

WHEN IS EXTRINSIC EVIDENCE REALLY “EXTRINSIC”?

BRETON A. BOCCHIERI*

The purposes of this article are: (1) to explore the outer limits of using extrinsic evidence in patent claim construction and *Markman* hearings or trials; and (2) to suggest avenues for patent litigation advocacy in the search for the true meaning of a patent claim term. This article examines the outer regions of what constitutes “extrinsic evidence,” using examples from lower court decisions in which compelling extrinsic evidence was admitted and decidedly determined the claim interpretation at issue.

I. BACKGROUND AND HISTORY OF EXTRINSIC EVIDENCE

Prior to the Federal Circuit deciding *Markman v. Westview Instruments, Inc.*,¹ nearly any evidence could be used to argue the meaning of a patent claim term.² Courts relied on statements by inventors under the assumption that they were the experts as to what constitutes their invention.³ Dictionary definitions, technical treatises, documents obtained in discovery and nearly anything at all qualified as evidence as to what the words in a patent claim should mean.⁴ Before the Federal Circuit decision, the interpretation of a patent claim was deemed a mixed question of law and fact, and was something that the jury would often decide.⁵

* Partner & Co-Chair of Thelen's Intellectual Property Litigation Practice; J.D., Franklin Pierce Law Center. Mr. Bocchieri was lead trial counsel for SAES Getters, S.p.A. and Zak Designs, Inc. in the cases discussed in this article.

¹ 52 F.3d 967 (Fed. Cir. 1995).

² *See id.* at 979–81.

³ *Id.* at 980.

⁴ *Id.*

⁵ *See id.* at 983–84.

The Supreme Court decision in the case of *Markman v. Westview Instruments, Inc.*,⁶ however, which affirmed the Federal Circuit decision, changed the entire landscape. The Supreme Court held that claim interpretation, like contract law, was solely the province of the court, not the jury.⁷ In that ruling, the Court used the distinction between “intrinsic” and “extrinsic” evidence to establish an analytical framework for the lower courts to interpret claim terms.⁸

Under *Markman*, a court should rely largely, if not exclusively, on the reliable intrinsic record in making the claim interpretations at issue;⁹ much like how a court, in interpreting a written instrument, generally limits itself to the “four corners” of the contract writing, a court deciding on the interpretation of a patent claim must rely on the intrinsic evidence contained in the patent application.¹⁰ Due to this reliance on the intrinsic record, the Supreme Court’s decision in *Markman* has been criticized by commentators because patents, unlike contracts, embody a plethora of scientific principles that may be beyond the express record of the patent documents.¹¹ The following case information expounds upon the current state of the law.

A. What is “Extrinsic” Evidence?

After the Supreme Court’s decision in *Markman*, the Federal Circuit clarified the intrinsic versus extrinsic dichotomy. In *Vitronics Corp. v. Conceptronic, Inc.*,¹² the Court, in an opinion authored by Judge Michel, held that “[e]xtrinsic evidence is that evidence which is external to the patent and file history.”¹³ With the increased importance of the intrinsic versus extrinsic distinction, the lower courts (and especially the Federal Circuit) then set about interpreting patent claims following—and further expounding on—those rules.

⁶ 517 U.S. 370 (1996).

⁷ *Id.* at 372.

⁸ *Id.* at 383 n.8.

⁹ *See id.*

¹⁰ *Id.* at 383 n.8, 384 n.9.

¹¹ *See, e.g.*, Joseph N. Hosteny, *Warning: This Article May be Dangerous to Your Health*, <http://www.hosteny.com/archive/Hosteny%2008-99.pdf> (last visited Apr. 26, 2008).

¹² 90 F.3d 1576 (Fed. Cir. 1996).

¹³ *Id.* at 1584.

B. The Use of Extrinsic Evidence in Markman Hearings

When *Markman* and, subsequently, *Vitronics* were first decided, many commentators believed that only intrinsic evidence would be admissible in the context of claim construction. In *Pitney Bowes, Inc. v. Hewlett-Packard Co.*,¹⁴ Judge Michel, the author of the *Vitronics* opinion, clarified that perception. He made clear that:

Vitronics does not prohibit courts from examining extrinsic evidence, even when the patent document is itself clear. . . . Moreover, *Vitronics* does not set forth any rules regarding the admissibility of expert testimony into evidence.

