

1 Integrated multi-omics analysis reveals Lactobacillus
2 anti-inflammatory process in vaginal tissue

3 A demonstration of Rmarkdown using Herman Bumpus' data

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6 **1 Abstract**

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²⁴ 2 Introduction

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 - ²⁹ Introduction Introduction Introduction Introduction (¹), Introduction Introduction Introduction Introduction
 - ³⁰ Introduction Introduction Introduction Introduction Introduction Introduction Introduction Introduction
 - ³¹ Introduction Introduction Introduction Introduction Introduction Introduction Introduction Introduction
 - ³² Introduction Introduction Introduction Introduction Introduction **Introduction** **Introduction** *Introduction*
 - ³³ Introduction (^{2,3}) .
- ³⁴ Problem / question to answer

35 3 Results

36 Joint analysis of vaginal microbiome reveals distinct patient subgroups

37 To understand the longitudinal and tissue-specific microbiome profile in vaginal samples, 111 adult female sex
38 workers were enrolled in [...]. Among those, 14 were previously tested positive for HIV during the cohort's
39 sampling procedure. [Describe here what was done and when, which samples, which tissues].

40 To be able to better understand the differences in microbiome profile across all datasets collected, we performed
41 a joint graph-based clustering analysis in order to identify co-regulated bacterial communities (see "Methods"
42 section for details). A total of 15 bacterial communities were identified.

43 Noticeably, bacterial community NA consisted only of Lactobacillus species (**).

44 Patients were thus subdivided into 8 groups,

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129 4 Discussion

130 I have analysed data collected by Herman Bumpus³ on the relationship between sparrow (*Passer domesticus*)
131 total length and survival following an unusually severe storm. I found that sparrows that died in the storm
132 were longer than sparrows that survived, which suggests that higher sparrow body length decreased survival.
133 Of course, it is not possible to definitively conclude a causal relationship between any aspect of body size and
134 sparrow survival, and even the available data collected by Bumpus would permit a more thoughtful analysis
135 than that conducted in this study (see [Appendix Table 1](#)).

136 Overall, this document demonstrates how high quality, professional looking documents can be written using
137 Rmarkdown. The [underlying code](#) for this manuscript is publicly available, along with [accompanying notes](#)
138 to understand how it was written. By using Rmarkdown to write manuscripts, authors can more easily use
139 version control (e.g., git) throughout the writing process. The ability to easily integrate citations through
140 BibTeX, LaTeX tools, and dynamic R code can also make writing much more efficient and more enjoyable.
141 Further, obtaining the benefits of using Rmarkdown does not need to come with the cost of isolating colleagues
142 who prefer to work with Word or LaTeX because Rmarkdown can easily be converted to these formats (in
143 the case of Word, with the push of a button). By learning all of the tools used in this manuscript, readers
144 should have all of the necessary knowledge to get started writing and collaborating in Rmarkdown.

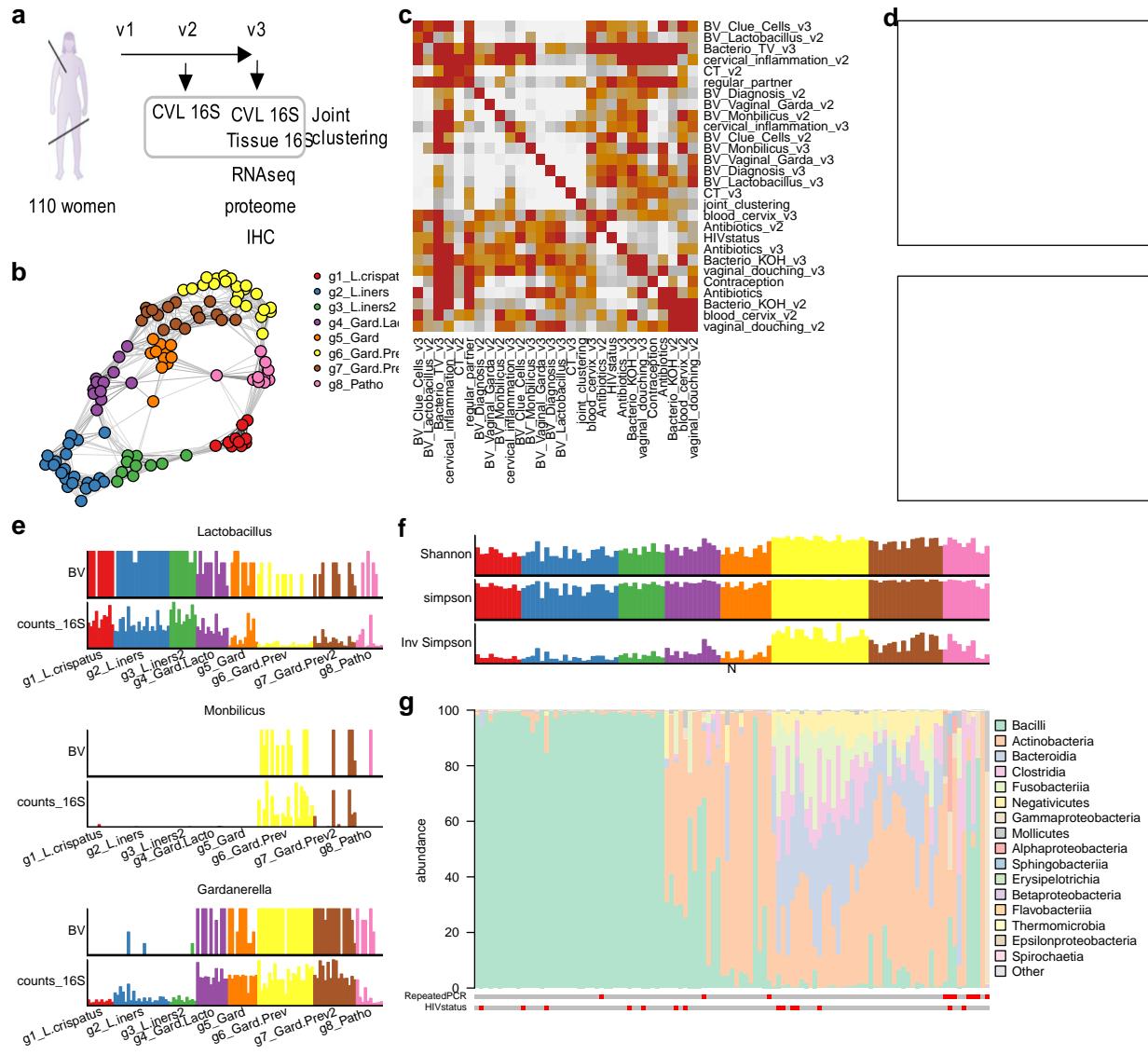
145 **5 Methods**

146 6 References

- 147 1. Johnston, R. F., Niles, D. M. & Rohwer, S. A. Hermon bampus and natural selection in the house sparrow
148 *Passer domesticus*. *Evolution* **26**, 20–31 (1972).
- 149 2. Darwin, C. *The origin of species*. 495 (Penguin, 1859).
- 150 3. Bumpus, H. C. Eleventh lecture. The elimination of the unfit as illustrated by the introduced sparrow,
151 *Passer domesticus*. (A fourth contribution to the study of variation.). *Biological Lectures: Woods Hole*
152 *Marine Biological Laboratory* 209–225 (1898).

