Sir,

CTX-M-15 is an extended-spectrum β-lactamase (ESBL) extensively reported in humans, and in particular in *Escherichia coli* clones of sequence types (STs) ST131 and ST405. 1

In animals, a highly prevalent ESBL gene is the *CTX-M* gene, also being found in *Klebsiella pneumoniae*, causing outbreaks in hospitals worldwide. 2–4

In animals, a highly prevalent ESBL gene is the *CTX-M* gene, with the *bla* gene also being found in *E. coli* isolated from food-producing animals and pets. 5

From 2008 to 2010, 24 *K. pneumoniae* isolates were recovered from urine samples of unrelated dogs (n = 18) and cats (n = 6), 17 of which were collected in the same referral veterinary hospital specialized for surgery in the near suburbs of Paris, France. The other seven isolates were from pets attending surrounding regular veterinary clinics. Susceptibility testing to 32 antimicrobials was performed by agar diffusion and interpreted according to approved clinical breakpoints (http://www.sfm-microbiologie.fr). All isolates were resistant to cefotiofur, cefotaxime, cefazidime and aztreonam, resistant or of intermediate susceptibility to ceftazidime and imipenem. ESBL production was systematically confirmed by a positive synergy test between ceftazidime and clavulanate. All isolates were resistant to ciprofloxacin, streptomycin, sulphonamides and trimethoprim, and 19 isolates were also resistant to kanamycin, gentamicin, tobramycin and netilmicin; only 2 isolates were resistant to tetracycline. Patterns of PFGE performed on XbaI-digested genomic DNA were indistinguishable or differed by no more than two bands (data not shown), strongly suggesting that the same clone was responsible for all infections. Furthermore, all isolates belonged to ST15.

The *bla* gene, preceded by the IS*Ecp1* element, and the *bla* and *bla* genes were identified in all 24 *K. pneumoniae* isolates. None of the *qnr* genes was detected, including the *qnrS1* gene that has been reported in association with the *bla* and *bla* genes. 6

Considering the clonality of the strains, only a randomly chosen subset of them (9/24) was further investigated. The transformation of plasmid DNA into *E. coli* K12 was performed with selection on cefotaxime-supplemented plates. All transformants displayed the ESBL phenotype along with most co-resistances (Table 1). They also harboured all β-lactam genes detected in the donor, together with the *aac(6*′*-ib-cr*) gene. In the nine donors, S1-PFGE plasmid profiling demonstrated two plasmids, one of 120 kb and the other ranging from 40 to 70 kb, depending on the isolate. In the nine

### Table 1. Phenotypic and molecular features of the nine CTX-M-15-producing *K. pneumoniae* isolates

<table>
<thead>
<tr>
<th>Strain</th>
<th>District</th>
<th>Date of isolation</th>
<th>Animal</th>
<th>Infection</th>
<th>β-Lactamases</th>
<th>Multilocus sequencinga</th>
<th>Additional resistances</th>
</tr>
</thead>
<tbody>
<tr>
<td>25346 referral hospital</td>
<td>2010</td>
<td>dog</td>
<td>urinary tract</td>
<td>CTX-M-15, TEM-1, OXA-1</td>
<td>ST15</td>
<td>STR, KAN, TOB, GEN, NET, SUL, TMP, TET, NAL, CIP</td>
<td></td>
</tr>
<tr>
<td>24492 regular clinic 1</td>
<td>2010</td>
<td>dog</td>
<td>urinary tract</td>
<td>CTX-M-15, TEM-1, OXA-1</td>
<td>ST15</td>
<td>STR, SUL, TMP, NAL, CIP</td>
<td></td>
</tr>
<tr>
<td>24418 regular clinic 2</td>
<td>2009</td>
<td>dog</td>
<td>urinary tract</td>
<td>CTX-M-15, TEM-1, OXA-1</td>
<td>ST15</td>
<td>STR, SUL, TMP, NAL, CIP</td>
<td></td>
</tr>
<tr>
<td>24419 regular clinic 2</td>
<td>2009</td>
<td>dog</td>
<td>urinary tract</td>
<td>CTX-M-15, TEM-1, OXA-1</td>
<td>ST15</td>
<td>STR, KAN, TOB, GEN, NET, SUL, TMP, NAL, CIP</td>
<td></td>
</tr>
<tr>
<td>24420 referral hospital</td>
<td>2009</td>
<td>cat</td>
<td>urinary tract</td>
<td>CTX-M-15, TEM-1, OXA-1</td>
<td>ST15</td>
<td>STR, KAN, TOB, GEN, NET, SUL, TMP, NAL, CIP</td>
<td></td>
</tr>
<tr>
<td>24428 referral hospital</td>
<td>2009</td>
<td>dog</td>
<td>urinary tract</td>
<td>CTX-M-15, TEM-1, OXA-1</td>
<td>ST15</td>
<td>STR, SUL, TMP, NAL, CIP</td>
<td></td>
</tr>
<tr>
<td>24681 referral hospital</td>
<td>2008</td>
<td>cat</td>
<td>urinary tract</td>
<td>CTX-M-15, TEM-1, OXA-1</td>
<td>ST15</td>
<td>STR, TOB, SUL, TMP, TET, NAL, CIP</td>
<td></td>
</tr>
<tr>
<td>24684 referral hospital</td>
<td>2008</td>
<td>dog</td>
<td>urinary tract</td>
<td>CTX-M-15, TEM-1, OXA-1</td>
<td>ST15</td>
<td>STR, KAN, TOB, GEN, NET, SUL, TMP, TET, NAL, CIP</td>
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<td>24687 referral hospital</td>
<td>2008</td>
<td>dog</td>
<td>urinary tract</td>
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<td>ST15</td>
<td>STR, KAN, TOB, GEN, NET, SUL, TMP, TET, NAL, CIP</td>
<td></td>
</tr>
</tbody>
</table>

