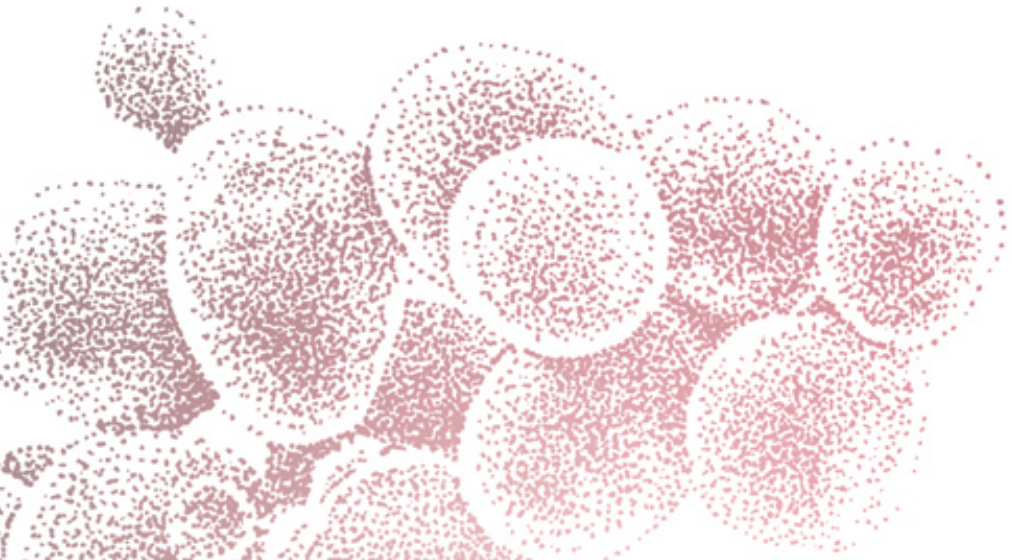


Engineering Biology

Company management, The company and Corporate Stories (from the Annual Report 2015/16)

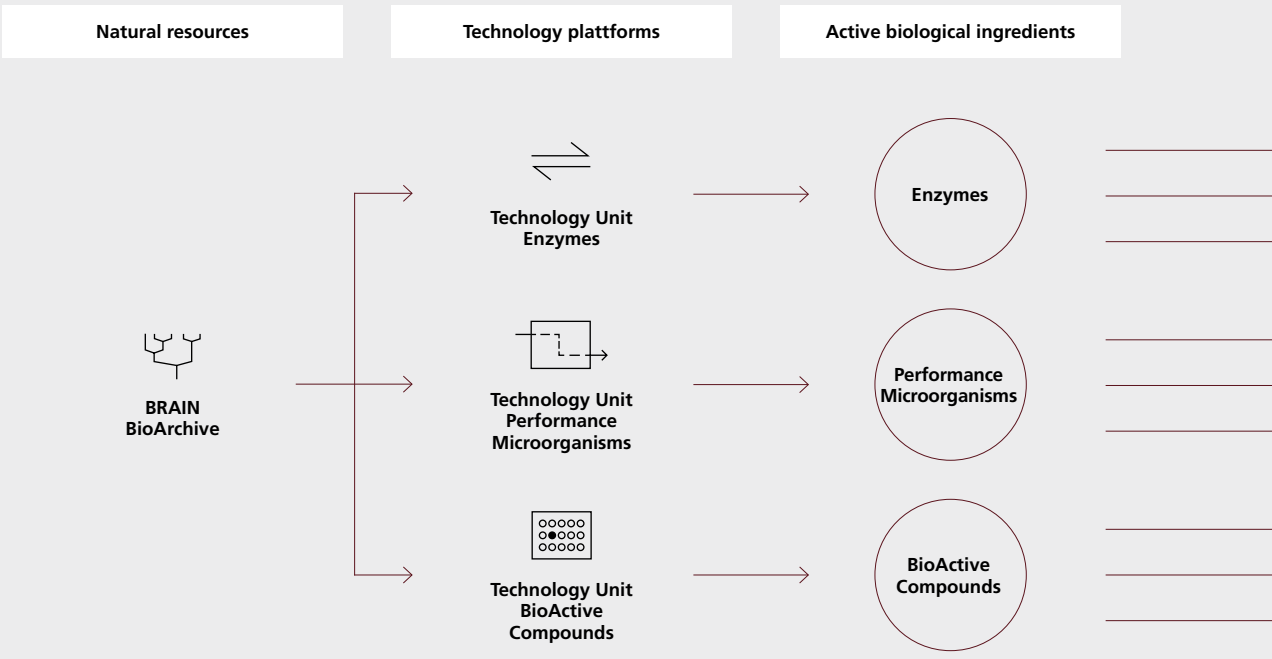
B·R·A·I·N

BRAIN Group financial highlights

in € million	2015/16	2014/15	2013/14
Consolidated income statement data:			
Revenue	22.8	21.1	10.4
Total operating performance[1]	**26.1**	**25.7**	**13.8**
Operating result (EBIT)	–13.8	–4.6	–4.8
Adjusted operating result (adjusted EBIT)[2]	**–7.6**	**–4.4**	**–4.8**
Net loss for the reporting period	–14.9	–5.9	–5.5
Consolidated balance sheet data:			
Total equity	26.9	5.7	12.1
Equity ratio (in %)	**57 %**	**19 %**	**48 %**
Total assets	47.5	30.4	25.3
Consolidated cash flow data:			
Cash flows from operating activities	**–8.7**	**–4.1**	**–3.9**
Cash flows from investing activities[3]	–11.2	–0.5	–1.5
Cash flows from financing activities	25.0	3.4	0.6

1 Defined as the sum of revenue, other income and changes in inventories of finished goods and work in progress
2 Adjusted for IPO costs (€ 974 thousand) and share-based compensation costs relating to BRAIN AG (€ 3,857 thousand) and its subsidiary AnalytiCon Discovery GmbH (€ 1,766 thousand).
3 In 2015/16, € 10 million of this amount was invested in short-term deposit accounts with an original term of three months, which cannot be reported as cash or cash equivalents due to the accounting principles applied.

FROM THE BIOARCHIVE TO THE B2B MARKET: THE BRAIN VALUE CHAIN



Mission Statement

BRAIN represents the introduction of bio-based processes to industry for sustainable, bio-based economic activity and is on the way to becoming a fully integrated bioeconomy company. To this end, BRAIN develops and produces bio-active compounds, enzymes and performance micro-organisms based on the company's proprietary BioArchive. These bio-active ingredients serve to improve products and processes in the speciality and consumer goods industries.

NUMBER OF COLLEAGUES IN THE BRAIN GROUP

237

NUMBER OF CHARACTERISED MICROORGANISMS IN BRAIN'S BIOARCHIVE

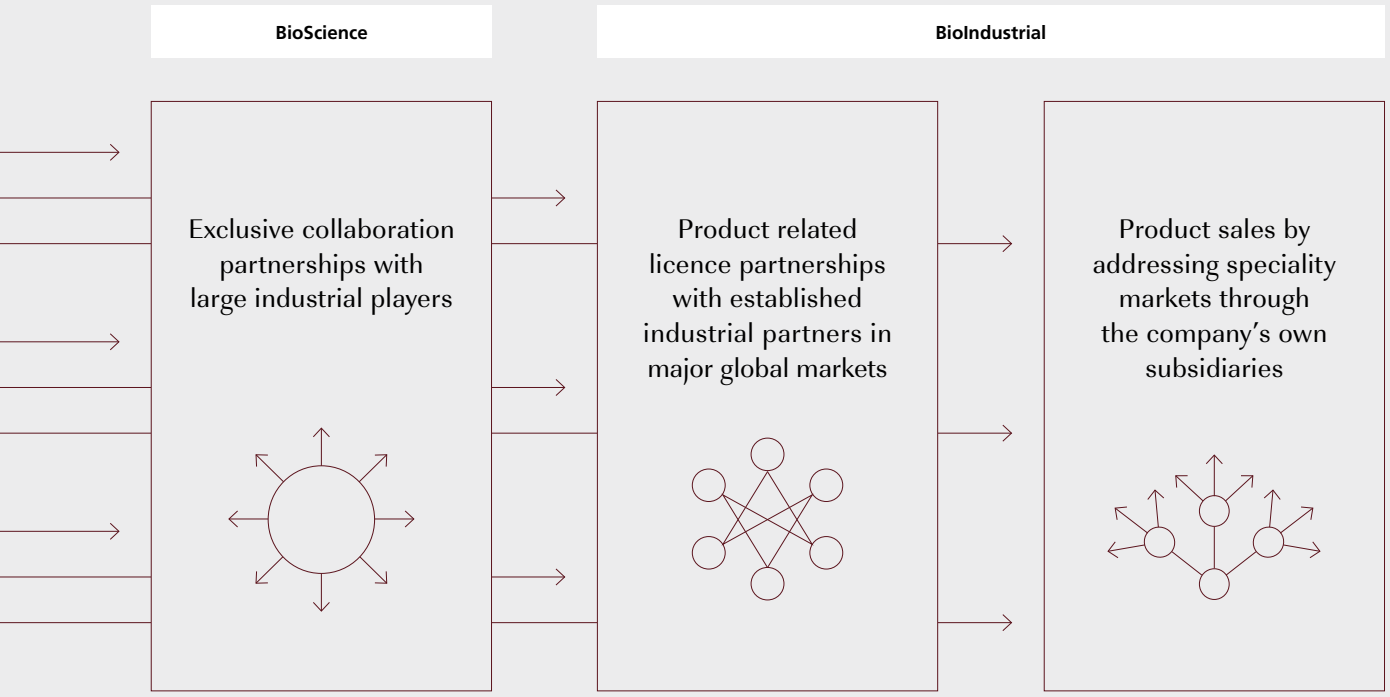
53,000

NUMBER OF BRAIN PATENTS AND PATENT APPLICATIONS

362

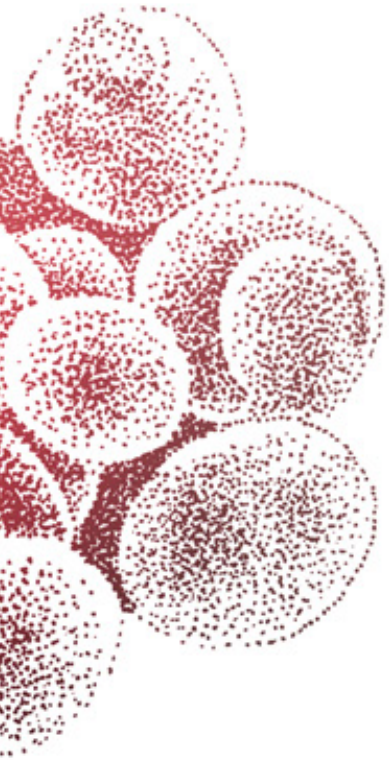
NUMBER OF NATURAL SUBSTANCES IN BRAIN'S BIOARCHIVE

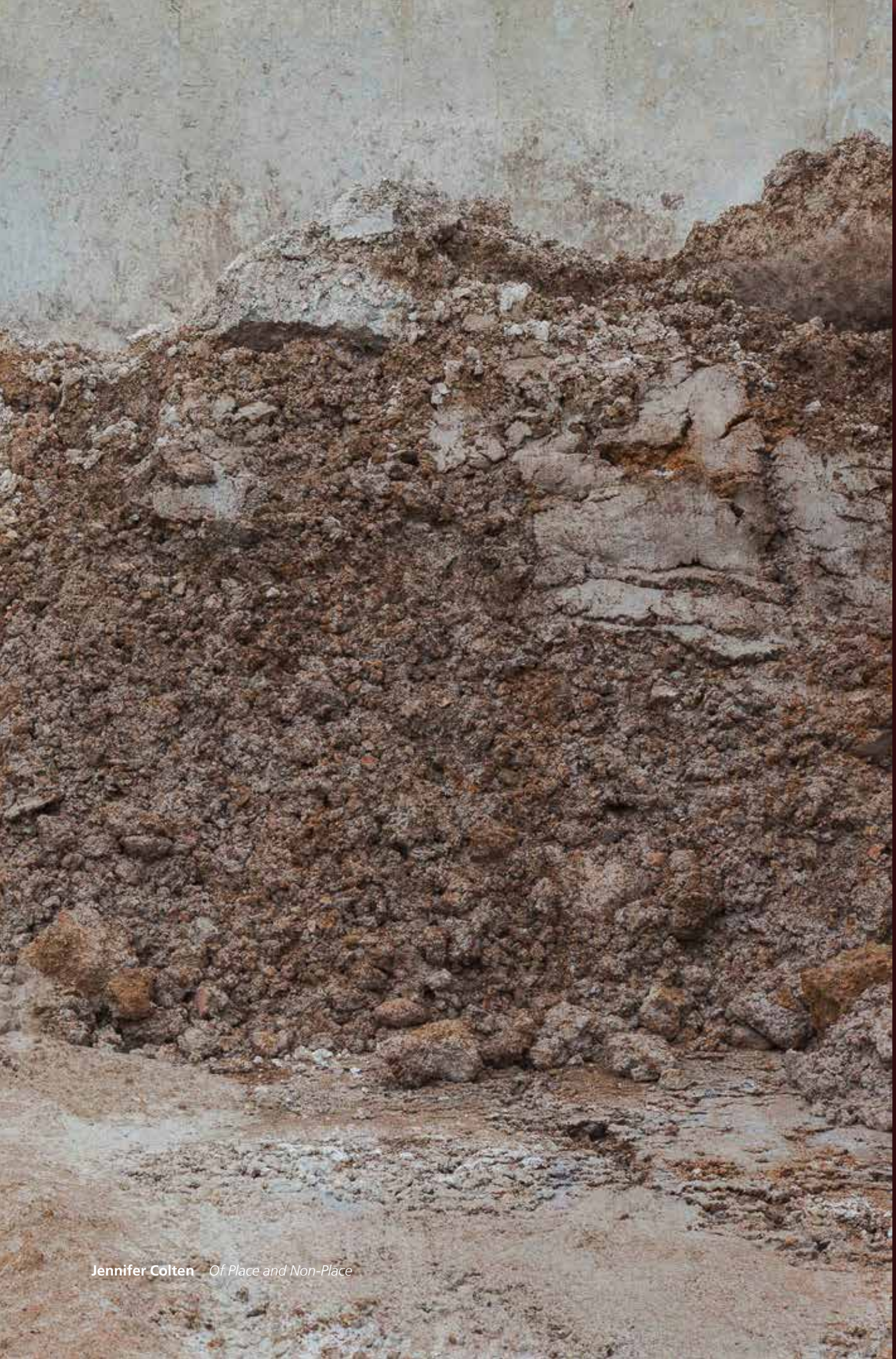
49,500



"BRAIN is rethinking biology. The technological use of biological processes in an industrial environment drives us every day."

Dr Jürgen Eck — member of the founding team and CEO of BRAIN AG





Jennifer Colten *Of Place and Non-Place*

Jennifer Colten *Wasteland Ecology*

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Jennifer Colten *Wasteland Ecology*

Jennifer Colten *Wasteland Ecology*

Jennifer Colten *Wasteland Ecology*

HIDDEN SPECIES DIVERSITY

The works shown here are by photographer Jennifer Colten, who studied at Massachusetts College of Art and teaches photography at Washington University in St Louis. They are taken from her "Of Place and Non-Place" and "Wasteland Ecology" projects.

They show landscapes and brownfield sites shaped by human activity, at the same time devastated and indestructible. The plants Colten captures with her camera are delicate yet tough enough to have found a niche in these barren places. Although they portray neither lush meadows nor bushy forests, her photographs allow us to feel the potential of nature. "The unplanned renaturation of contaminated areas often gives rise to an incredible species diversity", says Colten on her Wasteland Ecology project. Some plants are indigenous, whereas others have recently established themselves or even emerged for the first time in this inhospitable environment.

Microbial diversity, more varied by far than the vegetal type, cannot be photographed using a conventional camera. Only the microscope reveals the numerous bacteria and other microorganisms that exist even in nutrient-poor sand and stone.

While the photographs printed here were not commissioned by BRAIN, they refer to the company nevertheless, because they show species diversity in initially unexpected places. A handful of soil is estimated to contain up to a million different microorganisms. Nature's creativity, as stored in the BioArchive, provides the foundation for BRAIN, which harnesses microbial biodiversity for industrial purposes.

www.jennifercolten.com

Biodiversity as inspiration

→ **BRAIN's BioArchive**, one of the world's largest and most comprehensive of its kind, enables biological microbial diversity to be put to technical use.

— Microorganisms are omnipresent. They were the first inhabitants of our planet and **their diversity is unsurpassable**. But only a fraction of them have been discovered so far.

— To discover new bacteria or other microorganisms, microbiologists need neither explore the rainforest nor travel to other distant regions. **A large number of as yet unknown unicellular organisms live in our very own front gardens**. BRAIN technologies make it possible to detect even unusual microorganisms right here in Germany, including heat-resistant bacteria that feed on carbon dioxide as their sole source of nutrition, in the flue gas channel of a coal-fired power plant in North Rhine-Westphalia.

— BRAIN's BioArchive contains over 50,000 characterised microorganisms and almost as many natural substances, derived from plants or edible parts of plants, as well as extensive metagenome libraries of non-culturable microorganisms. How can carbon dioxide be used as a resource? Which untapped natural substances might make our food healthier? Where can we find enzymes to optimise complex industrial processes? **BRAIN's BioArchive provides answers** to these and many other questions.

300 million
reusable ready-to-screen **metagenome clones**

53,000
characterised microorganisms for strain development

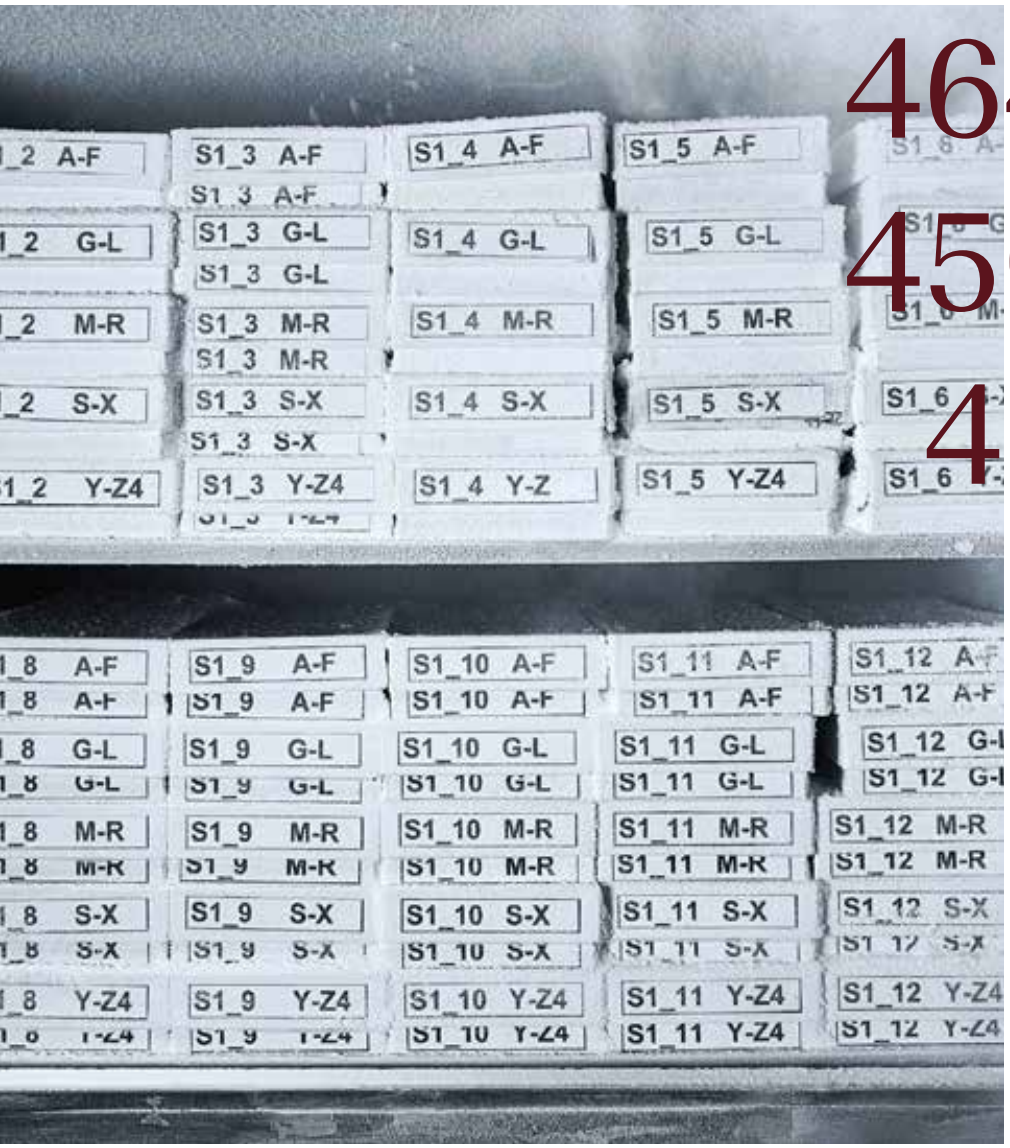
49,500
natural and naturally inspired **compounds**

13,000
plant fractions available for isolation campaigns

464
enzyme libraries available for screening

450
habitat collections and environmental samples

43
metagenome libraries isolated from various habitats



Glimpse into BRAIN's BioArchive: several copies of the organisms, genes and natural substances are stored in different places.

CONTENTS — CORPORATE STORIES

CONTENTS

Dr Jürgen Eck — Chief Executive Officer

Dear shareholders,

The past 2015/16 fiscal year was one of the most eventful in the history of BRAIN AG. Our successful IPO in February 2016 has enabled us to push forward our growth and industrialisation strategy consistently and effectively.

The stock market debut of BRAIN AG was not just the first IPO on the Frankfurt Stock Exchange in 2016, but also the first IPO of a bioeconomy company on any exchange in Germany, as well as the first IPO by a company from the biotechnology sector since November 2006. Counter to the current growing general trend to float young German growth companies on stock markets abroad, BRAIN has demonstrated that it is still possible to float successfully on the domestic market, too.

Accompanying conditions were anything other than rosy at the time. A day before our initial listing, the DAX index of leading German shares slipped below its psychologically important 9,000 point mark. At over 30 points, volatility as registered by the VDAX index had also jumped significantly compared with the period at the end of 2015, prompting most investment bankers to regard new issues as either difficult or impossible.

"Inspired by the vision of a sustainable, bio-based economy, BRAIN is one of the creative players in this global industrial transformation process."

Despite this, when BRAIN shares started trading on the Frankfurt Stock Exchange, the initial quotation of € 9.15 was above the € 9.00 issue price. The share also performed well subsequently: at a Xetra closing price of € 11.70 as of the fiscal year-end on September 30, we recorded a share price appreciation of 30% above the issue price — a success confirming our decision to float on the stock market.

The star at BRAIN is its team — a genuine joint effort made by all BRAIN colleagues formed the foundation for this successful IPO. The team's experience, expertise and creativity — along with a great corporate culture — represent the key to BRAIN's success. The unusually high involvement of private investors, who subscribed for around 19% of the placement volume, also helped us take this step.