. . . .

. . . Thus, under *Vitronics*, it is entirely appropriate . . . for a court to consult trustworthy extrinsic evidence to ensure that the claim construction . . . is not inconsistent with clearly expressed, plainly apposite, and widely held understandings in the pertinent technical field.¹⁵

Indeed, in the seminal *Markman* decision itself, the Federal Circuit explicitly stated:

[Extrinsic] evidence may be helpful to explain scientific principles, the meaning of technical terms, and terms of art that appear in the patent and prosecution history. Extrinsic evidence may demonstrate the state of the prior art at the time of the invention. It is useful “to show what was then old, to distinguish what was new, and to aid the court in the construction of the patent.”¹⁶

The Federal Circuit later reflected in *Phillips v. AWH Corp.*:¹⁷

[T]hat extrinsic evidence in the form of expert testimony can be useful to a court for a variety of purposes, such as to provide background on the technology at issue, to explain how an invention works, to ensure that the court’s understanding of the technical aspects of the patent is consistent with that of a person of skill in the art, or to establish that a particular term in the patent or the prior art has a particular meaning in the pertinent field.¹⁸

The Federal Circuit also held that “[t]he court may, in its discretion, receive extrinsic evidence in order ‘to aid the court in coming to a correct conclusion’ as to the ‘true meaning of the language employed’ in the patent.”¹⁹ This is:

¹⁴ 182 F.3d 1298 (Fed. Cir. 1999).

¹⁵ *Id.* at 1308–09.

¹⁶ *Id.* at 1308–09.

¹⁷ 415 F.3d 1303 (Fed. Cir. 2005).

¹⁸ *Id.* at 1318.

¹⁹ *Markman*, 52 F.3d at 980 (citing *Seymour v. Osborne*, 78 U.S. (11 Wall.) 516, 546 (1870)).

[B]ecause extrinsic evidence can help educate the court regarding the field of the invention and can help the court determine what a person of ordinary skill in the art would understand claim terms to mean, it is permissible for the district court in its sound discretion to admit and use such evidence.²⁰

C. *Limitations on the Use of Extrinsic Evidence*

While the courts may always *receive* extrinsic evidence, the Federal Circuit has cautioned against its unrestrained *use* in claim interpretation. “Extrinsic evidence is to be used for the court’s understanding of the patent, not for the purpose of varying or contradicting the terms of the claims.”²¹ As Judge Michel cautioned in *Vitronics*:

[E]xtrinsic evidence in general, and expert testimony in particular, may be used *only* to help the court come to the proper understanding of the claims; it may *not* be used to vary or contradict the claim language. *Nor* may it contradict the import of other parts of the specification. Indeed, where the patent documents are unambiguous, expert testimony regarding the meaning of a claim is entitled to no weight. . . . Nor may the inventor’s subjective intent as to claim scope, when unexpressed in the patent documents, have any effect. Such testimony cannot guide the court to a proper interpretation when the patent documents themselves do so clearly.²²

D. *The Current State of Using Extrinsic Evidence in Markman Trials*

The debate over the use of intrinsic versus extrinsic evidence in interpreting patent claims is also a debate over what further types of extrinsic evidence may or may not be relied upon and to what degree. *Vitronics* held that technical treatises and dictionaries are types of extrinsic evidence “worthy of special note.”²³ In *Phillips*, the Federal Circuit attempted to resolve the ambiguity by returning to a more traditional interpretation of patent claims and relegating dictionaries to their proper place. While in so doing, by its own recognition, lessening the potential impact of dictionaries, *Phillips* raised as many questions as it answered and did not provide a magic formula for interpreting claims:

[W]e recognized that there is no magic formula or catechism for conducting claim construction. Nor is the court barred from considering any particular sources or required to analyze sources in any specific sequence, as long as

²⁰ *Phillips*, 415 F.3d at 1319.

²¹ *Markman*, 52 F.3d at 981.

²² *Vitronics Corp. v. Conceptor, Inc.*, 90 F.3d 1576, 1584 (Fed. Cir. 1996) (emphasis added).

