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Datasheet for the decision of 15 February 2011

Case Number: T 1644/08 - 3.3.08

Application Number: 96905762.9

Publication Number: 0815209

IPC: C12N 9/42

Language of the proceedings: EN

Title of invention:
Novel endoglucanases

Patentee:
Novozymes A/S

Opponent:
AB Enzymes Oy

Headword:
Endoglucanases/NOVOZYMES

Relevant legal provisions:
EPC Art. 54, 56, 84, 123(2)

Relevant legal provisions (EPC 1973):
-

Keyword:
"Admissibility of the main request - (yes)"
"Main request - added subject-matter (no); clarity (yes); novelty and inventive step (yes)"

Decisions cited:
T 0363/99, T 1120/00, T 0875/02, T 1898/07

Catchword:
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Case Number: T 1644/08 **-** 3.3.08

D E C I S I O N
of the Technical Board of Appeal 3.3.08
of 15 February 2011

Appellant: (Opponent)
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Decision under appeal: **Decision of the Opposition Division of the European Patent Office posted 15 July 2008 rejecting the opposition filed against European patent No. 0815209 pursuant to Article 101(2) EPC.**

Composition of the Board:

Chairman: T. J. H. Mennessier
Members: P. Julià
D. S. Rogers

Summary of Facts and Submissions

I. An appeal was lodged by the opponent (appellant) against the decision of the opposition division, whereby the opposition against the European patent No. 0 815 209 was rejected. The opposition division considered that none of the grounds of opposition under Articles 100(a) and 100(c) EPC prejudiced the maintenance of the patent as granted.

II. The opposed patent was based on the European patent application No. 96 905 762.9 which was published as International patent application WO 96/29397 (hereinafter "*the application as filed*"). The patent application contained 104 claims, wherein claims 72 and 89 read as follows:

"72. A DNA construct comprising a DNA sequence encoding an enzyme exhibiting endoglucanase activity, which DNA sequence comprises
a) the DNA sequence shown in SEQ ID No. 8, or the DNA sequence obtainable from the plasmid in *Saccharomyces cerevisiae* DSM 10081, or
b) an analogue of the DNA sequence shown in SEQ ID No. 8 or the DNA sequence obtainable from the plasmid in *Saccharomyces cerevisiae* DSM 10081, which
i) is homologous, preferably at least 75% homologous, with the DNA sequence shown in SEQ ID No. 8 or the DNA sequence obtainable from the plasmid in *Saccharomyces cerevisiae* DSM 10081,
ii) hybridizes under the conditions described herein with the same nucleotide probe as the DNA sequence shown in SEQ ID No. 8 or the DNA

sequence obtainable from the plasmid in *Saccharomyces cerevisiae* DSM 10081,

iii) encodes a polypeptide which is homologous, preferably at least 70% homologous, with the polypeptide encoded by a DNA sequence comprising the DNA sequence shown in SEQ ID No. 8 or the DNA sequence obtainable from the plasmid in *Saccharomyces cerevisiae* DSM 10081,

iv) encodes a polypeptide which is immunologically reactive with an antibody raised against the purified endoglucanase encoded by the DNA sequence shown in SEQ ID No. 8 or obtainable from the plasmid in *Saccharomyces cerevisiae*, DSM 10081."

"89. An enzyme exhibiting endoglucanase activity, which enzyme

a) is encoded by a DNA construct according to any of claims 66-83,

b) produced by the method according to claim 88, or

c) is immunologically reactive with an antibody raised against a purified endoglucanase encoded by the DNA sequence shown in any of the sequence listings SEQ ID No 1, 4, 6, 8, 10, 12, 16, 19."

III. With its statement of grounds of appeal, the appellant filed two experimental reports.

IV. The patentee (respondent) replied to the appellant's grounds of appeal and filed six auxiliary requests, further documents and experimental evidence.

V. Further submissions were also filed by the appellant commenting on the respondent's new claim requests.

VI. The board issued a summons to oral proceedings to which a communication was attached. In that communication the parties were informed of the board's preliminary, non-binding views on the issues to be discussed at the upcoming oral proceedings.

VII. Both the appellant and the respondent replied to the communication of the board and filed further documents and experimental evidence. While the respondent filed a new main request and six new auxiliary requests, the appellant commented on these new claim requests.

VIII. In reply to the appellant's comments, the respondent submitted further observations and documents.

IX. Oral proceedings took place on 15 February 2011. At these proceedings, the respondent withdrew all its previous claim requests and filed a new main request mainly based on the previous auxiliary request 4.

