

Introduction

Work Project

19/01/2021

InnoVec: Fighting Infectious Diseases with a Bloodless Mosquito Diet - Market, Competition and Intellectual Property

A **work project**, presented as part of the requirements for the Award of a Master's degree in Management from the **Nova School of Business and Economics**

Work project carried out under the supervision of: Professor Nuno Arantes-Oliveira

Lena Greiner (45139)

Introduction

Abstract & Keywords

Vector-borne diseases such as Malaria, Dengue fever or Zika have previously mainly concerned countries below the equator. However, climate change forces them to move up north and make them an even more relevant problem for all countries across the globe. To fight vector-borne diseases, research requires a lot of blood in order to rear the distinct vectors such as mosquitoes, bugs, fleas, ticks and others. Within this pitch we present the company InnoVec and its product BLESS, a blood-free feeding alternative for vectors used in research and big-scale rearing projects.

This individual part covers the market, competitive landscape and Intellectual Property of InnoVec. First, a market sizing is presented, followed by market trends, opportunities and threats. Second, the competitive environment and main industry players are analyzed. Lastly, the roll-out of an Intellectual Property protection strategy along with its associated costs is detailed.

Information and assumptions are based on patent WO2019198013A1 in combination with the following paper:

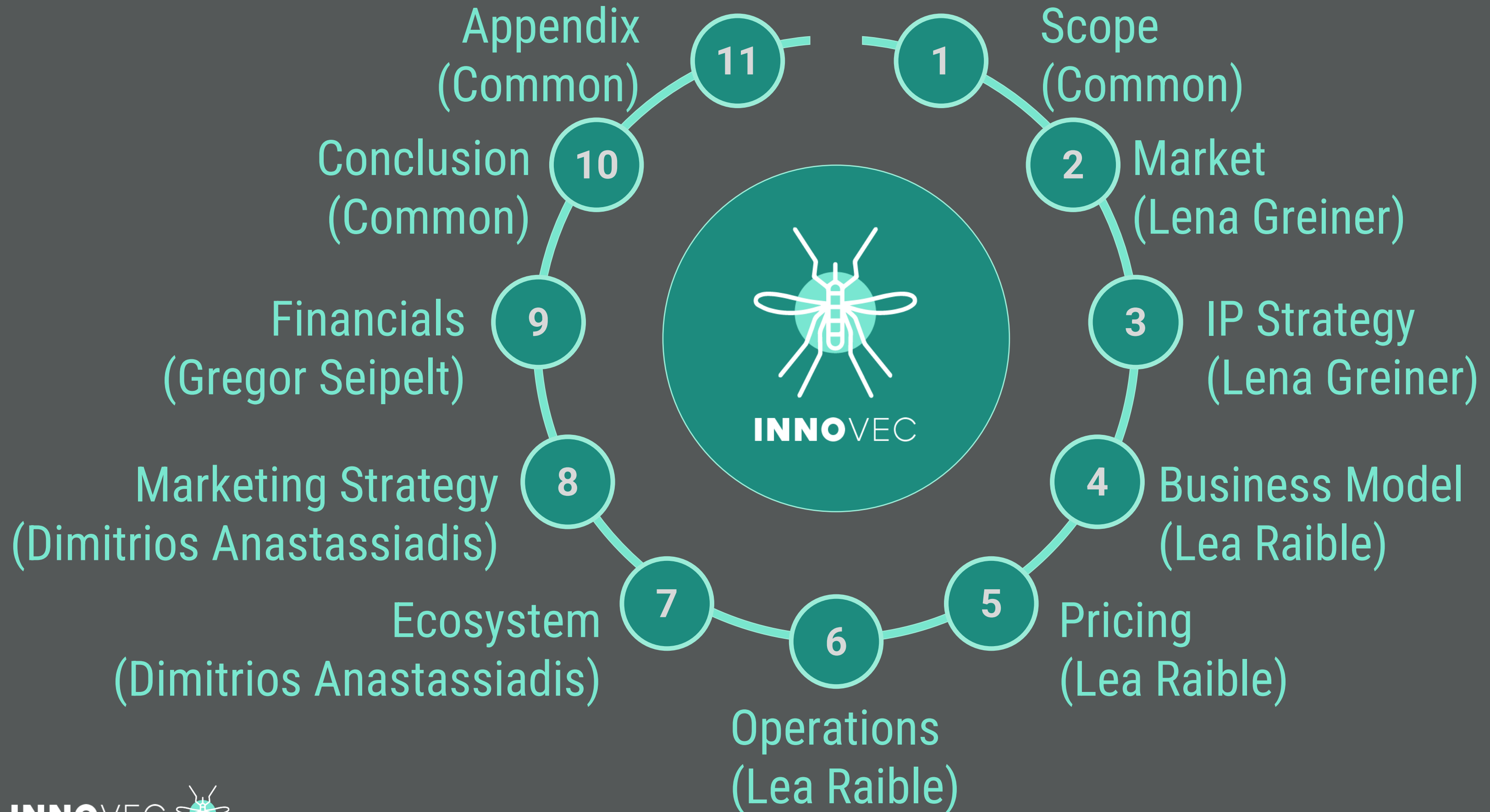
- Joana Marques, João C. R. Cardoso, Rute C. Felix, Rosa A. G. Santana, Maria das Graças Barbosa Guerra, Deborah Power & Henrique Silveira (2018). nature.com scientific reports. *Fresh-blood-free diet for rearing malaria mosquito vectors*
- The InnoVec Team has worked in closed collaboration with Joana Marques and Henrique Silveira, who are the main inventors of the blood-free diet.

This work used infrastructure and resources funded by Fundação para a Ciência e a Tecnologia (UID/ECO/00124/2013, UID/ECO/00124/2019 and Social Sciences DataLab, Project 22209), POR Lisboa (LISBOA-01-0145-FEDER-007722 and Social Sciences DataLab, Project 22209) and POR Norte (Social Sciences DataLab, Project 22209).

KEYWORDS: ENTREPRENEURSHIP, BUSINESS MODEL, VECTOR-BORNE DISEASES, MOSQUITOES, BLOODLESS DIET, MARKET, INTELLECTUAL PROPERTY

Introduction

Table of Contents



A close-up photograph of a mosquito on a plant stem, overlaid with a teal gradient and a white number '1'. The mosquito is positioned in the center-right of the frame, facing right. Its head, thorax, and legs are clearly visible, showing fine details like its compound eyes and antennae. The background is a blurred natural setting. A diagonal teal gradient overlay covers the entire image, and a large white number '1' is placed on the left side.

1

Scope

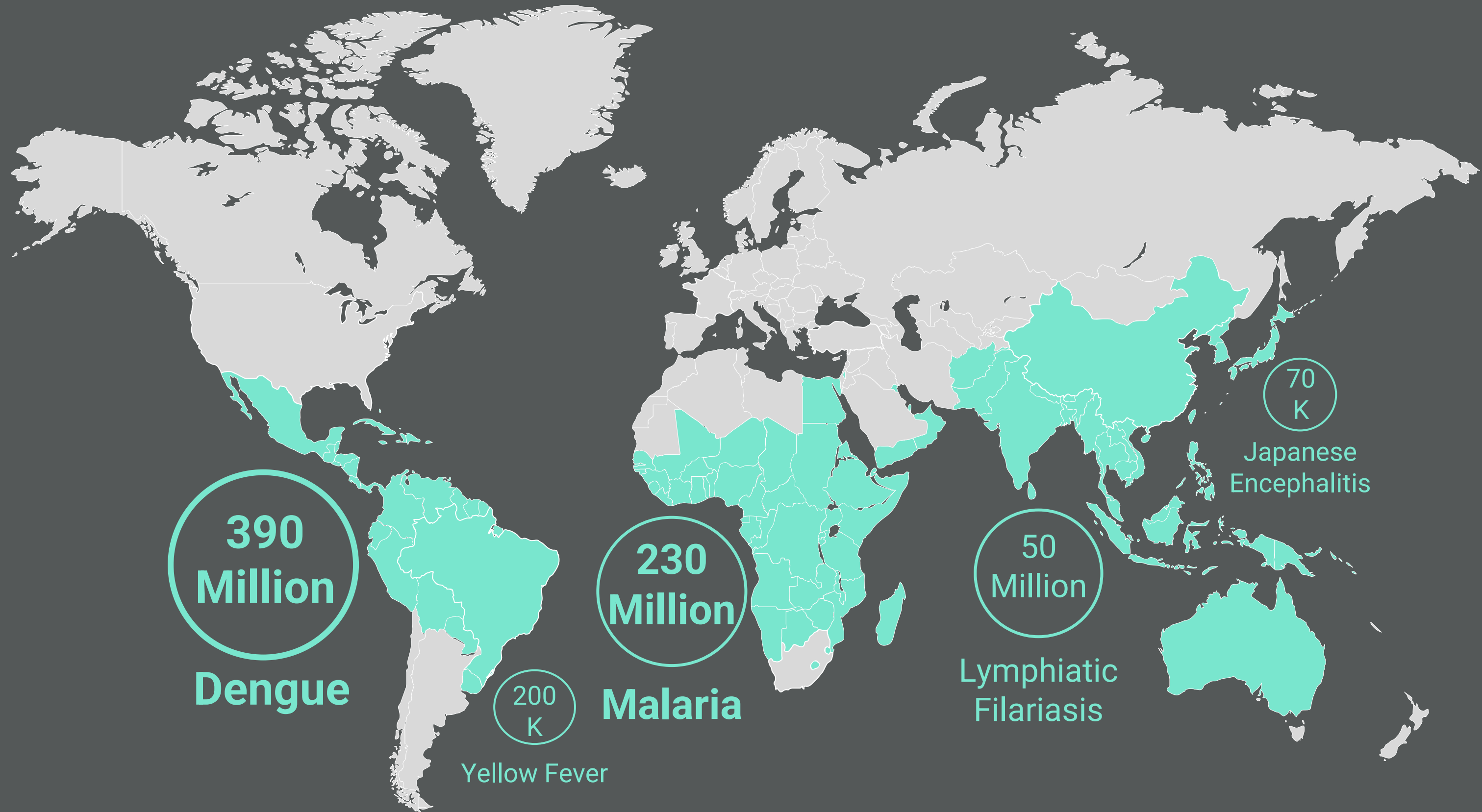
**Do you know
what the
world's deadliest
animal is?**



