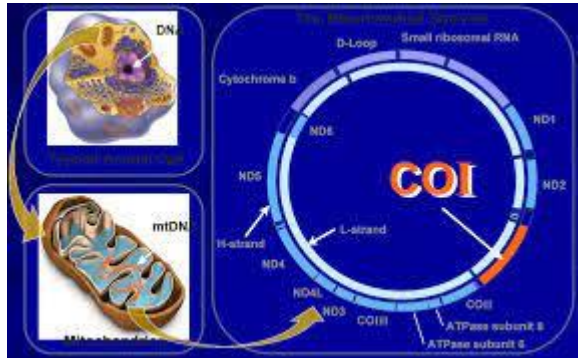
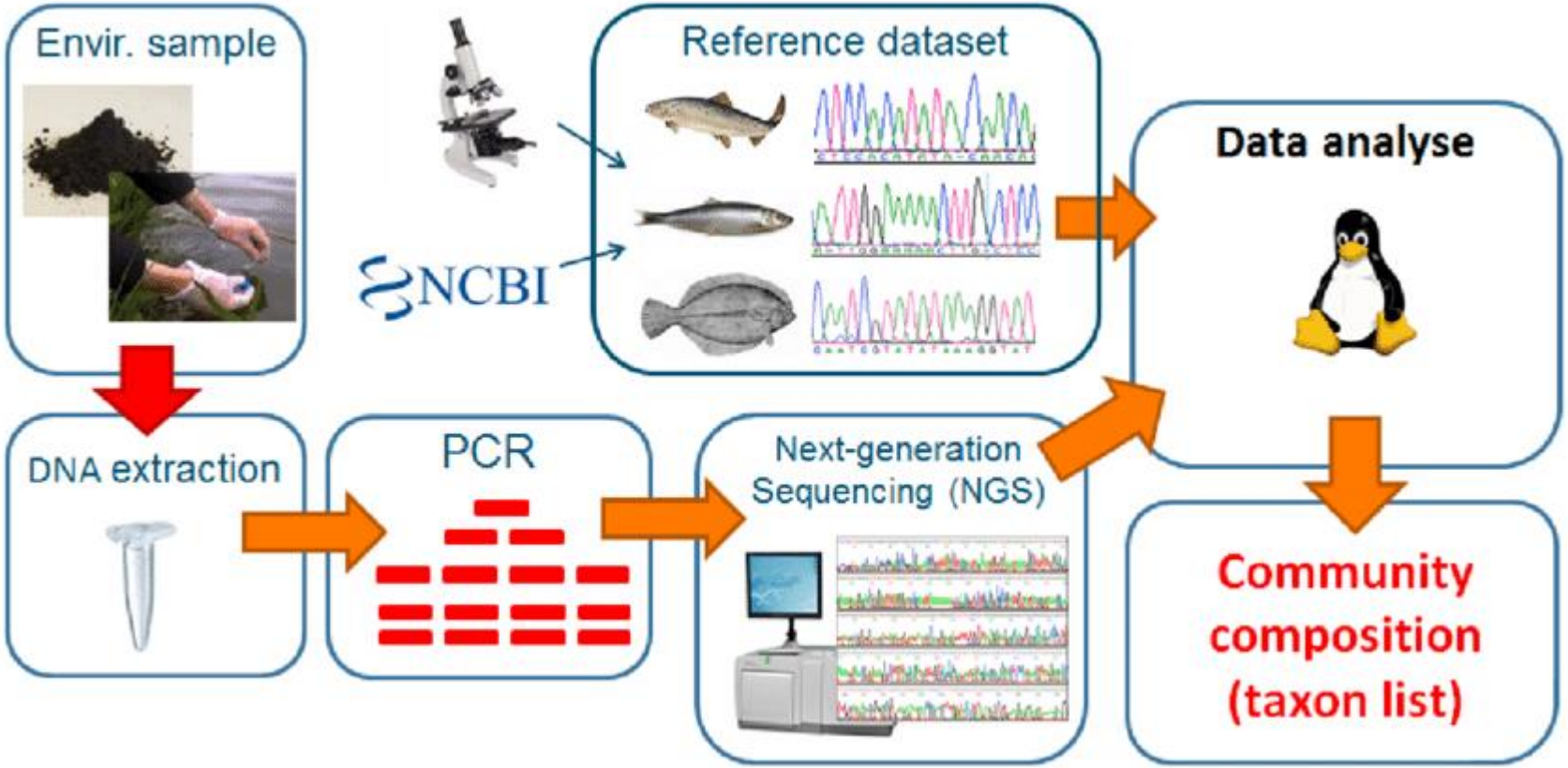
Environmental DNA