X. The respondent's main request consisted of 21 claims. Claim 1 read as claim 72 of the application as filed (*supra*) with part (b) contemplating only two alternatives i) and ii):

"1. ...
i) has at least 90% identity with the coding region of the DNA sequence shown in SEQ ID No. 8 or the DNA sequence obtainable from the plasmid in *Saccharomyces cerevisiae* DSM 10081, or
ii) encodes a polypeptide which has at least 90% identity with the polypeptide encoded by a DNA sequence comprising the DNA sequence shown in SEQ ID No. 8 or

the DNA sequence obtainable from the plasmid in *Saccharomyces cerevisiae* DSM 10081."

Claim 10, which corresponded to claim 89 of the application as filed (*supra*) but contemplated only two alternatives a) and b), read as follows:

"10. An enzyme exhibiting endoglucanase activity, which enzyme is
a) encoded by a DNA construct according to any of claims 1-4, or
b) at least 90% identical to the amino acid sequence shown in SEQ ID No. 9."

Claims 2 to 4 related to particular embodiments of claim 1. Claim 5 concerned a recombinant expression vector comprising a DNA construct according to any of claims 1 to 4. Claims 6 to 8 were directed to a cell comprising a DNA construct of any of claims 1 to 4 or a vector according to claim 5. Claim 9 related to a method of producing an enzyme exhibiting endoglucanase activity comprising culturing a cell of any of claims 6 to 8. Claims 11 and 17 concerned a method of providing colour clarification of laundry and a laundry composition, respectively, wherein both claims referred to an enzyme according to claim 10. Claims 12 to 16 and claims 18 to 20 were particular embodiments of claims 11 and 17, respectively. Claim 21 was directed to the use of the enzyme according to claim 10 for treatment of fabric or textile, preferably for preventing backstaining, for bio-polishing or for "stone-washing" cellulosic fabric.

XI. The following documents are cited in the present decision:

D1: WO 91/17243 (publication date: 14 November 1991);

D6: WO 94/07998 (publication date: 14 April 1994);

D7: P.O. Sheppard et al., Gene, 1994, Vol. 150, pages 163 to 167;

D8: C. Breuil et al., Biotechnol. Letters, 1986, Vol. 8, No. 9, pages 673 to 676.

XII. The arguments of the appellant, insofar as they are relevant to the present decision, may be summarised as follows:

Admissibility of the main request

The main request was based on an auxiliary request that was filed shortly in advance of the oral proceedings and, thus, was late filed. Moreover, the main request could have been filed at a much earlier stage of the proceedings since it intended to overcome an objection for lack of novelty that was on file from the beginning of the opposition proceedings. According to the established case law, the patentee's right to file amendments is not unlimited (cf. T 1898/07 of 17 June 2010, point 2 of the Reasons and T 363/99 of 19 April 2004, point 2 of the Reasons) and good reasons have to be provided for the late filing of amendments.

Main request

Article 123(2) EPC

The application as filed referred to several degrees of identity, including 90% identity. However, they were always linked to the GAP computer program and the 'GAP creation and extension penalties' settings used for their calculation. Moreover, there was no specific sequence singled out among all the sequences, (SEQ ID NO), disclosed. Although claim 1(b) i) and ii) referred to a 90% identity, the computer program and settings were not specified. There was no basis in the application as filed for singling out a specific SEQ ID NO and a degree of identity, let alone for combining them.

Nor was a basis in the application as filed for feature a) of claim 10 in isolation. Original claim 89 required the endoglucanase to be encoded by a DNA construct but, in line with the disclosure found in the description of the application as filed, such as on page 32, lines 5 to 15, it also required the enzyme to be produced by a particular method and/or to have particular immunological properties. Claim 10 b) had no basis in the application as filed since its wording was different from that found in the description of the application as filed, such as on pages 30 and 31.

Article 84 EPC

The analogues of SEQ ID NO:8 were defined in the application as filed as having the characteristics cited in original claim 72(b) i) to iv) and being at least 75% homologous with SEQ ID NO:8. Claims 1 and 10

of the main request did not contemplate these characteristics and required the analogues to have at least 90% identity. Thus, the products of claims 1 and 10 were not fully characterized and essential features were missing from these claims. Moreover, there was no indication as how the degree of identity was calculated or whether the degree was over the full length of the coding region or over only parts thereof.

Article 54 EPC

The endoglucanase of claim 10 was at least 90% identical to SEQ ID NO:9 which itself had a high degree of identity to the endoglucanases from ***Humicola insolens*** DSM 1800 and from ***Fusarium oxysporum*** DSM 2672 of document D1. Sequence alignments filed with the notice of opposition showed long stretches of identity among these sequences. The teachings of document D1 were not limited to these sequences but contemplated homologues exhibiting endoglucanase activity and being encoded by DNA which hybridized to the same probe as the DNA coding for these specific endoglucanase enzymes, such as stated on page 4, lines 24 to 32 of document D1. Probes could be based, for instance, on the oligonucleotides listed in Table 1 of document D1 (cf. pages 34 to 35) and on regions having identity stretches such as those shown in the sequence alignments filed with the grounds of opposition. Probes hybridizing to a DNA encoding the endoglucanase from ***Thielavia terrestris*** would certainly have hybridized with DNA sequences encoding homologues of the endoglucanases shown in document D1. Thus, these homologues fell within the scope of claims 1 and 10 of the main request. According to decision T 1120/00 of

22 October 2004, if a prior patent application disclosed not only a specific DNA sequence but also homologues thereof, claims in a latter patent application were novel over such a disclosure only if they excluded all these DNA sequences in their entirety. If there was an area of overlap between this prior art and the claimed subject-matter, novelty was not acknowledged.

