Acta Crystallographica Section E
**Structure Reports**
**Online**

ISSN 1600-5368

# Ethyl 2-(cyclopentyloxy)-5-ethyl-4-hydroxy-6-methylnicotinate

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**Key indicators**

Single-crystal X-ray study
$T$ = 293 K
Mean $\sigma$(C–C) = 0.005 Å
$R$ factor = 0.059
$wR$ factor = 0.185
Data-to-parameter ratio = 16.2

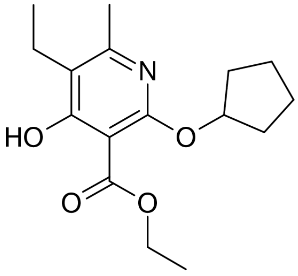
For details of how these key indicators were automatically derived from the article, see http://journals.iucr.org/e.

Structural analysis of the title compound, $C_{16}H_{23}NO_4$, reveals that the pyridine ring and the ester moiety are coplanar. This conformation is stabilized by an intramolecular hydrogen bond between the hydroxyl and ester groups.

Received 25 July 2002
Accepted 29 July 2002
Online 31 July 2002

## Comment

In an attempt to design new HIV reverse transcriptase inhibitors (Parniak & Sluis-Cremer, 2000), the title compound (I), namely ethyl 2-(cyclopentyloxy)-5-ethyl-4-hydroxy-6-methylnicotinate, was synthesized and studied by X-ray diffraction. The atom labeling and molecular conformation adopted for this compound are depicted in Fig. 1. The pyridine heterocycle is planar; the displacement of the atoms from their mean plane does not exceed 0.014 Å. The cyclopentyl ring is orthogonal to the pyridine heterocycle [dihedral angle of 89.59 (2)° between the mean planes], with N1—C2—O10—C11 and C2—O10—C11—C12 torsion angles of −4.9 (4) and −86.2 (3)°, respectively. Furthermore, the ester function is nearly coplanar with the pyridine ring [C4—C3—C16—C17 1.4 (4)°]. This conformation is induced by an intramolecular hydrogen bond between the hydroxyl and ester moieties (O21—H21···O17, see Table 1). In addition to this hydrogen bond, the molecular structure of (I) is also stabilized by intermolecular C—H···O contacts (see Table 1).



(I)

## Experimental

The title compound, (I), was synthesized from ethyl 5-ethyl-4-hydroxy-6-methyl-pyridine-2(1$H$)-one-3-carboxylate (Dollé *et al.*, 1995). In a 25 ml two-necked flask under argon, the pyridinone (1.12 g, 5 mmol) and $Ag_2CO_3$ (0.717 g, 2.6 mmol) were dissolved in 10 ml benzene. The reaction mixture was warmed to 303 K and a slight excess of iodocyclopentane (640 µl, 5.5 mmol) was then added. After 18 h, the whole mixture was cooled to 273 K, diluted with 10 ml pentane, and filtered. This organic layer was washed successively with diluted $NaHCO_3$ and saturated NaCl, then dried with anhydrous $Na_2SO_4$, filtered off and evaporated to dryness. This sample was

DOI: 10.1107/S1600536802013612

purified on a $SiO_2$ column (eluant: dichloromethane/pentane: 3:1). 1.375 g (4.65 mmol, 93% yield) of a white solid were obtained. Spectroscopic analysis, $^1$H NMR (90 MHz, $CDCl_3$, $\delta$, p.p.m.): 1.1 (*t*, 3H, $CH_3$), 1.4 (*t*, 3H, $CH_3$), 1.5–2.2 (*m*, 8H), 2.4 (*s*, 3H, $CH_3$), 2.6 (*q*, 2H, $CH_2$), 4.3 (*q*, 2H, $OCH_2$), 5.5 (*m*, 1H, OCH), 12.5 (*s*, 1H, NH). Slow evaporation of a solution of (I) in ethanol gave colourless crystals suitable for X-ray analysis.

