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Chemical Compounds Related as Genus and Species and the Patentability Requirement of Novelty

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CHEMICAL COMPOUNDS RELATED AS GENUS AND SPECIES AND THE PATENTABILITY REQUIREMENT OF NOVELTY

I. INTRODUCTION

The patentability of chemical compounds related as genus[1] and species[2] presents a problem in deciding the proper scope of patent protection granted to an inventor.[3] Should the inventor of a genus be granted a patent

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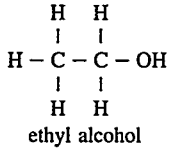
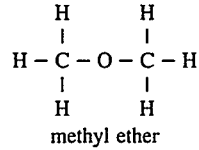
1. In chemistry "genus" means "a group of compounds closely related both in structure and in properties." *In re* Kalm, 378 F.2d 959, 963 (C.C.P.A. 1967). Organic compounds can have the same formula yet have entirely different properties and structures since organic compounds are three-dimensional and differences in three dimensions cannot be shown by a two-dimensional formula. G. LEE, H. VAN ORDEN, & R. RAGSDALE, GENERAL AND ORGANIC CHEMISTRY 763 (1971). For example, C_2H_6O is the formula for both ethyl alcohol and methyl ether, yet their properties and molecular configurations are different, as shown below.

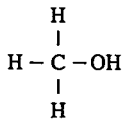


ethyl alcohol

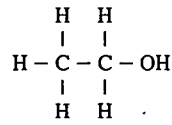


methyl ether

Compounds which have the same formula, but different three-dimensional structures, are called isomers. R. MORRISON & R. BOYD, ORGANIC CHEMISTRY 32 (2d ed. 1966). As can be seen from the above example, ethyl alcohol and methyl ether are isomers. These compounds are not members of the same genus or chemical family, whereas methyl alcohol (CH_4O) and ethyl alcohol (C_2H_6O), having slightly different formulas but similar structure and properties, are both members of the same generic family. That family is the lower molecular weight alcohols, represented by the general formula $C_nH_{2n+2}O$.



methyl alcohol



ethyl alcohol

2. "Species" refers to a particular chemical compound falling within a genus. The general formula, $C_nH_{2n+2}O$ described in note 1 *supra*, includes the following straight chain, low molecular weight alcohols:

methyl	CH_3OH
ethyl	CH_3CH_2OH
n-propyl	$CH_3CH_2CH_2OH$

R. MORRISON & R. BOYD, *supra* note 1, at 501. Each of these compounds is a species and has its own properties and structure. Thus, n-propyl alcohol is a species within a genus of lower molecular weight alcohols. A homologous series is one in which each compound differs from the preceding compound by an identical chemical grouping (CH_2 in the above example). Such compounds are called homologs. *Id.* at 101. Each homologous series is characterized by a functional group defining the structure of the family of compounds and largely determining its properties. *Id.* at 175. In the above example the hydroxyl group (OH) is the main functional group.

3. 1 D. CHISUM, PATENTS § 3.04[1][c] (1979).

covering all of the often numerous compounds which the genus might include? Should disclosure of the genus automatically eliminate a later inventor's ability to patent individual members of the genus, or should a court consider genus size and similarity of structure and properties in deciding patentability of the individual species?[4] The Court of Customs and Patent Appeals has examined some of these issues.[5] This comment will discuss and synthesize its decisions.

II. BACKGROUND

The granting of patents is constitutionally based[6] and has been provided for by statute since 1790.[7] An inventor is entitled to a patent if the claimed invention falls within statutorily defined subject matter[8] and can meet other requirements of utility,[9] novelty,[10] and nonobviousness.[11] In

4. This comment is concerned with the situation in which the genus has previously been disclosed and the subsequent claim is for a species within that genus. For example, if "fluids" were the previously disclosed genus, would the species "milk" be patentable?

5. *See In re* Schaumann, 572 F.2d 312 (C.C.P.A. 1978); *In re* Wiggins, 488 F 2d 538 (C.C.P.A. 1973); *In re* Arkley, 455 F.2d 586 (C.C.P.A. 1972); *In re* Ruschig, 343 F.2d 965 (C.C.P.A. 1965); *In re* Petering, 301 F.2d 676 (C.C.P.A. 1962); *In re* Baranauckas, 228 F.2d 413 (C.C.P.A. 1955).

