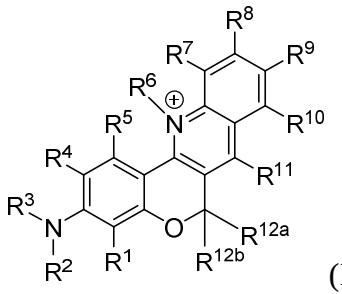
WHAT IS CLAIMED IS:

1. A compound of Formula (I), a salt or a mesomeric form thereof:



(I)

wherein each of R^1, R^4, R^5, R^7, R^8, R^9, R^{10}, R^{11}, R^{12a} and R^{12b} is independently H, C_1-C_6 alkyl, substituted C_1-C_6 alkyl, C_1-C_6 alkoxy, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_1-C_6 haloalkyl, C_1-C_6 haloalkoxy, (C_1-C_6 alkoxy)C_1-C_6 alkyl, optionally substituted amino, amino(C_1-C_6 alkyl), halo, cyano, hydroxy, hydroxy(C_1-C_6 alkyl), nitro, sulfonyl, sulfo, sulfino, sulfonate, S-sulfonamido, or N-sulfonamido;

R^2 is C_1-C_6 substituted with alkyl carboxyl (–C(O)OH), carboxylate (–C(O)O$^-$), –C(O)OR^{15}, and –C(O)N$R^{16}R^{17}$, wherein R^{15} is optionally substituted C_1-C_6 alkyl, optionally substituted C_6-C_{10} aryl, optionally substituted 5 to 10 membered heteroaryl, or optionally substituted C_3-C_7 cycloalkyl, and wherein each of R^{16} and R^{17} is independently H, optionally substituted C_1-C_6 alkyl, optionally substituted C_6-C_{10} aryl, optionally substituted 5 to 10 membered heteroaryl, or optionally substituted C_3-C_7 cycloalkyl;

~~each of R^2 and~~ R^3 is ~~independently~~ H, C_1-C_6 alkyl, or substituted C_1-C_6 alkyl; and

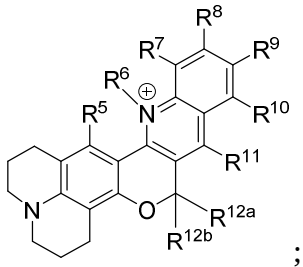
R^6 is C_1-C_6 alkyl or substituted C_1-C_6 alkyl;

~~alternatively, R^1 and R^2 together with the atoms to which they are attached form an optionally substituted 5-10 membered heteroaryl or an optionally substituted 5-10 membered heterocyclyl;~~

alternatively, R^3 and R^4 together with the atoms to which they are attached form an optionally substituted 5-10 membered heteroaryl or an optionally substituted 5-10 membered heterocyclyl;

alternatively, R^8 and R^9 together with the atoms to which they are attached form an optionally substituted C_6-C_{10} aryl, an optionally substituted 3-10 membered carbocyclyl, an optionally substituted 5-10 membered heteroaryl or an optionally substituted 3-10 membered heterocyclyl;

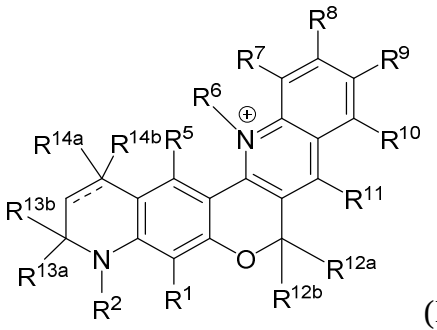
provided that when each of R^2 and R^3 is ethyl; each of R^1, R^4, R^5, R^7, R^8, R^{10}, R^{11}, R^{12a} and R^{12b} is H; and R^6 is methyl; then R^9 is a substituted C_1-C_6 alkyl comprising a carboxyl; and

provided that when R^1 and R^2 together with the atoms to which they are attached form a piperidinyl and R^3 and R^4 together with the atoms to which they are attached form a piperidinyl such that the compound has the structure  ; each of R^5, R^7, R^8, R^{10}, R^{11}, R^{12a} and R^{12b} is H; and R^6 is methyl; then R^9 is a substituted C_1-C_6 alkyl comprising a carboxyl.

