It should be noted that completely prophetic applications will rarely satisfy the requirements on enablement/disclosure in technological fields where there is a substantial amount of unpredictability. Thus, in most applications concerning inventions in unpredictable fields of technology, at least one working example will be provided to support enablement of the claimed inventions.

(u) Explain what test has been used by your examining authority to determine whether a claim has sufficient support in the specification, and how has this test been applied in the following circumstances

Each of the fact patterns described in the examples would be governed by the same general test; namely, would the disclosure enable a person skilled in the relevant art to practice the invention as claimed without the exercise of "undue" experimentation? The inquiry in each application will require a fact-specific evaluation of this question. General answers cannot be provided, as the nature of each particular claimed invention and its relation to the disclosure of the application will depend on the facts of each case. The summary of the relevant criteria in applying the test of enablement in the context of undue experimentation is provided in the answer to question (i) above.

(i) a disclosure provides one or several "working examples" or specific embodiments, but a claim is directed generically to a class of products or their use;

Generally, see answer to question (i) above.

The application of this "general" test has been evaluated by the Federal Circuit in a number of situations. For example, in *Amgen v. Chugai, Amgen Inc. v. Chugai Pharmaceutical Co., 927 F.2d 1200, 18 USPQ2d 1016* (Fed. Cir.), cert. denied, *502 U.S. 856 (1991),* the court addressed a variety of claims drawn to DNA sequences that encoded erythropoeitin. Claim 7 of the patent claimed any DNA sequence that would express functional erythropoeitin. However, the specification did not indicate which analogs would create a functional protein. The court stated:

By focusing on the biological properties of the EPO analogs, it failed to consider the enablement of the DNA sequence analogs, which are the subject of claim 7. Moreover, it is not necessary that a patent applicant test all the embodiments of his invention, *In re Angstadt, 537 F.2d 498, 502, 190 U.S.P.Q. 214, 218 (CCPA 1976);* what is necessary is that he provide a disclosure sufficient to enable one skilled in the art to carry out the invention commensurate with the scope of his claims. For DNA sequences, that means disclosing how to make and use enough sequences to justify grant of the claims sought. Amgen has not done that here. In addition, it is not necessary that a court review all the Wands factors to find a disclosure enabling. They are illustrative, not mandatory. What is relevant depends on the facts, and the facts here are that Amgen has not enabled preparation of DNA sequences sufficient to support its all-encompassing claims.

It is well established that a patent applicant is entitled to claim his invention generically, when he describes it sufficiently to meet the requirements of Section 112. See *Utter v. Hiraga, 845 F.2d 993, 998, 6 USPQ2d 1709, 1714 (Fed. Cir. 1988)* ("A specification may, within the meaning of *35 U.S.C. § 112* para. 1, contain a written description of a broadly claimed invention without describing all species that claim encompasses.");*In re Robins, 57 C.C.P.A. 1321, 429 F.2d 452, 456-57, 166 U.S.P.Q. 552, 555 (CCPA 1970)* ("Representative samples are not required by the statute and are not an end in themselves."). Here, however, despite extensive statements in the specification concerning all the analogs of the EPO gene that can be made, there is little enabling

disclosure of particular analogs and how to make them. Details for preparing only a few EPO analog genes are disclosed. Amgen argues that this is sufficient to support its claims; we disagree. This "disclosure" might well justify a generic claim encompassing these and similar analogs, but it represents inadequate support for Amgen's desire to claim all EPO gene analogs. There may be many other genetic sequences that code for EPO-type products. Amgen has told how to make and use only a few of them and is therefore not entitled to claim all of them.

In affirming the district court's invalidation of claims 7, 8, 23-27, and 29 under Section 112, we do not intend to imply that generic claims to genetic sequences cannot be valid where they are of a scope appropriate to the invention disclosed by an applicant. That is not the case here, where Amgen has claimed every possible analog of a gene containing about 4,000 nucleotides, with a disclosure only of how to make EPO and a very few analogs.

...

Considering the structural complexity of the EPO gene, the manifold possibilities for change in its structure, with attendant uncertainty as to what utility will be possessed by these analogs, we consider that more is needed concerning identifying the various analogs that are within the scope of the claim, methods for making them, and structural requirements for producing compounds with EPO-like activity. It is not sufficient, having made the gene and a handful of analogs whose activity has not been clearly ascertained, to claim all possible genetic sequences that have EPO-like activity. Under the circumstances, we find no error in the court's conclusion that the generic DNA sequence claims are invalid under Section 112.