²³ *Id.* at 1584 n.6.

those sources are not used to contradict claim meaning that is unambiguous in light of the intrinsic evidence. For example, a judge who encounters a claim term while reading a patent might consult a general purpose or specialized dictionary to begin to understand the meaning of the term, before reviewing the remainder of the patent to determine how the patentee has used the term. The sequence of steps used by the judge in consulting various sources is not important; what matters is for the court to attach the appropriate weight to be assigned to those sources in light of the statutes and policies that inform patent law.²⁴

Phillips, while trying to curb the wholesale use of dictionaries, nevertheless did not definitively settle the intrinsic-extrinsic distinction. As such, while “intrinsic” means the patent and patent office files and nothing else, “extrinsic” has largely been defined as things that are not intrinsic.²⁵

II. EXAMPLES OF THE USE OF EXTRINSIC EVIDENCE

A. *When is Extrinsic Evidence Not “Extrinsic”*

Another key issue is to determine whether a particular piece of evidence is truly extrinsic or whether it is, in the words of Judge Rudy Brewster,²⁶ merely evidence that shows “basic . . . principles” of science or is otherwise corroborative of what the patent “suggests [to] a person of ordinary skill in the art.”²⁷

In a *Markman* trial for *SAES Getters, S.p.A. v. Aeronex, Inc.*, Judge Brewster decided the issue of whether the patent claim term “iron and manganese” meant “elemental iron” and “elemental manganese,” as opposed to the “oxides” of these metals.²⁸ The evidence submitted to the court for the *Mark-*

²⁴ *Phillips*, 415 F.3d at 1324.

²⁵ Reminiscent of the discussion in the recent book *GATES OF FIRE*, by Stuart Pressfield, in which the Spartans, prior to the battle of Thermopylae, discuss what “courage” truly means (noting that it is never fully defined, but rather is distinguished only by reference to what it is not, i.e., the absence of courage) to this day, courts have never fully defined all of the instances in which the term “extrinsic evidence” may come into play or whether each such instance should be deemed truly “extrinsic.”

²⁶ Judge Brewster is a well-known patent jurist who recently decided the *Qualcomm Inc. v. Broadcom Corp.*, No. 05-CV-1958-RMB (BLM), 2007 WL 4351017 (S.D. Cal. Dec. 11, 2007) and *Lucent Techs. Inc. v. Gateway, Inc.*, 509 F. Supp. 2d 912 (S.D. Cal. 2007) cases. The second of these cases held in favor of Microsoft, a counterclaim-defendant in the case.

²⁷ Order on Claim Construction for U.S. Patent 5,716,588 at 3, *SAES Getters, S.p.A. v. Aeronex, Inc.*, No. 02CV612B (LSP) (S.D. Cal. July 15, 2003) [hereinafter *Claim Construction*].

²⁸ *Id.* at 2–4; see Defendant Aeronex’s Claim Construction Brief Re the SAES 5,716,588 Patent at 5–6, *SAES Getters S.p.A. v. Aeronex, Inc.* 219 F. Supp. 2d 1081 (S.D. Cal. June 5, 2003) (No. 02CV612 B (LSP)), 2003 WL 23830821.

man trial was several-fold. First, there were deposition admissions from the inventor of the cross-claimed patent (U.S. Patent No. 6,241,955, owned by defendant counter-claimant Aeronex).²⁹ Second, there was a declaration from the plaintiff's expert.³⁰ Third, there were statements relied upon in the defendant's patent.³¹ The plaintiff argued that, contrary to the defendant's reading of the patent, this evidence showed that the "iron and manganese" referenced in the patent's specification were not in fact, in elemental form and that, therefore, metal oxides would also be present in the resultant product.³²

One interesting aspect of the case was the definition of the claim term "getter." "Getter" is a material for absorbing chemical impurities.³³ In this case, a getter was used to purify gas entering a semi-conductor fabrication chamber.³⁴ The patent-in-suit involved a process for purifying ammonia gas streams by removing oxygen, a notorious contaminant that interferes with the fabrication of semi-conductor devices.³⁵

In "Example 1" of the plaintiff's patent (U.S. Patent No. 5,716,588), the specification recited a recipe for preparing "getter material."³⁶ The patent also referred to "metal" and "bare metal" to describe the iron and manganese getter, and the claim used the terms "iron" and "manganese" as included in the "getter material."³⁷ The defendant thus argued that the claim should be limited to "bare metals and . . . not include oxides of either iron or manganese."³⁸

The court's opinion was significant in several respects, but the court made two statements of particular importance relevant to this article's discussion. First, the court made an analysis based on its interpretation of chemistry set out in the patent's specification.³⁹ Second, the court referred to the teachings of another of the defendant's patents (U.S. Patent No. 6,241,955) as corroborating the expert testimony.⁴⁰ The court held as follows:

²⁹ *Claim Construction*, *supra* note 27, at 3.