**THE
MOSQUITO**

Problem Scope

Yearly Mosquito-borne Infections



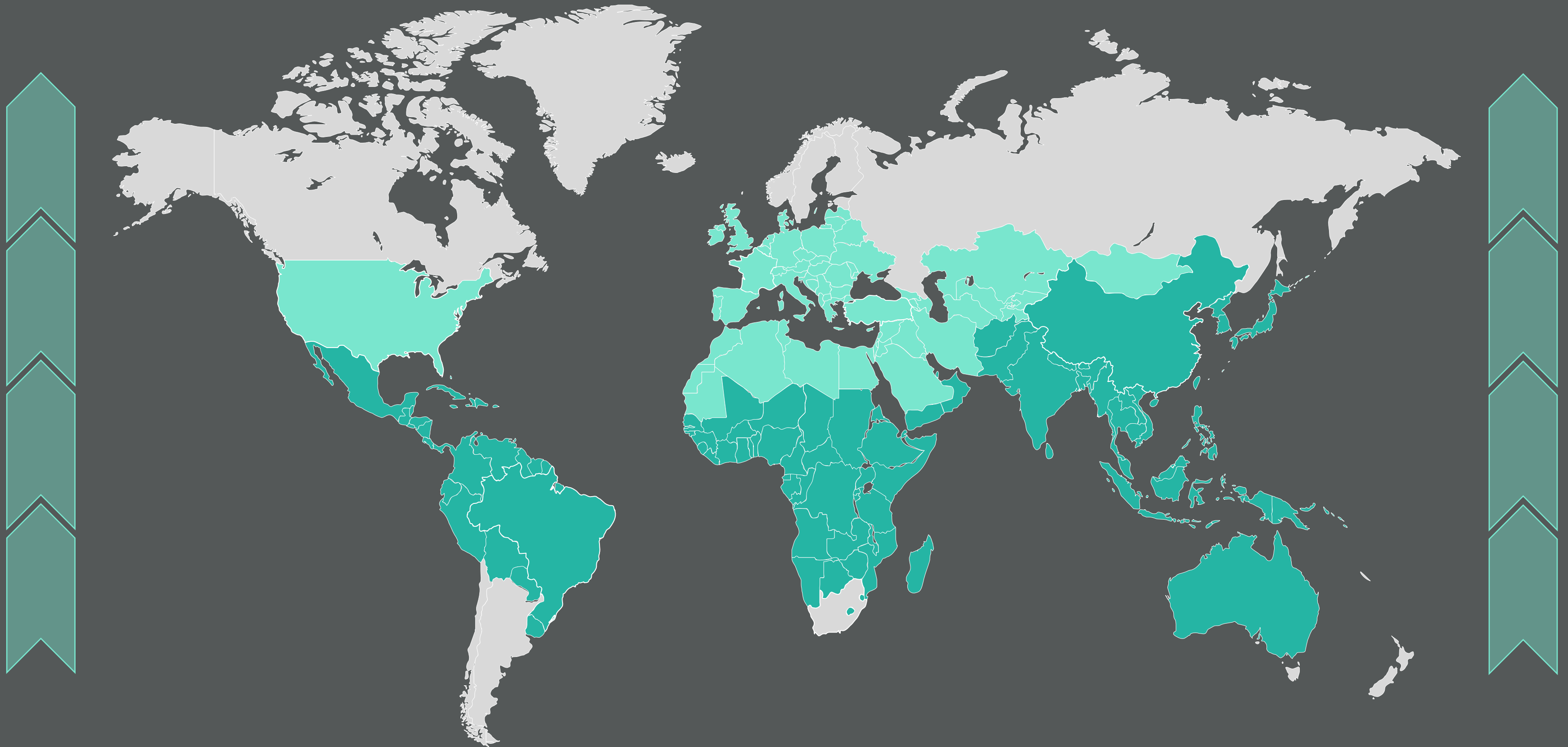
**THE MOSQUITO IS RESPONSIBLE FOR >1
MILLION DEATHS EACH YEAR**

**HALF OF THE WORLD'S POPULATION IS AT
RISK FOR MALARIA**

**MALARIA KILLS A CHILD EVERY TWO
MINUTES**

Problem Scope

Diseases Move North



Problem Scope

Mosquitoes as Vectors

Type of Pathogen



Viruses & Parasites

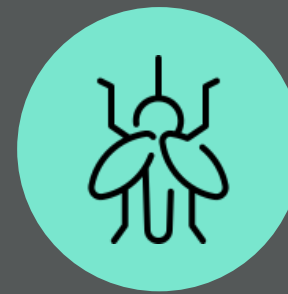
Vector: Mosquito



Aedes



Anopheles



Culex



Diseases Caused

Dengue Rift Valley fever
Chikungunya
Yellow Fever **Zika**
Lymphatic filariasis

Malaria
Lymphatic filariasis

Japanese Encephalitis
West Nile fever
Lymphatic filariasis

Problem Scope

Disease Elimination Requires Blood



Approaches to Disease Elimination:

- Mosquito Control
- Vaccination Research
- Treatment Research

Mosquito Rearing:

All elimination strategies require large scale mosquito rearing

Blood:

Mosquito rearing requires a lot of (fresh vertebrate) blood

Problem Scope

Pain Points



Unmoral Ethics

- Human **blood shortage**
- **3R principle** in science: avoid experiments on large animals



Varying Quality

- Slaughter house blood: **varying quality & disease transmission**
- Blood **shelf life <2 weeks**



High Costs

- High quality blood is **very expensive**
- Using blood or alive animals: **huge administrative efforts**



Solution

BLESS - The Bloodless Diet

BLESS, the bloodless diet for mosquitoes:

An ethical, high-quality blood alternative that can be easily mixed together, offered at a competitive price

Tolerability

No unethical ingredients;
Not a hazardous mixture

Price

Competitive pricing
€270/l

Stability

Powder at 4°C durable for
one year



Packaging

Lyophilized product in
powder form – easy for
packaging and shipping

Size

Available in two sizes:
100kg drum & 1kg bottle

Preparation

Easily mix 300g of BLESS
with 1l of distilled water

Technical Understanding

How the Diet Works

First Step

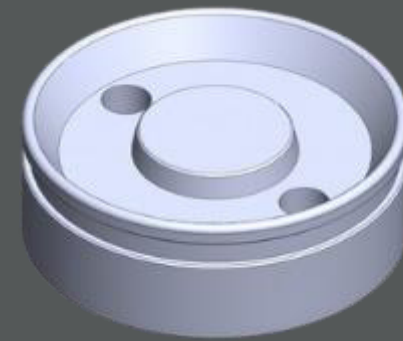
Diet is **produced in lyophilized form**

Main ingredients (for Anopheles mosquitoes):

- **Egg development:** Bovine Serum Albumin & Cholesterol
- **Phagostimulant:** ATP
- **Sugar:** D-glucose
- **Receptor trigger:** Peptides
- **Mosquito fitness:** Nutrients (vitamins, minerals etc.)

Second Step

Diet is **liquified by customers** and filled into feeding device



Third Step

Female mosquitoes are **fed 2-3 times per week**



Technical Understanding

Future Product Development



In order to adapt the diet for other insects, slight modifications to the formulation are expected.

Roadmap:

- **Aedes & Culex:** Ongoing projects with Brazilian research facilities and the World Mosquito Program to generate a proof of concept
 - **Expected time frame PoC: 1 year**
- **Ticks, Bugs, Fleas etc.:** BLESS is currently being tested on ticks with partnering companies and research facilities
 - **Expected time frame PoC: 4-5 years**

InnoVec

Mission



Our Mission

Establish an ethical, cost-efficient, and blood-free alternative as a standard in research for vector-borne diseases.



INNOVEC



InnoVec
Vision



Our Vision

To actively contribute to the solution of the world's deadliest vector-borne diseases by reducing blood use in research and business.



Listen...

...to the market!

Close exchange with potential customers, clients and **all stakeholders**



Act...

...in a responsive way!

R&D focus accelerates development of **innovative products**



Grow...

...by adding value!

