Of these Nile Tilapia (Oreochromis niloticus; previously: Tilapia nilotica) and various hybrids thereof, are the most farmed. The aquaculture of Tilapia in warm fresh-water is well-developed in several countries in Central- and South America, in Africa, and in Asia. In such fish-farming operations, Sa infection can cause large-scale mortalities and huge economic losses, see: Evans et al. (2006, Aquaculture Health Int., no. 7, p. 10-14).

The disease caused by Sa infection in fish is known as Streptococcosis. Environmental factors, especially temperature, play an important role in the development of this disease: massive increased mortalities typically occur during the high water-temperature season, and a low but persistent level of mortality can occur with decreased water temperature.

Common clinical signs of Streptococcosis include erratic swimming, exophthalmia and affected organs showed haemorrhages, inflammation and ascites. Next to serious effects on animal welfare, the main effects of disease are economic: loss of revenue and increase of costs due to acute disease and mortality.

In aquaculture, the adaptation of husbandry practices is normally insufficient to overcome these negative effects, and the use of antibiotics can be controversial. Therefore vaccines are the preferred way to fight infection and disease caused by Sa. Different types of vaccines against Sa have been developed and were found to be very effective; a review is given in Liu et al. (2016, Dis. Aq. Org., vol. 122, p. 163-170).

Well-known streptococcal vaccines for fish are based on bacterin antigens (formalin killed bacterial cells) that are emulsified with an oil adjuvant. Eldar et al. (1995, Vaccine, vol. 13, p. 867-870) describe a bacterin vaccine of S. difficile, which bacterium has meanwhile been reclassified as serotype Ib S. agalactiae. Such vaccines can be administered by injection e.g. intraperitoneally. Examples of commercially available bacterin vaccines against Sa are from MSD Animal Health: AQUAVAC® Strep Sa-Si, against infection by Streptococcus agalactiae serotype Ib, and against Streptococcus iniae; and: AQUAVAC® Strep Sa1, against Sa of serotypes Ia and III, which contains formalin-inactivated bacteria (bacterin) of two Sa serotypes: Ia (strain TI 1422), and III (strain TI 1428). The vaccine is a water-in-oil emulsion using a commercial non-mineral oil adjuvant: Montanide™ ISA 763A VG. See also WO 2011/048041.

WO 2008/003734 and WO 2011/048041 describe prior developments in Streptococcal bacterin vaccines.

With global climate changes such as warming and acidification of freshwater habitats, the risk of Sa infection and disease in aquaculture is only increasing (Phuoc et al., 2021, Aquaculture, vol. 534, 736256). Consequently, there is a constant need to provide further effective Sa vaccines.

It is therefore an object of the present invention to overcome a disadvantage in the prior art, and to accommodate to this need in the field by providing a vaccine against a new type of Sa Ia bacterium.

Summary

In one aspect, there is provided Streptococcus agalactiae bacterium of serotype Ia (Sa Ia) having the characterising features of the bacterium as deposited at the Collection Nationale de Cultures de Microorganismes (CNCM), Institut Pasteur, Paris, France, under accession number: CNCM I-5929.

In another aspect, there is provided a composition comprising a preparation of the Sa Ia bacterium or of the descendant, both as defined herein.

In another aspect, there is provided a diagnostic test kit, characterised in that said kit comprises a container comprising the Sa Ia bacterium or the descendant, both as defined herein, and/or comprising the composition as defined herein.

In another aspect, there is provided the Sa Ia bacterium or the descendant, both as defined herein, and/or the composition as defined herein, for use as a vaccine for fish against Streptococcosis.

In another aspect, there is provided a vaccine for fish against Streptococcosis, characterised in that said vaccine comprises the Sa Ia bacterium or the descendant, both as defined herein, and/or the composition as defined herein, and a pharmaceutically acceptable carrier.

In another aspect, there is provided a method for the preparation of the vaccine as defined herein, the method comprising the step of admixing the Sa Ia bacterium or the descendant, both as defined herein, and/or admixing the composition as defined herein, and a pharmaceutically acceptable carrier.

In another aspect, there is provided use of the Sa Ia bacterium or the descendant, both as defined herein, and/or of the composition as defined herein, in the manufacture of the vaccine as defined herein for the protection of fish against Streptococcosis.

