UNITED STATES PATENT AND TRADEMARK OFFICE

**BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES**

Ex parte ROGER TIMMIS,
MITCHELL R. TOLAND, TIMNIT GHERMAY,
WILLIAM C. CARLSON and JAMES A. GROB

Appeal 2007-0862
Application 10/680,675
Technology Center 1600

Decided: June 14, 2007

Before TONI R. SCHEINER, DONALD E. ADAMS, and
ERIC GRIMES, *Administrative Patent Judges*.

GRIMES, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a method for sorting plant embryos. The Examiner has rejected the claims as nonenabled and lacking adequate written description. We have jurisdiction under 35 U.S.C. § 6(b). We reverse the rejection for inadequate written description but affirm the rejection for nonenablement.

BACKGROUND

"Reproduction of selected plant varieties by tissue culture has been a commercial success for many years" (Specification 1). The predominant approach to conifer tissue culture is somatic embryogenesis, a process in which

> an explant, usually a seed or seed embryo, is placed on an initiation medium where it multiplies into a multitude of genetically identical immature embryos. . . . [T]he immature embryos are placed on a development or maturation medium where they grow into somatic analogs of mature seed embryos. These embryos are then individually selected and placed on a germination medium for further development.

(*Id.*) "[T]he selection from the maturation medium of individual embryos suitable for germination . . . is a skilled yet tedious job that is time consuming and expensive" (*id.* at 2).

The Specification discloses a method for automated sorting of embryos. The method is "based on classification of plant embryos by the application of classification algorithms to digitized images and absorption, transmittance, or reflectance spectra of the embryos" (*id.* at 3).

> The method first develops a classification model by acquiring raw digital image data of reference samples of plant embryos of known embryo quality. . . . Data analysis is performed . . . using one or more classification algorithms to develop a classification model for classifying plant embryos by embryo quality. . . . Raw digital image data of plant embryos of unknown embryo quality is then acquired using the same methods . . . [and] analyzed using classification algorithms used to develop the classification model in order to classify the quality of the plant embryo of unknown quality.

(*Id.* at 3-4.)

DISCUSSION

1. CLAIMS

Claims 1-14 are pending and on appeal. The claims have not been argued separately and therefore stand or fall together. 37 C.F.R. § 41.37(c)(1)(vii). We will focus on claims 1 and 14, which read as follows:

> 1. A method for classifying plant embryos according to their quantifiable characteristics, comprising:
>
> (a) developing a classification model by
>
> (i) acquiring raw digital image data of reference samples of whole plant embryos or of embryo organs of known quantifiable characteristics;
>
> (ii) performing a data analysis by applying one or more classification algorithms to the acquired raw digital image data, wherein at least one of the classification algorithms uses more than an embryo perimeter from the acquired raw digital image data, the data analysis resulting in development of a classification model for classifying plant embryos by their quantifiable characteristics;
>
> (b) acquiring raw digital image data of a plant embryo or a plant embryo organ of unknown quantifiable characteristics; and
>
> (c) applying the developed classification model to the raw digital image data of step (b) in order to classify the plant embryo of unknown quantifiable characteristics according to its presumed quantifiable characteristics.
>
> 14. The method of Claim 1 wherein the quantifiable characteristics comprise conversion potential, resistance to pathogens, drought resistance, heat resistance, cold resistance, salt tolerance, preference for light quality, or suitability for long-term storage.

Thus, claim 1 is directed to an automated method for classifying plant embryos. Digital images of plant embryos having known characteristics are analyzed and used to develop a "classification model" for classifying other

plant embryos. That is, the known samples are used to train a computer to recognize embryos having similar characteristic(s). (Specification 8: 24-26 ("The classification model is deduced from a 'training' data set of multiple images of plant embryos or plant embryo organs acquired from embryos having known embryo quality.")).

After a classification model has been generated based on known samples, it is applied to digital images of a plant embryo of unknown characteristics, in order to classify the unknown embryo "according to its presumed quantifiable characteristics"; i.e., the unknown embryo is classified as similar to or dissimilar from the embryos in the training set. (Specification 8: 30-31 ("Unclassified embryos are classified as acceptable or not based on how close images of the unclassified embryos fit to the classification model developed from the training set groups.")).

Claim 14 specifies that the "quantifiable characteristics" can be conversion potential (i.e., likelihood to germinate; Specification 7: 13-15); resistance to pathogens, drought, heat, or cold; salt tolerance; preference for light quality; or suitability to long-term storage (i.e., storage of the embryos themselves; Specification 7: 15-18). These characteristics are referred to generically as "plant embryo quality" in the Specification (*id.* at 7: 5-19).

2. WRITTEN DESCRIPTION

Claims 1-14 stand rejected under 35 U.S.C. § 112, first paragraph, as lacking an adequate written description in the Specification. The Examiner finds that the Specification describes the claimed method only as applied to selecting embryos for their germination potential, and not with respect to other quantifiable characteristics:

> Appellant has demonstrated that one can take embryos which are visually determined to be good (an old and well known process), capture digital image data, and then take that data and apply well known data processing algorithms to interpret the data and produce a "classification model." It is not in the creation of a such a model that appellant has failed to adequately describe or enable . . . their claimed invention but in the application of said model. As such, the invention as a whole has not been adequately described or enabled.

