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Datasheet for the decision of 7 May 2021

Case Number: T 1529/17 - 3.3.08

Application Number: 04741794.4

Publication Number: 1649029

IPC: C12P1/00, C12P1/02, C12P1/04, C12P7/02

Language of the proceedings: EN

Title of invention:
A METHOD OF PRODUCING A LOW MOLECULAR WEIGHT PLANT SECONDARY METABOLITE IN A YEAST CELL

Patent Proprietor:
Evolva SA

Opponent:
Hoffmann Eitle

Headword:
Vanillin production in yeast/EVOLVA SA

Relevant legal provisions:
EPC Art. 100(c), 100(a), 54, 100(b), 83

Keyword:
Amendments and Novelty - main request (yes)
Sufficiency of disclosure - main request (no) - 7th to 12th auxiliary request (no)

Decisions cited:

Catchword:

Europäisches Patentamt
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Office européen des brevets

Beschwerdekammern

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Case Number: T 1529/17 - 3.3.08

D E C I S I O N
of Technical Board of Appeal 3.3.08
of 7 May 2021

Appellant: (Patent Proprietor)	Evolva SA Duggingerstrasse 23 4153 Reinach (CH)
Representative:	Forrest, Stuart WP Thompson 138 Fetter Lane London EC4A 1BT (GB)
Respondent: (Opponent)	Hoffmann Eitle Patent- und Rechtsanwälte PartmbB Arabellastrasse 30 81925 München (DE)
Representative:	Hoffmann Eitle Patent- und Rechtsanwälte PartmbB Arabellastraße 30 81925 München (DE)
Decision under appeal:	**Decision of the Opposition Division of the European Patent Office posted on 8 May 2017 revoking European patent No. 1649029 pursuant to Article 101(3)(b) EPC.**

Composition of the Board:

Chairman	B. Stolz
Members:	D. Pilat
	D. Rogers

Summary of Facts and Submissions

I. European patent N° 1 649 029 was opposed on the grounds of Articles 100 (a), (b) and (c) EPC. An opposition division considered that Article 100(b) EPC prevented maintenance of the patent as granted as well as on the basis of Auxiliary requests 1 to 6. The patent was revoked.

II. With its statement of grounds of appeal, the patent proprietor (appellant) submitted 1st to 12th auxiliary requests. The 7th to 12th auxiliary requests corresponded to the 1th to 6th auxiliary requests underlying the decision under appeal and the 1st to 6th auxiliary requests corresponded to the 7th to 12th auxiliary requests underlying the decision under appeal.

III. The opponent/respondent did not reply to the statement of grounds of appeal nor make any other submissions.

IV. The parties were summoned to oral proceedings. In a communication pursuant to Article 17(1) RPBA 2020, the parties were informed of the board's provisional, non-binding opinion, especially on issues concerning Articles 100(b) EPC.

V. Appellant submitted comments in reply to the board's communication and filed new documentary evidence as Annexes 7 to 13.

VI. Oral proceedings took place on 7 May 2021, in the absence of the respondent.

VII. Independent claim 1 and dependent claims 2, 4, 9, 11 and 13 of the main request read as follows:

"1. A method of producing a low molecular weight organic aglycon compound comprising following steps:

a) fermenting a yeast cell in a suitable medium where the yeast cell is capable of growing, wherein the yeast cell comprises a gene encoding a product involved in the biosynthesis pathway leading to a low molecular weight organic aglycon compound and a glycosyltransferase gene encoding a glycosyltransferase capable of glycosylating the produced aglycon, under suitable conditions wherein the yeast cell produces the aglycon and the corresponding glycosylated form of the aglycon;
b) deglycosylating the glycosylated form of the aglycon; and
c) recovering the aglycon compound;

(i) wherein the low molecular weight organic aglycon compound has a molecular weight from 50 to 3000 and wherein the aglycon compound is a plant secondary metabolite compound, and
(ii) wherein the glycosyltransferase is a glycosyltransferase capable of conjugating a sugar to the aglycon compound; and
wherein a gene encoding a product involved in the biosynthesis pathway is a heterologous gene encoding a product involved in the biosynthesis pathway."

2. The method of claim 1, wherein the microorganism cell with the glycosyltransferase during culture fermentation is capable of producing higher amounts of the glycosylated form of the aglycon as compared to the

amounts of the corresponding aglycon produced by the same microorganism cell without the glycosyltransferase.

