

## Identification of Two Novel Carbapenemase Gene Variants from a Carbapenem-Resistant *Aeromonas Veronii* Environmental Isolate

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**Abstract :** Carbapenems are last-resort antibiotics used in clinical settings to treat antibiotic-resistant bacterial infections. Thus, the emergence and spread of resistance to carbapenems is a major public health concern. Here, we have studied a carbapenem-resistant *Aeromonas veronii* strain previously isolated from a water sample from Sam Simeon Creek (Hearst San Simeon State Park, CA). Analysis of this isolate using disk-diffusion, CarbaNP, eCIM and mCIM assays revealed that it was resistant to amoxicillin-clavulanic acid and all carbapenems tested and that this isolate produced a potentially novel carbapenemase of the Metallo- $\beta$ -lactamase family. Whole genome sequencing analysis revealed that this *A. veronii* isolate carries a novel variant of the bla<sub>Cpha</sub> class  $\beta$ -carbapenemase gene that was closely related to the bla<sub>Cpha7</sub> gene of *Aeromonas jandaei*. This isolate also carried a novel variant of the bla<sub>Oxa</sub> class D carbapenemase gene that was most closely related to the bla<sub>Oxa-912</sub> gene found in other *Aeromonas veronii* isolates. Finally, we also identified a novel class C  $\beta$ -lactamase gene moderately related to the bla<sub>F<sub>ox-17</sub></sub> gene of *Providencia stuartii* and other bla<sub>F<sub>ox</sub></sub> variants identified in *Klebsiella pneumoniae*, *Escherichia coli* and other Enterobacteriaceae. Overall, our findings reveal that environmental isolates are an important reservoir of multiple carbapenemases and other  $\beta$ -lactamases of clinical significance.

**Keywords :**  $\beta$ -lactamases, carbapenem, antibiotic-resistant, *aeromonas veronii*

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