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Declaration under Rule 4.17:

— as to the identity of the inventor (Rule 4.17(i))

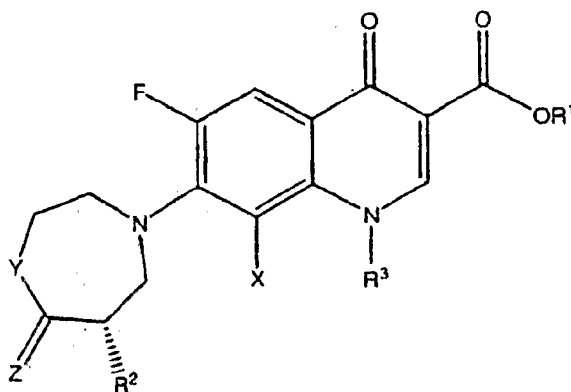
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(88) Date of publication of the international search report:

29 May 2008

(54) Title: QUINOLONE CARBOXYLIC ACIDS, DERIVATIVES THEREOF, PROCESSES FOR ITS PREPARATION AND ITS USE AS ANTIBACTERIAL AGENTS



(I)

(57) Abstract: A process of preparing a quinolone carboxylic acid or its derivatives having a formula as shown below, comprises using a starting 7-fluoro quinolone that already has one or more desired substituents at one or more particular positions on the quinolone ring and preserving the orientation of such substituents throughout the synthesis. The present process comprises fewer steps than prior-art processes. The present process also can include a simple separation of a desired enantiomer of the quinolone carboxylic acid or its derivatives from the enantiomeric mixture. Pharmaceutical compositions comprising fluoroquinolones prepared by the present process can be used effectively against a variety of microbial pathogens..

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# INTERNATIONAL SEARCH REPORT

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## A. CLASSIFICATION OF SUBJECT MATTER

INV. C07D401/04 C07D413/04 C07D417/04 C07D215/233 A61K31/55  
A61K31/551 A61K31/553 A61K31/554 A61P31/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
C07D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, CHEM ABS Data, WPI Data, BEILSTEIN Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2006/008046 A (BAYER HEALTHCARE AG [DE]; SCHOHE-LOOP RUDOLF [DE]; ZIMMERMANN HOLGER []) 26 January 2006 (2006-01-26) example 1a	1, 4
X	FR 2 706 459 A (BOUCHARA SA [FR]) 23 December 1994 (1994-12-23) examples 1-3	1, 4
X	EP 0 614 664 A (TAKEDA CHEMICAL INDUSTRIES LTD [JP]) 14 September 1994 (1994-09-14) Production example 15, compound 61. page 36 - page 37	1, 4
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☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

### \* Special categories of cited documents:

\*A\* document defining the general state of the art which is not considered to be of particular relevance

\*E\* earlier document but published on or after the international filing date

\*L\* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

\*O\* document referring to an oral disclosure, use, exhibition or other means

\*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*Z\* document member of the same patent family

Date of the actual completion of the international search

1 April 2008

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10/04/2008

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# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2007/079304

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	<p>DATABASE CAPLUS [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; ITO, YASUO ET AL: "Homopiperazinylquinolinecarboxylic acid derivatives as medicinal broad-spectrum bactericides" XP002474470 retrieved from STN Database accession no. 1989:39031 Preparation of compounds (I), exemplified by RN 116355-62-5 and 118330-16-8. abstract</p>	1,4
X	<p>&amp; JP 63 196580 A (HOKURIKU PHARMACEUTICAL CO., LTD., JAPAN) 15 August 1988 (1988-08-15) compounds I, IV</p>	1,4
X	<p>DATABASE CAPLUS [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; ITO, YASUO ET AL: "Antibacterial homopiperazinylquinolinecarboxylic acid derivatives and their preparation" XP002474471 retrieved from STN Database accession no. 1989:39030 Preparation of compounds (I), exemplified by RN 118330-19-1 and 118330-20-4. abstract</p>	1,4
X	<p>&amp; JP 63 196579 A (HOKURIKU PHARMACEUTICAL CO., LTD., JAPAN) 15 August 1988 (1988-08-15) examples I, IV</p>	1,4
X	<p>DATABASE CAPLUS [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; ITO, YASUO ET AL: "Preparation of 1-(3-carboxy-7-quinoliny)homopiperazine derivatives as broad-spectrum bactericides" XP002474472 retrieved from STN Database accession no. 1988:529070 Preparation of compounds (I), exemplified by RN 116355-61-4 and 116355-63-6. abstract</p>	1,4
X	<p>&amp; JP 63 132885 A (HOKURIKU PHARMACEUTICAL CO., LTD., JAPAN) 4 June 1988 (1988-06-04) examples I, IV</p>	1,4
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# INTERNATIONAL SEARCH REPORT

International application No  
PCT/US2007/079304

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE CAPLUS [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; "Difluoroquinolinecarboxylic acid derivatives" XP002474473 retrieved from STN Database accession no. 1985:149296 Preparation of compounds (I), exemplified by RN 95796-20-6 and 95796-19-3. abstract	1,4
X	& JP 60 006684 A (HOKURIKU PHARMACEUTICAL CO., LTD., JAPAN) 14 January 1985 (1985-01-14) examples I,IV	1,4
X	EP 0 493 608 A (SS PHARMACEUTICAL CO [JP]) 8 July 1992 (1992-07-08) page 6, line 13 - line 21; claims 1,2; examples 15,16	20-43
Y	EP 0 601 197 A (SS PHARMACEUTICAL CO [JP]) 15 June 1994 (1994-06-15) claims 1,2; examples 1-5; tables 1-3	1-43
Y	WO 94/15933 A (CHEIL FOODS & CHEM [KR]) 21 July 1994 (1994-07-21) Several examples, e.g. 2-6,13-15 etc.. page 66 - page 67; claim 4	1-43
Y	K. ARAKI ET AL.: "Quinolone Antimicrobial Agents Substituted with Morpholines at the 7-Position. Syntheses and Structure-Activity Relationships." J.MED.CHEM., vol. 36, no. 10, 1993, pages 1356-1363, XP002474254 Scheme V. Page 1362: The preparation of cpd 28 via protected amine 7. example 41; table IV	1-43

## INTERNATIONAL SEARCH REPORT

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### Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☒ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:  

Although claims 26-37 are directed to a method of treatment of the human/animal body, the search has been carried out and based on the alleged effects of the compound/composition.
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

#### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No  
PCT/US2007/079304

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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