2. The compound of claim 1, wherein R^2 is H and R^3 is C_1-C_6 alkyl or substituted C_1-C_6 alkyl.

3. The compound of claim 1, wherein each of R^2 and R^3 is independently C_1-C_6 alkyl.

4. The compound of claim 1, wherein the compound of Formula (I) is also represented by Formula (Ia), a salt, or a mesomeric form thereof:



(Ia)

wherein each of R^{13a}, R^{13b}, R^{14a} and R^{14b} is independently H, C_1-C_6 alkyl, substituted C_1-C_6 alkyl, C_1-C_6 alkoxy, C_2-C_6 alkenyl, C_2-C_6 alkynyl, C_1-C_6 haloalkyl, C_1-C_6 haloalkoxy, (C_1-C_6 alkoxy)C_1-C_6 alkyl, optionally substituted amino, amino(C_1-C_6 alkyl), halo, cyano, hydroxy, hydroxy(C_1-C_6 alkyl), nitro, sulfonyl, sulfo, sulfino, sulfonate, S-sulfonamido, or N-sulfonamido; and

the bond represented by a solid and dashed line ------ is selected from the group consisting of a single bond and a double bond, provided that when ------ is a double bond, then R^{14b} is absent.

5. The compound of claim 4, wherein the bond represented by a solid and dashed line ------ is a double bond.

6. The compound of claim 5, wherein R^{14a} is H or C_1-C_6 alkyl.

7. The compound of claim 6, wherein R^{14a} is methyl.

8. The compound of claim 4, wherein the bond represented by a solid and dashed line ------ is a single bond.

9. The compound of claim 8, wherein R^{14a} is H and R^{14b} is C_1-C_6 alkyl.

10. The compound of claim 8, wherein each of R^{14a} and R^{14b} is H.

11. The compound of any one of claims 4 to 10, wherein each of R^{13a} and R^{13b} is H.

12. The compound of any one of claims 4 to 10, wherein each of R^{13a} and R^{13b} is C_1-C_6 alkyl.

13. The compound of claim 12, wherein each of R^{13a} and R^{13b} is methyl.

14. The compound of any one of claims 4 to 13, wherein R^2 is C_1-C_6 alkyl or substituted C_1-C_6 alkyl.

~~15. The compound of claim 14, wherein R^2 is C_1-C_6 alkyl substituted with one or more substituents selected from the group consisting of carboxyl (–C(O)OH), carboxylate (–C(O)O^-), sulfo (–SO_3H), sulfonate (–SO_3^-), –C(O)OR^{15}, and –C(O)$NR^{16}R^{17}$, wherein R^{15} is optionally substituted C_1-C_6 alkyl, optionally substituted C_6-C_{10} aryl, optionally substituted 5 to 10 membered heteroaryl, or optionally substituted C_3-C_7 cycloalkyl, and wherein each of R^{16} and R^{17} is independently H, optionally substituted C_1-C_6 alkyl, optionally substituted C_6-C_{10} aryl, optionally substituted 5 to 10 membered heteroaryl, or optionally substituted C_3-C_7 cycloalkyl.~~

~~16.~~15. The compound of claim ~~15~~14, wherein R^2 is C_1-C_6 alkyl substituted with carboxyl or –C(O)$NR^{16}R^{17}$, and wherein each R^{16} and R^{17} is independently C_1-C_6 alkyl substituted with carboxyl, carboxylate, –C(O)OR^{15}, sulfo or sulfonate.

~~17.~~16. The compound of any one of claims 1 to ~~16~~15, wherein R^1 is H.

~~18.~~17. The compound of any one of claims 1 and 4 to 13, wherein R^1 and R^2 are joined together with the atoms to which they are attached to form an optionally substituted 6 membered heterocyclyl.

~~19.~~18. The compound of claim ~~18~~17, wherein the 6 membered heterocyclyl is substituted with one or more C_1-C_6 alkyl.

~~20.~~19. The compound of any one of claims 1 to ~~19~~18, wherein each R^5 and R^{11} is H.

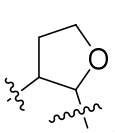
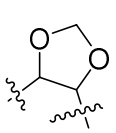
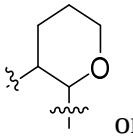
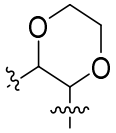
~~21.~~20. The compound of any one of claims 1 to ~~20~~19, wherein R^6 is C_1-C_6 alkyl.

~~22.~~21. The compound of any one of claims 1 to ~~20~~19, wherein R^6 is C_1-C_6 alkyl substituted with carboxyl or –C(O)$NR^{16}R^{17}$, and wherein each R^{16} and R^{17} is independently C_1-C_6 alkyl substituted with carboxyl, carboxylate, –C(O)OR^{15}, sulfo or sulfonate.

~~23.~~22. The compound of any one of claims 1 to ~~22~~21, wherein at least one of R^7, R^8, R^9 and R^{10} is independently C_1-C_6 alkyl or C_1-C_6 alkoxy.