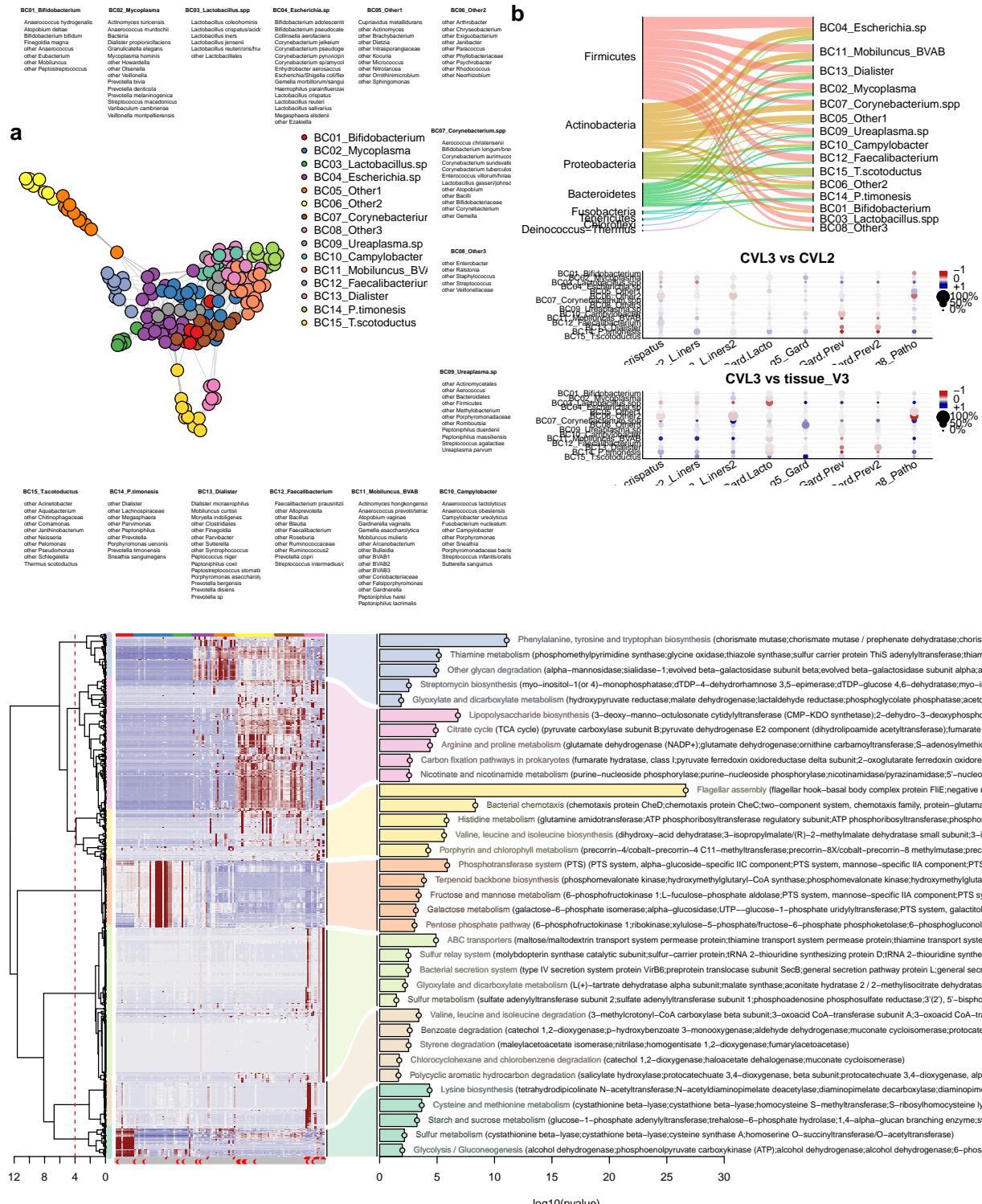
153 7 Appendix Table 1

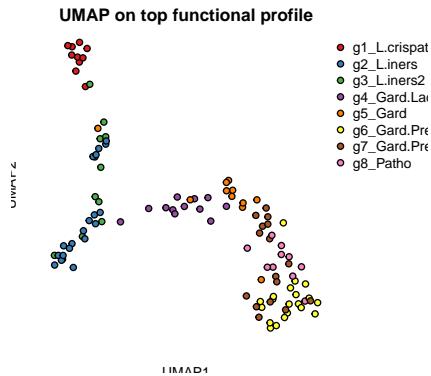
¹⁵⁴ An example table is shown below, which includes all of the variables collected by ³ for the first 10 measured
¹⁵⁵ sparrows. The full data set can be found online in [GitHub](#).

156 **8 FIGURES (MAIN)**157 **8.1 Figure 1**

158 **Figure 1. Identification of patient groups.** (a) Schematic representation of ##### . (b)
159 Schematic representation of ##### . (c) Schematic representation of ##### . (d)
160 Schematic representation of ##### . (e) Schematic representation of ##### .
161 Schematic representation of ##### .

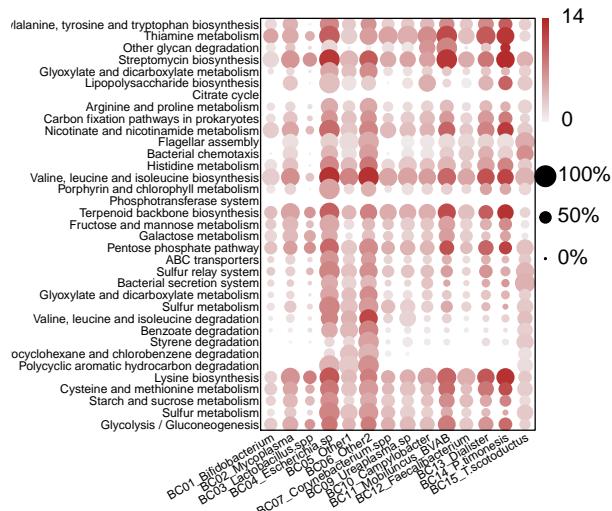
162 8.2 Figure 2





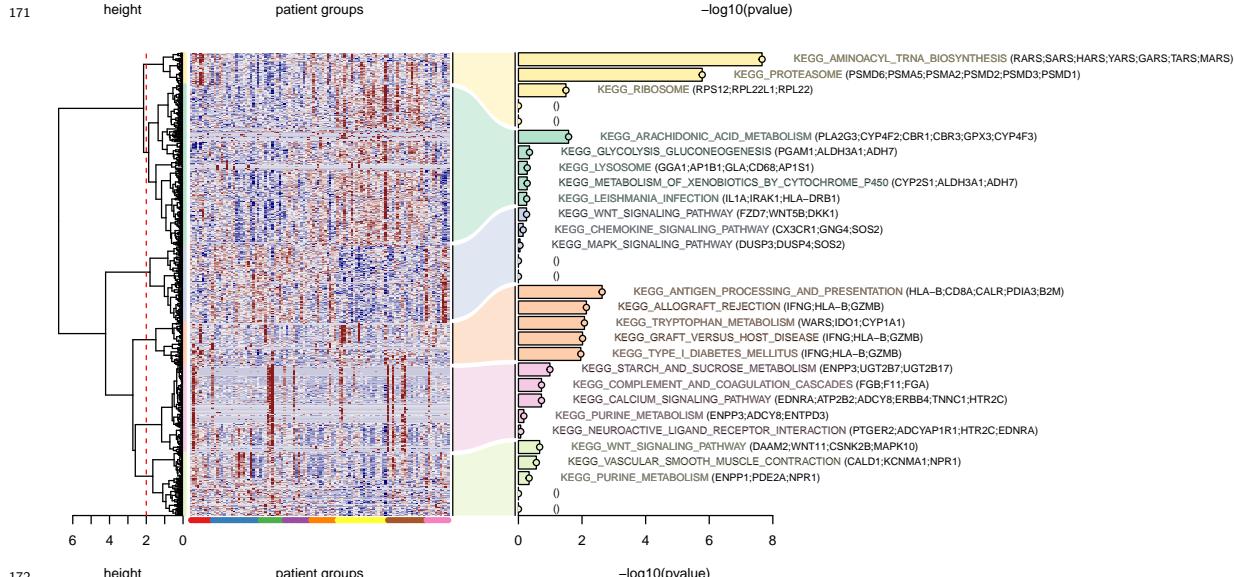
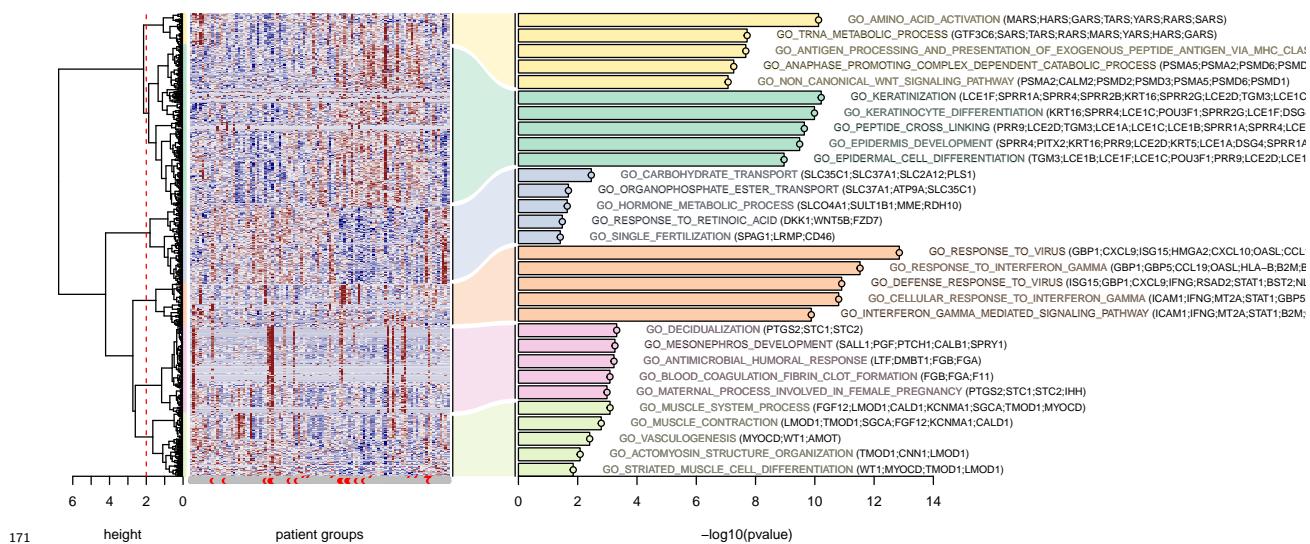
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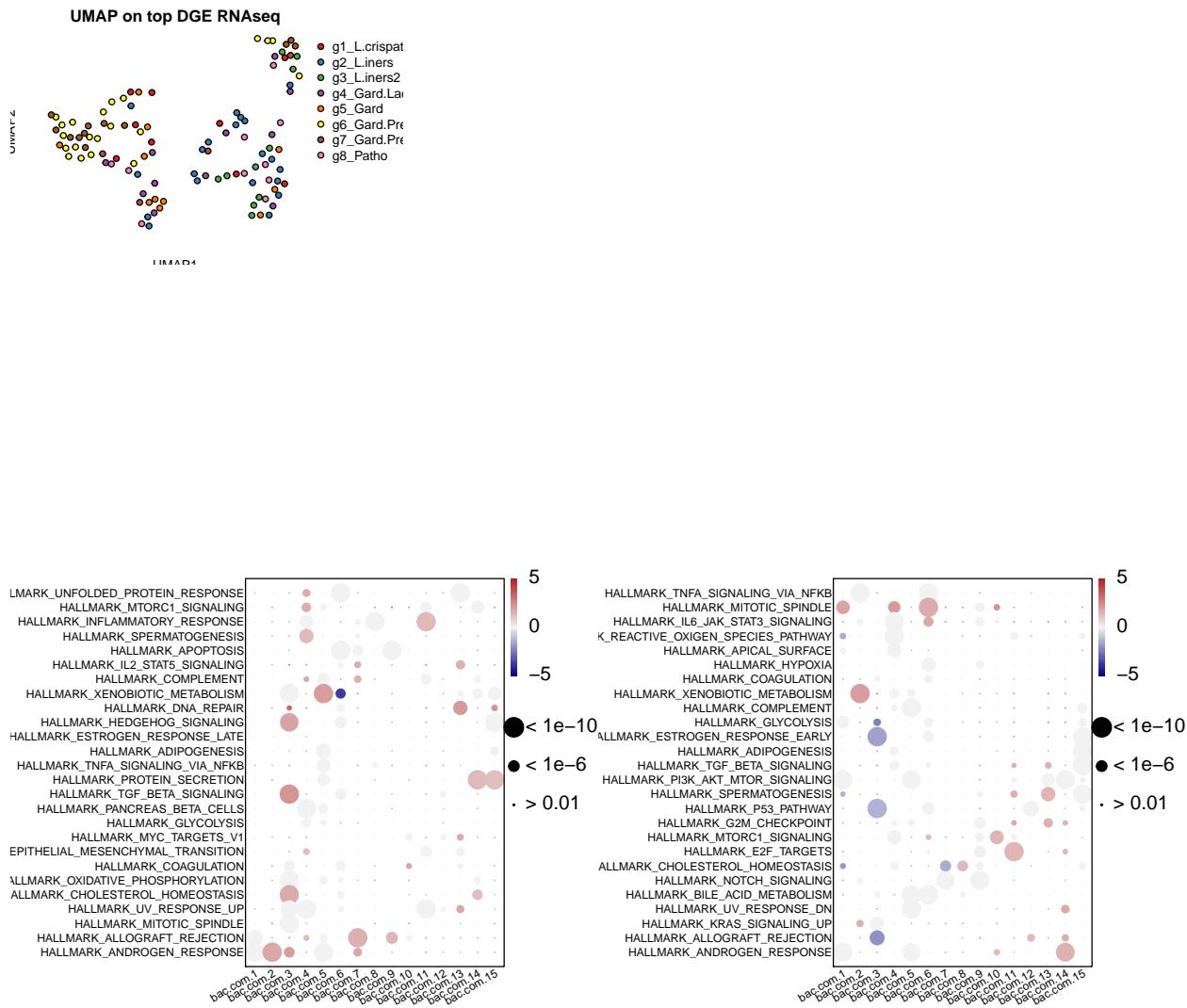
166 **Figure 2. Identification and characterization of vaginal bacterial communities.** (a) Schematic
167 representation of ##### . (b) Schematic representation of ##### . (c) Schematic
168 representation of ##### . (d) Schematic representation of ##### .