(Answer 4-5.) By "good" embryos, we understand the Examiner to mean embryos having a morphology that indicates they are more likely to germinate. (See *id.* at 5: "Using morphology as a basis for selecting embryos is old and well known – embryos of a certain morphology tend to germinate better than others.").

The Examiner argues that the Specification does not adequately describe the genus of "quantifiable characteristics" that could be selected for using the claimed method (*id.* at 5). The Examiner also argues that the Specification does not adequately describe "how one could practice this invention wherein a digital image of only 'embryo organs' is captured and a model is made" (*id.*). Finally, the Examiner argues that the description is inadequate because "there is nothing to convey to one of skill in the art that the properties in claim 14 could be reasonably predicted using a digital image classification model (*id.* at 6).

We will reverse the rejection for lack of written description. "The 'written description' requirement . . . serves both to satisfy the inventor's obligation to disclose the technologic knowledge upon which the patent is based, and to demonstrate that the patentee was in possession of the invention that is claimed. . . . The descriptive text needed to meet these

requirements varies with the nature and scope of the invention at issue, and with the scientific and technologic knowledge already in existence." *Capon v. Eshhar*, 418 F.3d 1349, 1357, 76 USPQ2d 1078, 1084 (Fed. Cir. 2005).

Here, the Examiner argues that the Specification does not adequately describe the "quantifiable characteristics" to be selected for using the claimed method, relying on the test defined by *University of California v. Eli Lilly and Co.*, 119 F.3d 1559, 43 USPQ2d 1398 (Fed. Cir. 1997), and cases applying it. That test, however, does not apply to every generic term recited in a claim: it applies only to a chemical genus encompassing compounds that are not defined by structure. *See Amgen, Inc. v. Hoechst Marion Roussel, Inc.*, 314 F.3d 1313, 1332, 65 USPQ2d 1385, 1398 (Fed. Cir. 2003): "Both *Eli Lilly* and *Enzo Biochem* are inapposite to this case because the claim terms at issue here are not new or unknown biological materials that ordinarily skilled artisans would easily miscomprehend."

Like the "vertebrate cells" and "mammalian cells" recited in the claims at issue in *Amgen*, the term "quantifiable characteristics" recited in the instant claims is not a "new or unknown biological material[ ] that ordinarily skilled artisans would easily miscomprehend." As in *Amgen*, the *Eli Lilly*/*Enzo Biochem* test that the Examiner relies on is inapposite here.

The Examiner also argues that the claims lack adequate descriptive support because the Specification does not describe how to use images only of embryo organs to practice the claimed method or how to classify embryos according to the properties recited in claim 14 using digital image classification (Answer 5, 6).

In a nutshell, the Examiner's reasoning seems to be that the Specification does not describe these aspects of the claims because it does not provide any working examples showing classification based on embryo organs or classification with respect to the properties recited in claim 14. Lack of working examples, however, is not an adequate basis for a written description rejection. *See Falkner v. Inglis*, 448 F.3d 1357, 1366, 79 USPQ2d 1001, 1007 (Fed. Cir. 2006) ("[E]xamples are not necessary to support the adequacy of a written description[;] . . . the written description standard may be met . . . even where actual reduction to practice of an invention is absent).

The instant Specification describes the claimed method in general terms (e.g., Specification 3-4) and provides working examples of using the method to classify embryos based on likelihood to germinate (*id.* at 13-42). The Specification also states that the method can be used to classify embryos based on any quality susceptible to quantification (*id.* at 8: 28-29), and that images of embryo organs can be used instead of images of whole embryos (*id.* at 7: 28-35).

We reverse the rejection of claims 1-14 for lack of adequate written description because the Examiner has not adequately explained why the Specification's disclosure does not satisfy that requirement of 35 U.S.C. § 112, first paragraph. Whether it satisfies the enablement requirement of the same paragraph is a separate issue, to which we now turn.

3. ENABLEMENT

Claims 1-14 also stand rejected under 35 U.S.C. § 112, first paragraph, as nonenabled. The Examiner relies in part on the same

reasoning used to support the written description rejection: After explaining the rejection for lack of adequate description, the Examiner concludes that

> [i]t follows logically that the entire claimed invention has not been enabled by the instant specification because applicant has not taught how to apply the instant invention such that one of skill in the art could predict using applicants' classification model . . . whether or not any embryo would germinate or have one of the other "characteristics" as in claim 14.

(Answer 7.) The Examiner also argues that the "specification has not enabled the use of 'embryo organs of' an embryo as the means for creating a classification model" (*id.*).

Although we have some quibbles, we agree with the thrust of the Examiner's reasoning and his conclusion that the Specification does not enable practice of the full scope of the claimed method without undue experimentation.

First, the quibbles: the Examiner has not adequately supported his conclusion that more than routine experimentation would be required to use the claimed method to classify embryos on the basis of germination potential. The Examiner has acknowledged that "[u]sing morphology as a basis for selecting embryos is old and well known – embryos of a certain morphology tend to germinate better than others" (Answer 5).

