*

Subpaludosic acid

A: 29 B: x B': 37 C: 29 E: x F: x G: x

HPLC: 13

V: - UV: +

Acid Spray: Red-brown LW UV: Brown

Archers: x

K: No Result C: Red KC: PD: No Result

Mass Spectrum: -1, 193, 177, 165, 149

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Cryptochlorophaeic acid, Paludosic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1985: Orcinol-type depsides and depsidones in the lichens of the *Cladonia chlorophaea* group (Ascomycotina, Cladoniaceae). *Bryologist* 88: 380-387.

Notes: Occurs in *Ramalina paludosa*

Subpicrolichenic acid

A: 33 B: x B': 36 C: 33 E: x F: x G: x

HPLC: 15

V: - UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: Red PD: No Result

Mass Spectrum: 414, 396, 370, 356

Substance Class: Depsones

Biosynthetically Related Compounds: Picrolichenic acid, Hyperpicrolichenic acid, Superpicrolichenic acid

Reference: Elix, JA/ Calanasan, CA/ Archer, AW 1991: Subpicrolichenic acid and superpicrolichenic acid, two new depsones from *Pertusaria* lichens. *Australian Journal of Chemistry* 44: 1487-1493.

Notes: Minor component in *Pertusaria amara*

Subpsoromic acid

A: 36 B: x B': 38 C: 34 E: x F: x G: x

HPLC: 14

V: - UV: +

Acid Spray: Brown LW UV: Brown

Archers: No Result

K: No Result C: No Result KC: No Result PD: P.Yellow

Mass spectrum: 344, 300, 299, 277

Substance Class: Orcinol β -Orcinol Depsidones

Biosynthetically Related Compounds: Psoromic acid

Reference: Elix, JA/Wardlaw, JH 2000: Subpsoromic acid, a new depsidone from the lichen *Ocellularia praestans*. *Australian Journal of Chemistry* 53: 813-814.

Notes: Occurs in *Ocellularia praestans*

Subsekikaic acid

A: 44 B: x B': 53 C: 50 E: x F: x G: x

HPLC: 28

V: - UV: +

Acid Spray: Orange LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 254, 208, 182

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Homosekikaic acid, Sekikaic acid

Reference: Culberson, CF/ Culberson, WL/ Johnson, A 1990: The *Ramalina americana* complex (Ascomycotina, Ramalinaceae): chemical and geographical correlations. Bryologist 93: 167-186.

Notes: Occurs in *Ramalina americana* s. lat.

Subsphaeric acid

A: 50 B: x B': 67 C: 50 E: x F: x G: x

HPLC: 50

V: - UV: +

Acid Spray: P. Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 224, 206, 182

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Isosphaeric acid, Sphaerophorin

Reference: Elix, JA/ Evans, JE/ Nash III, TH 1988: New depsides from *Dimelaena* lichens. Australian Journal of Chemistry 41: 1789-1796.

Notes: Acid Spray: pale yellow, grey halo. LW UV: strong-purple, green halo. Occurs in *Dimelaena thysanota*.

Substictic acid

A: 13 B: x B': 4 C: 10 E: x F: x G: 23

HPLC: 4

V: - UV: +

Acid Spray: Brown LW UV: Brown

Archers: No Result

K: Yellow C: No Result KC: PD: P. Orange

Mass Spectrum: 372, 354, 344, 328

Substance Class: Orcinol β -Orcinol Depsidones

Biosynthetically Related Compounds: Stictic acid

Reference: Elix, JA/ Gaul, KL/ James, PW/ Purvis, OW 1987: Three New Lichen Depsidones. Australian Journal of Chemistry 40: 417-423.