4. The method of any of the preceding claims, wherein the glycosyltransferase gene is a heterologous glycosyltransferase gene.

9. The method of claim 1, wherein secondary metabolite compound is a plant secondary metabolite compound selected from the group consisting of:

- Terpenoids
- Alkaloids
- Phenylpropanoids
- Phenyl derivatives
- Hexanol derivatives
- Flavonoids
- Coumarins, stilbenes
- Cyanohydrins
- and Glucosinolates.

11. The method of claim 10, wherein the plant secondary metabolite organic aglycon compound is vanillin.

13. The method of any of the preceding claims, wherein the deglycosylating step b) of claim 1 takes place outside the growing cell following excretion or extraction of the in step a) produced glycosylated form of the aglycon and wherein the deglycosylating is an enzymatic process mediated by a beta-glucosidase."

VIII. The 7th to 12th auxiliary requests comprised the following modifications:

7th Auxiliary request

Claim 1 of the 7th auxiliary request differs from the claim 1 of the main request in that it was amended to include the features of claims 4 and 2.

8th Auxiliary request

Claim 1 of the 8th auxiliary request differs from the claim 1 of the main request in that it was amended to include the features of claims 4, 2 and 13.

9th Auxiliary request

Claim 1 of the 9th auxiliary request differs from the claim 1 of the main request in that it was amended to include the features of claims 4, 2 and 9 partially in that Terpenoids was deleted.

10th Auxiliary request

Claim 1 of the 10th auxiliary request differs from the claim 1 of the main request in that it was amended to include the features of claims 4, 2, 9 partially, and 13.

11th Auxiliary request

Claim 1 of the 11th auxiliary request differs from the claim 1 of the main request in that it was amended to include the features of claims 4, 2 and 11.

12th Auxiliary request

Claim 1 of the 12th auxiliary request differs from the claim 1 of the main request in that it was amended to include the features of claims 4, 2, 11 and 13.

IX. The following documents are referred to in this decision:

D19: E.H. Hansen *et al.* "De novo Biosynthesis of Vanillin in Fission Yeast (Schizosaccharomyces pombe) and Baker's Yeast (Saccharomyces cerevisiae)", Applied and Environmental Microbiology, vol. 75, n°9, pp. 2765-2774, Epub 13 March 2009,

D34: D.J. Fitzgerald *et al*. "Analysis of the inhibition of food spoilage yeasts by vanillin." International Journal of Food Microbiolgy, vol. 86(1-2), pp. 113-122, 1 September 2003.

Annex 6: Experimental data submitted by the Appellant on 6 March 2017 in opposition proceedings.

X. The submissions made by the **appellant**, insofar as relevant to the present decision, may be summarized as follows:

Claim interpretation

Step a) of the method of claim 1 referred to "a yeast cell". The skilled person would have understood that "a" could mean "one or more" yeast cells and was not limited to a single yeast cell, especially since no reference in the description pointed to the use of a single yeast cell. This viewpoint was confirmed by dependent claim 3 referring to several species of yeast.

Sufficiency of disclosure Articles 100(b) and 83 EPC

Example 14 described the production of vanillin from glucose in *S. cerevisiae* strains. However, the skilled person was well aware that overproduction of vanillin would be toxic to the yeast, and thus had to be prevented. Native *S. cerevisiae* contained also enzymes that converted vanillic acid to vanillin, while the production of vanillin was in equilibrium with the other vanillin derivatives. Thus, example 14 contained sufficient information on how to produce vanillin from glucose in yeast.

Example 15 described the production of vanillin β-D-glucoside by a further *S. cerevisiae* strain harbouring a glycosyltransferase in a fermentation medium to which more glucose and vanillin were added. It was then concluded that vanillin β-D-glucoside was much less toxic to yeast. Thus, it was possible to overproduce vanillin starting from β-D-glucoside by shifting the equilibrium of the reaction towards the vanillin β-D-glucoside form by merely adding vanillin to the reaction vessel and removing the vanillin β-D-glucoside produced (see patent paragraph [0120]). The skilled person knew how to control the enzymatic reaction equilibrium and how to push it towards the production of a less toxic glycon form.

