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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte GERMAN SPANGENBERG, ANGELA JANE LIDGETT,
ROBYN LOUISE HEATH, RUSSELL LEIGH McINNES,
DAMIAN PAUL LYNCH, ULRIK PETER JOHN, AIDYN MOURADOV,
and MEGAN ELIZABETH GRIFFITH.¹

Appeal 2014-008793
Application 12/669,659
Technology Center 1600

Before: JEFFREY N. FREDMAN, RICHARD J. SMITH and
JOHN E. SCHNEIDER, *Administrative Patent Judges*.

SCHNEIDER, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134(a) involving claims directed to nucleic acid constructs which have been rejected obvious. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

¹ Appellants identify the Real Party in Interest as Agriculture Victoria Services Pty. Br. 1.

STATEMENT OF THE CASE

The present invention relates to “the modification of lignin biosynthesis in plants, to enzymes involved in the lignin biosynthetic pathway and nucleic acids encoding such enzymes and, more particularly, to methods of modifying lignin biosynthesis via sense suppression and to related nucleic acids and constructs.” Spec. 1.

Claims 27, 29, 30, 36, 40–46, 48, and 49² are on appeal. Claim 27 is illustrative and reads as follows:

27. A substantially purified or isolated nucleic acid comprising a fragment or variant of a gene encoding caffeic acid O-methyltransferase (COMT), said nucleic acid being capable of modifying lignin biosynthesis in a plant via sense suppression;

wherein said fragment or variant comprises a frame shift mutation relative to the gene upon which the fragment or variant is based, resulting in a loss or at least 50% reduction in enzymatic activity in the encoded polypeptide; and

wherein said frame shift mutation is a mutation that deletes or inserts one, two, four five, seven or eight nucleotides within 200 bases of the 5' end of the gene upon which the fragment or variant is based and within a short distance of the ATG start codon of the gene upon which the fragment or variant is based.

² While the Examiner indicates that claims 27, 29, 30, 36, 40–48 remain rejected, Ans. 2, a review of the prosecution history indicates that claim 47 was cancelled and new claim 49 was added in an amendment after final. Amendment filed Sept. 30, 2013. The Examiner entered the Amendment for purposes of this appeal. Advisory Act. mailed Oct. 10, 2013. Appellants acknowledge that all of the claims are subject to the obviousness rejection (Appeal Br. 2) and the Examiner addressed the rejection of claim 49 in the Answer (Ans. 4). Accordingly, we treat claims 27, 29, 30, 36, 40–46, 48, and 49 as subject to the rejection for obviousness.

The claims stand rejected as follows:

Claims 27, 29, 30, 36, and 40–46, 48, and 49 stand rejected under 35 U.S.C. § 103(a)³ as unpatentable over Demmer⁴ in view of Que⁵.

DISCUSSION

Issue

In rejecting the pending claims as obvious, the Examiner finds that Demmer teaches

the transformation of plants with a nucleic acid encoding SEQ ID NO:182 which is the lignin biosynthesis gene COMT that has 100% identity to the instantly claimed SEQ ID NO:134 in the sense direction (see claims 1-7, 10-16 and 18-19, for example) wherein lignin content is altered, and wherein the sense orientation includes cosuppression (see paragraph 87, for example), including near the 5' end of the translated sequence.

Ans. 2–3.

The Examiner finds that while Demmer does not teach cosuppression using a frameshift mutation, Que teaches cosuppression of Chalcone synthase using frameshift mutations within 200 bases of the 5' end of the gene. *Id.*

The Examiner concludes that

[g]iven the state of the art, the disclosure by Demmer et al and the disclosure by Que et al, it would have been obvious to one of ordinary skill in the art to co-suppress the instantly claimed gene

³ The Examiner also rejected the pending claims under 35 U.S.C. § 112, first paragraph. However, that rejection was withdrawn. Advisory Act. Mailed Oct. 10, 2013.

⁴ Demmer et al., US 2005/0150008 A1, published Jul. 7, 2005 (“Demmer”).

⁵ Que et al., *The Frequency and Degree of Cosuppression by Sense Chalcone Synthase Transgenes Are Dependent on Transgene Promoter Strength and Are Reduced by Premature Nonsense Codon in the Transgene Coding Sequence*, 9 *The Plant Cell* 1357 (1997) (“Que”).

as taught by Demmer et al to modify lignin content, using the variant types taught by Que et al and consistent with what is commonly practiced in the art. Absent evidence of a surprising result, the claimed variants fall under the scope of the variants taught by Demmer et al, specifically in targeting the 5' region of the gene, and one of ordinary skill in the art would have appreciated them as design choices in cosuppressing COMT.

Ans. 3–4.