The successful course of our IPO shows that the bioeconomy is accepted and understood as a future-oriented topic and is also indisputably recognised in capital market circles as a future sector, irrespective of any short-term equity market turbulence.

This move towards a bio-based industry rings in the start of a new era characterised by two megatrends: firstly, the trend to natural ingredients, including cosmetics and food, for example, and, secondly, the shift in the raw materials base towards renewable raw materials, and the utilisation of byproduct and waste flows as a basis for greater sustainability and resource efficiency. This trend rests on solutions that nature has discovered over 3.5 billion years of evolution, which are being transferred to industrial processes and products. Moreover, such solutions, collected and stored in our BioArchive, make no compromises in terms of performance and quality, but even offer advantages in many respects.

Even if the oil price were to continue falling and oil does not become a scarce commodity, we cannot continue consuming resources as we have to date. We must reduce carbon dioxide emissions to counter climate change. We must close materials cycles to create the foundation for resource-efficient production. Equally, we have to pay attention to nutrition, and here particularly the healthy or even health-promoting nutrition for a growing world population. The bio-based industry offers options and solutions to meet these future challenges.

Products that have been manufactured to date from fossil raw materials by means of chemical processes are being replaced by products made from renewable raw materials or industrial byproduct flows and produced with resource-efficient, energy-saving methods that deploy enzymes or microorganisms, for example. The projects that BRAIN is advancing together with various partners in its ZeroCarbFP strategic alliance are examples of such an approach. The alliance partners — including Fuchs Schmierstoffe and Südzucker — are searching for microorganisms that utilise carbonaceous industrial byproduct flows or even carbon dioxide from flue gas as substrates, and convert them into valuable building blocks for industrial production. Access to the "Toolbox of Nature" in the form of enzymes, microorganisms and bioactive natural substances also provides the foundation for entirely new products, however. Related examples include the development of ingredients that make our food healthier through reducing sugar and salt.

The fact that around twelve percent of global chemical industry sales in 2015 were attributable to bio-based production processes shows that such developments do not just serve niches, for example. This proportion has doubled in the past five years. Experts predict an almost further doubling by 2020. Every one in five euros in the chemical industry will then already derive from bioeconomy processes. In other words: the establishment of a bio-based industry is progressing, project by project, and idea by idea. We are right at the centre of this trend, as well as at the start of an era of a bio-based economy.

But this is mainly a quiet revolution. This evolution is occurring at the level of constituent substances and components, and is barely visible to the consumer as a consequence. But what is important is that it is happening, and is also being supported by policymakers, whether through introducing sugar taxes or CO_2 emission allowances.

Such political support is to be welcomed, as experience in the nutrition area shows that enlightened consumers also expect tasty and sweet products. In other words, to meet sweetness expectations, it has to be possible to reduce sugar content without compromising on taste. The sweetness typical of sugar is desired, but without sugar's disadvantages.

At the end of fiscal 2015/16, BRAIN entered into a strategic partnership bearing the name "DOLCE" to develop a new generation of natural sweeteners with the natural ingredients specialist and BRAIN subsidiary AnalytiCon, and with Roquette, a market leader for ingredients derived from plant-based raw materials. These three partners have set themselves the challenge of developing new concepts in the sugar and sweeteners area in various markets and applications.

An example to cite here is the natural peptide brazzein, which is 1,200 times sweeter than normal sugar, but has none of its disadvantages. This is one of around 60 natural sweeteners that we have collected within a "SweetBox". Equally exciting is a second product line where we are developing substances that boost the sweetness of normal sugar. This is the industry's holy grail, as these natural substances should reduce sugar content in foods but retain the typical sugar taste.

Pleasingly, we are in very advanced negotiations with two large consumer goods companies about also including them in DOLCE directly in development. According to our planning today, the first products containing these ingredients can be launched on the market in around five to six years.

We have some progress to report in these areas, in other words. In the enzymes business, however, we had to face a challenge in 2015/16 due to certain enzyme products used to manufacture bioethanol. A marked decrease occurred here at the start of the year as some bioethanol manufacturers temporarily shut down their plants due to the very low oil price. This special enzyme business has nevertheless recovered over the course of the fiscal year under review.

Due to such volatility in low-margin, high-volume markets, we also regard ourselves as being endorsed in the strategy we have adopted of increasingly expanding our higher-margin special enzymes business (e. g. enzymes for the food manufacturing industry), to thereby gradually counter the commoditisation of volume-driven "bulk" enzymes. We reported low double-digit growth in the special enzymes area in the 2015/16 fiscal year. This growth was not yet sufficient to fully offset the reduction in the bioethanol-dependent enzyme business at the start of the 2015/16 fiscal year, but trends over the course of the year give us confidence.

The result for the fiscal year under review reflects the additional expenses and one-off costs connected with realising the IPO, as well as almost unchanged and constant expenses and investments for research and development as the basis for the product development pipeline. While only part of the one-off expenses that are directly allocable to the IPO in accordance with IFRS accounting principles can be taken into account in adjusted EBIT, we largely retained our operative cost structure as planned.

This confirms us on our path of reaching breakeven in the 2017/18 fiscal year. The aim is to establish BRAIN long-term and sustainably as a substantial market participant of the bio-based economy. Our product development pipeline is an important growth pillar in this context. Moreover, we are not excluding further acquisitions.

"Engineering Biology", the technological utilisation of biological processes within the industrial environment, is our guiding principle and the title of this annual report. Realising this objective gives us new impetus every day. Inspired by the vision of a sustainable, bio-based economy, BRAIN is one of the creative players in this global industrial transformation process.

Here, we have our highly committed employees' contribution and input to thank for our successes. Also on behalf of my Management Board colleagues, I would like to thank you for your commitment and for your hard work day by day. And I would also like to thank you, our shareholders, for your continuing support and confidence in BRAIN.

Together with you, I would like to wish our company a successful and exciting 2016/17 fiscal year, and wish you stimulating reading of our first annual report.

Dr Jürgen Eck — Chief Executive Officer

Dear shareholders,

In the 2015/16 financial year, BRAIN AG continued successfully on its adopted track, reaching further milestones on its path to becoming a leading company in the bioeconomy area.

With the IPO in February 2016 and consequently the departure from the previous pure private equity financing, more than € 30 million of cash inflow laid the foundation for the company's next growth phase. Since 9 February 2016, the shares of BRAIN AG have been traded in the Prime Standard segment of the Frankfurt Stock Exchange. The company is thereby subject to the most stringent transparency and publicity requirements applicable anywhere in Germany.

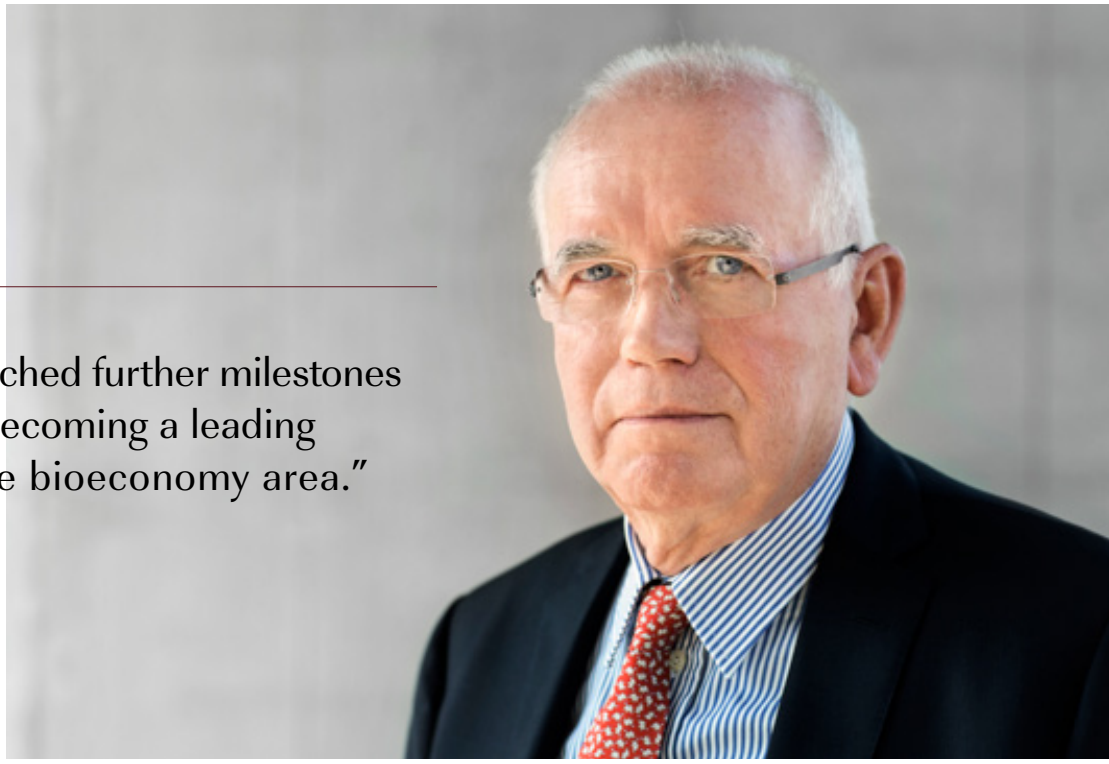
This also affected our Supervisory Board work. Firstly, it includes regulations and requirements that impact the Supervisory Board directly. Secondly, the Supervisory Board also has to accompany and supervise the Management Board in complying with the new regulations and assure itself that corresponding structures and processes have been set up within the company to ensure such compliance. Moreover, as the Supervisory Board we provided personnel support for the structural change. For instance, a resolution was passed on 18 December 2015 whereby Dr Georg Kellinghusen would step down from the Supervisory Board and instead assume the position of Chief Financial Officer (CFO) of BRAIN AG from 1 January 2016 to 31 December 2016. Dr Kellinghusen's Management Board mandate was also extended until the end of the first Ordinary Annual General Meeting (AGM) in the 2016/17 financial year.

The following report provides information about the Supervisory Board's work in the 2015/16 financial year, in other words, from 1 October 2015 until 30 September 2016. During this period, we completely fulfilled the tasks and duties incumbent upon us pursuant to the law, the company's bylaws and the rules of business procedure for the Supervisory Board.

We continuously supervised the Management Board in its management of the business, and consulted on all matters of importance for the company. In this context, the Supervisory Board was always convinced of the legality, propriety, appropriate nature and economic efficiency of the management of the company.

Collaboration between the Supervisory and Management Boards

The Management Board informed the Supervisory Board regularly, promptly and comprehensively in the form of detailed written and verbal reports on



"BRAIN has reached further milestones on its path to becoming a leading company in the bioeconomy area."

Dr Ludger Müller — Chairman of the Supervisory Board

all questions relating to strategy, planning, business development, the risk position, risk trends and compliance that are of importance for the company and the Group, and consequently complied fully with its reporting duties to the Supervisory Board in the relevant period. The Supervisory Board and its committees were involved in all important business transactions and decisions of fundamental significance for the company in this context. Collaboration with the Management Board was characterised in all aspects by responsible and purposeful action.

Personnel matters

The following changes occurred to the composition of the Management and Supervisory Boards in the reporting period:

With effect as of 1 November 2015, Mr Eric Marks (54) was appointed Chief Operating Officer (COO) of BRAIN AG. Dr Jürgen Eck, who has been at BRAIN and been a member of its shareholder group since 1994 and previously managed the company as sole Management Board member (CEO), assumed the role of Chairman of the Management Board (CEO). Eric Marks holds a degree in business management and has more than 25 years' experience in industry, particularly in establishing and expanding sales, and acquiring and serving major customers at Gist-Brocades (NL) and Genencor (USA). At BRAIN, Mr Marks is responsible as COO for BRAIN's BioIndustrial business, and consequently the expansion of the subsidiaries' sales functions, as well as marketing BRAIN's own product pipeline.

With effect as of 1 January 2016, Dr Georg Kellinghusen was appointed Chief Financial Officer (CFO) of BRAIN AG. Dr Kellinghusen was previously a member of the Supervisory Board of BRAIN AG. Dr Kellinghusen stepped down from the Supervisory Board as of 31 December 2015. Following its extension, this CFO appointment is valid for the period from 1 January until the end of the first Ordinary AGM in the 2016/17 financial year.

The AGM of BRAIN AG on 18 December 2015 unanimously appointed Mr Christian Körfgen to be a new Supervisory Board member with effect as of 1 January 2016, whereby he assumed the seat that Dr Georg Kellinghusen vacated.

Supervisory Board meetings

In the 2015/16 financial year, a total of eight Supervisory Board meetings were held on an attended basis, four attended meetings of the committees, as well as nine telephone conferences of the Supervisory Board and the committees, and two resolutions were passed by way of written circular. The Supervisory Board members always had sufficient time in this context to critically engage with the information submitted by the Management Board and contribute its own views. As part of the meetings, the information was discussed in detail with the Management Board and examined as to its plausibility. The Supervisory Board issued its approval of specific business transactions as required by law, the company's bylaws or the rules of business procedure for the Supervisory or Management Boards.

TABLE 01.1 **OVERVIEW OF SUPERVISORY BOARD MEETINGS IN THE 2015/16 FINANCIAL YEAR**

Name	Meetings attended (including committee meetings)	Remarks
Dr Ludger Müller	11/11	
Dr Holger Zinke	8/8	
Siegfried L. Drueker	8/9	Mr Druecker was excused
Christian Körfgen (since 01.01.2016)	4/4	Replacement member for Dr Georg Kellinghusen
Prof Dr Klaus-Peter Koller	8/8	
Dr Matthias Kromayer	11/11	
Dr Georg Kellinghusen (until 31.12.2015)	4/4	

Outside the scope of meetings, too, the Supervisory Board members, especially myself as Supervisory Board Chairman, as well as the Audit Committee Chairman, were in regular communication both with each other and with the Management Board. This especially entailed consultations on questions about the company's strategy, planning, business development, the risk position, risk management, corporate governance and compliance. The Supervisory Board members were informed about important information at the latest at the next plenary or committee meetings.

No conflicts of interest occurred in the Supervisory Board in the reporting period.

Focus areas of consultation in the plenary Supervisory Board

During the 2015/16 financial year, we on the plenary Supervisory Board concerned ourselves especially with the following topics.

- Annual financial statements for the 2014/15 financial year
- Shareholders' general meetings in October 2015 and December 2015
- Expansion of the Management Board
- Business allocation plan for the Management Board
- Planning, preparation and implementation of the IPO of BRAIN AG
- Equity capital measures
- Current and future research projects
- Strategic alliances and planned cooperations, especially the DOLCE project announced by press release on 28 August 2016
- Acquisition strategy of BRAIN AG, especially discussion of a catalogue of criteria for potential takeover candidates as presented by the Management Board
- Reaching the corporate targets for the 2015/16 financial year, especially developing the BioIndustrial and BioSciences divisions
- Risk management and internal controlling systems
- Compliance, especially management of an insider register, information for affected individuals, and

the introduction of share trading windows for BRAIN employees and managers
- Composition of the Supervisory Board and the ratio of women on the Management and Supervisory Boards
- Corporate governance report and the corporate governance statement of conformity
- Budget for the 2016/17 financial year
- Employee share scheme in the 2016/17 financial year (from the first half of the year)
- Tender for the audit of the financial statements for the 2016/17 financial year
- Restructuring of the Intended Post IPO Framework Agreement (PSOPalt)

In each case following intensive review and discussion, the Supervisory Board passed the following specific resolutions:

Our plenary meetings during the first five months of the financial year focused on resolutions connected with the IPO of BRAIN AG. On 4 January 2016, given the difficult capital market situation, we conducted an intensive discussion concerning the timing of the planned IPO and finally approved the publication of the flotation plans. A corresponding press release was published on 5 January 2016. At the 19 January 2016 meeting, we approved the timing of the subscription period as well as the IPO price range of € 9.00 to € 12.00. These were published on 20 January 2016 with the listing prospectus. At the end of the subscription period, on 3 February 2016, by way of circular resolution, we approved the € 9.00 issue price as well as the IPO capital increase from Approved Capital (2015/I) of up to 3,500,000 new no par value shares.

In the telephone conference on 5 December 2015, the Supervisory Board approved the documents for the annual financial statements for the 2014/15 financial year, and assented to the Management Board's proposal for the application of unappropriated profit. We subsequently released the 2014/15 annual financial statements, together with the 2012/13 and 2013/14 financial statements, for publication in the listing prospectus.

In the meetings and resolutions of 14 October 2015 and 18 December 2015, the Supervisory Board approved the expansion of the Management Board to include a COO and a CFO in light of the company's growth strategy for the future. The corresponding Management Board contracts as prepared by the Personnel Committee were approved in meetings and resolutions of 30 October 2015 and 19 January 2016, and the allocation of business for the Management Board was realigned accordingly.

The meeting on 23 September 2016 included, among other items, decisions concerning the Intended Post IPO Framework Agreement (PSOP), the termination of the Management Board employment contract with Mr Marks as of 31 October 2016 and the reappointment of Mr Goebel (with effect as of 1 November 2016).

As part of the meeting on 23 September 2016, the Supervisory Board launched the review of its efficiency. The Supervisory Board Chairman distributed corresponding questionnaires for this purpose. The results of this efficiency review were presented and discussed in the Supervisory Board, including consultations about potential improvements.

Committees

The Supervisory Board has currently formed a total of three committees to efficiently perform its work: an Audit Committee, a Nomination Committee and a Personnel Committee. These committees prepare resolutions for the Supervisory Board as well as topics that are to be covered by the plenary session. The Supervisory Board's decision-making powers are also transferred to committees where legally permissible. In all cases, the committee chairs report on the committees' work at the subsequent plenary meeting.

Audit Committee

The Audit Committee concerns itself especially with supervising the financial accounting process, the effectiveness of the internal control system, the risk management system, the auditing of financial statements, and here especially the auditor's independence, services rendered additionally by the auditor, setting the focus areas for the audit and agreeing the audit fee, as well as compliance.

Pursuant to the German Stock Corporation Act (Sections 107 (4), 100 (5) AktG), the audit committee must include at least one independent Supervisory Board member with expertise in financial accounting or financial auditing. The Audit Committee Chairman, Siegfried L. Drueker, meets these statutory conditions and also possesses special knowledge in the areas of mergers & acquisitions, corporate finance and investment banking. He also meets the criteria of Section 5.3.2 Clauses 2 and 3 of the Code. Along with its Chairman, the Audit Committee also includes the further Supervisory Board members Dr Ludger Müller and Dr Matthias Kromayer.

The Audit Committee held two attended meetings and four telephone conferences in the 2015/16 financial year.

Nomination Committee

The Nomination Committee did not meet separately in the 2015/2016 financial year.

Personnel Committee

The Personnel Committee prepares personnel decisions for the Supervisory Board, especially including the selection, appointment and dismissal of Management Board members, the conclusion and amendment of service contracts and pension arrangements, the compensation scheme including its implementation as part of the service contracts, target setting for variable compensation, setting and reviewing appropriate total compensation for each Management Board member, and approving the annual compensation report. The Personnel Committee also passes resolutions concerning the representation of the company as against Management Board members pursuant to Section 112 AktG, the approval of Management Board members' other business activities pursuant to Section 88 AktG (prohibition of competition), and other ancillary activities, especially assuming Supervisory Board posts or positions on comparable controlling bodies outside the BRAIN Group. Dr Ludger Müller is the Chairman of the Personnel Committee. Besides the Chairman, the committee includes the Supervisory Board member Dr Matthias Kromayer.

The Personnel Committee held two meetings and one telephone conference in the 2015/16 financial year. With effect as of 1 November 2015, Mr Eric Marks (54) was appointed COO, and with effect as of 1 January 2016, Dr Georg Kellinghusen was appointed CFO of BRAIN AG.

The Personnel Committee also consulted in detail on Mr Frank Goebel's appointment to the Management Board and the termination of the Management Board contract with Mr Marks, and prepared the extension of Dr Kellinghusen's Management Board contract.

Corporate governance and statement of conformity

As part of its meeting on 19 January 2016, the Supervisory Board consulted in detail concerning the company's corporate governance, including requirements deriving from the Corporate Governance Code, covering in depth some aspects of corporate governance at its meetings on 26 February and 30 May 2016.

Rules of business procedure for both the Audit Committee and the Personnel Committee were approved on 23 September 2016.

The company's first statement of conformity was approved by the Supervisory Board by way of written circular after the end of the 2015/16 fiscal year in December 2016. Apart from the exceptions it justifies, the recommendations of the Code were, and are, complied with. The full wording of the statement of conformity as well as the Corporate Governance Report prepared by the Management and Supervisory Boards of BRAIN AG, and the corporate governance statement, are published on the company's website at www.brain-biotech.de/en/investor-relations/corporate-governance.

In connection with the provisions of Section 111 (5) of the German Stock Corporation Act (AktG), the Supervisory Board has set itself the target of taking women into appropriate account in its future composition. Accordingly, resolutions passed at the 23 September 2016 meeting of the Supervisory Board of BRAIN AG included a resolution that the Supervisory Board should include one woman, corresponding to a 17 % ratio. The implementation period for this target runs until 30 June 2017. Also on 23 September 2016, the Supervisory Board passed a resolution to leave the ratio of women for the Management Board of BRAIN AG unchanged until 30 June 2017 (corresponding to a 0 % ratio).

Audit of the separate and consolidated annual financial statements

Auditor

The Annual General Meeting on 18 December 2015 determined that PricewaterhouseCoopers Aktiengesellschaft Wirtschaftsprüfungsgesellschaft (PWC), Frankfurt am Main, should be the auditor for the financial year ending 30 September 2016. This appointment also includes appointing the auditor for the consolidated financial statements for the financial year ending 30 September 2016. PwC audited the separate annual financial statements for the financial year from 1 October 2015 to 30 September 2016 prepared according to the financial accounting regulations of the German Commercial Code (HGB), as well as the management report for BRAIN AG. The auditor, PwC, awarded an unqualified audit certificate. Pursuant to section 315a of the German Commercial Code (HGB), the consolidated financial statements of BRAIN AG for the financial year from 1 October 2015 to 30 September 2016 and the Group management report were prepared on the basis of International Financial Reporting Standards (IFRS), as applicable in the European Union. Both the consolidated financial statements and the Group management report were also awarded an unqualified audit certificate. The auditor also found that the Management Board has set up an appropriate information and supervision system that is suitable in its design and use to identify developments at an early juncture that jeopardise the company as a going concern.

Review by the Supervisory Board

The documents for the financial statements and the audit reports were discussed extensively at the Audit Committee meeting on 12 December 2016, in the telephone conference on 19 December 2016 as well as at the Supervisory Board meeting on 10 January 2017. The auditor, PwC, reported on the main results of its audit. It also provided information about its findings on internal control and risk management in relation to the financial accounting process, and was available for additional queries and information. The review of the separate and consolidated financial statements by the Audit Committee was reported upon in detail by its Chairman at the plenary meeting. Following in-depth reviewing and discussion of the separate financial statements, the consolidated financial statements and the combined management report, the Supervisory Board raised no objections to the documents submitted. The Supervisory Board consequently concurs with the Audit Committee's

recommendation and approves the result of the audit by the auditor. By way of resolution on 15 January 2017, the Supervisory Board then approved the separate and consolidated annual financial statements of BRAIN AG for the 2015/16 financial year. The separate annual financial statements of BRAIN AG have been adopted as a consequence.