InnoVec - Reliable and innovative specialist of blood alternatives

Introduction

Interview Overview



26 interviewees provided valuable insights for our business;
Interviewee target group: Management- & C-Level

2



Market

Market

Introduction: Research Institutes



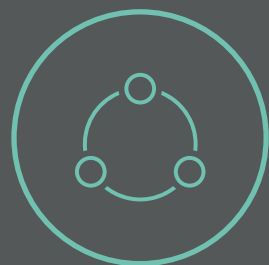
Vaccination/Medication

For drug and vaccine development research



Mark, Release, Recapture (MRR) Projects

For estimating mosquito population reach and size



Wild Projects in Endemic Areas

Within small controlled areas (e.g., with genetically modified mosquitoes)



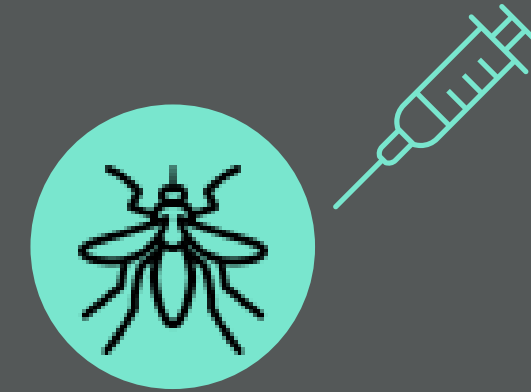
Market

Introduction: Release Projects

01

The Wolbachia Bacteria

Mosquitoes **get injected with naturally growing Wolbachia** bacteria and pass them on to the next generations



02

Transmission Blocking

Wolbachia mosquitoes **imped viruses to grow** and thus **cannot be passed to people easily**



03

Release Projects

Within big scale release projects Wolbachia-carrying **mosquitoes are bred and released into affected areas**

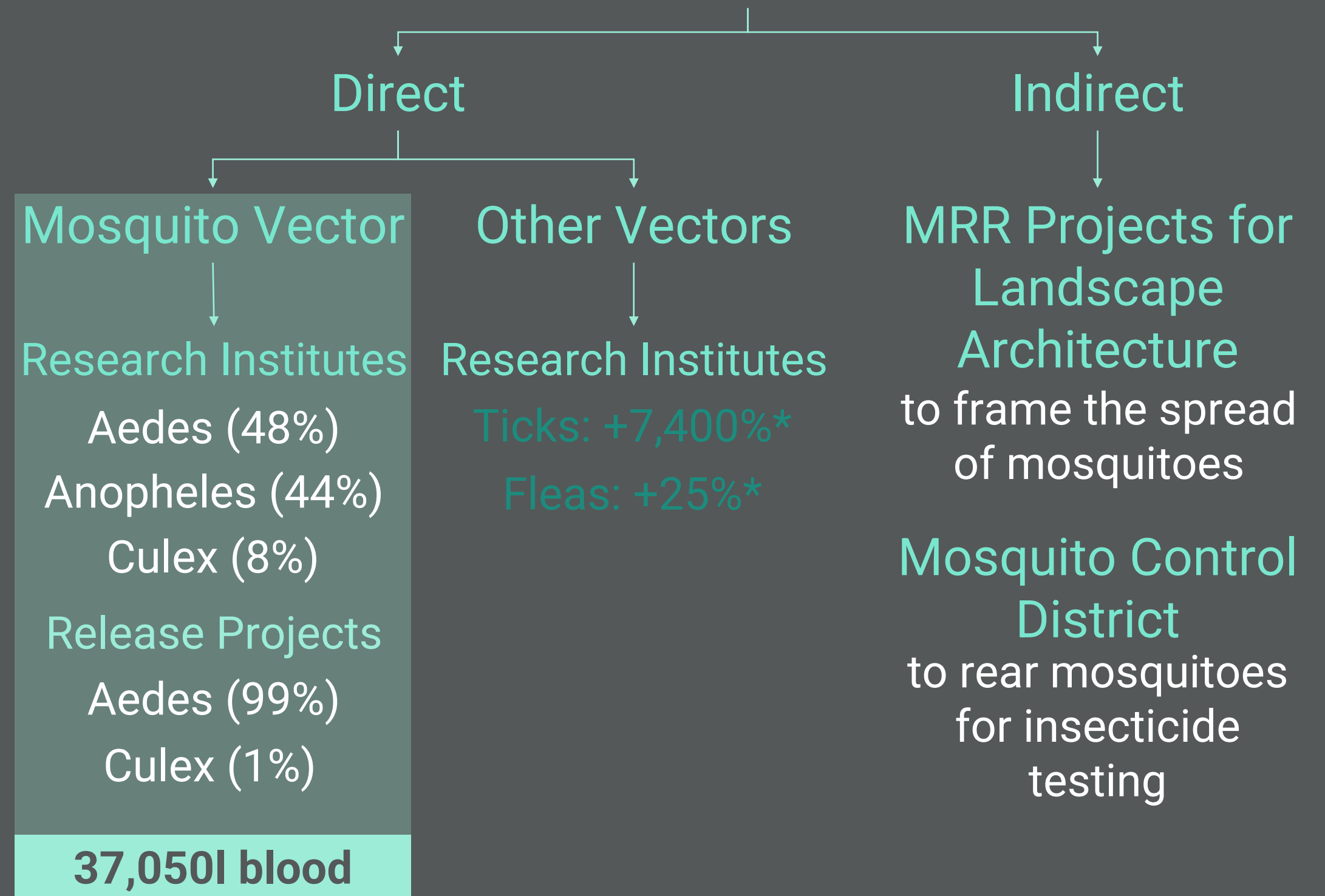


Market Overview

InnoVec's Vision

“ To actively contribute to the solution of the world's deadliest **vector-borne diseases** by reducing blood use in research and business ”

Vector-borne Disease Market



*Blood consumption compared to mosquitoes

Market

Direct Mosquito Vector Market

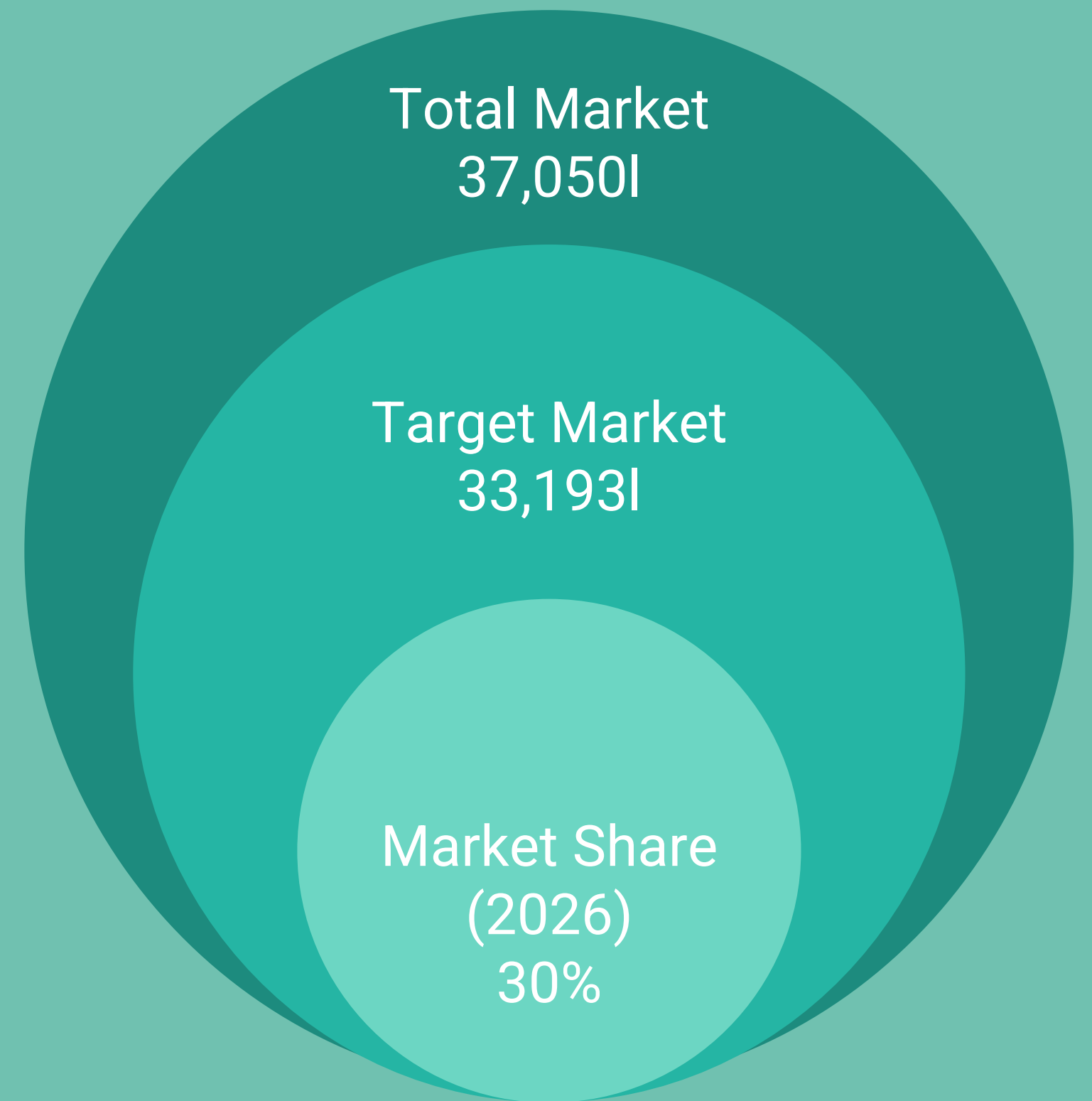
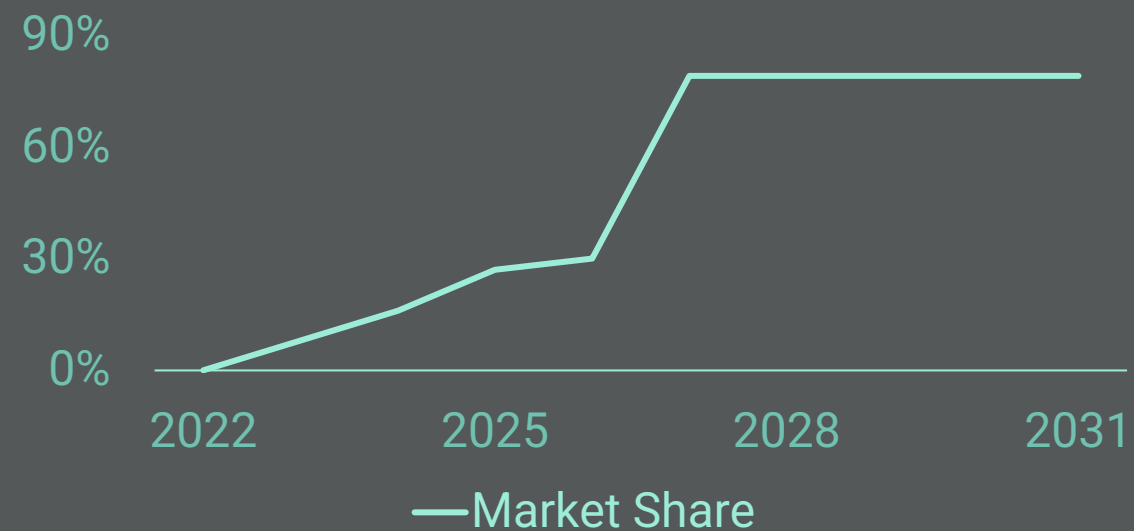
Total Market

