

The simplification of aphid terminology

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Abstract. A report is provided of a workshop at 4th International Symposium on Aphids, where the decision was reached to recommend a major simplification of the terms used in papers on aphid biology, in order to make aphid work more accessible. It was concluded that most of the specialist terms usually applied to aphid morphs and life cycles could and should be avoided in papers that are intended to be of general interest to other biologists. Specific recommendations are made for their replacement by terms that are simpler and more widely understood.

INTRODUCTION

Aphids are remarkable insects worthy of more attention from biologists. The complex terminology associated with aphid morphs and life cycles, however, acts as a barrier to communication between aphidologists and biologists in other disciplines, so that much aphid research is not easily accessible to non-aphidologists. Participants at the 4th International Symposium on Aphids met for an evening workshop to try to resolve this problem. Many people contributed to a lively discussion, and there was a general consensus on the need for a major simplification of the terminology used in papers that are of general interest to other biologists. This report summarises the conclusions reached at that meeting, supported by the majority of its participants.

It should perhaps be emphasised that the problem being addressed was specifically how best to communicate with fellow biologists who have neither the time nor the inclination to learn a complex terminology for one particular small group of insects. Aphid terminology has evolved to fulfil the needs of a specialist group of biologists, and it was agreed that it remains necessary for certain types of communication within that group, especially for the description of new species and the detailed comparison of aphid life cycles. But when it comes to communicating the broader implications of work on aphids to other biologists, it is necessary to ask whether the same point can be made without using it.

ALTERNATION OF GENERATIONS

Cyclical parthenogenesis is a primitive aphid feature also found in certain other animal groups, and a basic feature of plant systems. The meeting supported the view (expressed by Aulay Mackenzie) that the aphid life cycle could be described as a single sexual generation alternating with a varying number of asexual generations (or a sexual phase alternating with an asexual phase); use of the term “asexual” being possible as it is virtually certain that aphid parthenogenesis does not involve meiotic recombination. Alternative terminology (unisexual/bisexual, uniparental/biparental) for these phases may however be

necessary to communicate effectively with workers on other groups of parthenogenetic or cyclically parthenogenetic organisms.

GENERAL DESCRIPTION OF THE LIFE CYCLE

There was general support for the proposition (by Manya Stoetzel) that a clear, simple and succinct description of the most important features of the life cycle of an aphid is possible without using specialist terminology. The parthenogenetic generations are winged and/or wingless females and give rise to a single sexual generation of males and mating females, and the latter lay fertilised eggs. It was generally agreed that the females of the sexual generation were best termed mating females rather than sexual females (as "asexual females" is a contradiction in terms). The term ovipara was rejected as a barrier to communication, as in *Adelgidae* and *Phylloxeridae* (and most other insects) all females are oviparous. The terms aptera, alata, apterous vivipara, alate vivipara, apterous virginopara and alate virginopara were all rejected as unnecessary for communication with other biologists, but in *Aphididae* (as opposed to *Adelgidae* and *Phylloxeridae*) it may sometimes be necessary to explain that parthenogenetic females are viviparous and mating females are oviparous, these being widely understood terms.

The fundatrix (or stem mother) will not usually need to be referred to specifically; "foundress" might be an appropriate term for communication with workers on social insects (William Foster). The terms sexupara and presexual are also unnecessary for the description of aphid life cycles where no host alternation occurs.

HOST ALTERNATION

A minority of aphids have a regular alternation between unrelated host plants, and in an evolutionary context it may sometimes be necessary to distinguish these, with adequate explanation, as primary and secondary hosts. The terms heteroecious and autoecious (and also monoecious) were rejected, everyone favouring host-alternating and non host-alternating.

If it is necessary to refer specifically to the winged morphs that accomplish the migration between primary and secondary hosts, then there was general agreement about the terms emigrant for the morph moving from primary to secondary host, and remigrant (with some favouring return migrant) for the morph or morphs returning from secondary to primary host. It was agreed that alate fundatrigenia, alate gallicola, alate sexupara and gynopara are all terms to be avoided in communicating with other biologists. Likewise the terms used for the secondary host generations of host-alternating aphids (*alienicolae*, *exules*) were also rejected as unnecessary. There was also a general consensus that terms with a seasonal reference such as spring migrant and autumn and fall migrant are inadvisable, as not all aphids change hosts at the same time of year.

LOSS OF THE SEXUAL PHASE OF THE LIFE CYCLE

There was general agreement that the terms holocyclic and anholocyclic (also androcyclic, gynocyclic) are unnecessary when communicating with other biologists, who will more readily understand what is involved if species, populations or genotypes of aphids are described as with or without a sexual phase. Permanently parthenogenetic may be useful as a readily understandable replacement for anholocyclic.

MORPH TERMINOLOGY IN ADELGIDAE

It was generally agreed that the terms used in descriptions of adelgid life cycles (sistens, neosistens, progrediens, etc.) are far too specialised, and must be avoided if work on adelgid ecology and evolution is to receive any attention at all from other biologists.

CONCLUSIONS

Some fairly radical proposals emerged from this meeting, and if adopted they could make a considerable difference to the attention and regard paid to aphid biology by other scientists. These recommendations are not, of course, set in tablets of stone; no rules can be laid down to force all aphid workers to simplify their terminology along the lines indicated. One might, however, sum up the general feeling at the meeting as follows:

- If we aphidologists want to have our work noticed and acknowledged by other biologists, we have to be able to communicate with them; and as we are in the minority, that means speaking their language, not expecting them to learn our's.

- When tempted to use a specialist aphidological term, it may simply be enough to ask oneself the question, "Is the use of this term absolutely essential to the particular point that I am trying to make?" Probably nine times out of ten, it will not be.