Article 56 EPC

Document D6, the closest prior art, related to variants of known cellulases with improved properties when used in detergent compositions. Several cellulases were described as suitable parent cellulases, including the endoglucanase from ***Humicola insolens*** DSM 1800. Starting from this prior art, the technical problem to be solved was the provision of further endoglucanases for use in detergent compositions. The invention as claimed in the main request provided a solution to this technical problem.

However, this solution was obvious. Document D6 identified the endoglucanase from ***Humicola insolens*** DSM 1800 as a cellulase of the family 45 (cf. page 9, lines 26 to 30). Members of that family were known to share regions of highly conserved amino acids - as shown in Figure 1 of document D6 - and, based on these regions, probes could be designed and used to isolate new family members. Indeed, suitable probes for members of the cellulase family 45 - or the K-family - were shown in Figure 1 of document D7, a document which was part of the common general knowledge. In line with decision T 875/02 of 7 December 2004, once a perfect probe was

available to the skilled person, cloning of the full-length gene was obvious. The quality of the probe shown in Figure 1 of document D7 and its suitability for cloning a DNA sequence encoding the endoglucanase from ***Thielavia terrestris*** had never been challenged.

Several ***Thielavia terrestris*** strains were known to be among the most cellulolytic strains from various culture collections of thermophilic fungi and ***Thielavia terrestris*** strain NRRL 8126 was known to have a high cellulase activity. Document D8 reported the presence in this latter strain of a high amount of thermostable endoglucanase activity with a good half-life at 60°C, a temperature known to be normally used in washing operations. This temperature was thus a clear pointer for the skilled person who would immediately have considered the endoglucanase from ***Thielavia terrestris*** NRRL 8126 of document D8 to be suitable for detergent compositions as those described in document D6. Knowing these advantageous properties of the endoglucanase from ***Thielavia terrestris*** NRRL 8126, it was obvious to use the tools available from document D6 (or the probe from document D7) in that strain and obtain thereby the claimed subject-matter. No technical problems would have been encountered by the skilled person as shown in the patent-in-suit. The alleged presence of several endoglucanases in ***Thielavia terrestris*** NRRL 8126 was shown in post-published documents. These documents would not have prevented the skilled person from using the probe of document D7 and identifying the endoglucanase of the family 45 in that strain. Arguments relying on post-published documents were based on an ex post facto analysis and, thus, were not to be taken into account.

In view of the deficiencies of the respondent's experimental reports (*inter alia*, they were not performed at optimal pH conditions for each of the compared endoglucanases (6.0-10.0 for *Humicola insolens* and 5.0-7.0 for *Thielavia terrestris*), the enzyme dosage was not indicated, the substrate was inappropriate or undefined, etc.), there was no evidence on file to show the advantageous properties of the endoglucanase from *Thielavia terrestris* NRRL 8126 - and certainly not for all the enzymes falling within the scope of the claims. Moreover, if an advantageous property was to be acknowledged, then it was a mere bonus effect because it was inherent to that endoglucanase, which was itself obvious from the combination of documents D6 and D8 - with document D7 as common general knowledge.

XIII. The arguments of the respondent, insofar as they are relevant to the present decision, may be summarised as follows:

Admissibility of the main request

In the board's communication, the arguments for lack of novelty over document D1 were different from those raised in opposition proceedings. In order to overcome this objection, a new feature was introduced into the claim requests filed in advance of the oral proceedings. It was at the oral proceedings that this feature was discussed for the first time and reasons given to explain the problems arising from its introduction. The main request intended to overcome these problems, it was based on one of the auxiliary requests filed in

advance of the oral proceedings and it was a clear limitation of the granted claims.

Main request
Article 123(2) EPC

The DNA sequence and the encoded endoglucanase from *Thielavia terrestris* (SEQ ID NO:8, 9) were disclosed in an individualized form in the application as filed, such as in the examples and in original claim 72. A preferred range of 90% identity was also disclosed for all the embodiments of the invention, including that of claim 72 (SEQ ID NO:8). The combination of SEQ ID NO:8 and 90% identity was thus directly derivable from the application as filed.

