**Three-component One-pot Total Syntheses of Gyantrypine,
Fumiquinazoline F and Fiscalin B Promoted by Microwave Irradiation[†]**

Ji-Feng Liu, Ping Ye, Bailin Zhang, Grace Bi, Katie Sargent, Libing Yu, Daniel
Yohannes, and Carmen M. Baldino*

ArQule, Inc., Division of Chemical Technologies, 19 Presidential Way, Woburn, MA
01801, USA

jliu@arqule.com

Supporting Information

Table of Contents:

General and	
Materials.....	S2
¹ H and ¹³ C NMR spectra:	
18a	S3-S4
18b	S5
20a	S6-S7
1a	S8-S9
1b	S10-S12
1c	S13-S14
1d	S15-S16
2	S17-S19
3	S20-S21
4	S22
5	S23-S24

General and materials. All reagents and solvents were purchased and used without further purification. Personal ChemistryTM Creator and Smith stations were used for milligram-scale microwave reactions. Irradiation was initiated at 300 W to raise the temperature to the setpoint and then power was applied at intervals and levels to maintain the desired temperature. Reactions were run in sealed vessels. Reaction times reported included time for the vial to ramp to the desired temperature. MicroSynth Microwave Labstation for Synthesis from Milestone Microwave Laboratory System were used for gram-scale microwave reactions. The product isolation was performed on prep-TLC plates or flash column chromatography on 40-63 μm silica gel. The Preparative HPLC was carried out employing a ProntoSIL 120-10-C18 column (50x20 mm). The flow rate was at 44 mL/min utilizing an acetonitrile/water mobile phase. Chiral analysis was performed on an analytical Berger SFC/MS system equipped with a ChiralCel OD-H Column (4.6X250 mm) with a flow rate of 3 mL/min and 25% MeOH in CO₂ as the mobile phase (30 °C, 130Bar outlet pressure). When the analytical HPLC was coupled with APCI sourced mass spectrometric detection, a makeup flow (0.3 mL/min) of 0.1% formic acid in MeOH was used. The chiral purification was carried out on a SFC system equipped with a ChiralCel OJ-H Column (20X250 mm) with a flow rate of 60 mL/min and a mobile phase composed of 20% MeOH in CO₂. The column oven was set at 30 °C and the outlet pressure at 100 bar. Fraction collection was triggered based on the UV_{214nm} trace. ¹H NMR (300, or 400 MHz) and ¹³C NMR (75, or 100 MHz) spectra were recorded in CDCl₃ solution (unless otherwise stated). Chemical shifts are given in parts per million (*ppm*) downfield from tetramethylsilane (TMS) as an internal reference, and coupling constants (*J*-values) are in hertz (Hz). Selected data are reported in the following manner: chemical shift; multiplicity (s = singlet, d = doublet, t = triplet, m = multiplet, b = broad); coupling constants and assignment. Low-resolution mass spectra were recorded in the ES⁺ mode. The high-resolution mass spectra (HRMS) were recorded in the FAB mode.

Compound 18a

Compound 18a

PV1471-S2-4-C13
Pulse Sequence: s2iu1

18a

Compound 1a

Compound 1b

PT-40-C13
Pulse Sequence: zgpg30

1b

Compound 1c

Compound 1c

JFL-S-1-C13
Pulse Sequence: zgpg30

1c

Compound 1d

PY-80-C13
Pulse Sequence: zgpg30

1d

Compound 2

DL-03-C13

Pulse Sequence: zgpg30

2

Compound 3

Compound 3

3

471-05-1-2
Pulse Sequence: zgpg30