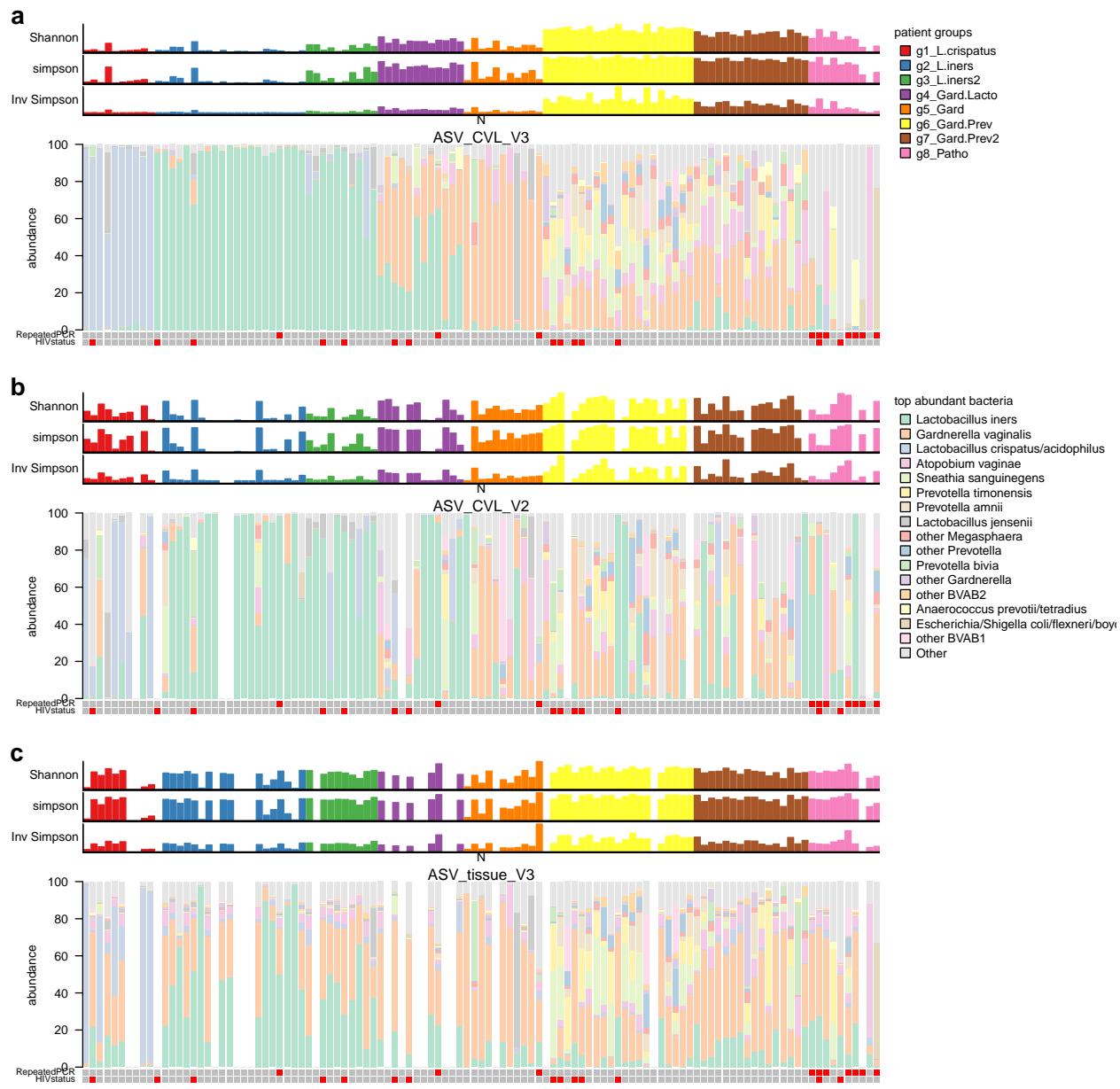


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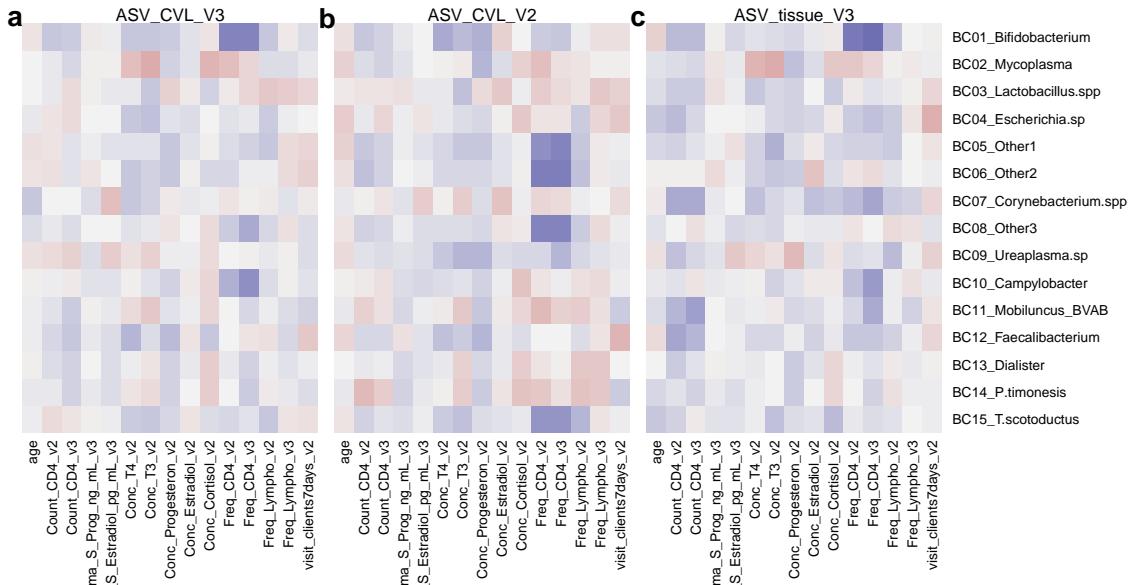
170 8.3 Figure 3

