

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte SAKAE TSUDA and AI MIURA

Appeal 2008-5484
Application 10/496,104
Technology Center 1600

Decided: December 4, 2008

Before ERIC GRIMES, RICHARD M. LEBOVITZ, and STEPHEN
WALSH, *Administrative Patent Judges*.

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DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to a method of collecting antifreeze proteins from fish. The Examiner rejected the claims as obvious. We have jurisdiction under 35 U.S.C. § 6(b). We affirm.

STATEMENT OF THE CASE

Claims 7 and 21-24 are on appeal. Claims 21 and 22 stand or fall with claim 7; claim 23 and claim 24 are each argued separately and each will stand or fall separately. 37 C.F.R. § 41.37(c)(1)(vii).

Claim 7 reads as follows:

7. A method of collecting antifreeze proteins, which method removes an odor of a fish body, comprising:
- 1) preparing a suspension of a paste composed of the fish body or a crushed dry food composed of the fish body;
 - 2) centrifuging the suspension of the paste composed of the fish body or the crushed dry food composed of the fish body obtained in 1) to obtain a supernatant solution;
 - 3) carrying out heat treatment for the supernatant solution obtained in 2);
 - 4) obtaining a supernatant solution containing antifreeze proteins by removing a precipitate generated in 3) by centrifugation; and
 - 5) collecting the antifreeze proteins from the supernatant solution obtained in 4).

Claims 23 and 24 read:

23. The method of claim 7, further comprising, before step 1), removing the head portion and abdominal portion from the fish body.

24. The method of claim 23, further comprising, after said removing and before step 1), drying of the fish body.

The Examiner rejected the claims under 35 U.S.C. § 103(a) for obviousness over a combination of the teachings in three U.S. patents: Lillford et al. (U.S. Patent No. 6,156,880, issued Dec. 5, 2000) in view of Hays et al. (U.S. Patent No. 5,869,092, issued Feb. 9, 1999) and Ley et al. (U.S. Patent No. 6,906,176 B2, issued Jun. 14, 2005) (Ans. 3).

CLAIMS 7, 21 AND 22

The Examiner finds that Lillford disclosed a method of isolating Antifreeze Proteins (AFPs) from natural sources including fish, and Hays disclosed that AFPs can be isolated from cod and sculpin fish. Because Lillford listed fish as an AFP source, the Examiner concludes that one of ordinary skill in the art would have found it obvious to apply Lillford's method to fish that Hays listed as sources of AFPs. Relying further on Lillford's method steps, and on Ley for its teaching of centrifugation to separate cellular debris, the Examiner contends that the claimed method would have been obvious. (Ans. 3-4.)

Appellants contend the references of record teach away from the invention and the Examiner used impermissible hindsight to equate filtration and centrifugation. (App. Br. 9-19.) Appellants contend the Examiner disregarded the claimed method's unexpected results and that the invention provides a source of AFP never disclosed in the prior art. (*Id.* at 18-20.)

The issues presented are 1) do the references teach away from the invention, 2) did the Examiner use impermissible hindsight, 3) did the Examiner disregard unexpected results, and 4) does the invention provide a source of AFP never disclosed in the prior art?

Findings of Fact

1. Lillford taught a process for recovering antifreeze proteins (AFPs) from natural sources. (Col. 2, ll. 19-42.)

2. Lillford taught that the process can be applied to any natural source of heat-stable AFPs including fish. (Col. 3, ll. 6-10.)

3. Lillford disclosed working Example 1 in which AFPs were isolated from winter rye. (Col. 6, ll. 1-38.)

4. Lillford's Example 1 included steps in which

- a) rye clippings were homogenized in a blender until the leaf tissue was completely disrupted;
- b) the homogenate was filtered through muslin;
- c) the filtrate juice was heat treated by boiling for 10 minutes; boiling caused precipitation of unwanted proteins and the desired AFP stayed in the supernatant;
- d) the "supernatant was separated from the precipitate by centrifuging at 15,000g for 20 minutes or by further filtration through muslin" (Col. 6, ll. 18-20);
- e) the AFPs could be isolated from the supernatant by freeze drying. (Col. 6, ll. 21-23.)

5. Lillford's five method steps corresponded to claim 7's five method steps with a difference at step 2: Lillford used filtration, not centrifugation, to separate insoluble material ("precipitate") from soluble material in the crude suspension (the homogenate). (Ans. 3.)

6. Lillford taught that the AFP rich juice could be separated from its source by any convenient process. (Col. 3, l. 61 – col. 4, l. 3.)

