

**Table S1. Crystallographic Data for 2**

|                         |                                                                                                                                                                                                                |
|-------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Empirical Formula       | $C_7H_9N_2O_2ClPt$                                                                                                                                                                                             |
| Formula Weight          | 383.70                                                                                                                                                                                                         |
| Crystal Color and Habit | colorless prism                                                                                                                                                                                                |
| Crystal Dimensions      | 0.28 x 0.18 x 0.42 mm                                                                                                                                                                                          |
| Crystal System          | triclinic                                                                                                                                                                                                      |
| Lattice Parameters      | $a = 8.170(2) \text{ \AA}$<br>$b = 9.274(3) \text{ \AA}$<br>$c = 7.374(2) \text{ \AA}$<br>$\alpha = 108.68(2)^\circ$<br>$\beta = 113.27(2)^\circ$<br>$\gamma = 74.40(2)^\circ$<br>$V = 479.7(6) \text{ \AA}^3$ |
| Space Group             | $P\bar{1}$ (No.2)                                                                                                                                                                                              |
| Z                       | 2                                                                                                                                                                                                              |
| $D_{\text{calc}}$       | $2.66 \text{ g cm}^{-3}$                                                                                                                                                                                       |
| Radiation               | MoK $\alpha$ ( $\lambda = 0.71069 \text{ \AA}$ )                                                                                                                                                               |
| $\mu(\text{MoK}\alpha)$ | $150.3 \text{ cm}^{-1}$                                                                                                                                                                                        |
| Absorption Corrections  | $\psi$ scans (transmission factors 0.51- 1.00)                                                                                                                                                                 |
| Temperature             | $-120^\circ\text{C}$                                                                                                                                                                                           |
| $2\theta_{\text{max}}$  | $50^\circ$                                                                                                                                                                                                     |

**Table S1. continued**

|                                         |                                                        |
|-----------------------------------------|--------------------------------------------------------|
| No. of Reflections Measured             | Total: 1794<br>Unique: 1683 ( $R_{\text{int}}=0.032$ ) |
| No. of Reflections ( $I>3\sigma(I)$ )   | 1514                                                   |
| No. of Variables                        | 119                                                    |
| Residuals $R$ ; $R_w$                   | 0.034; 0.044                                           |
| Goodness of Fit                         | 1.41                                                   |
| Maximum Peak in Final<br>Difference Map | 1.76 e/Å <sup>3</sup> (0.97 Å from Pt)                 |

**Table S2. Positional Parameters for 2**

| atom | x           | y          | z           |
|------|-------------|------------|-------------|
| Pt   | -0.09244(4) | 0.20724(4) | -0.24409(5) |
| Cl   | 0.0377(3)   | 0.3019(3)  | -0.3938(4)  |
| O(1) | -0.213(1)   | 0.1102(8)  | -0.130(1)   |
| O(2) | -0.463(1)   | 0.0391(7)  | -0.172(1)   |
| N(1) | -0.287(1)   | 0.392(1)   | -0.243(1)   |
| N(2) | 0.107(1)    | 0.020(1)   | -0.226(1)   |
| C(2) | -0.460(1)   | 0.372(1)   | -0.296(1)   |
| C(3) | -0.596(1)   | 0.496(1)   | -0.286(2)   |
| C(4) | -0.555(1)   | 0.644(1)   | -0.221(2)   |
| C(5) | -0.382(2)   | 0.668(1)   | -0.167(2)   |
| C(6) | -0.247(1)   | 0.537(1)   | -0.179(2)   |
| C(7) | -0.494(1)   | 0.207(1)   | -0.370(2)   |
| C(8) | -0.390(1)   | 0.113(1)   | -0.215(1)   |