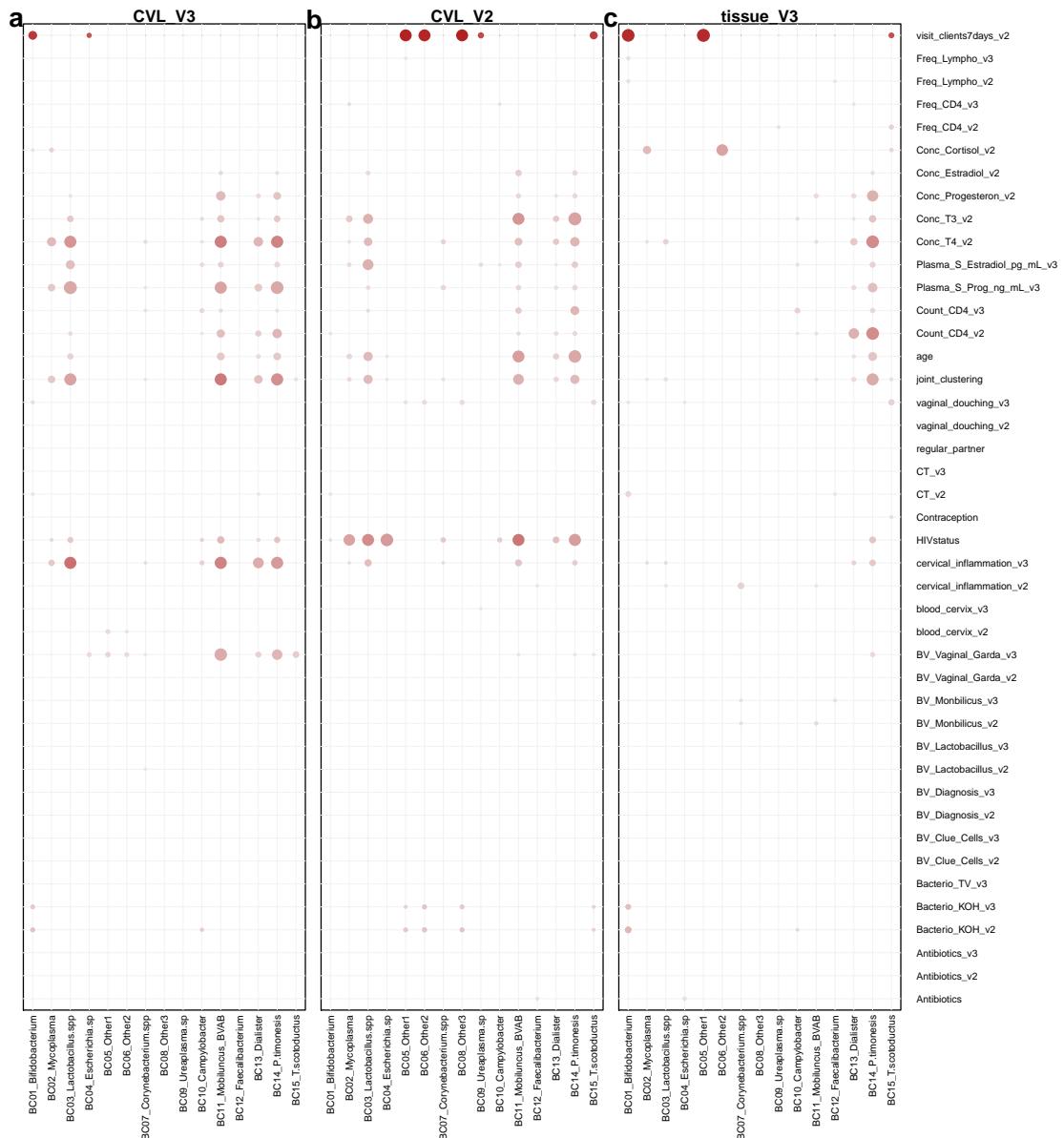




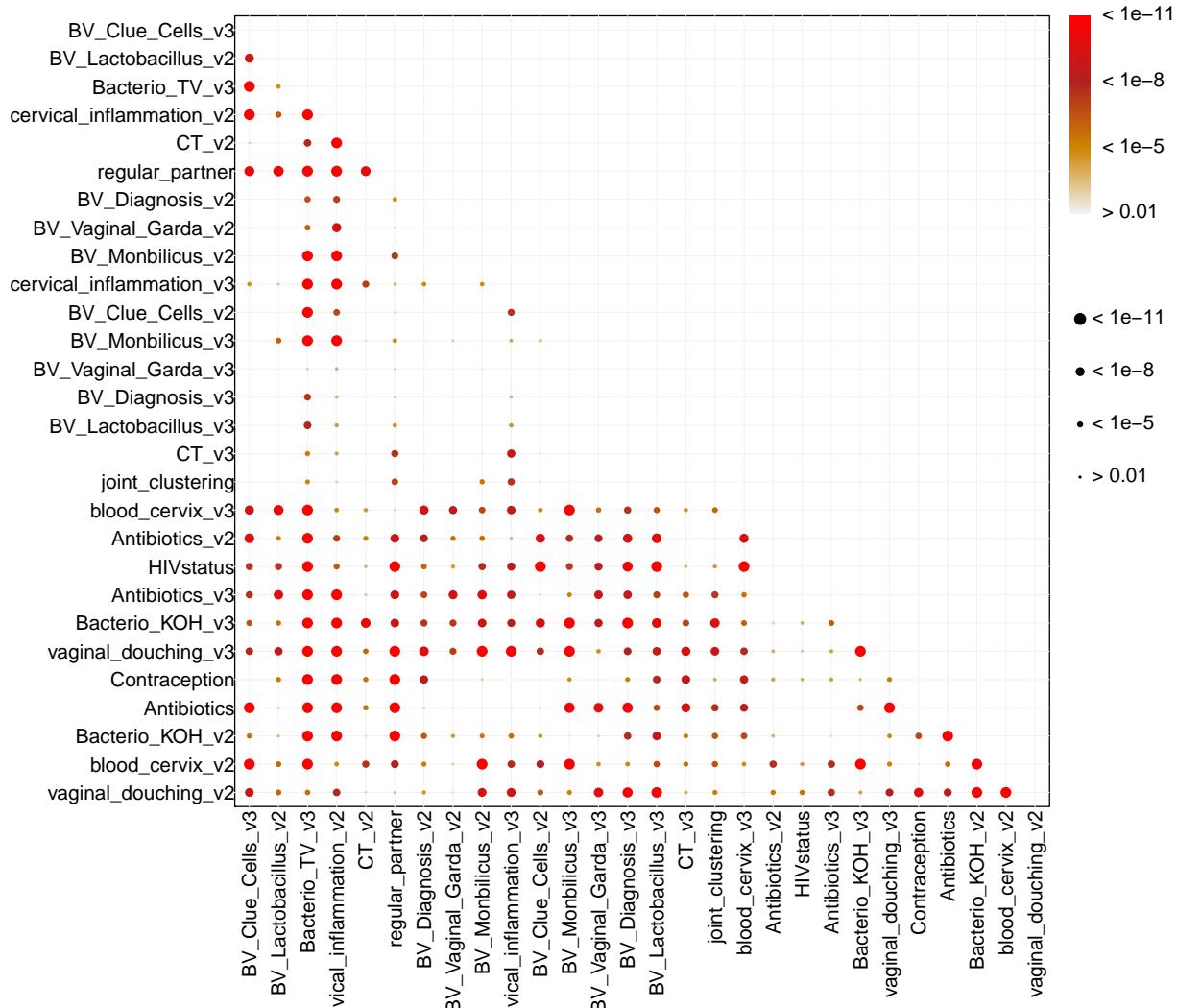
178 **9 FIGURES (SUPPL)**179 **9.1 Figure S1**

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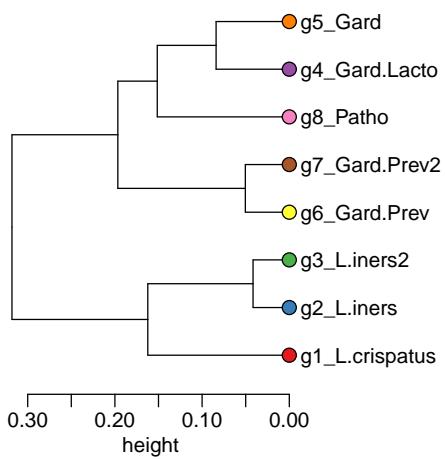
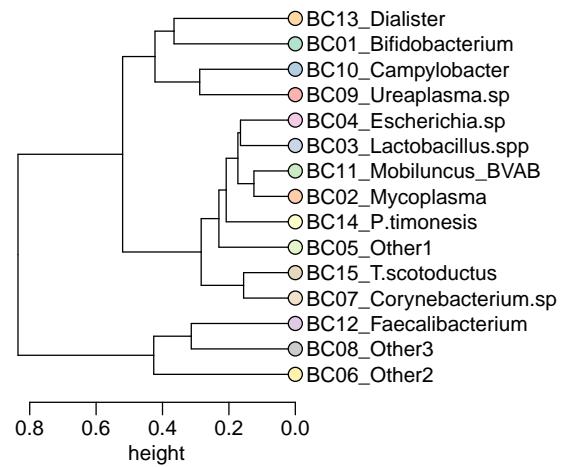
181 **9.2 Figure S2**