³⁰ *Id.* at 2–3.

³¹ *Id.*

³² *Id.* at 2.

³³ *Id.* at 3.

³⁴ U.S. Patent No. 5,716,588 col.3 ll.19–27 (filed July 26, 1996).

³⁵ *Id.* col.1 ll.29–50.

³⁶ *Id.* col.6 ll.4–46.

³⁷ *See Claim Construction*, *supra* note 27, at 2–3.

³⁸ *Id.* at 2.

³⁹ *Id.* at 3.

⁴⁰ *Id.*

The Court determined that the phrase “a getter material including iron and manganese” should be interpreted as “a material including, but not limited to, iron and manganese in their pure forms and/or in their oxides”. The Court was persuaded that this was the proper claim interpretation because of *the chemistry involved in producing bare iron and manganese from their respective oxides*. According to Dr. Cava [plaintiff’s expert], to produce bare iron or manganese, iron oxide or manganese must be heated to a much higher temperature than the 400° C disclosed in Example 1 of the ‘588 patent. While Dr. Alvarez [defendant’s inventor] did dispute this assertion, the specification in the other patent at issue in this case, U.S. Patent 6,241,955 (the “‘955 patent”), which was granted to Dr. Alvarez, supports Dr. Cava’s view when it states that:

[I]t has been found that, starting with a highest oxidation state [of manganese] one must heat the oxides to progressively higher temperatures in the presence of a reducing agent to achieve reduction, ultimately requiring a temperature of about 1200° C to reduce the oxides completely to metallic manganese.

(‘955 patent, Column 6 lines 36–41). While the ‘955 patent was not prior art for the ‘588 patent and is *extrinsic evidence*, it discloses *basic chemical principles* and suggests that a person of ordinary skill in the art would understand that the method described in Example 1 of the ‘588 patent would likely yield metal oxides, and not simply bare metal. Since the method described as a preferred embodiment of the ‘588 patent would create metal oxides, and the use of the term “including” in the claim would allow the inclusion of materials other than the ones specified, the Court found it appropriate to interpret claim 1 to include bare iron and manganese along with their oxides. In light of this construction, disputes regarding the remaining claim terms were easily resolved.⁴¹

When interpreting the patent claim terms of the plaintiff’s ‘588 patent, the court thus specifically took into account: (1) an expert’s declaration; and (2) statements in another patent of the defendant. By so doing, the court expressly *admitted* extrinsic evidence and *considered* it in making the central claim interpretation in the case.

While one can argue both the pros and cons of the *SAES Getters* opinion, existing law appears to support Judge Brewster’s ruling. Arguably, he did not use extrinsic evidence to directly interpret the claim terms. Rather, Judge Brewster used extrinsic evidence to interpret *the specification* and, in particular, the recipe used in the specification for making an “iron and manganese getter material” that was set out in Example 1 of the patent.⁴² One can argue that Judge Brewster, in fact, acted prudently, as he was not persuaded by the protes-

⁴¹ *Id.* (emphasis added).

⁴² *Id.*

tations of either party regarding the recipe set out in the patent, and instead looked to evidence outside the four corners of the patent (the extrinsic evidence) to define the “general” principles of chemistry at issue. Therefore, the court’s acknowledged reliance upon extrinsic evidence may well have been within the *Vitronics* rule. At a bare minimum, even assuming the Federal Circuit would disapprove of such use of extrinsic evidence, it is a compelling example of how persuasive extrinsic evidence can justifiably influence a court.⁴³

The above underscores the importance of the use of extrinsic evidence in current patent litigation. Most practitioners can read a file history, read the claims, follow the canons of claim construction and develop interpretations based on the intrinsic record. The greater challenge is to craft cogent arguments based on extrinsic evidence and persuasive explanations as to how that evidence fits within both the four corners of the patent and the “generally accepted scientific principles” embraced by the technology in dispute. Whenever possible, such arguments must be tempered into a finely honed presentation of the *implicit* teachings of the intrinsic record, and thus be merely corroborative of the scientific principles at work in the technology at play. Since nearly all patent litigation embraces technology, there will likely always be scientific principles to plumb when considering the specific extrinsic evidence at issue. Skillful advocates must always review such aspects of the case at the earliest stage of any patent litigation.