- Research institutes: **3,857** blood
- Release projects: **33,193** blood

Target Market

- Release projects

Market Share



Market

Assumptions: Research Institutes



Mosquito Characteristics

- Ø Blood consumption per lifetime: **8 microliter** (Range 8µl -24µl)
- Ø Lifetime female mosquito: **1 month**
- Market calculation for **one year**, only female mosquitoes are considered



Research Institutes

- Ø **Number of research institutes** related to mosquito-borne diseases in the US extrapolated for all six continents **according to GDP per capita**

Mosquitoes



- **Size of research institutes** split into:

- 1) 15% big-sized research institutes (1M-10M female mosquitoes/year)
- 2) 40% medium-sized research institutes (100K-1M)
- 3) 45% small-sized research institutes (0-100K)



- Weighted average approach leads to Ø **1.3M female mosquitoes per research institute per year, Ø 11l**
- **Proportion of research institute** assumed to carry out **wild release projects** in endemic areas: 4% in Africa, Northern America and Asia, 3% in Europe, LATAM and Oceania, Ø **55l**

$$304 \text{ (research institutes)} * \text{Ø}11\text{l} + 10 \text{ (wild release projects)} * \text{Ø}55\text{l} = 3,857\text{l}$$

Market

Assumptions: Release Projects



Characteristics Big-scale Release Projects

- They operate with the **Wolbachia method**, so far mainly applying for Aedes type of mosquitoes

Liters of Blood Required



- **National Environment Agency (NEA) : 131M female mosquitoes** produced per year (calculated with \emptyset lifetime of female mosquitoes and \emptyset blood consumption per lifetime), **Total: 1,047**



- World mosquito program (WMP): **200l per week** with currently 11 projects = **\emptyset 945l per project/year**, **Total: 10,400l**



- **Oxitec**: Three projects (Florida, Brazil, California), equal amount of blood as WMP's projects is assumed, **Total: 2,836l**



- **Wolbaki**: twice the size of the WMP, **Total: 18,909**

Market Trends



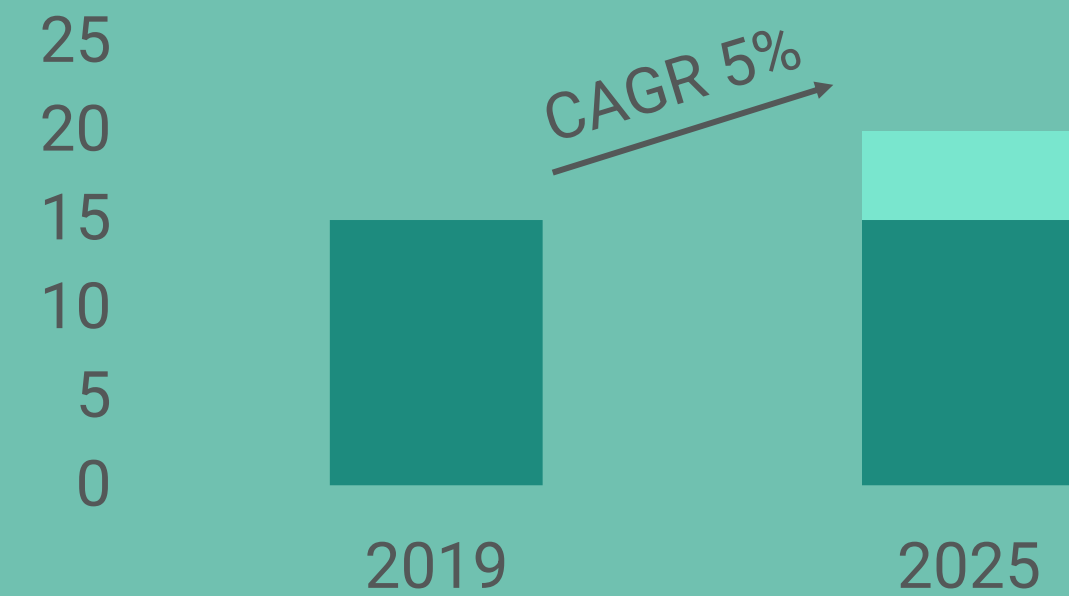
Bioethics

Awareness increases with upscaling of release projects



Climate Change

Temperature increase, floodings



Funding Power

Global vector control market is growing

Market Opportunities



Mosquito Market Expansion

MRR projects for **dam construction** and **land-use changes** such as Mosquito control districts



Expansion and Collaboration

Big-scale release projects for **genetically modified mosquitoes**



Vector Market Expansion

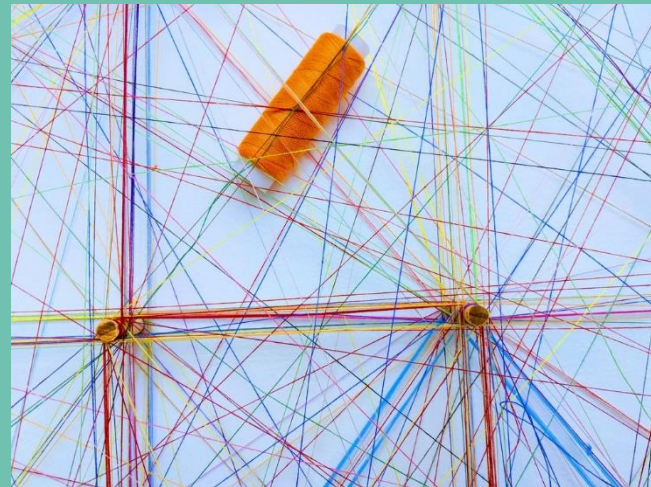
Blood alternatives being used in research for further vectors, **like ticks, fleas, bugs**



WHO Standard

Increase in **bioethical awareness** might lead to blood-alternatives being **WHO standard** in the long-run

Market Challenges



Established Networks

Easy to access and cheap blood sources for research institutes (e.g., slaughter blood)

Ethical awareness and quality standard



Cultural Resistance

Resistance against **new approaches in research**

Convincing efficacy of BLESS

SANARIA



Vaccine Progress


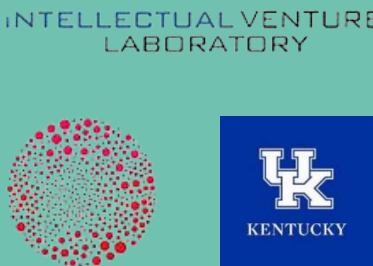
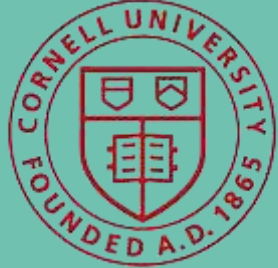




Approved vaccine against Malaria

Research continues to have higher and long-term efficacy

Market

Competitive Rivalry




						
<p>Universidade Federal de Rondônia Porto Velho Brazil, CIDACS</p>	<p>Intellectual Ventures Lab., Kentucky Uni., Australian Institute of Tropical Health</p>	<p>Cornell University</p>	<p>Vanderbilt University</p>	<p>New Mexico State University</p>	<p>Rutgers University</p>	<p>Nova IHMT, InnoVec</p>
<p>SBM Protein-rich sugar solution</p>	<p>SBM Mainly tested plasma, ATP</p>	<p>SBM Proteins with salts, ATP</p>	<p>SBM BSA, ATP</p>	<p>SBM BSA, hemoglobin, ATP, cholesterol, glucose, chicken yolk</p>	<p>SBM BSA, glucose, cholesterol</p>	<p>SBM BSA, ATP, cholesterol, glucose, peptides, nutrients</p>

