I. Summary of Facts and Submissions

1 European patent 2 575 433 having the title "ENERGY SAVING BREWING METHOD" is based upon European patent application No. 11 729 247.4 filed on 31-05-2011. It claims priority of DK 201070243 filed on 03-06-2010.

The mention of the grant of the patent has been published in the European Patent Bulletin of 07-09-2016. Proprietor of the patent (PP) is
Applicant 1:
Carlsberg Breweries A/S
Ny Carlsberg Vej 100
1799 Copenhagen V
DK

Applicant 2:
Heineken Supply Chain B.V.
2de Weteringplantsoen 21
1017 ZD Amsterdam
NL.

2 Notices of opposition have been filed by
Opponent 1 (O1):
Privatbrauerei Hirt Vertrieb GmbH /
Braucommune Freistadt/
Privatbrauerei Zwettl Karl Schwarz GmbH et al
Hirt 1
9322 Micheldorf
AT
on 02-06-2017

Opponent 2 (O2):
Then Christoph
Frohschammerstr. 14
80807 München
DE
on 16-05-2017.

Opponents have requested revocation of the patent in its entirety based on Article 53(b) EPC, Article 54 EPC and Article 56 EPC with their notices of opposition.

O2 requested oral proceeding in case of an unfavourable decision.

In the response to the notices of opposition, PP presented arguments that the oppositions were to be rejected.

3 A preliminary opinion was issued to the parties with a communication of 03-08-2018. OD introduced on its own motion an objection under Article 100(b) EPC.

4 With letter of 30-11-2018, O1 provided further arguments and raised an objection under Article 83 EPC.

5 With letter of 13-12-2018, PP provided further arguments and requested oral proceedings if the patent was not to be maintained as granted.

6 The parties were informed with communication of 27-06-2019 that OD intended to stay the proceedings because of the referral to the Enlarged Board of Appel of the case G3/19.

7 On 14-05-2020 the Enlarged Board of Appel issued the decision on the case G3/19.

8 On 11-06-2020, PP requested the proceedings to be resumed.

9 On 08-07-2021, OD issued a new summons for oral proceedings.

10 On 09-03-2022, O2 provided further arguments and submitted D8 to D11.

11 On 10-03-2022, PP provided further arguments and submitted auxiliary requests 1 to 3.

The documents of the opposed patent are the following:

Description, Paragraphs

1-406 of the patent specification

Sequence listings, SEQ ID NO

1-20 of the patent specification

Claims, Numbers

1-16 of the patent specification

Drawings, Sheets

1-13 of the patent specification

II Reason for the decision

Claim 1 of the opposed patent

A method for preparing a barley based beverage with low levels of one or more off-flavours and/or precursors thereof, wherein the method involves reduced energy input, the method comprising the steps of:

(i) providing a barley plant or part thereof, wherein said barley plant comprises: (a) a first mutation that results in a total loss of functional lipoxygenase (LOX)-1; and

(b) a second mutation resulting in a total loss of functional LOX-2; and

(c) a third mutation resulting in a total loss of functional S-adenosylmethionine:methionine S-methyltransferase (MMT);

(ii) optionally malting at least part of said barley, thereby obtaining malted barley;

(iii) mashing said barley and/or malted barley and optionally additional adjuncts, thereby obtaining a wort;

(iv) heating said wort optionally in the presence of additional ingredient(s), wherein at the most 4% of the wort volume is evaporated, thereby obtaining heated wort;

(v) processing said heated wort into a beverage;

thereby preparing the barley based beverage with low levels of one or more off-flavours and/or precursors thereof.

Claim 7 of the opposed patent:

A barley plant, or a part thereof, wherein said barley plant comprises:

a) a first mutation that results in a total loss of functional LOX-1, and

b) a second mutation resulting in a total loss of functional LOX-2 and

c) a third mutation resulting in a total loss of functional MMT.

Main Request (MR)

Admissibility of D8 to D11

12 PP requested D8 to D11 not to be admitted into the proceedings as these documents were late filed and prima-facie not relevant.

12.1 O2 argued that D8 to D11 were filed in order to address points put forward in the summons to oral proceedings. These documents were in the letter of O2 (09-03-2022) used as evidence that the mutations of the plant of claim 7 are equal to mutations occurring naturally. D11 was furthermore relied upon for showing that mutations of MMT in other plants were known.