Fitzgerald *et al.* (document D34) demonstrated that the skilled person knew of at least one way of converting vanillic acid into vanillin in *S. cerevisiae*. First, it disclosed that vanillin (the aldehyde form) was reversibly converted to either vanillyl alcohol (the alcohol form) or vanillic acid (the acid form). Second, *S. cerevisiae*, as used in the patent, had to contain enzyme activities capable of interconverting vanillin to vanillic acid, known in the art as "aldehyde dehydrogenases" or ALD. These enzymes were also known

to be "equilibrium enzymes" capable of shifting a reaction equilibrium of substrates/products and redox cofactors to a new equilibrium to offset the changes. Third, an "aldehyde dehydrogenase" or ALD activity was inherently present in *S. cerevisiae* and shifted the reaction towards the formation of the aldehyde form (vanillin) from the acid form. Thus, thanks to the *S. cerevisiae's* natural ability to carry out this conversion biased in favour of the vanillin form, the skilled person knew how to achieve this interconversion.

Although document D19 stated: "...a heterologous PPTase enzyme is needed for activation, by phosphopantetheinylation of the ACAR gene in *S. cerevisiae*", this finding was not supported by any data. Table 3 only showed results for a *S. cerevisiae* comprising a heterologous PPTase (PPTcg-1). No data in document D19 established that a reduced PPTase activity of *S. cerevisiae* or a lack of activity of *S. cerevisiae* occurred in the absence of PPTcg-1.

Document D19 provided no verifiable facts that *S. cerevisiae* required a heterologous PPTase for vanillin production sufficient to cast serious doubt on the practicability of the claimed method. Document D19 did not demonstrate that the *S. cerevisiae of the* patent needed a heterologous PPTase capable of activating the heterologous aromatic carboxylic acid reductase (ACAR), because phosphopantetheinylation of ACAR by Lys5p, naturally present in *S. cerevisiae,* did not take place.

It furthermore underlined that in case the experimental data in Annex 6 were considered to lack relevance because of the genetic difference of the yeast strain used in Annex 6 and in the patent, then by analogy the

claims set out in document D19 would also be irrelevant as they were not supported by any data.

Example 14 used *S. cerevisiae* harbouring ACARs from *P. ostreatus* and *T. gibbosa* for the production of vanillin. They differed from the Nocardia ACAR used in document D19. Thus, the results obtained in document D19, which established that the ACAR from Nocardia required a heterologous PPTase for the production of vanillin, could not convincingly demonstrate that the *S. cerevisiae* of example 14 required an additional PPTase for the production of vanillin as well.

The *S. cerevisiae* strain FSC67-X1 containing FaOMT, 3DHD and ACAR genes but no heterologous PPTase, as used in example 14, was able to produce significant amounts of vanillin from glucose, much like the FSC67 strain was able to produce vanillic acid and protocatechuic acid from glucose as a precursor (see paragraph [0205]). Presumably, the inclusion of a heterologous PPTase might enhance the conversion rate, but it was not essential to performing the invention.

XI. Appellant (patent proprietor) requested, as its main request, that the decision under appeal be set aside and the patent be maintained as granted, or alternatively upon the basis of any one of the 1st to 12th auxiliary requests, all auxiliary requests being filed under cover of a letter dated 18 September 2017. It further requested that the documents and evidence filed with its statement of grounds of appeal and with its letter of 6 April 2021 be admitted into the proceedings.

XII. The respondent did not file any submissions or requests during the appeal proceedings.

Reasons for the Decision

Procedural issues

Admission of the 1st to 6th auxiliary requests submitted by the appellant

The 1st to 6th auxiliary requests were not admitted into the opposition proceedings (see decision under appeal, items 8 and 9). The appellant has not provided any arguments that the opposition division, by not admitting the 1st to 6th auxiliary requests into the proceedings, exercised its discretion according to the wrong principles, or without taking into account the right principles, or in an unreasonable way. The board has thus no reason to overrule this decision (see Case Law of the Boards of Appeal of the European Patent Office, 9th Edition, Chapter IV.C.4.5.2, page 1092), hence the 1st to 6th auxiliary requests are not admitted into the appeal proceedings.

Main request (Claims as granted)
Amendments (Article 100(c) EPC) and Novelty (Article 100(a) EPC)

1. In the decision under appeal, the opposition division found that the main request did not contravene Article 100(c) and Article 100(a) in conjunction with Article 54(2)(3) EPC. The respondent provided no arguments as to why this finding was erroneous.