Report on the review of the dependent companies report pursuant to Section 314 of the German Stock Corporation Act (AktG)

Moreover, the Supervisory Board reviewed the report prepared by the Management Board on relationships with affiliates pursuant to Section 312 (1) of the German Stock Corporation Act (AktG) for the period of dependency between 27 October 2015 and 4 February 2016 ("dependent companies report") and discussed it extensively with the Management Board and with the auditor that also audits the dependent companies report.

The auditor reported in detail on the main points of its audit. In this context, the Supervisory Board concerned itself in depth with the report on the audit of the dependent companies report by the auditor. The discussion resulted in no grounds for reservations.

The auditor issued the following audit opinion relating to the dependent companies report:
"In accordance with the audit and appraisal incumbent upon us, we confirm that

1. the actual disclosures presented in the report are correct, and
2. for the legal transactions listed in the report the consideration rendered by the company was not inappropriately high."

Following the conclusive results of the extensive review of the dependent companies report by the Supervisory Board, the Supervisory Board states that no reservations are to be expressed (Section 314 (3) AktG) against the Management Board statement at the conclusion of the report concerning relationships with affiliates (concluding statement pursuant to Section 312 (3) Clause 1 AktG).

Thank you from the Supervisory Board

The Supervisory Board would like to thank the members of the Management Board as well as all employees of the BRAIN Group for their commitment and outstanding personal contribution during the 2015/16 financial year. We look forward to continuing the past years' growth story together with you.

Zwingenberg, 15 January 2017

BRAIN AG, the Supervisory Board
Dr Ludger Müller — Supervisory Board Chairman

Members of the Supervisory Board and Supervisory Board committees

Dr Ludger Müller, Chairman

Member since 17 March 2011.
Appointed until end of AGM 2018/19.

Further board mandates in 2015/16:
- Managing Director of subsidiaries of MP Beteiligungs-GmbH: PUTSCH Immobilien GmbH, KEIPER Brasilien Beteiligungs-GmbH, KEIPER Lateinamerika Beteiligungs-GmbH, BSN GmbH, Managing Director of BRL GmbH
- TU Kaiserslautern, University Council Chairman

Dr Holger Zinke, Deputy Chairman

Member since 8 July 2015.
Appointed until end of AGM 2016/17.

Further board mandates in 2015/16:
- Technische Universität Darmstadt, University Council member, Deputy Chairman
- Hochschule Mannheim – University of Applied Sciences, University Council member

Siegfried L. Drueker

Member since 3 May 2012.
Appointed until end of AGM 2019/20.

Further board mandates in 2015/16:
- Georgsmarienhütte Holding GmbH, Supervisory Board Chairman
- Georgsmarienhütte Holding GmbH, Supervisory Board member
- Managing Director of STEGO Vermögensverwaltungs GmbH

Christian Körfgen [1]

Member since 1 January 2016.
Appointed until end of AGM 2018/19.

Further board mandates in 2015/16:
- Putsch GmbH & Co. KG, Advisory Board member, and member of the Advisory Boards of affiliates of Putsch GmbH & Co. KG (MP Beteiligungs-GmbH, Recaro Holding GmbH, Putsch Immobilien GmbH)
- until 31 March 2016: Managing Director of NH Central Europe GmbH & Co. KG and Managing Director of several affiliates of NH Central Europe GmbH & Co. KG (Airport Hotel Frankfurt Raunheim GmbH & Co. KG, Artos Beteiligungs-GmbH, Astron Immobilien GmbH, Heiner Gossen Hotelbetrieb GmbH, Hotel Aukamm Wiesbaden GmbH & Co. KG, Hotels Bingen & Viernheim GmbH & Co. KG, NH Central Europe Management GmbH, NH Hotelbetriebs- und Dienstleistungs-GmbH, NH Hotelbetriebs- und Entwicklungs-GmbH, NH Hotels Austria GmbH, NH Hotels Deutschland GmbH, NH Hotels Switzerland GmbH, NH Hotels Czequia s. r. o., NH Hotels Polska Sp. Zo. o., NH Hungary Hotel Management Ltd., NH Management Black Sea S. R. L., Objekt Leipzig Messe GmbH & Co.)

Prof Dr Klaus-Peter Koller

Member since 21 May 2001.
Appointed until end of AGM 2016/17.

Further board mandates in 2015/16:
- Member of the German Federal Ministry of Education and Research (BMBF) VIP+ Consultant Board
- Member of the Joint Board of Trustees of the Max Planck institutes for Biophysical Chemistry/Dynamics and Self-Organization, Göttingen
- Member of the Advisory Council and Honorary Member of the German Association for General and Applied Microbiology (VAAM)

Dr Matthias Kromayer

Member since 17 March 2011.
Appointed until end of AGM 2018/19.

Further board mandates in 2015/16:
- Amsilk GmbH, Advisory Board Deputy Chairman
- Biocrates AG, Supervisory Board Deputy Chairman
- Cerbomed GmbH, Advisory Board Chairman
- Immatics GmbH, Advisory Board member
- Immatics Inc., Advisory Board member
- Nexigen GmbH, Advisory Board Chairman
- Managing Director of tavia consulting GmbH

Audit Committee

Siegfried L. Drueker, Chairman
Dr Matthias Kromayer, Member
Dr Ludger Müller, Member

Nomination Committee

Dr Ludger Müller, Chairman
Dr Matthias Kromayer, Member
Dr Holger Zinke, Member

Personnel Committee

Dr Ludger Müller, Chairman
Dr Matthias Kromayer, Member

1 Successor to Dr Georg Kellinghusen, who was a Supervisory Board member until 31 December 2015, and who switched to the Management Board to become CFO as of 1 January 2016

The bioeconomy, a cornerstone of the "great transformation" of the economic system

An article by Dr Holger Zinke, founder of BRAIN AG

About ten years ago, the German Federal Environmental Foundation (DBU), the German Chemical Industry Association (VCI) and BRAIN organised the "White Biotechnology – success strategy for a sustainable chemical industry" congress in Berlin, under the patronage of then Federal Minister of Economics, Wolfgang Clement. In late 2015, again in Berlin, the Global Bioeconomy Summit was held. Organised by the Bioeconomy Council and under the patronage of the German Chancellor, the event was attended by almost 1,000 participants from 80 countries.

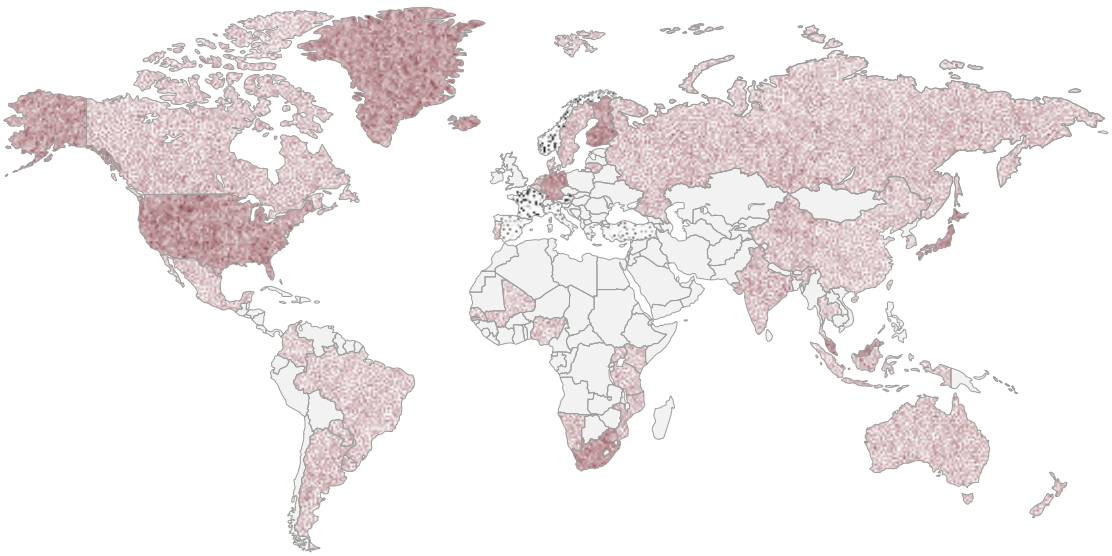
> "I think the biggest innovation of the twenty-first century will be the intersection of biology and technology. A new era is beginning, just like the digital one."
>
> **Steve Jobs (1955–2011)** — founder, Apple Inc.

While these are certainly signs of a rise in political esteem, the "bioeconomy" remains a specialist theme in industry and the capital market. Unjustly so, since more than 40 nations around the globe are meanwhile developing and implementing bioeconomy strategies with goals such as fostering innovation, sustainable development and green growth.

Not only did the German Government launch the National Research Strategy on the Bioeconomy in 2010, two years later a National Policy Strategy on the Bioeconomy was endorsed by cabinet decisions. What is striking is that this was not the promotion initiative of a single ministry, but a cross-ministerial strategy by the German Government as a whole. As a consequence, BRAIN initiated two strategic industrial alliances.

Despite these initiatives, the bioeconomy has not yet assumed its appropriate place on the priority list of industrial companies' strategies or the programmes of the political parties. Although such initiatives boost the competitive position of a technology enterprise as a pioneer and technology gate keeper, they are not enough in macroeconomic terms. Experts believe the bioeconomy represents a similarly important development as that of other system innovations such as digitisation, industry 4.0 or electromobility. Since the bioeconomy represents a prototype for broad-based, post-fossil industrial development, such comparisons are far from exaggerated. Quite the contrary.

But the transformation of traditional industries is still in its infancy. Representatives of established industries argue that switching over the resource base to renewable resources is impossible both in economic terms and in terms of volume. The Bioeconomy Council appointed by the Ger-



Bioeconomy policies around the world [1]

- Dedicated bioeconomy strategy
- Bioeconomy-related strategy
- Bioeconomy-related strategy; dedicated bioeconomy strategy under development
- Dedicated bioeconomy strategy under development

man Government anticipated this argument in its study on the chemical industry several years before. It established that investments in new fossil production plants would be more probable (being more lucrative in the short and medium term) than the broad implementation of new bio-based processes and products.

This viewpoint, while at first glance coherent, ignores social change, though, especially the change in consumer awareness. Citizens are becoming increasingly uneasy as regards the established fossil-based economy. Such citizens may be in the minority and there may be differences from country to country. This trend may be based on illogical arguments, such as those that apply to organic foods, but it is nonetheless a strong and presumably irreversible development and one that industry would do well to take seriously. Interestingly, the companies that are reacting to this trend are more likely to be medium-sized enterprises such as BRAIN than operators of world-scale facilities. In so doing, they achieve considerable economic success using biological knowledge, whether this concerns organic cosmetics, biological ingredients, microorganisms or enzymes.

The bioeconomy is therefore nothing less than a significant element of the "great transformation" of economic systems that climate scientists, for example, are continually calling for. The pathbreaking decisions taken at the United Nations Climate Change Conference (COP 21) came into force on 4 November 2016 in the form of the world climate agreement. Changes in the social awareness of issues related to resources, energy and the climate, as well as nutrition and health, are strong drivers. They will make the bioeconomy a social theme that will demand ever more substantial responses from industry, responses that industry will certainly be called to make.

Dr Holger Zinke

Dr Holger Zinke, micro- and molecular biologist, is the founder of BRAIN. He was the company's Chief Executive Officer before switching over to the Supervisory Board in July 2015. Dr Zinke received the German Environmental Award, the highest-endowed European environmental prize, in 2008 together with Dr Ernst-Ulrich von Weizsäcker, for his entrepreneurial endeavours as a "pioneer of sustainable economic activity". In 2009 he received the German Federal Cross of Merit and in 2011 the highest distinction of the German Life Sciences Association (VBIO), the Treviranus Medal. He is a member of the German Government's Bioeconomy Council, where he is in charge of the working group on competition.

1 German Bioeconomy Council

Senior Management

BRAIN is managed by an experienced team, some of whose members have been with the company for over 15 years.

BioScience

Dr Martin Langer Member of the Management Board, authorised signatory, Unit Head Corporate Development,
with the company since: March 1995

Corporate

Dr.-Ing. Ute Dechert Unit Head Organisation & Processes,
with the company since: April 1996

BioIndustrial

Dr Bela Kelety Unit Head New Business Development,
with the company since: October 2010

Dr Michael Krohn Member of the Management Board, authorised signatory, Unit Head BioActives & Performance Biologicals, with the company since: September 1997

Dr Guido Meurer Member of the Management Board, authorised signatory, Unit Head Producer Strain Development, with the company since: April 2000

Thomas Kessler Member of the Management Board, Unit Head Cosmetics, with the company since: August 2015

Dr Wolfgang Aehle Corporate Development, New Business Development Enzymes, with the company since: September 2008

BRAIN Management Board interview

Dr Georg Kellinghusen
Chief Financial Officer
(CFO)

Dr Jürgen Eck
Chief Executive Officer
(CEO)

Frank Goebel
Management Board
since 1 November 2016

"We aim to establish BRAIN as a substantial player in the bio-based industry."

Dr Jürgen Eck — Chief Executive Officer

At its meeting in September 2016, the Supervisory Board of BRAIN made a personnel decision to establish a six-month transition period between the current CFO Dr Kellinghusen and the future CFO Frank Goebel.

Dr Kellinghusen, you have 35 years' experience as a CFO. How were you able to contribute this experience as a member of BRAIN's management team?

GEORG KELLINGHUSEN

Having been CFO at many listed companies I was able to prepare BRAIN as a newcomer to the stock market for the situation of "being public" and also launch and establish areas such as investor relations and financial communication. All of that has now proved outstandingly successful and it goes without saying that I'll continue to be available to the company in an advisory capacity, as required, after I've stepped down from the Management Board.

Mr Goebel, you were Mr Kellinghusen's chosen candidate as his successor. How do you now feel about continuing to act for a while as "co-head"?

FRANK GOEBEL

I feel honoured to be able to benefit during this type of handover period from the broad knowledge of my predecessor, who has already spent such a long successful period in the business.

And why have you decided to work together for a further period of almost six months?

GEORG KELLINGHUSEN

As I'm responsible for the figures in the 2015/16 annual report, the Supervisory Board made the decision to extend my mandate until the Annual General Meeting on 9 March 2016. This gesture also made it possible to ideally prepare my successor Frank Goebel in a targeted manner for his future tasks as CFO on BRAIN's Management Board.

Mr Goebel, what experience have you gained from past situations before coming to BRAIN?

FRANK GOEBEL

I worked for a long time for the Royal Bank of Scotland, in the financing area, where I gained expertise in quickly finding my bearings within new companies and rapidly gaining an overview of their respective business areas and potential. I can now directly apply this capability especially in M&A activities at BRAIN, as well as operatively in terms of bringing new business partners on board. I also benefit from my closely knit network in this context.

Can you provide an outlook of your future tasks at BRAIN?

FRANK GOEBEL

I'm going to be responsible for the areas of BioIndustrial, M&A, and – as CFO from the day after the AGM on 9 March 2017 – also for finance.

"Our joint goal is to reach break-even point in 2017/18."

Frank Goebel — Member of BRAIN's Management Board

In which areas will you mainly operate, Dr Eck?

JÜRGEN ECK

Along with my CEO tasks, my area of activity on the new Management Board comprises BRAIN's overall strategy, as well as driving business ahead in the BioScience area.

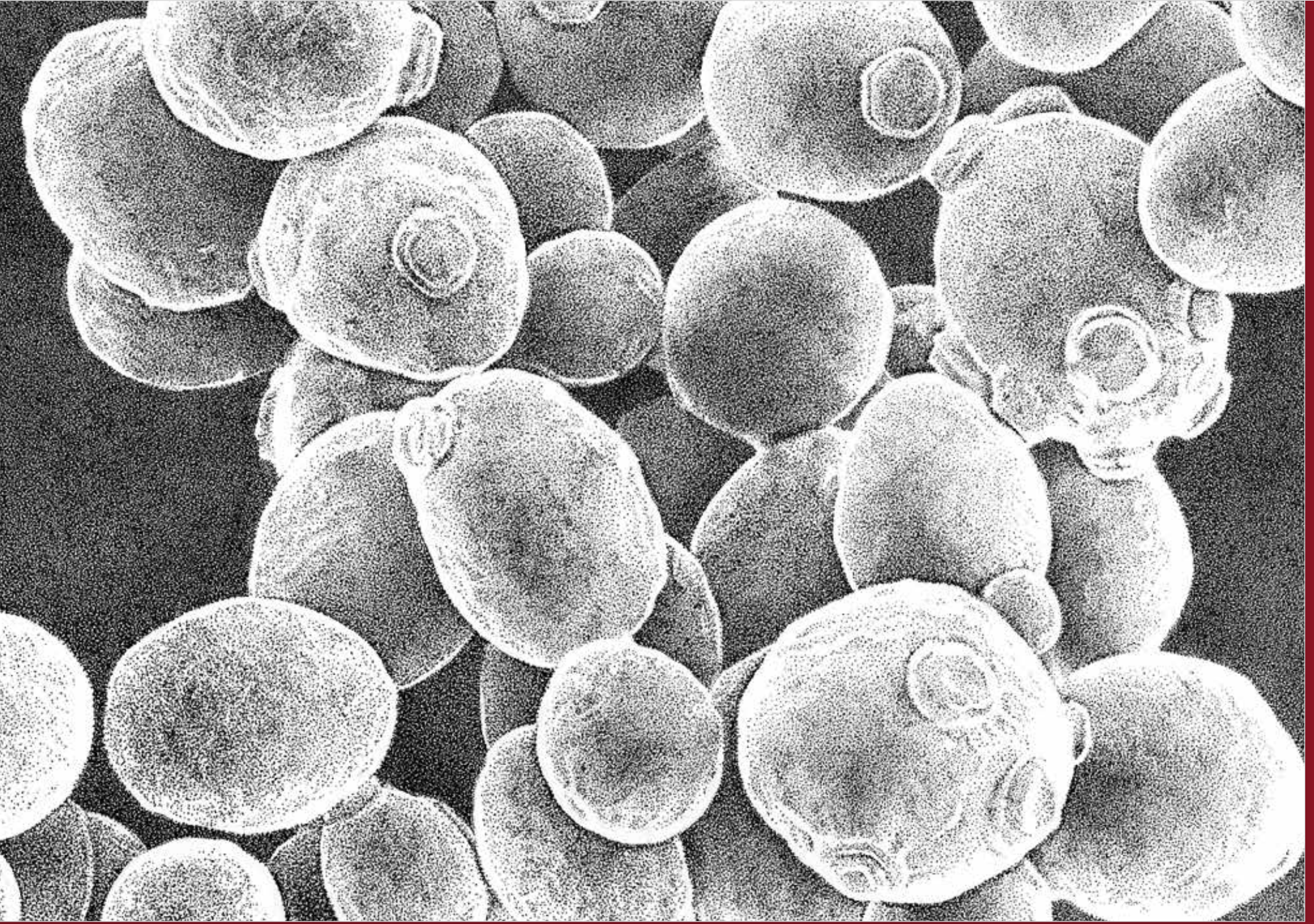
Where is the BRAIN journey heading? Do you have specific targets you aim to meet?

JÜRGEN ECK

We aim to establish BRAIN as a substantial player in the bio-based industry. In addition to this, we intend – as already in the past – to grow at a double-digit rate. We also stand by our planning of reaching break-even in our 2017/18 fiscal year.

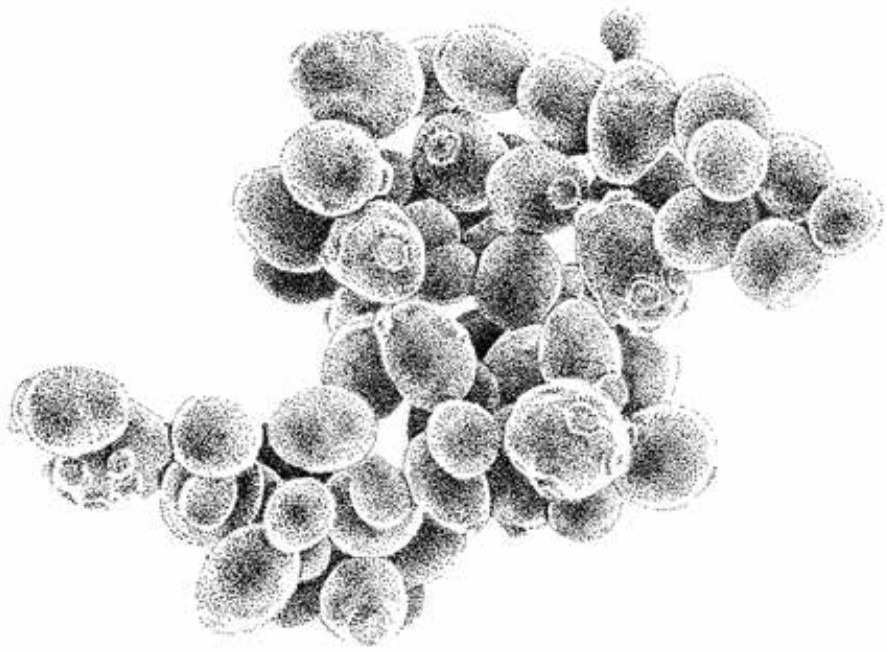
FRANK GOEBEL

We're not going to set out precise scenarios at present. The outlook BRAIN can provide is that we aim to market an average of two products per year from our pipeline. We're confident we can also achieve this successfully.



Natural sweetness without sugar

→ Tastes like sugar but does no harm: the plant-based sweetener brazzein can be produced using yeast BR-6724.



Properties

BR-6724 is a eukaryotic micro-organism, a yeast species used by BRAIN as one of 15 production strains for the synthesis of peptides.

It is a methylotrophic yeast, i. e. an organism that is capable of using methanol as its sole source of energy and carbon for its growth and metabolism.

Status

BR-6724 has been accorded GRAS status ("generally regarded as safe") by the U.S. Food and Drug Administration (FDA) and also has QPS status ("Qualified Presumption of Safety") at the European Food Safety Authority (EFSA).

Advantages

- easy to culture
- high genetic stability
- short generation time
- can be cultured over a wide pH range
- can be cultured at very high cell densities
- can very efficiently release peptides from the cell
- the high product yields make for a good space-time yield

16.8 bn

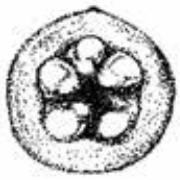
The **amount in euros** the German health care system alone would be able to save in annual costs if the population's consumption of sugar, salt and fats were in line with official recommendations. Of this amount, € 8.6 billion concerns the consumption of sugar.[1]

6,500

daltons – the molecular weight of brazzein

1,200

Brazzein is 1,200 **times sweeter** than sugar.



