POLICY FORUM: INTELLECTUAL PROPERTY

Coauthorship and Coinventorship

Philippe Ducor

In recent years, an increasing number of scientific discoveries are patented concomitantly with publication in the scientific literature (*1*). This trend is especially perceptible in life sciences, where the interactions between academia and industry are growing rapidly. This article examines the unclear relation between authorship and inventorship, and some of its consequences.

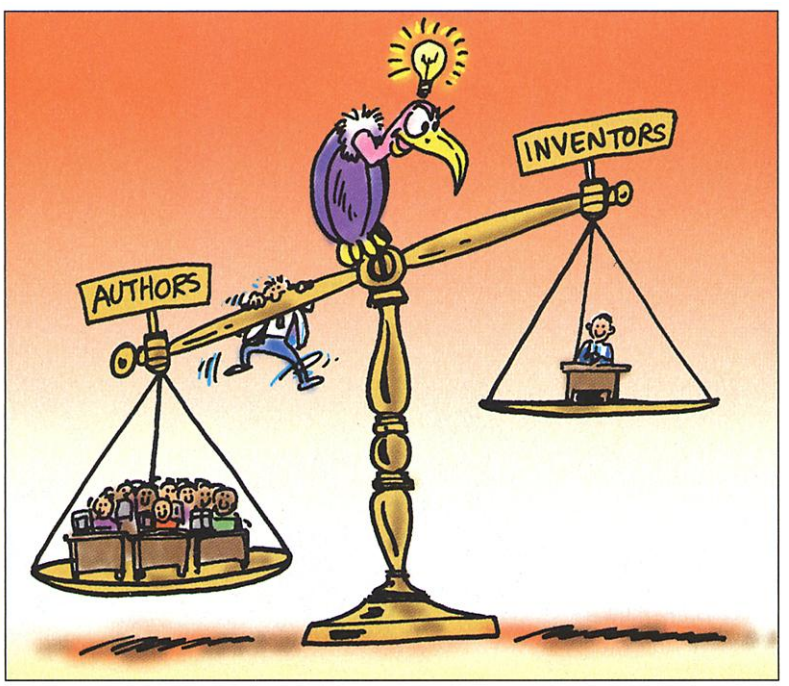
The credit provided by authorship in scientific articles has become the currency of success in academic careers. A good "credit history" provides the scientist prestige, easier funding, promotion, and sometimes media visibility. However, this system has some ill effects, as it can lead to "salami" science (*2*), coauthorship inflation, dilution of responsibility for content, "gift" authorship, and exclusion of authors.

At the same time, patents play an increasing role for academic researchers and often represent their first move toward entrepreneurship. Although a significant number of scientific publications now emanate from industry researchers, granted patents represent value, as well as evidence of productivity. Industry researchers often enumerate their inventions in résumés.

It is easy to find examples in which the number of authors in a scientific article is higher than the number of inventors on the corresponding patent. We did a manual search of various databases for concomitantly published and patented proteins pertaining to one of today's most researched fields in molecular biology (see figure on page 875) (*3*). Because of the method used, the data presented here cannot be considered representative. Out of 40 article-patent pairs, the last author was named as inventor in 37 cases, whereas the first author was named in 26 cases. These results correspond to the authors' positions in the scientific hierarchy, as well as (normally) to their respective contributions to the work. Out of 40 article-patent pairs examined, 38 had more authors than inventors, 2 had as many inventors as authors, and none listed more inventors than authors. The average number of authors was 10 and the average number of inventors was 3.

One explanation for these differences could be that criteria for inventorship are more stringent than criteria for authorship. However, a comparison does not support this theory. Most biomedical journals have adopted the International Committee of Medical Journal Editors (ICMJE) guidelines for authorship (*4*):

> *All persons designated as authors should qualify for authorship. ... Authorship credit should be based only on substantial contributions to 1) conception and design, or analysis and interpretation of data; and to 2) drafting the article or revising it critically for important intellectual content; and on 3) final approval of the version to be published. Conditions 1, 2, and 3 must all be met.*



CREDIT: JOE SUTLIFF

The author is at the University of Geneva Law School and BMG Avocats, CH-1211 Geneva 12, Switzerland. E-mail: philippe.ducor@bmglaw.ch

On the other hand, the statutory requirements for coinventorship are described in the U.S. code (*5*) and related case law:

> *Inventors may apply for a patent jointly even though (1) they did not physically work together or at the same time, (2) each did not make the same type or amount of contribution, or (3) each did not make a contribution to the subject matter of every claim of the patent.*

Commenting on this provision, the U.S. Court of Appeals for the Federal Circuit said: "[A] joint invention is simply the product of a collaboration between two or more persons working together to solve the problem addressed." (*6*) Similarly, in an earlier case: "To constitute a joint invention, it is necessary that each of the inventors work on the same subject matter and make some contribution to the inventive thought and to the final result." (*7*). Thus, the ICMJE guidelines for authorship use essentially the same principles and terminology as patent law: both are based on substantial contributions to conception and design.

