CERNAL — Host Analysis

Which expression host the platform targets first, and the evidence behind that choice. Every figure is pulled from the Hosts or Companies sheet of the team workbook, or stated as a published value with its reference. Exported from the team spreadsheet; no figure was added here.

Summary

How we got the numbers		
Every figure below is either pulled from the Hosts or Companies sheet by formula, or stated as a published value with its reference. Nothing is typed in twice.		
FINDING 1 — Mammalian hosts serve the most revenue		
Mammalian end-product market, US$B	325	Sum of Hosts column E where Group = Mammalian
All other hosts with a figure, US$B	43.5	Sum of Hosts column E where Group is not Mammalian
Mammalian multiple	7.47	Mammalian total divided by the others
Only hosts with a published product-level figure are counted. E. coli and S. cerevisiae make approved therapeutics but are reported by product, not host.		
FINDING 2 — The share evidence is stronger than the market forecasts		
Approved recombinant therapeutic proteins made in CHO	70%	Peer-reviewed review, 2024
Newly approved biopharmaceuticals made in CHO	85%	Reviews report 80–90%; 85% is the midpoint
Approved recombinant products from mammalian systems	67%	107 of 159 approved products
CHO share of mammalian-derived products	89%	Same source as the row above
Market forecasts for mAbs range from US$121B to US$322B between publishers. These share figures do not, which makes them the better evidence.		
FINDING 3 — Three layers, and where CERNAL sells		
End product — what the medicine sells for, US$B	325	Mammalian rows, Hosts column E
Manufacturing — what it costs to make, US$B	49.6	Mammalian rows, Hosts column F
Design tooling — where CERNAL sells, US$B	3.3	CHO cell-line development US$1.65B + HEK293 media US$1.8B, rounded
Tooling as a share of end product	1.0%	A tool captures a fraction of the activity it enables. Normal, and better said than hidden.
COUNTS — pulled from the Companies sheet		
Companies catalogued	55	Count of Companies column C
Of which mammalian hosts	18	Companies column B = Mammalian
Disclosed private funding tracked, US$M	4756.5	Sum of Companies column G

Hosts

Rank	Group	Host	What it produces	End-product market US$B	Manufacturing US$B	Basis for the figure	Parts library maturity	Reference
1	Mammalian	HEK293	Viral vectors for cell and gene therapy; recombinant proteins	25	2.7	Cell and gene therapy 2026. Publishers range US$16B–US$33B; 25 is the midpoint	High	Fortune Business Insights CGT 2026; Mordor viral vector mfg; Tan et al. Front Bioeng Biotechnol 2021;9:796991
2	Mammalian	CHO	Monoclonal antibodies and recombinant proteins	300	46.9	mAbs 2026. Publishers range US$121B–US$322B; 300 is a midpoint planning figure	Very high	Grand View / Precedence / Towards Healthcare mAbs 2026; Fact.MR biologics manufacturing 2026

Rank	Group	Host	What it produces	End-product market US$B	Manufacturing US$B	Basis for the figure	Parts library maturity	Reference
3	Mammalian	T and NK cells	Engineered cell therapies			Not separately sized — counted inside the CGT figure	Medium	—
4	Microbial	Corynebacterium glutamicum	Feed and food amino acids — lysine, glutamate	35		Amino acids 2026, forecast to US$62B by 2033	Medium	Coherent Market Insights amino acid market 2026–2033
5	Fungal	T. reesei, Aspergillus	Industrial enzymes, citric acid, food ingredients	8.5		Industrial enzymes 2025. Publishers range US$8.0B–US$8.5B	Low	Grand View; MarketsandMarkets; Precedence industrial enzymes 2025
6	Bacterial	Bacillus subtilis / licheniformis	Detergent and technical enzymes, vitamins			Shares the industrial enzymes figure — not additive	Low to medium	Shares row 5 reference
7	Microbial	E. coli	Recombinant proteins, insulin, bio-chemicals			Not sized by host — markets are reported by product	Very high	—
8	Yeast	S. cerevisiae	Insulin, beverage, biofuel, precision fermentation			Not sized by host — spans therapeutic and commodity output	High	—
9	Yeast	Pichia pastoris (K. phaffii)	Pharma proteins, enzymes, food proteins			Not sized by host	Medium	Encyclopedia MDPI entry 53976
10	Yeast	Yarrowia lipolytica	Lipids, organic acids, nutraceuticals			Not sized by host	Low	Industrial applications of Yarrowia lipolytica, ScienceDirect B9780443220920000050
11	Insect	Sf9 / Sf21	Vaccines and viral vectors		93%	Insect cell culture 2025, forecast US$1.95B by 2033	Medium	Credence Research insect cell lines market
12	Bacterial	Clostridium autoethanogenum	Gas fermentation to fuels and chemicals			Single-company host in practice	Very low	lanzatech.com/biorefining