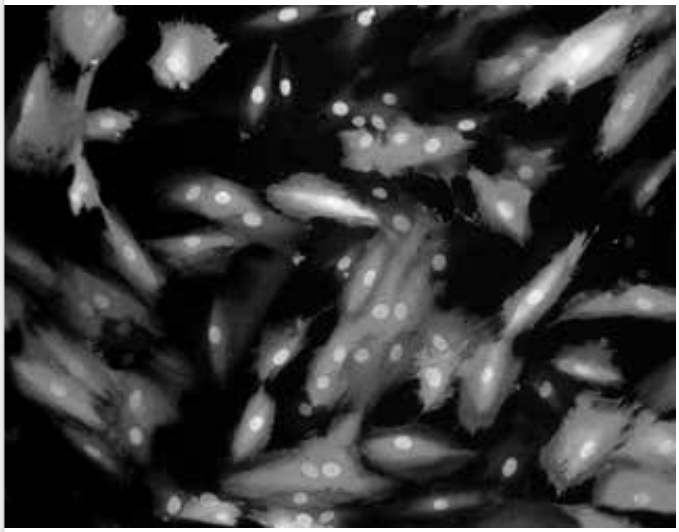
Brazzein occurs naturally in the West African plant ***Pentadiplandra brazzeana***. Since it is difficult and costly to extract the substance from the plant itself, manufacturing it by biotechnological methods is of great interest.

From tooth decay and obesity to diabetes, **too many sweet things make us ill** and place a strain on health insurance schemes. So low-calorie alternatives to sugar that go easy on our teeth are very popular. The problem is, they often have an unpleasant overtone.

The berries of the African plant *Pentadiplandra brazzeana*, however, taste so good that children forget to watch out for their mothers and lose all sense of time when chomping on the berries in the forest. Hence the name given to the plant by the local people – 'Oubli', from the French for 'to forget'.

The fruits of this plant contain a small natural peptide called brazzein that is **up to 1,200 times sweeter than sugar**, with a very similar taste. Brazzein is low in calories and considered to be very well-tolerated, given the long history of its consumption. Because it is soluble in water and has other favourable technical properties, it is also **an ideal substitute for sugar in industrial food production**.

1 Healthcare Costs Associated with an Adequate Intake of Sugars, Salt and Saturated Fat in Germany: A Health Econometrical Analysis, Dr Toni Meier et al., Martin Luther University Halle-Wittenberg, PLOS one, 9 September 2015



Immortalised cell lines isolated from human taste cells: when searching for the next generation of natural sweeteners or sweetness enhancers, BRAIN makes use of its own patented Human Taste Cell Screening Technology.

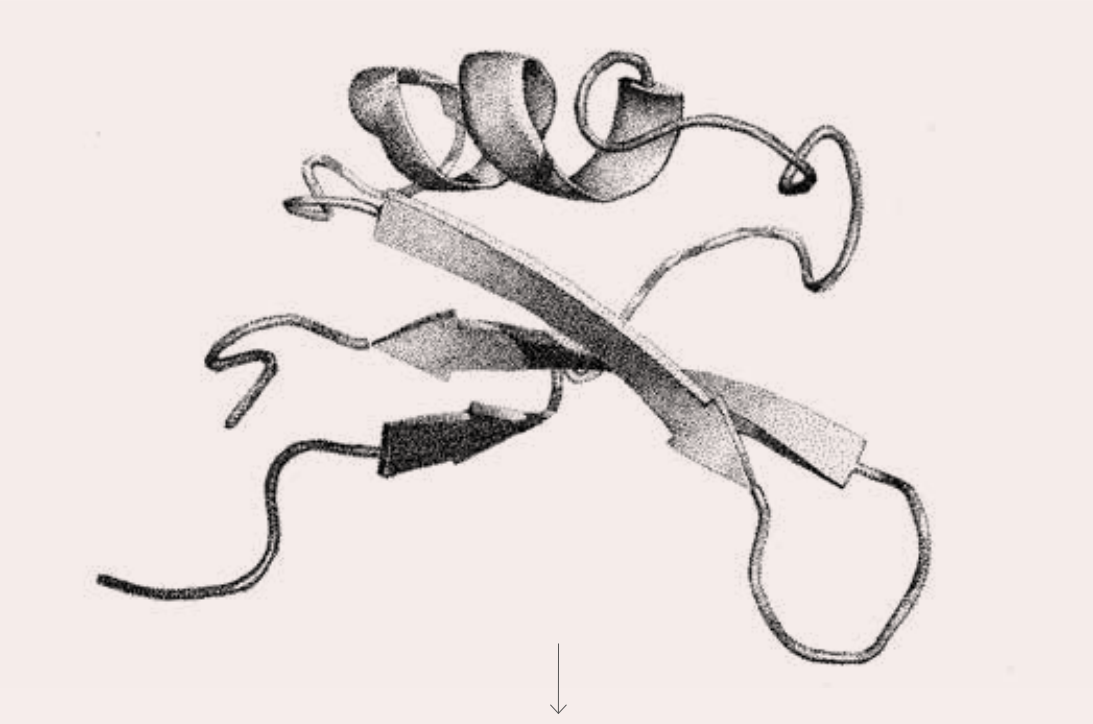
Isolating brazzein from the plant is time-consuming, unsustainable and costly. BRAIN has therefore developed a **biotechnical process using the yeast BR-6724** as a production organism. The peptide produced by the yeast cells is identical to the plant-derived substance and showed the same quality in a corresponding study.

Yeast cells have long been used by the food industry, for instance in breadmaking and beer brewing. The microorganisms developed by BRAIN as part of the NatLifE strategic alliance and the DOLCE partnership are **particularly robust and can be used in a wide variety of different applications.**

BRAIN insight

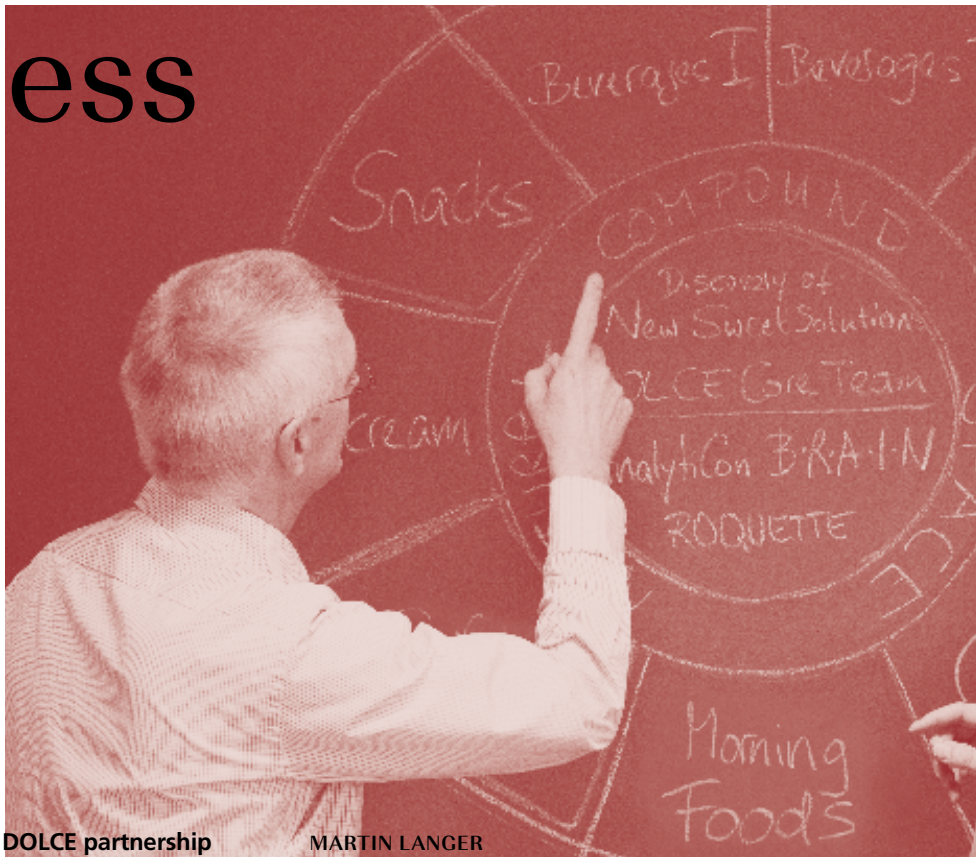
BRAIN develops active product components that determine the products' key properties. These include new or optimised enzymes and biocatalysts that meet complex process and application requirements. The peptide brazzein can be used, for example, as a sugar substitute in confectionery or soft drinks.

Enzymatic structure of brazzein



Possible products

DOLCE – Strategic partnership for natural sweetness

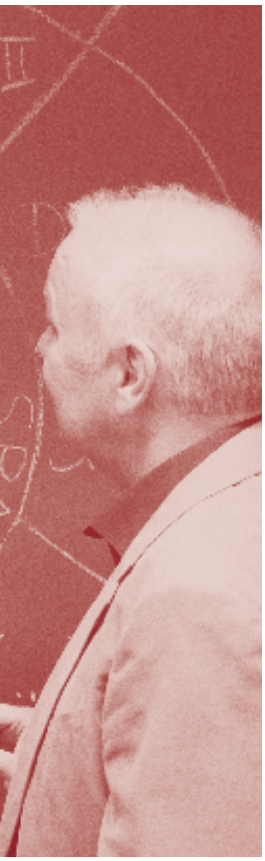


MARTIN LANGER

Three companies in the DOLCE partnership are assuming the challenge of developing new concepts for different markets and applications in the sugar and sweeteners sector. An interview with Dr Martin Langer, Dr Michael Krohn, Member of BRAIN's Management Board, and Dr Lutz Müller-Kuhrt, Managing Director of AnalytiCon Discovery GmbH.

Why is everyone talking about sugar substitutes at the moment? What makes them so interesting?

Consumers in industrialised countries are changing their eating habits. They are increasingly veering towards "clean label" and "all natural" products, foods that are free from chemical ingredients. This consumer trend is supported by policy-makers, who aim to reduce the annual costs to the health care system due to malnutrition. The sugar tax introduced in some countries has already put pressure on the consumer goods industry, and the WHO is even propagating the introduction of a 20 % sugar tax in all industrialised countries.



Aren't there already enough solutions on the market when it comes to sweeteners?

MICHAEL KROHN

Almost all current calorie-reduced sweeteners are of chemical/synthetic origin and must be accordingly labelled. Stevia was the first example. But what prevents wider use of stevia are the secondary flavours that consumers describe as "tasting like liquorice" or "bitter". So potential clearly exists in the field of bio-based substitutes.

Where are these substances to be found?

LUTZ MÜLLER-KUHRT

As part of the BRAIN Group, AnalytiCon is in possession of a collection comprising several tens of thousands of natural substances whose structure has already been analysed. To our knowledge, this is the largest collection worldwide. The special thing about this collection is that many of the substances were isolated from edible plants and are therefore probably eligible for GRAS (generally recognised as safe) status. That is what makes this collection so interesting as a starting point for chasing down new food ingredients. AnalytiCon has specialised in natural substances since the 1980s. We have continuously expanded our collection since then.

And how can the relevant candidates be found among the myriad of natural substances out there?

LUTZ MÜLLER-KUHRT

We can take a rational approach and look at plants that have been historically or empirically considered sweet, or which we at AnalytiCon know to taste sweet. We process these, isolate the corresponding substance and if it is new, we patent it. We have already identified 60 substances and put them together in a "sweetbox" as part of the DOLCE programme. This gives us at DOLCE a jump start in terms of developing natural sweeteners.

MICHAEL KROHN

BRAIN has also identified one initial candidate. We have identified the relevant plant peptide and manufactured it using biotechnological processes. This is brazzein, which is 1,200 times sweeter than sugar and delighted both our internal tasters and the first external tasting team. However, to avoid being dependent on source materials from plants that are known to be sweet, BRAIN developed its own Human Taste Cell Technology (HTC) within the NatLifE strategic alliance. It patented this technology in the USA in August this year. We are the first and only research group to have isolated and immortalised human taste cells, which can be used as a kind of "molecular tongue" to screen collections of substances. These cells also pre-taste each substance and provide a taste signal that determines the quality of the substance. Such natural substances will then be further developed with Roquette under the DOLCE partnership.

MARTIN LANGER

The exciting thing about HTC technology is that it can be used not only to search for the next generation of HISs (high-intensity sweeteners) but also for STEs (sweet taste enhancers), which have no taste in themselves but mediate between sugar and receptors and potentialise the sweet effect. That means only a fraction of sugar is needed for the same taste. This is relevant to many industrial applications, because in some cases, only the physical effects of sugar are needed for food production; as a filler for biscuits, as a "glue" for muesli bars or for the satisfying crunch of cornflakes.

How can added value be derived from this?

LUTZ MÜLLER-KUHRT

We have decided to partner with Roquette, a major agricultural product manufacturer, to tackle the issue of sweetness at an early stage. In this partnership, we supply access to the largest library of natural substances, and BRAIN

“Since we reported on DOLCE in late August 2016, we have received calls and emails from many interested consumer goods manufacturers.”

Dr Michael Krohn

has the unique technology for screening them and providing them to the partners of the DOLCE programme. When developing natural substances up to market stage, it’s important to have partners with global operations that can ensure the corresponding expertise in terms of formulation, approval and production. Roquette will handle these tasks within DOLCE.

MARTIN LANGER

One might add that the DOLCE programme has met with a huge response from globally operating consumer goods manufacturers. We give these companies the opportunity (in some cases exclusive, in others not) to become DOLCE partners in sub-segments such as beverages, milk production, chocolate, sauces, chewing gum and morning foods. The advantage for members is that they can be informed about developments at an early stage and acquire exclusive licenses for substances.

How many members do you have at present?

MICHAEL KROHN

We are currently holding negotiations. Those with two global consumer goods manufacturers are already very advanced. One thing is certain: since we reported on DOLCE in late August 2016, we have received calls and emails from many interested consumer goods manufacturers.

Is that something you can really earn money with?

MARTIN LANGER

Let me quote some figures from the 2014 issue of Beverage Digest. This states that global sales of 800 billion litres of beverages earn a thousand billion US dollars. Carbonated drinks account for one third of that volume. According to a 2015 analysis in Markets & Markets, the sugar substitute market amounts to USD 13.26 billion, and experts anticipate growth up to USD 16.53 billion in 2016. This market is currently dominated by sales of chemical sweeteners. A Lux Research study carried out in 2015 indicates that the trend towards natural ingredients will mean up to 25 % of all saccharose can be replaced with biological sugar substitutes. Those figures are our inspiration.

The NatLifE 2020 strategic alliance

In the Natural Life Excellence 2020 (NatLifE 2020) strategic alliance, 22 alliance partners coordinated by BRAIN work together to research, develop and produce natural ingredients as special products for a healthier life.

BRAIN coordinates the NatLifE 2020 strategic alliance, the first research alliance to be supported by the "Industrial Biotechnology Innovation Initiative" of the German Federal Ministry of Education and Research (BMBF) as of 1 February 2013.

The common approach of NatLifE 2020 is to use biotechnology and an understanding of biological systems to develop a new generation of sustainably produced biologically active components. As active ingredients for improved formulations for the food and cosmetic industry, these are to make a recognisable contribution to improving people's nutrition, health and well-being.

The alliance unites technology developers, SMEs and industrial enterprises. For the entire project term, a sum of roughly € 30 million is available to the partners. BMBF provides up to 50 % of this sum under the Industrial Biotechnology Innovation Initiative.

After some three years of successful research and development, an interim evaluation of the alliance was performed in late 2015. The evaluators recommended that support for the alliance should be continued. Phase 2, which is to last three years, therefore commenced according to schedule in March 2016. Another three-year phase of NatLifE 2020 (Phase 3) is also planned.

100 m

BMBF has set aside **funding** of € 100 million to support alliances that are intended to revolutionise industrial processes.

30 m

€ 30 million are to be **invested** in the NatLifE alliance. BMBF provides part of the project's funding.

22

partners work together within the alliance.

NatLifE2020

9

patent applications were drawn up between 2013 and 2015, and a large number of scientific papers were published.

→ OTHER PRIORITY AREAS OF THE BIOACTIVE COMPOUNDS UNIT

Innovative skin care

Skin is the largest human organ. It covers our body, protects us from injury and regulates our body temperature. Creams and lotions are designed to keep skin young and healthy. But most cosmetics contain petrochemical ingredients, which often have constituents or residues that may be harmful to health.

Modern products, on the other hand, rely on bioactive substances whose development and production are inspired by nature.

BRAIN has channelled the latest findings on skin biology into active cosmetic ingredients that influence cellular mechanisms and specifically delay skin ageing. Initial products are available in stores under the MYE Kosmetik brand. In addition, BRAIN has amongst others developed the SYNIC and PERLANCE BLANC PUR, ÉLIXIR MÉTAMORPHOSE, ProBeActive product lines as well as the perfume bel été together with the internationally famous cosmetics company Monteil. Both lines have been successfully launched on the market.

MYE KOSMETIK

Discover MYE cosmetics at:
→ **www.myekosmetik.de**

MONTEIL PARIS

Learn more about MONTEIL at:
→ **www.monteil.com**

B·R·A·I·N

Go here to learn more about BRAIN's future-ready solutions based on biological diversity:
→ **www.brain-biotech.de/en**

02

The company

02 The company p. 55

The bioeconomy – introducing bio-based processes to industry

Modern biology and biotechnology have made their way into society. While classical economic disciplines and the sectors based on them are increasingly coming up against their limits and have trouble handling the transition towards a sustainable approach to natural resources and ecosystems, the introduction of bio-based processes to economic systems and society acts as the driver of a new, sustainable industrial transformation process.

Setting the scene

Global challenges such as growing populations, scarcer resources and climate change are causing society, policy-makers and business to rethink. This advent of a bio-based approach to processes and industries is termed the bioeconomy. The relevant product innovations focus on sustainability, resource efficiency and health. Industrial biotechnology is the driving force within the bioeconomy. Being broadly applicable in various markets, biotechnology has the potential to drive the global implementation of sustainable problem solutions.

Classical economic disciplines and the sectors based on them are increasingly coming up against their limits and have trouble handling the transition towards a sustainable approach to natural resources. This is where the bioeconomy comes in. It paves the way for a new, sustainable transformation of economic systems and society in general.

Precisely this understanding of contributing to transformation is reflected in various transnational bioeconomy programmes worldwide. Agenda 21, the programme of action developed at the Rio Earth Summit in 1992, already points to the special role played by biotechnology when it comes to breathing life into the vision of sustainable development.

The EU Commission published the European Bioeconomy Strategy in 2012. The United Nations adopted the 2030 Agenda for Sustainable Development in late September 2015, and the UN Climate Change Conference in Paris in December 2015 achieved further success in terms of climate change mitigation. As a driver of the bioeconomy, biotechnology is one of the mega trends of decades to come. It is a key technology in the new transformation cycle of industries and society as a whole. Now is the time to use this momentum and develop it further. The European bieconomy currently employs some 22 million people, who achieve approximately € 2 thousand billion in added value.

europa.eu/rapid/press-release_IP-12-124_de.htm

As a cross-cutting technology, biotechnology integrates various life sciences and engineering disciplines such as micro- and molecular biology, biochemistry, genetics, cell biology and

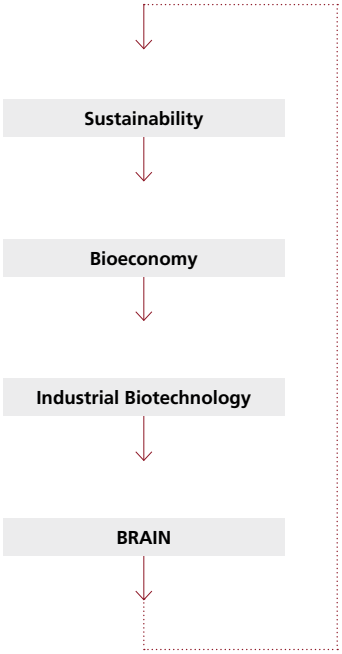
FIGURE 02.1 **SETTING THE SCENE**

Need for sustainability
- Challenge: provision of healthy food, bio-based products and CO_2 and energy-saving processes
- Response: increased use of sustainable biological resources and solutions, rather than non-renewable alternatives like fossil oil or chemicals

Rise of Bioeconomy
- Governments and businesses have realized the need for a bio-based economy.
- Bioeconomy is fueled by constant innovation and public interest.

Game-changing technology
- Industrial biotechnology is a key enabling technology in the transition to an eco-friendly, low carbon and resource-efficient economy.

BRAIN provides solutions for sustainable, all-natural product ingredients and processes:
- We make packaged food healthier.
- We make consumer care products more natural.
- We transform waste streams into new products.
- We substitute (hazardous) chemical products by biobased/natural solutions.



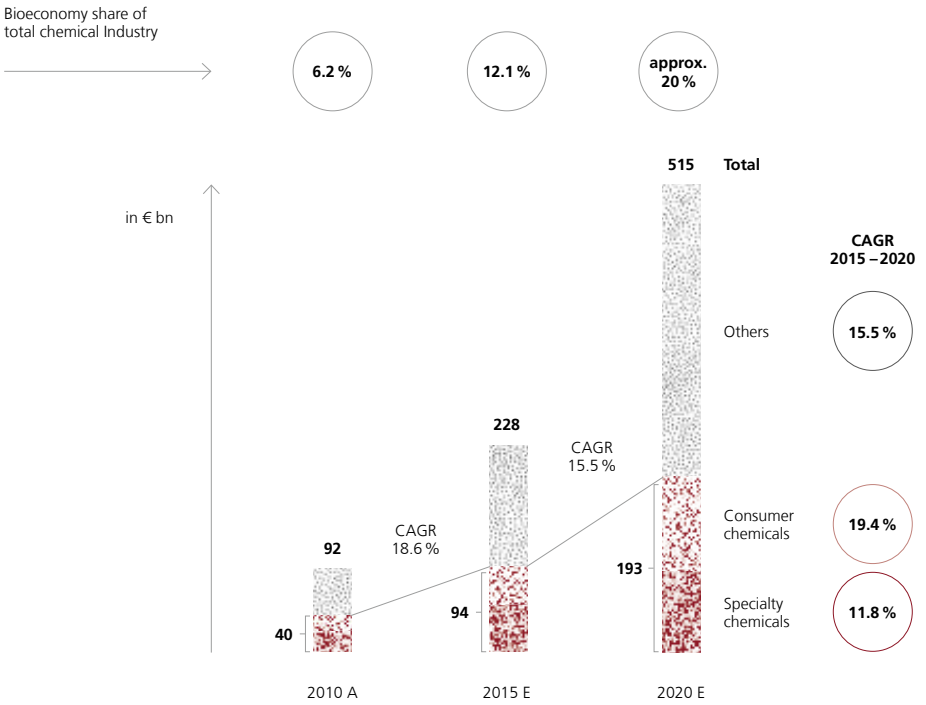
immunology, bio-process engineering, bioinformation science, medicine and material sciences, and serves a variety of markets such as the chemicals, pharmaceutical, consumer goods, animal feed, energy, environmental protection and food industries.

As a form of integrated environmental protection, biotechnology offers excellent opportunities for sustainable transformation and, due to its integrated application and implicit sustainability impacts, benefits society in general.

