Sequencing 101

(The incomplete) history of sequencing

High-throughput Sanger sequencing
Dye-terminators and capillary electrophoresis

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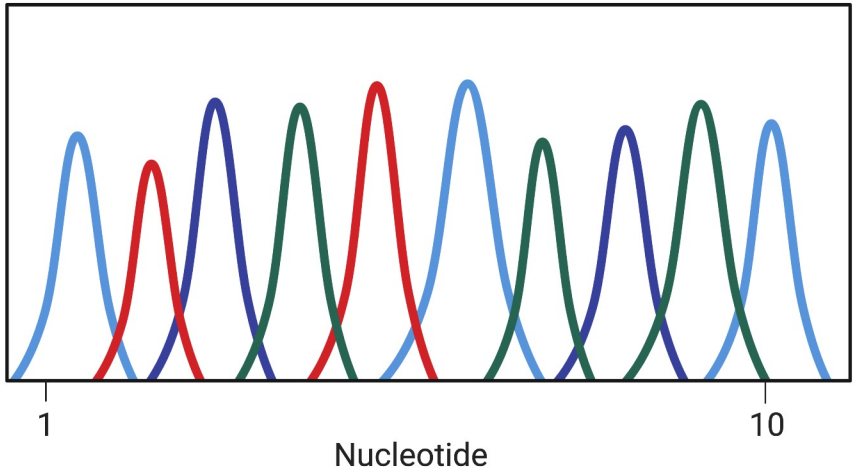
High-throughput Sanger sequencing
Dye-terminators and capillary electrophoresis



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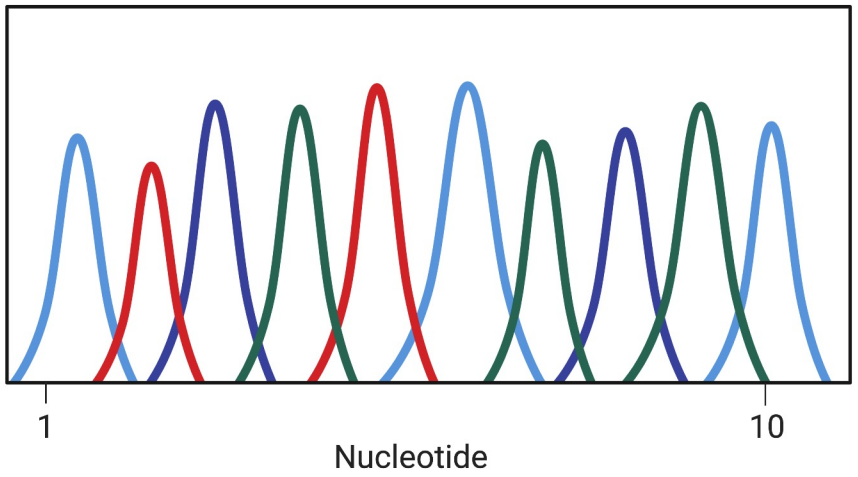
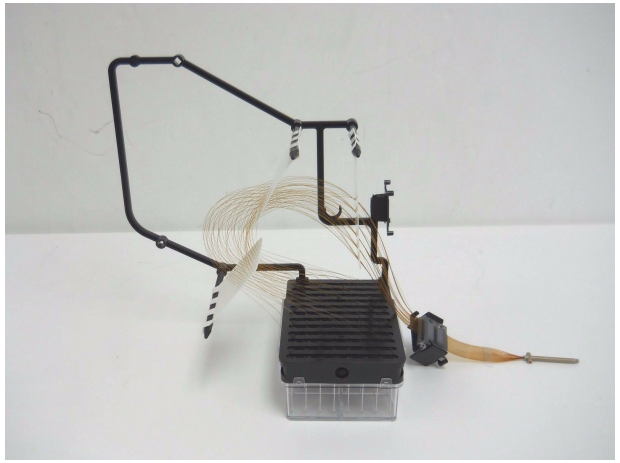
High-throughput Sanger sequencing
Dye-terminators and capillary electrophoresis





