

~~27. The method of claim 23, wherein penalization based on cross hybridization is performed at each level of a phylogenic tree starting with the lowest level.~~

28. The method of claim 23, wherein only penalized OTUs scoring above a hybridization signal strength threshold are further analyzed.

29. The method of claim 27, wherein only parts of phylogenic tree that include an OTU are analyzed.

30. A method for selecting probes for assaying a condition in a sample comprising:

a) applying one or more test samples having said condition to the detection system of claim 1;

b) applying one or more control samples not having said condition to said detection system to determine the probability of the presence or absence of said OTUs in said control samples;

c) determining a pattern of OTU's associated with the test samples that is not associated with the control samples;

d) identifying probes that selectively detect the OTU's associated with the test sample for use in a low density probe system.

31. The method of claim 30, wherein said domain is bacterial, archaeal, or fungal.

32. The method of claim 30, wherein said pattern consists of up to 200 different OTUs.

33. The method of claim 30, wherein the sample is a water sample and the condition is fecal contamination, toxic alga bloom contamination, presence of fish-farm pathogens, a point source contamination, a non-point source contamination, or a combination thereof.

34. The method of claim 30, wherein the sample is a human or animal sample.

27. The method of claim 23, wherein penalization based on cross hybridization is performed at each level of a phylogenic tree starting with the lowest level.

28. The method of claim 23, wherein only penalized OTUs scoring above a hybridization signal strength threshold are further analyzed.

29. The method of claim 27, wherein only parts of phylogenic tree that include an OTU are analyzed.

30. A method for selecting probes for assaying a condition in a sample comprising:
a) applying one or more test samples having said condition to the system of claim 1;
b) applying one or more control samples not having said condition to said system to determine the probability of the presence or absence of said OTUs in said control samples;
c) determining a pattern of OTU's associated with the test samples that is not associated with the control samples;
d) identifying probes that selectively detect the OTU's associated with the test sample for use in a low density probe system.

31. The method of claim 30, wherein said domain is bacterial, archaeal, or fungal.

32. The method of claim 30, wherein said pattern consists of up to 200 different OTUs.

33. The method of claim 30, wherein the sample is a water sample and the condition is fecal contamination, toxic alga bloom contamination, presence of fish-farm pathogens, a point source contamination, a non-point source contamination, or a combination thereof.

34. The method of claim 30, wherein the sample is a human or animal sample.