Companies

Host	Group	Company	HQ	Ownership	Products	Disclosed funding US$M	Reference
HEK293 / HEK293T	Mammalian	Novartis (AveXis)	CH/US	Public	AAV vector production Zolgensma		Tan et al. Front Bioeng Biotechnol 2021;9:796991 lists Zolgensma among HEK293-produced biologics
HEK293 / HEK293T	Mammalian	Lonza	CH	Public	Clonal HEK293T suspension for LVV; HEK293 for AAV to 2,000 L		lonza.com/specialized-modalities/cell-and-gene/viral-vectors
HEK293 / HEK293T	Mammalian	Oxford Biomedica	UK	Public	Lentiviral vectors HEK293 suspension, 2 L to 2,000 L		cellandgene.com/ecommcenter/oxfordbiomedica
HEK293 / HEK293T	Mammalian	AGC Biologics	DK/US	Private	Lentiviral vectors; licensed Asimov LV Edge, Jan 2026		pharmasource.global Asimov / AGC Biologics partnership
HEK293 / HEK293T	Mammalian	Thermo Fisher (Brammer Bio)	US	Public	Viral vector CDMO		
HEK293 / HEK293T	Mammalian	uniQure	NL/US	Public	AAV gene therapy vectors		
HEK293 / HEK293T	Mammalian	MeiraGTx	US/UK	Public	AAV manufacture; riboswitch platform		meiragtx.com/technology-innovation/riboswitch-in-vivo-delivery-platform
HEK293 / HEK293T	Mammalian	Kelonia (Lilly)	US	Acquired 2026	Lentiviral in vivo CAR-T		Nature Rev Drug Discov d41573-026-00068-8

Host	Group	Company	HQ	Ownership	Products	Disclosed funding US$M	Reference
CHO	Mammalian	Roche / Genentech	CH/US	Public	Monoclonal antibodies		
CHO	Mammalian	Amgen	US	Public	Monoclonal antibodies, fusion proteins		
CHO	Mammalian	AbbVie	US	Public	Monoclonal antibodies		
CHO	Mammalian	Samsung Biologics	KR	Public	CDMO biologics manufacture		
CHO	Mammalian	WuXi Biologics	CN	Public	CDMO biologics manufacture		
CHO	Mammalian	Asimov	US	Private	CHO Edge expression system; Kernel CAD; RNA Edge		asimov.com/cho-edge-expression-system
T and NK cells	Mammalian	Senti Biosciences	US	Public	Logic-gated CAR-NK SENTI-202		globenewswire Senti RMAT announcement, May 2026
T and NK cells	Mammalian	ArsenalBio	US	Private	Programmable T cells; pivoted to in vivo 2026	140	fiercebiotech.com/biotech/arsenalbio-sheds-most-staff-pivot-vivo-car-t
T and NK cells	Mammalian	Capstan (AbbVie)	US	Acquired 2025	CPTX2309 in vivo CAR-T via targeted LNP		news.abbvie.com/2025-08-19-AbbVie-Completes-Acquisition-of-Capstan-Therapeutics
T and NK cells	Mammalian	Strand Therapeutics	US	Private	Programmable mRNA; SignalLock microRNA sensors	153	businesswire Strand STX-001 Phase 1 data, ASCO 2025
Corynebacterium glutamicum	Microbial	Ajinomoto	JP	Public	L-glutamate, L-lysine		
Corynebacterium glutamicum	Microbial	CJ CheilJedang	KR	Public	L-lysine and feed amino acids		
Corynebacterium glutamicum	Microbial	ADM	US	Public	L-lysine		
Corynebacterium glutamicum	Microbial	Evonik	DE	Public	Feed amino acids		
Corynebacterium glutamicum	Microbial	Meihua Group	CN	Public	Glutamate, lysine, threonine		
Corynebacterium glutamicum	Microbial	Fufeng Group	CN	Public	Glutamate and amino acids		
T. reesei, Aspergillus	Fungal	Novonesis	DK	Public	Industrial enzymes ~50% share of the segment		novonesis.com
T. reesei, Aspergillus	Fungal	IFF (Danisco)	US	Public	Industrial enzymes		
T. reesei, Aspergillus	Fungal	dsm-firmenich	NL/CH	Public	Enzymes, food ingredients, vitamins		
T. reesei, Aspergillus	Fungal	AB Enzymes	DE	Private	Industrial enzymes		
T. reesei, Aspergillus	Fungal	Perfect Day	US	Private	Recombinant whey protein beta-lactoglobulin	1000	researchandmarkets.com/articles/key-companies-in-precision-fermentation
T. reesei, Aspergillus	Fungal	Onego Bio	FI	Private	Recombinant ovalbumin		onego.bio
T. reesei, Aspergillus	Fungal	Acies Bio (with Ginkgo)	SI	Private	A. niger strain programme, Aug 2026		
T. reesei, Aspergillus	Fungal	Cargill	US	Private	Citric acid and food acids		
Bacillus subtilis / licheniformis	Bacterial	Novonesis	DK	Public	Detergent and technical enzymes		
Bacillus subtilis / licheniformis	Bacterial	IFF (Danisco)	US	Public	Detergent and technical enzymes		
E. coli	Microbial	Eli Lilly	US	Public	Recombinant insulin and proteins		
E. coli	Microbial	Ginkgo Bioworks	US	Public	Chassis in cell-programming services	2500	en.wikipedia.org/wiki/Ginkgo_Bioworks
E. coli	Microbial	Codexis	US	Public	Enzyme engineering and manufacture		
E. coli	Microbial	Genomatica (Geno)	US	Private	Bio-nylon intermediates, BDO mixed-host	388	tracxn.com/d/companies/genomatica