Notes: Occurs in *Aspicilia mashiginensis*

Subvirensic acid

A: 22 B: 57 B': 48 C: 33 E: x F: x G: x

HPLC: 13

V: – UV: +
Acid Spray: P.Brown LW UV: Brown
Archers: No Result
K: P.Brown C: No Result KC: PD: P.Orange
Mass Spectrum: 344, 326, 300, 299
Substance Class: Orcinol β -Orcinol Depsidones
Biosynthetically Related Compounds: Convirensic acid, Protocetraric acid, Virensic acid
Reference: Elix, JA/ Liu, X-W/ Wardlaw, JH 2002: Subvirensic acid, a new depsidone from the lichen *Flavoparmelia haysomii*. Australian Journal of Chemistry 55: 505-506.
Notes: Minor component in *Flavoparmelia haysomii*

Succinprotocetraric acid

A: 4 B: 23 B': 18 C: 10 E: x F: x G: 26
HPLC: 10
V: – UV: +
Acid Spray: Grey LW UV: Purple
Archers: No Result
K: P.Brown C: No Result KC: PD: D.Red
Mass Spectrum: -1, 358, 312, 258
Substance Class: β -Orcinol Depsidones
Biosynthetically Related Compounds: Fumarprotocetraric acid, Malonprotocetraric acid, Physodalic acid, Protocetraric acid, Virensic acid
Reference: Baker, C/ Elix, JA/ Murphy, DPH/ Kurokawa, S/ Sargent, MV 1973: *Parmelia reptans*, a new lichen species producing the depsidone, succinprotocetraric acid. Australian Journal of Botany 21: 137-140.
Notes: Occurs in *Xanthoparmelia semiviridis*

Succinsalazinic acid

A: 12 B: 23 B': 7 C: 10 E: x F: x G: x
HPLC: 8
V: – UV: +
Acid Spray: Yellow LW UV: Purple
Archers: x
K: Red C: No Result KC: PD: D.Red
Mass Spectrum: x
Substance Class: β -Orcinol Depsidones
Biosynthetically Related Compounds: Fumarprotocetraric acid, Quaesitic acid, Salazinic acid, Succinprotocetraric acid, Protocetraric acid
Reference: New Report
Notes: Minor component in *Megalalaria pulvereae*

Superconfluent acid

A: 50 B: x B': 43 C: 60 E: x F: x G: x

HPLC: 41

V: – UV: +

Acid Spray: P.Yellow LW UV: B.Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: -1, 291, 290, 266

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Confluent acid, Glaucophaeic acid, Hyperconfluent acid, Insignin, Superconfluent acid

Reference: Elix, JA/ Wardlaw, JH 1996: Synthesis of depsides present in the lichen *Porpidia glaucophaea*.

Australian Journal of Chemistry 49: 817-924.

Notes: Occurs in *Haematomma pachycarpus*, *Porpidia glaucophaea*

Superlatolic acid [Prasinic acid]

A: 53 B: x B': 80 C: 56 E: x F: x G: x

HPLC: 59

V: – UV: +

Acid Spray: P.Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 266, 248, 234

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Hyperlatolic acid, Isohyperlatolic acid, Methoxymicareic acid, Micareic acid, Perlatolic acid

Reference: Elix, JA/ Lajide, L/ Coppins, BJ/ James, PW 1984: Two new diphenyl ethers and a new depside from the lichen *Micarea prasina* Fr. Australian Journal of Chemistry 37: 2397-2402.

Notes: Acid Spray: pale yellow, grey halo. LW UV spray: strong-purple, green halo. Occurs in *Micarea subviridescens*

Superpicrolichenic acid

A: 54 B: x B': 57 C: 53 E: x F: x G: x

HPLC: 34

V: – UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: Red PD: No Result

Mass Spectrum: 498, 470, 452, 440

Substance Class: Depsones

Biosynthetically Related Compounds: Hyperpicrolichenic acid, Isohyperpicrolichenic acid, Picrolichenic acid, Subpicrolichenic acid,

Reference: Elix, JA/ Venables, D/ Archer, AW 1994: 70. Further new depsones from the lichen *Pertusaria truncata*. Australian Journal of Chemistry 47: 1345-1353.

Notes: Occurs in *Pertusaria truncata*

Superplanaic acid

A: 53 B: x B': 47 C: 60 E: x F: x G: x

HPLC: 55

V: – UV: +

Acid Spray: P.Yellow LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 264, 263, 91

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Planaic acid, Isohyperplanaic acid, Hyperplanaic acid

Reference: Elix, JA/ Barclay, CE/ Lumbsch, HT 1994: New depsides from the lichen *Lecanora planaica*. - Australian Journal of Chemistry 47: 1199-1203.