48/96 –capillars
Read length < 900 bp
< 90 Kbp / run

(The incomplete) history of sequencing

Sequencing by synthesis:
Pyrosequencing

Genome sequencing in microfabricated high-density picolitre reactors

Marcel Margulies, Michael Egholm, [...] Jonathan M. Rothberg

Nature **437**, 376–380(2005) | Cite this article

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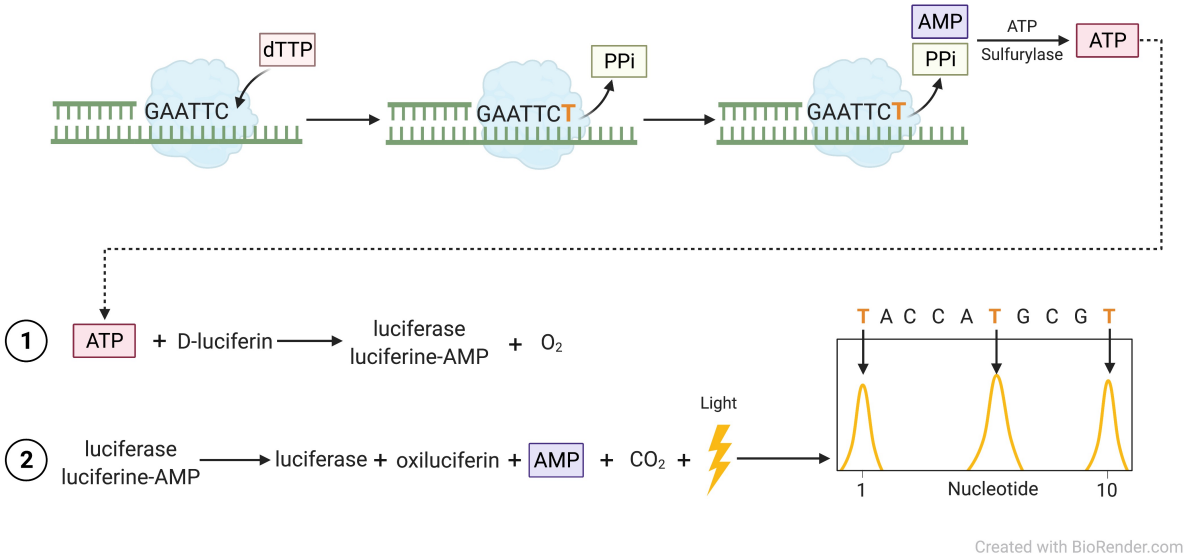

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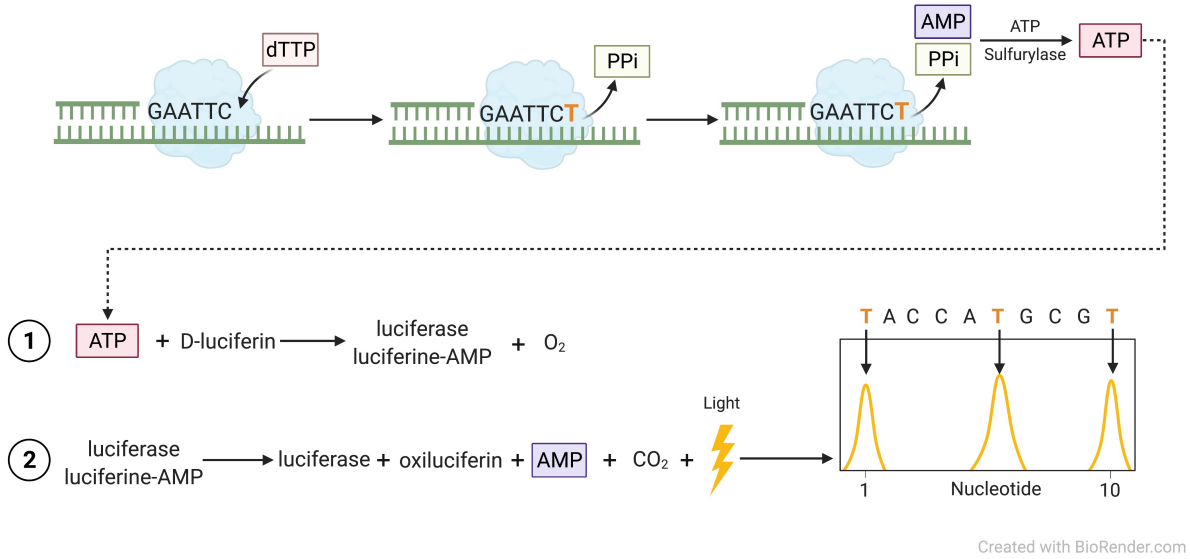
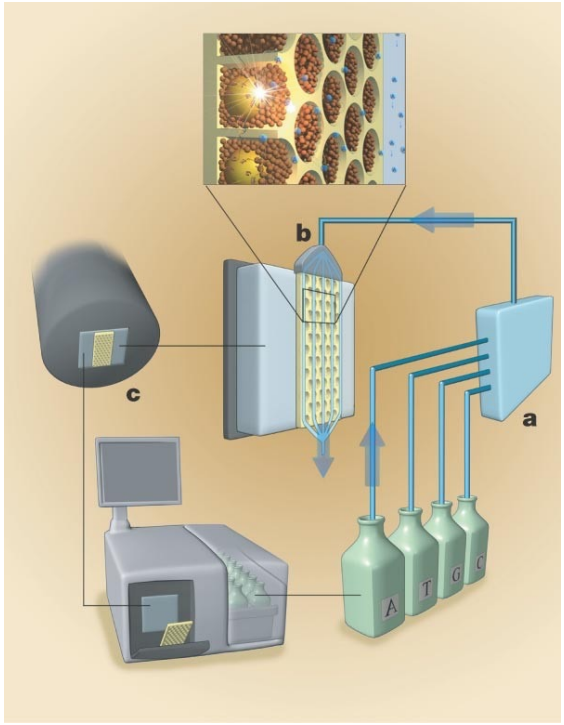