6. The United States Constitution provides Congress with the power "[t]o promote the Progress of Science and the useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries." U.S. CONST. art. I, § 8, cl. 8.

7. The Patent Act of 1790 granted the inventor of a "sufficiently useful and important" device the sole right to manufacture or sell that device for up to 14 years. Act of Apr. 10, 1790, ch. 7, § 1, 1 Stat. 109, 110. The Patent Act of 1793 added the requirement that a patentable discovery be "new." Act of Feb. 21, 1793, ch. 11, 1 Stat. 318, 319. The United States Supreme Court in Hotchkiss v. Greenwood, 52 U.S. (11 How.) 248 (1851), defined "new" in such a way that a third test of patentability was established. To be patentable an invention had to evidence skill and ingenuity beyond that possessed by an ordinary mechanic skilled in the art. *Id.* at 267. This test remained outside the statutory scheme and was subject to varying judicial construction until it was incorporated by the Patent Act of 1952 as the requirement of nonobviousness. 35 U.S.C. § 103 (1976).

8. The Patent Act of 1952 provides: "Whoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." 35 U.S.C. § 101 (1976). For an elaboration of eligible subject matter, see 1 D. CHISUM, PATENTS ch. 1 (1979).

9. The Patent Act requires that a machine, manufacture, process or composition of matter or improvement thereon be useful. 35 U.S.C. § 101 (1976). For a general discussion of the utility requirement, see 1 D. CHISUM, PATENTS ch. 4 (1979). To obtain a patent on a chemical compound or process, the applicant must disclose a practical use for the compound produced. Brenner v. Manson, 383 U.S. 519 (1966) (refusing patent for novel process for production of steroid because there was no known usefulness for the compound produced).

10. The Patent Act provides:

A person shall be entitled to a patent unless—

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

(b) the invention was patented or described in a printed publication in this or a foreign coun-

chemical patents it is well settled that novelty is lacking, and a genus is thus unpatentable, when at least one species within the genus has already been disclosed[12] in the prior art.[13] A genus is said to be anticipated[14] by

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try or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States, or

(c) he has abandoned the invention, or

(d) the invention was first patented or caused to be patented, or was the subject of an inventor's certificate, by the applicant or his legal representatives or assigns in a foreign country prior to the date of the application for patent in this country on an application for patent or inventor's certificate filed more than twelve months before the filing of the application in the United States, or

(e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent, or

(f) he did not himself invent the subject matter sought to be patented, or

(g) before the applicant's invention thereof the invention was made in this country by another who had not abandoned, suppressed, or concealed it. In determining priority of invention there shall be considered not only the respective dates of conception and reduction to practice of the invention, but also the reasonable diligence of one who was first to conceive and last to reduce to practice, from a time prior to conception by the other.

35 U.S.C. § 102 (1976).

For a general discussion of novelty, see 1 D. CHISUM, PATENTS ch. 3 (1979).

11. Section 103 of the Patent Act provides:

A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if 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. Patentability shall not be negatived by the manner in which the invention was made.

35 U.S.C. § 103 (1976). The nonobviousness requirement is discussed in 2 D. CHISUM, PATENTS ch. 5 (1979); Note, *Standards of Obviousness and the Patentability of Chemical Compounds*, 87 HARV. L. REV. 607 (1974).

12. *In re* Steenbock, 83 F.2d 912 (C.C.P.A. 1936). In considering an applicant's subsequent claim for an invention relating to a process for treating fungus material (a generic class that includes yeast) to render it antirachitically activated, the court stated: "The principle is well established in chemical cases, and in cases involving compositions of matter, that the disclosure of a species in a cited reference is sufficient to prevent a later applicant from obtaining generic claims . . . ." *Id.* at 913. This rule is not restricted to chemical genus-species patents, but is applied in other areas as well. *E.g.*, *In re* Slayter, 276 F.2d 408 (C.C.P.A. 1960) (genus of polyphase materials anticipated a subsequent species disclosure of a reinforced glass formed by incorporating short metal filaments in a glass matrix).

13. "Prior art" is the fund of information which is in the public domain. Much of the information comes from patent disclosures and publications, but other sources of information exist. *See generally* D. Chisum, *Sources of Prior Art in Patent Law*, 52 WASH. L. REV. 1 (1976).