Notes: Occurs in *Lecanora planaica*

SV 1

A: 48 B: 30 B': 20 C: 21 E: 4 F: x G: x

HPLC: 37

V: + UV: +

Acid Spray: Grey LW UV: Grey

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: x

Substance Class: unknown

Biosynthetically Related Compounds: x

Reference: Culberson, CF 1972: Improved conditions and new data for the identification of lichen products by a standardized thin-layer chromatographic method. Journal of Chromatography 72: 113-125.

Notes: Visible: yellow-green pigment, before spraying. Occurs in *Xanthoparmelia tasmanica*

Taraxerol

A: x B: x B': x C: x E: x F: x G: x

HPLC: x

V: – UV: –

Acid Spray: x LW UV: x

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 426, 411, 302, 287

Substance Class: Terpenoids

Biosynthetically Related Compounds: Friedelin

Reference: Nicollier, G/ Tabacchi, R/ Gavin, J/ Breton, JL/ Gonzales, AG 1979: Triterpenes de la 'mousse de chêne' (*Evernia prunastri* ((L.) Ach.). *Helvetica Chimica Acta* 62: 807-810.

Notes: Occurs in *Evernia prunastri*

Teloschistin [Fallacinol]

A: 44 B: x B': 31 C: 36 E: 13 F: x G: x

HPLC: 24

V: + UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 300

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Emodin, Fallacinal, Parietin, Parietinic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 189. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 174.

Notes: Red-orange pigment. Occurs in *Teloschistes flavicans*

Teloschistin acetate [Monoacetylfallacinol]

A: 68 B: x B': 43 C: 52 E: 45 F: x G: x

HPLC: 36

V: + UV: +

Acid Spray: Yellow LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 300

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Emodin, Fallacinal, Parietin, Parietinic acid, Teloschistin

Reference: Piattelli, M/ Giudici de Nicola, M 1968: Anthraquinone pigments from *Xanthoria parietina* (L.) Th.Fr. *Phytochemistry* 7: 1183-1187.

Notes: Red-orange pigment. Minor component in *Xanthoria parietina*

Tenuiorin

A: 76 B: 58 B': 55 C: 76 E: 25 F: x G: x

HPLC: 39

V: – UV: +
Acid Spray: Yellow LW UV: Green

Archers: D.Red

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 332, 182, 165

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: 2',2''-Di-*O*-methyltenuiorin, Gyrophoric acid, Methyl gyrophorate, Methyl lecanorate, 2''-*O*-Methyltenuiorin, 2'-*O*-Methyltenuiorin

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 128. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 310.

Notes: Occurs in *Pseudocyphellaria crocata*

Testacein [Testacea unknown]

A: 42 B: x B': 25 C: 22 E: x F: x G: x

HPLC: 32

V: – UV: +

Acid Spray: Pink LW UV: Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: x

Substance Class: unknown

Biosynthetically Related Compounds: x

Reference: Hale, ME 1987: A monograph of the lichen genus *Parmelia* Acharius sensu stricto (Ascomycotina: Parmeliaceae). Smithsonian Contribution to Botany 66: 1–55 [as unknown #27].

Notes: Occurs in *Parmelia testacea*, *P. subtestacea*, *Pyxine* sp.

2,2',7,7'-Tetrachlorohypericin

A: x B: x B': x C: x E: x F: x G: x

HPLC: x TLC: Rf = 0.2 [chloroform/methanol, 9/1]

V: + UV: +

Acid Spray: Indigo LW UV: Blue

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 645, 643, 641, 639

Substance Class: Phenanthraperylenequinones

Biosynthetically Related Compounds: 7,7'-Dichlorohypericin

Reference: Reference: Cohen, PA/ Towers, GHN 1995: Anthraquinones and phenanthraperylenequinones from *Nephroma laevigatum*. Journal of Natural Products 58: 520-526.