2. In the absence of any such arguments, the board has no reason to deviate from the decision under appeal. Thus, the subject-matter of the main request does not extend beyond the content of the application as filed (Article

100(c) EPC) and the ground for opposition of Article 100(a) in conjunction with Article 54 EPC does not prejudice the maintenance of the patent as granted.

Sufficiency of disclosure (Article 100(b) EPC)

Claim interpretation

3. Appellant argued that a skilled person would understand the reference in step a) of claim 1 to "a yeast cell" as meaning "one or more" yeast cells in the sense of one or more yeast strains. It was not limited to a single yeast cell/strain, especially since no reference in the description pointed to the use of a single yeast cell/strain. This viewpoint was confirmed by dependent claim 3 referring to several species of yeast.

4. The board disagrees with appellant's interpretation. Step a) requires "fermenting a yeast cell" and the subsequent clauses, referring back to the sole antecedent ("where the yeast cell"), define "the" or "a" yeast cell as

(i) capable of growing,

(ii) comprising a gene encoding a product involved in the biosynthesis pathway leading to a low molecular weight organic aglycon compound **and** a glycosyltransferase gene encoding a glycosyltransferase capable of glycosylating the produced aglycon, under suitable conditions; and

(iii) producing the aglycon and the corresponding glycosylated form of the aglycon.(emphasis added)

Thus, even if the step of fermenting "a yeast cell" of claim 1 a) may be performed with different strains/

species of yeast cells, the one selected must comprise all of features (i) to (iii) of claim 1. Whether the step of fermenting a yeast cell in a suitable medium encompasses the fermentation of additional yeasts which do not comprise all of features (i) to (iii) of claim 1 is irrelevant. The method of claim 1 clearly requires that at least one of the yeast cells/strains comprises all of features (i) to (iii). Thus, the board does not agree with the appellant that the skilled person only had to combine the strains of examples 14 and 15 of the patent to put the invention into effect.

5. In the decision under appeal, the opposition division found that the patent contravened Article 83 EPC because "the preferred embodiment of the invention (i.e. the production of vanillin in Saccharomyces spp.) is not sufficiently disclosed" (see point 5.3). This finding was substantiated by post-published document D19.

The decision under appeal considered that

> "only a double mutant of S. cerevisiae lacking the β-glucosidase gene *bgl1* and the alcohol dehydrogenase gene *adh6* can be used as a host for producing vanillin. However, the patent in suit is silent about said mutations. In addition, the patent in suit is silent on the additional genetic modification required for activation of recombinantly expressed ACAR enzyme in *S. cerevisiae* via a heterologous phosphopantetheinyl transferase (PPTase)" (see point 5.1).

The opposition division underlined that the experimental evidence provided in Annex 6 was insufficient to overcome the objection under Article 83 EPC, as it was obtained using an S. cerevisiae strain

with all the modifications taught and highlighted in post-published document D19 but missing in the patent:

- the deletion of the β-glucosidase gene (*bgl1*);
- the deletion of the alcohol dehydrogenase gene (*adh6*); and
- the expression of a heterologous phosphopantetheinyl transferase (PPTase).

6. Appellant asserted that according to established case law, it is permissible for the skilled person to use its common general knowledge to supplement the information in the application (see decision T 1625/06, point 6 of the reasons, Case Law, supra., I.C.2.8.5). Details of the requirements of the yeast strains, and information showing the skilled person's understanding were provided.

7. Leaving aside the question of whether both genes, *bgl1* and *adh6,* have to be inactivated/deleted or not, the board considers that the main question to be addressed is whether the introduction of a phosphopantetheinyl transferase (PPTase) is required to carry out the method of claim 1 in *S. cerevisiae*.

8. The board considers the following:

8.1 Example 14 describes the introduction of a vanillin de novo biosynthetic pathway into *S. cerevisiae* strain FSC58. The resulting strain, FSC67-X1, was capable of producing an increased amount of vanillin despite its toxicity (see patent paragraph [0205]) but not of glycosylating vanillin.