7. Ley taught that, to isolate a protein, a host cell may be lysed and the cellular debris removed by either filtration or centrifugation before further purification of the protein. (Col. 4, ll. 54-63.)

8. Hays taught that AFPs were isolated from a large number of fish, including the genera *Gadus* (cod) and *Myoxocephalus* (sculpin). (Col. 4, ll. 1-66.)

9. The Examiner reviewed additional record prior art evidence which showed that fish AFPs were known to be found in liver and skin, citing Fletcher¹ and Evans.² (Ans. 5.)

Principles of Law Relating to Obviousness

Section 103 of Title 35 prohibits a patent when “the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.”

A prior art reference is said to teach away from an applicant’s invention “when a person of ordinary skill, upon reading the reference, would be discouraged from following the path set out in the reference, or would be led in a direction divergent from the path that was taken by the applicant.” *In re Gurley*, 27 F.3d 551, 553 (Fed. Cir. 1994).

“The combination of elements from non-analogous sources, in a manner that reconstructs the applicant’s invention only with the benefit of hindsight, is insufficient to present a *prima facie* case of obviousness.” *In re*

¹ Garth L. Fletcher et al., *Antifreeze Proteins of Teleost Fishes*, 63 ANNU. REV. PHYSIOL. 359-90 (2001).

² Robert P. Evans et al., *Isolation and characterization of type I antifreeze proteins from Atlantic snailfish (*Liparis atlanticus*) and dusky snailfish (*Liparis gibbus*)*, 1547 BIOCHIMICA ET BIOPHYSICA ACTA 235-44 (2001).

Oetiker, 977 F.2d 1443, 1447 (Fed. Cir. 1992). The anti-hindsight test requires that determinations of obviousness “should be based on evidence rather than on mere speculation or conjecture.” *Alza Corp. v. Mylan Labs, Inc.*, 464 F.3d 1286, 1290 (Fed. Cir. 2006).

Analysis of the “teaching away” Issue

Appellants contend that AFP is a plasma protein and that until their invention it was not known that AFP may be collected from a paste composed of the fish body. (App. Br. 9.) According to Appellants, Lillford, Hays and Ley fail to teach that AFP can be collected from a paste composed of the fish body. (*Id.* at 11.) Appellants argue that rebuttal references they list “counseled” the artisan that fish AFP is a serum protein and that “therefore” fish AFP is purified from fish plasma. (*Id.* at 12-14, listing 17 references.) Appellants argue they are first to teach AFP in fish muscles, that “fish AFP was isolated from serum exclusively in the record,” and that the cited publications “*in toto* teach away from collecting AFP from a paste composed of the fish body.” (*Id.* at 14-15.)

The question is not whether AFP can be purified from fish plasma, but rather whether those of skill in the art would have expected to purify AFP from the fish body on the Examiner’s evidence and reasoning. First, assuming only for the sake of argument that AFPs were present only in the plasma part of a fish body, Appellants have not shown that those of skill in the art would have expected Lillford’s method to fail when used on fish. Appellants have not met the teaching away test.

Second, the Examiner effectively rebutted Appellants’ argument that the prior art of record showed fish AFP isolated exclusively from serum.

Fletcher and Evans support the Examiner's finding that at the time of the invention, fish AFPs were known to be in liver and skin, citing Fletcher and Evans. (FF9.) This evidence supports the Examiner's finding that at the time the invention was made, those of skill in the art knew fish AFPs were not restricted to serum and knew they were present elsewhere in the fish body. (*Id.* at 6.) Third, we agree with the Examiner that the claims are not limited to fish muscle and do not distinguish over Lillford on that basis. (*Id.*) Finally, although Appellants' arguments emphasize fish "paste" as the source material for AFPs, Appellants do not contest that Lillford's blender homogenate meets claim 7's "paste."

Analysis of the "hindsight" issue

The Examiner concluded that at Lillford's second step it would have been obvious to centrifuge, rather than filter, insoluble debris from the suspension of starting material. Appellants argue that (1) this is impermissible hindsight, (2) the Examiner puts them to proofs about filtration, (3) the two processes are distinct and not equivalent, and (4) the two processes cannot be applied interchangeably at all occasions. (App. Br. 15-18.)

The evidence is: (1) Lillford discloses using any conventional or convenient process, e.g., pressing, filtering, extracting (FF6); (2) Ley teaches the functional equivalence of filtration and centrifugation for separating cellular debris from a solution (FF7); and (3) the artisan would have known that both methods are simple, conventional methods for separating soluble and insoluble fractions. (Ans. 4.)