Several computer programs were available to the skilled person for calculating degrees of identity. The application as filed referred to the GAP program only as an example of a program but was not intended to be limited thereto. Whereas several preferred degrees of identity were indicated, 90% was the most preferred. It was also known to the skilled person that at a higher degree of identity, the particular computer program used was less relevant, since less differences were to be accommodated.

The features of claim 10 had a basis in original claims 72 and 89 a). While feature a) had a further basis in page 32, lines 5 to 15 of the application as filed, feature b) was further supported by page 31, lines 1 to 18 and page 32, lines 32 to 33, wherein the term "enzyme" was defined as including homologues that were

further characterized by a preferred degree of identity of at least 90%.

Article 84 EPC

The wording of claims 1 and 10 of the main request was identical to that of the granted claims except for the degree of identity. Thus, appellant's objection for lack of clarity should not be allowed into the appeal proceedings. In any case, the analogues of original claim 72 b) were not required to have all the features i) to iv) mentioned in that claim. The description of the application as filed stated - with reference to the properties i) to iv) - that the endoglucanases had "*any or all*" of them, such as on page 26, last paragraph combined with page 23, lines 9 to 37. Thus, no features were missing from claims 1 and 10. Moreover, methods to calculate the degree of identity among different sequences were known to the skilled person. Evidence was also on file showing that, when drafting patent applications, it was normal to refer to degrees of sequence identity without indicating any computer program. The skilled person knew that, at a higher degree of identity, the particular computer program used was also less relevant.

Article 54 EPC

Document D1 disclosed the endoglucanases from *Humicola insolens* DSM 1800 and from *Fusarium oxysporum* DSM 2672. None of them fell within the scope of claims 1 and 10. Although homologues of these enzymes were defined as being encoded by DNA that hybridized to the same probe as the DNA coding for these specific endoglucanases,

there was no disclosure in document D1 of a probe common to the endoglucanases of that document and to that of the patent-in-suit. In order to design such a probe, it was necessary to identify identity stretches between these sequences and, thus, hindsight knowledge of the patent-in-suit was required. Apart from the oligonucleotides shown in Table 1 of document D1, all references to probes were of a general character only. There were many other regions - on which to base the design of probes - different from those showing identity stretches in the sequence alignments filed with the grounds of opposition. Moreover, it was not certain whether the undefined area (hybridizing homologues) around the specific endoglucanases of document D1 overlapped with the subject-matter of claims 1 and 10. According to the case law, the correct standard to apply when deciding novelty was on the basis of a direct and unambiguous disclosure. The factual situation underlying the decision T 1120/00 (*supra*) was different from that of the present case. The claimed subject-matter was specifically defined and clearly restricted by reference to a limited degree of (90%) identity.

Article 56 EPC

Document D6, the closest prior art for the assessment of inventive step, concerned variants of known cellulases obtained by mutating the DNA sequences encoding them. Although parent cellulases derived from several organisms were cited, *Thielavia* or *Thielavia terrestris* were not mentioned. Starting from this prior art, the technical problem to be solved was the provision of endoglucanases active at a broad pH range.

The endoglucanase from ***Thielavia terrestris*** was shown to have an activity above 50% at a broad (5.0 to 9.0) pH range and, thus, to solve the technical problem.

There was no reference in document D6 to the ***Thielavia*** strains from document D8, although the latter was published eight years earlier than the former. None of the prior art documents concerning detergent cellulases or endoglucanases suggested ***Thielavia*** as a possible source for these enzymes. Many organisms were known to produce cellulases in a multi-enzyme cellulase system, i.e. to express several cellulases of different types. There was a vast range of possible sources and the selection of ***Thielavia*** was not comparable to what was called a "one way-street" situation. Document D8 disclosed a complex cellulase system with several components (glucosidase, cellulases), including an endoglucanase activity. However, it was not known whether this activity was derived from a single or from several endoglucanases nor was any cellulase family identified. There was evidence on file showing the presence of several endoglucanases in ***Thielavia terrestris*** and thus, even if the teachings of documents D6 and D8 were combined, the skilled person would not have inevitably arrived at the claimed subject-matter.

Although the endoglucanase activity was shown to be thermostable in document D8, there was no information whether this activity was stable over a broad pH range. There was no reference to detergents in document D8, which was only concerned with the bioconversion of lignocellulosic residues. For the degradation of cellulose to sugar, the activity of all components of the cellulase system (glucosidases, cellobiohydrolases

and endoglucanases) was required. The teachings of document D8 were thus in a different technical field than that of document D6 and the patent-in-suit. In the absence of any pointer, their combination was not obvious and required hindsight knowledge of the patent-in-suit. There was no motivation to choose the probe of document D7 for cellulases of the family 45 (K-family), select ***Thielavia terrestris*** from all other possible sources available in the art and use the probe in that strain. For assessing inventive step, it was not a question whether the skilled person could have made all these choices but whether it would have made them.