12.2 OD notes that D8 to D11 were filed prior to the time limit specified by Rule 116(1) EPC. OD finds that these documents are prima-facie relevant for establishing whether a technical effect is present and for determining whether the person skilled in the art could arrive at the claimed subject matter. Accordingly D8 to D11 are admitted into the proceedings, see also GL E-III.8.6.

Ground 100(a) with reference to Article 53(b) EPC

13 Both O1 and O2 argue that the subject-matter of the claims (7-16) is excluded from patentability under Article 53(b) EPC. The method of random mutagenesis underlying the claimed invention would constitute an “essentially biological process for the production of plants”. Contrary to Opinion G 3/19 of the EPO’s Enlarged Board of Appeal, plants made by such a non-patentable process should be considered excluded from patentability at least since the incorporation of the EU Biopatent Directive (Directive 98/44/EC of the European Parliament and of the Council of 6 July 1998 on the protection of biotechnological inventions) into the EPC in 1999. This was in line with the intention of the EU legislator as clarified in the EU Commission Notice on certain articles of the EU Biopatent Directive published in 2016 (OJ EU C 411/3 of 8.11.2016). The patentability of plants made by biological methods had never been accepted neither by the EPO member states nor in the case law of the EPO’s Boards of Appeal (e.g. T 356/93). In addition, the claimed plants would constitute varieties. It was not clear how to transfer the claimed mutations to other varieties such as wheat. Rule 27(b) EPC could not justify patentability as it would only apply to technical inventions but not where the feature in question would be propagated using biological methods.

13.1 P refers to Opinion G 3/19 of the EPO's Enlarged Board of Appeal and decision T 420/19. While in view of this not decisive, P also argues that the chemical mutagenesis method underlying the claimed invention does not qualify as "essentially biological process" in the sense of the practice followed by the EPO. With regard to the plant variety objection, P refers to Rule 27(b) EPC and decision G 1/98 of the EPO's Enlarged Board of Appeal. The claimed subject-matter was directed to barley plants in general carrying three specific mutations leading to loss of function of specific enzymes, and thus not limited to a specific plant variety.

13.2 In G 3/19 of 14 May 2020 (OJ EPO 2020, 119) the Enlarged Board of Appeal held (see points XXVI.8 and XXIX. of the Reasons for the Opinion, as well as "Conclusion") that *"taking into account developments after decisions G 2/12 and G 2/13 of the Enlarged Board of Appeal, the exception to patentability of essentially biological processes for the production of plants or animals in Article 53(b) EPC has a negative effect on the allowability of product claims and product-by-process claims directed to plants, plant material or animals, if the claimed product is exclusively obtained by means of an essentially biological process or if the claimed process features define an essentially biological process*." However the Enlarged Board of Appeal also held (ibid.) that *"this negative effect does not apply to European patents granted before 1 July 2017 and European patent applications which were filed before that date and are still pending*."

13.3 This interpretation and finding is de facto binding for the OD. It is also observed that a barley plant comprising a mutation resulting in a total loss of functional MMT and wherein the plant was generated using the same method as used in the opposed patent was found not to be within the exceptions of patentability in decision T 420/19 (see points 3-10 of the Reasons for the Decision). As also confirmed in this decision, in Opinion G 3/19 the Enlarged Board of Appeal dealt with arguments against the patentability of plants exclusively obtained by means of an essentially biological process based on the EU Biopatent Directive and the related EU Commission Notice. Still, the Enlarged Board defined the above-mentioned cut-off date for applying the new interpretation of Article 53(b) EPC based on Rule 28(2) EPC. For the sake of completeness, the OD notes that before the legislative clarification of 2017, the patentability of plants generated by an essentially biological process was acknowledged in decisions G 2/12 and G 2/13 (OJ EPO 2016, 27 and 28) of the Enlarged Board of Appeal (see also T 420/19, point 11 of the Reasons for the Decision).

13.4 Since the present European patent was granted before 1 July 2017, the subject-matter of the claims (7-16) is not excepted from patentability in view of Article 53(b) EPC, irrespective of the method of production of the claimed plants.