**Table S3. Thermal Displacement Parameters for 2**

| atom | U11       | U22       | U33       | U12        | U13       | U23       |
|------|-----------|-----------|-----------|------------|-----------|-----------|
| Pt   | 0.0137(3) | 0.0122(3) | 0.0131(3) | -0.0020(1) | 0.0046(2) | 0.0024(2) |
| Cl   | 0.019(1)  | 0.028(1)  | 0.036(1)  | -0.005(1)  | 0.011(1)  | 0.012(1)  |
| O(1) | 0.025(4)  | 0.023(4)  | 0.024(4)  | 0.000(3)   | 0.012(3)  | 0.013(3)  |
| O(2) | 0.028(4)  | 0.013(3)  | 0.027(4)  | -0.008(3)  | 0.013(3)  | 0.005(3)  |
| N(1) | 0.021(4)  | 0.013(4)  | 0.012(4)  | -0.004(3)  | 0.004(3)  | -0.000(3) |
| N(2) | 0.023(5)  | 0.021(4)  | 0.018(4)  | 0.005(4)   | 0.009(4)  | 0.006(4)  |
| C(2) | 0.023(5)  | 0.020(5)  | 0.009(5)  | -0.008(4)  | 0.008(4)  | 0.003(4)  |
| C(3) | 0.024(5)  | 0.025(6)  | 0.025(6)  | -0.001(4)  | 0.010(5)  | 0.011(5)  |
| C(4) | 0.028(6)  | 0.023(5)  | 0.017(5)  | -0.000(4)  | 0.005(4)  | 0.004(4)  |
| C(5) | 0.043(7)  | 0.013(5)  | 0.015(5)  | -0.004(5)  | 0.005(5)  | -0.001(4) |
| C(6) | 0.024(5)  | 0.013(5)  | 0.019(5)  | -0.006(4)  | 0.002(4)  | 0.004(4)  |
| C(7) | 0.019(5)  | 0.024(5)  | 0.021(5)  | -0.006(4)  | 0.009(4)  | 0.003(4)  |
| C(8) | 0.028(5)  | 0.007(4)  | 0.015(5)  | 0.000(4)   | 0.010(4)  | -0.001(4) |

**Table S4. Bond Lengths (Å) and Angles (deg) for 2****(a) Bonds**

|      |      |          |      |      |         |
|------|------|----------|------|------|---------|
| Pt   | Cl   | 2.274(3) | N(1) | C(6) | 1.36(1) |
| Pt   | O(1) | 2.025(7) | C(2) | C(3) | 1.38(1) |
| Pt   | N(1) | 2.002(8) | C(2) | C(7) | 1.51(1) |
| Pt   | N(2) | 2.037(8) | C(3) | C(4) | 1.39(2) |
| O(1) | C(8) | 1.33(1)  | C(4) | C(5) | 1.36(2) |
| O(2) | C(8) | 1.20(1)  | C(5) | C(6) | 1.41(1) |
| N(1) | C(2) | 1.35(1)  | C(7) | C(8) | 1.51(1) |

**(b) Angles**

|      |      |      |          |      |      |      |          |
|------|------|------|----------|------|------|------|----------|
| Cl   | Pt   | O(1) | 175.8(2) | N(1) | C(2) | C(7) | 116.5(8) |
| Cl   | Pt   | N(1) | 92.2(2)  | C(3) | C(2) | C(7) | 122.3(9) |
| Cl   | Pt   | N(2) | 90.6(3)  | C(2) | C(3) | C(4) | 119(1)   |
| O(1) | Pt   | N(1) | 89.5(3)  | C(3) | C(4) | C(5) | 121(1)   |
| O(1) | Pt   | N(2) | 87.8(3)  | C(4) | C(5) | C(6) | 118(1)   |
| N(1) | Pt   | N(2) | 176.2(3) | N(1) | C(6) | C(5) | 121(1)   |
| Pt   | O(1) | C(8) | 118.1(6) | C(2) | C(7) | C(8) | 113.3(8) |
| Pt   | N(1) | C(2) | 119.2(6) | O(1) | C(8) | O(2) | 120.3(9) |
| Pt   | N(1) | C(6) | 120.7(7) | O(1) | C(8) | C(7) | 118.0(8) |
| C(2) | N(1) | C(6) | 119.9(8) | O(2) | C(8) | C(7) | 122(1)   |
| N(1) | C(2) | C(3) | 121(1)   |      |      |      |          |