The advantageous properties of the endoglucanase from ***Thielavia terrestris*** were shown in the patent-in-suit and corroborated by experimental evidence on file. This endoglucanase was shown to have a superior activity at a broader (5.0 to 9.0) pH range and, thus, to be functional at standard (pH) conditions of known (washing) processes. For an industrial process, it was normal to assess enzymatic activities at its standard (pH) conditions and not to adapt the normal conditions of this process to the optimal (pH) conditions of the enzymes. The limitation of the claims to endoglucanases with at least 90% identity to that from ***Thielavia terrestris*** was reasonable and there was no evidence on file to show that this group of enzymes did not have the same advantages as those shown by the specific endoglucanase.

XIV. The appellant (opponent) requested that the decision under appeal be set aside and that the patent-in-suit be revoked.

XV. The respondent (patentee) requested that the decision under appeal be set aside and that the patent be maintained upon the basis of claims 1 to 21 of the main request filed during the oral proceedings on 15 February 2011.

Reasons for the Decision

Admissibility of the main request

1. The main request has been filed in direct reply to the objections raised by the board at oral proceedings and in its communication issued in preparation of these proceedings (cf. point VI *supra*). The main request is essentially based on auxiliary request 4 that was filed in reply to the board's communication within the one-month limit in advance of the date of the oral proceedings and which was later withdrawn at oral proceedings (cf. points VII and IX *supra*). It does not raise any new issues that could have taken the board or the appellant by surprise and it could reasonably be dealt with during the oral proceedings. Although the main request - in view of the stage of the appeal proceedings reached - was late filed, the board decides to exercise its discretion according to Article 13(1) of the Rules of Procedure of the Boards of Appeal (RPBA) and admits the main request into the appeal proceedings.

Main request
Articles 123(2),(3) EPC

2. No objections have been raised under Article 123(3) EPC and the board does not see any reason to do so of its own motion. The subject-matter of the main request has been limited in comparison to that of the claims as granted. The requirements of Article 123(3) EPC are thus fulfilled.

3. Claim 1(b) i) and ii) and claim 10 have been objected to under Article 123(2) EPC (cf. point XII ***supra***).

3.1 The application as filed discloses several DNA constructs comprising DNA sequences encoding endoglucanases from several organisms, including SEQ ID NO:8 from ***Thielavia terrestris*** NRRL 8126 (cf. ***inter alia*** page 26, lines 10 to 14 of the application as filed, WO 96/29397). Each of these DNA constructs and sequences are not only individualized as such in the application as filed but also explicitly claimed in original claims 66 to 81, wherein claim 72 is directed to the specific sequence SEQ ID NO:8. Claim 72(b) i) refers to analogues of this DNA sequence which are defined as being preferably at least 75% homologous with the DNA sequence SEQ ID NO:8 (cf. point II ***supra***). Thus, there is a disclosure in the application as filed combining the specific DNA sequence SEQ ID NO:8 with a preferred degree of homology.

3.2 According to the application as filed, the homology is determined as the degree of identity and the most preferred DNA sequences are those for which their coding region exhibits at least 90% identity. This most

preferred degree of identity is explicitly linked to the coding region of each of the disclosed specific DNA sequences, including SEQ ID NO:8 (cf. page 30, lines 1 to 19). In this context, it is stated that "*The homology may suitably be determined by means of computer programs known in the art* ***such as*** *GAP provided in the GCG program package*" (in bold by the board) and some specific settings of the GAP program are further disclosed. The reference to the GAP computer program is clearly understood as giving only an example of a possible computer program available in the art, but not as limiting the calculation of the degree of identity to that specific program, let alone to the particular settings referred to therein.

3.3 Original claim 89(a) is directed to an enzyme which exhibits endoglucanase activity and is encoded by a DNA construct according to any of claims 66 to 83. These claims are directed to DNA constructs comprising the specific DNA sequences disclosed in the application as filed (cf. page 32, lines 5 to 7 of the application as filed). In particular, claim 72(a) relates to the sequence SEQ ID NO:8 and claim 72(b) iii) requires an analogue of sequence SEQ ID NO:8 to encode a polypeptide having a preferred degree of homology, namely at least 70% - as defined in the application as filed (cf. page 31, lines 1 to 18).

3.4 It has been argued by the appellant that the DNA analogues of claim 72(b) are required to have all the features i) to iv) referred to in that claim (cf. point XII *supra*). Contrary to the appellant's view, the board considers that this claim is ambiguously drafted because there is no "*and*" or "*or*" linking these four

features (cf. point II ***supra***). However, this ambiguity is clearly removed by the definition of "analogue" found in the description of the application as filed, which states that "***... any DNA sequence encoding an enzyme exhibiting endoglucanase activity, which has any or all of the properties i)-iv)***" (in bold by the board) (cf. page 26, last paragraph). This definition is also in line with that given for an enzyme exhibiting endoglucanase activity, wherein the enzyme is characterized by features a), b) "***and/or***" c) (in bold by the board) (cf. page 32, lines 5 to 15 of the application as filed), i.e. any or all of the indicated properties (see also original claim 89; point II ***supra***).