BIOL3110


5
1
1L
2
4
3

Meta-barcoding





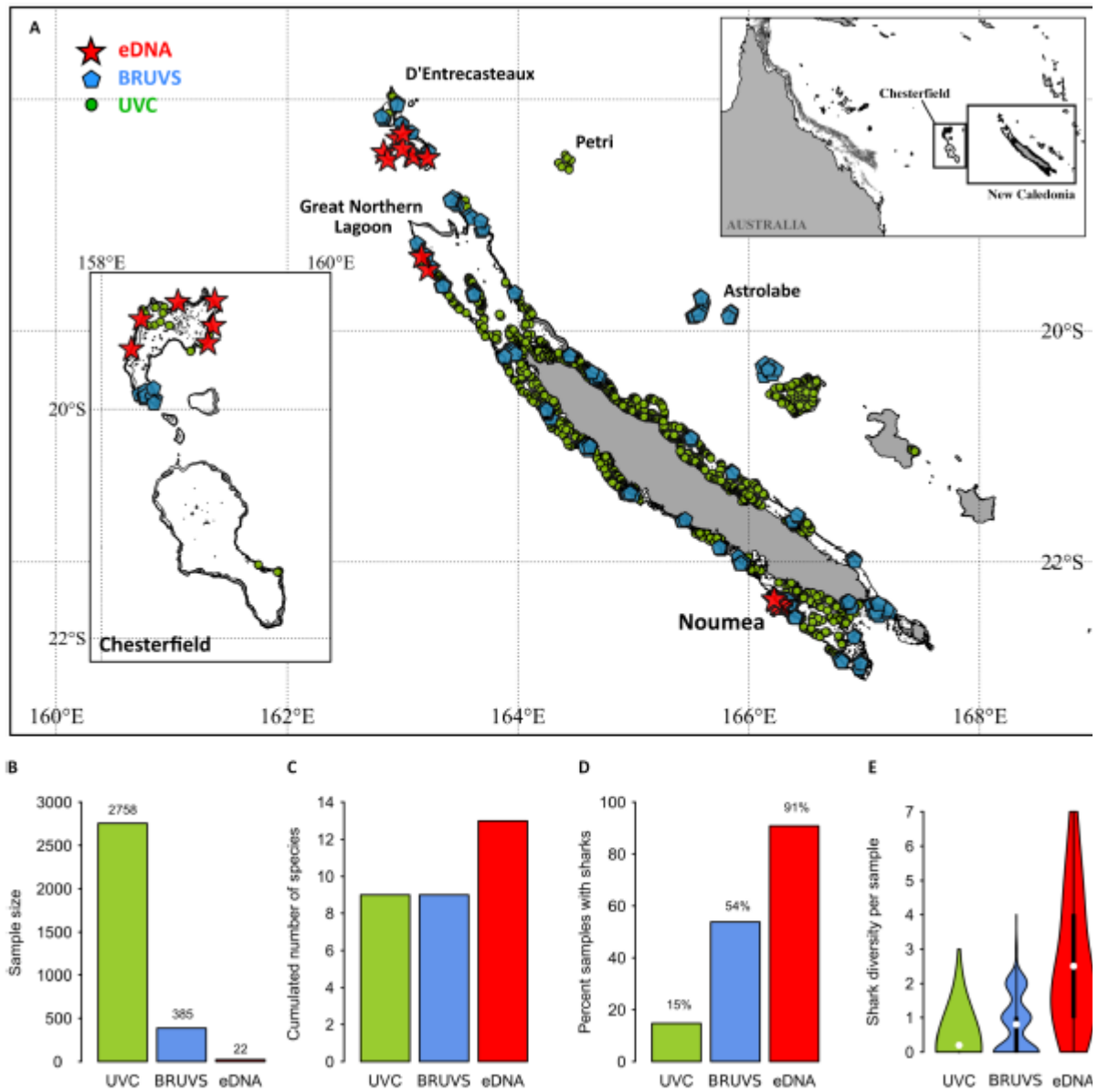


Fig. 1. Sampling design and analyses of surveys across the New Caledonian archipelago, southwestern Pacific. (**A**) Sampling design in the New Caledonian archipelago (red stars, eDNA; blue pentagons, BRUVS; green dots, UVC). (**B**) Sample size (UVC, $n = 2758$; BRUVS, $n = 385$; eDNA, $n = 22$). (**C**) Cumulated number of shark species detected. (**D**) Frequency of samples with sharks detected. (**E**) Violin plot showing detected shark species richness, significantly different between techniques ($P < 0.001$, Kruskal-Wallis test), with eDNA detecting more shark species (2.5 ± 1.9) compared to BRUVS (0.8 ± 0.8) and UVC (0.2 ± 0.5) ($P < 0.001$, Dunn's tests). White dots are mean values; thick black bars correspond to interquartile ranges; thin black lines are 95% confidence intervals.