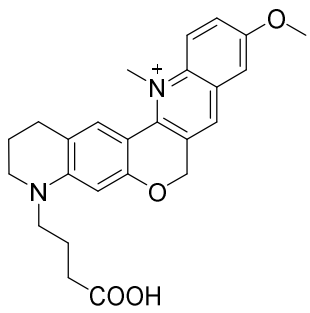
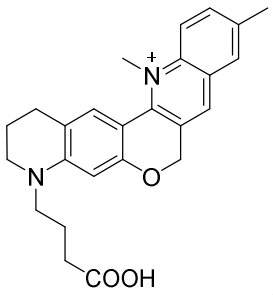
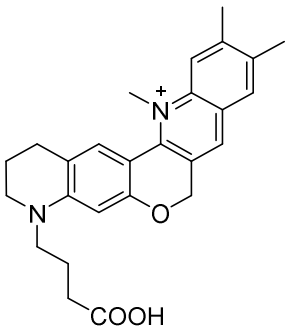
~~24.~~23. The compound of any one of claims 1 to ~~22~~21, wherein at least one of R^7, R^8, R^9 and R^{10} is C_1-C_6 alkyl substituted carboxyl, carboxylate, sulfo, sulfonate, –C(O)OR^{15} or –C(O)$NR^{16}R^{17}$, and wherein each R^{16} and R^{17} is independently H or C_1-C_6 alkyl substituted with carboxyl, carboxylate, –C(O)OR^{15}, sulfo or sulfonate.

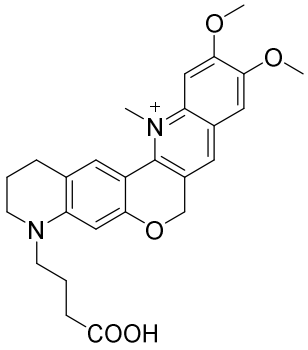
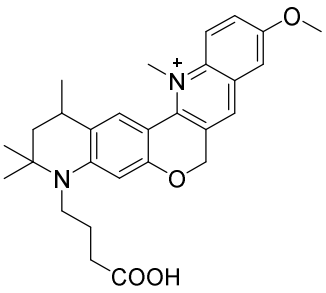
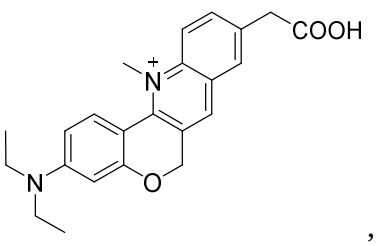
~~25.~~24. The compound of any one of claims 1 to ~~22~~21, wherein R^8 and R^9 together with the atoms to which they are attached form an optionally substituted 5 or 6 membered heterocyclyl.

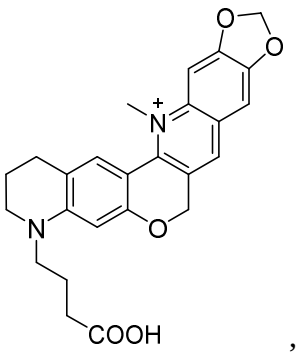
~~26.~~25. The compound of claim ~~25~~24, wherein the optionally substituted 5 or 6 membered heterocyclyl is , ,  or .

~~27.~~26. The compound of any one of claims 1 to ~~26~~25, wherein each of R^{12a} and R^{12b} is H.

~~28.~~27. The compound of claim 1, selected from the group consisting of:

, , ,

, , ,



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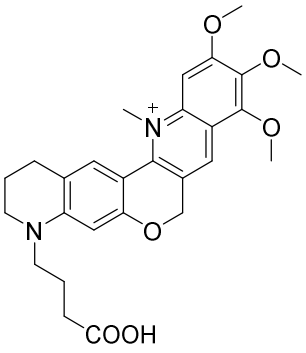

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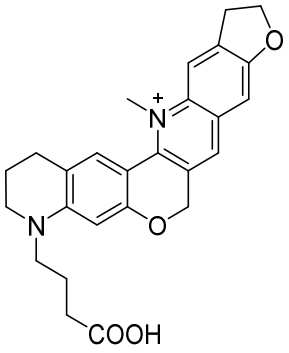

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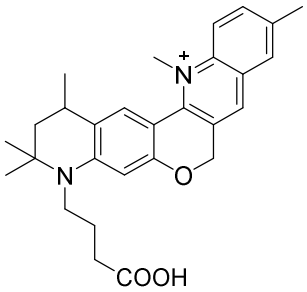

, salts and mesomeric forms thereof.

~~29.~~28. A nucleotide or oligonucleotide labeled with a compound according to any one of claims 1 to ~~28~~27, wherein the compound is attached to the C5 position of a pyrimidine base or the C7 position of a 7-deaza purine base through a linker moiety.