Host	Group	Company	HQ	Ownership	Products	Disclosed funding US$M	Reference
E. coli	Microbial	Solugen	US	Private	Specialty chemicals mixed-host	357	newmarketpitch.com/blogs/news/synthetic-biology-top-startups-fundraising
E. coli	Microbial	Arzeda	US	Private	Designed enzymes and pathways	32	newmarketpitch.com/blogs/news/synthetic-biology-top-startups-fundraising
S. cerevisiae	Yeast	Novo Nordisk	DK	Public	Recombinant insulin		
S. cerevisiae	Yeast	Amyris	US	Public (Ch.11 2023)	Farnesene, squalane, sweeteners		
S. cerevisiae	Yeast	Angel Yeast	CN	Public	Yeast products and extract		
S. cerevisiae	Yeast	Lallemand	CA	Private	Industrial and beverage yeast		
Pichia pastoris (K. phaffii)	Yeast	Impossible Foods	US	Private	Soy leghemoglobin		encyclopedia.pub/entry/53976
Pichia pastoris (K. phaffii)	Yeast	Biocon	IN	Public	Recombinant insulin and biosimilars		encyclopedia.pub/entry/53976
Pichia pastoris (K. phaffii)	Yeast	Formo	DE	Private	Fermented dairy proteins	61	vegconomist.com/category/fermentation
Pichia pastoris (K. phaffii)	Yeast	Liberation Labs	US	Private	Contract precision fermentation capacity	125.5	vegconomist.com Liberation Labs $50.5M
Yarrowia lipolytica	Yeast	DuPont / IFF	US	Public	New Harvest EPA omega-3 oil		ScienceDirect B9780443220920000050
Yarrowia lipolytica	Yeast	Oxyrane	BE/UK	Private	Human acid alpha-glucosidase OXY2810		ScienceDirect B9780443220920000050
Yarrowia lipolytica	Yeast	Biocatalysts Ltd	UK	Private	Phospholipase Lipomod 833L2		ScienceDirect B9780443220920000050
Yarrowia lipolytica	Yeast	Mayoly	FR	Private	Recombinant lipase LIP2		ScienceDirect B9780443220920000050
Sf9 / Sf21	Insect	Protein Sciences (Sanofi)	US	Public	Flublok recombinant influenza vaccine		
Sf9 / Sf21	Insect	Thermo Fisher	US	Public	Baculovirus expression reagents and services		
Clostridium autoethanogenum	Bacterial	LanzaTech	US/NZ	Public	Gas fermentation to ethanol and chemicals		lanzatech.com/biorefining