Mooloolabenes A−E, Norsesterterpenes from the Australian Sponge *Hyattella intestinalis*

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Five new norsesterterpenes, mooloolabenes A−E (**1**−**5**), and the new sesterterpene mooloolaldehyde (**6**), related to the scalarane family of compounds, were isolated from an acetone extract of the Australian sponge *Hyattella intestinalis*. Structural elucidation, including relative stereochemical assignment, was based on spectroscopic analysis. All compounds tested showed cytotoxic activity against the P388 cell line.

Sponges of the order Dictyoceratida have proven to be a bountiful source of chemical variants based on the scalarane skeleton,[1−3] with new examples being isolated nearly every year since the discovery of scalarin from the methanol extract of *Cacospongia scalaris* in 1972.[4] The scalarane family of compounds shows wide-ranging biological activities, with perhaps the most important being their anti-inflammatory[5] and cytotoxic[6−14] properties. Scalaranes can show varied patterns of alkylation, giving rise to C_{26} and C_{27} homo- and bishomo compounds in which methylation typically occurs at carbons 20 and 21.[14,15] While these alkylated scalaranes are commonly encountered, there are relatively few reported instances of norscalaranes. A study of *Hyrtios erecta* revealed the first example of a norsesterterpene scalarane hyrtial (**7**)[16] that lacks the C-19 aldehyde functionality commonly observed among the tetracyclic dialdehyde scalaranes such as scalaradial.[17] Since then, multiple examples of norscalaranes have been reported including 19-norscalaranes,[10,18] 20-methyl-19-norscalaranes,[19] and 20,22-dimethyl-19-norscalaranes.[15,19,20] A single report describes the isolation of scalarane sesterterpenes oxidatively modified at the C-24 methyl position from a sponge named by these authors as *Hyatella intestinalis*.[21] In this paper we report the isolation of mooloolabenes A−E (**1**−**5**), the first examples of norscalarane metabolites lacking a methyl substituent at C-8, together with the oxidatively modified C_{25} scalarane **6**, which may be their biosynthetic precursor, and describe the biological activities of these compounds.

Results and Discussion

Sponge samples were collected from the Inner Gneering shoals off Mooloolaba, South-East Queensland, at a depth of 10−15 m in July 2005 and again in January 2006. The sponge acetone extract was subjected to flash column chromatography to afford fractions that were purified by Si HPLC, giving compounds **1**−**6**.

Mooloolabene A (**1**) was isolated as a white, amorphous solid and was revealed to have the molecular formula $C_{24}H_{34}O_2$ from the HRESIMS sodiated ion at *m*/*z* 377.2451. ^{13}C NMR and HSQC data showed the presence of four methyls, seven methylenes, eight methines, and five quaternary carbons. Characteristic ^1H and ^{13}C NMR signals (Tables 1 and 2) indicating the presence of an α,β-unsaturated aldehyde [δ_H 9.49 (1H, s, H-20), 7.12 (1H, m, H-16); δ_C 193.4 (C-20), 153.1 (C-16), and 137.9 (C-17)] were supported by HMBC correlations from H-20 to C-16 and C-17. A second aldehyde [δ_H 9.51 (1H, d, J = 4.3 Hz, H-19); δ_C 201.4 (C-19)] was also present together with an isolated double bond [δ_H 5.47 (1H, dddd, H-7); δ_C 121.4 (C-7) and 136.2 (C-8)]. These structural features were strongly reminiscent of the scalarane dialdehyde 12-deacetoxyscalaradial (**8**),[11] the main observable difference being the absence of one methyl in exchange for a second double bond. Assignment of the new double bond to C-7/C-8 was based on HMBC correlations from H-7 to C-5, C-6, C-9, and C-14 (δ_C 49.6, 23.7, 52.7, and 44.6) and from H_2-6 (δ_H 1.93 m) to C-8 (δ_C 136.2), while COSY correlations from H_2-6 to H-7 further confirmed this assignment. HMBC correlations from H_3-24 (δ_H 0.70 s) to C-12, C-13, C-14, and C-18 (δ_C 38.2, 36.5, 44.6, and 57.7) positioned this methyl group at the C/D ring junction, while correlations from methyls H_3-21 and H_3-22 (δ_H 0.87 and 0.91) to C-4 (δ_C 32.7) established the presence of geminal methyl substitution at C-4. Long-range correlation of H_3-23 (δ_H 0.81) to C-1 and C-10 (δ_C 39.8 and 35.6) placed the final methyl signal at the A/B ring junction. The upfield shifts of H_3-23, H_3-24, and their associated carbons are consistent with the loss of a γ-methyl substituent, as reported by Crews and Bescansa in a stereochemical study on scalaranes.[22] Dialdehydes of the scalaradial and 18-*epi*-scalaradial series can be distinguished by the downfield shifts of H-18 and