Appellants contend that the Examiner has improperly resorted to hindsight in making the rejection in that the rejection improperly looks from the perspective of the claimed invention and not what is taught by the prior art. Appeal Br. 2. Appellants argue that there is no reason why one skilled in the art would combine the references without using the present specification as a guide. Appeal Br. 3. Appellants argue that Que's primary approach to cosuppression does not involved a frameshift mutation. *Id.* Appellants conclude by arguing that the Examiner improperly cites the use of frameshift mutations to manipulate down-regulation as motivation to combine the reference as neither reference teaches that down-regulation is the desired result in the case of the COMT gene. Appeal Br. 5.

The issue with respect to this rejection is whether the Examiner has established by a preponderance of the evidence that claims 27, 29, 30, 36, and 40–46, 48, and 49 would have been obvious over Demmer combined with Que as defined by 35 U.S.C. § 103(a).

Findings of Fact

We adopt as our own the Examiner's findings and analysis. The following findings are included for emphasis and reference convenience.

FF1. Demmer discloses controlling production of lignin in plants through the use of genetic constructs which modulate the biosynthesis of lignin. Demmer ¶ 31.

FF2. Demmer teaches that lignin production can be regulated by modifying the gene that encodes for caffeic acid O-methyl transferase (“COMT”). Demmer ¶ 11.

FF3. Demmer discloses the use of genetic constructs to reduce the amount of lignin synthesized by a plant using cosuppression. Demmer ¶ 87.

FF4. Demmer teaches introducing genetic constructs near the 5' end of a translated sequence. *Id.*

FF5. Que teaches the use of frameshift mutations within 200 based pairs of the 5' end of a gene. Que 1362.

FF6. The frameshift mutation in Que resulted in reduced enzymatic activity. Que Table 5.

Principles of Law

“The factual predicates underlying an obviousness determination include the scope and content of the prior art, the differences between the prior art and the claimed invention, and the level of ordinary skill in the art.” *In re Rouffet*, 149 F.3d 1350, 1355 (Fed. Cir. 1998).

“[J]ust because better alternatives exist in the prior art does not mean that an inferior combination is inapt for obviousness purposes.” *In re Mouttet*, 686 F.3d 1322, 1334 (Fed. Cir. 2012).

Analysis

Claim 27 is representative of the rejected claims and is directed to a nucleic acid fragment which encodes for COMT which has been modified

by a frame shift mutation resulting in a reduction of COMT enzymatic activity.

We agree with the Examiner's finding that

[g]iven the state of the art, the disclosure by Demmer et al and the disclosure by Que et al, it would have been obvious to one of ordinary skill in the art to co-suppress the instantly claimed gene as taught by Demmer et al to modify lignin content, using the variant types taught by Que et al and consistent with what is commonly practiced in the art. Absent evidence of a surprising result, the claimed variants fall under the scope of the variants taught by Demmer et al, specifically in targeting the 5' region of the gene, and one of ordinary skill in the art would have appreciated them as design choices in cosuppressing COMT.

Ans. 3–4.

Appellants contend that the Examiner improperly applied hindsight in reaching a conclusion of obviousness. Appeal Br. 2–3, Reply Br. 3. We are unpersuaded. As the Examiner points out, the elements of claim 27 are taught by the references and the motivation to combine the references stems from the references themselves. *See* Ans. 5. Demmer teaches alteration of lignin content via cosuppression of COMT and Que teaches that cosuppression can be achieved by frame shift mutation. *Id.* It is well-established that any judgment on obviousness is necessarily a reconstruction based upon hindsight reasoning, “but so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made and does not include knowledge gleaned only from applicant’s disclosure, such a reconstruction is proper.” *In re McLaughlin*, 443 F.2d 1392, 1395 (CCPA 1971).

Appellants next argue that one skilled in the art would not select the frame shift technique of Que as “Que does not teach frameshift mutations as

a preferred or even a desirable method for achieving cosuppression.” Appeal Br. 4. We remain unpersuaded. While Que does not utilize frameshift mutations for the same reason as Appellants, Que does demonstrate frameshift mutations lead to cosuppression. As the Examiner points out, even if “Que et al did not set out to demonstrate this effect” (Ans. 7), this does not negate a finding of obviousness in using Que’s frameshift cosuppression effect with Demmer’s desire to cosuppress COMT to reduce lignin content. *In re Mouttet*, 686 F.3d at 1334.

Conclusion of Law

We conclude that the Examiner has established by a preponderance of the evidence that claim 27 would have been obvious over Demmer combined with Que under 37 U.S.C. § 103(a).

Claims 29, 30, 36, and 40–46, 48, and 49 have not been argued separately and therefore fall with claim 27. 37 C.F.R. § 41.37(c)(1)(iv).

SUMMARY

We affirm the rejection of claims 27, 29, 30, 36, and 40–46, 48, and 49 under 35 U.S.C. § 103(a) as unpatentable over Demmer in view of Que.

TIME PERIOD FOR RESPONSE

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a).

AFFIRMED