3.5 It follows from the above that claim 1(b) i) and ii) has a basis in original claim 72(b) i) and iii) in combination with the disclosure found on page 30, lines 1 to 19 of the application as filed. Claim 10(a) and (b) has a basis in original claims 89(a) and 72(b) in combination with the disclosures found on page 31, lines 1 to 18 and page 32, lines 5 to 7 of the application as filed.

4. Thus, the main request fulfils the requirements of Article 123(2) EPC.

Article 84 EPC

5. Apart from the degree of identity, which instead of being at least 70 or 75%, is now required to be at least 90% in claims 1(b) and 10(b) (in the former claim the degree of identity has also been limited to the coding region of the sequence SEQ ID NO:8), the wording of these claims is in all other respects identical to

that of granted claims 1 and 10. It is thus questionable, as argued by the respondent (cf. point XIII *supra*), whether these claims are open to discussion for the purpose of Article 84 EPC. However, in view of the fact that the objections raised under Article 84 EPC are also related to those raised under Article 123(2) EPC - which have been decided in the respondent's favour (cf. points 3.1 to 3.5 *supra*), the board decides to deal with them.

6. As stated in point 3.4 *supra*, neither the DNA analogues nor the enzymes exhibiting endoglucanase activity are required to have all the features i) to iv) cited in original claim 72(b). Claims 1 and 10 of the main request are not missing any essential technical feature.

7. Although there is no method indicated in the claims for calculating the feature "*at least 90% identity*" or "*at least 90% identical*" with sequence SEQ ID NO:8, the patent-in-suit refers to a well-known method in the art, namely the GAP computer program with standard settings (cf. point 3.2 *supra*). The board is convinced that other methods were also available to the skilled person and that the absence of a reference to these methods in this type of claims was, and still is, current practice when drafting a patent application in this field - as shown by patents and patent applications contemporaneous with the patent-in-suit. No unclarity arises from this absence, even though different methods may provide different results which, under certain circumstances, may have different consequences when assessing novelty and/or inventive step.

8. Lastly, claim 1(b) i) and ii) requires the (analogue) DNA sequence to have at least 90% identity with the (full-length) coding region of or, the (full-length) polypeptide encoded by, the DNA sequence SEQ ID NO:8. Similarly, claim 10(b) requires the enzyme exhibiting endoglucanase activity to be at least 90% identical to the (full-length) amino acid sequence SEQ ID NO:9. No ambiguity arises from these claims which, in the board's view, do not contemplate fragments of these (full-length) sequences.

9. The main request is thus considered to fulfil the requirements of Article 84 EPC.

Article 54 EPC

10. Document D1 discloses the cDNA sequences encoding the (~ 43 kD) endoglucanases from ***Humicola insolens*** DSM 1800 and from ***Fusarium oxysporum*** DSM 2672 as well as the amino acid sequences of both enzymes (cf. page 5, lines 5 to 21, claims 6 to 11 and SEQ ID NO:1 to 4 of document D1). Document D1 defines a homologue of these enzymes as "***... a polypeptide encoded by DNA which hybridizes to the same probe as the DNA coding for the endoglucanase enzyme with this amino acid sequence*** (of the appended Sequence Listing) ***under certain specified conditions ...***" (cf. page 4, lines 24 to 32). In Example 2, it is stated that for screening a cDNA library from ***Humicola insolens*** and for cloning a cDNA encoding the endoglucanase "(t)***he oligonucleotide probes were made on the basis of amino acid sequences of tryptic fragments of the purified ~ 43 kD endoglucanase***" and several probes are disclosed in Table 1 of document D1 (cf. page 17, lines 11 to 13 in

combination with page 34, lines 11 to page 35, line 9). Homologous endoglucanases derived from other microorganisms producing cellulolytic enzymes are also contemplated and a list of possible microorganisms is explicitly given in document D1 (cf. page 5, lines 22 to 26).

11. It is not contested that the specific sequences of the endoglucanases disclosed in document D1 do not fall within the scope of the claims of the main request and that the homologues referred to in that document are disclosed only in a generic form without providing any particular examples thereof. Moreover, there is no mention of ***Thielavia***, let alone of ***Thielavia terrestris*** NRRL 8126, as a possible source for cloning these homologous endoglucanases in the list of microorganisms disclosed in document D1.