8.2 Example 15 describes a different yeast strain, JH6 (*adh6 adh7*), transformed with a yeast expression

plasmid containing arbutin synthase (AS) (i.e. a glycosyltransferase), cultured in a medium containing glucose and a sublethal concentration of vanillin. The strain was capable of producing vanillin β-D-glucoside which is much less toxic to yeast.

8.3 The appellant argued that "the Examples ... provide the skilled person with the promise of the invention and ... do not give rise to a fundamental lack of sufficiency". However, as demonstrated in document D19, a scientific publication by the inventors published almost six years after the first filing date, performing the method of claim 1 in *S. cerevisiae* is more complicated. Simply combining the modifications disclosed in Examples 14 and 15 in a single strain of S. cerevisiae would not do.

8.4 Document D19 discloses the introduction of a de novo vanillin biosynthesis pathway in *S. cerevisiae* consisting of three heterologous genes encoding first a 3-Dehydroshikimate dehydratase (3DSD) which converts 3-dehydroshikimic acid to protocatechuic acid, second an aromatic carboxylic acid reductase (ACAR) which converts protocatechuic acid to protocatechualdehyde, and third an O-methyltransferase (e.g. Hs-OMT) which methylates protocatechuic aldehyde at its 3-O position (see page 2772, column 1, first full paragraph). After growth of the yeast strain VAN286, the clarified medium was found to contain the vanillin precursors protocatechuic acid and vanillic acid, but none of the corresponding aldehydes, including vanillin, was detected. This indicated that the ACAR enzyme was not expressed or not functional in *S. cerevisiae* (page 2772, sentence bridging columns 1 and 2), despite the presence of a native Lys5 gene encoding a protein

having PPTase activity in *S. cerevisiae* (p.2772, column 2, lines 50-54).

Document D19 discloses a wide variety of yeasts including *S. cerevisiae* metabolizing vanillin-β-D-glucoside to vanillin and metabolizing vanillin to vanillyl alcohol or vanillic acid (page 2769, paragraph spanning columns; figure 1).
A specific *S. cerevisiae bgl1* and *adh6* mutant lacking a β-glucosidase and an alcohol dehydrogenase gene showed a limited ability to metabolize vanillin-β-D-glucoside and vanillin (see page 2769, column 2, lines 23-30).
The production of vanillin in *S. cerevisiae* mutants required the introduction of an efficient PPTase gene (page 2772, paragraph spanning columns) while production in *S. pombe* did not. It was "indeed puzzling that bacterial ACAR can be activated by inherent enzymes in one yeast but not in another" (see page 2772, column 2, lines 45 to 47).

8.5 The board notes that *S. pombe*, is not at all mentioned in the patent. The examples in the patent disclose production of vanillin only in *E. coli* and *S. cerevisiae*.

8.6 The skilled person in an attempt to carry out the method of claim 1 using the *S. cerevisiae* VAN286 disclosed in document D19 would have failed to produce vanillin. This embodiment is not a puzzle on the edge of the claim. It is furthermore nowhere shown, neither in document D19 nor elsewhere, that it needed only a few attempts to transform failure into success based on the skilled person's common general knowledge and thus amounted to an occasional failure. There are no instructions in the patent or in the prior art which show that some strains used in the method of claim 1

required the addition of PPTase, nor is it a solution to a known problem requiring no more than routine techniques to put the claimed invention into effect.

8.7 The board agrees with the appellant that there was no indication in the patent that a heterologous PPTase capable of activating the heterologous ACAR had to be introduced into *S. cerevisiae.*

8.8 Appellant argued that there were no data in document D19 supporting the view set out at page 2772. This was a mere unsubstantiated statement. Table 3 showed only results for a *S. cerevisiae* comprising a heterologous PPTase (PPTcg-1). No data supported a finding of reduced PPTase activity of *S. cerevisiae* or a lack of activity of *S. cerevisiae* in the absence of PPTcg-1.

8.9 The board cannot share appellant's view on this point. The subtitle in the results section on page 2772, column 1 reads: "Construction of a vanillin-producing *S. cerevisiae* yeast requires heterologous activation of the ACAR gene." It is specified that after growth of the *S. cerevisiae* strain VAN286 in batch cultures (5 ml) with SC medium for 48 h, the clarified medium contained the vanillin precursors protocatechuic acid and vanillic acid, but none of the corresponding aldehydes, including vanillin, was detected. A functional ACAR enzyme was only obtained after the *E. coli entD*, the C. glutamicum *PPTcg-1*, or the N. farcinica *PPTnf-1* gene was expressed in strain VAN286. This allowed the detection of protocatechuic aldehyde as well as vanillin in the clarified fermentation broth (see Table 3).