Broad-based support

The bioeconomy is not just a scientific or political playing field. Today, it is an issue that many innovative companies are already pursuing with a great deal of energy and success. Its application makes it possible to develop new energy-efficient and resource-efficient processes and products and establish them on the markets. This supports the transition to resource-efficient economic activity and a society based on a sustainable footing. In this vein, the UN 2030 Agenda and the UN Climate Change Conference in Paris ratified decisions to reduce the greenhouse gas CO_2, for example. The Global Bioeconomy Summit held in Berlin in late November 2015 under the patronage of German Chancellor Dr Angela Merkel further substantiates this trend. At this summit, the bioeconomy was discussed and enshrined as a key German and European technology.

FIGURE 02.2 **GROWING BIOTECH SALES**



Chemicals and materials are increasingly produced using biotechnology.[1]

BRAIN focuses on consumer and speciality chemicals, expected to grow at approx. 15.5 % from € 94 bn to € 193 bn in the next five years

Industrial biotech sales are expected to outgrow the overall Chemical markets – which are expected to grow at 4.1% (CAGR 2015–2020e)

Transforming industry

Many economists see biotechnology as a driving force in connection with efforts and programmes to introduce the bioeconomy and as the basic innovation for a new Kondratieff cycle geared to sustainability. They thus accord it the same significance that some analysts and scientists currently attribute to digitisation. In view of the existing bio-based orientation of entire sectors, one could almost go so far as to call this the age of digitisation and bio-based industry.

According to a study published by the EU with the title "Innovating for Sustainable Growth", 9 % of people employed in Europe can already be directly or indirectly assigned to the bioeconomy. In the USA, as the US National Academy of Science published in 2015, about 2.2 % of productivity as a whole consisted of bio-based products, to the tune of USD 353 billion. In the global chemical industry alone, sales achieved with biotechnological processes or technologies are growing by about 20 % per year (see Ernst & Young Biotech Report 2014).

Worldwide biotech sales within the chemical industry were estimated at around € 228 billion for 2015, i. e. approx. 12 % of all sales in that sector. That means the percentage of biotech sales in the chemical industry has doubled since 2010. Experts assume that one in five euros in chemical industry sales will be earned with biotechnological processes and products in 2020. This trend is accompanied by lively biotech-friendly M&A activity on the part of established companies such as BASF, with the takeover of Verenium, DSM with the takeover of Martek, and Novozymes, which recently took over Organobalance.

But the promotion initiatives of EU Horizon 2020 launched in 2012 with some € 80 billion in funding and the 2010 German initiative entitled "National Research Strategy 2030", with a funding volume of € 2.4 billion dedicated to industrial biotechnology, also send out a clear message.

ec.europa.eu/research/bioeconomy/pdf/official-strategy_en.pdf

Figure 02.2

1 Festel et al., Journal of Commercial Biotechnology, 2012, modified (2015 and 2020 estimated, excluding pharmaceutical and biofuels); CEFIC, BRAIN estimates; Roland Berger

Besides many different societal and economic drivers, there are also broad political supporters that make the bioeconomy one of the key technologies of the 21st century, according to statements by former EU Commission President Juan Manuel Barroso (Barroso 2010; Europe 2020). By inaugurating the German Bioeconomy Council and announcing a research strategy that focuses on industrial biotechnology, the German Government also sent a signal at an early stage and took a clear stance with its broad support for the bioeconomy (German Federal Ministry of Education and Research: National Research Strategy Bioeconomy 2030). A strategy paper published in the USA in 2015 by Thomas M. Connelly shows that the bioeconomy is one of the key growth issues for the 21st century in the USA too.

www.bmbf.de/pub/Nationale_Forschungsstrategie_Biooekonomie_Kurz_dt._eng.pdf

Sustainability will become a significant investment factor

The bioeconomy approach will receive growing support from financial markets in response to growing environmental concerns. A study by US SIF showed that both asset managers and institutional investors with a focus on socially responsible investment (SRI) are increasingly including environmental protection factors in their investment policy and thus limiting or rejecting securities from companies that use substantial quantities of fossil fuels. Beyond this, investors who are worried about climate risk submitted 72 applications on this subject in 2014 (over twice as many as in 2012) and negotiated a series of pledges with specific companies to publish or reduce their greenhouse gas emissions. In all, sustainable and responsible capital investments and impact investing in the USA rose by 76 % from 2012 to 2014 (US SIF). A topical example in this context is the strong shift in investments towards greater sustainability owing to the decision taken by the Norwegian parliament. In future, the Norwegian sovereign wealth fund will no longer invest in business with coal. This represents the largest disinvestment in fossil fuels and concerned 122 companies around the globe. It should also be pointed out here that the sovereign wealth fund of Norway, totalling USD 900 billion, is the largest of its kind worldwide. This decision by the Norwegian Government might prompt other investors to limit their own investments in the fossil fuels sector.

In fact, another major investor, Allianz, announced in November 2015 prior to the UN Climate Change Conference (COP 21) in Paris that it would no longer finance coal-based business models. Allianz will no longer invest in companies that receive more than 30 % of their revenue from coal mining or generate more than 30 % of their energy from coal. It will disinvest in equity securities to the value of € 225 million up to March 2016, while bonds to the value of € 3.9 billion will be allowed to expire.

Finally, a growing number of investors are interested in sustainable investments. In 2012, one US dollar in nine was invested in US capital assets under professional management in the sphere of sustainable investments, mainly in the form of equity securities. Up to 2014, the figure was one US dollar in six, which means an increase to a total sum of USD 6.57 thousand billion in sustainable investments (source: Morgan Stanley Institute for Sustainable Investing).

FIGURE 02.3 **OUR MISSION: TO ENABLE THE BIOECONOMY**

We develop and produce novel biological ingredients such as bio-active natural substances, enzymes and high-performance microorganisms based on our proprietary BioArchive to improve products for various B2B markets.

We facilitate sustainable, efficient, bio-based products and processes for the speciality and consumer goods industries.
We are on the way to becoming a fully integrated bioeconomy company.

Implementation of our mission through:

Unique selling points

- Extensive proprietary BioArchive full of natural solutions
- Unique combination of technological expertise and access to the BioArchive
- Successful track record for the provision of novel biological ingredients

and growth strategy

- Attractive pipeline of proprietary product candidates
- Access to global markets through licencing via industrial partners
- Access to selected markets through the company's own subsidiaries

BRAIN and the bioeconomy

BRAIN is the first bioeconomy company to go public. The company issued its shares in the prime standard segment of the Frankfurt Stock Exchange on 9 February 2016. The company's goal is to successfully drive forward the use of bio-based processes in industry, a development that has already begun.

Figure 02.3

Besides BRAIN's comprehensive access to "nature's toolbox", its unique selling point also consists in its unique technology portfolio. This has been broadly safeguarded with approximately 350 patents both for substances and technologies. With its mix of availability and technological access to nature's toolbox, BRAIN is in a position to make processed foods healthier and consumer products more natural. Thanks to our technologies (microorganisms), industrial waste streams (e. g. CO_2, household waste, electronic waste and many other types) can be used to derive valuable new products. Added to this, it is increasingly becoming possible to use biological solutions to replace chemicals that are harmful to health.

Strategy

Industrialisation strategy along the value chain: from research partner to fully integrated company with its own production, marketing and sales.

Over its first 15 years of operations, BRAIN has developed itself into a preferred research and development cooperation partner for established industrial companies in the chemicals, nutrition and animal feed industries, as well as the cosmetics sector. In the course of these co-operation programmes, BRAIN has realised growing sales and also succeeded in establishing and continuously expanding its first proprietary technologies and its unique BioArchive. BRAIN will continue to develop and expand its BioScience segment in the future in parallel to its second segment established six years ago, the so-called BioIndustrial segment.

Figure 02.5

These successes over many years have resulted in a situation where BRAIN has been progressing along the value chain since 2010 with a current total of 15 of its own developments. Industrialisation of the BRAIN business has consequently occurred through vertical integration. The BioIndustrial segment markets the company's own development lines.

The BioScience segment has been and remains profitable over all these years, reporting tidy double-digit annual growth rates. With its industrialisation strategy, BRAIN anticipates even greater sales potential in its BioIndustrial segment than in its BioScience segment and also expects to boost its EBIT margin insofar as BRAIN develops its own products further along the value chain before marketing them.

FIGURE 02.4 **THE SEGMENTS**

BioScience	BioIndustrial
Description · Exclusive collaboration partnerships with large industrial players · BRAIN is a trusted partner due to its unique IP and know-how · IP transfer to the customer, BRAIN retains rights	**Description** · Own product innovations either through industrial partners (royalty-based income stream) or through own subsidiaries (full P&L effect) · Targeting partners or businesses with global market access
Focus · Technology driven, joint developments	**Focus** · Value accretive growth strategy
Remuneration & benefits · Upfront, milestone, success payments · Exclusivity fees · Royalties	**Remuneration & benefits** · Licence fees from established industrial partners · Product-related cash flows · Realising product/technology synergies
Rationale · Continuation of a trusted business model · Stable and profitable growth · Technology development and retained rights	**Rationale** · Leverage BRAIN's proprietary IP and know-how · Optimise the way to market · Scalability

Company structure and business model

Figure 02.6

The thinking and action at BRAIN AG and its majority-owned subsidiaries focus on the identification, research, utilisation and marketing of natural biological substances and processes for industrial use.

A key objective of this so-called white biotechnology is to replace artificial, scarce and/or even health-damaging industrial substances and processes in manufacturing with biological, biochemical and biotechnology solutions, thereby making industrial process structures more effective, environmentally compatible and sustainable. White biotechnology also stands for access to product innovations and the establishment of new biological processes. BRAIN is advancing the biologisation of industry and supporting a more sustainable and resource-conserving economy.

In developing products in the focus areas of bioactive natural materials, microorganisms and enzymes, BRAIN can make recourse to the extensive information base of its BioArchive – one of the world's largest natural resource collections.

Outstanding USPs

Over the 23 years of its operations, BRAIN has developed many USPs (unique selling propositions), which have already helped BRAIN's operating segments develop their business in the past.

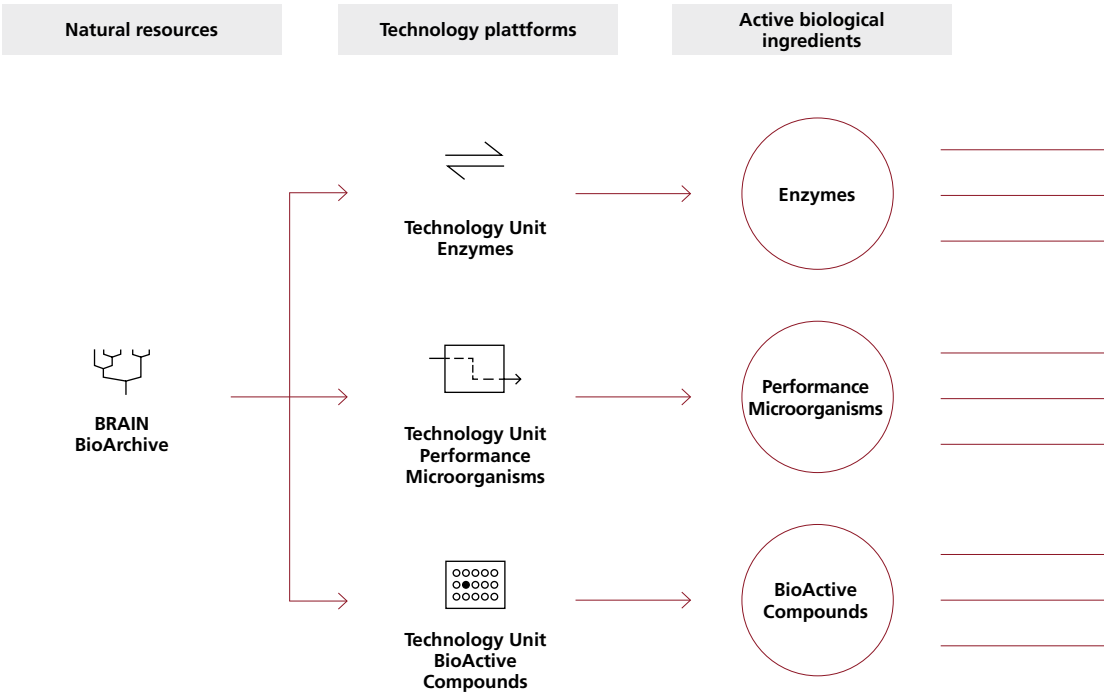
The BRAIN BioArchive

This comprises, firstly BRAIN's own extensive BioArchive, which includes an immense variety of biological solutions for industrial processes and bioproducts. The BRAIN BioArchive encompasses around 53,000 comprehensively characterised, cultivable microorganisms, more than 50,000 characterised natural substances and fractions consisting of edible plant material, as well as a large number of new enzymes and metabolic pathways derived from organisms that have not been cultivable before. This unique collection is being expanded continuously, and already enables a new access to previously unutilised, natural and sustainable substances and processes.

BRAIN technologies

Combining this "Toolbox of Nature" – as the BRAIN BioArchive is fondly called – with unique technological expertise consequently makes BRAIN interesting as a partner for industry, enabling the company to grow sustainably through cooperations. Examples of this BRAIN technological expertise are collected in more than 350 patents and patent applications in more than 48 patent families, and include technology innovations and product innovations in all three of BRAIN's product categories: enzymes, performance microorganisms and bioactive natural substances.

FIGURE 02.5 **FROM THE BIOARCHIVE TO THE B2B MARKET**



BRAIN products

Enzymes

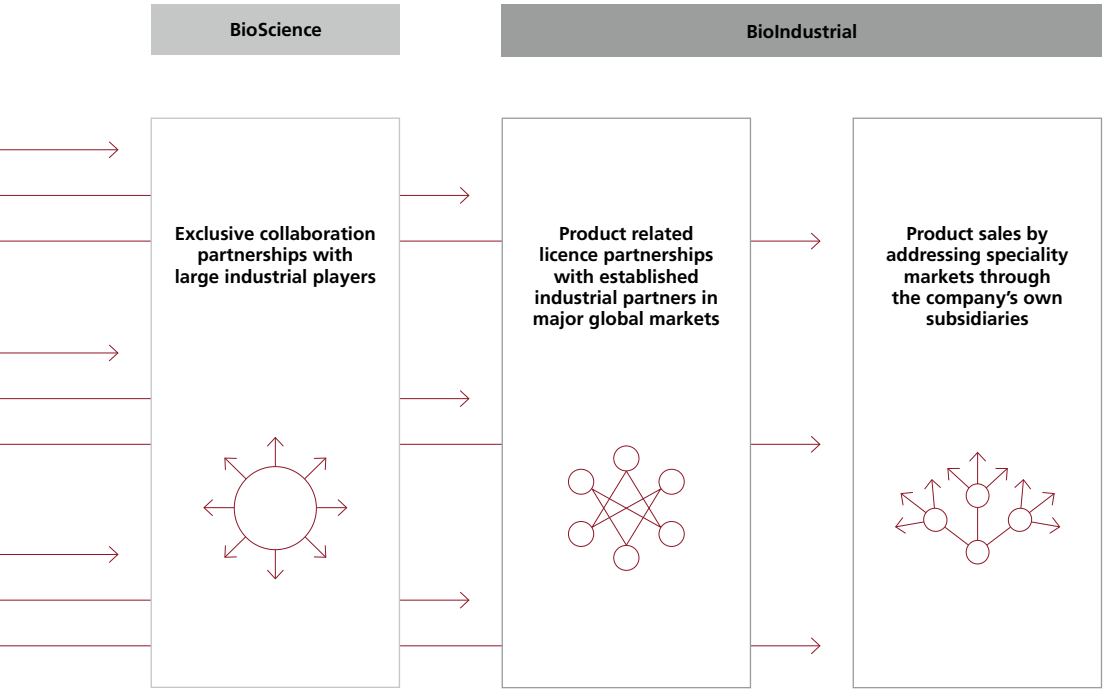
BRAIN develops new or optimised enzymes and biocatalysts that meet complex process and application requirements, and enable innovative and technical production processes to be established. Access to an almost inexhaustible source of enzymes through metagenomic technology enables the company to find and develop many of technological enzyme solutions.

Performance microorganisms

BRAIN develops customised designer microorganisms as functional biomass for optimised industrial production processes or to establish bioprocesses in chemical procedures (BioSubstitutes), as well as to manufacture bioactive natural substances and enzymes for speciality markets.

Bioactive natural substances

BRAIN identifies and develops bioactive natural substances for product developments in the nutrition, cosmetics and chemical industries. The focus here is on the biological effect of natural substances and on improving nutrition formulations, cosmetics and animal feed.



Track record

BRAIN's unique track record also deserves mention. The BRAIN team has succeeded over the past years in initiating and successfully establishing more than 100 industrial cooperations of many years' standing. This BRAIN business – which it continues to operate as a business division – has been integrated as its BioScience area. This BioScience business has been continuously expanded over the past years and has been profitable since BRAIN commenced operating activities. The company has succeeded over the past years in delivering a large number of biological solutions and substances to industry that have then found their way into various product applications – ranging from chewing gum through to modern detergents, various chemical processes and cosmetics.

Growth strategy

The cooperations with industrial partners are nevertheless only scalable on a linear basis – the more industrial corporations are launched, the greater the staff costs incurred. BRAIN continues to serve only a small part of its value chain with this business model, and has consequently also participated to only a minor extent in innovation successes on the market. For this reason, the company started a few years ago (intensively from 2010) to also initiate its own developments in interesting areas along the value chain, thereby creating an attractive pipeline totalling 15 proprietary product candidates over the years. These substance developments are in various development stages.

Figure 02.7

Licence partnerships with established industrial partners in major global markets

When addressing major global markets, BRAIN endeavours to license innovations or enter into partnerships with established market participants. The "DOLCE" programme announced in August 2016 can be seen as an example of a partnership in large markets. Together with the BRAIN subsidiary AnalytiCon and the French agriculture sector company Roquette, BRAIN will develop the next generation of natural sweeteners and sweetness enhancers. All three partners in the DOLCE team have different tasks in developing the natural substances found in this context. Instead of marketing the products through a separate subsidiary, the production and marketing task within DOLCE is performed by Roquette, a company operating worldwide. Roquette is known to consumer goods manufacturers across all continents as a reliable and preferred manufacturer. No doubts exist that a punctual global rollout will occur.

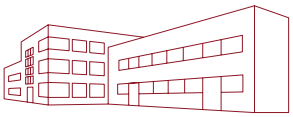
Addressing speciality markets through the company's own subsidiaries

BRAIN gains access to selected specialty markets through its own subsidiaries in this context. The development of enzymes 1 and 2 from the BRAIN pipeline offers an example of this. Over many years, WeissBioTech has established a broad and closely interlinked global sales network for existing products. BRAIN innovations in the enzymes area enable the joint strategy of BRAIN and WeissBioTech – to strengthen the special enzymes division of WeissBioTech – to be implemented on time. The company plans to deploy 20 % of the funds raised by the IPO to invest in further M&A activities, in order to gain more access to specialty markets.

→ Spotlight WeissBioTech p. 68

FIGURE 02.6 **THE BRAIN GROUP**

BioScience



The BRAIN Group holds 100 % of shares.

BRAIN AG
Zwingenberg

BRAIN represents the introduction of bio-based processes to industry for sustainable, bio-based economic activity. For this, BRAIN develops tailor-made solutions from natural biodiversity for successful applications in industry.

CEO: Dr Jürgen Eck

The BRAIN Group holds 57.7 % of shares.

ANALYTICON DISCOVERY
Potsdam

AnalytiCon Discovery is one of the leading companies in the research and development of products based on natural substances. AnalytiCon is a partner of choice in the pharmaceutical, food and cosmetics industries.

Managing Director: Dr Lutz Müller-Kuhn

BioIndustrial

The BRAIN Group holds 50.6 % of shares.

WEISSBIOTECH
Ascheberg

WeissBioTech GmbH is an established company in the enzymes and natural preservatives for the food industry segment. Its global network of distribution partners enables WeissBioTech to sell its products around the world.

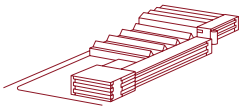
Managing Director: Hans de Bie

The BRAIN Group holds 68.3 % of shares.

MONTEIL
Düsseldorf

MONTEIL is considered an anti-ageing specialist. The cosmetics company is an experienced partner to beauty institutes and perfume stores, and is represented in over 30 countries. Its products incorporate an ideally adjusted concentration of natural bio-active ingredients.

Managing Director: Christine Kiefer



The BRAIN Group holds 100 % of shares.

L. A. SCHMITT
Ludwigsstadt

L. A. Schmitt was founded in Leipzig in 1925 and produces its own high-end cosmetic product lines, as well as products for trading companies, and wellness and cosmetics brands. Regular new developments incorporate the latest scientific findings.

Managing Director: Manfred Stöver

The BRAIN Group holds 100 % of shares.

MEKON SCIENCE NETWORKS
Eschborn

Mekon Science Networks links up experts at BRAIN AG with external industrial partners and networks, with the aim of marketing innovative products and development candidates from BRAIN's production pipeline.

Managing Director: Dr Bela Kelety

Spotlight on WeissBioTech

WeissBioTech
your partner in white biotechnology

WeissBioTech GmbH (WBT) was created in 2002, initially under the name Add Food Services GmbH, with the aim of developing, producing and marketing food additives such as preservatives, processing aids and enzymes, etc. for industries such as the dairy and meat industries and for the food industry in general. Since its creation, the company has succeeded in establishing itself in the segment of enzymes, natural preservatives for the food industry and in the white biotechnology market.

Wide variety of products and global sales outlets

WBT has a solid product portfolio that is pragmatically and flexibly structured and enables WBT to gain recognition in its markets. This portfolio and the broad range of enzyme products it offers for a variety of industrial segments, such as the production of fruit juices and alcoholic beverages, for the starch processing industry and the production of renewable fuels, provides a good basis for introducing novel or improved enzyme products.

Its global network of more than 30 distribution partners enables WBT to sell its products around the world with a relatively small sales team of its own. Adding further (enzyme) functionalities to its portfolio and marketing the existing portfolio in other markets offers WBT further growth opportunities.

WBT's own infrastructure comprises an administrative unit in Ascheberg near Münster and a 3,000-square-metre storage, production and research facility in Chanteloup-en-Brie near Paris.

WBT was formed as an association of experienced people who worked for decades in the target industries now served by WBT. This experience includes a deep understanding of the application technologies and enzymes involved and a broad network in the target industries. This ideal combination has allowed WBT to develop win-win relationships with customers and its own producers that further strengthen WBT's network and provide key support for the company's future development.

Creating and building synergies

In November 2014, BRAIN and WBT entered into a strategic partnership in the strongly growing industrial enzymes segment. This cooperation offers both companies the unique opportunity to create and build synergies in the fields of white biotechnology and the bioeconomy. It combines the complementary disciplines of highly developed research into enzymes and biocatalysts with the development, production and distribution of technical enzymes on the market.

Together, the two companies will continue their strategy as planned to expand the higher-margin speciality enzymes business (e. g. enzymes for the food industry to manufacture innovative functional foods) in order to successively counteract the commoditisation of volume-driven bulk enzymes.

www.weissbiotech.com

"WeissBioTech has been working intensively on its production and sales units for the enzyme industry for many years. The strategic partnership with BRAIN makes it possible to close the gap between identifying new enzymes and their development, production and marketing for the target industry."