12. Nevertheless, the appellant argues that, in view of the high (~70%) degree of identity between the enzymes of document D1 and the endoglucanase from ***Thielavia terrestris*** NRRL 8126, their amino acid sequences share long stretches of identity (cf. pages 20 and 21 of the appellant's notice of opposition of 4 October 2006) and probes based on these identity regions will hybridize with a DNA sequence encoding the endoglucanase from ***Thielavia terrestris*** NRRL 8126 and with DNA sequences encoding these endoglucanases of document D1. Therefore, the former enzyme falls within the definition of homologues given in document D1 and, in line with decision T 1120/00 (***supra***), these homologues anticipate the endoglucanase of the patent-in-suit (cf. point XIII ***supra***).

13. The board does not share this view. The presence of stretches of identity between the amino acid sequences of the endoglucanases - and the DNA sequences encoding them - disclosed in document D1 and in the patent-in-suit is not contested. However, the determination of these stretches and the selection of specific oligonucleotide probes within these regions, i.e. the common probes, require hindsight based on the knowledge of the patent-in-suit, namely the amino acid and nucleotide sequences disclosed therein. This is all the more so since, to arrive at subject-matter falling within the scope of the claims - starting from the disclosure of document D1, common probes have to be used in the screening of a cDNA library from ***Thielavia***, and more particularly from the strain used in the patent-in-suit - ***Thielavia terrestris*** NRRL 8126, none of them being mentioned in document D1. Thus, the board considers the appellant's arguments, which might be of importance for assessing inventive step (***infra***), lack of relevance for the assessment of the novelty of the subject-matter claimed in the main request.

14. Whereas the subject-matter of the main request is directed to the specific amino acid and DNA sequences derived from ***Thielavia terrestris*** NRRL 8126 and to an intermediate generalization, namely a limited group of related sequences having at least 90% identity to these specific sequences, the homologues referred to in document D1 represent a broad generalization of the specific sequences disclosed in that document since both the (shared) probe and the hybridization conditions are only broadly defined (cf. point 10 ***supra***). This situation is completely different from that underlying decision T 1120/00 (***supra***), wherein the

claims then under consideration and the disclosure of a prior art document contemplated comparable levels of generalization, in particular, a broad generalization defined in similar terms ("*substantially homologous*"). In the board's view, an essential message that this decision seeks to convey is that the same standard must be applied to the disclosure of a patent or a patent application and to that of the prior art (cf. T 1120/00, *supra*, point 15 of the Reasons). In the present case, the intermediate generalization (limited group of related sequences) represents a fair and reasonable extension of the specific sequences disclosed in the patent-in-suit which cannot be compared to the broad generalization made in document D1. This limited group of related sequences is not seen as being clearly, directly and unambiguously anticipated by the broad generalization of document D1.

15. The main request is thus considered to fulfil the requirements of Article 54 EPC.

Article 56 EPC

16. Document D6, which both parties regarded as the closest prior art for the assessment of inventive step, describes the production of mutant cellulase (endoglucanase) variants with improved properties when used as ingredients of detergent compositions. The document is exemplified by site-directed mutagenesis of the endoglucanase from *Humicola insolens* disclosed in document D1. There is a reference to parent cellulases obtained from other microorganisms, such as bacteria or, more preferably, fungi - even though *Thielavia* is not cited at all. It is also explicitly stated that

"*(p)referably, the parent cellulase is selected from the cellulases classified in family 45*" (cf. page 9, lines 26 to 30 of document D6).

17. Starting from this prior art, the technical problem to be solved may be defined as the provision of an alternative parental endoglucanase. It is not contested that the claimed subject-matter provides a solution to this particular technical problem.

18. The appellant, however, argues that this solution is obvious in the light of a combination of documents D6 and D8 taken together with document D7, the latter representing only the common general knowledge of the person skilled in the art (cf. point XII *supra*). The board cannot follow the appellant's argument for the reasons given below.

19. First, document D8 relates to a different technical field than that of the patent-in-suit, namely the bioconversion of lignocellulosic residues (cf. page 673, second paragraph of document D8). Although the endoglucanase activity is described as thermostable (cf. page 673, first paragraph and page 675, last paragraph), there is no other information, such as a pH range and a pH optimum, that might be of relevance for establishing its possible use in detergent compositions. The sole reference to thermostability is not considered enough to immediately draw the attention of the skilled person working in the field of detergents to that document.

20. Indeed, document D8 does not put any emphasis on the endoglucanase activity alone but on the complete cellulolytic system described in that document, i.e.