~~30.~~29. The labeled nucleotide or oligonucleotide of claim ~~29~~28, wherein the compound is attached the nucleotide or oligonucleotide via a carboxyl group of R^2 or R^6 of Formula (I).

~~31.~~30. The labeled nucleotide or oligonucleotide of claim ~~29~~28, wherein the compound is attached the nucleotide or oligonucleotide via a carboxyl group of one of R^7, R^8, R^9 and R^{10} of Formula (I).

~~32. The labeled nucleotide or oligonucleotide of any one of claims 29 to 31, wherein the compound is attached to the C5 position of a pyrimidine base or the C7 position of a 7-deaza purine base through a linker moiety.~~

~~33.~~31. The labeled nucleotide or oligonucleotide of any one of claims ~~29~~ 28 to ~~32~~30, further comprising a 3’ OH blocking group covalently attached to the ribose or deoxyribose sugar of the nucleotide.

~~34.~~32. The nucleotide or oligonucleotide of any one of claims ~~29~~ 28 to ~~33~~31, wherein the nucleotide or oligonucleotide is an oligonucleotide hybridized to at least a portion of a target polynucleotide.

~~35.~~33. The oligonucleotide of claim ~~34~~32, wherein the target polynucleotide is immobilized on a solid support.

~~36.~~34. The oligonucleotide according to claim ~~35~~33, wherein the solid support comprises an array of a plurality of immobilized target polynucleotides.

~~37.~~35. A kit comprising a first nucleotide labeled with a first compound according to any one of claims ~~29~~ 28 to ~~33~~31.

~~38.~~36. The kit of claim ~~37~~35, further comprising a second nucleotide, wherein the second nucleotide is labeled with a second compound that is different from the first compound of the first labeled nucleotide.

~~39.~~37. The kit of claim ~~38~~36, wherein the first labeled nucleotide and the second labeled nucleotide are excitable using a first light source wavelength.

~~40.~~38. The kit of claim ~~38~~ 36 or ~~39~~37, further comprising a third nucleotide, wherein the third nucleotide is labeled with a third compound that is different from the first and the second compounds, and wherein the first and third labeled nucleotides are excitable using a second light source wavelength.

~~41.~~39. The kit of claim ~~40~~38, further comprising a fourth nucleotide, and wherein the fourth nucleotide is unlabeled (dark).

~~42.~~40. The kit of any one of claims ~~37~~ 35 to ~~41~~39, each of the first labeled nucleotide, the second labeled nucleotide and the third labeled nucleotide has an emission spectrum that is detectable in a single detection channel.

~~43.~~41. The kit of any one of claims ~~37~~ 35 to ~~42~~40, further comprising a DNA polymerase and one or more buffer compositions.

~~44.~~42. A method of determining the sequence of a target polynucleotide, comprising:

(a) contacting a primer polynucleotide/target polynucleotide complex with one or more labeled nucleotides, wherein at least one of said labeled nucleotide is a nucleotide of any one of claims ~~29~~ 28 to ~~33~~31, and wherein the primer polynucleotide is complementary to at least a portion of the target polynucleotide;

(b) incorporating a labeled nucleotide into the primer polynucleotide to produce an extended primer polynucleotide; and

(c) performing one or more fluorescent measurements of the extended primer polynucleotide to determine the identity of the incorporated nucleotide.

~~45.~~43. The method of claim ~~44,~~42 wherein the primer polynucleotide/target polynucleotide complex is formed by contacting the target polynucleotide with a primer polynucleotide complementary to at least a portion of the target polynucleotide.

~~46.~~44. The method of claim ~~44~~ 42 or ~~45~~43, further comprising (d) removing the label and the 3′ blocking group from the nucleotide incorporated into the primer polynucleotide.

~~47.~~45. The method of claim ~~45~~43, further comprising (e) washing the removed label and the 3′ blocking group away from the primer polynucleotide.

~~48.~~46. The method of claim ~~47~~45, further comprising repeating steps (a) to (e) until a sequence of at least a portion of the template polynucleotide strand is determined.

~~49.~~47. The method of claim ~~48~~46, wherein the steps (a) to (e) is repeated at least 50 times.

~~50.~~48. The method of any one of claims ~~44–~~42 to ~~49~~47, wherein the label and the 3′ blocking group from the nucleotide incorporated into the primer polynucleotide are removed in a single chemical reaction.

~~51.~~49. The method of any one of claims ~~44–~~42 to ~~50~~48, wherein the method is performed on an automated sequencing instrument, and wherein the automated sequencing instrument comprises two light sources operating at different wavelengths.