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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
12/438,383	06/24/2010	Jack D. Keene	5405-401	5412
20792	7590	10/27/2016	EXAMINER	
MYERS BIGEL, P.A. PO BOX 37428 RALEIGH, NC 27627			ZARA, JANE J	
			ART UNIT	PAPER NUMBER
			1674	
			MAIL DATE	DELIVERY MODE
			10/27/2016	PAPER

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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte JACK D. KEENE and PATRICK J. LAGER¹

Appeal 2014-006955
Application 12/438,383
Technology Center 1600

Before DEMETRA J. MILLS, ERIC B. GRIMES, and JOHN E. SCHNEIDER, *Administrative Patent Judges*.

GRIMES, *Administrative Patent Judge*.

DECISION ON APPEAL

This is an appeal under 35 U.S.C. § 134 involving claims to determining an association between a microRNA and an mRNA target, which have been rejected as anticipated and obvious. We have jurisdiction under 35 U.S.C. § 6(b).

We reverse.

STATEMENT OF THE CASE

“MicroRNAs (miRNAs), together with RNA binding proteins (RNABPs), constitute the primary regulators of eukaryotic post-

¹ Appellants identify the Real Party in Interest as Duke University. (Appeal Br. 2.)

transcriptional gene expression and function in a broad range of cellular processes. miRNAs . . . repress gene expression by affecting the stability or translation of target messenger RNAs (mRNAs).” (Spec. 1:16–20.) “[T]he composition and organization of endogenous miRNAs, mRNAs and RNABPs within messenger ribonucleoprotein (mRNP) complexes are poorly understood.” (*Id.* at 2:16–18.)

Claims 13–24 and 26–28 are on appeal. Claim 13 is illustrative and reads as follows:

13. A method of identifying and/or confirming mRNA target(s) of one or more microRNAs, the method comprising:
- (a) partitioning from a biological sample at least one RNP complex, said complex containing a subset of mRNAs associated with the RNP complex(es), and
 - (b) identifying a subset of microRNA associated with the RNP complex, thereby determining the association between a microRNA and an mRNA target.

Claim 27, the only other independent claim, includes all of the limitations of claim 13, and additionally requires that “the subset of mRNAs is represented by less than 75% of all mRNAs in the biological sample; and the subset of miRNAs is represented by less than 75% of all miRNAs in the biological sample.”

The claims stand rejected as follows:

Claims 13–24 and 26–28 under 35 U.S.C. § 103(a) as obvious based on Schwarz,² Keene,³ Naguibneva,⁴ and Penalva⁵ (Ans. 3) and

Claims 13, 15–20, 22, and 26–28 under 35 U.S.C. § 102(b) as anticipated by Schwarz (Ans. 8).

I

The Examiner has rejected all of the claims on appeal as obvious based on Schwarz, Keene, Naguibneva, and Penalva. The Examiner finds that Schwarz

teach[es] methods of identifying and/or confirming one or more mRNA targets of one or more microRNAs comprising partitioning at least one RNP complex from a biological sample, identifying a subset of microRNA associated with the RNP complex, thereby determining an association between a microRNA and an mRNA target, . . . wherein the subsets of mRNAs and miRNAs are optionally represented by less than 75% of all mRNAs in the biological sample

(Ans. 4.)

In other words, the Examiner finds that Schwarz teaches all of the limitations of both independent claims. The Examiner finds that “Schwarz does not teach tagged Hu protein or tagged poly(A) binding protein, or

² Schwarz et al., *Why do MiRNAs live in the miRNP?*, 16 Genes and Development 1025–1031 (2003).

³ Keene, *Ribonucleoprotein infrastructure regulating the flow of genetic information between the genome and the proteome*, 98 Proc. Natl. Acad. Sci. 7018–7024 (2001).

⁴ Naguibneva et al., US 2009/0053718 A1, published Feb. 26, 2009.

⁵ Penalva et al., *Gene Expression Analysis of Messenger RNP Complexes*, 257 Methods in Molec. Biol. 125–134 (2004).

microRNA subsets including miR-181” (*id.*), as recited in, e.g., dependent claims 23 and 24. The Examiner relies on Keene, Naguibneva, and Penalva for their disclosures of these limitations. (*Id.* at 4–5.)

The Examiner concludes that it would have been obvious “to identify mRNA targets of one or more microRNAs by partitioning biological samples comprising at least one RNP complex because the interactions of miRNAs with target mRNAs in RNP complexes were previously studied by many, as disclosed by Schwarz and Naguibneva.” (*Id.* at 5.) The Examiner finds that

[o]ne would have been motivated to study the specificities and regulation of expression by miRNA for target mRNA because miRNA regulation of mRNA had been studied in various biological systems as well as in vitro as a means for identifying possible clinical candidates for developmental abnormalities and carcinogenesis, as taught previously by Schwarz and Naguibneva.

(*Id.* at 6.)

Appellants argue that, although the Examiner cited various portions of Schwarz, “none of these citations support the statement that ‘the interactions of miRNAs with target mRNAs in RNP complexes were previously studied, as disclosed by Schwarz.’” (Appeal Br. 5.) Rather, Appellants argue, “when Schwarz describes and depicts the interaction of miRNAs with target RNAs – there is **no mention or depiction of a protein in combination with the miRNA or target RNA when the miRNA and target mRNA are interacting, let alone a ribonucleoprotein (RNP) complex.**” (*Id.* at 4.)

Appellants also argue that the Examiner has not provided adequate reason to combine the cited references because “simply motivating one ‘to study’ a particular area fails to provide any motivation for selecting and

combining the cited references in a specific way to produce the claimed invention.” (*Id.* at 7.)

We agree with Appellants that the evidence does not support the Examiner’s finding that Schwarz teaches all of the limitations of independent claims 13 and 27. The Examiner does not point to any specific passages of Schwarz as teaching each of the claim limitations, instead citing to the “entire document, esp. text 1025-1028, figure 2 on page 1029.” (Ans. 4.)

After reviewing Schwarz’s disclosure, however, we find no teaching of, among other things, “partitioning from a biological sample at least one RNP complex” or “identifying a subset of microRNA associated with the RNP complex,” as required by claims 13 and 27. Schwarz’s Figure 2B, for example, is a schematic diagram that shows a generic microRNA associated with a generic mRNA and blocking translation of the mRNA by a ribosome. We also find no description in Schwarz of ribonucleoprotein (RNP) complexes that include RNA binding proteins, mRNAs, and microRNAs, let alone any description of partitioning such RNP complexes from a biological sample and identifying the microRNAs associated with the RNP complexes.

The Examiner has not pointed to disclosures in Keene, Naguibneva, or Penalva that make up for these deficiencies in Schwarz. Because the Examiner has not provided evidence sufficient to support a *prima facie* case of obviousness, we reverse the rejection of claims 13–24 and 26–28 as obvious based on Schwarz, Keene, Naguibneva, and Penalva. *See In re Rijckaert*, 9 F.3d 1531, 1532 (Fed. Cir. 1993) (“In rejecting claims under 35 U.S.C. § 103, the examiner bears the initial burden of presenting a *prima*

facie case of obviousness. Only if that burden is met, does the burden of coming forward with evidence or argument shift to the applicant.”).

II

The Examiner has rejected claims 13, 15–20, 22, and 26–28 as anticipated by Schwarz. As discussed above, however, the Examiner has not shown that Schwarz teaches all of the limitations of independent claims. We therefore reverse the rejection under 35 U.S.C. § 102(b).

SUMMARY

We reverse both of the rejections on appeal.

REVERSED