183 **9.3 Figure S2 v2**

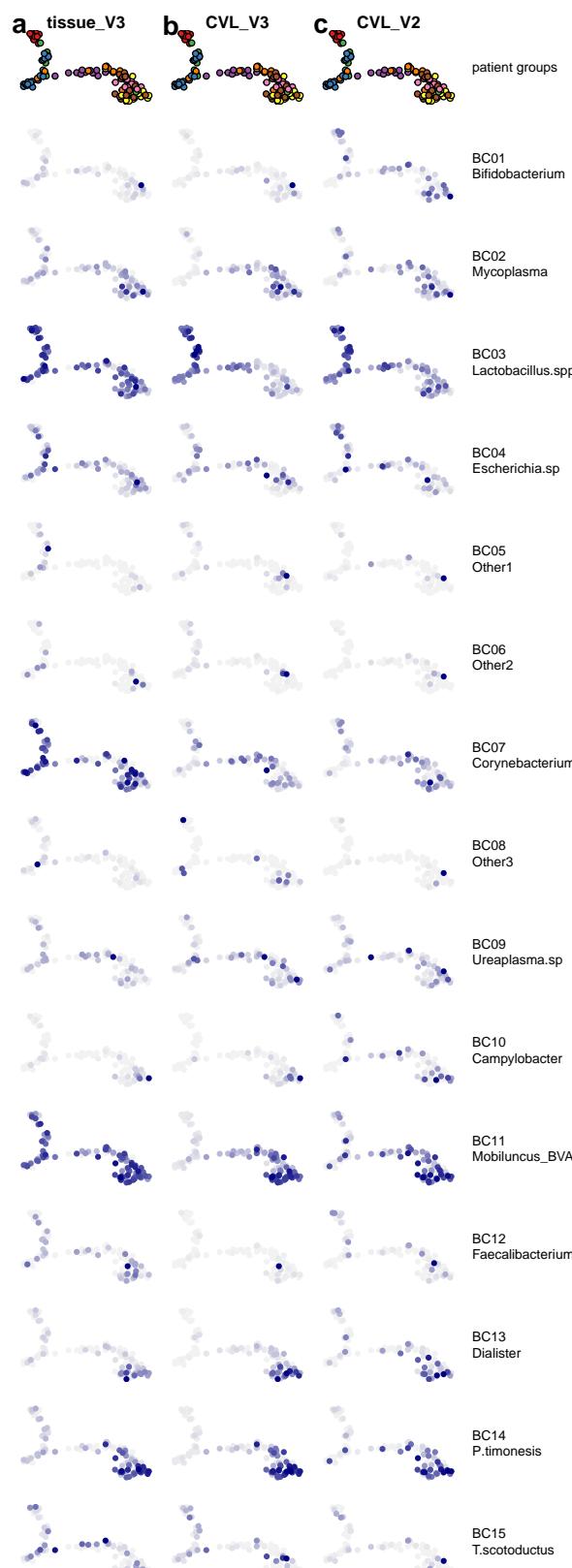
185 9.4 Figure S2 v3



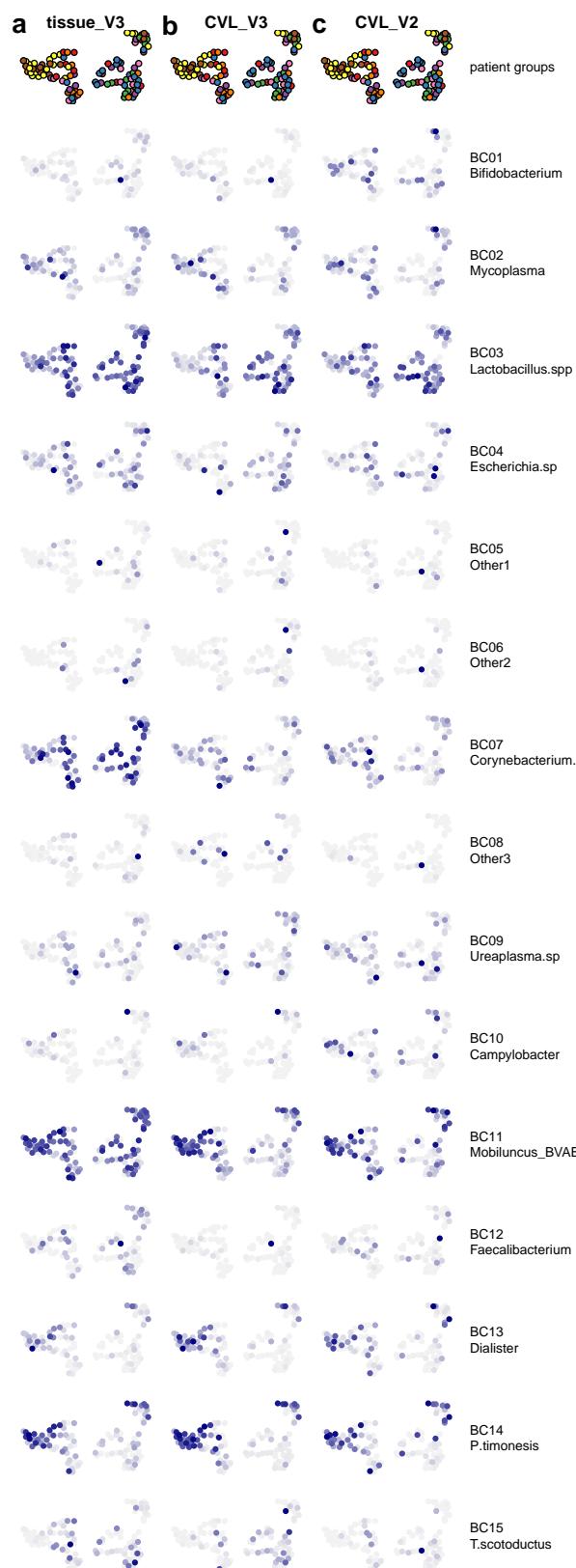
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187 **9.5 Figure S3****a****b**

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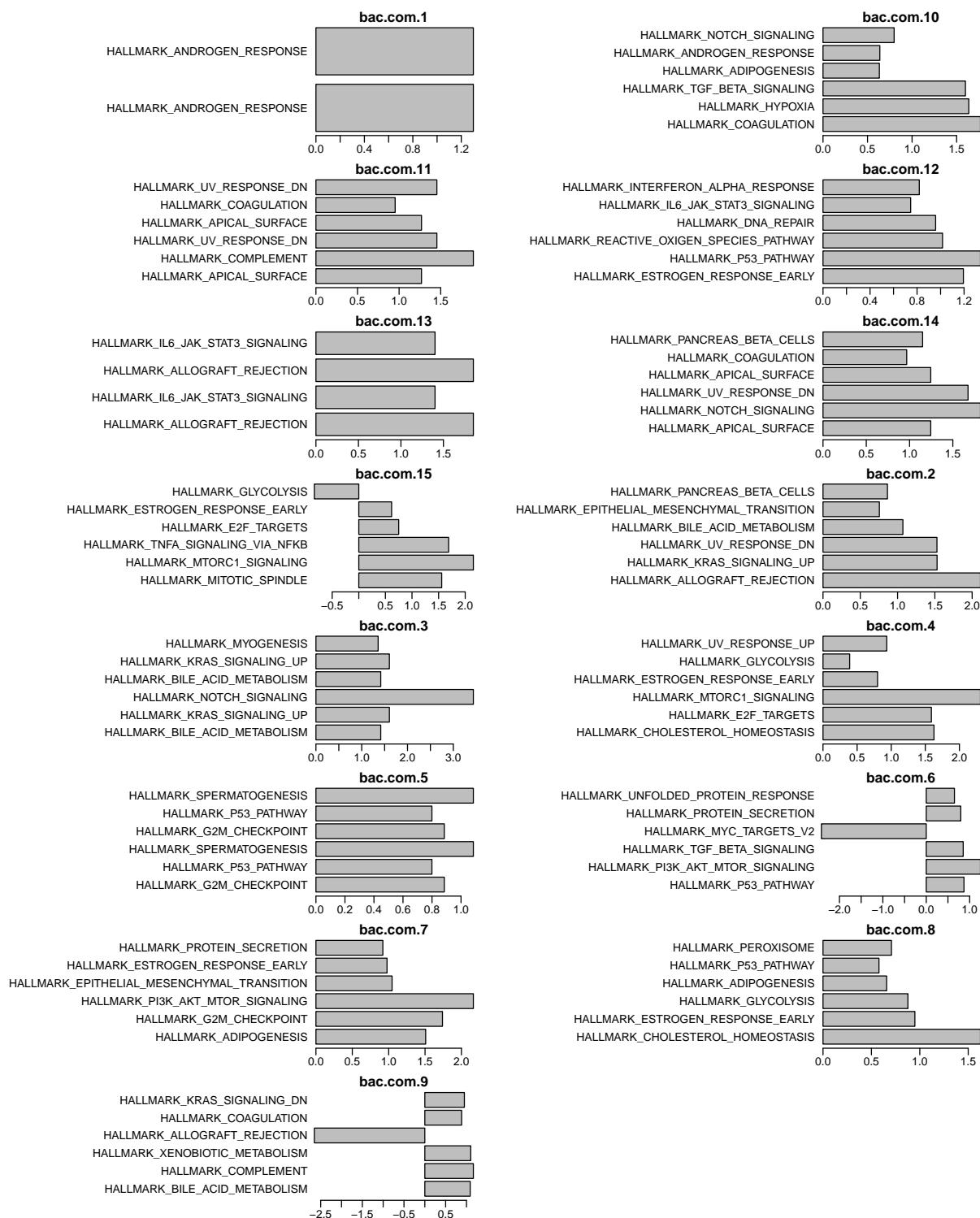
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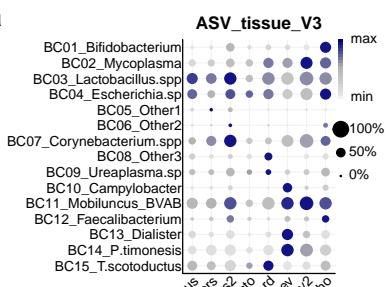
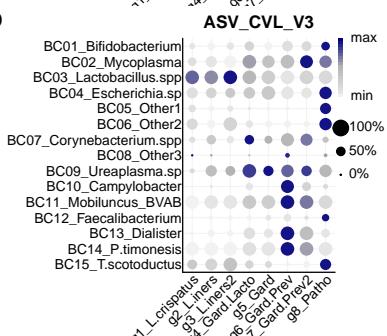
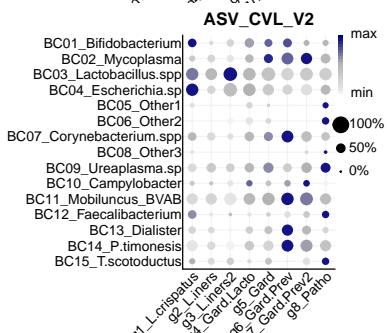
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191 9.7 Figure S5