These definitions show that the requirements for coauthorship and coinventorship are very similar, at least on paper. Both require a collaborative contribution of the coauthors or coinventors to the published research or patented result, respectively (*8*). Accordingly, the number of authors named in a given scientific article should be equal to the number of inventors on the corresponding patent.

An alternative explanation for the discrepancy is that some contributors listed as authors were offered "gift" authorship or were mere "pairs of hands," and are rightfully not mentioned as inventors on the corresponding patent. This explanation certainly plays a role, as studies show that the ICMJE guidelines are not always followed in practice (*9*). Another possible explanation is that some authors mentioned on the article have been excluded from inventorship on the patent, even though they were significant contributors to the work. This situation can arise for various reasons, not least the ignorance of the omitted inventor that the other authors have actually filed a patent on the published subject matter.

In 14 cases included in our survey, the first, the last, or authors in both positions on the paper were not mentioned as inven-

tors on the corresponding patent, although these authors typically contribute most to the work. In addition, in all seven papers coauthored by individuals from academia and from industry, only industry authors were mentioned as inventors on the corresponding, industry-owned, patent. This includes one case in which first and last authors were from academia.

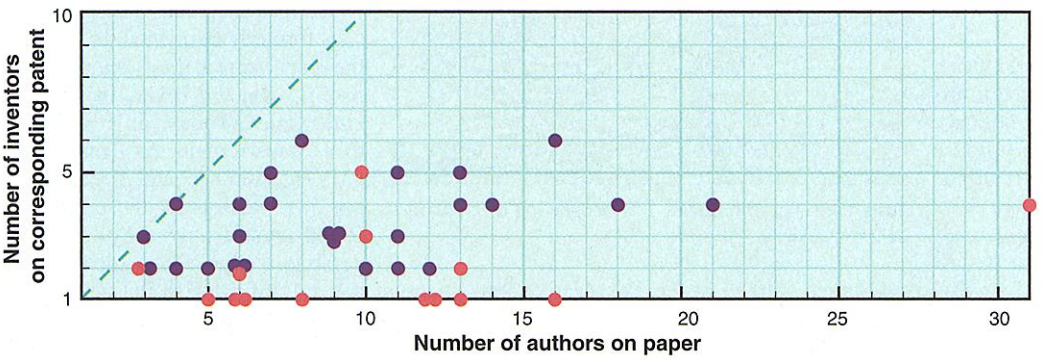
This type of situation has resulted in court disputes. A postdoctoral fellow recently sued her former mentor for patenting her work without informing her and without naming her as inventor (*10*). She was, in fact, the first author in the corresponding paper, published in *Science*. The U.S. District Court ultimately dismissed the case as the postdoc had no claim to ownership of the patent: she and her mentor both had the same employer (the University of Chicago) which, according to its rules, owns all inventions made by employees. Regardless of the cause, any discrepancy creates the presumption that one or more inventors were omitted and constitutes a legal hazard on both the validity and the value of the patent. Pursuant to 35 U.S.C. §102(f), a U.S. patent not listing the correct inventors can be declared invalid. If a judge facing a patent with three inventors is provided with a corresponding paper having 10 authors and the ICMJE guidelines, chances are that the evidence will be considered sufficient that at least some inventors have been omitted.

Admittedly, U.S. law provides a procedure for correcting wrong inventorship when the latter results from a good-faith error (*11*, *12*). This provision was introduced in 1983 after Congress realized that the solution prevailing until then—strict invalidity of patents not naming the correct inventors—was not a sensible policy. The procedure allows a patent owner to request the U.S. Patent and Trademark Office (USPTO) or the judge to correct a patent having improper inventorship. However, correction of inventorship is not necessarily a simple procedure. The patentee has the burden of convincing the judge that the omission was a good-faith error. The procedure will take time and cost legal fees. At the time that the patentee has to decide how to react to the claim by a competitor that inventors were omitted, he has no idea whether the correction will eventually be accepted. Accordingly, depending on the circumstances of the case, he has a strong incentive to grant a license to the claimant in order to avoid further proceedings.