14 As regards the objection based on the first part of Article 53(b) EPC (plant varieties), it follows from Rule 27(b) EPC and decision G 1/98 of the Enlarged Board of Appeal (OJ EPO 2000, 111) that inventions where the technical feasibility is not confined to a particular plant variety do not fall under the afore-mentioned patentability exception, even if claims may comprise (but not individually claim) such varieties (see also Guidelines for Examination in the EPO, section G-II, 5.4.1). The subject matter of claims 7-11 is not limited to a plant variety because the mutations can be introduced into any barley plant (examples 1 and 2 of the opposed patent) and are not linked to a particular genetic background. It is furthermore also clear that 3 specific mutations (see claim 7 (a) to (c)) within the barely genome is by no means sufficient for describing a plant variety as defined in Rule 26(4) EPC. The additional arguments of O2 regarding alleged non-technicality of the invention and that the features could only be transferred to other plants by means of biological methods are not relevant for assessing whether implementation of the invention is limited to specific varieties. OD thus arrives at the conclusion that the patentability exception for plant varieties does not apply to the presently claimed subject-matter.

15 In its notice of opposition O1 also referred to Article 53(a) EPC and the potential economic effects of the commercial exploitation of the claimed barley plants and derived products. However, as confirmed inter alia in decisions G 1/98 (OJ EPO, 2000, 111, point 3.9 of the Reasons for the Decision) and T 1213/05 (point 53 of the Reasons for the Decision), the economic effects of the grant of patents in specific areas is not a relevant consideration in the context of Article 53(a) EPC.

16 In conclusion, the ground for opposition under Article 100(a) in combination with Article 53 EPC does not prejudice maintenance of the opposed patent.

Article 87 EPC

17 O2 has referred to two documents published after the date of priority (WO2010075860 published 08.06.2010 and WO2010063288 published 10.06.2010). It has thus to be established whether the priority of the opposed patent is valid.

In this respect OD considers that the priority document filed 03.06.2010 provides a basis for claims 1 and 7 within claims 1 and 24 (priority document DK201070243). OD considers also that the priority document is enabling regarding the claimed plants because p. 80-84 provide the same information for generating the claimed plants as described in the opposed patent, see also the conclusion regarding the grounds of opposition raised under Article 100(b) EPC.

18 Neither O1 nor O2 pointed to features lacking in the priority document which would demonstrate that the claimed invention was not the same invention as disclosed in the priority document, Article 87(1)(b) EPC.

Ground 100(a) with reference to Article 54(3) EPC

19 OD is of the opinion that WO2010075860 (claim 15) describes a barley plant with a first mutation that results in a total loss of functional LOX-1 and a second mutation resulting in a total loss of functional LOX-2. OD has not identified any barley plant within this document which also comprises a third mutation resulting in a total loss of functional MMT. Hence, the subject matter of claim 7 is considered new in light of WO2010075860.

OD is of the opinion that WO2010063288 (claim 12) describes a barley plant with a mutation resulting in a total loss of functional MMT. OD has not identified within this document a plant wherein also LOX-1 and LOX-2 have been rendered inactive. Hence, the subject matter of claim 7 is considered new in light of this document.

19.1 O2 argued that since the two documents describe the same mutations as defined in the opposed patent, the mere combination thereof did not render the subject matter new.

19.1.1 For examination of novelty in the sense of Article 54 EPC it is required that the disclosure describes all the features of the claim and it is furthermore elaborated in the guidelines G-VI.1:

It is to be noted that in considering novelty (as distinct from inventive step; see G-VII, 8), it is not permissible to combine separate items of prior art together. It is also not permissible to combine separate items belonging to different embodiments described in one and the same document, unless such combination has specifically been suggested (see T 305/87).

OD considers that the guidelines of the EPO (underlined passage) makes it clear that with regard to no novelty, combinations of separate items, i.e. documents, are not allowed.

19.2 O1 has presented the argument that the subject matter of claims 1-12 represents the usual steps during a malting process and the subject matter of said claims is not new.

19.2.1 OD has not been able to identify within the cited prior art methods and products having all the features of the claims. In this respect, claim 1(i) and claim 7 refer to a barley plant having a number of technical features such as a) a first mutation that results in a total loss of functional LOX-1, b) a second mutation resulting in a total loss of functional LOX-2 and c) a third mutation resulting in a total loss of functional MMT. Such plants have not been identified by O1. Hence OD is of the opinion that the subject matter of claims 1-12 is new.

Ground 100(a) with reference to Article 56 EPC

20 OD considers that for evaluation of the closest prior art, a document referring to barley and off-flavours is the most promising starting point. WO02053721 or WO2005087934 are both documents directed to barley plants with reduced or no Lox-1 activity for improving beer flavour. Both documents are cited in the opposed patent.