The portion of Lillford's disclosure the Examiner points to teaches (1) the AFP rich liquid "can be separated from its source by any convenient process for example pressing, filtering, homogenizing, extraction, etc."; and (2) the insoluble fraction resulting from the later heating step "can then be treated by any convenient process in order to remove the insoluble fraction and retain the AFP rich liquid fraction. The insoluble fraction can be removed e.g. by filtering, precipitation etc." (Lillford, col. 3, l. 61 – col. 4, l. 9.) Lillford also states in its example that precipitate (obtained in a later step) can be removed by either filtration or centrifugation (FF4; Col. 6, ll. 18-20). Thus, Lillford expressly teaches that filtering and precipitation (centrifuging) are functional equivalents in the context of separating an insoluble fraction from an AFP rich liquid. Ley is further evidence in support of the Examiner's conclusion. We agree with the Examiner's fact-based conclusion, and reject Appellants' "impermissible hindsight" characterization. Lillford and Ley both confronted the problem of separating a protein rich liquid from undesired insoluble debris. Lillford and Ley both teach centrifugation to solve the problem. Appellants' argument does not establish impermissible hindsight under *Oetiker* because the Examiner's evidence-based prima facie case is based on analogous steps in Lillford and an analogous step in Ley, all directed to solving analogous protein purification problems.

Analysis of the "unexpected results" and "new source" Issues

Although set out under new headings, Appellants' arguments repeat some of the "teaching away" arguments discussed above. Appellants repeat the contention that prior to the invention AFPs were thought to be serum

proteins, citing Deng et al.,³ and other record references. According to Appellants, preparing AFP by mincing fish muscle tissue has never been reported before, and their result would not have been expected. (App. Br. 18-19.) Appellants also contend they achieved an order of magnitude higher yield than reported by Deng, and the Examiner erred in not recognizing the results as surprising or unexpected.

First, the Examiner rebutted Appellants' "new source" contention by citing evidence from the record establishing that in addition to Lillford's and Hays' teaching of fish AFPs, those of skill in the art knew that AFPs were present in fish liver and fish skin. (Ans. 5.) Because Appellants' argument to the contrary ignores that fact, it is not persuasive. "Scientific confirmation of what was already believed to be true may be a valuable contribution, but it does not give rise to a patentable invention."

PharmaStem Therapeutics, Inc. v. ViaCell, Inc., 491 F.3d 1342, 1363-64 (Fed. Cir. 2007).

Second, while Appellants argue they are the first to isolate AFPs from muscle tissue, "muscle tissue" is not a claim limitation. The Examiner correctly resisted the suggestion to restrict the claims to fish "muscle tissue."

Third, when surprising results are alleged, a side-by-side comparison with the prior art can be helpful to assess the evidence. The Examiner explained how the facts Appellants proffered in their comparison do not support the "surprising" or "unexpected" result argument. (Ans. 12.)

³ Gejing Deng et al., *Isolation and characterization of an antifreeze protein from the longhorn sculpin, Myoxocephalus octodecimspinosus*, 1388 *BIOCHIMICA ET BIOPHYSICA ACTA* 305-14 (1998).

Appellants compared their result to Deng's result. (App. Br. 18-19.) The Examiner found at least two critical differences: (1) Deng started with fish serum, not a fish body, and the Examiner found that Appellants started with more material; and (2) Deng measured AFP concentration in the result, but Appellants measured total protein concentration. (Ans. 12-13.) Appellants argue that Example 3 produced an AFP concentration of 6.6 mg/mL in the end supernatant, and they calculate an AFP yield of 4.95 mg/mL of fish paste. (App. Br. 19.) Appellants argue this is a 60-fold higher yield than Deng's 80 µg/mL serum. *Id.* Example 3 does not support the argument, for the reason the Examiner explained. Example 3 measured protein concentration, not AFP concentration. (Spec. 26, ll. 12-13.) That is, Example 3 reports the concentration of all protein in the sample, not AFP concentration. Appellants' argument is based on a mistake of fact. The Examiner correctly gave it little weight.

CLAIM 23

The obviousness of removing fish heads and guts

Claim 23 is dependent on claim 7, and inserts an additional step before step 1): "removing the head portion and abdominal portion from the fish body."

The Examiner rejected claim 23 as obvious for the reasons applied to claim 7, and for the additional reason that one of ordinary skill in the art would have known to remove the bony, malodorous and microbe containing portions of the fish head and abdomen, as well as the spine and the tail. The Examiner also noted that "fish from fish markets are typically sold without

these parts, to improve the odor and to remove what is discarded anyway.”

(Ans. 14.)