Table 1. ^{13}C NMR Assignments for Compounds **1**−**6**[a]

C	**1**[b]	**2**[b]	**3**[c]	**4**[c]	**5**[b]	**6**[c]
1	39.8	39.8	39.7	41.9	39.9	39.1
2	18.7	18.8	18.4	18.7	18.9	18.7
3	42.0	42.1	36.0	44.7	42.2	41.8
4	32.7	32.7	36.3	33.6	32.7	33.2
5	49.6	49.7	50.7	52.4	49.7	56.0
6	23.7	23.7	23.4	67.8	23.7	19.2
7	121.4	120.8	121.2	119.1	120.4	35.6
8	136.2	136.5	136.4	142.5	137.3	53.7
9	52.7	52.9	52.9	53.4	53.1	60.0
10	35.6	35.7	35.5	35.7	35.7	37.9
11	19.7	20.2	19.9	20.6	20.3	16.5
12	38.2	36.6	38.2	38.7	39.0	40.1
13	36.5	37.5	36.6	34.4	34.2	37.0
14	44.6	40.2	44.6	45.0	45.1	58.5
15	27.2	27.7	27.2	25.9	26.0	21.8
16	153.1	152.5	152.9	117.6	117.8	22.8
17	137.9	137.3	137.9	134.9	135.0	113.7
18	57.7	56.0	57.8	56.7	56.7	63.4
19	201.4	202.1	201.3	98.3	98.5	98.3
20	193.4	192.9	193.4	70.4	70.5	134.8
21	33.5	33.5	27.3	33.1	33.6	33.3
22	22.3	22.3	66.8	24.5	22.3	21.3
23	15.0	15.0	16.2	17.3	15.0	15.3
24	13.6	19.2	13.7	12.8	12.5	205.4
25						16.0
6-O*C*OCH$_3$				170.6		
6-OCO*C*H$_3$				21.9		
19-O*C*OCH$_3$				170.3	170.5	170.0
19-OCO*C*H$_3$				21.4	21.4	21.3
22-O*C*OCH$_3$			171.3			
22-OCO*C*H$_3$			21.0			

[a] Chemical shifts (ppm) referenced to $CDCl_3$ (δ_C 77.0). [b] At 500 MHz. [c] At 750 MHz.

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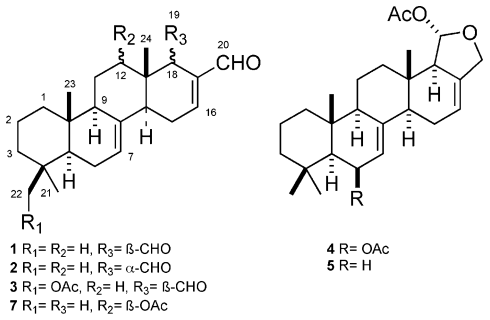
Table 2. ^{1}H NMR Assignments for Compounds **1**−**3**[a]