Although the statement, that vanillin or aldehydes corresponding to the vanillin precursors could not be

detected in the clarified medium of batch cultures of *S. cerevisiae* VAN286, is not supported by graphical or numerical results, this does not imply that this statement is unreliable or not credible. Experimental results which cannot be distinguished from controls are for many reasons seldom published. First, they are often of reduced scientific significance or value. Second, if need be, they can be easily and readily reproduced to test their probative value. Third, other results, e.g. in Table 3, showing that strain VAN286 transformed with PPTcg-1 produced vanillin, vanillyl alcohol, vanillic acid, protocatechuic acid and protocatechuic aldehyde in *in vivo* experiments, provide further support for the truth of this statement.

8.10 The board considers that the facts published in the results section of document D19 are verifiable and cast serious doubt on appellant's assertion that the skilled person could readily and without undue burden perform the claimed invention. The respondent therefore discharged its burden of proof which shifts to the appellant to refute the convincingly established facts by way of counter-arguments.

8.11 The board notes that the appellant carried out additional experiments (see Annex 6) using derivatives of *S. cerevisiae* strain VAN286 to test whether they were capable of producing vanillin or derivatives thereof. As noted by the opposition division, these derivatives comprise an exogenous PPTase. Thus, no conclusion can be drawn on the basis of the data shown as to whether the endogenous PPTase was sufficient for producing vanillin or not.

8.12 The board is also not convinced by appellant's arguments based on Fitzgerald *et al.*(document D34) that

S. cerevisiae contains enzyme activities capable of interconverting vanillin to vanillic acid, known in the art as "aldehyde dehydrogenases", rendering expression of a heterologous PPTase non-essential. The authors assessed vanillin's antimicrobial potential against three different species of yeasts. Although vanillin was mainly bioconverted to vanillyl alcohol and at a low level to vanillic acid during fermentation, said bioconversion was presumably catalysed by non-specific dehydrogenases expressed constitutively in yeast cells. The board cannot see why the skilled person would consider the term "non-specific dehydrogenases" acting on vanillin to refer necessarily to an alcohol or aldehyde dehydrogenase, producing a corresponding alcohol and acid. There is no clear teaching why the vanillic acid, produced in marginal proportions during fermentation, should result from a reversible aldehyde dehydrogenase enzymatic reaction, rather than from the reaction of an aldehyde oxidase (see abstract, Figures 3 and 4). Fitzgerald *et al.* discloses neither explicitly nor inherently an "ALD" enzymatic activity by an aldehyde dehydrogenase in *S. cerevisiae*, let alone of an enzyme activity skewed towards the formation of the aldehyde form (vanillin) from its acid form. The conversion of vanillin to products other than vanillyl alcohol might rather be obtained through oxidation of vanillin to vanillic acid. Finally, the detection of vanillic acid was only observed when *S. cerevisiae* was cultured in a medium with at least 10 mM of vanillin (see page 118, column 2 lines 1 to 19, Figure 3). Thus, Fitzgerald *et al.* (document D34) fails to establish that yeast cells have a natural aldehyde dehydrogenase capable of reversibly converting vanillic acid to vanillin under any conditions.

8.13 Hence, in the absence of proof to the contrary, the verifiable facts disclosed in document D19 are sufficient to cast serious doubt that the method of claim 1 can be readily performed on the preferred embodiment of the invention, *S. cerevisiae*.

8.14 The board concludes that the subject-matter of claims 1 to 13 is not disclosed in a manner sufficiently clear and complete to be carried out by a person skilled in the art over their entire breadth and for this reason contravenes the requirements of Article 83 EPC.

7th to 12th Auxiliary requests
Sufficiency of disclosure Article 83 EPC

9. The amendments introduced into claim 1 of the 7th to 12th auxiliary requests do not help to overcome the objection raised under Article 83 EPC in respect of the main request.
Consequently, none of these requests meets the requirements of Article 83 EPC.

Order

For these reasons it is decided that:

The appeal is dismissed.

The Registrar: The Chairman:

L. Malécot-Grob B. Stolz

Decision electronically authenticated