SBM = Substitute Blood Meal

Market

Deep Dive: Competitive Rivalry

Product	Company/Institute	Mosquito Type	Up for Sale?	Patent?	Egg Production	Mosquito Behavior	Score
SBM	Universidade Federal de Rondônia Porto Velho Brazil, CIDACS	Anopheles	✗	✗	✗	✗	0
SBM	Intellectual Ventures Lab., Kentucky Uni., Australian Institute of Tropical Health	Anopheles, Aedes	✗	✗	✗	○	0.5
SBM	Cornell University	Aedes	✗	✗	✗	✓	1
SBM	Vanderbilt University	Aedes	✗	✗	✓	✗	1
Skito Snack	New Mexico State University	Aedes	✗	✗	✗	○	1.5
SBM	Rutgers University	Aedes	✗	✓	✗	✓	2
	Nova IHMT, InnoVec	Anopheles, WIP: Aedes & Culex	✓	✓	✓	✓	4

✓ = 1 ○ = 0.5 ✗ = 0



Market Substitutes

Product	Durability	Reliability	Price	Bioethics
Human Blood	Short	High	High	-2
Slaughter Blood	Short	Low	Low	0
Fresh vertebrate Blood	Short	Medium	High	-2
Defibrinated Animal Blood	Short	High	Medium	-1
	Long	High	Low-medium	1

Quality

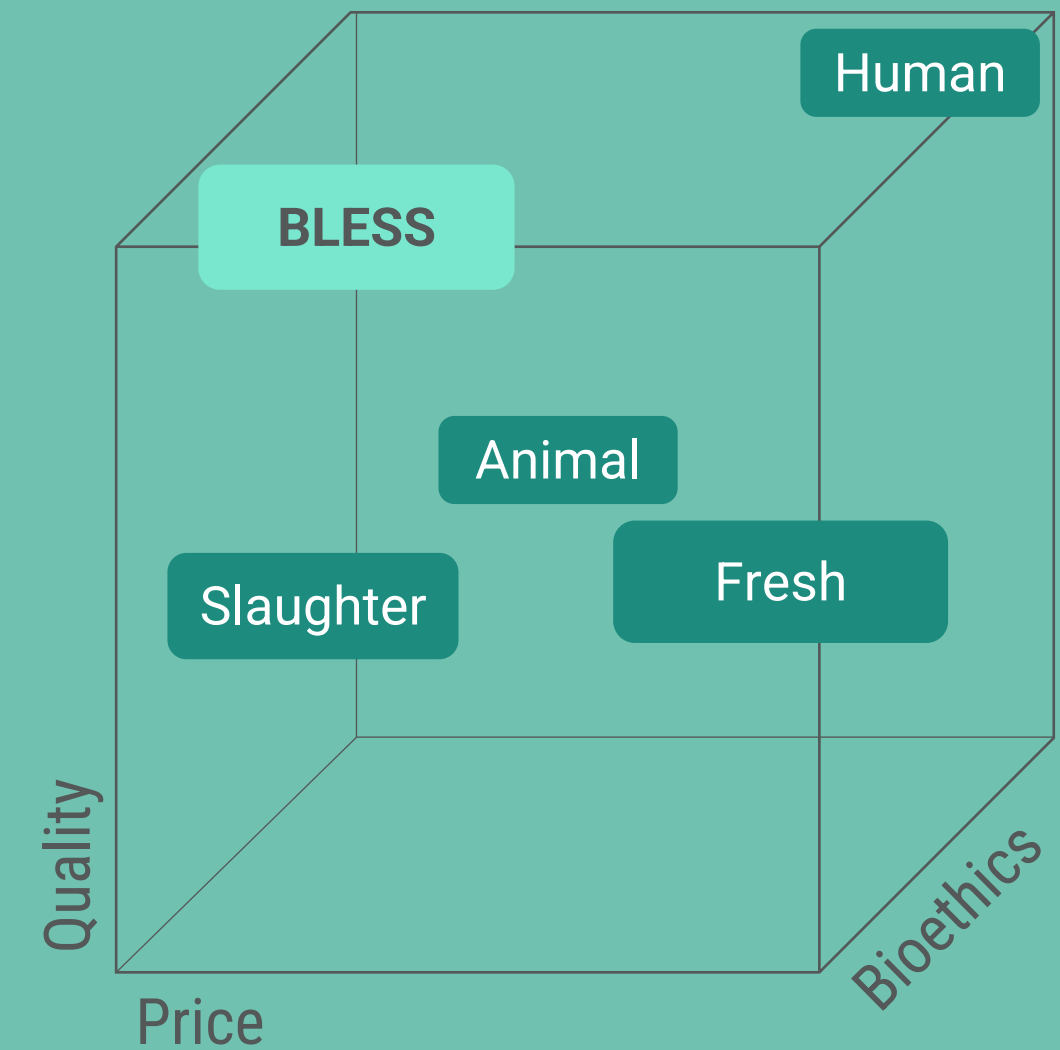
- Durability: short (2 weeks) to long (1 year)
- Reliability/Purity: low/medium/high

Price

Low (€2.5) to high (€2000) price per liter

Bioethics

-2 (unethical) to 1 (ethically reasonable)



Market Summary



01

New Entry

Low-medium threat:
Sustainable IP
Strategy

02

Buyers

Medium threat: New player
in **culture-resistant
industry**
Competitive pricing

03

Substitutes

Medium threat: Different
types of **established blood
substitutes**

04

Suppliers

Low threat: Bulk
purchasing decreases
power
Low switching cost for
InnoVec

05

Competitive Rivalry

Low: Not yet up for
sale



3

IP
Strategy

IP Strategy

IP Portfolio

Patents

- License existing patent and register **new patents** to prevent others from imitating/ distributing
- Guarantees **market share development**
- 20 years protection

Domain

- **InnoVec.com** domain registration

Trademark

- **Brand and product name protection**
- 10 years protection to infinite
- Minimum 10 years protection

GARRIGUES

Supported by Tier 1 Portuguese legal service firm with expertise in the life science industry and with international focus



Patents



Anopheles Patent

Licensing Contract – Exclusive rights for InnoVec

- Up front fee: 50% of funding-free patent development cost
- Royalty rate: For future Anopheles net revenue
- Renewal fee: For EU and USA

€325K

4.3%

€15K/Year

CCMAR
Centro de Ciências do Mar



Aedes and Culex Patent

Proof of concept within 1 year

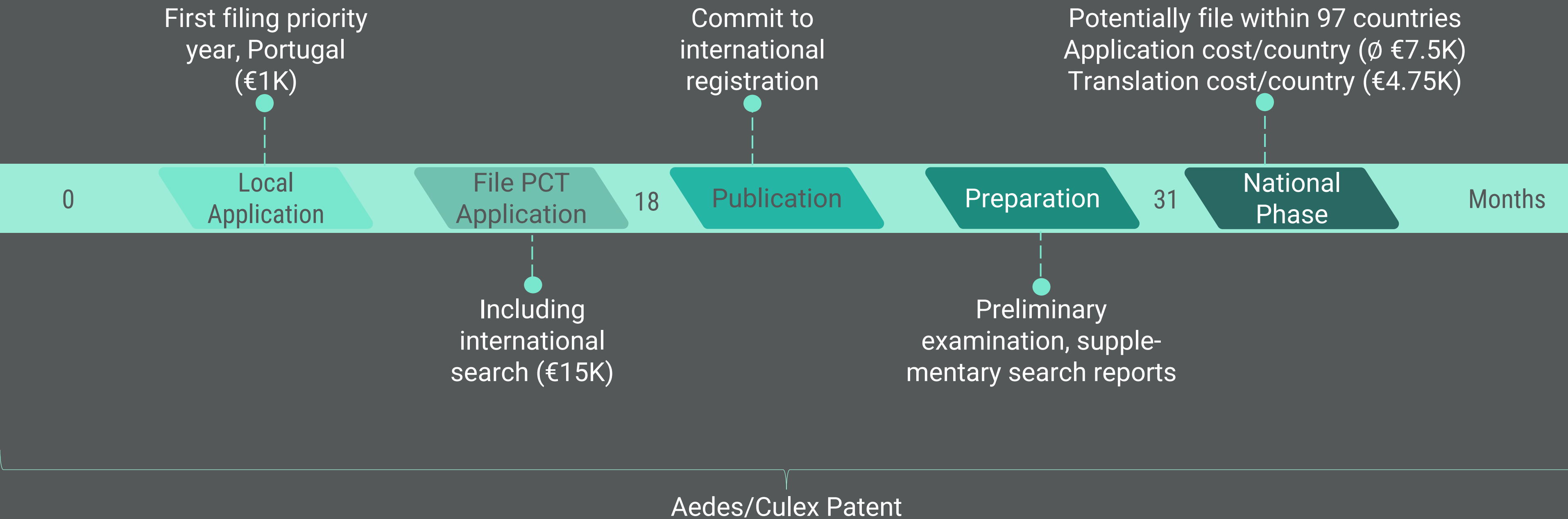
- File for a patent end of 2022

IP Strategy

Patents Timeline



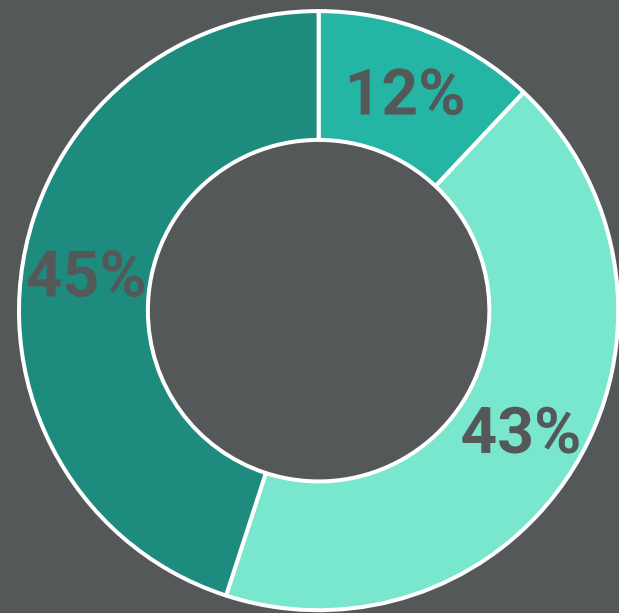
Patent process by Patent Cooperation Treaty (PCT)