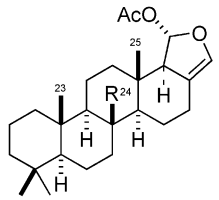
C	**1**[b]	**2**[b]	**3**[c]
1a	0.98, m	0.97, m	1.04, m
1b	1.81, ddd (13.0, 5.2, 2.8)	1.80, ddd (12.9, 3.0, 3.0, 3.0)	1.87, dddd (12.9, 3.0, 3.0, 3.0)
2	1.44, m	1.47, m	1.46, m
3a	1.15, m	1.16, m	0.99, m
3b	1.42, m	1.42, m	1.79, m
4			
5	1.07, dd (4.4, 12.1)	1.08, dd (4.5, 12.1)	1.27, m
6a	1.93, m	1.93, dm (13.4)	1.95, m
6b			2.10, m
7	5.47, dddd (6.0, 2.0, 2.0, 2.0)	5.46, dddd (6.0, 2.0, 2.0, 2.0)	5.48, dddd (6.0, 2.0, 2.0, 2.0)
8			
9	1.70, m	1.66, m	1.75, m
10			
11a	1.28, m	1.42, m	1.54, m
11b	1.52, m	1.61, m	1.64, m
12a	1.43, m	1.54, m	1.44, m
12b	1.96, m	1.85, m	1.98, m
13			
14	1.94, m	2.22, m	1.94, m
15a	2.30, m	2.24, m	2.31,
15b	2.55, m	2.64, m	2.55,
16	7.12, m	7.10, m	7.13,m
17			
18	2.90, sept (2.0)	3.38, brs	2.90, sept (1.9)
19	9.51, d (4.3)	9.85, d (2.7)	9.51, d (4.3)
20	9.49, s	9.43, s	9.49, s
21	0.87, s	0.86, s	0.96, s
22a	0.91, s	0.91, s	3.98, brd (10.9)
22b			4.33, d (10.9)
23	0.81, s	0.82, s	0.83, s
24	0.70, s	0.74, s	0.71, s
22-OAc			2.05, s

[a] Chemical shifts (ppm) referenced to $CHCl_3$ (δ_H 7.25). [b]At 500 MHz. [c]At 750 MHz.

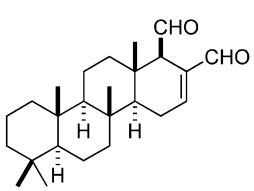


1 R_1= R_2= H, R_3= ß-CHO
2 R_1= R_2= H, R_3= α-CHO
3 R_1= OAc, R_2= H, R_3= ß-CHO
7 R_1= R_3= H, R_2= ß-OAc

4 R= OAc
5 R= H



6 R= CHO



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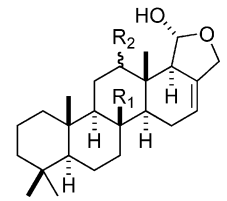

9 R_1= CH_3, R_2= α-OAc
10 R_1= CH_2OAc, R_2= ß-OH
11 R_1= CH_3, R_2= H

H-19 in the 18-*epi* metabolites.[23] For mooloolabene A, the orientation of H-18 was axial on the basis of 1D NOEs from H-18 to H-12*ax* and H-14 (δ_H 1.43 and 1.94), with the evidence for this stereochemistry also strengthened by the observed *J* value of 4.3 Hz for H-19.[17,23]

Mooloolabene B (**2**) crystallized as white needles and had an HRESIMS parent ion of 354.2556, giving a molecular formula of $C_{24}H_{34}O_2$. The 1D and 2D NMR data for **2** were nearly identical to those for compound **1**; however the appearance of the H-19 aldehyde (δ_H 9.85, J = 2.7 Hz) in **2** compared to this signal in **1** suggested that the C-19 aldehyde group was axially disposed. Furthermore H-18 resonated downfield at δ_H 3.38 compared to δ_H 2.90 in **1**. Irradiation of H-19 gave 1D NOEs onto H-12ax and H-14. Hence **2** was the C-18 epimer of **1**.[23] Other major NMR differences observed for **2** were a 6 ppm downfield shift of the methyl C-24 signal (δ_C 19.2) with a 4 ppm upfield shift of C-14 (δ_C 40.2). These carbon chemical shift changes fit the model by Crews and Bescansa, for a change in stereochemistry of the substituent at C-18 from beta to alpha.[22]

