Editorial

Brilliant Ideas Can Come in All Sizes: Research Letters

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Abstract

The *Journal of Medical Internet Research* is pleased to offer "Research Letter" as a new article type. Research Letters are similar to original and short paper types in that they report the original results of studies in a peer-reviewed, structured scientific communication. The Research Letter article type is optimal for presenting new, early, or sometimes preliminary research findings, including interesting observations from ongoing research with significant implications that justify concise and rapid communication.

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KEYWORDS

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Did you know that Albert Einstein published his famous $E=mc^2$ equation on mass-energy equivalence in roughly 2 pages [1]? Or that the original and preliminary communication suggesting the double-helix structure of DNA by Watson and Crick (Figure 1 [2,3]) is also only a little more than 1 page in length? If winning a Nobel prize is evidence of brilliance, then one may conclude that the length of a manuscript is not commensurate with its value.

Because less is sometimes more, the *Journal of Medical Internet Research* is now pleased to offer "Research Letter" as a new article type. Research Letters in the *Journal of Medical Internet Research* are similar to original and short paper types in that they report the original results of studies in a peer-reviewed, structured scientific communication. The Research Letter article type is optimal for presenting new, early, or sometimes preliminary research findings, including interesting observations from ongoing research with significant implications that justify concise and rapid communication.

The *Journal of Medical Internet Research* is publishing Research Letters for several reasons. First, the Research Letter

is an optimal medium for quickly communicating transformative work, offering authors an opportunity to submit their focused research work for potentially more rapid peer review and publication processes simply by the nature of the communication. Second, larger and more extensive research on contemporary issues might also produce focused findings that may be incidental to the primary aims, yet still be valuable to report. One interesting key result can be displayed in 1 or 2 tables or figures. Additionally, students and early career researchers are encouraged to submit Research Letters as a pathway for reporting their impactful, targeted research projects; this may offer a stepping stone for these researchers as they publish work that contributes to the field and to their scientific growth and professional advancement. For readers, who often include busy scientists and professionals, Research Letters can offer new ideas or approaches in a brief and quickly digestible, yet robust and high-quality, manner. Taking experiences from other high-impact journals, Research Letters are often highly cited.



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Figure 1. Archived scan of "Molecular Structure of Nucleic Acids: A Structure for Deoxyribose Nucleic Acid," published on April 25, 1953, by Watson and Crick [2]. Source: Linus Pauling and the Race for DNA [3].

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equipment, and to Dr. G. E. R. Deacon and the captain and officers of R.R.S. *Discovery II* for their part in making the observations.

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MOLECULAR STRUCTURE OF NUCLEIC ACIDS

A Structure for Deoxyribose Nucleic Acid

'E wish to suggest a structure for the salt of deoxyribose nucleic acid (D.N.A.). This W structure has novel features which are of considerable biological interest.

A structure for nucleic acid has already been proposed by Pauling and Corey¹. They kindly made their manuscript available to us in advance of publication. Their model consists of three inter-twined chains, with the phosphates near the fibre axis, and the bases on the outside. In our opinion, this structure is unsatisfactory for two reasons: (1) We believe that the material which gives the X-ray diagrams is the salt, not the free acid. Without the acidic hydrogen atoms it is not clear what forces would hold the structure together, especially as the negatively charged phosphates near the axis will repel each other. (2) Some of the van der Waals distances appear to be too small. Another three-chain structure has also been sug-

gested by Fraser (in the press). In his model the phosphates are on the outside and the bases on the inside, linked together by hydrogen bonds. This structure as described is rather ill-defined, and for

this reason we shall not comment

on it. We wish to put forward a radically different structure for the salt of deoxyribose nucleic acid. This structure has two helical chains each coiled round the same axis (see diagram). We have made the usual chemical assumptions, namely, that each chain consists of phosphate diester groups joining β -D-deoxy-ribofuranose residues with 3',5' linkages. The two chains (but not their bases) are related by a dyad perpendicular to the fibre axis. Both chains follow rightaxis. Both chains follow right-handed helices, but owing to the dyad the sequences of the atoms in the two chains run in opposite directions. Each chain loosely resembles Fur-berg's² model No. 1; that is, the bases are on the inside of the helix and the phosphates on the outside. The configuration of the sugar and the atoms near it is close to Furberg's 'standard configuration', the sugar being roughly perpendi-cular to the attached base. There

is a residue on each chain every 3.4 A. in the z-direction. We have assumed an angle of 36° between adjacent residues in the same chain, so that the structure repeats after 10 residues on each chain, that is, after 34 A. The distance of a phosphorus atom from the fibre axis is 10 A. As the phosphates are on the outside, cations have easy access to them. the outside, cations have easy access to them. The structure is an open one, and its water content

is rather high. At lower water contents we would expect the bases to tilt so that the structure could become more compact