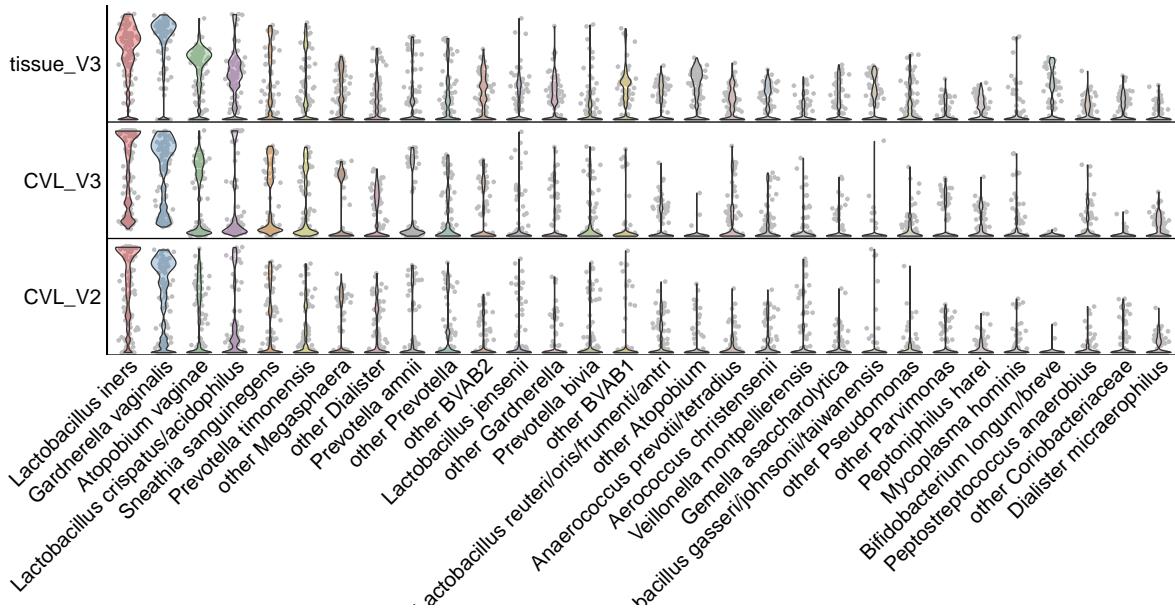
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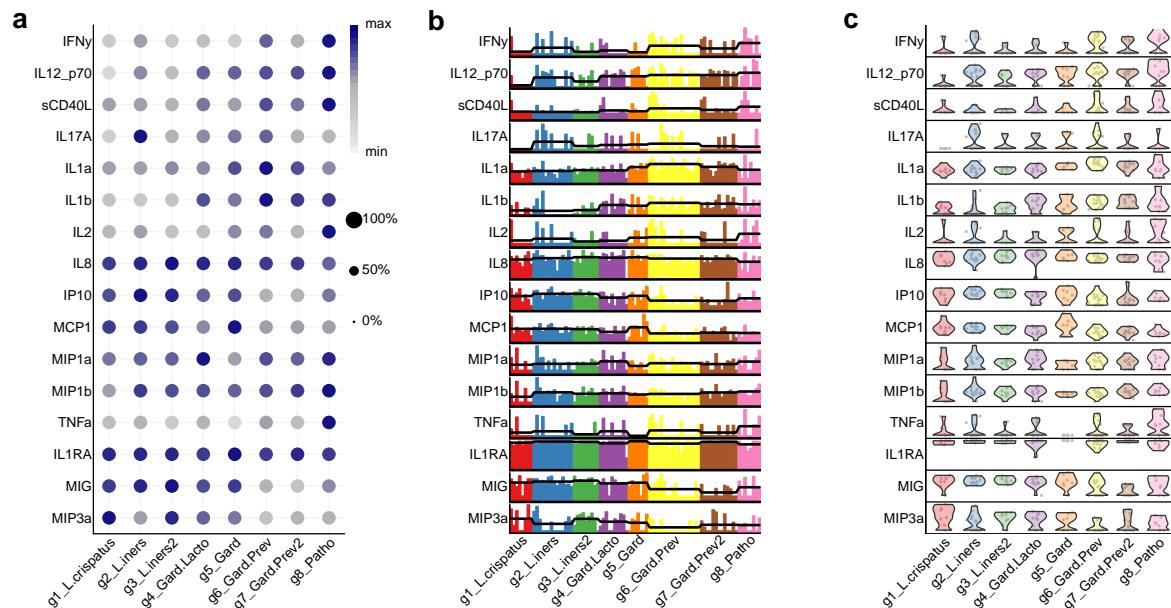
193 9.8 Figure S6



195 **9.9 Figure S7****a****b****c**

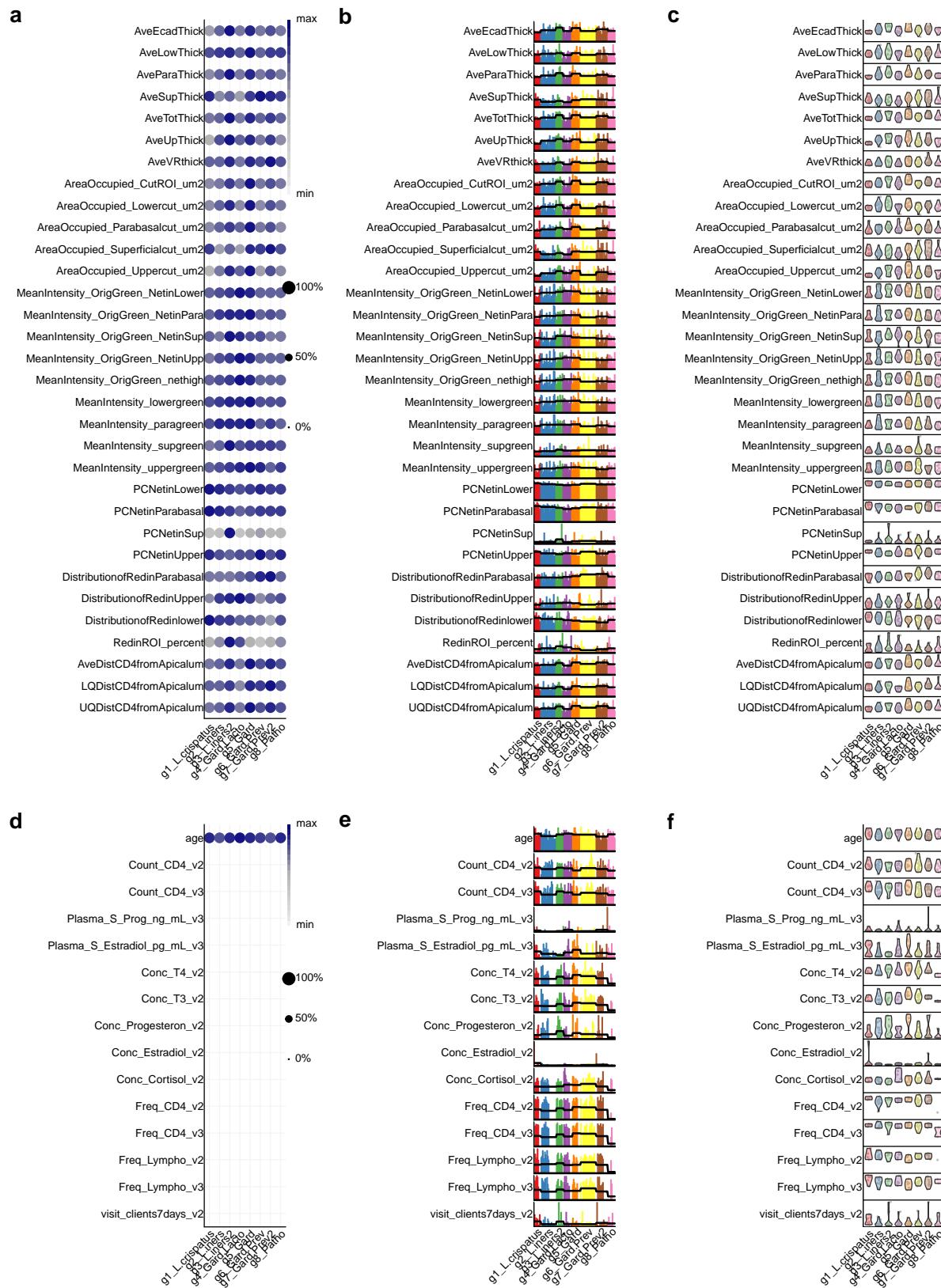
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9.10 Figure S8