Hans de Bie — CEO of WeissBioTech GmbH

Its global network of distribution partners enables WBT to sell its products around the world.

Argentina: Juan Roberto Poggi y Cia SRL **Australia & New Zealand:** Ozbiotec Pty Ltd. **Belarus:** A-PROFI limited **Bulgaria:** Sermia Ltd. **Central America:** Deltagen Bioproducts N.A. **Chile:** Comercial Santa Adriana Ltda. **China:** Wuxi Innoke Technology Co. Ltd. **Czech Republic & Slovakia:** Vulcascot s.r.o. **Finland:** Senson Oy **Georgia:** A Profi-Group Ltd. **Germany:** C. Schliessmann, G. Wein GmbH & Co. **Greece:** Elton International Trading Company S.A **Hungary:** T&M kft. **India:** Anthem Cellutions (India) Ltd. **Iran:** Arteen Chimi Dev. trade **Italy:** Agrienology S.R.L., Corimpex Service Srl **Netherlands:** In2Food B.V. **Poland:** BART Spolka z ograniczona, Vulcascot Polska Sp. z.o.o **Romania:** Elton Corporation SA **Serbia:** Elton Corporation d.o.o. **South Africa:** Mountain River Group Latarie(Pty)Ltd **Spain:** Larbus s.a. **Turkey:** Maltepe Kimya **Ukraine & Uzbekistan:** A-Profi Ukraine **USA & Canada (Fuel Ethanol):** BASF Enzymes LLC **USA & Canada (Food Industry):** ATP Group

Product pipeline

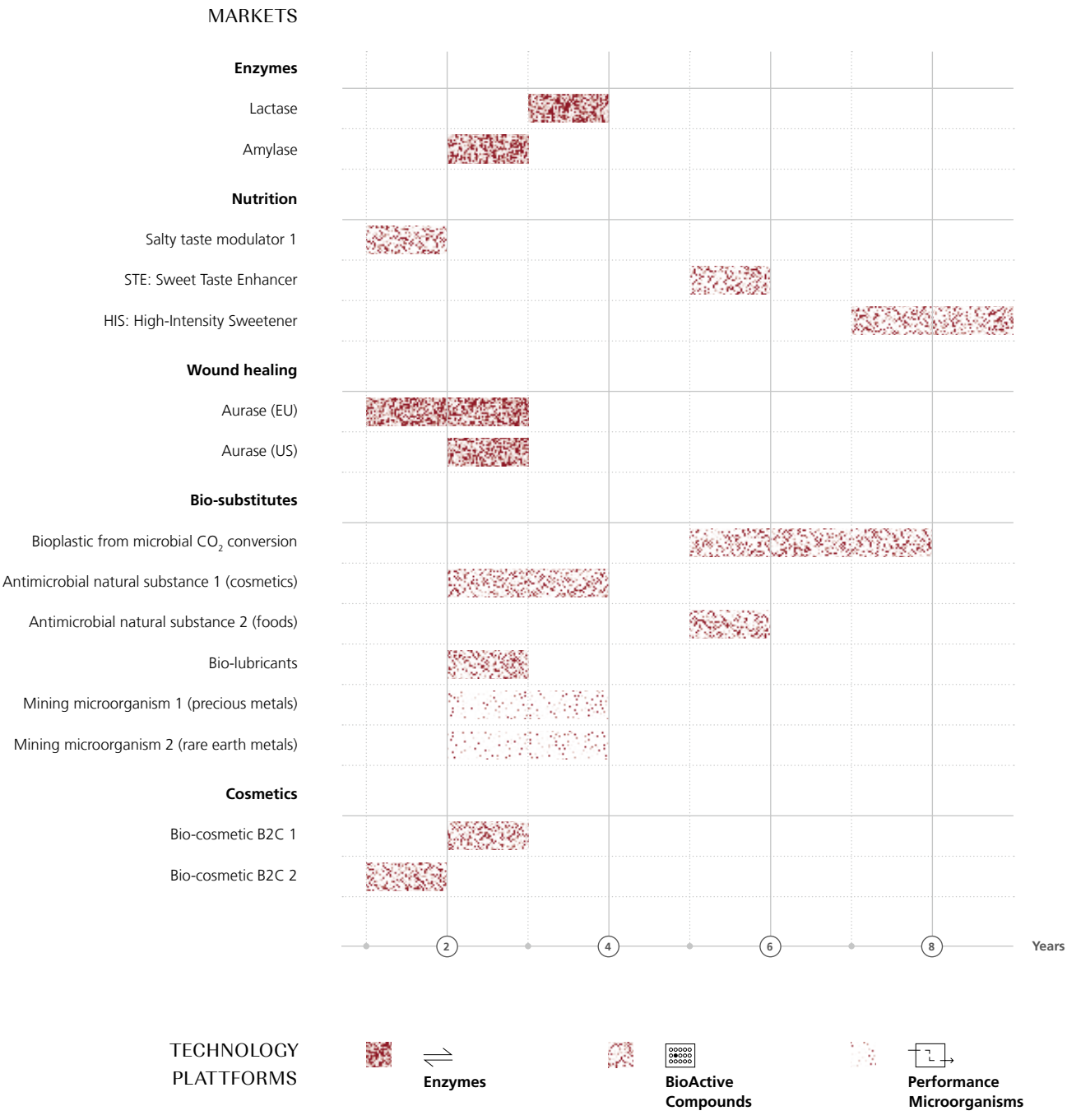
BioIndustrial – our own product pipeline as a driver of growth

BRAIN's current product pipeline forms the essential basis for the future success of the company's industrialisation strategy. Overall, BRAIN is currently developing 15 different product candidates in parallel. All of them are to be launched on the market in the next few years. The company plans to market one to two products per year or enter into product-based partnerships.

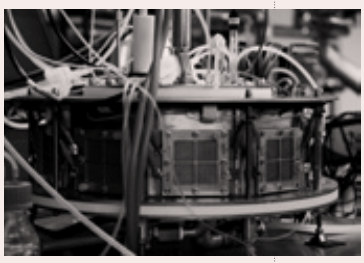
Novel biological sugar substitutes and taste modulators provide answers to urgent social issues such as obesity and the related lifestyle diseases. Biosubstitutes such as bioplastics or bio-based lubricants drive the replacement of existing chemical processes with biological ones, reduce CO_2 emissions and thus make for greater sustainability. Added to this are a wide variety of enzymes for use in the food industry, detergents or wound treatment, as well as innovative active ingredients for the cosmetic industry.

BRAIN's pipeline is continuously filled up as soon as one development line has been marketed. Before a new development project starts at BRAIN, it is subjected to technical and commercial reality tests and incorporated into corresponding business cases that follow the project along the value chain in a stage-gate process. The programme is only commenced if it is considered feasible from a technical/scientific and commercial perspective. This significantly increases the chances of a programme being successful, since ideas that hold no prospects of technical and/or commercial success are weeded out at a very early stage. Of the current 15 development lines, the company plans to pursue one to two products/processes to market stage. As soon as a product or process has hit the market, a new programme is added to the development pipeline. The aim is to maintain a steady state of 14–16 development lines. This means BRAIN's innovation process can also be seen as a value driver in the medium to long term.

FIGURE 02.7 **NEW PRODUCT DEVELOPMENT**



Highlights of the 2015/2016 business year



2015 — 2016

October — November — December — January

5 October 2015

High-tech process optimisation in biogas plants

BRAIN announces the achievement of an optimised biogas production process feeding on industrial waste streams. In the ESE-BIOGAS programme, BRAIN scientists successfully improved the microbial biogas production process, resulting in a 20 % higher energy yield compared to known standard processes.

17 November 2015

BRAIN enlarges Management Board

On 1 November 2015, Mr Eric Marks (54) was named Chief Operating Officer (COO) of BRAIN AG. Chairmanship of the Board (CEO) will be taken on by Dr Jürgen Eck, who has been with BRAIN and in its group of partners since 1994.
It was also announced that Dr Georg Kellinghusen would assume the role of CFO of BRAIN AG as of 1 January 2016.

3 December 2015

BRAIN honoured with German Citizen Award

The German Citizen Award, Germany's major prize for honorary services, was conferred for the 13th time in 2015. Under this year's motto "Cultural Life – Expanding Horizons", there were more than 2,300 entries. BRAIN and its founder Dr Holger Zinke were awarded second prize in the "Committed Business" category.

5 January 2016

BRAIN announces intention to float

On 5 January, BRAIN became the first German company in the bioeconomy sector to announce plans for an Initial Public Offering on the Frankfurt Stock Exchange with admission to the Prime Standard.

20 January 2016

BRAIN sets IPO price range

BRAIN in cooperation with its current shareholders as well as ODDO Seydler as lead manager of the transaction determined the terms for its initial public offering ("IPO"). Accordingly, the price range was set at € 9.00 to € 12.00 per share.

February

3 February 2016

BRAIN sets IPO price at € 9 per share

The final offer price for BRAIN shares was set at € 9 per share. Following the IPO capital increase, the share capital of BRAIN AG will amount to 16,414,348 shares.

9 February 2016

BRAIN share successfully starts trading

BRAIN successfully began trading in the Prime Standard segment of the stock exchange under the ticker symbol BNN and ISIN DE0005203947/WKN 520394. The first share price was at € 9.15, and therefore above the issue price of € 9. A total of € 32.5 million (including over-allotments) were placed in the context of the offering, from which the company receives gross proceeds of € 31.5 million.

March

1 March 2016

NatLifE 2020 Strategic Alliance given go-ahead after successful interim review

At the end of the year 2015, following nearly three years of successful research and development, the alliance had to undergo an interim review by a panel of scientific experts set up by the German Ministry of Education and Research (BMBF). The expert panel recommended to enter into Phase 2 of the alliance. As scheduled, Phase 2 will start on 1 March 2016. Another three-year phase of NatLifE 2020 (Phase 3) is also planned.

April

13 April 2016

BRAIN and Südzucker cooperate in the field of CO_2 as a nutrient for microorganisms

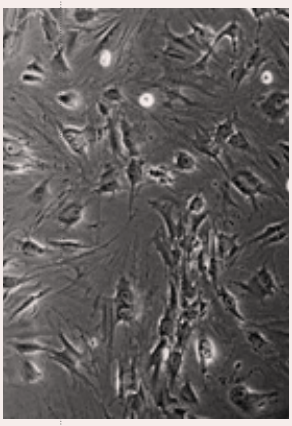
BRAIN and Südzucker are intensifying their cooperation in the field of microbial utilisation of carbon dioxide from waste streams as part of the strategic alliance ZeroCarbFP. The intermediate products generated from CO_2 may then be utilised as specialty products in the bioplastics industry, which so far has been dependent on fossil resources. Based on the promising results, the two partners have now applied for further funding in order to scale up the process to a pilot facility at the Zeitz CO_2-emitting bioethanol plant.

May

31 May 2016

BRAIN continues to demonstrate solid business performance in the first half year 2015/16

During the reporting period from 1 October 2015 to 31 March 2016, the business developed positively with only one exception. The BRAIN Group's total operating performance increased from € 12.8 m to € 13.0 m in a year-over-year comparison.



werk bund
label 2016

DOLCE

June

July

August

September

14 June 2016

BRAIN and PS Biotech announce cooperation on biotechnological process optimisation

PS Biotech, a start-up company based in Aachen, is working together with BRAIN on optimisation of substrate release in miniaturised biofermentation processes as part of the NatLifE 2020 Strategic Alliance coordinated by BRAIN.

30 June 2016

Huge success in "cat taste" research

BRAIN and DIANA Pet Food today announce the achievement of an important milestone within their strategic partnership in the field of cat taste science.

27 July 2016

Wound dressings made from bacterial alginate

In a joint project called AlBioTex, researchers at the Hohenstein Institute, BRAIN and Kelheim Fibres GmbH have successfully developed wound dressings made from bacterial alginate.

3 August 2016

BRAIN granted key patent in the United States

BRAIN announces today the granting of US patent 9,404,080 with the title "Human taste cells capable of continuous proliferation". This confers intellectual property rights to BRAIN on using these cells for investigating the mechanisms of taste modulation and screening for novel all-natural taste molecules in the USA.

29 August 2016

DOLCE – the next generation of natural sweeteners

BRAIN, AnalytiCon Discovery and Roquette have signed a strategic partnership for the development of next-generation natural sweetening solutions. The three partners are addressing the challenge of finding sugar and sweetening solutions in different markets and applications. Many of the major Fortune 500 global consumer goods companies are known to have significant interest in this field.

16 September 2016

BRAIN presented with the Werkbund Label 2016 award

BRAIN has received the WERKBUND Label 2016 Award from the Deutscher Werkbund Baden-Württemberg for acting as a role model in terms of transdisciplinary cooperation.

26 September 2016

BRAIN appoints experienced corporate finance specialist to the Board of Management

Changes in the Board of Management and the management team were pushed forward on 23 September 2016. Frank Goebel will be appointed to the Board of Management of BRAIN as per 1 November 2016. This step will anchor the Group's M&A activities, which are crucial for the company's forward integration, directly in the Group's Board of Management.

Press review

"Toolbox of life" stored at BRAIN

DIE ZEIT, 19 November 2015

At the service of health: BRAIN finds and develops agents that block bitter taste

MITTELDEUTSCHE ZEITUNG, 30/31 October 2015

BRAIN discovers geobacillus that "digests" carbon dioxide

FAZ, 30 November 2015

Bioeconomy pioneer breaks glass ceiling on stock exchange

transkript, 1–2/2016

BRAIN injects some innovation into the capital market

FOCUS MONEY ONLINE, 19 January 2016

Biotech company BRAIN sets sights high for stock exchange price

FAZ, 06.01.2016

IPO possible even in tough market

Börsen-Zeitung, 10 February 2016

BRAIN acts as beacon in sector that is key to the German economy

Darmstädter Echo, 31 May 2016

Bioeconomy is key sector for transforming economic systems

BIOspektrum, March 2016

Mining for gold and silver with bacteria

Wirtschafts Woche, 19 August 2016

BRAIN on quest for "holy grail" of sweeteners

transkript, 10/2016

We are at the start of a new era

EURO am Sonntag, 8 to 14 October 2016

Lively corporate culture

Technology campus

In 1996, BRAIN bought a technology campus consisting of 2,500 square metres of laboratories, production and office facilities in different buildings. The core of the campus is the Bauhaus building, classed as a monument, which was revitalised in meticulous detail and won the prestigious Josef Maria Olbrich prize awarded by the Association of German Architects (BDA) in 1998.

An important precondition for BRAIN's style of work is the open, light-filled building in which all employees can interact with each other at any time, quite in keeping with the Bauhaus model that can still be admired in Dessau today.

Creativity arises in an environment that promotes work and thought processes while being aesthetically pleasing. The BRAIN technology campus provides such creative space.

Built on the Bauhaus philosophy

The BRAIN building is one of the few remaining examples of industrial Bauhaus architecture and is therefore a listed building. Functionality and new, innovative approaches were the hallmark of the Bauhaus era and the basis for its success. BRAIN follows the Bauhaus philosophy. Similarly to Bauhaus teachings, interdisciplinary work in the think tank made up of scientists, engineers and technicians at BRAIN is characterised by open talks, mutual support and a shared approach.

The new glass building inaugurated in 2010 builds an optical bridge between the former Fissan factory complex of listed buildings and a hall that doubled the available office and lab space at BRAIN and houses the production area as well as the lobby, access passages and exhibition rooms.

The architecture of the technology campus creates a positive working climate and encourages staff members to identify with the company. BRAIN has long placed an emphasis on creating and cultivating an eye for beauty.

Cultural involvement as part of the company profile

Like art itself, a technology company is firmly embedded in society and its creative processes. A lively and creative corporate culture that thrives on the power of its actors to shape the world in which they live is therefore a key factor for a company's success. BRAIN's cultural activities should thus be seen as a specific commitment to a dialogue that broadens horizons rather than as a form of benevolent patronage.

Creative dialogue

Young artists meet creative scientists. Both groups need a sensitive eye and a feel for detail to capture a moment or an observation. Photographers and scientists face similar challenges in their everyday work. It is interesting to observe how much these two groups can benefit from and inspire each other.

One example of BRAIN's cultural involvement is its many years of successful participation in the Kunst *privat!* art initiative launched by the Hessian Ministry of Economics, Energy, Transport and Regional Development. The works of selected young artists are exhibited on BRAIN's premises and made available to the public on guided tours. Some artists are available for in-depth discussions during the exhibitions.

Selected pictures are on view and accessible to BRAIN staff every day. Some even belong to staff members who put them on display. BRAIN thus offers a constant platform for a productive exchange between science and art.

Kunst *privat!*

One example of BRAIN's cultural involvement is its annual participation in the Kunst *privat!* art initiative launched by the Hessian Ministry of Economics, Energy, Transport and Regional Development.

Transdisciplinary role model function

BRAIN received the WERKBUND Label 2016 for its function as a transdisciplinary role model. This label is awarded every two years by the Deutscher Werkbund Baden-Württemberg (regional branch of this German association of artists and craftspeople) to projects, ideas, companies, concepts and products that stand out for their exceptional commitment and set examples in society, politics and culture.

"The technological use of biological processes in a transdisciplinary, pro-integration networking company is an absolute role model also on a global scale and would be reason enough in itself to consider giving the Werkbund label to such a company that is environmentally focused in the broadest sense of the word", said architect and jury member Alexander Grünenwald.

But what particularly convinced the jury to award its prize to BRAIN were the unique company philosophy that addresses the transfer of creative academic thought through to industrial applications, and the unique corporate communications and culture that had already won a number of prizes. Behind all this is an enthusiastic, committed team of staff members who strongly identify with the company and their individual sphere of activity.

BRAIN received the WERKBUND Label 2016 for its function as a transdisciplinary role model from Deutscher Werkbund Baden-Württemberg.

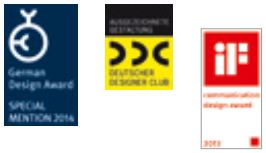
Award-winning corporate communications

BRAIN has been publishing its BLICKWINKEL periodical once per quarter for a number of years. This informs a select group of shareholders, cooperation partners and friends of the company about specific subjects and developments related to the company. Current developments at the company are placed in relation to economic, scientific and social affairs.

The design of this key medium for corporate communications consciously distinguishes itself from other publications in this sector. The photography and graphic design in particular are unconventional. Each issue is individually illustrated. Exclusively created photographs underline the aesthetic side to the company's apparently technical line of work.

BRAIN's IPO engendered new challenges also with regard to corporate communications and entailed an obligation to inform and communicate with investors. BRAIN's internal marketing team took this opportunity to redesign the quarterly publication and apply the new design within the current business year.

The high-quality format that was consistently applied for four business years and received a number of design awards, e. g. the iF communication design award 2013, was replaced by a concept that was more accessible and flexible in terms of content and design. This stands out not for its outsize format and exclusive finish, but its compact size and contemporary look. Quarterly bulletins and six-monthly reports in appropriate colours are published in parallel to the quarterly magazines.



BLICKWINKEL has received the following awards:
Rat für Formgebung (German Design Council) – German Design Award Special Mention 2014, DDC (Deutscher Designer Club) – Gute Gestaltung 13 (Bronze), iF (International Forum Design) – communication design award 2013 (Award).

The new BLICKWINKEL format offers accessible, flexible and compact information on company trends. You can find all issues at: www.brain-biotech.de/en/blickwinkel

Quarterly statements and mid-year financial statements in corresponding colours are published in parallel to the quarterly magazines.

Staff culture

"At BRAIN, personalities with an entrepreneurial bent address new challenges each day with passion and creativity. A remarkable corporate culture, to my way of thinking."

Dr.-Ing. Ute Dechert — Unit Head Organisation & Processes

A total of 237 colleagues[2] think and work together creatively and independently in the BRAIN Group, always with a focus on the product and its application. In all, 125 colleagues were working for BRAIN AG in September 2016. Sixty-one people are employed by the subsidiary AnalytiCon Discovery GmbH, 20 people work at L. A. Schmitt, 14 at WeissBioTech, 12 at MONTEIL, 4 at Mekon and 1 at BRAIN Capital.

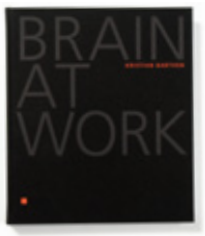
The constellation of the BRAIN Group makes it possible to realise a completely closed value chain. Various types of access to the market are created so as to directly harness the value of developments. The aim is not to assimilate the Group's companies. After their acquisition, they continue to act as independent entities in their given markets, like satellites with different concepts, locations and corporate cultures.

BRAIN as the core that drives innovation

BRAIN is the think tank of the BRAIN Group and drives its innovation. It maintains an open, creative and future-ready dialogue in all directions. People who stick to well-trodden paths miss out on discoveries. BRAIN's approach to solving problems is therefore a creative one that is designed to open up thought patterns and perceptions, encourage people to aim higher and go further, and enable surprising new perspectives.

The BRAIN organism

BRAIN as an organism consists of an interdisciplinary team of highly qualified scientists, engineers and technicians. This diversity of people, expertise and talents promotes fresh new ideas that are pursued in all directions and are fine-tuned in an interdisciplinary exchange. In this way, the company recognises opportunities before they become mainstream.



The photographic picture book "BRAIN AT WORK" was published in 2009. It attempts to explore the innermost nature of a biotechnology company.

Commitment to education and training

Fresh thinking calls for fresh minds. BRAIN offers students a platform for independent scientific studies with a strong practical focus. It maintains longstanding cooperation arrangements with several universities and training partnerships with various industrial partners. This is BRAIN's contribution to training young people, an unbroken tradition since 1996.

2 All statements made here reflect the status in September 2016, including executive officers and trainees.

237 colleagues work for the **BRAIN Group**.

125 colleagues work for **BRAIN AG**.

1007 **years of research experience** are accumulated at BRAIN.

164 **grants, trainee and "free environmental year" placements** have been provided by BRAIN to date.

The BRAIN share and the capital market

→ Despite difficult market conditions, in January 2016 BRAIN AG decided to place the Group's growth strategy on a broader financial base through an IPO.
→ The Xetra closing price of € 11.70 as of the September 30 financial year-end represents a significant share price appreciation of 30 % compared to the issue price.

Capital market environment

The capital market environment in the 2015/16 financial year reflected considerable nervousness and continued high volatility, evident in the performance of the DAX index of leading German shares. More than 2,600 points, or 23 %, stood between the high in December (11,382 points) and the low in February (8,753 points). On a year view, the DAX closed on 30 September 2016 at 10,511 points with a gain of 8.8 %.

IPO of BRAIN AG

Despite difficult market conditions, the Management and Supervisory Boards of BRAIN AG decided in January 2016 to further advance the Group's growth strategy and establish it on a broader financial basis through an IPO. Consequently, a total of up to 4.025 million shares were offered for subscription in the period between 21 January 2016 and 3 February 2016. The IPO price range lay between € 9.00 and € 12.00 per share. The offer comprised 3,500,000 new shares from a capital increase and up to 525,000 shares as part of a potential overallocation. These were made available by the main shareholder of many years' standing, MP Beteiligungs-GmbH. The shares were offered both as part of public offerings in Germany and Austria as well as private placements in selected other countries. In this context, a minimum proportion of 10 percent of the shares offered were reserved especially for private investors, with the company also providing separate subscription access for such investors.