Marguelis et al., 2005. Nature

Read length ~ 400–1000 bp
20 – 600 Mbp / run

(The incomplete) history of sequencing

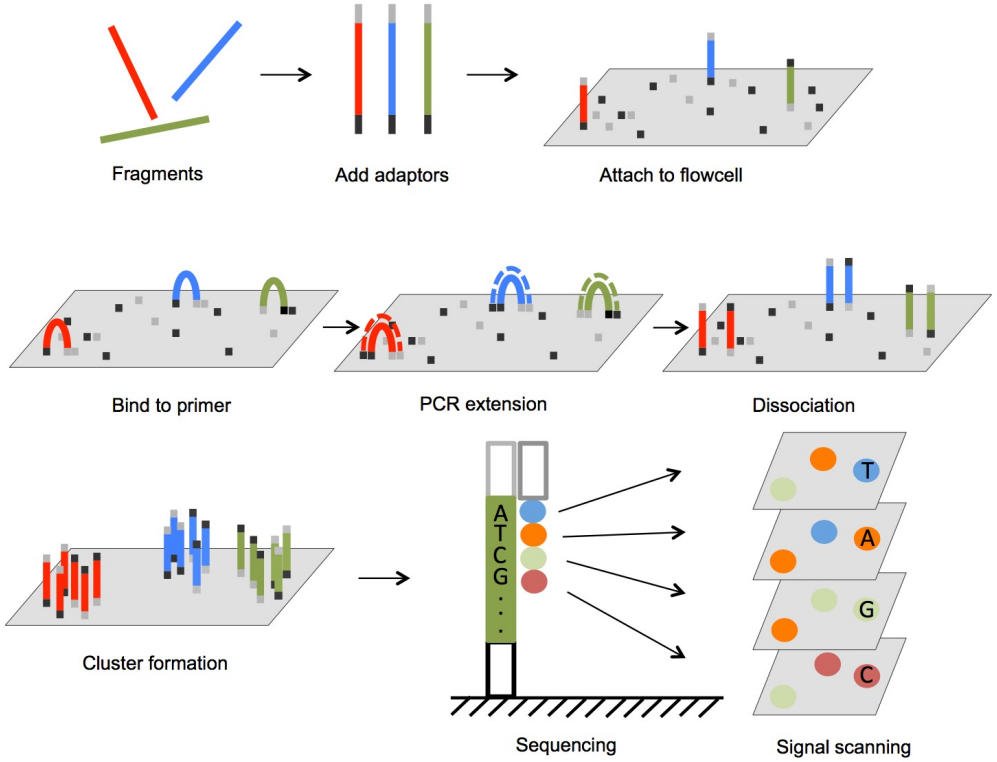
Sequencing by synthesis:
Short-read sequencing