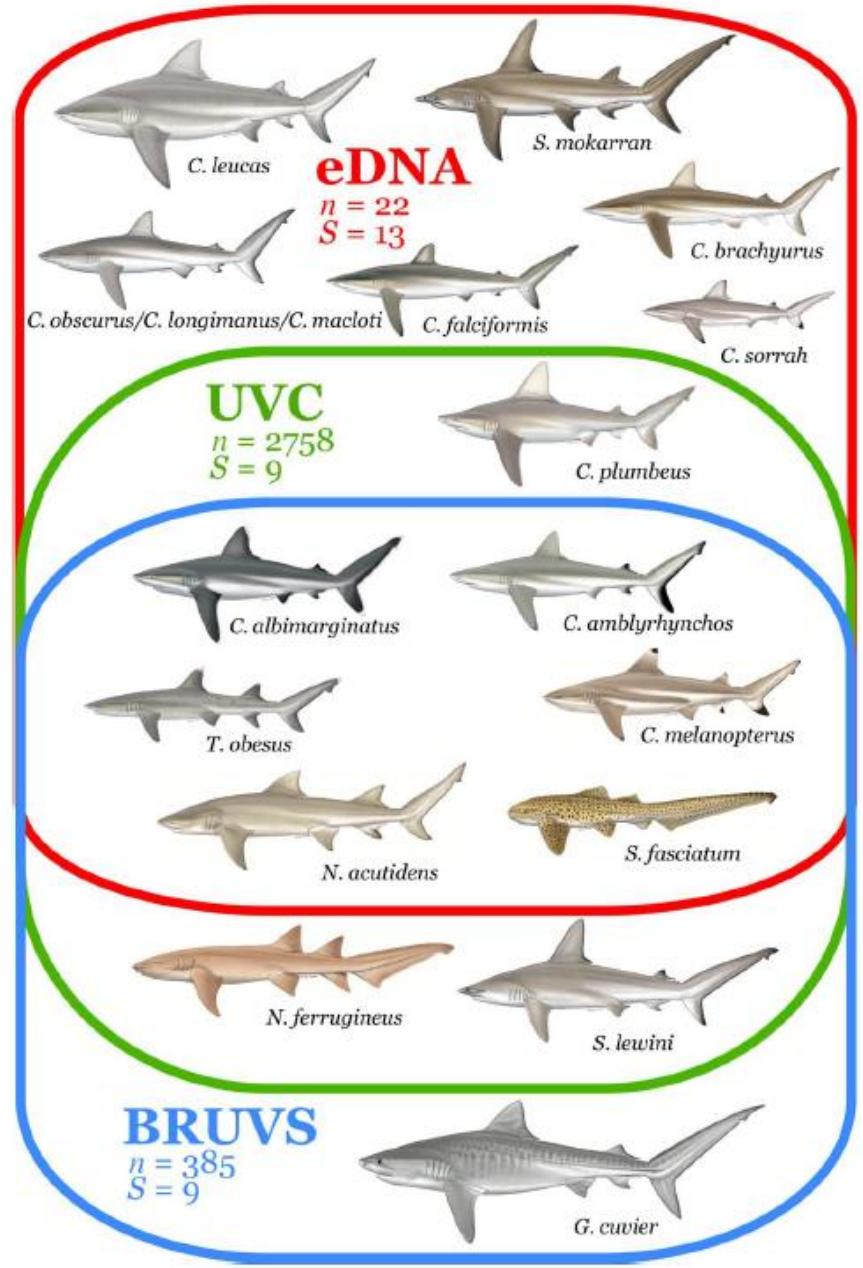


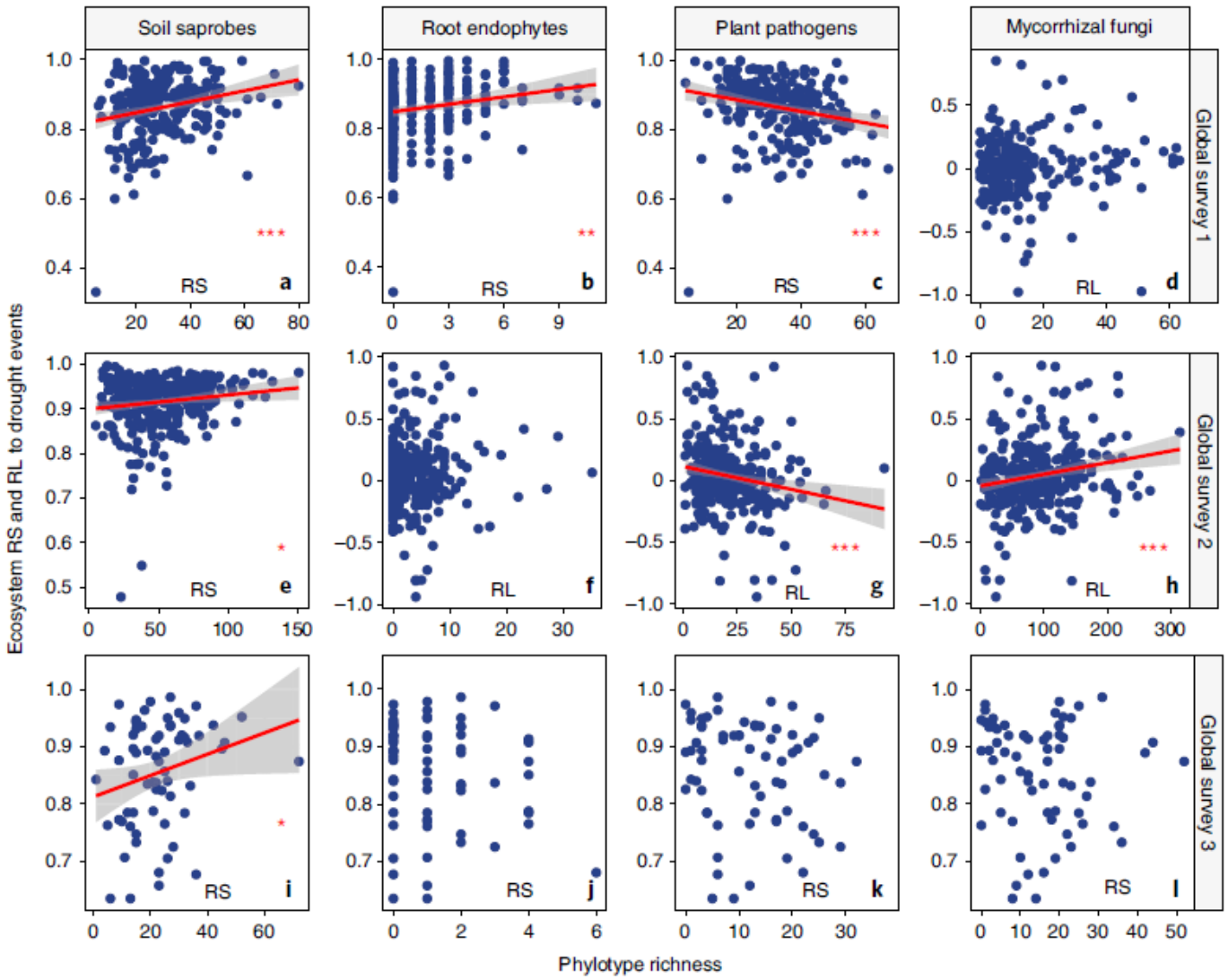
Fig. 2. Detection of shark species with different sampling methods. Venn diagram showing the species detected by eDNA ($n = 22$ samples, $S = 13$ species), UVC ($n = 2758$ samples, $S = 9$ species), and BRUVS ($n = 385$ samples, $S = 9$ species). Scientific drawings courtesy of M. Dando.