**Table S5. Intermolecular Distances (Å) for 2**

| atom | atom | distance | ADC(*) | atom | atom | distance | ADC(*) |
|------|------|----------|--------|------|------|----------|--------|
| Cl   | N(2) | 3.47(1)  | 55402  | O(2) | N(2) | 3.42(1)  | 45501  |
| Cl   | C(3) | 3.59(1)  | 65501  | N(1) | C(4) | 3.57(1)  | 46402  |
| O(1) | N(2) | 2.96(1)  | 2      | N(2) | C(8) | 3.54(1)  | 2      |
| O(2) | O(2) | 3.15(1)  | 45502  | C(2) | C(4) | 3.57(1)  | 46402  |
| O(2) | N(2) | 3.29(1)  | 2      | C(2) | C(5) | 3.58(1)  | 46402  |
| O(2) | C(5) | 3.33(1)  | 54501  | C(3) | C(6) | 3.57(2)  | 46402  |
| O(2) | C(7) | 3.36(1)  | 45402  | C(4) | C(8) | 3.40(1)  | 46502  |
| O(2) | C(4) | 3.39(1)  | 46502  | C(7) | C(8) | 3.53(1)  | 45402  |

Contacts out to 3.60 angstroms. Estimated standard deviations in the least significant figure are given in parentheses.

(\*) footnote

The ADC (atom designator code) specifies the position of an atom in a crystal. The 5-digit number shown in the table is a composite of three one digit numbers and one two digit number: TA(1st digit) + TB(2nd digit) + TC(3rd digit) + SN(4th and 5th digit). TA, TB, & TC are the crystal lattice translation digits along cell edges a, b, and c. A translation digit of 5 indicates the origin unit cell. If TA=4, this indicates a translation of one unit cell length along the a axis in the negative direction. Each translation digit can range in value from 1 to 9 and thus (+/-)4 lattice translations from the origin (TA=5, TB=5, TC=5) can be represented.

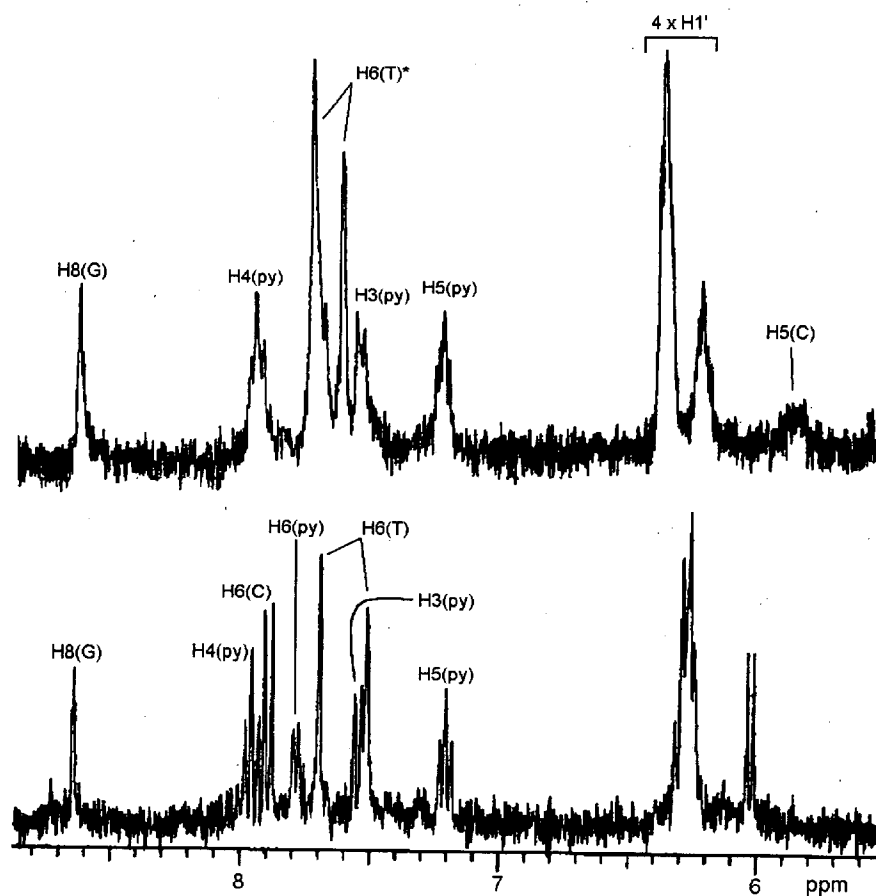
The SN or symmetry operator number refers to the number of the symmetry operator used to generate the coordinates of the target atom. A list of the symmetry operators relevant to this structure are given below.