Illumina (Solexa)
Genome Analyzer, 2006
1 Gbp / run

(The incomplete) history of sequencing

Sequencing by synthesis:
Short-read sequencing

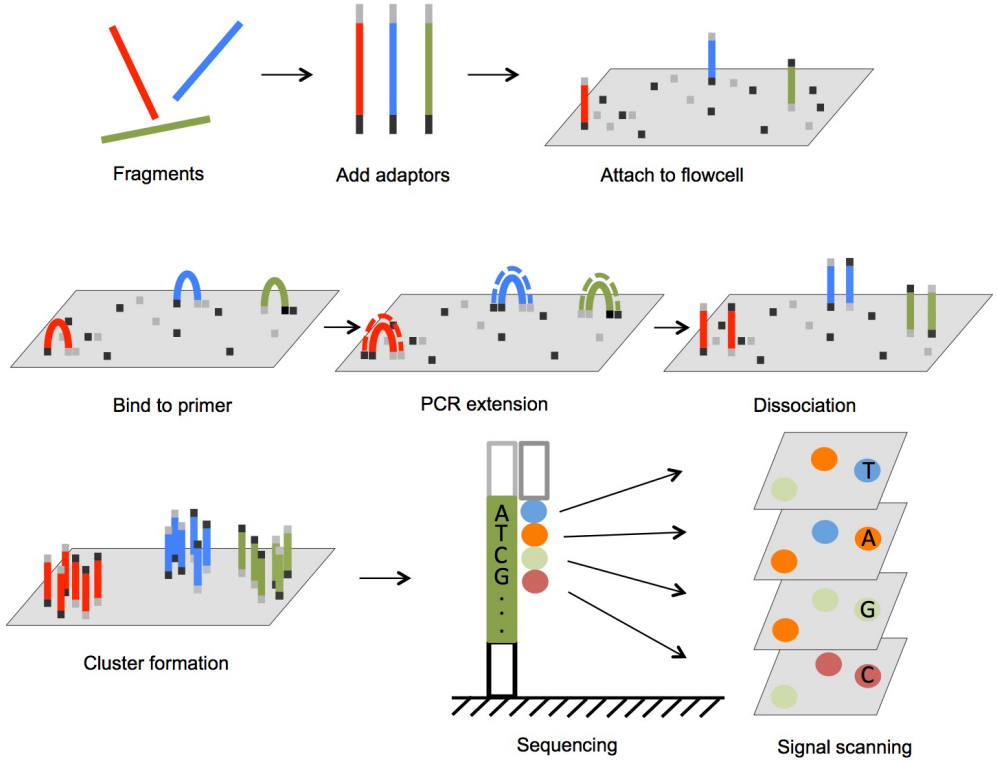
Illumina
Genome Analyzer IIx, 2008
20 Gbp / run (9.5 days)



(The incomplete) history of sequencing

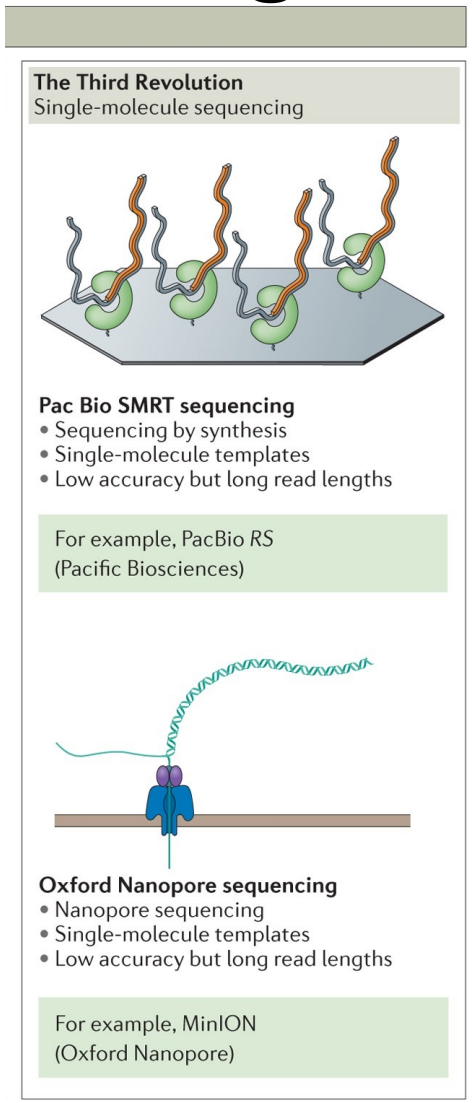
Sequencing by synthesis:
Short-read sequencing