In the case of *In re Vaeck*, 947 F.2d 488, 20 USPQ2D 1438 (Fed.Cir. 1991), the Federal Circuit upheld a rejection by the PTO of generic claims involving expression of a chimeric or fusion protein in a genus of bacteria based on a lack of enablement. As noted above in the answer to question (k) above, the claimed invention was generally directed to various embodiments of an invention based on use of cyanobacteria to express the "bacillus" protein (an endotoxin that is effective in killing mosquito and black flies). The key to the holding by the Federal Circuit that the claims were not enabled was the large degree of variability among the species of cyanobacteria and the projected difficulties of expressing a variety of proteins through transformation of variants of this species. Specifically, it held:

Taking into account the relatively incomplete understanding of the biology of cyanobacteria as of appellants' filing date, as well as the limited disclosure by appellants of particular cyanobacterial genera operative in the claimed invention, we are not persuaded that the PTO erred in rejecting claims 1-46 and 50-51 under § 112, first paragraph. There is no reasonable correlation between the narrow disclosure in appellants' specification and the broad scope of protection sought in the claims encompassing gene expression in any and all cyanobacteria. See *In re Fisher, 427 F.2d 833, 839, 166 U.S.P.Q. 18, 24 (CCPA 1970)* (the first paragraph of § 112 requires that the scope of the claims must bear a reasonable correlation to the scope of enablement provided by the specification). Accordingly, we affirm the § 112 rejection as to those claims.

In so doing we do not imply that patent applicants in art areas currently denominated as "unpredictable" must never be allowed generic claims encompassing more than the particular species disclosed in their specification. It is well settled that patent applicants are not required to disclose every species encompassed by their claims, even in an unpredictable art. *In re Angstadt, 537 F.2d 498, 502-03, 190 U.S.P.Q. 214, 218 (CCPA 1976).* However, there must be sufficient disclosure, either through illustrative examples or terminology, to teach those of ordinary skill how to make and how to use the invention as broadly as it is claimed. This means that the disclosure must adequately guide the art worker to determine, without undue experimentation, which species among all those encompassed by the claimed genus possess the disclosed utility. Where, as here, a claimed genus represents a diverse and relatively poorly understood group of microorganisms, the required level of disclosure will be greater than, for example, the disclosure of an invention involving a "predictable" factor such as a mechanical or electrical element. See *Fisher, 427 F.2d at 839, 166 U.S.P.Q. at 24.* In this case, we agree with the PTO that appellants' limited disclosure does not enable one of ordinary skill to make and use the invention as now recited in claims 1-46 and 50-51 without undue experimentation (footnotes omitted).

In both of these decisions, the court relied on the case of *In re Fisher*, a decision rendered by the Court of Customs and Patent Appeals (CCPA), the predecessor court to the Federal Circuit. In Fischer, the CCPA addressed a generic claim to a biologically active composition (adrenocorticotropic hormone, or ACTH) that had been defined in terms of its overall biological activity in combination with a claim to any polypeptide that comprised a 24 amino acid partial sequence of the ACTH hormone. The CCPA upheld a rejection by the PTO on the basis of lack of enablement, stating:

The second aspect of breadth mentioned by the board in the quoted portion of its opinion has not yet been discussed. This is the problem arising from the potency recitation "at least 1 International Unit of ACTH per milligram." This is a so-called "open-ended" recitation. It has a lower limit but no upper limit. As previously mentioned, the specification discloses products having potencies from 111% to 230% of standard, which we understand to mean from 1.11 to 2.30 International Units of ACTH activity per milligram. The issue thus presented is whether an inventor who is the first to achieve a potency of greater than 1.0 for certain types of compositions, which potency was long desired because of its beneficial effect on humans, should be allowed to dominate all such compositions having potencies greater than 1.0, including future compositions having potencies far in excess of those obtainable from his teachings plus ordinary skill.

It is apparent that such an inventor should be allowed to dominate the future patentable inventions of others where those inventions were based in some way on his teachings. Such improvements, while unobvious from his teachings, are still within his contribution, since the improvement was made possible by his work. It is equally apparent, however, that he must not be permitted to achieve this dominance by claims which are insufficiently supported and hence not in compliance with the first paragraph of *35 USC 112.* That paragraph requires that the scope of the claims must bear a reasonable correlation to the scope of enablement provided by the specification to persons of ordinary skill in the art. In cases involving predictable factors, such as mechanical or electrical elements, a single embodiment provides broad enablement in the sense that, once imagined, other embodiments can be made without difficulty and their performance characteristics predicted by resort to known scientific laws. In cases involving

unpredictable factors, such as most chemical reactions and physiological activity, the scope of enablement obviously varies inversely with the degree of unpredictability of the factors involved. In the present case we must conclude, on the record before us, that appellant has not enabled the preparation of ACTHs having potencies much greater than 2.3, and the claim recitations of potency of "at least 1" render the claims insufficiently supported under the first paragraph of *35 USC 112.*

Our conclusion is in no way opposed to the principles of the cases cited by appellant in support of his contention that he is entitled to coverage of the breadth now sought. *Farbenfabriken of Elberfeld Co. v. Kuelmsted ("the aspirin case"), 171 Fed. 887 (N.D. Ill. 1909),* affd. *179 Fed. 701 (7th Cir. 1910), In re Williams, 171 F.2d 319, 80 USPQ 150 (1948),* and *Parke, Davis & Co. v. Mulford & Co., 196 Fed. 496 (2d Cir. 1912),* each involved claims to substantially pure compositions. Such claims do not present the same breadth problem as here, because in those cases the possible range of further purification was either small or nonexistent. Such claims have an inherent upper limit of 100% purity, whereas in the present case it would appear theoretically possible to achieve potencies far greater than those obtained by appellant. *Merck & Co. v. Olin Mathieson Chemical Corp., 253 F.2d 156, 116 USPQ 484 (4th Cir. 1958),* involved a claim reciting an activity of "at least 440 L.L.D. units per milligram," but no issue appears to have been raised regarding that recitation and the court's opinion does not consider it.