Notes: Blue-black pigment. Occurs in *Nephroma laevigatum*

1,5,6,8-Tetrahydroxy-3-methylanthraquinone

A: x B: x B': x C: x E: x F: x G: x

HPLC: x TLC: Rf 0.08 [pyridine/acetone, 4/1]

V: + UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 286, 270, 258, 257

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Xanthorin, Valsarin

Reference: Stensiö, K-E/ Wachtmeister, CA. 1969 1,5,8-Trihydroxy-6-methoxy-3-methylanthraquinone from *Laurerea purpurina* (Nyl.) Zahlbr., Acta Chemica Scandinavica 23: 144-148 (1969).

Notes: Red-orange pigment. Occurs in *Asahinea chrysantha*, *Laurerea purpurina*

Thamnolic acid

A: 3 B: x B': 25 C: 13 E: x F: x G: x

HPLC: 18

V: - UV: +

Acid Spray: Brown LW UV: Brown

Archers: P.Red

K: Yellow C: No Result KC: PD: Orange

Mass Spectrum: -1, 376, 226, 209

Substance Class: β -Orcinol Depsides

Biosynthetically Related Compounds: Barbatic acid, Cryptothamnolic acid, Decarboxythamnolic acid, Haemathamnolic acid, Hypothamnolic acid, Lactothamnolic acid, Squamatic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 151. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 301.

Notes: Occurs in *Cladonia macilenta*

Thelophoric acid

A: 0 B: x B': 0 C: 0 E: x F: x G: x

HPLC: 11

V: + UV: +

Acid Spray: Purple LW UV: Grey

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: -1, 187, 165, 155, 128

Substance Class: Terphenylquinones

Biosynthetically Related Compounds: Polyporic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 209. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 184.

Notes: Violet pigment. Acid Spray: fades to grey. Occurs in *Lobaria retigera*

Thiomelin

A: 80 B: x B': 82 C: 88 E: 73 F: x G: x

HPLC: 53

V: + UV: +

Acid Spray: Orange LW UV: Orange

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 342, 340, 327, 325

Substance Class: Xanthones

Biosynthetically Related Compounds: 2-Dechloro-8-*O*-methylthiomelin, 4-Dechloro-8-*O*-methylthiomelin, 2-Dechlorothiomelin, 4-Dechlorothiomelin, 8-*O*-Methylthiomelin

Reference: Elix, JA/ Gaul, KL/ Sterns, M/ Samsudun, MW 1987: The structure of the novel lichen xanthone, thiomelin and its congeners. Australian Journal of Chemistry 40: 1169-1178.

Notes: Yellow pigment. Occurs in *Rinodina thiomela*

Thiophanic acid [2,4,5,7-Tetrachloronorlichexanthone]

A: 55 B: 56 B': 52 C: 49 E: 2 F: 10 G: x

HPLC: 44

V: + UV: +

Acid Spray: P.Brown LW UV: P.Brown

Archers: x

K: No Result C: Orange KC: PD: No Result

Mass Spectrum: 400, 398, 396, 394

Substance Class: Xanthones

Biosynthetically Related Compounds: Arthothelin, Asemone, Di-*O*-Methylthiophanic acid, Isoarthothelin, 3-*O*-Methylthiophanic acid, 6-*O*-Methylthiophanic acid, Thuringione, 2,4,7-Trichloronorlichexanthone

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 180. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 212.

Notes: Yellow pigment. Acid Spray: very pale dirty yellowish brown. Occurs in *Lecanora rupicola*

Thiophanic acid

A: 63 B: 68 B': 63 C: 60 E: 2 F: 9 G: x

HPLC: 41

V: +

UV: +

Acid Spray: P. Yellow

LW UV: Green

Archers: Brown

K: No Result C: Orange

KC: PD: No Result

Mass Spectrum: 344, 342, 340, 311

Substance Class: Xanthones

Biosynthetically Related Compounds: 2-Chlorolichexanthone, 2-Chloro-6-*O*-methylnorlichexanthone, 4-Chloro-6-*O*-methylnorlichexanthone, 2,4-Dichlorolichexanthone, Lichexanthone

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 180. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 213.

