Notes on a new classification of Plecoptera

Late in 1977, shortly before PERLA 3 was published, Prof. KEVAN of McGill University, Ste. Anne de Bellevue, Quebec, sent a copy of his "Suprafamilial classification of 'orthopteroid' and related insects" (KEVAN 1976, 1977a, b). This includes a classification of Plecoptera. Permission to reproduce this with some notes in PERLA was readily granted (for which Prof. KEVAN is sincerely thanked), but it arrived shortly after PERLA 3 had been published. This information is therefore presented now after considerable delay but will probably be new for many of us. My brief account is inevitably biased by my own views and is intended to direct those interested to the original paper. Prof. KEVAN informed me that reprints are no longer available, but the text forms part of Memoir 4 of the Lyman Entomological Museum and Research Laboratory, McGill University, and can be obtained for 5.00/copy.

The present higher classification of orthopteroid insects and many other groups is described as being in a state near anarchy, if not chaos, or as a fluid situation at least. The author is concerned about numerous conflicting and frequently changing classifications and about the way in which the non-specialist is left behind with outmoded classifications differing from one text to the other. He is also alarmed about the situation of those who have to learn or even to teach insect taxonomy. No doubt these are serious problems calling for a change.

Rational action by entomologists and zoologists in general (extension of the scheme to all animal classification is proposed) is required. KEVAN proposes to start putting our house in order by first deciding where to put the principal furniture and by trimming untidy pieces later. We should, unlike Alice in Wonderland, first decide on appropriate sizes for slices, then cut up cakes and distribute them. If furniture or cakes were concerned, I would have no objections. However, these examples have little in common with our situation. The cakes we are dealing with were baked by evolution long ago and in many cases with time have lost shape to the extent that they have become unrecognizable. We do not have to cut up cakes, but we have to reconstruct them from crumbs. Our task is also not to

arrange existing furniture but to make it from bits and pieces that we have to find, recognize and fit together. In doing this we must constantly check to see if a screw we may find in some untidy corner indicates that some of the furniture we have already assembled was put together incorrectly.

The major problems of stonefly classification arose not because specialists dealt with untidy pieces and forgot about the principal furniture, but because students of Plecoptera were so sure of what their principal furniture was. The higher classification of Plecoptera can readily be traced back to LATREILLE. Unfortunately, Filipalpia, on which plecopterologists relied on so long was not their house but a pack containing a refrigerator and washing machine.

Of course, KEVAN allows for modifications of classifications if need be. "Here the phyletic or cladistic approach to taxonomy will play a dominant role. The result could then be put to a test by the use of 'phenetic' methods. Indeed, I believe that it is here that 'numerical taxonomy' has its most important role to play, particularly in respect of ranking the taxa recognized within a given hierarchical system..." But is it inevitable that such modifications bring about nomenclatorial changes upsetting textbooks and puzzling non-specialists?

KEVAN proposes a scheme which "aims at minimal disturbance of existing practice, and even where details may be unfamiliar, it is seldom actually innovative." An existing...hierarchical system is adopted uniformly... The principles of symbolic logic (GREGG, 1954) are employed, so that all superior categories are divided into an equal number of inferior categories of equivalent rank. The number of subcategories used is the optimum workable on the basis of maximum need within any group. To achieve this, each 'primary' category falls within a 'super-'category and includes within it one or more 'sub-' and 'infra-'categories." The rank of every taxon is indicated by a special suffix like those prescribed for family-group names by ICZN or like those generally used by botanists. A change in rank is made by change of the suffix, but author and date are not changed. They

may be put into parentheses to indicate some later change of form and/or rank, and author and date of such changes may be added. It is very important that absolute ranking to which much weight is assigned in this scheme "for the present... must largely be subjective" (KEVAN 1977b).

Stability of the scheme arises from extension of the principle of ICZN "for family-group names and their 'co-ordination' up to and including the level of suborder. The same rule of priority is applied. (Priority is also applied, in a modified way, to the names of orders and higher taxa but these are not coordinate with family-group names)." Extension of priority to before LINNAEUS, 1758, is requested for names above sub-order, and priority goes first to a name with a standard termination (see below). "Whether or not an author used a name in a restricted or expanded sense ... is of no consequence in the proposed system." This is so, because the names are considered per se, separate from their sense and the concepts they were used for. The point of reference is the name of the genus from which the oldest family-group name was derived.

Plecoptera are sometimes thought to be related to Orthoptera (though KEVAN is not convinced they are) and have therefore been included in the scheme. We can therefore test it on familiar grounds. The following is the classification proposed by KEVAN for the placement of Plecoptera, and their subdivision. In the first section, I have usually omitted synonyms, but the classification of Perlariae is copied in detail; abbreviations and symbols have been replaced by full wording, and an accidentally misspelled name has been corrected.

Superphylum: INSECTA Linnaeus, 1758 (after Plinius, 77 A.D., below); ARTICULATA Cuvier, 1805 (part); CONDYLOPA (Condylopes) Latreille, 1831 ARTHROPODA Siebold + Stannius, 1845 or EUARTHROPODA auctt. (polyphyletic).