The Specification states that embryos "that are most likely to successfully germinate into normal plants are preferentially selected using a number of visually evaluated screening criteria . . . [including] axial symmetry, cotyledon development, surface texture, [and] color" (Specification 2: 6-9). The Specification also provides working examples of the claimed method to classify embryos "using the usual zygotic embryo

criteria of color, axial symmetry, freedom from obvious flaws, and cotyledon development" (*id.* at 21: 4-5; see also *id.* at 23: 11-12 ("embryos judged to be of high morphological quality, as previously defined").

Thus, the evidence of record appears to show that the morphological properties associated with embryos most likely to germinate into plants were well-known in the art and routinely applied by technicians in hand-sorting embryos. In light of the state of the art and the guidance and working examples presented in the Specification, the Examiner has not adequately explained why undue experimentation would be required to use the claimed method to classify embryos according to their germination potential.

We also conclude that the Examiner has not adequately explained why the claimed method could not be practiced, without undue experimentation, using digital images of embryo organs rather than complete embryos. As shown in the application's Figure 1, a plant embryo is made up of embryo organs (cotyledon, hypocotyl, and radical). Some of the morphological properties commonly used to sort embryos are those of the embryo organs (e.g., cotyledon development; Specification 2: 8). The Specification provides a working example of the claimed method in which the observed features used as inputs included presence of fused cotyledons, presence of gaps between cotyledons, hypocotyl length, radical length, cotyledon length, and cotyledon number (*id.* at 23: 16-19).

Thus, the evidence of record appears to show that the morphological features of individual embryo organs, and not just those of the embryo overall, are important indicators of which embryos are likely to germinate. Granted, the claimed method may not be as accurate if only features of

embryo organs were used as inputs, but the claims do not require any particular level of accuracy. The Examiner has not adequately explained why the claimed method could not be practiced without undue experimentation using digital images of embryo organs.

That said, we agree with the Examiner's conclusion that the claims are nonenabled because the Specification provides inadequate guidance with respect to classifying embryos on the basis of characteristics other than germination potential using the claimed method. (*See, e.g.,* Answer 6, 7-8.) Claim 14, for example, makes clear that the "quantifiable characteristics" recited in claim 1 include "resistance to pathogens, drought resistance, heat resistance, cold resistance, salt tolerance, preference for light quality, [and] suitability for long-term storage."

The Specification provides no guidance regarding what features of a digital image of embryos or embryo organs are associated with any of these characteristics. Nor does the Specification provide any working examples that show the use of embryo images to classify plant embryos according to any characteristic other than likelihood to germinate. In fact, the evidence of record does not show there exist any features of plant embryo images that can be used to classify embryos as resistant to pathogens, drought, etc. Therefore, we agree with the Examiner that using the claimed method to classify plant embryos according to characteristics other than likelihood to germinate would likely require undue experimentation on the part of those skilled in the art.

Appellants argue that

> the present invention is *not* directed to requiring to first identify a particular set of parameters or data that can be always used as

> indicative of specific quantifiable characteristics of plant embryos. . . .
>
> To the contrary, the present invention is directed to developing a classification model . . . without requiring first identifying what parameters or data are indicative of specific quantifiable characteristics. . . . In other words, the method of the present invention requires no pre-judgment that only the embryo perimeter information is indicative of embryo quality, and instead uses non-perimeter information also, such as texture, color, and any pattern contained in the non-perimeter pixels of an embryo image, in developing a classification model.

(Br. 12).

Essentially, Appellants' argument is that they have disclosed a method of training a computer to recognize images of embryos that are most likely to germinate; if it turns out that there are also visually recognizable characteristics of embryos that are pathogen resistant, drought resistant, etc., then their patent should cover teaching computers to recognize them, too, even though Appellants haven't disclosed (presumably because they don't know) what to train the computer to look for.

We disagree. "Patent protection is granted in return for an enabling disclosure of an invention, not for vague intimations of general ideas that may or may not be workable. . . . Tossing out the mere germ of an idea does not constitute enabling disclosure." *Genentech Inc. v. Novo Nordisk A/S*, 108 F.3d 1361, 1366, 42 USPQ2d 1001, 1005 (Fed. Cir. 1997).

Here, Appellants have disclosed a method for using digital image data to classify plant embryos according to their likelihood to germinate. They have not, however, disclosed a method for using digital image data to classify plant embryos according to any other quantifiable characteristics.

With respect to classifying embryos according to pathogen resistance, drought resistance, etc., the specification discloses nothing more than a general idea that may or may not be workable. That does not constitute an enabling disclosure and we affirm the rejection of claims 1-14 for lack of enablement.

SUMMARY

We reverse the rejection for lack of written description but affirm the rejection of claims 1-14 for lack of enablement.

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

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WEYERHAEUSER COMPANY
INTELLECTUAL PROPERTY DEPT., CH 1J27
P.O. BOX 9777
FEDERAL WAY, WA 98063