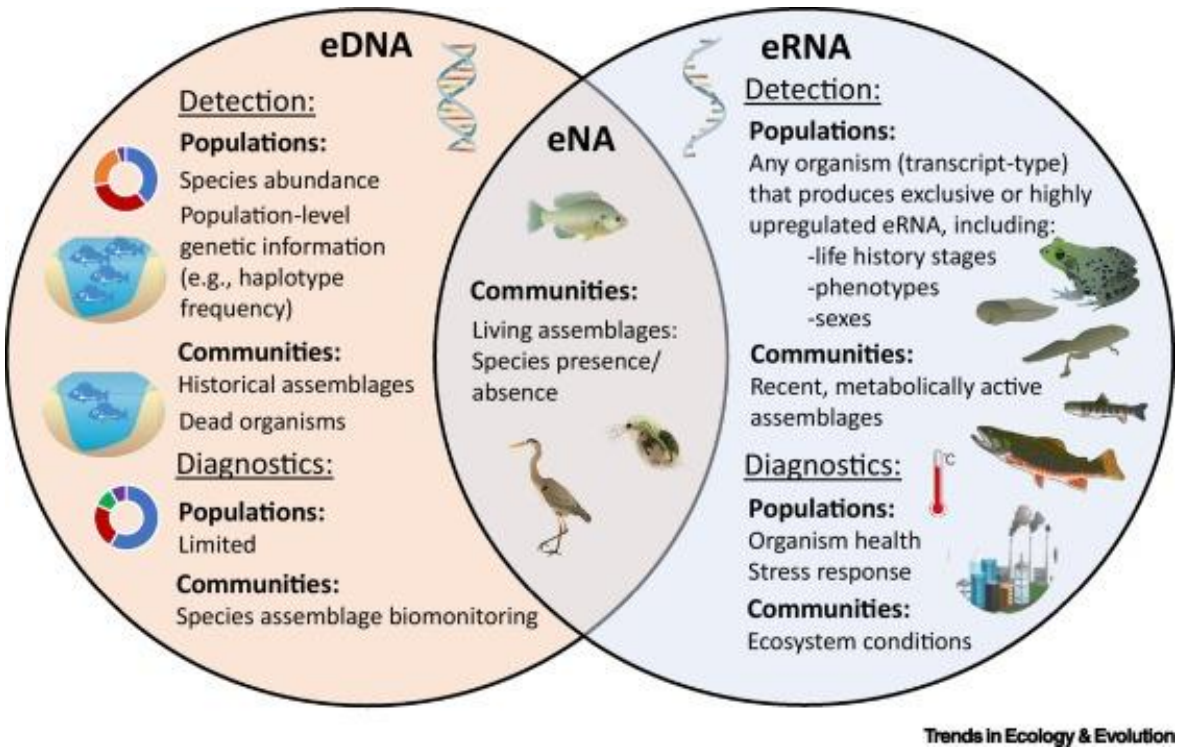
Bousarrie et al. 2018 Science Adv

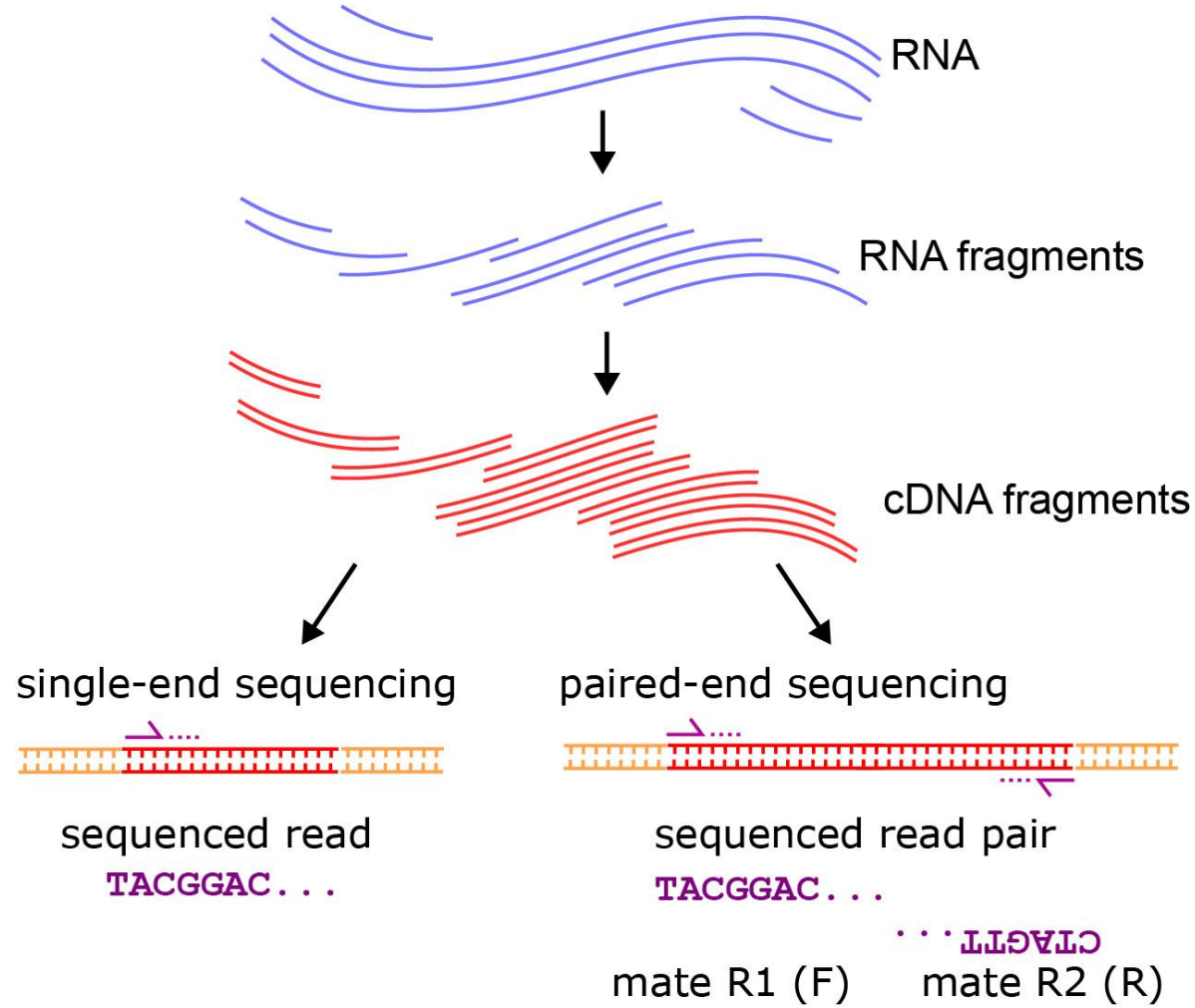
Invertebrates for monitoring vertebrate biodiversity (iDNA)

Community composition and functional diversity

Liu et al. 2022 Nat Ecol Evol




eDNA
Detection:
Populations:
Species abundance
Population-level genetic information (e.g., haplotype frequency)
Communities:
Historical assemblages
Dead organisms
Diagnostics:
Populations:
Limited
Communities:
Species assemblage biomonitoring
eNA
Communities:
Living assemblages:
Species presence/ absence
eRNA
Detection:
Populations:
Any organism (transcript-type) that produces exclusive or highly upregulated eRNA, including:
-life history stages
-phenotypes
-sexes
Communities:
Recent, metabolically active assemblages
Diagnostics:
Populations:
Organism health
Stress response
Communities:
Ecosystem conditions
Trends in Ecology & Evolution


RNA
RNA fragments
cDNA fragments
single-end sequencing
paired-end sequencing
sequenced read
TACGGAC...
sequenced read pair
TACGGAC...
...CTAGTT
mate R1 (F)
mate R2 (R)