

## 1202-1 (Sesquiterpene)

Name: 2,10-Dibromo-3-chloro- $\alpha$ -chamigrene; 4,10-Dibromo-3-chloro- $\alpha$ -chamigrene<sup>(3)</sup>;  
2,10-Dibromo-3-chlorochamigr-7-ene  
{4,8-Dibromo-9-chloro-1,5,5,9-tetramethyl-spiro[5.5]undec-1-ene}

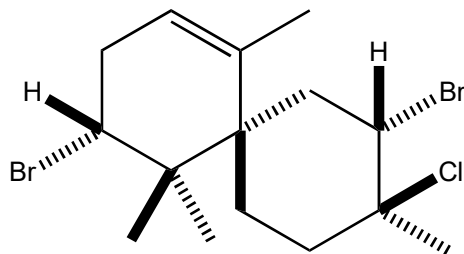
Origin: *Laurencia* sp. (the Gulf of California, Mexico)<sup>(1)</sup>;  
*Laurencia nipponica* (as *L. glandulifera*)<sup>(2)</sup> (Oshoro Bay, Otaru, Hokkaido, Japan)<sup>(3)</sup>;  
*Laurencia nipponica* (Atsuta, Hokkaido, Japan)<sup>(4,5)</sup>;  
*Laurencia okamurai* (Yasurihama, Mie Prefecture, Japan)<sup>(6)</sup>;  
*Laurencia scoparia* (Negril, Jamaica)<sup>(6)</sup>;  
*Laurencia japonensis* (Chinzei, Saga Pre.; Heki, Yamaguchi Pref.; Mihonoseki, Shimane Pref.;  
Iwami, Tottori Pref.; Toyooka, Hyogo Pref.; Shimoda, Shizuoka Pref.,  
Japan)<sup>(8)</sup>;  
*Laurencia* sp. cf. *L. gracilis* (Matheson Bay, Leigh, New Zealand)<sup>(9)</sup>;  
*Laurencia implicata* (Britomart Reef, The Great Barrier Reef, Australia)<sup>(10)</sup>;  
*Laurencia okamurai* (*L. composita*???) (Qingdao, Shandong Province, China)<sup>(11)</sup>;  
*Laurencia glomerata* (Buffels, Cape Point, South Africa)<sup>(12)</sup>;  
*Laurencia nangii* (Selakan Island and Lohok Butun (Bun-Bun Island), Sabah, Malaysia)<sup>(13)</sup>;  
*Laurencia filiformis* (Taroona Beach, Hobart, Tasmania)<sup>(14)</sup>;

Formula: C<sub>15</sub>H<sub>23</sub>Br<sub>2</sub>Cl

Mol. Wt.: 398.60

Opt. Rot.: [ $\alpha$ ]<sub>D</sub> -14 (CHCl<sub>3</sub>)<sup>(3)</sup>; [ $\alpha$ ]<sub>D</sub><sup>21</sup> -20.5 (CHCl<sub>3</sub>)<sup>(7)</sup>; [ $\alpha$ ]<sub>D</sub><sup>28</sup> -24.5 (CHCl<sub>3</sub>)<sup>(13)</sup>; [ $\alpha$ ]<sub>D</sub> -38.5 (CHCl<sub>3</sub>)<sup>(14)</sup>

Mp.: Oil



### References and Notes

(1) Howard, B. M. and Fenical, W. 1975. Tetrahedron Lett., **16**, 1687-1690. Structures and chemistry of two new halogen-containing chamigrene derivatives from *Laurencia*. (<sup>1</sup>H-NMR) (together with 2,10-dibromo-7,8-epoxychamigrene)

(2) *Laurencia nipponica* Yamada has been confused with the Adriatic species *Laurencia glandulifera* Kutzing. *Laurencia glandulifera* does not occur in Japanese water, and therefore *L. glandulifera* reported by Irie group should be revised to *L. nipponica*. Saito, Y. 1985. Jpn. J. Phycol., **33**, 167-171. So-called *Laurencia glandulifera* in Japan and *L. nipponica* (Rhodophyceae, Rhodomelaceae) (in Japanese).

(3) Suzuki, M., Furusaki, A., and Kurosawa, A. 1979. Tetrahedron, **35**, 823-831. The absolute configurations of halogenated chamigrene derivatives from the marine alga, *Laurencia glandulifera* Kutzing. (IR, <sup>1</sup>H-NMR, MS)

(4) Suzuki, T., Kikuchi, H., Kurosawa, E. 1982. Bull. Chem. Soc. Jpn., **55**, 1561-1563. Six new sesquiterpenoids from the red alga *Laurencia nipponica* Yamada. (together with 2,10-dibromo-3-chloro- $\alpha$ -chamigrene, six new laurane-type sesquiterpenes, *trans*-phytol, *trans*-phytol acetate)

(Continue to 1201-2)

## References and Notes

(Continue from 1201-1)