Appellants contend that the Examiner fails to cite any reference teaching this step, the prior art does not teach isolating AFP from a fish body, and no permutation of teachings from Lillford or Hays could have suggested the method of claim 23. (App. Br. 20-21.)

The issue with respect to this rejection is whether one of skill in the art would have thought it desirable to gut a fish and remove the head before starting Lillford’s AFP purification process on a fish body.

Findings of Fact Relating to the head and guts removal Issue

9. At the time of the invention, fish were routinely cleaned by gutting and removing the head.

Analysis of the head and guts removal Issue

First, the Examiner’s findings that Fletcher and Evans disclosed fish liver AFP and fish skin AFP rebutted Appellants’ contention about the scope of the prior art teachings about AFPs in fish bodies. For the reasons already given, the scope of the prior art included AFPs from fish bodies.

Appellants’ repetition of the argument here adds nothing new on that issue.

The Examiner stated a reason for cutting off the bony head and getting rid of the guts: to remove the bony, malodorous and microbe containing portions of the fish head and abdomen, as well as the spine and the tail, before starting the AFP purification process. Based on the fact that fish were typically sold without those parts, the Examiner also found that one of skill in the art would have expected to obtain the fish with the head and intestines already removed.

Appellants don't dispute the Examiner's findings relating to cleaning but instead argue that the Examiner failed to cite a reference teaching removing a fish head and abdomen. "If the problem is within the knowledge of one of ordinary skill in the art, then it is irrelevant that the prior art does not disclose the problem." *Cross Med. Prods., Inc. v. Medtronic Sofamor Danek, Inc.*, 424 F.3d 1293, 1323 (Fed. Cir. 2005). We agree with the Examiner that subjecting fish to routine cleaning procedures before starting Lillford's AFP purification would have been an obvious variation to Lillford's procedure. A suggestion to alter a known procedure by adding another known procedure "need not be found in the references sought to be combined, but may be found in any number of sources, including common knowledge, the prior art as a whole, or the nature of the problem itself." *DyStar Textilfarben GmbH & Co. v. C.H. Patrick Co.*, 464 F.3d 1356, 1361 (Fed. Cir. 2006).

CLAIM 24

The obviousness of drying fish

Claim 24 is dependent on claim 23 and inserts the step "drying of the fish body" after the head and guts are removed and before step 1).

The Examiner rejected claim 24 as obvious for the reasons applied to claim 23, and for the additional reason that one of ordinary skill in the art would have known that drying fish is a conventional method of preservation. The Examiner concluded that it would have been obvious to dry, or to refrigerate, or to freeze the fish material after acquiring it if one were not ready to start the purification process. (Ans. 15.)

Appellants contend that the Examiner failed to cite any reference teaching this step, the prior art does not teach isolating AFP from a fish body, and neither Lillford alone nor Lillford in combination with Hays would have suggested the method of claim 24. (App. Br. 21.)

The issue with respect to this rejection is whether one of skill in the art would have thought it desirable to dry a fish body after the head and guts were removed but before starting Lillford's AFP purification process.

Findings of Fact Relating to the fish drying step

10. Drying fish was a conventional method of preservation.

Analysis of the fish drying step issue

For the reasons already given, the scope of the prior art included AFPs from fish bodies. Appellants' repetition of the argument here adds nothing new on that issue.

Appellants do not dispute the Examiner's finding that drying fish was a conventional method of fish preservation. As with claim 23, Appellants focus on whether that fact was recited in the references. The conventionality of drying fish is undisputed; we are not persuaded of error merely because the fact was not recited in a reference because the suggestion to add a known procedure to another known procedure may come from knowledge in the art. *Cross Medical*, 424 F.3d at 1323; *DyStar*, 464 F.3d at 1361.

CONCLUSIONS OF LAW

With regard to the rejection of claims 7, 21 and 22, we conclude that the references do not teach away from the invention, the Examiner did not rely on impermissible hindsight, the Examiner did not disregard unexpected

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results, and the claimed invention does not provide a source of AFP never disclosed in the prior art.

With regard to the rejection of claim 23, we conclude that one of skill in the art would have thought it desirable to gut a fish and remove the head before starting Lillford's AFP purification process on a fish body.

With regard to the rejection of claim 24, we conclude that one of skill in the art would have thought it desirable to dry a fish body after the head and guts were removed but before starting Lillford's AFP purification process.

ORDER

We affirm the rejection of claims 7 and 21-24 under 35 U.S.C. § 103(a) over a combination of the teachings in Lillford et al. (U.S. Patent No. 6,156,880) in view of Hays et al. (U.S. Patent No. 5,869,092) and Ley et al. (U.S. Patent No. 6,906,176).

TIME PERIOD

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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