The novel feature of the structure is the manner in which the two chains are held together by the In which the two chains are held together by the purine and pyrimidine bases. The planes of the bases are perpendicular to the fibre axis. They are joined together in pairs, a single base from one chain being hydrogen-bonded to a single base from the other chain, so that the two lie side by side with identical z-co-ordinates. One of the pair must be a purine and the other a pyrimidine for bonding to occur. The hydrogen bonds are made as follows : purine position 1 to pyrimidine position 1; purine position 6 to pyrimidine position 6.

pyrimidine position 6. If it is assumed that the bases only occur in the structure in the most plausible tautomeric forms (that is, with the leto rather than the enol con-figurations) it is found that only specific pairs of bases can bond together. These pairs are : adenine (purine) with thymine (pyrimidine), and guanine (purine) with cytosine (pyrimidine). In other words, if an adenine forms one member of a pair, on either chain, then on these assumptions the other member must be thymine ; similarly for guanine and cytosine. The sequence of bases on a single chain does not appear to be restricted in any way. However, if only specific pairs of bases can be

way. However, if only specific pairs of bases can be formed, it follows that if the sequence of bases on one chain is given, then the sequence on the other chain is automatically determined.

It has been found experimentally^{3,4} that the ratio of the amounts of adenine to thymine, and the ratio of guanine to cytosine, are always very close to unity

for deoxyribose nucleic acid. It is probably impossible to build this structure with a ribose sugar in place of the deoxyribose, as the extra oxygen atom would make too close a van der Waals contact.

The previously published X-ray data^{5,6} on deoxy-ribose nucleic acid are insufficient for a rigorous test of our structure. So far as we can tell, it is roughly compatible with the experimental data, but it must be regarded as unproved until it has been checked against more exact results. Some of these are given in the following communications. We were not aware in the following communications. We were not aware of the details of the results presented there when we devised our structure, which rests mainly though not entirely on published experimental data and stereo-chemical arguments. It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material. Full details of the structure, including the con-ditions assumed in building it, together with a set of co-ordinates for the atoms, will be published elsewhere.

elsewhere. We are much indebted to Dr. Jerry Donohue for

constant advice and criticism, especially on inter-atomic distances. We have also been stimulated by a knowledge of the general nature of the unpublished experimental results and ideas of Dr. M. H. F. Wilkins, Dr. R. E. Franklin and their co-workers at

Research Letters should still present original work that has not been previously published. Work presented at a conference that has not been previously published in proceedings can be submitted as a Research Letter. However, tables or figures from previously published or submitted papers would not be considered in a Research Letter. Authors can refer to article type information on the format of a Research Letter in JMIR Publication's Knowledge Base [4]. In this issue of the Journal

This figure is purely diagrammatic. The two rlbbons symbolize the two phosphate—augar chains, and the hori-zontal rods the pairs of bases holding the chains together. The vertical line marks the fibre axis

https://www.jmir.org/2022/7/e41046

example [5], with additional Research Letters currently in review.

of Medical Internet Research, the journal has published its first

We encourage authors to consider submitting their Research Letters to the Journal of Medical Internet Research. Additionally, the journal editors may suggest to authors the Research Letter article type as a more suitable format for their work. This is not intended to undersell the contribution of the



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submission. Authors may not realize that the Research Letter is subject to the same rigorous peer-review process as other article types here at JMIR Publications. As we have seen from Einstein and other eminent Nobel Prize winners, brilliant ideas can be expressed succinctly.

We look forward to reviewing and publishing your Research Letters!

Conflicts of Interest

RK is the Co-Editor-in-Chief at JMIR Publications. TIL is a scientific editor at JMIR Publications. GE is founder and president of JMIR Publications.

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