IP Strategy

Patents Cost

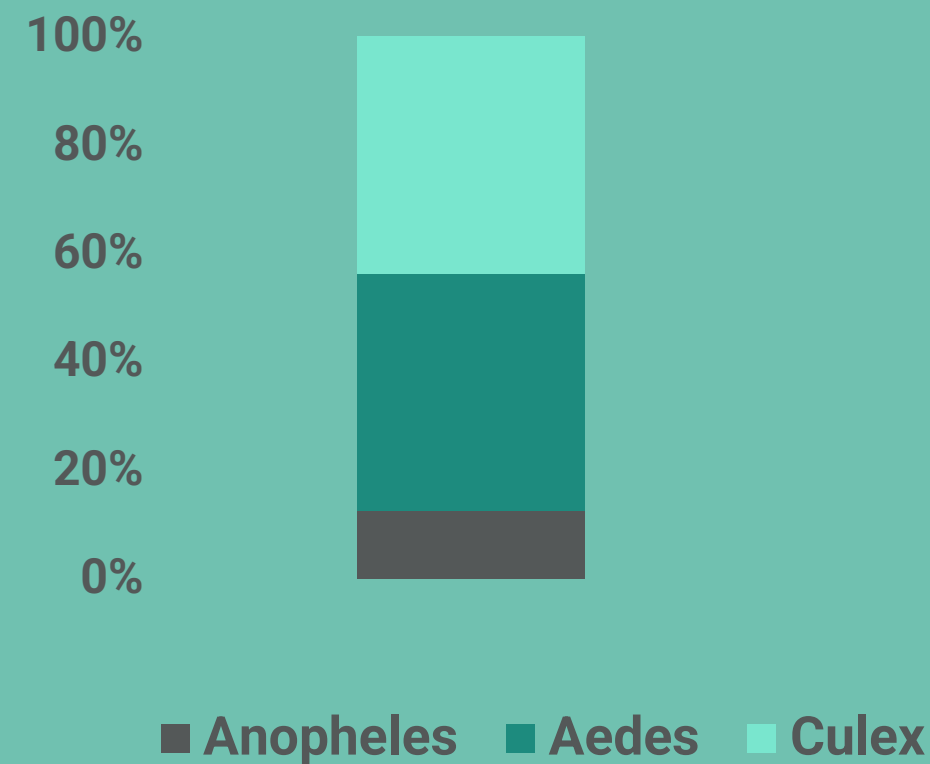
Cost Drivers for one Patent



- Translation Fees
- Attorney Fees
- Application Fees

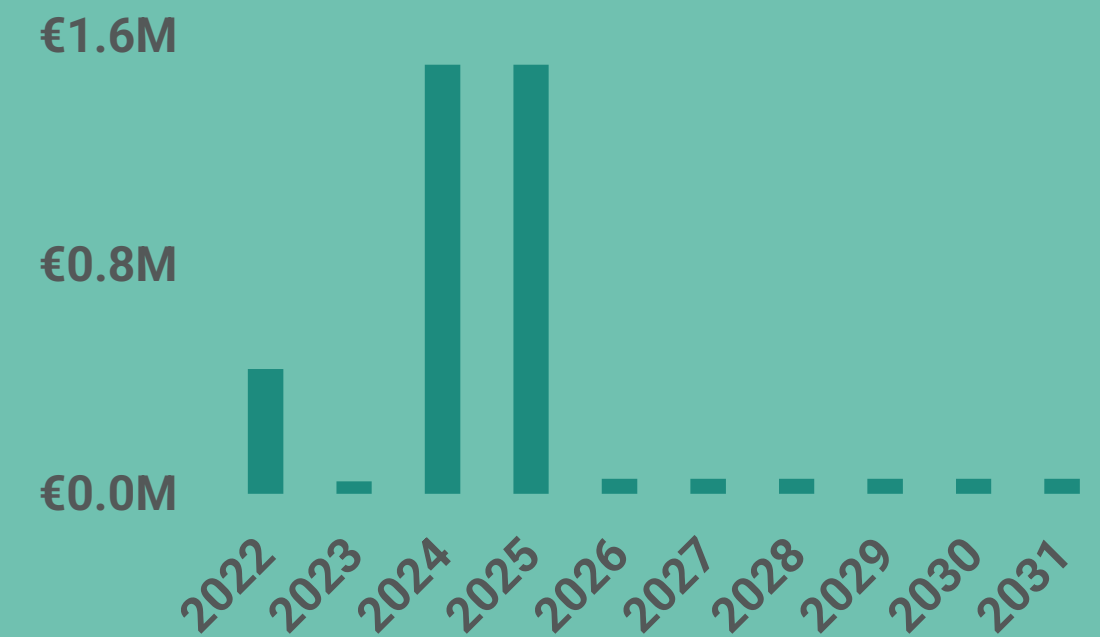
- Total Cost: €1.5M
- Renewal Fee/year: €15-20K

Patent Cost by Mosquito Type



- Total patent cost range: €2M – €3.8M

Patent Cost per Year



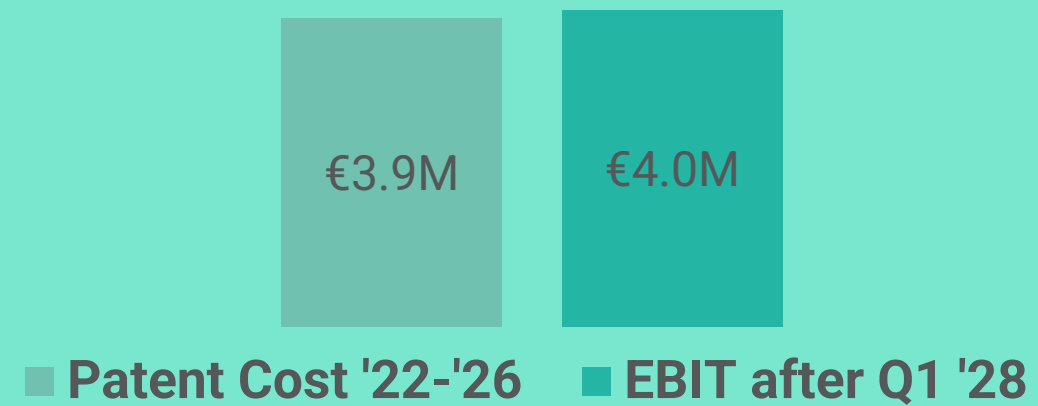
- Peak in 2024 & 2025 due to **Aedes and Culex PCT process costs**
- Continuous **renewal fees of €55K** from 2026 onwards



IP Strategy

Why Patent/PCT?

Patent Cost Amortization



Patent cost amortization 1 year and 4 months after break-even

Increased time for development



Support decreases risk

IP Strategy

Sustainable Competitive Advantage



Strong R&D Focus



Reliable partner for
blood substitute



Partnerships create
supporting ecosystem



Create long-term
value added



Pilot project with WMP



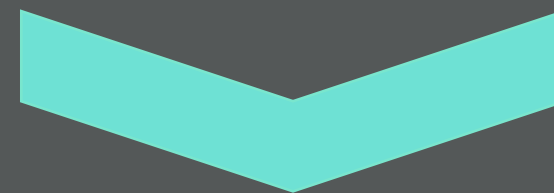
Trigger turning point
and rethinking in the
industry



Market extension
opportunities



Sustainable profits



**Long-term sustainable
competitive advantage**

IP Strategy

Risks & Mitigation



Threat of new entrants:
Competition extends the
diet

Patent portfolio strategy



Patent: Different
conditions in foreign
laws

Act in accordance with
foreign law by
collaborating with
Garrigues and working
according to PCT
process



Know-how: Transfer to
third parties during
operating business

Non-Disclosure
Agreements as default
measure

A large white number '4' is positioned on the left side of the image. The background is a teal color with a diagonal split. The upper right portion shows a close-up of a fly's head and thorax, while the lower left portion shows a textured, light-colored surface. The number '4' is centered vertically and horizontally within the teal area.

4

Business
Model

5

Pricing



A large white number '6' is positioned on the left side of the image. The background is a dark teal color, split diagonally from the top-left to the bottom-right. The upper-left portion of the diagonal is a lighter shade of teal and contains a close-up photograph of a dragonfly perched on a plant stem. The dragonfly is facing left, with its long abdomen and transparent wings clearly visible. The lower-right portion of the diagonal is a darker shade of teal and contains the word 'Operations' in white text.