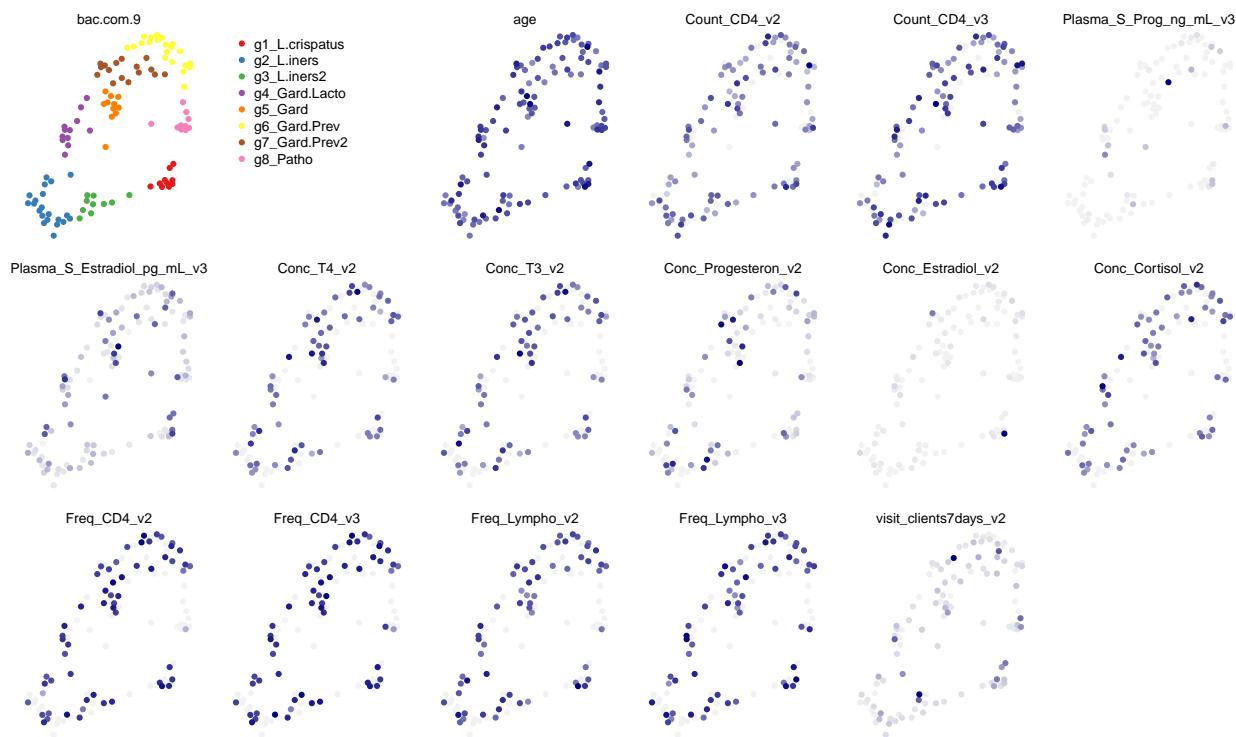
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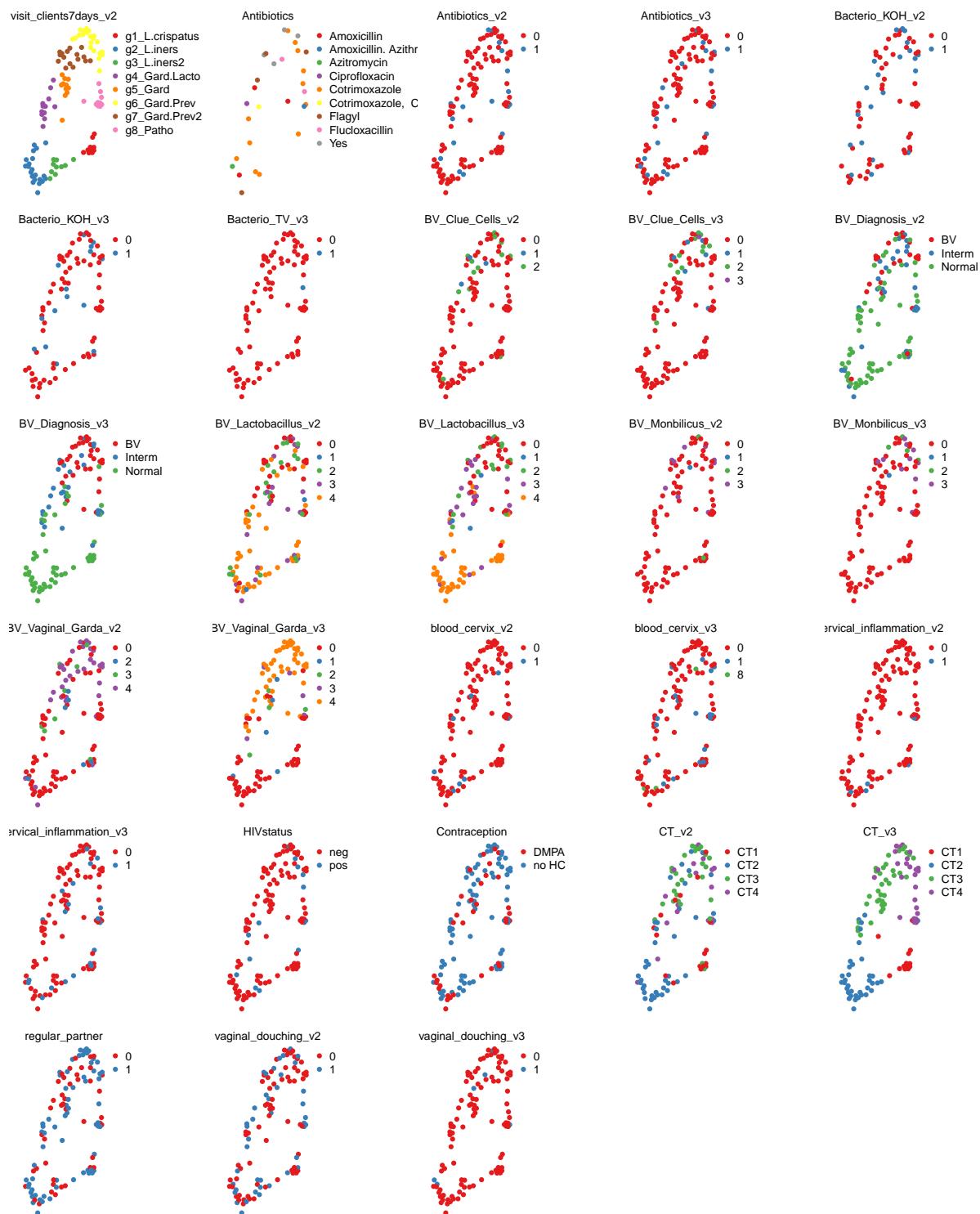
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201 9.12 Figure S10