### *Crystal data*

$C_{16}H_{23}NO_4$
$M_r$ = 293.35
Triclinic, $P\bar{1}$
$a$ = 6.312 (1) Å
$b$ = 10.571 (1) Å
$c$ = 12.396 (2) Å
$\alpha$ = 84.205 (7)°
$\beta$ = 77.098 (8)°
$\gamma$ = 88.827 (5)°
$V$ = 802.1 (2) Å$^3$

$Z$ = 2
$D_x$ = 1.215 Mg m$^{-3}$
Cu $K\alpha$ radiation
Cell parameters from 25 reflections
$\theta$ = 30.0–40.0°
$\mu$ = 0.71 mm$^{-1}$
$T$ = 293 (2) K
Platelet, colourless
0.21 × 0.10 × 0.09 mm

### *Data collection*

Enraf–Nonius CAD-4 diffractometer
$\theta/2\theta$ scans
Absorption correction: analytical (Alcock, 1970)
$T_{\min}$ = 0.865, $T_{\max}$ = 0.939
3449 measured reflections
3147 independent reflections
1678 reflections with $I > 2\sigma(I)$

$R_{\rm int}$ = 0.022
$\theta_{\max}$ = 71.9°
$h = -5 \rightarrow 7$
$k = -13 \rightarrow 13$
$l = -14 \rightarrow 15$
3 standard reflections every 200 reflections frequency: 60 min intensity decay: 3.5%

### *Refinement*

Refinement on $F^2$
$R[F^2 > 2\sigma(F^2)]$ = 0.059
$wR(F^2)$ = 0.185
$S$ = 1.01
3147 reflections
194 parameters
H-atom parameters constrained

$w = 1/[\sigma^2(F_o^2) + (0.076P)^2 + 0.272P]$ where $P = (F_o^2 + 2F_c^2)/3$
$(\Delta/\sigma)_{\max}$ = 0.023
$\Delta\rho_{\max}$ = 0.26 e Å$^{-3}$
$\Delta\rho_{\min}$ = −0.19 e Å$^{-3}$

**Table 1**
Hydrogen-bonding geometry (Å, °).

| $D$—H···$A$ | $D$—H | H···$A$ | $D$···$A$ | $D$—H···$A$ |
|---|---|---|---|---|
| O21—H21···O17 | 1.01 | 1.58 | 2.513 (3) | 152 |
| C19—H19$A$···O17$^{\rm i}$ | 0.97 | 2.83 | 3.211 (4) | 105 |

Symmetry code: (i) $1 - x, -y, 2 - z$.

The displacement parameter of the hydroxyl H atom was refined and the methyl groups were allowed to rotate about their local threefold axes.

Data collection: *CAD*-4 *EXPRESS* (Enraf–Nonius, 1992); cell refinement: *CAD*-4 *EXPRESS*; data reduction: *HELENA* (Spek, 2000); program(s) used to solve structure: *SIR*97 (Altomare *et al.*, 1999); program(s) used to refine structure: *SHELXL*97 (Sheldrick, 1997); molecular graphics: *PLATON* (Spek, 2000); software used to prepare material for publication: *SHELXL*97.

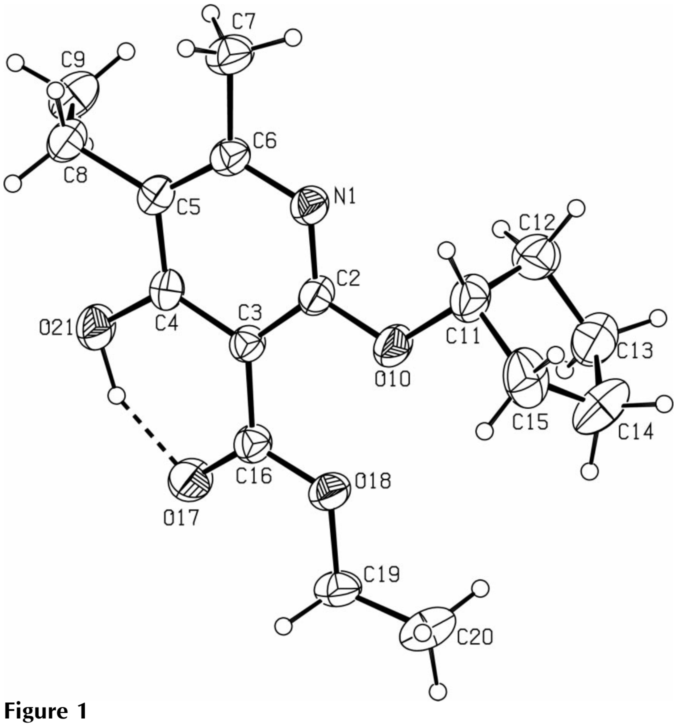


**Figure 1**
*ORTEP* view of compound (I), with displacement ellipsoids drawn at the 30% probability level.

SB and CC thank the Industry and Agriculture Research Foundation (FRIA) and the Région Wallonne (DGTRE) for financial support. The authors thank the Facultés Universitaires Notre-Dame de la Paix for the use of the Scientific Computing Facility.

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