6

Operations

7

Ecosystem





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Marketing
Strategy

A large white number '9' is positioned on the left side of the image. The background is a teal color with a diagonal split. The upper right portion of the background features a close-up, black and white photograph of a mosquito, showing its head, legs, and wings in detail. The lower left portion of the background is a solid teal color.

9

Financials

Financials

Funding, Forecasting & Exit



Non-Dilutive Funding Strategy

Financial injection is based on grants and governmental support



Upfront Investment of €6.3M

Five years of cashburn until InnoVec is profitable



Exit Option for Co-founders as of 2031

Deal volume for insectaries and related organizations is increasing



10

Conclusion



Conclusion

Management Team



LEA RAIBLE

**MSc. Management
CEO – Manufacturing &
Pricing**

Professional experience:
IT Consulting, Project
Management and Customer
Experience



LENA GREINER

**MSc. Management
CEO – Market &
Strategy**

Professional experience:
IT Consulting, Restructuring
and Project Management



GREGOR SEIPELT

**MSc. Management
CFO – Financial
Forecast & Funding**

Professional experience:
Private Equity, Investment Banking
and Audit



**DIMITRIOS
ANASTASSIADIS**

**MSc. Management
CSO – Customer &
Partnerships**

Professional experience:
CRM, Sales and Corporate
Strategy

Conclusion

Operational Team



**PROF. PHD.
HENRIQUE SILVEIRA**

**Parasitologist
Head of R&D**

Professional experience:
Deputy director of IHMT R&D center,
collaborating researcher tropical
institute Brazil, developer of
institutional diagnostics and planning



**PHD. JOANA
MARQUES**

**Tropical Biologist
R&D Diet Development**

Professional experience:
Research Associate regarding
plasmodium transmission stage,
post-doctoral fellow for mosquito
reproduction



3 FTE
Logistics



1 FTE
IT Security

Conclusion

Advisory Board



**PROF. DR.
ANDREAS WIESER**

Chief Medical Officer,
Entrepreneur,
Tropical Institute LMU
Munich

**Market & Strategy,
Scientific Support**



RAUL SARAVIA

Investment
Manager at Portugal
Ventures

Financial & Funding Support



**PROF. NUNO
ARANTES OLIVEIRA**

Entrepreneur,
Investor &
Professor NOVA SBE

Overall Direction of InnoVec

Conclusion

Summed up: InnoVec



Exploit the momentum of increasing vector-borne diseases and benefit from accelerated growth



Market leadership with 79% market share will enable an increase of price markup from 30% up to 50% and boost profit margins



Due to simultaneous investments in R&D operations for ticks and fleas InnoVec will enter new markets as of 2027

“What has happened in Lisbon the past few years is fantastic – It is an absolute breakthrough for mosquito transmitted diseases research”

Prof. PhD. Frans Jongejan - University of Utrecht & CEO TBD International

Conclusion

Work Distribution



LEA RAIBLE

Individual contribution:
7, 8, 14, 15, 43, 44, 45,
47, 48, 49, 50, 51, 53, 54,
55, 56, 57



LENA GREINER

Individual contribution:
21, 22, 23, 24, 25, 26, 27,
28, 29, 30, 31, 32, 33, 35,
36, 37, 38



GREGOR SEIPELT

Individual contribution:
79, 80, 81, 82, 83, 84, 85,
86, 87, 88, 89, 90, 91, 92,
93, 94, 95



DIMITRIOS ANASTASSIADIS

Individual contribution:
59, 60, 61, 62, 63, 64, 65,
66, 67, 68, 69, 70, 71, 72,
74, 75, 76

Common contribution:
2, 3, 4, 5, 6, 9, 10, 11, 12, 13, 16, 17, 18, 19,
20, 34, 36, 39, 40, 41, 42, 46, 52, 58, 73,
77, 78, 96, 97, 98, 99, 100



Appendix

Appendix

BLESS – Diet Formulation

Components (1/2)	g/L
Bovine serum albumin	200
Sodium chloride	6.4
D-glucose anhydrous	4.5
Sodium bicarbonate	3.7
Cholesterol	1
L-glutamine	0.584
Adenosine triphosphate	0.55
Potassium chloride	0.4
Calcium chloride anhydrous	0.2
L-lysine monohydrochloride	0.146
Sodium phosphate monobasic anhydrous	0.109
L-isoleucine	0.105
L-leucine	0.105
L-tyrosine disodium salt dihydrate	0.104
Magnesium sulfate anhydrous	0.098
L-threonine	0.095
L-valine	0.094
L-arginine monohydrochloride	0.084
L-phenylalanine	0.066

Components (2/2)	g/L
L-cystine dihydrochloride	0.063
L-histidine monohydrochloride monohydrate	0.042
L-serine	0.042
Glycine	0.03
L-methionine	0.03
L-tryptophan	0.016
Phenol red	0.015
Pyruvic acid sodium salt	0.011
Inositol	7.00E-03
Choline chloride	4.00E-03
D-calcium pantothenate (vitamin B5)	4.00E-03
Folic acid	4.00E-03
Niacinamide (nicotinamide)	4.00E-03
Pyridoxine Monohydrochloride	4.00E-03
Thiamine monohydrochloride (vitamin B1)	4.00E-03
Riboflavin (vitamin B2)	4.00E-04
Ferric nitrate nonahydrate	0.0001

Appendix

Market Calculation Details

	Northern America	Europe	Asia	Africa	LATAM	Oceania
Release projects						
# of female mosquitoes/year			130,909,091			
Total per region (I)	1,891	945	22,793		3,782	3,782
Total release projects	33,193					
Research institutes						
Average # of female mosquitoes	1,349,250	1,349,250	1,349,250	1,349,250	1,349,250	1,349,250
Microliter needed per female	8	8	8	8	8	8
Research institute per GDP per capita	0.004	0.004	0.004	0.004	0.004	0.004
# of research institutes	57	114	53	9	27	44
Liter needed	614	1,235	577	95	295	470
Total insectaries	3,286					
# of research institutes carrying out wild projects in endemic areas	2	3	2	0	1	1
Average # of liters needed for one project	55	55	55	55	55	55
Liter needed	126	190	118	19	45	72
Total wild projects endemic areas	571					
Total research institutes	3,857					
Total per region	2,631	2,371	23,488	114	4,122	4,324
Whole market (I)	37,050					

Appendix

Potential PCT Countries

Potential 97 Patent Countries

Industrial:

Japan, Singapore, South Korea, Australia, Canada, USA, Austria, Belgium, Denmark, Finland, France, Germany, Italy, Liechtenstein, Luxembourg, Netherlands, Norway, Sweden, Switzerland, United Kingdom

Emerging:

Peru, Phillipines, Thailand, Malaysia, India, China, Vietnam, Mexico, Brazil, Indonesia, Albania, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Greece, Hungary, Iceland, Ireland, Latvia, Lithuania, Malta, Monaco, North Macedonia, Poland, Portugal, Romania, San Marino, Serbia, Slovakia, Slovenia, Spain, Turkey, Bosnia and Herzegovina, Montenegro, Cambodia, Republic of Moldova, Morocco, Tunisia, Georgia

Developing:

Angola, Benin, Burkina Faso, Central Africa, Chad, Congo, Côte d'Ivoire, Dem. Rep. Congo, Eq. Guinea, Algeria, Cameroon, Eritrea, Gabon, Ghana, Guinea, Guinea-Bissau, Kenya, Liberia, Madagascar, Malawi, Mali, Mauritana, Mozambique, Namibia, Niger, Nigeria, Rwanda, Senegal, Sierra Leone, Sudan, Tanzania, Togo, Uganda, Zambia, Zimbabwe, Ecuador, Panama, Costa Rica, Guatemala, Hondurras, Colombia, Sri Lanka

Appendix

Patent Cost

Translation Fees

4,750 * 39
languages

Attorney Fee

7,500 per Patent
410/hour

Application Fees

42 * Developing Countries (€5K)
35 * Emerging Countries (€7.5K)
20 * Industrial Countries (€10K)

Renewal Fees

42 * Developing Countries (€12)
35 * Emerging Countries (€130)
20 * Industrial Countries (€767)

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Total Patent costs	382,591 €	46,862 €	1,504,677 €	1,504,669 €	55,488 €	55,599 €	55,605 €	55,611 €	55,617 €	55,624 €
Upfront Costs payable to Nova	325,000 €									
Total Anopheles Patent Costs	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €	0 €
Total Aedes Costs	21,385€*	16,019 €	744,925 €	744,925 €	0 €	0 €	0 €	0 €	0 €	0 €
Total Culex Costs	21,385€	16,019 €	744,925 €	744,925 €	0 €	0 €	0 €	0 €	0 €	0 €
<i>Renewable Fees Anopheles (only US and Europe patent)</i>	14,763 €	14,763 €	14,763 €	14,763 €	14,763 €	14,763 €	14,763 €	14,763 €	14,763 €	14,763 €
<i>Renewable Fees Aedes</i>	0 €	0 €	0 €	0 €	20,362 €	20,362 €	20,362 €	20,362 €	20,362 €	20,362 €
<i>Renewable Fees Culex</i>	0 €	0 €	0 €	0 €	20,362 €	20,362 €	20,362 €	20,362 €	20,362 €	20,362 €
<i>Royalties Anopheles</i>	57 €	60 €	63 €	56 €	0 €	112 €	117 €	123 €	130 €	136 €
Trademark Fees	56,000 €									
Domain	1,500 €									