B. Teachings of Prior Art – Extrinsic Evidence or Not?

From the above discussion, one can see that the definition of extrinsic evidence is certainly not a closed universe. A situation that often arises in patent litigation is one in which another patent is referenced somewhere in the patent documents, but was not made a part of the patent file, was not considered by the USPTO, and thus is technically extrinsic evidence. An example of this is *Allure Home Creation Co. v. Zak Designs, Inc.*⁴⁴ In this case, the patentee stated in the specification: “Reference is made to Taiwanese laid-open publication

⁴³ Although not a part of the formal record, in the actual case at issue, additional extrinsic evidence was also presented, including similar admissions by the inventor of the defendant, counter-claimant’s patent. A motion to strike the extrinsic evidence was filed prior to the *Markman* trial, which the court denied on the basis that it can receive such evidence and later decide whether to rely on it. While the court did not specifically cite the testimony proffered in its Order, the Court’s reliance on the statements found in the defendant’s patent were to the same effect.

⁴⁴ *Allure Home Creation Co. v. Zak Designs, Inc.*, No. 03-193 (JWB), 2005 WL 1924323 (D.N.J. Aug. 11, 2005).

No. 340349 laid open on Sep. 11, 1988, which is believed not to disclose or claim the present invention.”⁴⁵ The patentee, however, submitted neither the original Chinese-language document nor a translation of the “Taiwanese laid-open publication” to the USPTO.⁴⁶ Because the patent owner stated that the Taiwanese application was “believed not to disclose or claim the present invention,”⁴⁷ the contents of the publication became important to the construction of the ’411 patent. Specifically, the defendant contended that the subject matter of the Taiwanese patent application was disclaimed in the ’411 patent and, in turn, that the ’411 patent’s claims could not be considered to recapture the disclaimed subject matter.⁴⁸

This issue became a central theme at the *Markman* hearing. The plaintiff contended that the claim term “wherein the material of the first vessel is fused with the material of the second vessel” could read on any device in which two vessels are joined together.⁴⁹ The defendant maintained that this claim language required two separate independent vessels that were separately formed and then later “fused” together.⁵⁰ As such, the defendant essentially argued that the *apparatus claim* at issue really defined a *process* by which two independent parts would ultimately become “fused.”

The defendant also uncovered invalidity proceedings for the ’411 patent’s foreign counterpart that had occurred in Taiwan and the People’s Republic of China.⁵¹ In those foreign patent proceedings, the referenced Taiwanese application was essential to the Taiwanese and Chinese Patent Offices’ determination

⁴⁵ U.S. Patent No. 6,155,411 col.2 ll.19–21 (filed Oct. 2, 1998).

⁴⁶ Allure Home Creation Co., Inc.’s Reply to Zak Designs, Inc.’s Proposed Conclusions of Law and Findings of Fact at 4, *Allure Home Creation Co. v. Zak Designs, Inc.*, No. 03-CV-193 (JWD) (D.N.J. Jan 18, 2005), 2005 WL 1362982 [hereinafter *Allure Reply*].

⁴⁷ ’411 Patent col.2 ll.20–21.

⁴⁸ Defendant Zak Designs, Inc.’s Reply to Plaintiff Allure’s Proposed Conclusions of Law and Findings of Fact for the July 29, 2004 *Markman* Hearing on Claim Construction for U.S. Patent No. 6,155,411 at 5, *Allure Home Creation Co. v. Zak Designs, Inc.*, No. 03-CV-193 (JWD), (D.N.J. Jan 18, 2005), 2005 WL 1362982 [hereinafter *Zak Reply*]. Furthermore, “[a] patentee may also limit the scope of the claims by disclaiming a particular interpretation during prosecution.” *Microsoft Corp. v. Multi-Tech Sys., Inc.*, 357 F.3d 1340, 1347 (Fed. Cir. 2004). “Claims cannot be construed as encompassing the prior art that was distinguished in the specification and disclaimed during prosecution.” *Kinik Co. v. Int’l Trade Comm’n*, 362 F.3d 1359, 1365 (Fed. Cir. 2004).