β-glucosidase, cellulobiohydrolase (CBH) and endoglucanase. Moreover, although document D8 was already published in 1986 - eight years earlier than document D6 - and, thus, was long available to the skilled person, there is no reference to that document or to ***Thielavia terrestris*** in any of the documents on file concerned with cellulolytic (endoglucanase) enzymes for detergent compositions, including document D6. This is all the more important because there are documents on file which show that there was a large number of possible alternative microorganisms and fungi available to the skilled person. The situation was thus not similar to what has been called in the case law a "one-way street" situation (cf. "Case Law of the Boards of Appeal of the EPO", 6th edition 2010, I.D.9.8, page 219).

21. Second, it is arguable whether document D7 meets the definition of "common general knowledge of the skilled person" given in the case law (cf. "Case Law", ***supra***, I.C.1.5, page 66). In any case, although this document discloses two oligonucleotide probes based on highly conserved, family-specific regions of the cellulases of the family 45 (K-family or Kfam) (cf. page 163, right-hand column, lines 1 to 14, page 166, the paragraph bridging left- and right-hand columns, and Figure 2), there is no indication in that document that could have led the skilled person to use these probes for screening a ***Thielavia*** strain. Nor is there any indication in document D8 that could have led the skilled person to expect the endoglucanase activity described therein to be associated with a member of the K-family (or family 45). In the absence of any of these indications, the combination of documents D6 and D8

together with document D7 cannot be seen as straightforward and obvious for the skilled person.

22. Third, document D8 does not allocate the endoglucanase activity exclusively to a single endoglucanase. The presence of multiple cellulolytic enzymes, with several enzymes having similar activities, is known to be the rule rather than the exception for fungal complex cellulolytic systems, such as that of the T*hielavia terrestris* strains disclosed in document D8. Indeed, there is post-published evidence on file showing the presence of several endoglucanases in *Thielavia terrestris* NRRL 8126. Thus, even if the combination of documents D6 and/or D7 with document D8 were to be seen as obvious, which in view of the above considerations is not, it would not be evident whether the skilled person would always have inevitably achieved the claimed subject-matter. The possible presence of several endoglucanases belonging to the same cellulase family and/or of structurally related - sharing some or few identity regions - endoglucanases from other cellulase families, the specific probe and the particular hybridization conditions selected, etc., might well have an influence on the final result obtained.

23. The present situation is quite different and not comparable with that underlying decision T 875/02 (*supra*). In that case, the closest prior art not only identified the high producer fungi (*Aspergillus ficuum* NRRL 3135) from which the desired (phytase) enzyme was purified but provided also a partial characterization (amino acid composition and amino acid sequences of a N-terminal peptide and of three internal peptides) of

this enzyme as well as a disclosure of the drawbacks encountered with a first immunoscreening cloning strategy and information on the preliminary positive results obtained using a second cloning strategy based on a probe derived from an internal peptide (cf. T 875/02, *supra*, points 2 to 4 of the Reasons). Although not disclosed, this probe - described as a "molecular biologist's dream" because of its low degeneracy and high specificity - could be derived from the closest prior art without inventive ingenuity (cf. T 875/02, *supra*, points 8 to 11 of the Reasons).

24. This information is not found in document D6, the closest prior art, which does not disclose the microorganism source of the claimed endoglucanase enzyme but needs to be combined - without any pointer to do so - with a further document (document D8). There is no characterization at all of the claimed endoglucanase in either document D6 or document D8, which does not even exclude the presence of other related enzymes. None of documents D6, D7 and D8 discloses a specific probe which was known to have such properties (high specificity) as to allow a skilled person to qualify it as a "molecular biologist's dream".

25. In view of the above considerations on the obviousness of the claimed endoglucanase, there is no need for the board to assess in detail whether this enzyme exhibits unexpected advantageous properties for use in detergent compositions. Nevertheless, the board shares the respondent's opinion that, for industrial processes, a significant enzymatic activity over a broad pH range is usually advantageous because it might allow the use of the enzyme at conditions normally used in an industrial

process without requiring further modifications of that process (cf. point XIII *supra*). Thus, for comparative examples, it is not the pH optimum of the endoglucanase which might be of relevance but the pH of the industrial process for which the enzyme is intended to be used. The examples of the patent-in-suit and the experimental evidence on file show that, whereas similar results are obtained at neutral (6.0 - 6.5) pH values, the claimed endoglucanase shows higher activity at lower or acidic (4.5 - 5.5) pH values when compared to other known endoglucanases, such as that from *Humicola insolens*. Moreover, the unexpected properties of the claimed endoglucanase are not seen as a mere bonus effect since, and as stated in point 20 *supra*, the present situation differs from what has been called in the case law a "one-way street" situation.

26. It follows from all the foregoing that the main request fulfils the requirements of Article 56 EPC.

Order

For these reasons it is decided that:

1. The decision under appeal is set aside.

2. The case is remitted to the department of first instance with the order to maintain the patent with claims 1 to 21 of the main request filed during the oral proceedings and a description to be adapted thereto.

The Registrar: The Chairman:

A. Wolinski T. Mennessier