14. "Anticipation" means the disclosure in the prior art of a thing substantially identical to the claimed invention. A. DELLER, WALKER ON PATENTS § 57 (2d ed. 1964). When the prior art anticipates, an invention is said to lack novelty. To constitute an anticipation, the prior art disclosure must be sufficiently clear and exact to enable those skilled in the art to make and use the claimed invention. Seymour v. Osborne, 78 U.S. (11 Wall.) 516 (1871).

It is important to note that a claim-precluding disclosure under § 102 of the Patent Act (anticipation) is distinct from a claim-supporting disclosure under § 112. Section 112 requires:

its species. However, patentability is less clear in the reverse situation—when a species claim comes after disclosure of its genus. In that situation, the prior generic disclosure may be speculative rather than based on actual invention.[15] Such speculative patents were possible under early decisions which held that a reference naming a compound or identifying it by structural formula was adequate disclosure to anticipate a later claim to that compound.[16] A more recent holding, however, requires an operative method of synthesis in addition to the mere compound name or structural formula.[17] While the anticipatory scope of a generic disclosure has not

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> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same . . . .

35 U.S.C. § 112 (1976). A patent application may sufficiently disclose an invention for the purpose of § 102, yet be inadequate for the purpose of § 112. *In re* Steenbock, 83 F.2d 912, 913 (C.C.P.A. 1936). The "description of a single embodiment of broadly claimed subject matter constitutes a description of the invention for anticipation purposes . . . , whereas the same information in a specification might not alone be enough to provide a description of that invention for purposes of adequate disclosure [for claim support]." *In re* Lukach, 442 F.2d 967, 970 (C.C.P.A. 1971). However, enumeration of each or of a plurality of constituent species is not necessarily required to support the genus claim if the genus is sufficiently described by other appropriate language. *In re* Dreshfield, 110 F.2d 235, 240 (C.C.P.A. 1940). The number of appropriate specific examples depends on the nature of the genus. "In cases involving unpredictable factors, such as most chemical reactions and physiological activity, the scope of enablement [claim-supporting disclosure] obviously varies inversely with the degree of unpredictability of the factors involved." *In re* Fisher, 427 F.2d 833, 839 (C.C.P.A. 1970). The sufficiency of a disclosure depends not on the number but on the nature of the claimed compounds and the supporting disclosures. If a patent claim covers closely related compounds, a comparatively limited disclosure may be sufficient to support it, whereas more extensive support may be necessary if the claim covers compounds related only in some structural aspects. *In re* Surrey, 370 F.2d 349 (C.C.P.A. 1966).

15. Once some members of a family have been identified and their properties established, it is possible to speculate on the existence of other members of the same family. The formula of the speculative compounds can be calculated by extending the family's general formula, and, while it is impossible accurately to predict all of a homolog's properties, its probable three-dimensional structure, boiling point, vapor pressure, and other basic chemical characteristics are often predictable from the properties of previously identified family members. *See* R. MORRISON & R. BOYD, *supra* note 1, at 12-14.

16. *E.g., In re* Von Bramer, 127 F.2d 149 (C.C.P.A. 1942). In *Von Bramer* the appellant argued that a "chemical product can be described in but two ways (1) by reciting a sufficient number of its physical and chemical attributes . . . or (2) 'to recite a process which will unquestionably produce the substance.' " *Id.* at 152. The court disagreed, saying that having been labeled according to a standard system of chemical nomenclature, the name of a compound alone will predict, based on properties of similar compounds in its class, what the compound's properties will be like. The court found it unnecessary to disclose an operative process for synthesizing the product.

17. *In re* Brown, 329 F.2d 1006 (C.C.P.A. 1964). In *Brown* a prior publication disclosed certain elastomeric compositions comprising an organosilicon elastomer, a filler, and an organic peroxide vulcanizing agent. The publication stated that attempts to prepare fluorine-containing silicone homopolymers had been unsuccessful. Subsequently, an applicant claimed a specific fluorine-containing silicone homopolymer and the court allowed the claim, finding that the previous publication did not

been defined, the court has expressed unwillingness to allow overly broad genus disclosures to anticipate later species claims.[18] This comment will focus on the acceptable degree to which a generic disclosure should be held to anticipate its constituent species.

