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- (54) **HYDROXY ESTOLIDES, POLY-CAPPED ESTOLIDES, AND METHODS OF MAKING THE SAME**
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- (\* ) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

6,797,753	B2	9/2004	Benecke et al.
7,544,645	B2	6/2009	Miller et al.
8,236,194	B1	8/2012	Bredsguard et al.
8,258,326	B1	9/2012	Forest et al.
8,268,199	B1	9/2012	Forest et al.
8,287,754	B1	10/2012	Bredsguard et al.
8,829,216	B2*	9/2014	Forest et al. .... 554/148
8,859,658	B2	10/2014	Bredsguard et al.
2006/0020062	A1	1/2006	Bloom
2009/0005508	A1	1/2009	Bloom

(Continued)

## FOREIGN PATENT DOCUMENTS

DE	3203491	A1	8/1983
GB	723244		2/1955

(Continued)

## OTHER PUBLICATIONS

Xie, W.D., et al., A new C-10 acetylene and a new triterpenoid from canyza canadensis, 2007, Ach Phar Res, vol. 30, No. 5, pp. 547-551.\*

Lin, W. et al., Formal synthesis of brefeldin A: applicatin of a zinc-mediated ring expansion reaction, 2007, J. Org. Chem, vol. 72, No. 12, pp. 4390-4395.\*

Ahmed, R. et al., Chemica constituents of seed of Prunus domestica and their insecticidal and antifungal activities, 2007, Saudi Chemical Society, 11(1), 1 page abstract.\*

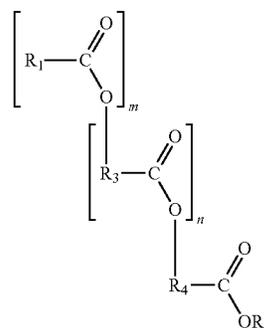
(Continued)

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(57) **ABSTRACT**

Provided herein are poly-capped estolides, including those of the Formula IV



in which n is an integer equal to or greater than 0; m is an integer equal to or greater than 2; R<sub>1</sub> is selected from optionally substituted alkyl that is saturated or unsaturated, and branched or unbranched; R<sub>2</sub> is selected from hydrogen and optionally substituted alkyl that is saturated or unsaturated, and branched or unbranched; and R<sub>3</sub> and R<sub>4</sub>, independently for each occurrence, are selected from optionally substituted alkyl that is saturated or unsaturated, and branched or unbranched. Hydroxy estolides are also described herein, which may be suitable end products, or serve as intermediates to provide poly-capped estolides. Also provided are compositions containing poly-capped estolides and methods of making both said poly-capped estolides and compositions thereof.

**19 Claims, No Drawings**

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(51) **Int. Cl.**

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(52) **U.S. Cl.**

CPC ..... **C10M 105/42** (2013.01); **C07C 69/67** (2013.01); **C07C 69/708** (2013.01); **C10M 105/34** (2013.01); **C11C 3/00** (2013.01); **C11C 3/003** (2013.01); **C10M 2207/301** (2013.01); **C10N 2220/022** (2013.01); **C10N 2220/023** (2013.01); **C10N 2220/027** (2013.01); **C10N 2220/028** (2013.01); **C10N 2220/10** (2013.01); **C10N 2230/02** (2013.01); **C10N 2230/60** (2013.01)

(58) **Field of Classification Search**

None  
See application file for complete search history.

(56) **References Cited**

## U.S. PATENT DOCUMENTS

5,703,022	A	12/1997	Floyd
6,018,063	A	1/2000	Isbell et al.
6,114,309	A *	9/2000	Allanson et al. .... 514/25
6,316,649	B1	11/2001	Cermak et al.