STR, streptomycin; KAN, kanamycin; TOB, tobramycin; GEN, gentamicin; NET, netilmicin; TET, tetracycline; SUL, sulphonamides; TMP, trimethoprim; NAL, nalidixic acid; CIP, ciprofloxacin.

aAllelic profile 1-1-1-1-1-1-1.
transfectants, the 40–70 kb plasmid was detected, occasionally together with a 250 kb plasmid, which might result from the fusion of plasmids of smaller sizes. Southern hybridization using bla\textsubscript{CTX-M}, IncF and IncR sequences as probes demonstrated that the 40–70 kb plasmid was of the IncR type and carried the bla\textsubscript{CTX-M-15} gene.

Amongst the 24 K. pneumoniae isolates, 17/24 were from pets that underwent cytostomy or perineal urethrostomy in the same referral hospital, two surgical procedures that aim at solving bladder or urethral occlusions due to abundant crystals in urine in healthy animals. Of the seven others, three (strains 24492, 24418 and 24419; Table 1) were from animals visiting two neighbouring regular veterinary clinics. Interestingly, two of them (24492 and 24418) were from animals hospitalized for similar urinary tract surgery in the above-mentioned referral hospital a few weeks before, and one of these two dogs died after a severe chronic infectious cystitis, a classical post-operative complication of urethrostomy. The third isolate (24419) was recovered 2 months later in the same regular clinic as isolate 24418, but from a diabetic dog that had no history with the referral hospital. No epidemiological data could be obtained for the four remaining K. pneumoniae isolates, which were recovered from different veterinary clinics located in the same geographical area.

This study reports recurrent veterinary hospital-acquired infections in pets with a ciprofloxacin-resistant CTX-M-15-producing K. pneumoniae ST15 clone and this mirrors the situation observed for nosocomial infections in human hospitals. A spread of this clone outside the veterinary hospital through post-operative follow-up is also suggested. Of concern, this clone has been reported in humans and the hypothesis of a direct human origin, such as from a pets’ owner, remains open. However, since the ST31/CTX-M-15 E. coli clone has also been reported in pets,\textsuperscript{5} a transfer to K. pneumoniae of the bla\textsubscript{CTX-M-15} gene from IncFII-type plasmids found in E. coli is also plausible. Finally, this study is also the first report of a bla\textsubscript{CTX-M-15} gene on an IncR-type plasmid in animals, a combination only recently reported in humans.\textsuperscript{3,8}

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Role of MexAB-OprM in intrinsic resistance of Pseudomonas aeruginosa to temocillin and impact on the susceptibility of strains isolated from patients suffering from cystic fibrosis

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Sir,
Temocillin (6-α-methoxy-ticarcillin) is resistant to most β-lactamases, including AmpC and extended-spectrum β-lactamases, and is therefore considered a useful alternative to carbapenems in infections caused by several resistant Gram-negative pathogens.\textsuperscript{1} Yet, temocillin is inactive against