The documents referred to under Article 54(3) cannot be relied upon for the discussion under Article 56 EPC which specifies: "*If the state of the art also includes documents within the meaning of Article 54, paragraph 3, these documents shall not be considered in deciding whether there has been an inventive step.*"

In the following OD refers to WO2005087934 but WO02053721 is an equally well suited springboard.

The subject matter of claim 7 differs from the prior art in that the barley plant comprises a second mutation resulting in a total loss of functional LOX-2 and a third mutation resulting in a total loss of functional MMT.

The opposed patent (tables 2,3,5-8 and Fig. 7) demonstrates that the triple-null mutant has less off-flavours and allows to use a more energy-saving brewing method without an increased risk of off-flavours. Also the beer foam (a quality parameter in beer brewing) formation is improved.

The problem to be solved is regarded as providing a barley plant with improved use in brewing.

This technical problem can be considered solved in light of the examples (tables 2,3,5-8 and Fig. 7).

D11 is a document referring to MMT mutants in Arabidopsis and maize. However, this document is silent with regard to barley and the potential effect of this enzyme on beer quality. The person skilled in the art would thus have no motivation for seeking to mutate this enzyme for arriving at solving the technical problem. The person skilled in the art would thus not arrive at the solution as defined in claim 7 and the subject matter is thus found not to be obvious in light of the cited prior art art.

It is observed that claim 1 relies on a method wherein plants with the same technical features as claim 7 are employed.

20.1 O2 has referred to D8 to D10 and argued that the mutations introduced represent mutations which cannot be distinguished from natural occurring mutations and the plants do thus not have new characteristics from other sources and can be made using methods described in D8 to D10. Because the person skilled in the art knows that Lox and MMT genes are causing problems in the brewing process and the identified mutations can occur naturally, the person skilled in the art would simply have to screen existing barley populations for arriving at identifying plants as defined in claim 7 of the opposed patent. According to O2, D11 demonstrates that MMT mutants were available in other plants.

O2 has also argued that the claimed invention relies only on identifying barley providing better brewing properties and this was standard in the art. The mere identification of the genetic basis is just a more accurate description of a plant which can be identified through its biochemical phenotype.

20.2 OD finds that O2 has not provided evidence in support for the assertion that the identification of a triple-null mutants as defined in claim 7 would be identified by the person skilled in the art if seeking to solve the technical problem. For arriving at the conclusion that subject matter is not inventive it is not sufficient that the person skilled in the could arrive at the solution, it has to be established that the person skilled in the art would arrive at the proposed solution, see GL G-VII.5.3.

OD has not identified in the cited prior art any information for the person skilled in the art that MMT knock-out in barley would improve beer flavour stability, D11 is silent with regard to barley and quality parameters for barley based beverages. It is also found by OD that D11 for determination of MMT activity relies on pulses of radioactive [^{35}S]Met applied to leaves which requires growing plantlets which renders the assay less suited for screening of populations. In contrast the opposed patent (§0319-0320) describes a seed based assay and a screening using leaf tissue from 4 day old germinated seeds. Thus, even if the

person skilled in the art were to seek to identify MMT mutants from already existing populations (which OD is not convinced of), it has not been shown that the means for screening large number of plants were available to the person skilled in the art.

OD considers that although the person skilled in the art might have been aware that off flavours such as T2N represent a technical problem regarding beer quality, the opponents have not provided evidence that the person skilled in the art would arrive at the plants with mutations as specified in claim 7. No evidence show that if identifying barley plants with less off-flavours, it would inevitably be plants with a genotype as defined in the opposed patent thus providing a one-way street, see GL G-VII.10.2.

It is also observed that in T0420/19 a plant having just one of the mutations (MMT) of the claimed barley plant has been found to meet the requirements of Article 56 EPC. No further evidence resulting in new facts or evidence beyond those provided in the case treated in T0420/19 have been provided by the opponents.

Ground 100(b) EPC

21 PP finds that the introduction of an objection regarding sufficiency (Article 100(b)) as introduced by OD with the summons to oral proceeding, dated 22-02-2018 is not admissible.

PP considers that G10/91 concludes that new grounds can only be introduced in exceptional circumstances and when prima-facie there are clear reasons to believe that such grounds are relevant and would in whole or in part prejudice the maintenance of the European patent. PP finds this opinion supported by GL DV-2.2 where it is indicated that opposition is not a continuation of examination and when alleging a lack of sufficiency, the burden of proof lies by the division (GL FIII-4).

