A new journal for an expanding field

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This issue serves two purposes. First and foremost, it is intended to inform you that **Chemistry & Biology** will begin publication in September, and to invite you to consider the journal as a forum for research papers that are of interest to both chemists and biologists. Second, it celebrates some of the achievements of recent work at the interface between chemistry and biology, and serves to show, by example, what kinds of subjects we expect to publish in the journal in the future. Naturally the brief reviews in this introductory issue do not reflect the format for the papers and reviews that will be published in the journal proper; instructions for potential authors can be found elsewhere in this issue.

It is the explosion of research at the interface of chemistry and biology, exemplified by the brief reviews in this issue, that has motivated us to provide a new outlet for research papers that should be read by researchers in both disciplines. At present, authors of such papers have the uncomfortable choice of publication in a chemical journal, which is rarely read by biologists, or the reverse. **Chemistry & Biology** will aim to be accessible to both sets of readers, and we will consider the journal a success if it lowers the language barriers between these two fields, which have so much to say to each other.

The increasing importance of the chemistry/biology interface is perhaps the largest change in chemistry in the past 10 years. There have always been chemists who find biology fascinating, and who have tried to apply chemical approaches to biological problems. But there have never been so many 'card-carrying' organic chemists working partially or completely on problems to do with biology. Once considered to be at the very outside edge of either field, interfacial research is poised to move into the mainstream of both disciplines. This merging of two types of approaches has resulted in a vigorous research discipline with unprecedented potential to address important biological and chemical problems. One example of the influence of biology in chemistry can be seen in the marked shift among chemists towards recognizing the value of molecular diversity; instead of building one molecule at a time, we can now create combinatorial libraries as a first step in screening for compounds that have the desired effect. This approach has its roots in the methods used by molecular biologists to hunt for the needle in the haystack of a cDNA library; the organic chemist starts by building the haystack, complete with needle, but the essence is the same. Similarly, chemists have been able to bring to biology their characteristic approach of synthesizing new molecules designed to answer specific questions, instead of making do with what the natural world offers us. This approach is particularly powerful because the molecules can be designed to be cell-permeable, allowing cellular pathways to be probed *in situ*.

We have tried to give some flavor of the vast range of recent work in this area in the brief reviews in this issue. Choosing these topics has been difficult for the best of reasons — there are too many good examples to choose from. Since many chemists were drawn into biology by attempting to understand the mechanism of action of natural products, it seems fitting to include two recent studies on the elucidation of the mechanism of action of the natural products cyclotheonamide A (Lee and Clardy) and calicheamicin (Nicolaou). Both of these molecules are fascinating in themselves as well as for their important biological activities (inhibiting serine protease activity, and cleaving DNA and initiating apoptosis, respectively). But chemists are no longer content to limit themselves to natural products; it is now genuinely possible to design drugs using an understanding of the mechanism of action of the target protein and its function in a cellular pathway. Marsters *et al.* give us an example of rational design as applied to Ras, and Schreiber and Crabtree show that such manipulation of function can be made modular, by attaching a domain that can be dimerized in a regulated way to different proteins whose signaling potential depends on dimerization.

Understanding the target cellular pathways in molecular detail is of course the first and essential step in drug design, and here too chemical approaches are important. Unnatural amino acids can be used to probe catalytic mechanism, as Chung and Schultz show for Ras, and structural and chemical information combined have given significant insight into the mechanisms of action of methane monooxygenase (Rosenzweig and Lippard) and intracellular signalling mechanisms, especially those involving protein–protein association mediated by SH2 and SH3 domains (Brugge). Our understanding of how regulatory switches such as iron-sulfur clusters are

used to control processes as diverse as oxygen metabolism (Klausner *et al.*) and gene transcription in response to toxic oxygen radicals (Storz) is also becoming increasingly chemical. Conversely, biological techniques can come to the rescue when chemistry fails; the use of molecular biology to elucidate the synthetic pathway for vitamin B_{12} (Scott) was not only extraordinary in itself, but opened the way for genetic manipulation of this pathway, allowing *ex vivo* synthesis of vitamin B_{12}. The same approach should make it possible to synthesize other complex natural products such as taxol.

Finally, chemistry can give us clues about where biology came from: as Eschenmoser shows, although there may have been other potential building blocks for DNA and RNA in the primordial 'soup' from which life arose, none of them would have served the purpose so well as the nucleic acids we now have. Nevertheless, Lehn shows us that creative molecular designs may lead to new types of supramolecular structures which can carry information, showing that in a different world, with different components available in the beginning, the fundamental structure of life might have been very different. Thus the interface between chemistry and biology is both broad in scope and varied in its interest to both groups of researchers. As Sydney Brenner points out in his afterword, chemistry entered the biological sciences some time ago; now it is time to make its influence even more widely felt.

It is increasingly clear that chemists and biologists have an enormous amount to say to each other. The recent progress of interdisciplinary research has been dramatic, and the number of collaborations at the boundaries of the two fields is growing rapidly. In this context, the need for a journal that will lower the communication barriers between the two fields, and publish papers that researchers in both areas will find interesting, is ever more apparent. Our aim is to provide exactly that in **Chemistry & Biology**. The journal will publish papers of exceptional interest from all areas of the chemistry/biology interface. **Chemistry & Biology** will expect authors to make the interest of their work clear to readers on the other side of the 'great divide', particularly in the abstract and in a special section entitled "Significance" at the end of each research paper. The journal will also commission brief reviews, sometimes to mark particularly interesting developments in either field, but more often on areas where a biological problem is ripe for input from chemists, or on chemical approaches that could be more widely applied in biology. In this way, we hope to stimulate further collaboration and contact between the two fields.

In this climate of decreasing library resources and increasing journal costs, new journals are not popular endeavours. We have been heartened by the response from the community, exemplified by the outstanding group of individuals who have agreed to join our Editorial Board. With the help of our exceptional associate editors, we will do our best to ensure that this is not "just another journal" but a unique, high-quality publication that truly serves our community. **Chemistry & Biology** will be swift and responsive in its handling of manuscripts; we are committed to reaching decisions on all submitted manuscripts within four weeks wherever humanly possible. Manuscripts of all lengths will be published as rapidly as is consistent with high standards for quality. Those of you who have seen other journals published by Current Biology Ltd will know that this publisher has a growing reputation for high-quality rapid-publication journals, and this journal will be no exception.

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