III. DISCUSSION OF CASES

The adequacy of a generic disclosure for anticipation was considered by the court in *In re Baranauckas*.[19] In that case the Patent Office rejected an applicant's claims for certain chlorine compounds because of a prior art reference.[20] Throughout its description this reference used the term "halogen," designating a family of chemical elements which includes chlorine.[21] The court found this disclosure sufficient to identify and anticipate the applicant's later claimed chlorine compounds.[22] The explicit naming of each halogen compound was unnecessary.[23]

The adequacy of a generic description for anticipation was next before the court in *In re Petering*.[24] There the prior art revealed a generic formula which represented a group of isoalloxazines and a method of producing them.[25] The prior art reference described compounds capable of influencing growth. The applicant's subsequent claims for certain of the isoalloxazines which prevented growth were denied as anticipated. The court found the prior art generic description to be inadequate, by itself, to

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anticipate since it lacked a method of preparation for the compound in issue and failed to place the homopolymer in the possession of the public. *Id.* at 1011.

18. *In re* Baranauckas, 228 F.2d 413 (C.C.P.A. 1955). The *Baranauckas* opinion concluded with a strong warning that while the precise boundary lines are not presently discernable "they do not extend so far as to permit publication of theoretical lists of hundreds or thousands of possible compounds to deny patent protection on such compounds to those who actually discovered them later. The exact boundaries . . . [are] to be delineated on a case by case basis." *Id.* at 416.

19. 228 F.2d 413 (C.C.P.A. 1955).

20. *Id.* at 414–16. The Patent Office's section 102 rejection was premised on a publication disclosing a method of producing hexabromocyclopentadiene. The method involved a number of steps including the production of 1, 2, 3, 4—tetrabromocyclopentadiene—1, 3, as an intermediate. The structural formula for this intermediate was disclosed in the publication and was nearly identical to the applicant's later claimed chlorine compounds, 1, 2, 3, 4—tetrachlorocyclopentadiene—1, 3, the difference being the substitution of bromine for chlorine.

21. Other members of the halogen family include bromine, fluorine, iodine, and astatine. G. LEE, H. VAN ORDEN, & R. RAGSDALE, *supra* note 1, at 321–23.

22. The prior art specifically showed the structural formula of 1, 2, 3, 4—tetrabromocyclopentadiene—1, 3, and elsewhere in the reference the inventor referred to the generic class "halogens." The court found that this reference to "halogens" indicated that the inventor perceived all halogens performing like bromine, the specific bromine compound being given merely as an example of the possible halogen compounds. 228 F.2d at 415.

23. *Id.* at 416.

24. 301 F.2d 676 (C.C.P.A. 1962).

25. *Id.* at 681.

anticipate.[26] The prior art, however, disclosed preferences for the variables in the generic formula,[27] and in combination the generic formula and narrowing language described a limited class of compounds.[28] This class was sufficiently limited to anticipate the applicant's later claimed compounds.

The court in *In re Ruschig*[29] further explained the *Petering* decision. In *Ruschig* the species claimed were compounds used in the control of diabetes.[30] The Patent Office rejected the claims, citing the disclosures of two earlier patents.[31] The court, however, reversed the rejection. A "small limited class" like that in *Petering* was lacking in the earlier patents.[32] The classes were too large[33] and diverse to anticipate.[34]

Similarly, in *In re Arkley*[35] the court found a generic description inadequate to anticipate. The claimed invention was an antibiotic[36] which the Patent Office rejected as anticipated by an earlier patent.[37] That patent disclosed a generic formula which encompassed over 230,000 compounds[38] and described a variety of substituents for the variables in the formula. Through a series of selected substitutions in precisely the proper combination, the disclosure could lead to the precursors[39] of the claimed compounds. The court, however, found this description to necessitate too

26. *Id.* An infinite number of resulting compounds was possible because there was no express limit on the number of alternative substituents for two of the variables.

27. *Id.*

28. The class described consisted of 20 compounds, excluding isomers. *Id. See* note 1 *supra* (explanation of isomers). In *Petering* the court acknowledged that isomerism would increase the number of compounds in the limited class, but found this fact immaterial because one with ordinary skill in the art would be aware of those species which involve standard, well-known isomerism. *Id.* at 682.