Mooloolabene C (**3**) was obtained as a white, amorphous solid with an HRESIMS sodiated ion at *m*/*z* 435.2511, corresponding to a molecular formula of $C_{26}H_{36}O_4$, suggestive of an acetoxy-substituted C_{24} structure. The proton data for **3** differed from the previous two compounds in containing only three methyl signals, while an acetoxymethyl singlet appeared at δ_H 2.05 together with an AB system at δ_H 3.98 and 4.33. The ^{13}C data confirmed the presence of an oxygenated carbon at δ_C 66.8 and an ester carbonyl (δ_C 171.3). Positioning of the acetoxy-substituted methyl at the quarternary carbon C-4 (δ_C 36.3) relied on HMBC correlations from both H-22a and H-22b (δ_H 3.98 and 4.33) to C-3 (δ_C 36.0), C-4 (δ_C 36.3), and C-5 (δ_C 50.7), and these protons also correlated to C-21 (δ_C 27.3). Further HMBC evidence for this arrangement was the presence of correlations from H_3-21 to C-22 at δ_C 66.8. ^{1}H and ^{13}C data again showed two double bonds, one adjacent to the C-20 aldehyde and the other placed at C-7/C-8 by HMBC and DQF-COSY. The aldehyde at C-18 was equatorially orientated since H-19 presented as a doublet with J = 4.3 Hz at δ_H 9.51.[23] Assignment of the C-22 acetoxymethyl group as axial was based on the ^{13}C chemical shift value of δ_C 27.3 for the C-21 methyl.[24]

Mooloolabene D (**4**) was isolated as a white, amorphous solid, the molecular formula of which was established to be $C_{28}H_{40}O_5$ from the sodiated HRESIMS parent ion of 479.2769. ^{13}C and ^{1}H data revealed that the major difference between **4** and compounds **1**−**3** was the absence of aldehyde signals. Instead, the ^{13}C data in combination with DEPT-135 information revealed a diacetoxy-substituted norscalarane with four methyl groups, four double-bond carbons, two oxygenated carbons (δ_C 67.8 and 70.4), and one acetal carbon (δ_C 98.3). Key features from the ^{1}H spectrum (Table 3) of **4** included an oxymethine proton (δ_H 5.54, m), an acetal proton (δ_H 6.14, d, J = 4.3 Hz), two olefinic methine protons (δ_H 5.58, m and 5.60, brs), an AB system (δ_H 4.26, d, J = 11 Hz; 4.45, brd, J = 11 Hz), and four methyl singlets. The NMR signals for C-1 to C-5 for compound **4** matched those observed for mooloolabenes A−C, with confirmation of these assignments from HMBC and COSY data. The oxymethine proton at δ_H 5.54, m, assigned to H-6, correlated with C-5 at δ_C 52.4, C-7 at δ_C 119.1, and an ester carbonyl (δ_C 170.6), thus positioning an acetoxyl substituent adjacent to the ring B double bond. The remaining signals seen for **4** corresponded closely to that seen for the pentacyclic scalaranes such as deoxoscalarin (**9**).[21,25] Assignment of the D and E ring carbons was based on correlations from protons H_3-24 (δ_H 0.69, s) to C-13, C-14, and C-18 (δ_C 34.4, 45.0, and 56.7), from H-18 (δ_H 2.51, brs) to C-17 and C-19 (δ_C 134.9 and 98.3), and from H_2-20 (δ_H 4.26, d, J = 11 Hz and 4.45, bd, J = 11 Hz) to C-16, C-17, C-18, and C-19 (δ_C 117.6, 134.9, 56.7, and 98.3). The relative stereochemistry at C-6 was established using NOESY data, which showed dipolar coupling from H-6 to the axially oriented H-5 and H_3-21, indicating that H-6 was equatorially oriented on the lower face of the molecule. H-18 was axially oriented since it showed a

Table 3. ^{1}H NMR Assignments for Compounds **4**−**6**[a]

