

Dr. \_\_\_\_\_

Comment on proposed letter on "Sex Factors and Conjugons"

I am willing to sign this letter, or to be counted among the number of supporters if the journal will not accept a long list of signatures.

I do not wish to sponsor this letter but will accept the proposed terminology if the letter is published.

I do not approve of the proposal.

Comments:

My apologies for having let this slip.

I certainly approve of "conjugon"; but I think there will still be semantic problems. "Generate a conjugation apparatus" has a reasonably clear connotation in E. coli K-12; but it is easy to imagine related processes, perhaps in other bacteria that will make you wish you had a more precise definition. Does pneumococcus or B. subtilis have a "conjugation apparatus" that we now label as "competence"?

Then are you going to distinguish a block of genes perhaps firmly integrated in a chromosome (≠ plasmid, therefore I assume ≠ ~~conjugon~~ conjugon) from the same DNA sequence outside? So I think to improve the present situation, with all of its confusions, you may have to introduce a whole family of terms to cover the various alternatives.

\*\*\*\*\*Thinking out loud\*\*\*\*\* :

Orthogonal criteria		defn. of conjugon
present Location of particle	on/ off chromosome	OFF
Scope of connected sequence	one/few genes // a small chromosome	FEW
recent history and prospects	probable interaction with chromosome or not	NOT
functions mediated:	pilus (penis) that remains attached to source cell and mediates DNA transfer ... including other genes	YES +
	detachable capsid containing DNA	NO
	others	+

Potential

"Female-specific" components are not included in this definition of conjugon -- I wonder if it would not be better to use a term that stresses the male-specificity implied here. Would you settle for pilosome/ pilogene for the plasmid and its genetic information respectively, the latter being possibly part of a chromosome. This may not sufficiently exclude non-sexual pili. So maybe ~~androsome/androgene~~ androsome/androgene.

I will be happy to go along with the term, but I have some comments that would be inconsistent with 'sponsoring' the note in its present text.

SUBSTANCE

We now know enough to think of several orthogonal criteria and to use these to label a taxonomy of particles. According to a first pass at this (below) one might have a fairly simple key for the 'species' conjugon. But I predict this will run into new troubles when the concept is cited, used and transformed by others. There tend to be two kinds of difficulty: confusing one species with another; and confusing different hierarchies of the classification.

If I understand you correctly, you would use conjugon only for the extra-chromosomal state of a particle; others more interested in sex and less in plasmids might want to relax this criterion, i.e., to generalize on the definition with respect to one parameter; others with respect to another. And most of our colleagues, being rather impatient with neological and neologicistic analysis will use conjugon for whatever happens to certain strains of E. coli.

The minimum prophylaxis is to display the tree explicitly; in addition one might wish to provide contrasting names for other nodes -- which one may feel foolish in doing before some of them are experimentally verified (v.i. -- a caution I heeded too well in defining 'plasmid' and leaving what came to be known as 'episome' to a passing reference.)

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## Potential

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## HISTORY

Perhaps not surprisingly, I have a different perception of the history of these terms than is indicated in the preamble. Certainly I coined the term PLASMID in 1952 to solve a rather different problem than indicated here-- namely to unify "plasmagenes" and "viruses". ~~XXXXXX~~ Lysogenicity rather than the F story was the focus of attention, as far as bacteria were concerned (the paper was written in 1951 with last minute revisions in early '52 and we had at most our first glimmers of F at that time). The concept of 'episome' was addressed there in remarks about "a special relationship between the nucleus and some viruses" but until we had completed our first studies of F and of lambda-segregation a few months later, we did not have the data to spell this out. (We were spending a lot of effort trying to persuade various people that F was not a virion, and keeping F and lambda unscrambled

Some of the characterizations in that 1952 paper inevitably appear somewhat muddled viewed from hindsight; but I think the definition of plasmid given there can still stand. With the emergence of the episome terminology, people tend to use 'plasmid' to mean an obligately non-chromosomal particle; but there is no easy operational test to help predict whether a particle can ever be integrated.

I'm sorry I don't have the reference right to hand; but you may be interested that the term 'episome' had been used earlier by McClintock or by Anderson to refer to particles (like Ac in maize) that migrate from one chromosomal location to another. There is no way to impose a rigorous definition on customary usage.

P.S. Checking back in my files, which are intermittently intact, I found only one draft version of the ms, for that paper-- which has significantly more detailed discussion about lysogenicity. I have to assume that the editors discouraged placing that much emphasis on lambda for a physiological reviews audience. Needless to say, this has no bearing on the public record; except that I have to guard against reading more than actually appears in the printed version.

not sure

Then, I think I have to correct the preamble. The term 'plasmid' was introduced in my 1952 paper without particular reference to F. Its application to temperate phages would also have to be revised in the light of later work-- which justified the general concept of the episome as a particular ~~one~~ that alternates between a chromogenic and a plasmagenic habit. PLASMID was coined to unify all extrachromosomal determinants, whether these could also be viewed as 'plasmagenes' or as symbiotic 'viruses', a distinction that I felt to be operationally meaningless, but which confused many contemporaries.

Today, in using ~~the~~ term plasmid (in distinction? to episome) ~~one~~ must clarify whether one means ~~extrachromosomal~~ existentially extrachromosomal, or obligatorily so. (I know of no way to prove that a plasmid is inherently incapable of entering a chromosome, i.e., of functioning as an episome.)

Incidentally episome was coined by McClintock (or Anderson) some years before Jacob for the migratory regulatory factors, like Ac in maize. It is no easy task to keep meanings straight -- as Al Hershey used to say, discoveries also keep getting in the way of simple thinking.