29. 343 F.2d 965 (C.C.P.A. 1965). In a sequel case the Patent Office challenged the patentability of one of the claims on a different statutory basis. *In re* Ruschig, 379 F.2d 990 (C.C.P.A. 1967). That case is of no importance here, however, since it concerned a § 112 rejection (claim-supporting) rather than a § 102 rejection (claim-precluding). *See* note 14 *supra*.

30. The later claimed compounds were sulfonylureas. They were oral medications that could be used to treat diabetes, replacing daily injections of insulin. 343 F.2d at 966.

31. *Id.* at 971.

32. *Id.* at 973–74.

33. The classes consisted of 130 and 156 compounds. *Id.* at 974.

34. The possible substituents were not closely related compounds as in *Petering*. *Id.*

35. 455 F.2d 586 (C.C.P.A. 1972).

36. The invention was a broad spectrum antibiotic of the cephalosporin C_1-type. *Id.*

37. *Id.* at 586–87.

38. "Appellants [the later applicants] 'conservatively' estimate that over 230,000 compounds (including, concededly, theirs) are embraced within this generic disclosure . . . ." *Id.* at 587. The Patent Office conceded that " '[i]f this were the only anticipatory disclosure in the reference,' the disclosure would be 'too diffuse' to support a § 102 rejection." *Id.*

39. A precursor is a substance from which another substance is derived.

much picking and choosing to arrive at the claimed compounds.[40] The reference did not give adequate direction for making the proper selections to justify an anticipation because the proper "blaze marks"[41] were wanting.

In re Wiggins[42] allowed the court to reaffirm the requirement of disclosing a method of preparation along with a compound name.[43] The applicants invented compounds useful for the treatment of Parkinson's disease. The Patent Office rejected the claims as anticipated by prior disclosures.[44] The disclosing publication named two of the later claimed compounds, but failed to provide an operative method of synthesis.[45] The court, reversing the Patent Office, found that the mere naming of a compound was inadequate to constitute anticipation.[46] A different conclusion would allow lists of theoretically possible compounds to be generated speculatively and published, thus barring the actual synthesizer of the named compounds from subsequently patenting them. The court noted, however, that a reference which merely names a compound is not entirely without effect.[47] Such a reference may be considered in examining other statutory requirements.[48]

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40. 455 F.2d at 588. Judge Baldwin stated in his concurring opinion:

> The difficulty is that Flynn [the prior art reference] gives 38 or so possible precursors and 15 or so tertiary amines which will react with those precursors to form C_A–type compounds [such as that claimed in the later patent application]. The Flynn disclosure, considered as a whole, does not sufficiently direct one skilled in the art to the claimed compound.

Id. at 591. To duplicate the later claimed compound, the correct precursor must be selected (out of 38 possibilities), and that selection must coincide with the correct reactant being selected (out of 15 possibilities). The possible combinations number in the thousands. Thus, the likelihood of making the two proper selections at the same time is very small unless further directions are given.

41. In *In re* Ruschig, 379 F.2d 990 (C.C.P.A. 1967), the court, in discussing the selection of variables, noted the old custom of marking trails in the woods by making blaze marks on the trees:

> It is no help in finding a trail or in finding one's way through the woods where the trails have disappeared—or have not yet been made, which is more the case here—to be confronted simply by a large number of unmarked trees. . . . We are looking for blaze marks which single out particular trees.

Id. at 995.

42. 488 F.2d 538 (C.C.P.A. 1973).

43. *See* note 17 *supra*. In *Wiggins*, the methods of preparation of the claimed compounds were disclosed by the applicant or were well-known in the art.

44. 488 F.2d at 542.

45. *Id.*

46. The court said that the prior reference's "listing of the compounds by name constituted nothing more than speculation about their potential or theoretical existence. The mere naming of a compound in a reference without more, cannot constitute a description of the compound . . . ." *Id.* at 543.

47. *Id.*

48. The reference may be useful in examining the § 103 nonobviousness requirement. *Id. See* note 11 *supra* (discussion of the nonobviousness requirement). The prior art reference may be combined with other relevant references in a § 103 examination.