Claims

1. Streptococcus agalactiae bacterium of serotype Ia (Sa Ia) having the characterising features of the bacterium as deposited at the Collection Nationale de Cultures de Microorganismes (CNCM), Institut Pasteur, Paris, France, under accession number: CNCM I-5929.

2. The Sa Ia bacterium according to claim 1, characterised in that in a polymerase chain reaction (PCR) with genetic material from said bacterium, a nucleotide (nt) fragment of a specific size is produced, when using a specific primer set, as follows:
   - a fragment of 500 nt, with the primer set of SEQ ID NO: 1 and SEQ ID NO: 2; or
   - a fragment of 1672 nt, with the primer set of SEQ ID NO: 3 and SEQ ID NO: 4; or
   - a fragment of 1772 nt, with the primer set of SEQ ID NO: 5 and SEQ ID NO: 6; or
   - a fragment of 1912 nt, with the primer set of SEQ ID NO: 7 and SEQ ID NO: 8; or
   - a fragment of 2016 nt, with the primer set of SEQ ID NO: 9 and SEQ ID NO: 10; or
   - a fragment of 876 nt, with the primer set of SEQ ID NO: 11 and SEQ ID NO: 12.

3. The Sa Ia bacterium according to claims 1 or 2, characterised in that in a PCR with genetic material from said bacterium, a nt fragment is produced of the sizes as defined in claim 2, with two or more of the primer sets as defined in claim 2.

4. The Sa Ia bacterium according to any one of claims 1 - 3, characterised in that in a PCR with genetic material from said bacterium, a nt fragment is produced of the sizes as defined in claim 2, with all six of the primer sets as defined in claim 2.

5. The Sa Ia bacterium according to any one of claims 1 - 4, characterised in that the bacterium is the bacterium as deposited under accession number: CNCM I-5929, or is a descendant from said deposited bacterium.

6. The Sa Ia bacterium according to any one of claims 1 - 5, or the descendant according to claim 5, characterised in that the bacterium has a genome having 90 % nucleotide sequence identity with the sequence of SEQ ID NO: 13.

7. Composition comprising a preparation of the Sa Ia bacterium or of the descendant, both according to any one of claims 1 - 6.

8. The composition according to claim 7, characterised in that the preparation comprises the Sa Ia bacterium or the descendant, both according to any one of claims 1 - 6, in inactivated form.

9. Diagnostic test kit, characterised in that said kit comprises a container comprising the Sa Ia bacterium or the descendant, both according to any one of claims 1 - 6, and/or comprising the composition according to claims 7 or 8.

10. The Sa Ia bacterium or the descendant, both according to any one of claims 1 - 6, and/or the composition according to claims 7 or 8, for use as a vaccine for fish against Streptococcosis.

11. Vaccine for fish against Streptococcosis, characterised in that said vaccine comprises the Sa Ia bacterium or the descendant, both according to any one of claims 1 - 6, and/or the composition according to claims 7 or 8, and a pharmaceutically acceptable carrier.

12. The vaccine according to claim 11, further comprising an adjuvant.

13. The Sa Ia bacterium, the descendant, or the composition, all for the use according to claim 10, or the vaccine according to claims 11 or 12, characterised in that the fish is from a genus selected from: Coptodon, Oreochromis, and Sarotherodon.

14. The Sa Ia bacterium, the descendant, or the composition, for the use, or the vaccine, all according to claim 13, characterised in that the fish is of a species selected from: Coptodon zillii, Coptodon guineensis, Oreochromis niloticus, Oreochromis aureus, Oreochromis mossambicus, Oreochromis hornorum, and Sarotherodon melanotheron; or is a hybrid of one or more of these species.

15. Method for the preparation of the vaccine according to claims 11 or 12, the method comprising the step of admixing the Sa Ia bacterium or the descendant, both according to any one of claims 1 - 6, and/or admixing the composition according to claims 7 or 8, and a pharmaceutically acceptable carrier.

16. The method according to claim 15, characterised in that the method comprises a step for inactivating the Sa Ia bacterium or the descendant, both according to any one of claims 1 - 6.

17. Use of the Sa Ia bacterium or the descendant, both according to any one of claims 1 - 6, and/or of the composition according to claims 7 or 8, in the manufacture of the vaccine according to claims 11 or 12 for the protection of fish against Streptococcosis.

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