C	**4**[b]	**5**[c]	**6**[b]
1a	1.05, m	0.97, m	0.85, m
1b	1.85, dd (1.5, 12.9)	1.82, ddd (3.0, 5.1, 12.7)	1.72, d (12.7)
2a	1.45, m	1.41, m	1.45, m
2b	1.62, m	1.50, m	1.57, m
3a	1.20, m	1.16, m	1.12, m
3b	1.39, m	1.42, m	1.37, m
4			
5	1.27, m	1.09, dd (4.4, 11.9)	0.83, m
6a	5.54, m	1.92, m	1.08, m
6b			1.51, m
7a	5.58, m	5.41, m	0.75, m
7b			2.67, dt (3.3, 12.7)
8			
9	1.70, dd (11.9, 4.3)	1.70, m	1.23, m
10			
11a	1.46, m	1.33, m	1.80, m
11b	1.61, m	1.57, m	1.34, m
12a	1.32, m	1.29, m	1.94, m
12b	1.74, td (3.3, 12.8)	1.71, m	
13			
14	1.95, m	1.93, m	1.27, m
15a	1.95, m	1.93, m	0.95, m
15b	2.20, brd	2.19, m	1.80, m
16a	5.60, brs	5.60, brd (1.4)	1.91, m
16b			2.44, ddd (1.4, 5.1, 13.9)
17			
18	2.51, brs	2.49, brs	2.31, brs
19	6.14, d (4.3)	6.13, d (4.4)	6.30, d (2.0)
20a	4.26, d (11.0)	4.25, brd (11.0)	6.02, t (2.0)
20b	4.45, brd (11.0)	4.46, m	
21	0.97, s	0.86, s	0.82, s
22	1.11, s	0.91, s	0.74, s
23	1.09, s	0.82, s	0.78, s
24	0.69, s	0.64, s	10.14, brd (1.3)
25			0.71, s
6-OAc	2.03, s		
19-OAc	2.08, s	2.07, s	2.07, s

[a] Chemical shifts (ppm) referenced to $CHCl_3$ (δ_H 7.25). [b]At 750 MHz. [c]At 500 MHz.

NOESY coupling to H-14. The relative stereochemistry of the acetoxyl at C-19 was established as α based on the *J* value of 4.3 Hz between H-18 and H-19, indicating a *trans* relationship,[21,26] together with the observation of an NOE from H-19 to H_3-24.[21]

Mooloolabene E (**5**) was isolated as a white, amorphous solid and exhibited a HRESIMS of 421.2728, representing a molecular formula of $C_{26}H_{38}O_3$. Again, the pattern of signals seen for **5** matched that seen for the pentacyclic scalaranes such as deoxoscalarin (**9**),[21,25] except for the presence of only four methyl groups and a second double bond. Assignment of the D and E ring carbons was based on correlations from protons H_3-24 (δ_H 0.64, s) to C-13, C-14, and C-18 (δ_C 34.2, 45.1, and 56.7), from H-18 (δ_H 2.49, brs) to C-17 and C-19 (δ_C 135.0 and 98.5), and from H_2-20 (δ_H 4.25, d, J = 11 Hz and 4.46, d, m) to C-16, C-17, C-18, and C-19 (δ_C 117.8, 135.0, 56.7, and 98.5). The relative stereochemistry at C-18 and C-19 was the same as in **4** on the basis of the near identical proton, carbon, and *J* values for the two compounds, shown in Tables 1 and 3.

The final compound, mooloolaldehyde (**6**), was isolated as a white, amorphous solid and exhibited a $[M + Na]^+$ ion of 451.2835, corresponding to a molecular formula of $C_{27}H_{40}O_4$. The presence of 27 carbons implicated an acetoxy-substituted scalarane. ^{13}C, DEPT-135, and ^{1}H NMR data for **6** revealed one aldehyde group [δ_H 10.14 (1H, bd, J = 1.3 Hz, H-24); δ_C 205.4 (C-24)], one acetal carbon (δ_C 98.3), an alkene group [δ_H 6.02 (1H, t, J = 2 Hz); δ_C 113.7 (C-17) and 134.8 (C-20)], and four methyl groups (δ_H 0.71, 0.74, 0.78, and 0.82, all s), while comparison to the previously isolated compounds indicated a pentacyclic skeleton. Unlike mooloolabenes D and E, the double bond in **6** was positioned between C-17 and C-20, analogous to heteronemin,[27] evident from the HMBC correlations from protons H_2-16, H-18, and H-19 (δ_H 1.91 and 2.44, 2.31, brs, and 6.30, d, J = 2 Hz) to C-20 (δ_C 134.8) and from H-18 to C-17, C-19, and C-20 (δ_C 113.7, 98.3, and 134.8). The configuration of the E ring was established from NOESY data, which showed dipolar couplings from H-19 to H_3-25 (δ_H 0.71, s) and from H-14 (δ_H 1.27, m) to H-18, corroborated by a ^3J value of 2 Hz between H-18 and H-19.[12] HMBC correlations from the aldehyde proton (δ_H 10.14, brd, J = 1.3 Hz) to C-7 and C-8 (δ_C 35.6 and 53.7) together with the NOESY interactions between the aldehyde proton and axial methyl groups H_3-23 and H_3-25 (δ_H 0.78, s; 0.71, s) placed this moiety at C-24. The axial proton at C-7 shows a *W* interaction with the aldehyde proton, while H-7*eq* is deshielded by the adjacent carbonyl group.