Most recently, genus-species patentability was before the court in *In re Schaumann*.[49] In *Schaumann* the applicant's claimed compound[50] was an effective agent for increasing peripheral blood pressure in mammals without causing a significant increase in pulmonary circulation pressure or bradycardia.[51] A prior patent disclosed a generic formula which encompassed 105 compounds including the claimed compound.[52] Additionally, the prior patent revealed both a method of synthesis and a preference for certain substituents which operated to reduce the number of possible compounds to seven.[53] Consistent with the holdings in *Petering*[54] and *Ruschig*,[55] the *Schaumann* court found the limited class adequately descriptive to anticipate the applicant's compound.

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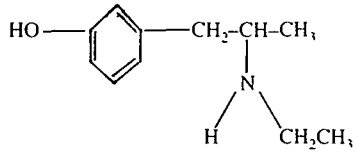
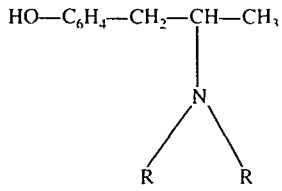
49. 572 F.2d 312 (C.C.P.A. 1978).

50. The applicant's claim was for a compound designated DL-1-(3-hydroxyphenyl)-2-ethylaminopropane (HEP). The structural formula of the claimed compound was:



51. Bradycardia is an abnormal slowness of the heart beat. B. MALOY, THE SIMPLIFIED MEDICAL DICTIONARY FOR LAWYERS 114 (3d ed. 1960).

52. The patent disclosed a class of (meta-hydroxyphenyl)-isopropylamines of the general formula:



" 'R designates hydrogen, an alkyl radical, for example methyl, ethyl, propyl, isopropyl, butyl, isobutyl, isoamyl, etc. or a cycloalkyl radical, for example cyclohexyl, ortho-, meta- or para-methylcyclohexyl, tetrahydronaphthyl, decahydronaphthyl, etc.' " 572 F.2d at 313 (quoting Patent No. 2,344,356 (1944)). When one R in the general formula designates hydrogen (H) and the other R designates an ethyl radical ($-CH_2CH_3$), the resultant compound is HEP, the same compound claimed by the later applicant. For a comparison, see note 50 *supra*; any difference is merely one of nomenclature. The applicant named the claimed compound (HEP) as a propane derivative using Arabic numerals to denote substituent positions, whereas the prior art inventor termed the compounds as amine derivatives using letters of the Greek alphabet to specify substituent positions. A prior patent anticipates and renders invalid a subsequent patent for the same invention. Pope Mfg. Co. v. Gormully Mfg. Co., 144 U.S. 238 (1892). *See* note 14 *supra* (explanation of the doctrine of anticipation).

53. 572 F.2d at 314.

54. 301 F.2d 676 (C.C.P.A. 1962).

55. 343 F.2d 965 (C.C.P.A. 1965).

IV. ANALYSIS

The basic objectives of the patent system are to encourage invention of useful devices, protect investments required to produce innovation, and encourage the prompt disclosure of inventions.[56] Before an inventor is rewarded[57] with a patent's private monopoly, he must give the public its quid pro quo, the discovery and disclosure of an invention which increases public knowledge.[58]

Disclosure of the invention theoretically will encourage activity by other inventors and make possible additional advances in the art.[59] If the first inventor is granted a patent with broad scope, however, the incentive remaining for subsequent inventors is diminished.[60] In the area of chemical patents, the courts must balance the protection deserved by the inventor of a genus[61] with the protection desirable for later inventors who discover individual species within the genus.[62] Thus, the court is faced with a dilemma: if it undermines the original patentee's monopoly, investment in research and public disclosure will be discouraged, whereas, if it does not reserve incentive for later inventors, improvements in the state of the art will be impaired.

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56. 1 D. CHISUM, PATENTS § 3.01 (1979). *See* Graham v. John Deere Co., 383 U.S. 1, 5–12 (1966).

57. One who invests labor and time in developing a new product should have the benefit of her invention by being given the right to exclude others completely from the use of her invention. Western Elec. Co. v. Milgo Elec. Corp., 190 U.S.P.Q. (BNA) 546, 549 (S.D. Fla. 1976).

58. *In re* Tenney, 254 F.2d 619, 624 (C.C.P.A. 1958).