* 52 hours per patent * €410/hour



Appendix

Raw Material Cost Details – Bulk Prices

Components	g/L	% of Total	Online Price per KG (€)	Bulk Price (assuming 10% of Online Price) (€)	Price per Liter BLESS (€)
Bovine serum albumin*	200	92.11%	874.04	200.00	40.0
Sodium chloride	6.4	2.95%	41.4	4.14	0.02650
D-glucose anhydrous	4.5	2.07%	17.96	1.80	0.00808
Sodium bicarbonate	3.7	1.70%	172	17.20	0.06364
Cholesterol	1	0.46%	600	60.00	0.06000
L-glutamine	0.584	0.27%	704	70.40	0.04111
Adenosine triphosphate	0.55	0.25%	2488	248.80	0.13684
Potassium chloride	0.4	0.18%	112	11.20	0.00448

*Bulk exception: Bovine serum albumin is assumed to be more expensive than 10% of the online price due to estimations by an industry expert

Appendix

Raw Material Cost Details – Regular Prices (1/2)

Components	g/L	% of Total	Online Price per KG (€)	Price per Liter BLESS (€)
Calcium chloride anhydrous	0.2	0.09%	60.4	0.01208
L-lysine monohydrochloride	0.146	0.07%	164	0.023944
Sodium phosphate monobasic anhydrous	0.109	0.05%	92.5	0.010083
L-isoleucine	0.105	0.05%	468	0.04914
L-leucine	0.105	0.05%	485	0.050925
L-tyrosine disodium salt dihydrate	0.104	0.05%	250	0.026
Magnesium sulfate anhydrous	0.098	0.04%	252	0.024696
L-threonine	0.095	0.04%	1680	0.1596
L-valine	0.094	0.04%	792	0.074448
L-arginine monohydrochloride	0.084	0.04%	406	0.034104
L-phenylalanine	0.066	0.03%	999	0.065934
L-cystine dihydrochloride	0.063	0.03%	2070	0.13041
L-histidine monohydrochloride monohydrate	0.042	0.02%	693	0.029106
L-serine	0.042	0.02%	1220	0.05124

Appendix

Raw Material Cost Details – Regular Prices (2/2)

Components	g/L	% of Total	Online Price per KG (€)	Price per Liter BLESS (€)
Glycine	0.03	0.01%	93	0.00279
L-methionine	0.03	0.01%	384	0.01152
L-tryptophan	0.016	0.01%	1340	0.02144
Phenol red	0.015	0.01%	4160	0.0624
Pyruvic acid sodium salt	0.011	0.01%	504	0.005544
I-inositol	7.00E-03	0.00%	377	0.002639
Choline chloride	4.00E-03	0.00%	111	0.000444
D-calcium pantothenate (vitamin B5)	4.00E-03	0.00%	5320	0.02128
Folic acid	4.00E-03	0.00%	3850	1.54E-02
Niacinamide (nicotinamide)	4.00E-03	0.00%	83.6	0.000334
Pyridoxine Monohydrochloride	4.00E-03	0.00%	538.84	2.16E-03
Thiamine monohydrochloride (vitamin B1)	4.00E-03	0.00%	187.62	7.50E-04
Riboflavin (vitamin B2)	4.00E-04	0.00%	735	0.000294
Ferric nitrate nonahydrate	0.0001	0.00%	149	1.49E-05

Appendix

Profit & Loss Statement

	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031
Price per Liter	268	268	268	268	268	309	309	309	309	309
Demand in Liter	26	3,146	6,334	11,546	13,540	41,945	45,332	48,915	52,785	56,880
Revenue	6,867	843,741	1,698,984	2,957,508	3,485,464	12,466,283	13,488,965	14,570,698	15,740,108	16,977,620
Raw Materials	1,055	129,693	261,154	476,044	558,269	1,729,381	1,869,053	2,016,763	2,176,333	2,345,165
Manufacturing	4,227	519,339	1,045,757	1,906,254	2,235,513	6,925,075	7,484,372	8,075,856	8,714,834	9,390,898
COGS	5,282	649,032	1,306,911	2,382,298	2,793,782	8,654,457	9,353,425	10,092,619	10,891,167	11,736,063
Gross Profit	1,585	194,709	392,073	575,210	691,682	3,811,826	4,135,540	4,478,079	4,848,941	5,241,557
R&D	490,000	490,900	491,809	492,727	493,654	494,591	495,537	496,492	497,457	498,432
Op. Personnel	15,000	30,300	30,603	46,364	46,827	47,295	47,768	48,246	48,729	49,216
Overh. Personnel	184,800	185,400	218,006	218,938	219,879	158,430	159,391	160,360	161,340	162,329
Patent	440,091	46,862	1,504,677	1,504,669	55,488	55,600	55,606	55,612	55,618	55,625
Other	84,400	59,825	60,256	104,292	94,735	95,183	95,638	96,099	96,566	97,040
CAC	134,595	52,063	56,005	236,625	42,063	21,032	21,032	21,032	21,032	21,032
Total Fixed Costs	1,348,886	865,350	2,366,550	2,603,616	952,647	872,131	874,971	877,841	880,742	883,673
Total Costs	1,354,168	1,514,382	3,673,461	4,985,914	3,746,429	9,526,588	10,228,396	10,970,460	11,771,909	12,619,736
EBIT	-1,347,302	-670,641	-1,974,477	-2,028,406	-260,965	2,939,695	3,260,569	3,600,238	3,968,199	4,357,884
Tax	0	0	0	0	0	617,336	684,719	756,050	833,322	915,156
Net Income	-1,347,302	-670,641	-1,974,477	-2,028,406	-260,965	2,322,359	2,575,850	2,844,188	3,134,877	3,442,728

Appendix

Interview Overview (1/3)

Interview N°	Category	Name	Expertise/Position	Company/Institute	Date
1	Project Team Meeting, overall direction of the company	Prof. PhD. Henrique Silveira, PhD. Joana Marques	Parasitology, Tropical Biology, Scientific background of the invention	Universidade de Nova - IHMT	Weekly
2	Scientific evaluation	Jonas Hartmann	MSc Biomedicine Focus: Infectious diseases & Molecular virology	Heidelberg University	19.09.2021
3	Scientific evaluation	Rafael Oliveira	PhD Candidate	Charité Berlin	27.09.2021
4	IP	Harald Rietsch	Patent Expert	Innovation Center Bavaria	27.09.2021
5	Financing & Funding	Jonas Kröger	Investment Banking Vice President Vienna	Kommunalkredit Austria AG	27.09.2021
6	Overall direction of the company	Joana Barba	Entrepreneurship, Startup Eco-System Contact, (conducted Projects with Bayer on this topic)	Nova SBE Entrepreneurship Hub	27.09.2021 19.10.2021
7	Market	Kerstin Slany	Insect Nutrition Entrepreneur	University of Salzburg	28.09.2021
8	Financing & Funding	Maximilian Seipelt	Private Equity Director, London	Icon Infrastructure	28.09.2021
9	Scientific evaluation, Market	Dr. Andreas Wieser	Senior physician, Start-up founder	Ludwig-Maximillan University - Tropical Institute	30.09.2021
10	IP	Andreas Peters	Patent Lawyer	Hannke Bittner & Partner	30.09.2021

Appendix

Interview Overview (2/3)

Interview N°	Category	Name	Expertise/Position	Company/Institute	Date
11	Scientific evaluation	Josephine Arndt	Masters Neuroscience, Antwerp	University of Antwerp	30.09.2021
12	Overall direction of the company	Nuno Prego Ramos	CEO	CellmAbs	07.10.2021
13	Overall direction of the company	Raul Saraiva	Director, Investment Manager	CellmAbs, Portugal Ventures	14.10.2021
14	Scientific evaluation, Market	Yashoda Kandel	PhD Candidate	New Mexico State University	18.10.2021
15	Scientific evaluation, Market, Price	Dr. Fabrizio Balestrino	Entomologist and Sterile Insect Technique Expert	Centro Agricoltura Ambiente - Giorgio Nicoli	22.10.2021
16	Scientific evaluation, Market, Price	Dr. Sarah Moore	Medical Entomologist and Department Head of the Vector Control Product Testing Unit	Ifakara Health Institute	25.10.2021
17	Scientific evaluation, Market, Price	Dr. Koen Dechering	CEO, Molecular Pharmacologist	TropiQ	26.10.2021
18	Scientific evaluation	Dr. Jeremie Gilles	Director, Product Development & Supply	World Mosquito Program	28.10.2021
19	Manufacturing	Dr. Oliver Seidelmann	Managing Director	ChrioBlock GmbH	02.11.2021
20	Financing & Funding	Julian Vaterl	Corporate & Private Banking	Sparkasse Munich	07.11.2021

Appendix

Interview Overview (3/3)

Interview N°	Category	Name	Expertise/Position	Company/Institute	Date
21	Manufacturing	Dr. Christian Steidl	Head of Marketing & Sales	ProChem GmbH	10.11.2021
22	Scientific evaluation, Market	Prof. Frans Jongejan	CEO	TBD International B.V.	12.11.2021
23	Market	Franz Schmidt	Sales and Business Development Representative	TCS Biosciences	12.11.2021
24	IP Strategy	PhD Ligia Gata	IP & Innovation Manager	Megaingenium	16.11.2021
25	Market	Dr. Hans Dautel	CEO	Insect Services	23.11.2021
26	IP Strategy	Mónica Aritzi Acha	Partner, practice area: IP	Garrigues	02.12.2021

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