Aldehyde **6** is only the second example of C-24 substitution seen in the scalarane family of metabolites, the first being 24-acetoxy-12-deacetyl-12-*epi*-deoxoscalarin (**10**) isolated from a Northern Australian specimen of *H. intestinalis* by Karuso et al.[21] Scalaranes oxidized at C-24 are plausible biosynthetic intermediates to the suite of mooloolabene metabolites isolated from the same sponge samples. Metabolites **1**−**6** also lack the hydroxyl or acetoxyl functionality at C-12 typically seen among the scalarane and scalarane-like compounds. The first example of a scalarane lacking such functionality at C-12 was 12-deacetoxyscalaradial isolated from *Cacospongia mollior*.[11]

The absolute stereochemistry of (−)-12-deacetoxydeoxoscalarin (**11**) has been established by total synthesis.[28] The negative $[\alpha]_D$ value exhibited by mooloolabenes A−D and by aldehyde **6** could suggest the absolute stereochemistry shown.

Previous studies have reported significant biological activity associated with the scalarane skeleton, with various members of the series displaying significant anti-inflammatory,[5,29] cytotoxic,[6−14] or antifeedant[11] activity, as well as inhibition of platelet aggregation.[30,31] When screened, none of the metabolites **1**−**6** displayed useful antimicrobial activity; however metabolites **3**−**6** were all cytotoxic toward the P388 mouse leukemia cell line, with IC_{50} values in the range 3−10 μg/mL. Mooloolabenes A and B were the most potent, showing IC_{50} values of 0.8 and 1.2 μg/mL, respectively, comparable to the level of activity shown by the norscalarals.[10] The potent biological effects of sesterterpene dialdehydes such as scalaradial and 18-*epi*-scalaradial are well documented, with the scalaradial (18*β*) series reported as showing more potent anti-inflammatory activity than the 18-*epi* series.[29] Members of both the 18α[10] and 18*β*[11,12] dialdehyde series both show cytotoxic activity, while scalaradial and 12-deacetylscalaradial are both ichthyotoxic to the mosquito fish *Gambusia affinis*.[32]

In conclusion, this study describes the isolation and characterization of six new bioactive terpenoids and extends the range of scalarane-like frameworks found in marine sponges.

Experimental Section

General Experimental Procedures. Optical rotations were obtained using a JASCO-P1010 polarimeter. One- and two-dimensional NMR spectra were acquired using Bruker AMX-400, Bruker DRX-500, or Bruker DMX-750 instruments. NMR spectra were obtained in deuterochloroform at room temperature. Samples were internally referenced to either $CHCl_3$ at δ_H 7.25 or $CDCl_3$ at δ_C 77.0. High- and low-resolution mass measurements were obtained from a Finnigan MAT 900 XL-Trap electrospray (ESI) mass spectrometer with a Finnigan API III electrospray source.

Animal Material. Specimens of *Hyattella intestinalis* were collected from the Inner Gneerings, a group of shoals off Mooloolaba (Australia), using scuba at a depth of 10−15 m on July 31, 2005 and on January 16, 2006. Samples were taken back to the laboratory, where they were stored at −20 °C until extraction. The sponge was globular and approximately 2−3 cm thick. The sponge was dark gray on the upper

surface with buff coloring on the underside and interior. A voucher specimen (QM G327440) is lodged at the Queensland Museum. Photographs of the sponge material are available in the Supporting Information.