59. In Kewanee Oil Co. v. Bicron Corp., 416 U.S. 470 (1974), the Court stated:

> When a patent is granted and the information contained in it is circulated to the general public and those especially skilled in the trade, such additions to the general store of knowledge are of such importance to the public weal that the Federal Government is willing to pay the high price of 17 years of exclusive use for its disclosure, which disclosure, it is assumed, will stimulate ideas and the eventual development of further significant advances in the art.

Id. at 481. Patents should be granted to later inventors of nonobvious improvements; "encouragment of improvements on prior inventions is a major contribution of the patent system and the vast majority of patents are issued on improvements." *In re* Hogan, 559 F.2d 595, 606 (C.C.P.A. 1977).

60. Incentive is diminished because a situation of blocking patents arises. Subsequent (improvement) inventors are precluded from using the basic invention without permission; thus, they cannot make, use, or sell their improvements without cooperation of the first inventor.

61. Limiting the inventor to claims involving the specific materials disclosed in the examples is not adequate protection. A later inventor could avoid infringing the claims by following the disclosure of the prior patent and merely substituting where appropriate. *See In re* Goffe, 542 F.2d 564, 567 (C.C.P.A. 1976).

62. Using the example of fluids (genus) and milk (species), discussed in note 4 *supra*, if the species patent were precluded by the earlier broad generic disclosure, the public would be deprived of the benefit of additional information about milk. *See* notes 1–2 *supra* (definitions of "genus" and "species"). On the other hand, if the first inventor does not receive adequate protection he will not make the original disclosure, instead relying on the protection afforded trade secrets. *See generally* R. MILGRIM, TRADE SECRETS ch. 2 (1978).

The court's attempts to balance these interests in the genus-species patentability area have provided some guidance in identifying the factors that are determinative of an adequate generic description for purposes of anticipation. The most important factor influencing the court is the size of the generic class disclosed in the prior art reference. This factor is considered in most of the genus-species anticipation cases;[63] if the size is too large the court is unwilling to find an anticipation.[64] In some instances, however, the court has allowed an otherwise overly broad generic class to be narrowed by limiting language found in the reference to give it an anticipation effect.[65]

The court has given only a limited indication of the acceptable maximum size of a genus. In *Petering*[66] and *Schaumann*[67] the genera were sufficiently described to support anticipation, and in each instance the genus was limited to encompass twenty or fewer compounds.[68] Prior to limitation by the court, the genus involved in *Schaumann*[69] contained a size which both the court, and apparently the Patent Office,[70] found excessive. In *Ruschig*[71] and *Arkley*[72] the court found generic classes of 130, 156, and a class numbering in the thousands, all inadequate to anticipate.

While it is difficult to generalize from so few cases, the court appears to find anticipation where the numbers of compounds encompassed by the

63. *See, e.g.*, notes 26, 28, 33, 38, 40, & 52 *supra*, and the sources cited therein, which indicate the court's interest in the resulting size of the generic class.

64. In an anticipation inquiry the court is only passing on the claim-precluding adequacy of the prior disclosure. The validity of the prior patent is not at issue.

65. For example, in *In re* Petering, 301 F.2d 676 (C.C.P.A. 1962), the generic formula taught by the prior art reference "encompasse[d] a vast number and perhaps even an infinite number of compounds." *Id.* at 681. The *Petering* court found this broad generic disclosure inadequate to anticipate a later claimed species. The prior reference, however, contained additional language which disclosed specific preferences for certain variable substituents in the generic formula. After examining the recited pattern of preferences, the court concluded that a more limited class, consisting of 20 compounds, was carved out from the broad generic group. The generic formula, coupled with the limiting language of the disclosure, was adequate to anticipate; expressly naming or structurally designating every compound in the more limited class was unnecessary. *Id.* at 681–82.

The same procedure was followed in *In re* Schaumann, 572 F.2d 312 (C.C.P.A. 1978), in which a genus with 105 compounds was narrowed to one containing only seven compounds by noting the method of synthesis and taking into account preferences for certain substituents. *Id.* at 314.

66. 301 F.2d 676 (C.C.P.A. 1962).

67. 572 F.2d 312 (C.C.P.A. 1978).

68. *Schaumann* arrived at a limited class of seven compounds and *Petering* carved out a class of about 20 compounds. 572 F.2d at 315; 301 F.2d at 681.