Notes: Yellow pigment. LW UV: fades to deep pink. Occurs in *Pertusaria xanthoplaca*

Thuringione

A: 53 B: x B': 58 C: 48 E: 15 F: 35 G: x

HPLC: 45

V: +

UV: +

Acid Spray: P. Yellow

LW UV: Green

Archers: Brown

K: No Result C: No Result

KC: No Result

PD: No Result

Mass Spectrum: 378, 376, 374

Substance Class: Xanthones

Biosynthetically Related Compounds: Arthothelin, Thiophanic acid, 2,4,5-Trichlorolichexanthone

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 180. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 213.

Notes: Yellow pigment. Occurs in *Lecidella carpathica*

Toensbergianic acid

A: 40 B: x B': 48 C: 45 E: x F: x G: x

HPLC: x

V: -

UV: -

Acid Spray: No Result

LW UV: No Result

Archers: x

K: No Result C: No Result

KC: No Result

PD: No Result

Mass Spectrum: x

Substance Class: Aliphatic acids

Biosynthetically Related Compounds: Norjackinic acid, Jackinic acid

Reference: Bayerova, S/ Kukwa, M/ Fehrer, J 2005: A new species of *Lepraria jackii* (lichenized Ascomycetes) from Europe. Bryologist 108: 131-138.

V: +

UV: +

Acid Spray: Yellow

LW UV: Yellow

Archers: x

K: No Result C No Result KC: No Result PD: No Result

Mass Spectrum: 408, 406, 404, 402

Substance Class: Xanthones

Biosynthetically Related Compounds: Arthothelin, 6-*O*-Methylarthothelin, Thiophanic acid, 2,4,5-Trichlorolichexanthone

Reference: Elix, JA/ Bennett, SA 1990: 6-*O*-Methylarthothelin and 1,3,6-tri-*O*-methylarthothelin, two new xanthones from a *Dimelaena* lichen. Australian Journal of Chemistry 43: 1587-1590.

Notes: Pale yellow pigment. Occurs in *Dimelaena elevata*

2,4,5-Tri-*O*-methylhiassic acid

A: 40 B: 35 B': 31 C: 38 E: x F: x G: x

HPLC: 28

V: -

UV: +

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: P.Red PD: No Result

Mass Spectrum: -1, 376, 226, 211

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: 2,4-Di-*O*-methylgyrophoric acid, 4,5-Di-*O*-methylhiassic acid, Gyrophoric acid, Hiassic acid, Gyrophoric acid, 4-*O*-Methylhiassic acid, 5-*O*-Methylhiassic acid

Reference: Elix, JA/ Jayanthi, VK/ Leznoff, CC 1981: 2,4-Di-*O*-methylgyrophoric acid and 2,4,5-tri-*O*-methylhiassic acid. New tridepsides from *Parmelia damaziana*. Australian Journal of Chemistry 34: 1757-1761.

Notes: Acid Spray: strong yellow, grey halo. Occurs in *Hypotrachyna neodamaziana*

Umbilicaric acid

A: 25 B: x B': 29 C: 18 E: x F: x G: x

HPLC: 25

V: -

UV: -

Acid Spray: P.Yellow

LW UV: Green

Archers: x

K: No Result C: No Result KC: P.Red PD: No Result

Mass Spectrum: -1, 182, 168, 164

Substance Class: Orcinol Tridepsides

Biosynthetically Related Compounds: 2,4-Di-*O*-methylgyrophoric acid, Gyrophoric acid, 3-Hydroxyumbilicaric acid, Lecanoric acid, 3-Methoxy-2,4-di-*O*-methylgyrophoric acid, 5-*O*-Methylhiassic acid, 3-Methoxyumbilicaric acid, 2,4,5-Tri-*O*-methylhiassic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 128. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 311.

Notes: Acid Spray: pale yellow, grey halo; weak-pale grey. LW UV: strong-purple, green halo. Occurs in *Umbilicaria polyphylla*

Ursolic acid

A: 52 B: 50 B': 54 C: 49 E: 25 F: x G: x

HPLC: x

V: – UV: –

Acid Spray: Purple LW UV: Lilac

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 456, 438, 249, 248

Substance Class: Terpenoids

Biosynthetically Related Compounds: x

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 205. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 386.