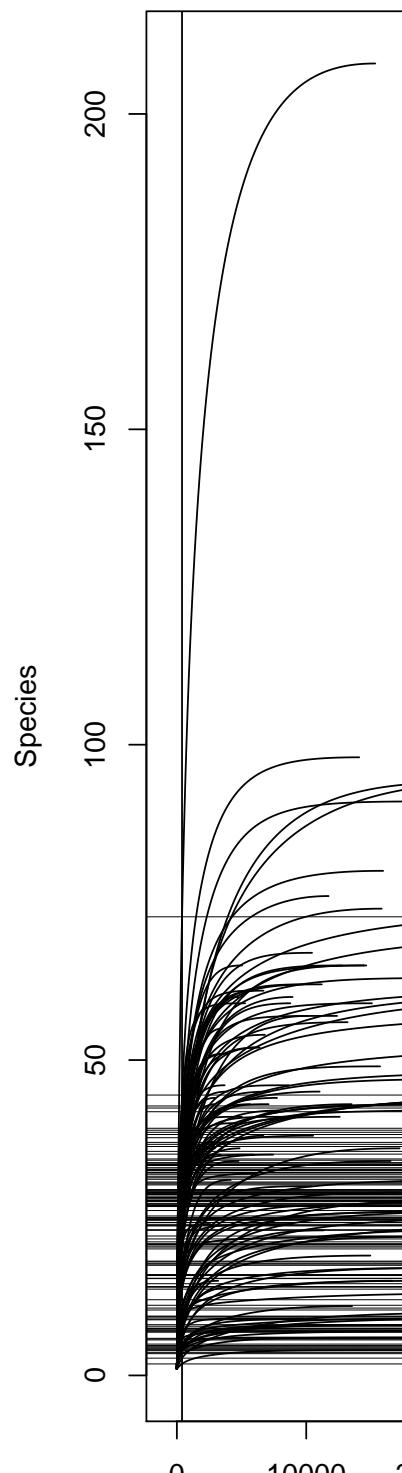
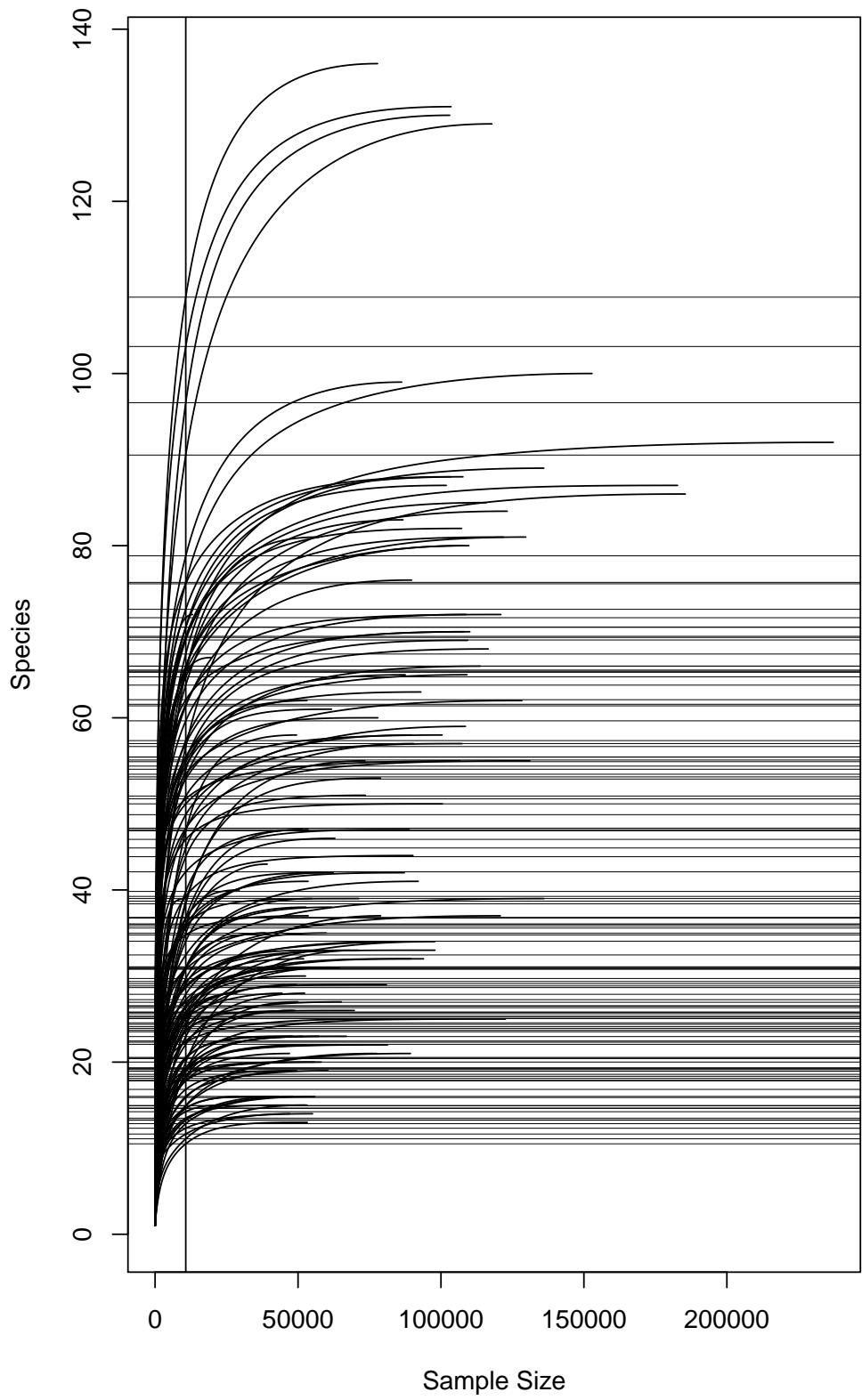


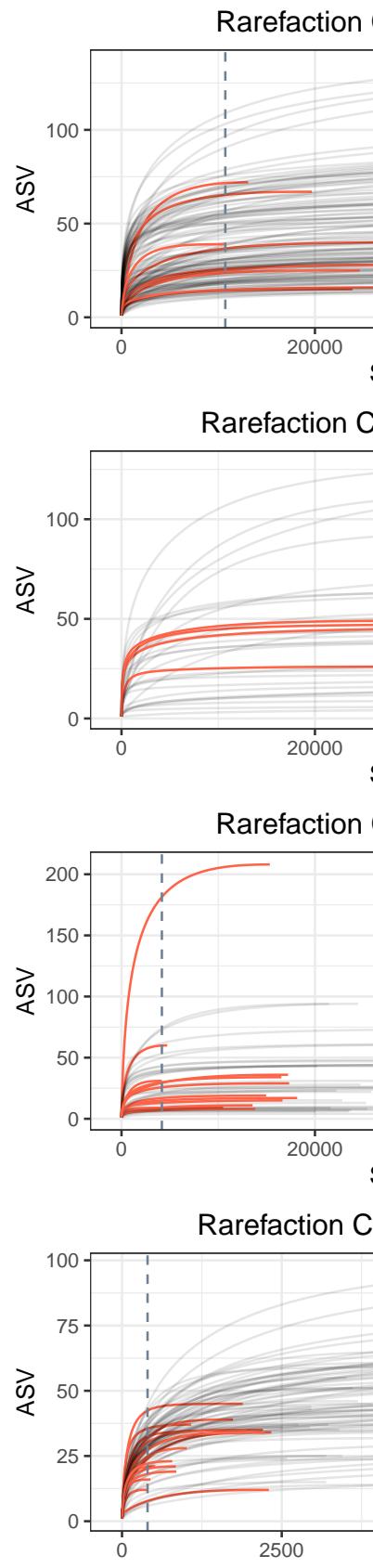
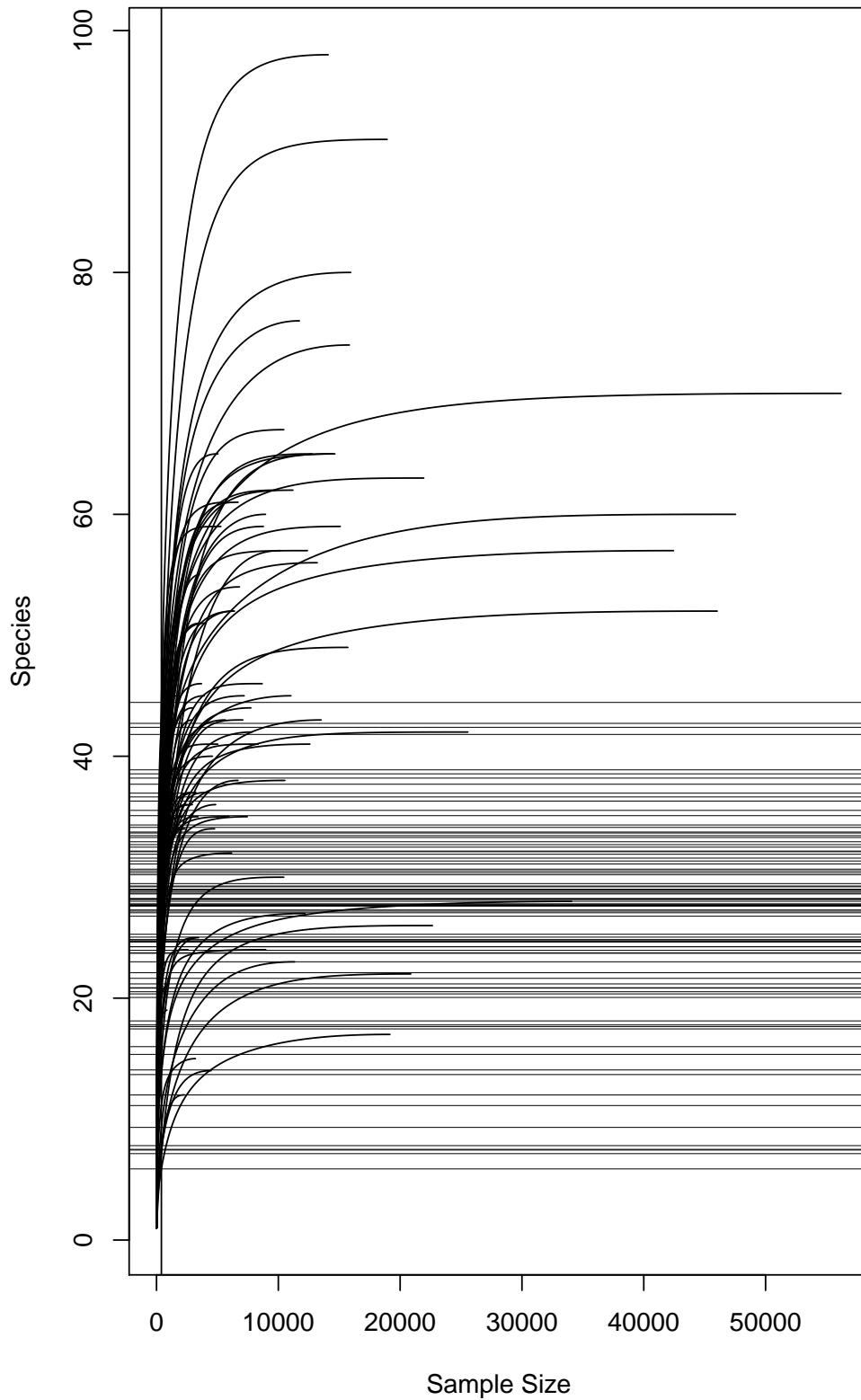
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204 **9.13 Figure S11**

206 **9.14 Figure S12**

208 9.15 Figure S13





₂₁₂ **10 TABLES (MAIN)**

₂₁₃ **10.1 Table 1**

²¹⁴ **10.2 Table 2**

215 **10.3 Table 3**

₂₁₆ **11 TABLES (SUPPL)**

₂₁₇ **11.1 Table S1**

²¹⁸ **11.2 Table S2**

²¹⁹ **11.3 Table S3**