69. 572 F.2d 312, 314 (C.C.P.A. 1978).

70. Appellants argued that the general formula of the prior reference could not anticipate each of the 105 or more compounds encompassed thereby. The patent examiner appears to have agreed with that argument, as he felt compelled to point out that the prior reference contained additional information further limiting the general formula. *Id.*

71. 343 F.2d 965 (C.C.P.A. 1965).

72. 455 F.2d 586 (C.C.P.A. 1972).

prior art genus are such that an inventor might reasonably be expected to have known of each of them. When the number reaches the hundreds it becomes less likely the inventor knew of each individual compound and more probable that he was merely speculating as to their existence.

In *Petering, Ruschig,* and *Schaumann,* the court discussed a second factor important in determining the adequacy of a generic disclosure—the similarity of structures and properties among members of the genus. In *Schaumann* the court distinguished *Petering* from *Ruschig* by noting that it was not merely the small size of the class that was determinative in *Petering;* the similarity in structure and properties was also decisive.[73] This criterion is closely related to the requirement of a limited class size, since, by nature, the smaller the genus the more similar the properties of the constituent compounds.[74] This approach would eliminate judicial validation of long lists of speculative compounds.[75]

A third important factor in determining the adequacy of generic disclosure for anticipation is the need to disclose an operative method of preparation.[76] A method of synthesizing the claimed compounds must either be available from the original reference or be within public knowledge.[77] Merely naming compounds without a method of preparation is inadequate to anticipate.[78]

A further underlying consideration may influence the court when the later claimed compound is thought to be especially beneficial to mankind. In such situations, the court appears tempted to find a lack of anticipation because of a strong desire to reward the later inventor;[79] a contrary result would truncate the species patentability investigation.[80]

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73. 572 F.2d at 316.

74. For an example, see R. Morrison & R. Boyd, *supra* note 1, at 501, which shows the increasing change in the physical properties of alcohols as the genus size is enlarged.

75. As early as *In re* Baranauckas, 288 F.2d 413 (C.C.P.A. 1955), the court warned against creating lists of speculative compounds. *See* note 18 *supra.*

76. *In re* Wiggins, 488 F.2d 538 (C.C.P.A. 1973).

77. *Id.*

78. The court said that if it "were to hold otherwise, lists of thousands of theoretically possible compounds could be generated and published which . . . would bar a patent to the actual discoverer of a named compound no matter how beneficial to mankind it might be." *Id.* at 543.

79. *Wiggins* involved compounds for treating Parkinson's disease. *See* text accompanying notes 43–46 *supra.* The prior reference revealed no information about the compound other than its name, whereas the later species claim revealed the compound's effectiveness in treating Parkinson's disease. *In re* Wiggins, 488 F.2d 538 (C.C.P.A. 1973). The *Ruschig* invention was a medication for the oral treatment of diabetes. *See* note 30 *supra* and text accompanying notes 30–33 *supra.* An antibiotic was the invention in issue in *Arkley. See* note 36 *supra* and text accompanying notes 35–41 *supra.*

80. Evidence of unusual properties and unexpected benefits is not relevant in a § 102 anticipation test. Such evidence would be relevant, however, in a § 103 nonobviousness test. The court may want the opportunity to hear and weigh these factors before deciding patentability in a close novelty case.

V. CONCLUSION

The court has long cautioned against creating speculative lists of generic compounds that exist only in theory yet preclude patentability by the later, actual inventor. Thus, the requirements for adequate disclosure have gradually stiffened. The court currently appears willing to find a generic disclosure adequate to anticipate subsequent species inventions if the number of compounds encompassed in the prior reference is limited to approximately twenty. More numerous classes run the risk of being overly broad. Compounds must also be similar in structure and properties, and a method of preparation must be described or well-known.

The court's insistence on a small, closely related genus seems appropriate in light of the objectives of the patent system. By allowing only the well-described part of the genus to be anticipated, incentive remains for later inventors, and innovation and improvement are encouraged. If the first inventor desires more protection he has an alternative. He can provide more detail about genus members and list more illustrative compounds. If the court allows theoretical lists or broad genus disclosures to anticipate later species claims, society might be deprived of the advancements and improvements which might flow from further disclosure.

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