⁴⁹ *Allure Reply*, *supra* note 46, at 12–13.

⁵⁰ *Zak Reply*, *supra* note 48, at 5–6.

⁵¹ Brief of Defendant-Appellant Zak Designs, Inc. at 5–6, *Allure Home Creation Co. v. Zak Designs, Inc.*, 225 Fed. Appx. 898 (Fed. Cir. Oct. 30, 2006) (No. 2006-1433), 2006 WL 3368779.

that the foreign patent application was, in fact, unpatentable.⁵² Additionally, the defendant argued that these foreign patent proceedings contained corroborating evidence concerning the '411 patent's disclaimer of the Taiwanese application and that, for this additional reason, the scope of the asserted claim should be limited.⁵³

In the *Markman* hearing, the parties submitted various forms of extrinsic evidence to the court, yet the court reserved the issue as to whether the court would use it in the claim construction determination.⁵⁴ In issuing its later opinion, the district court judge in *Allure Home Creation*, while agreeing with the defendant's proposed interpretation, cautioned against the use of extrinsic evidence, stating that "[o]nly in the rare circumstance in which there is still doubt as to the meaning of a claim after the court has examined the intrinsic record, should a court look to extrinsic evidence such as treatises, technical references, and expert testimony, to resolve any doubts or ambiguities."⁵⁵ In reaching its decision, the district court judge did, however, place heavy reliance upon the terms in the specification. As the court stated:

The crux of the present dispute is whether, under the '411 patent, the two vessels are preformed and then assembled ("fused") into one product or whether the patent also encompasses a product produced as a single entity. The Court concludes that the claims of the patent are limited to a product assembled from two preformed vessels.⁵⁶

The court relied upon the statements in the specification and yet stated that:

The Court realizes that the specification cannot be employed to limit a patent claim; however, the Court has not done that here. The specification *enhances* the plain meaning and permissible conclusion that the '411 patent speaks to a product resulting from the "fusing" of two separately constructed vessels not a container produced as a single piece from the outset.⁵⁷

Notably, the district court judge stated that "[t]o the extent that any figures submitted as part of the '411 patent might seem to embody a product not assembled from two separate vessels, they would not be accurate examples of the patent's

⁵² *Id.*

⁵³ *Id.*

⁵⁴ *Allure Home Creation Co. v. Zak Designs, Inc.*, No. 03-193 (JWB), 2005 WL 1924323, at *2 (D.N.J. Aug. 11, 2005).

⁵⁵ *Id.*

⁵⁶ *Id.* (emphasis added).

⁵⁷ *Id.* at *3 (emphasis added).

Claims.”⁵⁸ He went so far as to define what would be a non-infringing product, namely, that the claims would not cover “a container produced as a single piece from the outset.”⁵⁹

Of note in this case is that various forms of extrinsic evidence were presented to the court for its review. The district court judge received all of them, and the defendant extensively advocated their use.⁶⁰ While the plaintiff strongly objected to all of this evidence,⁶¹ it was used during the *Markman* trial.

In the end, while in *Allure Home Creation* Chief Judge Bissell acknowledged the technical rules on the use of extrinsic evidence, his decision on the claim interpretation paralleled what all the supposedly non-relied upon extrinsic evidence tended to prove. It is open for consideration whether or not the wealth of extrinsic evidence presented comforted the judge in reaching his decision, even if he did not formally rely upon it in making the final determination, as to the meaning of the claims at issue.

III. CONCLUSION

So long as judges alone determine the meaning of patent claim terms under *Markman*, the use of extrinsic evidence can be extremely important in patent litigation. Many courts welcome such evidence in their search for a level of understanding of the technology involved in nearly every patent case. Extrinsic evidence can help clarify, collaborate or explain the general or specific technological issues involved. While the court may not expressly rely upon it, extrinsic evidence may well subtly (or not so subtly) influence the court’s view of the implicit (or express) teachings of the patent’s specification, which, in turn, may decisively resolve the claim term under the crucible of review.

⁵⁸ *Id.* at *3 n.3 (emphasis added).

⁵⁹ *Id.* at *3.

⁶⁰ See *Zak Reply*, *supra* note 48.

⁶¹ See *Allure Reply*, *supra* note 46.