Notes: Common accessory compound in many lichens

Usnic acid

A: 70 B: 70 B': 66 C: 70 E: 23 F: 40 G: 88

HPLC: 36

V: + UV: +

Acid Spray: Green LW UV: Green

Archers: x

K: No Result C: No Result KC: Yellow PD: No Result

Mass Spectrum: 344, 260, 233, 217

Substance Class: Usnic acid derivatives

Biosynthetically Related Compounds: Contortin, Isousnic acid, Placodiolic acid, Pseudoplacodiolic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 170. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 228.

Notes: Yellow pigment. Occurs in *Usnea* sp.

Valsarin [Papulosin]

A: x B: x B': x C: x E: x F: x G: x

HPLC: 44 TLC: Rf 9 [chloroform/acetone, 4/3]; Rf 40 [chloroform/methanol, 9/1]

V: + UV: +

Acid Spray: Orange

LW UV: Orange

Archers: x

K: Violet C: No Result

KC: PD: No Result

Mass Spectrum: 320

Substance Class: Anthraquinones

Biosynthetically Related Compounds: 1,5,6,8-Tetrahydroxyanthraquinone, Xanthorin

Reference: Lam, JKK/ Sargent, MV/ Elix, JA/ Smith, DO'N. 1972: The synthesis of valsarin and 5,7-dichloroemodin, Journal of the Chemical Society, Perkin Transactions 1: 1466-1470.

Notes: Red pigment. Occurs in *Lasallia papulosa*

Variolaric acid

A: 18 B: 13 B': 12 C: 14 E: x F: x G: x

HPLC: 3

V: -

UV: +

Acid Spray: Grey

LW UV: White

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 314, 286, 270, 269

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: x

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 140. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 351.

Notes: Occurs in *Ochrolechia parella*

Verrucigeric acid

A: 38 B: x B': 5 C: 22 E: x F: x G: 45

HPLC: 14

V: -

UV: +

Acid Spray: Orange

LW UV: Orange

Archers: No Result

K: No Result C: No Result KC: No Result PD: No Result

Mass spectrum: 430, 386, 385, 384

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Constictic acid, Cryptostictic acid, Lusitanic acid, Norstictic acid, Stictic acid, Methyl stictic acid

Reference: Elix, JA/Wardlaw, JH 2000: Lusitanic acid, peristictic acid and verrucigeric acid, three new β -orcinol depsidones from the lichens *Relicina sydneyensis* and *Xanthoparmelia verrucigera*. Australian Journal of Chemistry 53: 815-818.

Notes: Minor component in *Xanthoparmelia verrucigera*

Vicanicin

A: 67 B: 75 B': 77 C: 64 E: 52 F: 85 G: x

HPLC: 37

V: – UV: +

Acid Spray: Grey LW UV: Purple

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 384, 382, 349, 347

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Argopsin, 7-Dechlorovicanicin, Isovicanicin, 4-*O*-Methylvicanicin, Norvicanicin, Pannarin

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 165. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 352.

Notes: Occurs in *Teloschistes flavicans*

Vioxanthin [Pigmentosin B]

A: 42 B: x B': 14 C: 43 E: x F: x G: x

HPLC: 28

V: + UV: +

Acid Spray: Green-brown LW UV: Yellow

Archers: x

K: Red C: No Result KC: PD: No Result

Mass spectrum: 547, 546, 528, 249

Substance Class: Naphthpyrone

Biosynthetically Related Compounds: Desmethylvioxanthin, Pigmentosin A

Reference: Elix, JA 2004: Vioxanthin from a lichen source. Australasian Lichenology 55: 14-15.

Notes: Yellow-green pigment. Minor component in *Hypotrachyna osseoalba*

Virensic acid

A: 36 B: 57 B': 56 C: 40 E: x F: x G: 56

HPLC: 26

V: – UV: +

Acid Spray: Brown LW UV: Brown

Archers: x

K: P.Brown C: No Result KC: PD: D.Red

Mass Spectrum: 358, 340, 312, 179

Substance Class: β -Orcinol Depsidones

Biosynthetically Related Compounds: Convirensic acid, Fumarprotocetraric acid, 2-Hydroxyvirensic acid, Hypoprotocetraric acid, Protocetraric acid, Subvirensic acid

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 165. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 352.