Extraction and Isolation. Two specimens of *H. intestinalis* (combined wet weight 105 g) were cut into small pieces and extracted exhaustively with a minimum of acetone. The extract was removed, filtered through cotton, then evaporated under reduced pressure to give an aqueous residue, which was partitioned with Et_2O. The organic layer was removed, dried with anhydrous Na_2SO_4, and concentrated under reduced pressure to give 450 mg of a brown, oily product, which was analyzed by TLC and ^{1}H NMR. The extract was subjected to gradient elution Si flash chromatography (hexanes → chloroform → ethyl acetate → MeOH). The fractions that eluted in hexanes/$CHCl_3$ (1:9) were combined and analyzed by TLC and ^{1}H NMR. This fraction was then divided into two samples based on solubility in EtOAc/hexanes (3:7). The soluble fraction was purified using semipreparative NP-HPLC (Waters 515; Gilson 132 series RI detector; Waters 10μ μPorasil 7.8 × 300 mm column; flow rate 3 mL/min) with EtOAc/hexanes (1:10) as solvent to afford **4**, **6**, and **5**, while the insoluble fraction was purified using EtOAc/hexanes (4:6), giving **2**, **1**, and **3**. A second sample of *H. intestinalis* (wet weight 61 g) was extracted and purified following the same methods as described for the purpose of obtaining more of compounds **2**, **3**, and **5** for further 2D NMR and HRMS analysis.

Mooloolabene A (1): (2.3 mg) white amorphous solid; $[\alpha]_D$ −81.4 (*c* 0.23, $CHCl_3$); ^{1}H and ^{13}C NMR ($CDCl_3$, 500 MHz), see Tables 1 and 2; HRESIMS *m*/*z* 377.2451, calcd for $C_{24}H_{34}O_2Na$ 377.2457.

Mooloolabene B (2): (2.0 mg) needles: $[\alpha]_D$ −193.9 (*c* 0.098, $CHCl_3$); ^{1}H and ^{13}C NMR ($CDCl_3$, 500 MHz), see Table 1 and 2; HRESIMS *m*/*z* 354.2556, calcd for $C_{24}H_{34}O_2$ 354.2559.

Mooloolabene C (3): (1.8 mg) white, amorphous solid: $[\alpha]_D$ −90.4 (*c* 0.088, $CHCl_3$); ^{1}H and ^{13}C NMR ($CDCl_3$, 750 MHz), see Tables 1 and 2; HRESIMS *m*/*z* 435.2511, calcd for $C_{26}H_{36}O_4Na$ 435.2511.

Mooloolabene D (4): (0.3 mg) white, amorphous solid: $[\alpha]_D$ −86.0 (*c* 0.015, $CHCl_3$); ^{1}H and ^{13}C NMR ($CDCl_3$, 750 MHz), see Tables 1 and 3; HRESIMS *m*/*z* 479.2769, calcd for $C_{28}H_{40}O_5Na$ 479.2773.

Mooloolabene E (5): (1.0 mg) white, amorphous solid: sample decomposed before an $[\alpha]_D$ value could be measured; ^{1}H and ^{13}C NMR ($CDCl_3$, 500 MHz), see Tables 1 and 3; HRESIMS *m*/*z* 421.2728, calcd for $C_{26}H_{38}O_3Na$ 421.2719.

Mooloolaldehyde (6): (1.3 mg) white, amorphous solid: $[\alpha]_D$ −39.2 (*c* 0.052, $CHCl_3$); ^{1}H and ^{13}C NMR ($CDCl_3$, 750 MHz), see Tables 1 and 3; HRESIMS *m*/*z* 451.2835, calcd for $C_{27}H_{40}O_4Na$ 451.2824.

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Supporting Information Available: ^{1}H NMR data for compounds **1**−**6** and photographs of *Hyattella intestinalis.* This material is available free of charge via the Internet at http://pubs.acs.org.

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