For a given intermolecular contact, the first atom (origin atom) is located in the origin unit cell (TA=5, TB=5, TC=5) and its position can be generated using the identity operator (SN=1). Thus, the ADC for an origin atom is always ADC=55501. The position of the second atom (target atom) can be generated using the ADC and the coordinates of that atom in the parameter table. For example, an ADC of 47502 refers to the target atom moved through operator two, then translated -1 cell translations along the a axis, +2 cell translations along the b axis, and 0 cell translations along the c axis.

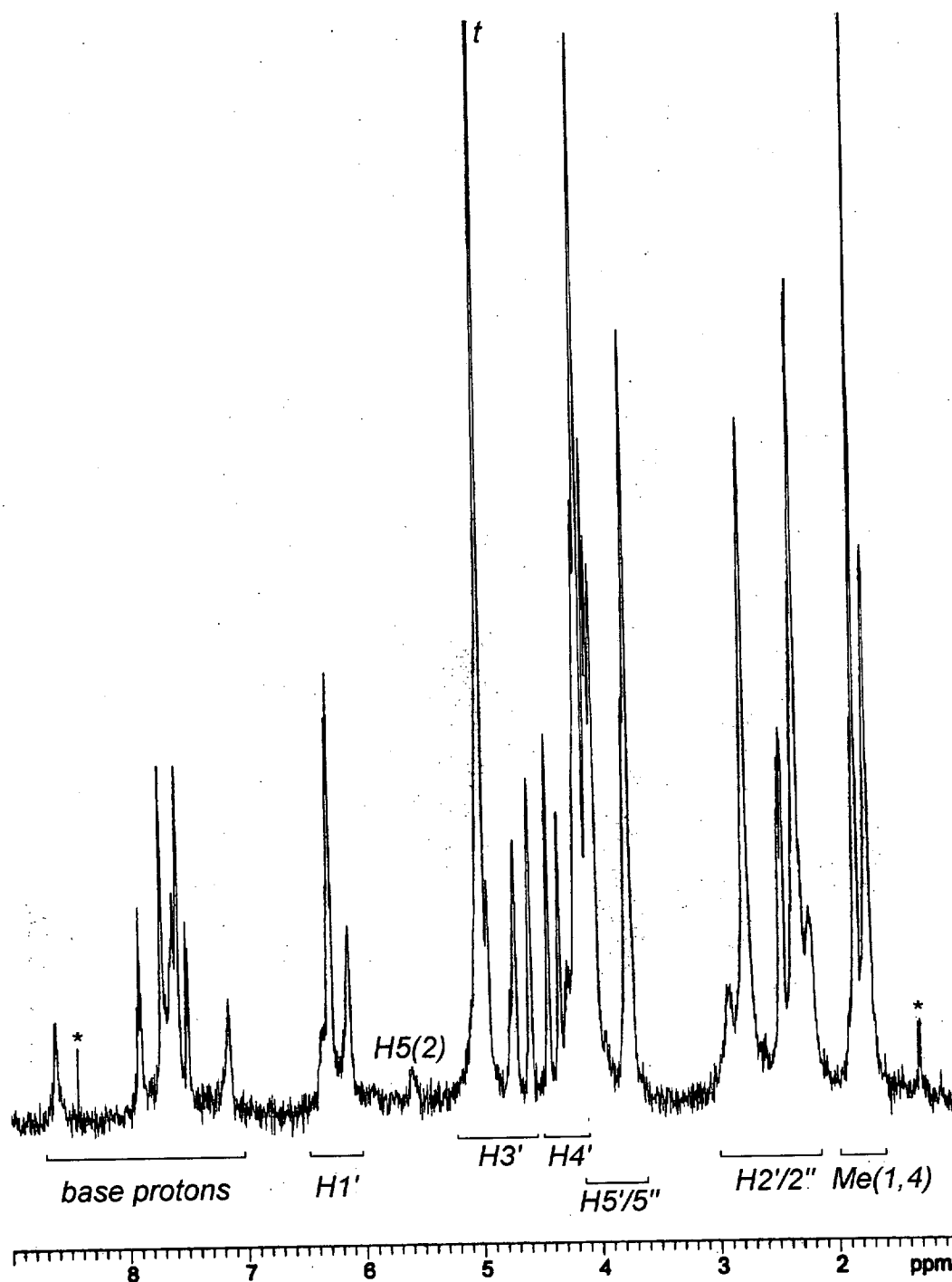
An ADC of 1 indicates an intermolecular contact between two fragments (i.e. cation and anion) that reside in the same asymmetric unit.