After the end of the subscription phase, the issue price was set at € 9.00 per share. A total of 3,608,054 shares were placed among private and institutional investors in this context,

whereby along with the total of 3,500,000 new shares from the capital increase 108,054 shares as part of the overallocation from existing shareholders' positions were also placed. Around 19 % of the placement volume was allocated to private investors. Such investors included BRAIN Group staff as well as MIG Fund investors who formed part of the group of existing BRAIN AG shareholders through various funds. The remaining placement volume was allocated to institutional investors from various European countries. The total IPO volume consequently amounted to around € 32.5 million, with € 31.5 million of gross issue proceeds accruing to the company. The proceeds are to be used mainly to research and develop new products, for the continuous improvement of existing products and technologies, as well as to bolster sales of the company's own products.

The IPO of BRAIN AG was not only the first IPO in Frankfurt in 2016, but also the first IPO of a company from the biotechnology sector since November 2006 and the first IPO of any bioeconomy company in Germany. Counter to a growing general trend to float young German growth companies on stock markets abroad, BRAIN has demonstrated that such IPOs can still be implemented successfully in Germany too.

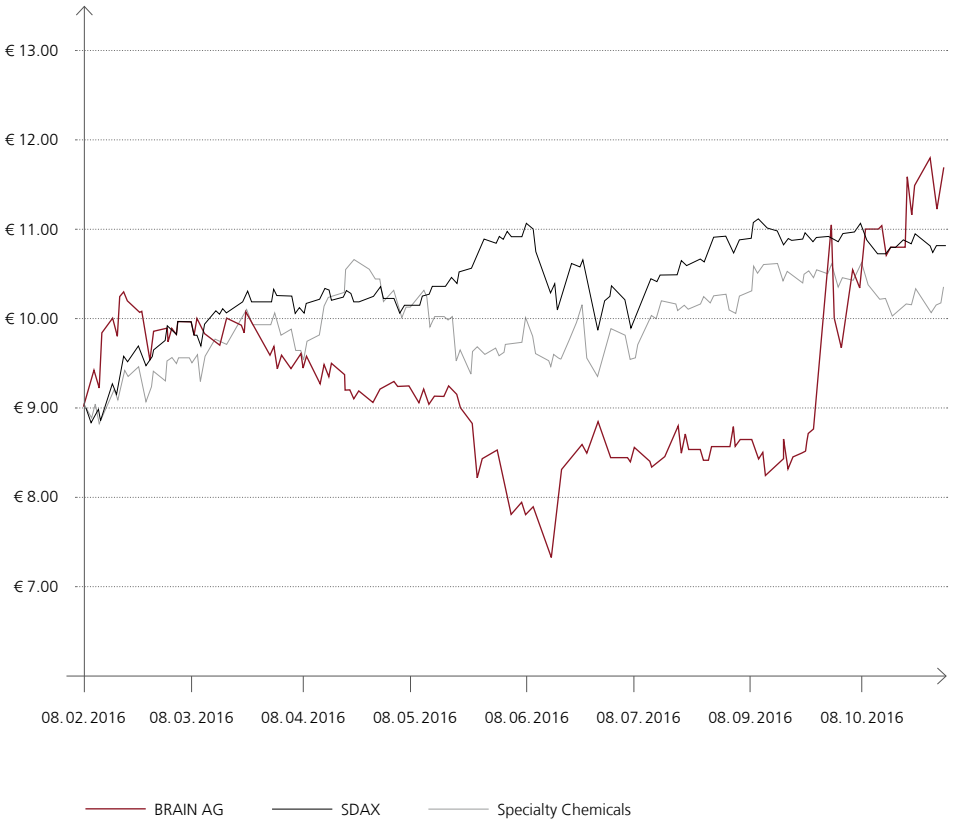
TABLE 02.1 **KEY IPO DATA**

Placement volume	3,500,000 shares from capital increase
Greenshoe	525,000 shares from existing shareholders, of which placed and exercised: 108,054 shares
ISIN / WKN	DE0005203947 / 520394
Share capital after IPO	€ 16,414,348
Subscription period	21. 01. 2016 – 03. 02. 2016
Bookbuilding range	€ 9.00 – 12.00
Issue price	€ 9.00
Market capitalisation at issue price	€ 147.73 million
First trading day	09. 02. 2016
Initial price	€ 9.15
Sole Global Coordinator und Sole Bookrunner	ODDO SEYDLER Bank AG

Price performance of the BRAIN share

The shares of BRAIN AG have been listed in the Prime Standard segment of the Frankfurt Stock Exchange since 9 February 2016. The initial price of € 9.15 already slightly exceeded the € 9.00 issue price. The share also performed well subsequently, remaining stably above the issue price. As of the midyear, the BRAIN share proved unable to withstand the general market trend, including in relation to the Brexit vote, and reduced significantly in price. The share consequently also reached its low for the year of € 7.33 on 14 June. The BRAIN share stabilised as part of the subsequent market recovery and also traded well above its issue price under the effect of positive news on the company's development. The share reached its high for the year[3] of € 11.80 on 26 September. The Xetra closing price of € 11.70 as of the financial year-end on September 30 represents a considerable share price appreciation of 30 % compared with the issue price. The BRAIN share consequently also outperformed its relevant benchmark indices, the SDAX and the DAXsubsector Chemicals, Specialty Performance Index, which registered gains of 20 % and 15 % respectively over the same period.

FIGURE 02.8 **DEVELOPMENT OF BRAIN SHARE PRICE ON THE XETRA**



3 in each case based on the closing price

TABLE 02.2 **KEY SHARE DATA**

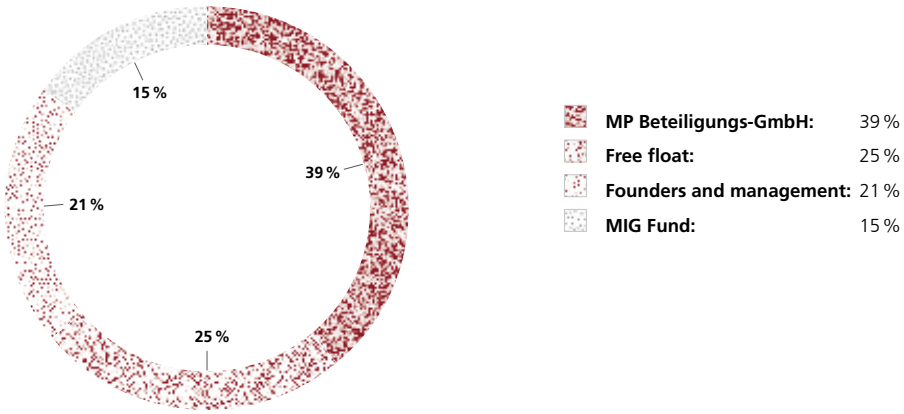
Share class	No-par-value registered shares
Stock exchange	Frankfurt Stock Exchange
Other exchanges	XETRA, Stuttgart, Berlin, Düsseldorf, Munich, Tradegate, London
Transparency level	Prime Standard
Number of shares	16,414,348
Share capital	€ 16,414,348
ISIN	DE0005203947
WKN	520394
Ticker symbol	BNN
Specialist	ODDO SEYDLER Bank AG
Designated Sponsor	ODDO SEYDLER Bank AG
Paying agent	Bankhaus Gebr. Martin
Share price 30. 09. 2016	€ 11.70
52-week high [4]	€ 11.80
52-week low [4]	€ 7.33
Market capitalisation 30. 09. 2016	192.05 million
Average daily trading volume (52 weeks as of 30. 09. 2016) [4]	13,040 shares/day

4 In each case based on the closing price since start of trading on 9 February 2016 until 30 September 2016

Shareholder structure

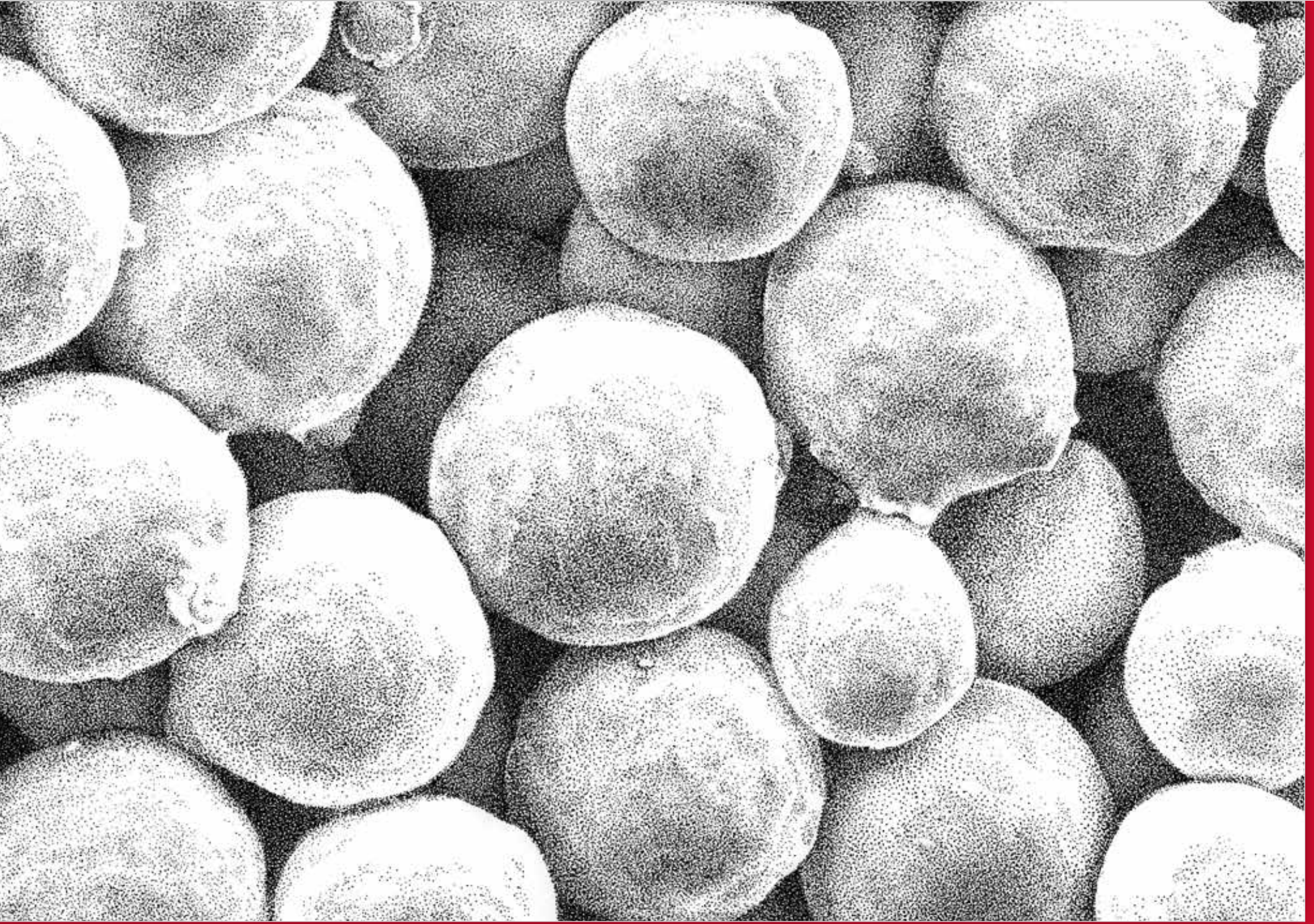
As a result of the capital increase as part of the IPO, the number of shares in issue of BRAIN AG increased from 12,914,348 to 16,414,348. The IPO also created a free float of 25.0 %. The shareholder structure of BRAIN AG as of 30 September 2016 is as follows:

FIGURE 02.9 **SHAREHOLDER STRUCTURE**



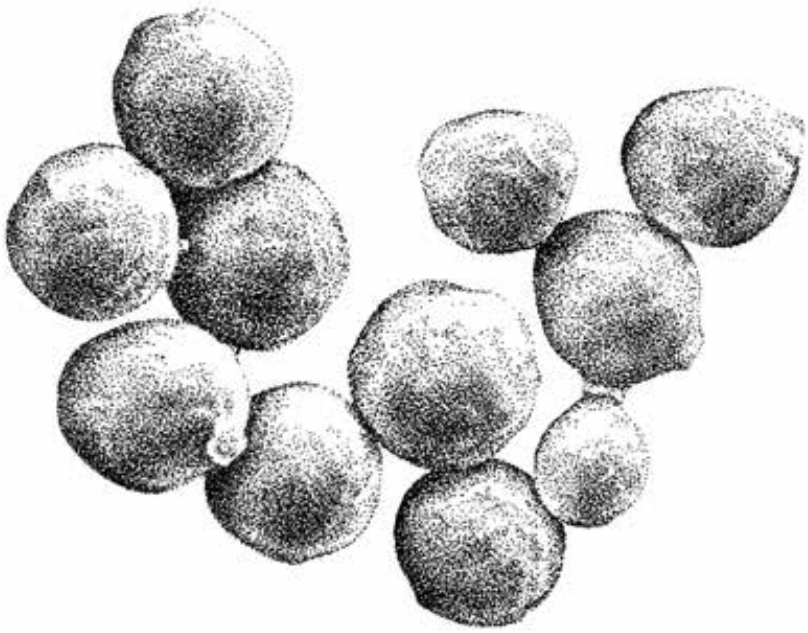
Financial communication

The IPO in February 2016 formed an important focus of investor relations work at BRAIN AG during the 2015/16 financial year. Along with regulatory requirements such as preparing the listing particulars and establishing the requisite investor relations structures, such work centred on investor roadshows, with the Management Board and rest of the management team conducting more than 90 personal discussions over ten days with national and international investors to highlight the growth potential of the bioeconomy and of BRAIN AG. The Management Board and management team also participated in several information events for private investors. As part of an ongoing service for investors after the IPO, BRAIN AG informed interested investors, analysts and the general public about current developments and the company's business progress in two quarterly announcements, a half-year financial report as well as numerous IR and press releases. BRAIN AG also presented itself at the ODDO Pharma Biotech Investor Conference in Paris on 31 March 2016, at the DVFA Spring Conference in Frankfurt between 9 and 11 May 2016, and at the Baader Investment Conference in Munich between 20 and 22 September 2016, as well as at numerous roadshow events across the whole of Europe.



Milk for everyone – lactose-free

→ Most people are **lactose**-intolerant. An enzyme produced by yeast **BR-0194** increases tolerance towards dairy products.



Properties

BR-0194 is a yeast species used by BRAIN as one of 15 production strains.

BR-0194 is capable of producing the enzyme lactase in a fermentation process. At the end of this process, the enzyme is extracted from the medium and processed into the enzyme-containing end product after purification.

Fields of application

BR-0194 grows on carbohydrates and proteins, which it uses as a source of nutrients.

This yeast species has been used for decades as a reliable producer of fermented products, e.g. in cheesemaking.

Advantages

The organism is capable of producing various enzymes in commercially attractive quantities.

This yeast belongs to a family of organisms that has been used for centuries for producing foodstuffs and has never caused any harm.

75 % 75 % of the **world's** population are affected by **lactose intolerance**.[1]

90 % of adults in some **Southeast Asian countries** suffer from lactose intolerance.[1]

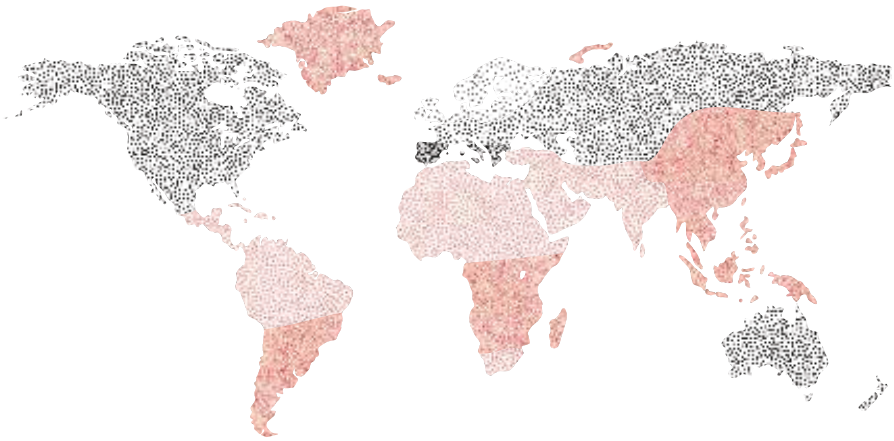
15 % In **Germany**, about 15 % of adults are lactose-intolerant.[2]

Milk is regarded as one of the staples of the Western diet. Yet the lactose (milk sugar) it contains provokes **stomachaches and other digestive problems** in three-quarters of the world's population. In some regions of Africa and Asia, 90 per cent of adults do not tolerate milk. In Germany, the figure is around 15 per cent. The people who are affected lack an enzyme called lactase that breaks down the disaccharide lactose in the small intestine and makes it digestible.

Lactase produced by yeast BR-0194 in a biotechnological process **solves the problem**. It is added to milk, yogurt, ice-cream and other dairy products, allowing everyone to digest them.

The market for the food enzyme lactase is growing fast. Last year, 100,000 metric tons of lactose-free dairy products were sold in Germany alone, more than three times as many as in 2008. More and more Asian people are also consuming dairy products.

1 Euromonitor, April 2016
2 en.wikipedia.org/wiki/Lactose_intolerance



Global distribution of lactose intolerance in recent populations (schematic) [1]

- 80–100 %
- 60–80 %
- 30–60 %
- 15–30 %
- 0–15 %

Together with enzyme specialist WeissBioTech, BRAIN is developing a **new lactase formulation for the dairy industry**. This expands the existing portfolio of WeissBioTech and serves as a basis for developing new enzymes with which the dairy sector can further improve its products. Some of the lactose-free foods currently available have a slight secondary flavour that many consumers find unpleasant. Another aim is to further reduce the residual milk sugar content.

This is an attractive segment: in 2015, the global market for lactose-free foods amounted to USD 6.7 billion. Experts predict it **will grow to USD 8.8 billion in 2020**.

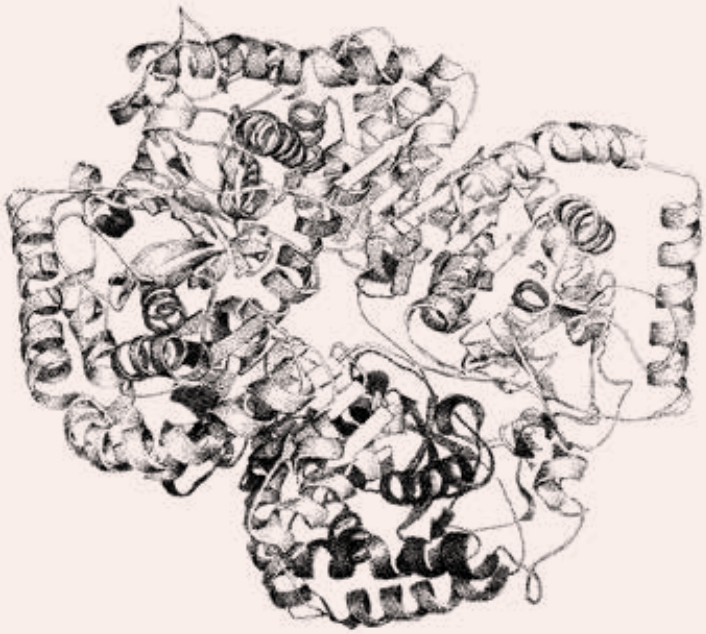
Enzymes have a **long tradition** in milk processing, especially in cheesemaking. Besides the new lactases, WeissBioTech and BRAIN intend to develop other innovative products for the dairy industry.

1 www.nahrungsmittel-intoleranz.com

BRAIN insight

BRAIN develops active product components that determine the products' key properties. These include new or optimised enzymes and biocatalysts that meet complex process and application requirements. The lactase enzyme can be used for example in lactose-free dairy products.

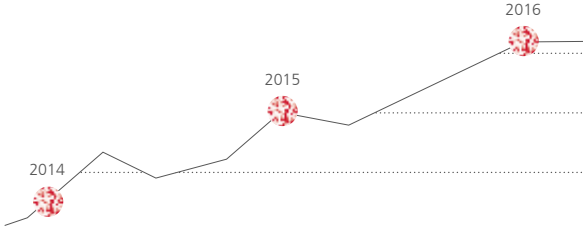
Enzymatic structure of lactase



Possible products

The enzymes market is far from saturated

→ Interview: **Dr Wolfgang Aehle, New Business Development Enzymes at BRAIN and Hans de Bie, CEO of WeissBioTech GmbH**



Enzymes are important industrial "helpers", not just for producing lactose-free dairy products. What other fields are enzymes used in, for example?

WOLFGANG AEHLE

Generally speaking, we distinguish between bulk enzymes that are used in large volumes for industrial applications and special enzymes that are specifically developed together with the customer to solve production problems on the customer side.

HANS DE BIE

Enzymes are mainly used in the detergents, animal feed and textile industries. Demand for enzymes has been growing strongly since the 1980s especially in the animal feed market, which has gone from practically zero to one billion euros. Since animal feed that has been enzymatically pretreated is easier for the animals to digest, they require less feed overall. The use of enzymes has therefore led to a rapid increase in economic efficiency.

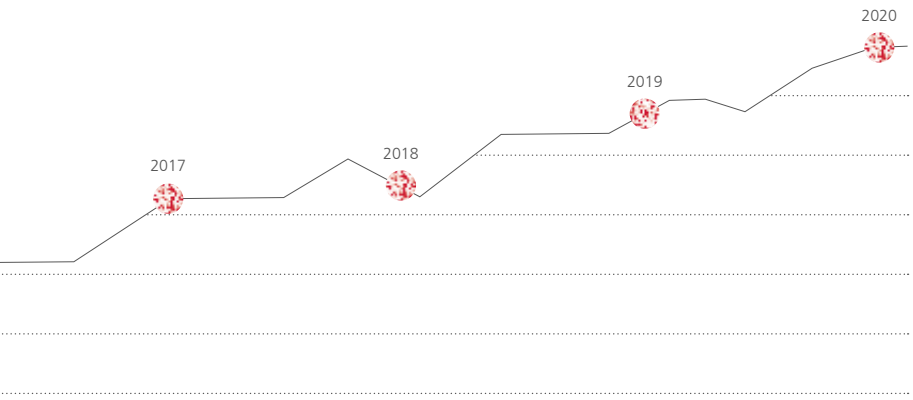
WOLFGANG AEHLE

One advantage of enzymes is that they are environmentally sound. Of course, enzymes are chemicals too, but chemicals of biological origin that are completely biodegradable. This makes them very environment-friendly.

Which enzymes do WeissBioTech and BRAIN specialise in?

WOLFGANG AEHLE

Two large corporations, Novozymes and Dupont, have a firm hold on the market for bulk enzymes. We certainly have no intention of copying them or competing with them. Our aim is to develop special enzyme solutions that can also be used on a large scale as part of the bulk market. This makes it clear that the two markets can't be separated. One evolves from the other.