Notes: Occurs in *Lecanora caesiorubella*

Vittatolic acid

A: 8 B: x B': 21 C: 5 E: x F: x G: 32

HPLC: 19

V: – UV: +

Acid Spray: Orange LW UV: P.Yellow

Archers: x

K: No Result C: No Result KC: Red PD: No Result

Mass Spectrum: 486, 442

Substance Class: Orcinol Depsidones

Biosynthetically Related Compounds: Alectoronic acid, 2'-O-Methylphysodic acid, Oxyphysodic acid, Physodic acid

Reference: Hirayama, T/ Fujikawa, F/ Yosioka, I/ Kitagawa, I 1975: Vittatolic acid, a new depsidone isolated from the lichen *Hypogymnia vittata* (Ach.) Gas. Chemical and Pharmaceutical Bulletin (Tokyo) 23: 693-695.

Notes: Acid Spray: pale orange, grey halo. LW UV: pale green-yellow, fades to mauve. Occurs in *Hypogymnia vittata*

Vulpinic acid

A: 71 B: 66 B': 54 C: 75 E: 18 F: x G: x

HPLC: 25

V: + UV: +

Acid Spray: Yellow LW UV: Green

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 322, 290, 261, 234

Substance Class: Pulvinic acid derivatives

Biosynthetically Related Compounds: Pulvinamide, Pulvinic acid, Pulvinic dilactone

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 216. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 403.

Notes: Intense yellow pigment. LW UV: strong-orange, large pale green halo. Occurs in *Letharia vulpina*

Wrightiin

A: 70 B: x B': 55 C: 74 E: 42 F: x G: x

HPLC: 29

V: – UV: +

Acid Spray: P.Green LW UV: Pink

Archers: x

K: No Result C: No Result KC: No Result PD: No Result

Mass Spectrum: 398, 396, 382, 380

Substance Class: Orcinol Depsides

Biosynthetically Related Compounds: Methyl 3,5-dichlorolecanorate, Methyl evernate, Methyl lecanorate

Reference: Maass, WSG/ Hanson, A 1986: Wrightiin, a new chlorinated depside from *Erioderma wrightii* Tuck. (Ascolichenes). Zeitschrift für Naturforschung 41b: 1589-1592.

Notes: Occurs in *Erioderma wrightii*

Xantholepinone A

A: 38 B: x B': 7 C: 28 E: 2 F: x G: x

HPLC: 15

V: + UV: +

Acid Spray: Yellow-brown LW UV: Sky Blue

Archers: x

K: Yellow-orange C: Orange KC: Red PD: No Result

Mass spectrum: x

Substance Class: Ergochromes

Biosynthetically Related Compounds:

Reference: Elix, JA/ Kantvilas, G 2007: A genus *Chrysothrix* in Australia. Lichenologist 39: 361-369.

Notes: Yellow pigment. Occurs in *Chrysothrix sulphurella* and *Myelochroa xantholepis*

Xanthorin [1,5,8-trihydroxy-6-methoxy-3-methylanthraquinone]

A: x B: x B': x C: 60 E: 20 F: x G: x

HPLC: 60 TLC: Rf 54 [benzene/ethyl formate/formic acid, 80/20/1]; Rf 35 [benzene/acetic acid, 40/3]

V: + UV: +

Acid Spray: Red LW UV: Red

Archers: x

K: Violet C: No Result KC: PD: No Result

Mass Spectrum: 300, 282, 272, 260

Substance Class: Anthraquinones

Biosynthetically Related Compounds: Erythroglaucin, Parietin, 1,5,6,8-Tetrahydroxyanthraquinone

References: Culberson, CF 1969: Chemical and botanical guide to lichen products. Univ. North Carolina Press, Chapel Hill: 191. Huneck, S/ Yoshimura, I 1996: Identification of Lichen Substances. Springer-Verlag, Berlin, Heidelberg, New York: 183.

Notes: Red pigment. Occurs in *Xanthoria elegans*