#### Symmetry Operators:

( 1 )    +X   ,   +Y   ,   +Z            ( 2 )    -X   ,   -Y   ,   -Z



**Figure S1.** <sup>1</sup>H NMR spectra (300 MHz, pH\* 6.6, 21 °C; downfield and H1' region) of the adducts [d(TCGT)-N7(3)-Pt(PyAc-O,N)(NH<sub>3</sub>)] (**III**, top) and [d(TGCT)-N7(2)-Pt(PyAc-O,N)(NH<sub>3</sub>)] (**IV**, bottom) giving signal assignments.



**Figure S2.**  $^1\text{H}$  NMR spectrum (500 MHz, 2 mM, pH\* 7.2, 5 °C, 64 transients) of **III** giving proton region assignments. The asterisks indicate unidentified impurities. The H<sub>2</sub>O signal is truncated (*t*).

## Experimental Details on Molecular Mechanics Calculations

Three-dimensional models of **III** were generated employing a platinum-modified<sup>1,2</sup> AMBER<sup>3</sup> force field. "Ad hoc" force field parameters for platinum-carboxylate were chosen, based on existing values in the AMBER database, to reproduce the geometry of the *N,O*-chelate in the solid state structure of **2** with deviations in bond distances and angles being smaller than 0.01 Å and 1°, respectively. Atomic charges for the pyridine-2-yl-acetate ligand were calculated by a combination of Gasteiger-Marsili and Hückel methods, included in the HyperChem/ChemPlus package.<sup>4</sup> The sequence 5'-TCGT-3' was built with the nucleic-acid data base module included in HyperChem 3.0/4.5. Torsions about the glycosidic bonds ( $\chi$ ) and sugar puckers (pseudorotation angles,  $P$ ) were manipulated using NAMOT<sup>5</sup> to account for through-space and through-bond connectivities established by 2D NMR spectroscopy. The chloro ligand in **2** was deleted and G(3)-N7 was attached to the metal. The Pt-N7 bond was allowed to slowly adopt its natural length of ~2.01 Å during initial energy optimization steps using a rms gradient of 0.01 kcal/mol·Å<sup>2</sup> and suitable geometry constraints (decrease of Pt-N7 in 0.5 Å increments starting from 4 Å, using a force constant of 150 kcal/mol·Å). The resulting structures were strain-minimized without geometry constraints to a  $\Delta$  rms gradient of 0.001 kcal/mol·Å<sup>2</sup>. Optimizations were carried out *in vacuo* with a distance-dependent dielectric constant,  $4r_{ij}$ , to account for solvent effects on intramolecular nonbonding interactions. For all calculations, sodium ions (+1 charge; van der Waals parameters  $r_i^* = 1.60$  Å and  $\epsilon_i = 0.05$  kcal/mol) were introduced to compensate for the negative charge on the phosphorous diester DNA backbone. 1,4 electrostatic and van der Waals interactions were scaled by the common factor of 0.5.