(ii) a claim defines a product only with respect to physiological, biological or other functions possessed by the product, rather than the physical characteristics of the product; and

ee response to question (r) above.

(iii) a disclosure provides one therapeutic application of a product, but a claim encompasses any therapeutic or diagnostic use of a product.

The answer to this question depends on the particular type of claim being presented. For example, an applicant who had demonstrated that a particular compound was useful, novel, non-obvious and fully enabled by the specification would be entitled to a product claim that would in effect cover any therapeutic or diagnostic composition containing that compound. Thus, it is possible to obtain patent claims that will enable the patent holder to prevent third parties from practicing any therapeutic or diagnostic use of the patented product.

Disclosures that support process claims directed to use of a compound or composition to treat or diagnose a particular disorder will not usually support generic claims directed to use of the composition to any therapeutic or diagnostic process. This stems primarily from the nature of therapeutic and diagnostic procedures, which tend to be fact-specific. Thus, a disclosure that shows how one might use a particular antibody composition to treat cancer would not have any relevance to use of that composition to treat arthritis. Generic claims presented in this form would likely be found deficient under 35 U.S.C. § 112, first paragraph, due to lack of enablement.

Claims of the form "the use of product X for therapeutic purposes" are not permitted under U.S. practice, as such claims fail to properly define processes in the meaning of U.S. patent law under 35 U.S.C. § 101. See, *Ex parte Dunki* , 153 USPQ 678 (Bd. App. 1967) and *Clinical Products, Ltd v. Brenner*, 255 F. Supp. 131, 149 USPQ 475 (D.D.C.

1966). In addition, claims in this form are deficient under 35 U.S.C. § 112, second paragraph for indefiniteness (i.e., a claim is indefinite where it merely recites a use without any active, positive steps delimiting how this use is actually practiced).

B. PATENT ENFORCEMENT ISSUES RELATED TO PATENTED BIOTECHNOLOGY INVENTIONS

Claim Interpretation Questions

(a) List the judicial decisions that have issued in your country concerning the enforcement of patent claims covering any of the inventions specified in questions A.a) or b).

The following cases involve issues related to enforcement of patented biotechnological inventions as defined in questions (A)(a) and (b) and were rendered by the Court of Appeals for the Federal Circuit (i.e., the appellate court having jurisdiction over all cases involving patent infringement, validity or interpretation). Cases at the district court level have not been included in this response.

- *Hybritech Inc. v. Monoclonal Antibodies, Inc.*, 802 F.2d 1367, 231 USPQ 81 (Fed. Cir. 1986), *cert. denied*, 480 U.S. 947 (1987);

- *American Hospital Supply Corporation et al., v. Travenol Laboratories, Inc., et al.*, 745 F.2d 1, 223 USPQ 577 (Fed. Cir. 1984);

- *Hybritech Incorporated, v. Abbott Laboratories*, 849 F.2d 1446, 7 USPQ2d 1191(Fed. Cir. 1988);

- *Amgen Inc., v. United States International Trade Commission, et al.*, 902 F.2d 1532, 14 USPQ2d 1734 (Fed. Cir. 1990);

- *Hormone Research Foundation, Inc. et al., v. Genentech, Inc.*, 904 F.2d 1558, 15 USPQ2d 1039 (Fed. Cir. 1990);

- *Amgen, Inc., v. Chugai Pharmaceutical Co., Ltd., et. al.*, 927 F.2d 1200, 18 USPQ2d 1016 (Fed. Cir. 1991);

- *Scripps Clinic & Research Foundation et. al., v. Genentech, Inc., et al.*, 927 F.2d 1565, 18 USPQ2d 1001 (Fed. Cir. 1991);

- *Genentech, Inc., v. Eli Lilly And Company, et. al.*, 998 F.2d 931, 27 USPQ2d 1241 (Fed. Cir. 1993);

- *North American Vaccine, Inc. v. American Cyanamid Company et. al.*, 7 F.3d 1571, 28 USPQ2d 1333 (Fed. Cir. 1993);

- *Genentech, Inc., v. the Wellcome Foundation Ltd., et al,* 29 F.3d 1555, 31 USPQ2d 1161 (Fed. Cir. 1994);

- *Imazio Nursery, Inc., v. Dania Greenhouses*, 69 F.3d 1560, 36 USPQ2d 1673, 135 A.L.R. Fed. 747 (Fed. Cir. 1996);