- (5) Furusaki, A., Katayama, C., Matsumoto, T., Suzuki, M., Suzuki, T., Kikuchi, H., and Kurosawa, E. 1982. Bull. Chem. Soc. Jpn., 55, 3398-3402. The crystal and molecular structure of 7,8-epoxyhalochamigrene. (**X-ray crystallographic analysis**)
- (6) Ojika, M., Shizuri, Y., and Yamada, K. 1982. Phytochemistry, **21**, 2410-2411. A halogenated chamigrane epoxide and six related halogen-containing sesquiterpenes from the red alga *Laurencia okamurai*. (together with 2,10-dibromo-3-chloro-7,8-*epi*-epoxychamigrene, 2,10-dibromo-3-chloro-9-hydroxy- $\alpha$ -chamigrene, prepacifenol epoxide, prepacifenol, 1-deoxyprepacifenol, nidificene, aplysin, debromoaplysin, laurinterol, isolaurinterol)
- (7) Kennedy, D. J., Selby, I. A., and Thomson, R. H. 1988. Phytochemistry, **27**, 1761-1766. Chamigrane metabolites from *Laurencia obtusa* and *L. scoparia*. (together with a chamigrane deriv., a known rearranged chamigrane deriv., elatol, 3 known chamigranes)
- (8) Takahashi, Y., Suzuki, M., Abe, T., and Masuda, M. 1998. Phytochemistry, **48**, 987-990. Anhydroaplysiadiol from *Laurencia japonensis*. (together with anhydroaplysiadiol, aplysiadiol)
- (9) König, G. M. and Wright, A. D. 1994. J. Nat. Prod., **57**, 477-485. New C<sub>15</sub> acetogenins and sesquiterpenes from the red alga *Laurencia* sp. cf. *L. gracilis*. (together with four new acetogenins, known actogenins; deacetyl laurencin, (3*E*)-dehydrobromolaurefucin, laurefucin, known sesquiterpenes; laurene, dihydrolaurene, 10-bromo- $\alpha$ -chamigrene, deoxyprepacifenol, prepacifenol, pacifenol, preintricatol)
- (10) Wright, A. D., König, G. M., and Sticher, O. 1991. J. Nat. Prod., **54**, 1025-1033. New sesquiterpenes and C<sub>15</sub> acetogenins from the marine red alga *Laurencia implicata*. (**<sup>1</sup>H-NMR, <sup>13</sup>C-NMR**) (together with palisadins A, B, aplysisstatin, 5 $\beta$ -hydroxyaplysisstatin, palisol, etcetera)
- (11) Ji, N.-Y., Li, X.-M., Zhang, Y., and Wang, B.-G. 2007. Biochem. System. Ecol., **35**, 627-630. Two new halogenated chamigrane-type sesquiterpenes and other secondary metabolites from the marine red alga *Laurencia okamurai* and their chemotaxonomic significance. (together with 1:1 mixture of (6*S*)- and (6*R*)-2,10-dibromo-3-chloro-7,9-chamigradiene, 2,10-dibromo-3-chloro-9-hydroxy- $\alpha$ -chamigrene, deoxyprepacifenol, 2,10-dibromo-3-chloro-7,8-epoxychamigrane, **2,10-dibromo-3-chloro- $\alpha$ -chamigrene**, *E*-isomer of neoisoprelaurefucin, cholesterol, cholest-5-en-3 $\beta$ ,7 $\alpha$ -diol)
- (12) Elsworth, J. F. and Thomson, R. H. 1989. J. Nat. Prod., **52**, 893-895. A new chamigrane from *Laurencia glomerata*. (together with a new 2,10-dibromo-3-chloro-7,8-epoxy-9-hydroxychamigrane, 3 known chamigrane sesquiterpenes)
- (13) Vairappan, C. S., Zani, I. I., and Kamada, T. 2014. J. Appl. Phycol., **26**, 1189-1198. Structural diversity and geographical distribution of halogenated secondary metabolites in red algae, *Laurencia nangii* Masuda (Rhodomelaceae, Ceramiales), in the coastal waters of North Borneo Island. (**<sup>1</sup>H-NMR, <sup>13</sup>C-NMR**) (together with dactyloxenes A, **2,10-dibromo-3-chloro- $\alpha$ -chamigrene**, deoxyprepacifenol, cycloelatanene B, neolaurallene, itomanallene B, pannosallene, intricatetraol)
- (14) Jongaramruong, J., Blackman, A. J., Skelton, B. W., and White, A. H. 2002. Aust. J. Chem., **55**, 275-280. Chemical relationships between the sea hare *Aplysia parvula* and the red seaweed *Laurencia filiformis* from Tasmania. (**<sup>1</sup>H-NMR, <sup>13</sup>C-NMR, MS**) (together with 5-acetoxy-2,10-dibromo-3-chloro-7,8-epoxychamigr-9-ene, **2,10-dibromo-3-chloro- $\alpha$ -chamigrene**, deoxyprepacifenol, pacifenol, (*E*)-tridecyl-2-heptadec-2-enal, **pentadecanal**)