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- (2) Bierbach, U.; Farrell, N. *Inorg. Chem.* **1997**, 36, 3657.
- (3) Weiner, S. J.; Kollman, P. A.; Case, D. A.; Singh, U. C.; Ghio, C.; Alagona, G.; Profeta, S., Jr.; Weiner, P. *J. Am. Chem. Soc.* **1984**, 106, 765.
- (4) *HyperChem*, Releases 3.0–4.5; Hypercube Inc.: Waterloo, Ontario, Canada, 1993–1995; *ChemPlus*, Release 1.0A; Hypercube Inc.: Waterloo, Ontario, Canada, 1994.
- (5) Carter, G.; Tung, C.-S. *Nucleic Acid Modeling Tool (NAMOT)*, Version 2.1; Los Alamos National Laboratory: Los Alamos, 1994.

**Table S6.** AMBER Force Field Parameters Added to the 3.0A Parameter Set**Bond Stretch Deformation**

| bond  | $r_0$ (Å) | $K_r$ [kcal (mol·Å <sup>2</sup> ) <sup>-1</sup> ] |
|-------|-----------|---------------------------------------------------|
| PT-OS | 2.0250    | 182.7050                                          |
| OS-C  | 1.3300    | 320.0000                                          |

**Angle Bend Deformation**

| angle    | $\theta_0$ (deg) | $K_\theta$ [kcal (mol·rad <sup>2</sup> ) <sup>-1</sup> ] |
|----------|------------------|----------------------------------------------------------|
| OS-PT-N3 | 87.8000          | 42.0000                                                  |
| OS-PT-NC | 89.5000          | 42.0000                                                  |
| OS-PT-CL | 176.0000         | 42.0000                                                  |
| PT-OS-C  | 118.1000         | 63.0000                                                  |
| NC-CA-CT | 116.5000         | 70.0000                                                  |
| C-CT-CA  | 113.3000         | 63.0000                                                  |
| OS-C-O   | 122.3000         | 80.0000                                                  |
| OS-C-CT  | 120.0000         | 85.0000                                                  |
| NB-PT-OS | 180.0000         | 42.0000                                                  |

**Torsional Deformation**

| torsional angle | $\phi_0$ (deg) | $n$ | $V_n$ (kcal mol <sup>-1</sup> ) |
|-----------------|----------------|-----|---------------------------------|
| N3-PT-OS-C      | 180            | 2   | 0 <sup>a</sup>                  |
| NC-PT-OS-C      | 180            | 2   | 0                               |
| CL-PT-OS-C      | 180            | 2   | 0                               |
| PT-OS-C-O       | 0              | 3   | 0                               |
| PT-OS-C-CT      | 0              | 3   | 0                               |
| NB-PT-OS-C      | 180            | 2   | 0                               |

**Improper Torsional Deformation**

| improper angle | $\chi_0$ (deg) | $n$ | $K_\chi/2$ (kcal mol <sup>-1</sup> ) |
|----------------|----------------|-----|--------------------------------------|
| OS-O-C-CT      | 180.0000       | 2   | 15.5000                              |

**Nonbond Interaction**

| atom | $r_i^*$ (Å) | $\epsilon^*$ (kcal mol <sup>-1</sup> ) |
|------|-------------|----------------------------------------|
| PT   | 1.7000      | 0.2000                                 |

<sup>a</sup> Neglected for geometry optimizations of the Pt coordination sphere.