Forecast for the World Enzymes Market[1]

The World Enzymes Market grew at a CAGR of 7.8 % during 2015–2020. It is expected to reach USD 5.4 billion worldwide by 2020.

1 Allied Market Research, Enzymes Market by Type, Reaction Type and Source – Global Opportunity Analysis and Industry Forecast, 2014–2020, September 2015

"You could say we have a two-pronged strategy — to use the latest technologies and improve classical enzymes."

Dr Wolfgang Aehle

Are there specific examples of applications for such special enzymes?

HANS DE BIE

Amaylase, which hydrolyses starch, is one example of a bulk enzyme, but various special solutions exist within the market. We cooperate with an adhesives manufacturer for which we have developed tailor-made special applications for amylases.

Sales of bioethanol enzymes have dropped due to the sustained decline in petroleum prices, which is making life hard for the enzymes sector. How are BRAIN and WBT reacting to this development?

HANS DE BIE

Developing enzyme solutions for the bioethanol market is not one of our primary activities. However, if we do develop solutions for starches that happen to be suitable for bioethanol production too, we take advantage of that fact. So solutions for the bioethanol sector are more or less a pleasant side-effect, but not a priority. As we saw at the start of the year, amylase sales in the bioethanol business are subject to strong fluctuations. We therefore prefer to focus on special applications that offer a higher profit margin.

How are markets developing, apart from bioethanol, and where do you see potential?

HANS DE BIE

As we said before, our line of work is in the starch market. Recent political developments and the introduction of "clean labels" have increased the demand for biological solutions in food production. For the starch sector, "clean label" means no chemically modified starch may be used. Other interesting fields of application for us are wine and fruit juice production.

WOLFGANG AEHLE

You could say we have a two-pronged strategy. On the one hand we want to use the latest technology like CRISPR and metagenomics to discover and develop new enzyme solutions, and on the other we intend to further improve existing classical enzymes.

Looking at dairy products and lactase, for instance, one might think the enzymes market is already saturated. Where is there any remaining potential for BRAIN and WBT?

HANS DE BIE

We are setting our sights on a widely diversified product portfolio that includes lactase solutions among many others. With this portfolio, we can approach customers and then gradually develop specifically tailored solutions together.

WOLFGANG AEHLE

Achieving success on the market involves more than providing a product, it also means being able to deliver good customer service. This includes recognising problems and having the ability to solve them. That is precisely what we offer our customers.

What role does the strategic partnership between BRAIN and WeissBioTech play here?

WOLFGANG AEHLE

To realise synergies, you have to combine core competencies. BRAIN is good at discovering enzymes and providing the documentation required for their approval. Those are precisely the technical prerequisites you need to launch a product on the market.

HANS DE BIE

... and WBT knows all about enzyme applications and knows exactly what to do with a product as soon as it is available. WBT has the necessary experience to get the approval documents to the authorities so that the product can be sold. So summing up, we can say: WBT brings BRAIN closer to the market since its more than 30 sales partners around the globe have the necessary access to the customer.

Has cooperation between the two companies paid off?

HANS DE BIE

We are thoroughly delighted with our cooperation with BRAIN and believe these synergies also hold further potential for the future. We have now been partners for almost two years, and I am very confident that we will have further successes to show in a couple more years.

Two years isn't very long. When do you expect success, and in which areas?

HANS DE BIE

The pathway from product development to market launch generally takes four to five years. So the first visible successes can be expected in 2017.

WOLFGANG AEHLE

Our aim is to introduce two products in 2017. Apart from this, we want to fill the product pipeline in order to have a constant supply of new products.

→ For more information on WeissBioTech GmbH, see also: "Spotlight WeissBioTech", p. 68

OTHER PRIORITY AREAS OF THE ENZYMES UNIT

Faster wound healing

The treatment of chronic wounds costs the German health system € 2 to 4 million each year. An enzyme named aurase could help alleviate the problem, since it dissolves dead tissue and thus offers better healing prospects.

BRAIN isolated the genetic blueprint for the enzyme from maggots of the common green bottle fly (*Lucilia sericata*) and produces it using biotechnologically optimised yeast cells.

The patented aurase is applied in the form of a gel, which is more pleasant for the patient than the maggot therapy offered by specialised doctors, involving maggots being placed on the open wounds.

Under the name "TIME care", BRAIN is pursuing other broad-based wound treatment strategies. Together with partners, the company has developed wound dressings made of alginate, a gelatinous substance that promotes healing and has so far been obtained from brown algae. Thanks to BRAIN, alginate can now be obtained using bacteria as the production organisms.

TIME care

For more information, please contact us at:
public@brain-biotech.de

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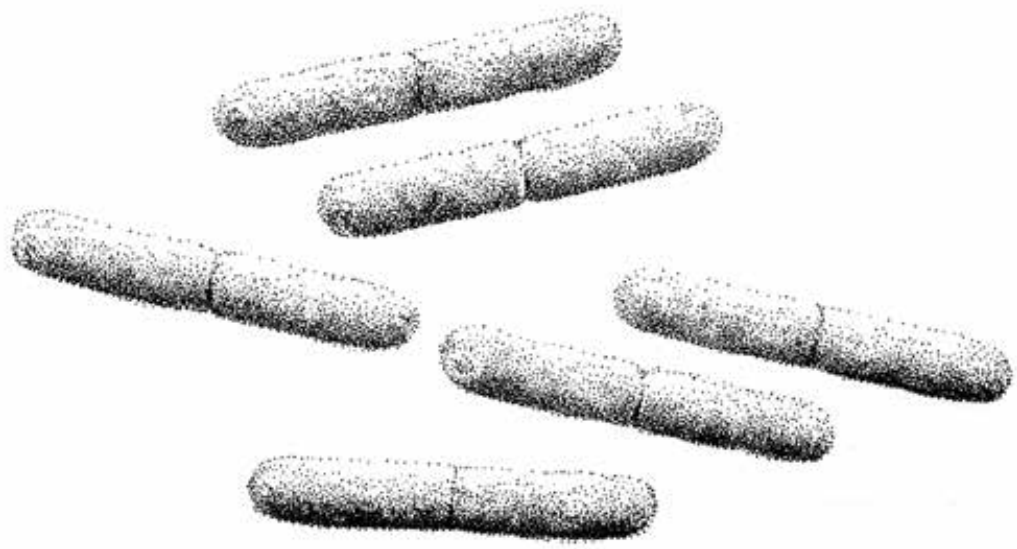
Go here to learn more about BRAIN's future-ready solutions based on biological diversity:
www.brain-biotech.de/en

From climate killer to raw material

BR-07116, a bacterium of the *Clostridium* genus, transforms the greenhouse gas carbon dioxide into valuable chemicals.



Properties

BR-07116 is an anaerobic soil bacterium that belongs to the genus *Clostridium*.

It is probably one of the oldest organisms on earth.

Its metabolism is chemoautotrophic. It uses carbonate respiration, which means it "feeds" on CO_2.

Fields of application

BR-07116 was identified and developed by BRAIN, and can also be used in conjunction with other Performance Microorganisms.

The bacterium converts CO_2 into just one product.

Possible applications exist in the field of biological energy storage.

Advantages

CO_2 fixation is very efficient and needs no further optimisation.

Over 90 % of CO_2 is converted into a single product.

A multitude of alternative metabolic pathways enable the use of various growth substrates.

Basic molecular genetic technologies have been established.

43 %

The 2014 **level of CO_2 in the atmosphere** was 43 % above the level when the Industrial Revolution started in 1750.[1]

60 %

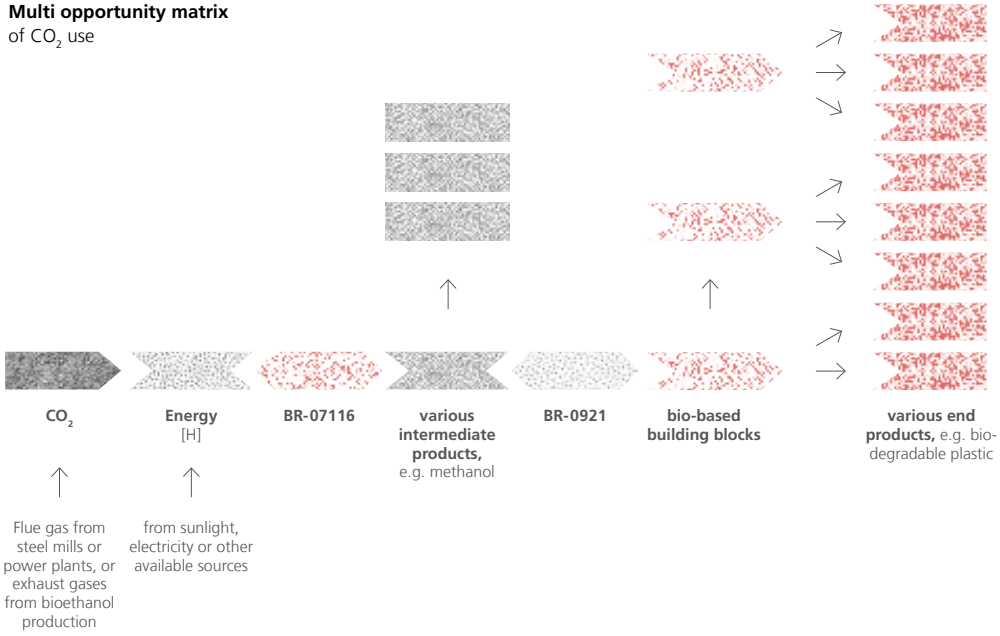
Fossil fuel emissions in 2014 were 60 % **above emissions in 1990** (the reference year in the Kyoto Protocol).[1]

Microorganisms are **miniature chemical factories** that are extremely sustainable and make no special demands in terms of their feedstocks. Some cells are even capable of transforming the greenhouse gas carbon dioxide into valuable substances. Industry could use these organisms to reduce its dependence on petroleum and its derivatives.

Carbon dioxide occurs not just in flue gas and exhaust gas, but as an undesired by-product of many industrial processes. **Using such waste streams** not only cuts feedstock and disposal costs but also reduces the burden on the environment.

The microbial metabolic pathways for reducing carbon dioxide stem from prehistoric times, when Earth's atmosphere was rich in this greenhouse gas and no other carbon sources were available.

1 co2.earth/global-co2-emissions



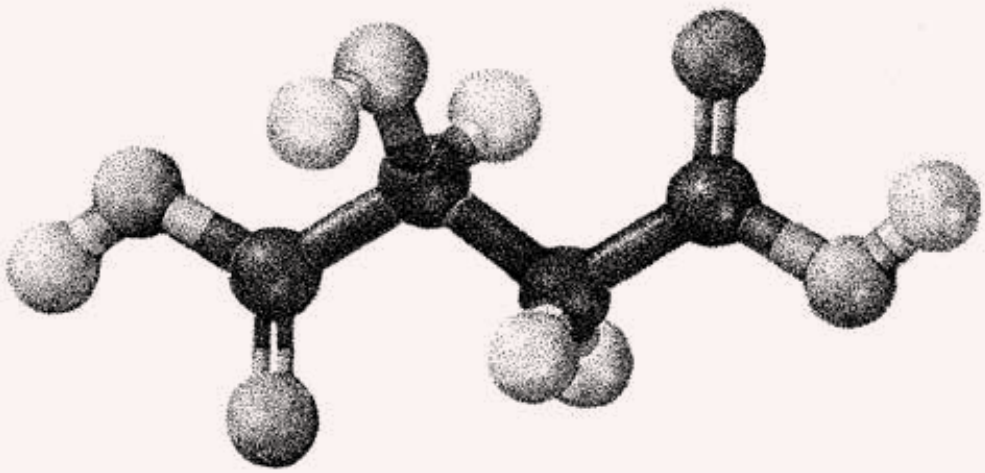
Both in factory chimneys and a hot spring in Wiesbaden, BRAIN has discovered bacteria (*Geobacillus* and *Clostridium*) that can feed exclusively on carbon dioxide. Clostridia, known by the code BR-07116, **convert the greenhouse gas into dicarbonic acids and other substances** that are used as bio-based building blocks in industry.

BRAIN has developed concepts for the use of carbon dioxide as part of the **Zero Carbon Footprint (ZeroCarb FP) strategic alliance**. A pilot plant is currently being planned together with a cooperation partner. The technology developed here can be transferred to other processes, since the bacteria used are undemanding and adapt to different carbon dioxide sources.

BRAIN insight

BRAIN develops tailor-made production microorganisms that can be used as functional biomass to optimise industrial production processes. This makes it possible to use industrial waste streams as resources for producing dicarbonic acids, for instance. These acids can be used to manufacture biodegradable plastics, or serve other purposes in the food industry.

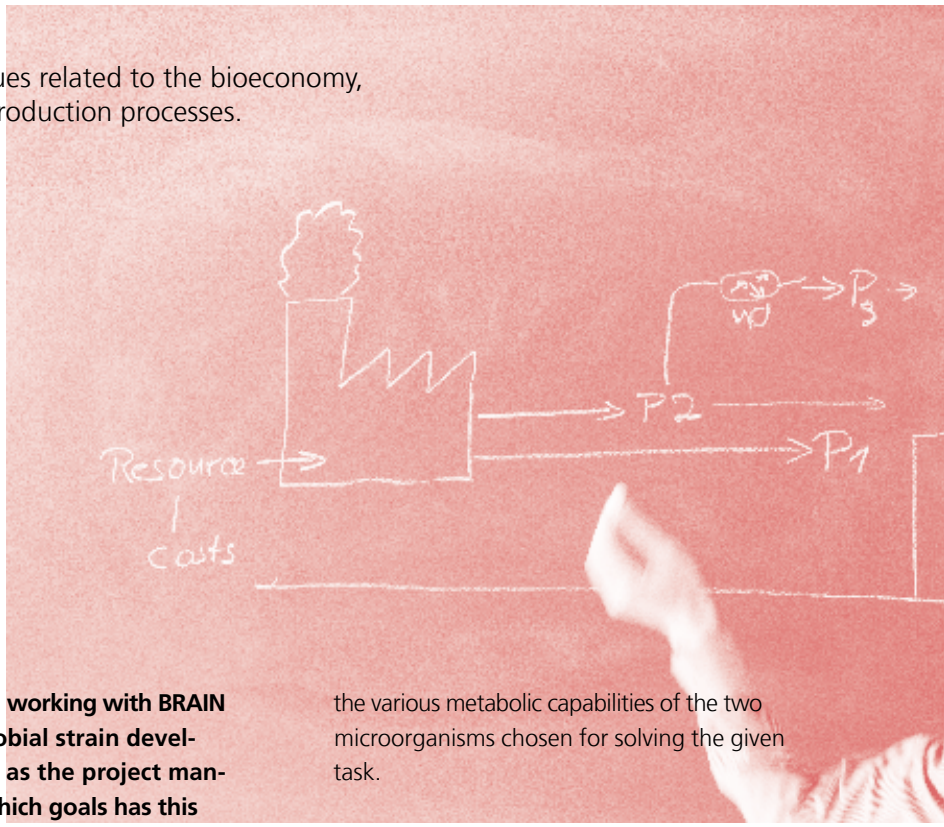
Calotte model of a dicarbonic acid



Possible products

Waste streams are the better feedstocks

BRAIN has long been working on issues related to the bioeconomy, recycling and sustainable industrial production processes.



Dr Mampel, you have been working with BRAIN for over 10 years on microbial strain development and are involved as the project manager in the CO_2 project. Which goals has this project already achieved?

JÖRG MAMPEL

In the ZeroCarbFP strategic alliance, we are working on this theme with Südzucker. Based on our good results, our application for further support up to 1 October 2016 was approved so that we can scale up an industrial unit in Zeitz to pilot-plant scale, among other measures.
In an unusually short time, we have been able to provide a proof of concept for the synthesis of our product using only CO_2 and hydrogen. The key to success lay in combining the various metabolic capabilities of the two microorganisms chosen for solving the given task.

What are the forecasts for further achievements?

JÖRG MAMPEL

We are already producing our product in the gram-per-litre range. The yield we achieved from scratch is around 40 % of what is potentially possible. Our further tests will show whether we can maintain this success, but we are pretty confident on that score.

Dr Meurer, as a member of BRAIN's Management Board, you are also in charge of the Producer Strain Development technology unit.

What is the general attraction of using industrial waste streams as feedstocks?

GUIDO MEURER

On a global scale, I'm sure we all realise we need to step up our efforts to recover resources. A resource-poor country like Germany does well to reduce its dependency and not waste the raw materials available to us here. So if industrial waste streams are seen as a source of valuable materials rather than a waste problem, that opens up new entry points for extending or diversifying the existing value chains. A material that previously had to be disposed of at high cost can now be transformed into a profitable (secondary) product and thus help to increase the profit margin of the main product, or make it more competitive.

What are the other advantages of producing valuable materials from waste streams as opposed to conventional production?

GUIDO MEURER

Waste streams place no strain on resources. Renewable raw materials, on the other hand, often raise 'food or fuel' issues. If waste streams replace available resources, users can shake off their dependence on established, rigid supply chains, possibly receive higher prices and above all, increase their security of supply. In the best of cases, using waste streams makes it possible to avoid high-risk resource extraction processes.

What other waste streams can be used apart from CO_2?

JÖRG MAMPEL

Microorganisms are world champions at breaking down organic substances. As long as the waste streams contain no compounds that are toxic for the organisms involved, almost anything that contains a carbon atom can be used. Recently, for instance, scientists demonstrated the degradation of PET by microorganisms. Glycerin is highly important for biotechnological applications. We use limonene as the starting material in a process for producing perillate. Limonene is obtained from the peel of citrus fruits and is available in large quantities.

GUIDO MEURER

In future, there will be a much greater emphasis on establishing or expanding production sites in such a way that all waste streams can be used for secondary production. Biological processes are increasingly being integrated in this context.

Which valuable materials can be generated, for instance? Which products can conceivably arise from them?

JÖRG MAMPEL

The organisms usually break down compounds in waste streams into an activated form of acetic acid that consists of two carbon atoms. By linking these C2 units and then modifying them, we can build chains of 20 and more connected carbon atoms, so-called biopolymers. At present, we are focusing on producing

“Microorganisms are world champions at breaking down organic substances.”

Dr Jörg Mampel

monocarbonic and dicarbonic acids such as malic acid that can be used to produce biocompatible plastics.

GUIDO MEURER

Microorganisms can degrade virtually all carbon structures sooner or later. So there is no causal link between the carbon compounds in the waste stream and the produced material. One synergy that can almost be termed traditional is the manufacture of enzymes, e. g. for detergents, based on wastewater from the paper industry. Further products include amino acids, vitamins, organic surfactants, antibiotics, etc.

How does this field of activity fit in at BRAIN?

GUIDO MEURER

BRAIN has long been working on issues related to the bioeconomy, recycling and sustainable industrial production processes. As of July 2013, these efforts are being supported for nine years by the German Federal Ministry of Education and Research and are grouped together within the industry-led ZeroCarbFP strategic alliance, but are also being carried out on a cross-sectoral basis. The CO_2 project mentioned earlier on also comes under this alliance.

What other projects are being tackled as part of the alliance?

JÖRG MAMPEL

Specifically, we are working on processes to use crude glycerin from various sources to produce propanediol and malic acid. Whereas propanediol is a “drop-in” bulk chemical, malic acid is currently used mainly in the food industry and the pharmaceutical sector. As part of our green mining activities, we are using microbial biomass to selectively enrich rare metals containing precious materials from a complex mixture of substances. We are also examining whether some of the above-mentioned monocarbonic and dicarbonic acids might support the green mining process. This opens up exciting synergy options as part of the ZeroCarbFP alliance.

Which goals have already been achieved in this respect?

GUIDO MEURER

Apart from our success with the CO_2 project, we have also been successful in developing several strains and processes to the stage where they can be transferred to pilot-plant scale in the second phase of the ZeroCarbFP alliance that was launched in October 2016. There are also plans for their further use beyond this in at least one other case.

The ZeroCarbFP strategic alliance

Partners in the ZeroCarbonFootprint strategic alliance work on using carbon-rich wastes as substrates and converting them into valuable building blocks for industrial production.

Huge quantities of carbon-rich waste streams occur every day in industry and in human settlements. Power plants emit flue gas. Added to this are sewage sludge and industrial wastewater. But hardly any use has been made so far of their potential as sources of carbon. The ZeroCarbFootprint (ZeroCarbFP) strategic alliance wants to change that. The 12 partners on board include industrial enterprises, medium-sized companies and representatives of academic research across Germany.

They are hunting down microorganisms that use carbon-rich wastes as substrates and convert these into valuable building blocks for industrial production.

BRAIN's know-how enters the equation when it comes to the quest for special microorganisms. To manufacture high-quality products using biotechnology, the industrial partners intend to focus on building blocks for bioplastics, de-icing and cooling agents, ore leaching technologies (green mining) and additives for manufacturing high-tech oils and fats.

The special feature is that the partners cooperate closely along the entire value chain, driven by their own entrepreneurial interests, but also with shared objectives.

They have their sights set on high-quality end products for the market. The strategic alliance is being promoted for nine years, starting in 2012. It underwent an interim scientific evaluation in early 2016. The evaluators recommended that support for the alliance should be continued in the second phase that started in October 2016. In this second promotion phase, BRAIN plays the role of coordinator.

48 m

€ 48 million are to be **invested** in the ZeroCarbFP alliance. The German Federal Ministry of Education and Research (BMBF) is providing part of the project's funding.

12

partners from industrial enterprises, medium-sized companies and academic research work together in the alliance.

9

years is the overall term (three phases of three years each) for the research, development and piloting alliance.

OTHER PRIORITY AREAS OF THE PERFORMANCE MICROORGANISMS UNIT

Bacteria as gold diggers

Microorganisms have more experience of mining for minerals than we do. For billions of years, they have been extracting iron and other essential metals from rock. Now they are intended to help make mining more environmentally friendly and secure supplies of raw materials.

The crucial prerequisite for efficient "organic mining" is to identify suitable microorganisms. Under the ZeroCarbFP alliance, BRAIN has carried out extensive screening and discovered bacteria that enrich high-tech elements such as gold and silver, and even make it easier to extract rare earth metals.

These microbial techniques are also suitable for ores with a low metal content and for recycling electronic and other types of waste. This increases the availability of domestic resources and reduces dependence on geopolitical risk countries that currently provide many strategic metals.

Learn more about this topic in our BLICKWINKEL quarterly magazine:
→ **www.brain-biotech.de/en/blickwinkel/precious**

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→ **www.brain-biotech.de/en**

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Addendum 10 August 2017

reddot award 2017
winner

This Annual Report was awarded with the Red Dot Award: Communication Design 2017 for its high design quality and creative performance.

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Silber 2017

Likewise this Annual Report was awarded with a silver certificate in the category Annual Reports Print Industry at the Best of Content Marketing Award, Europe's largest competition for content driven corporate communication.

Financial calendar

28 February 2017	**Publication of the quarterly report for the period ending 31 December 2016 (3M)**
09 March 2017	**Annual General Meeting, Zwingenberg**
31 May 2017	**Publication of the interim report for the period ending 31 March 2017 (6M)**
31 August 2017	**Publication of the quarterly report for the period ending 30 June 2017 (9M)**

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