21.1 OD considers that Article 114(1) EPC applies to all proceedings before the EPO and Rule 81(1) EPC gives OD the possibility to examine on its own motion grounds which would prejudice the maintenance of the patent. This is reflected in GL DV-2.2.

"*Once proceedings for examining the opposition(s) have been initiated because an admissible opposition has been filed (although it may have been withdrawn in the interim), there may be reason to believe that other grounds exist which, prima facie, in whole or in part prejudice the maintenance of the European patent. If that is the case, these grounds should generally be examined by the*

opposition division of its own motion pursuant to Rule 81(1). Such other grounds may result from facts emerging from the search report or the examination procedure, the examiner's personal knowledge or observations presented by third parties pursuant to Art. 115 (see also E-VI, 3)." - [emphasis by OD]

OD is of the opinion that in the present case three factors (see below) result in examination of sufficiency of disclosure to be introduced and each factor per se is sufficient for introducing this new ground of opposition.

The opposed patent (§ 0016) notes that methods for making transgenic barley plants lacking expression were not available. The opposed patent describes in concrete terms one way of preparing the barley plant of the claims and this method is based on mutagenesis, i.e. random genome modification (opposed patent §0308-0326). The examples describe that merely two potential mutants were identified after screening two populations of 10.000 plants (§0318). Hence, OD considers that already from reading the opposed patent per se, prima facie it appears that the subject matter of claim 7 cannot be worked over the full scope of the claims (GL FIII-1), i.e. any barley plant without a functional MMT enzyme. This lack of sufficiency is prima-facie evident from reading the opposed patent and suffices as reason for introducing a new ground for opposition.

The same observations as made for MMT apply regarding the mutations for Lox-1 and Lox-2 (§0311).

Hence, OD finds that the ground of opposition under Article 100(b) can be introduced.

22 Regarding Article 100(b) EPC, OD notes that after the summons to oral proceedings the decision T0420/19 became available. The decision is based on the same facts as the opposed patent and the board of appeal concluded that the subject matter was sufficiently disclosed.

The facts of the present case are so similar to the facts of the case treated in T0420/19 that the division considers that the reasoning applies to the present case, because the plants provided in the two cases are made using identical means.

It is thus concluded that the opposed patent (§0308-0326) provides sufficient information for the person skilled in the art in order to work the claimed subject matter over the full breadth of the claims without any undue burden because the examples provide means for screening barely plants allowing identification of plants with the correct genotype.

III Decision

23 For the reasons set out above, the grounds of oppositions do not prejudice maintenance of the patent as granted. The oppositions are rejected (Art. 101(2) EPC).

CONSOLIDATED LIST- KONSOLIDIERTE LISTE - LISTE RECAPITULATIVE

P: Hoiberg

1: Privatbrauerei Hirt Vertrieb GmbH / Braucommune Freistadt/Privatbrauerei Zwettl Karl Schwarz GmbH et al

2: Arbeitsgemeinschaft bäuerliche Landwirtschaft (Abl)/Arbeitsgem. der Umweltbe. der Gliedkirchen der Evangelischen Kirche in DE (AGU) et al

/	CITATIONS-ENTGEGENHALTUNGEN-CITATIONS	p	1	2
D1	Auszug Europäisches Patentregister EP2373154		D1	
D2	Patentansprüche EP2373154		D2	
D3	Einspruch gegen das Europäische Patent EP2373154		D3	
D4	Auszug aus dem europaischen Patent register EP2384110		D4	
D5	Patentansprüche EP2384110		D5	
D6	Einspruch gegen das Europäische Patent EP2384110		D6	
D7	Mitteilung der Kommission über bestimmte Artikel der Richtlinie 98/44/EG des Europäischen Parlaments und Rates über den rechtlichen Schutz biotechnologischer Erfindungen (2016/C 411/03)		D7	
D8	Correct legal interpretation of Article 53(b) EPC, Legal analysis provided bv No Patents on Seeds, April 2021			D1

D9	Monroe G. et al. (2022) Mutation bias reflects natural selection in Arabidopsis thaliana, Nature.	D2
D10	Kawall K. (2019), New Possibilities on the horizon: genome editing makes the whole genome accessible for changes. Front Plant Sci. 10:525	D3
D11	Kocsic M.G et al. (2003) , Insertional Inactivation of the Methionine S-Methyltransferase Gene Eliminates the S-Methylmethionine Cycle and Increases the Methylation Ratio, Plant Physiol.	D4