In addition, from sole owner, the patentee can become a co-owner of the patent along with the reinstated inventor(s). In such cases, the inventorship correction procedure creates an opportunity for competitors to obtain a favorable-terms license from these inventors. *Ethicon* v. *U.S. Surgical*—a 1998 Federal Circuit case—provides a good illustration of this situation (*13*). In this case, Ethicon sued U.S. Surgical for patent infringement of a patent covering an endoscopy trocar. While the suit was pending, U.S. Surgical became aware that the subject matter of the patent had actually been invented jointly by two people, one of whom was not named in the patent. Having contacted the omitted inventor, who confirmed his involvement in the invention, U.S. Surgical obtained a retroactive license from him and applied successfully for correction of inventorship. As a result, the infringement suit by Ethicon was dismissed by the court. This case demonstrates that the inventorship correction procedure cannot always save a patent from being seriously damaged by the omission of inventors. Indeed, nowadays alleged infringers increasingly attempt to locate a "missing inventor" to escape liability (*14*).

In our context of concomitant publication and patenting, the search for "missing inventors" is quite straightforward, and amounts to identifying the authors in the corresponding scientific paper. Being named as author in the article might constitute convincing evidence in court that one is an inventor, especially for first authors and in cases where the journal requires a statement that authors fulfill ICMJE requirements. The patent owner then has the burden to reverse the evidence, which is rarely an easy task. Accordingly, the potential exists for any discrepancy in the number of authors and inventors to be exploited by alleged infringers or would-be licensees. This could lead to a major reduction in value of the patent. Patent owners might then adopt restrictive publication policies as they become aware of the risk.

The ongoing debates about what constitutes authorship should take into account the legal ramifications as well as scientific considerations. Our proposal is to name as "authors" only significant contributors to the conception of the work, whereas lesser contributors would receive a distinct denomination—e.g., "collaborators"—with a mention of their actual contribution. This system is not fundamentally different from proposals made by others, all aiming to acknowledge the actual work performed by each contributor (*15*). The proposed system fully reconciles the notions of authorship and inventorship, solving most legal problems arising from concomitant publication and patenting of the same subject matter. This solution would not only satisfy the legalistic worries of patent specialists; it would also alleviate some of the problems plaguing the current authorship system.



Discrepancies between authors and inventors on the corresponding patents. The dashes indicate the relation that would have been seen if the two were equal. Red indicates 14 article-patent pairs in which the first, the last, or authors in both positions on the paper were not mentioned as inventors on the corresponding patent.

References and Notes

1. In the United States, patent applications can be filed before or after publication without any loss of rights. Unlike most other patent systems, U.S. law provides for a 1-year grace period during which the novelty of an invention is not destroyed by prior publication. 35 U.S.C. §102(b).
2. W. Broad, *Science* **211**, 1137 (1981).
3. To ensure that the subject matter in the article-patent pairs was identical, all selected documents disclosed genetic or amino acid sequences as their main feature.
4. ICMJE, *Ann. Intern. Med.* **126**, 36 (1997); available at www.acponline.org/journal/annals/01jan97/unifreqr.htm. More than 500 journals have adopted these guidelines.
5. 35 U.S.C. §116.
6. *Fina Oil & Chemical Co.* v. *Ewen*, 123 F.3d, 1466, 43 USPQ2d 1935 (Fed. Cir. 1997).
7. *Monsanto Co.* v. *Kamp*, 269 F. Supp. 818, 154 USPQ 259 (D.D.C. 1967).
8. In its monthly "Patent Resources" column, *Nature Biotechnology* lists the inventors of the patents featured as "authors" rather than as "inventors." See, e.g., *Nature Biotechnol.* **18**, 103 (2000).
9. W. Hoen, H. Walvoort, J. Overbeke, *JAMA* **280**, 217 (1998).
10. E. Marshall, *Science* **287**, 2399 (2000).
11. 35 U.S.C. §256.
12. *Pannu* v. *Iolab Corp.*, 97-1466, -1501; 47 USPQ2d 1657 (Fed. Cir. 1998).
13. *Ethicon, Inc.* v. *U.S. Surgical, Inc.*, 135 F.3d 1456 (Fed. Cir. 1998).
14. J. Barney and D. Carlson, *Intellectual Property Today*, Dec 1998.
15. See, for example, D. Rennie, V. Yank, L. Emanuel, *JAMA* **278**, 579 (1997).

16. I wish to thank P. Trigo-Trindade for his comments on the manuscript.