1 Gbp – >1 Tbp / run (~1–2 d)



(The incomplete) history of sequencing

Third revolution:
Long-read sequencing



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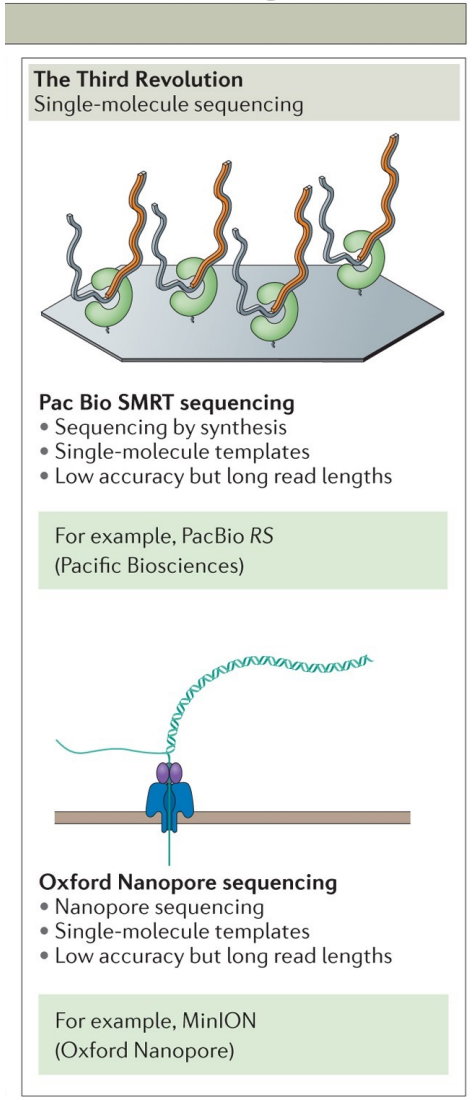
(The incomplete) history of sequencing

Third revolution:
Long-read sequencing



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Third revolution:
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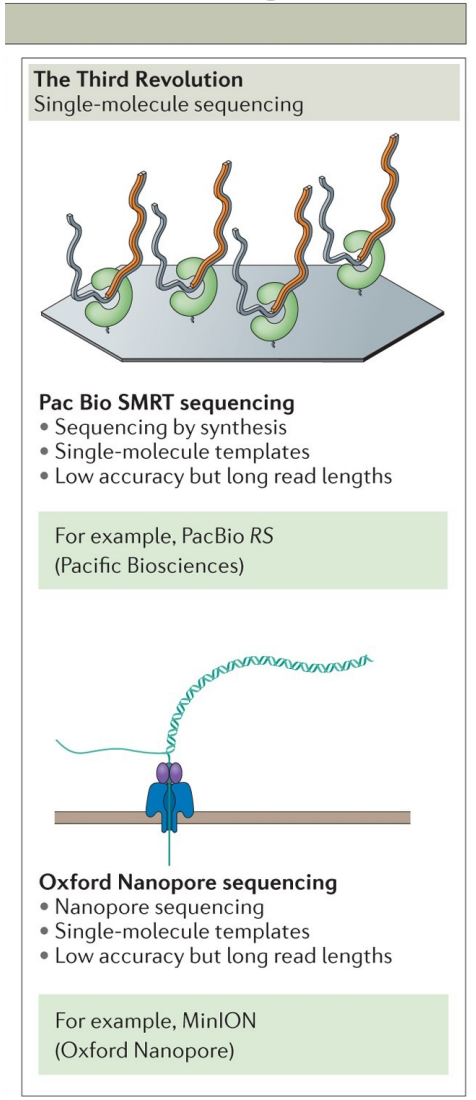

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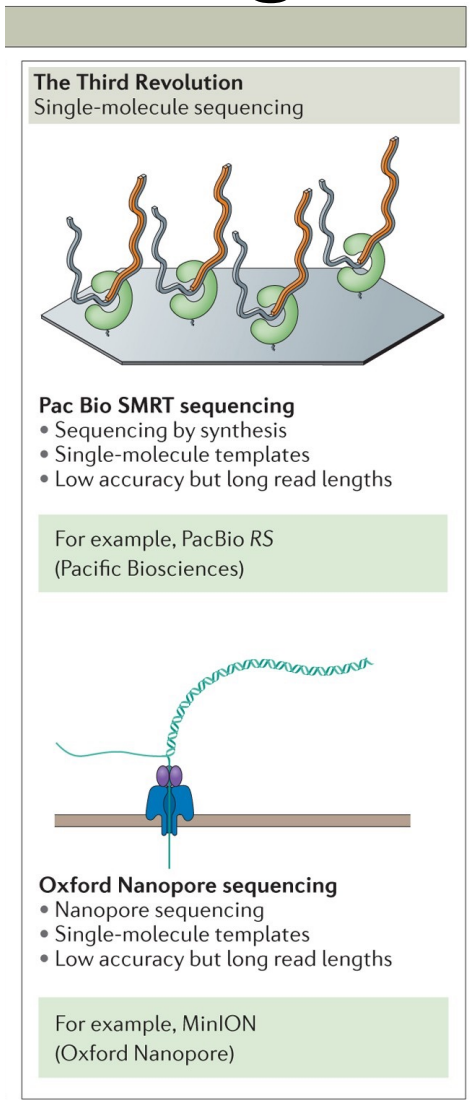

Sequel II
HiFi reads:
Read length:
20 kb
30 Gbp /run
(99.92 % acc.)

Minion:
Read length:
> 4 Mb
1–50 Gbp /run
(~ 97 % acc.)
Real-time!