Phylum: ENTOMA (Aristoteles, ca. 330 B.C., part) Latreille 1796 (part);...

Subphylum: TRACHEATA Haeckel, 1866;...

Infraphylum: ATELOCERATA Heymons, 1901, 1909;...

Superclass: HEXAPODA Latreille, 1825;...

Class: INSECTA (Caius Plinius Secundus, 77 A.A., part) Linnaeus, 1758 (part; ectognathous hexapods only), sensu Handschin, 1956;...

Subclass: DICONDYLIA Hennig, 1953.

Infraclass: PTILOTA (Aristoteles,...winged "Entoma"...)

Supercohort: NEOPTERYGOTA Crampton, 1924, 1926, 1928, 1929;...(KEVAN proposes use of this junior synonym, because TETRAPTERA Aristoteles and several others, which have priority, are "too general and/or ambiguous" to be used)

Cohort: POLYNEPHRIA Brauer, 1885 (part)...
(if procedures proposed by KEVAN are to be followed, the oldest synonym, AMETABOLA Burmeister, 1829, should be used, because it is not a homonym of AMETABOLIA Leach, 1815)

Subcohort: SYNISTATA Fabricius, sensu restricto...

Infracohort: PERLARIAE Latreille, 1802; PERLARIDES Leach, 1815; NEMOURAEDES Billberg, 1820; PERLARIA Newman, 1834.
(the other infracohorts of Synistata are PROTOPERLARIAE Tillyard, 1928, s.l., and EMBIARIAE Handlisch, 1903)

Superorder: PLECOPTEROIDA (Burmeister) Kevan, 1976.

Order: Plecoptera Burmeister, 1830.

Suborder: Eustenioidea (Tillyard) Kevan, 1976; Archiperlaria Illies, 1965 (with additions); Antarctoperlaria Zwick, 1973.

Infraorder: Eustheniidea (Tillyard) Kevan, 1976.

Superfamily: Eustenioidea (Tillyard) Kevan, 1976 ---idae Tillyard, 1921.

Infraorder: Gripopterygidea (Enderlein) Kevan, 1976.

Superfamily: Austroperloidea (Tillyard) Illies, 1965 (part)-- -idae Tillyard, 1921.

Superfamily: Gripopterygoidea (Enderlein) Kevan, 1976-- -idae Enderlein, 1909.

Suborder: Nemourodea (Billberg) Kevan, 1976; Nemourina Albarda, 1889; Filipalpia Klapalek, 1905; Holognatha Enderlein, 1909; Arctoperlaria Zwick, 1973 (part).

Infraorder: Nemouridea (Billberg) Kevan, 1976.

Superfamily: Taeniopterygoidea (Enderlein) Illies, 1965 (part)-- -idea Enderlein, 1909.

Superfamily: Nemouroidea (Billberg) Bradley, 1946-- Nemouraedea Billberg, 1820 (part) (-idae Selys, 1888).

Suborder: Perlodea (Latreille) Bradley, 1946 (as superordinal name); Subulipalpia Klapalek, 1905; Setipalpia Enderlein, 1909 (part); Systellognatha Enderlein, 1909; Arctoperlaria Zwick, 1973 (part).

Infraorder: Pteronarcidea (Yakobson + Bianki) Kevan, 1976.

Superfamily: Pteronarcoidea (Yakobson + Bianki) Kevan, 1976-- -ini Yakobson + Bianki, 1904 (-idae Enderlein, 1909).

Infraorder: Perlidea (Latreille) Karsch, 1883.

Superfamily: Perloidea (Latreille) Handlirsch, 1903 -- -ariae Latreille, 1802 (-idea Leach, 1817; -idea Stephens, 1836).

The second superorder within PERLARIAE is MIONOPTEROIDA (Martynov, part) Kevan, 1976.

As explained before, names are considered per se; references are to the first use of the names, but must not indicate that the author's concept is accepted. Hence, it is no contradiction if, for example, Holognatha Enderlein (which included all Eustheniodea), and Filipalpia Klapalek (which included Pteronarcyidae) are listed as synonyms of the much more restricted Nemourodea Billberg. All included and were, so to speak, based on Nemoura, the type genus of the oldest family-group name. An extension of the principle of coordinate categories to subordinal names would in fact make them synonyms. (Setipalpia Enderlein 1909 might be an error for Setipalpia Klapalek, 1909, because Enderlein refused to use Setipalpia and proposed Systellognatha instead). There is no example in Plecoptera, but a group name derived from some type genus would replace names formed otherwise (e.g., Setipalpia, Holognatha, Arctoperlaria), even if these had priority.

This flexibility in the use of names also means that, unless listed, it is not possible to say which families are included in a given group except the one containing the genus from which the group name was derived. Position of Diamphipnoidae, Scopuridae, Capniidae, Leuctridae, Notonemouridae, Peltoperlidae, Perlodidae and Chloroperlidae cannot be read from the scheme, nor can it be inferred reliably from the references given. It is of course easy to guess where they would probably be placed, because the scheme is obviously strongly influenced by ILLIES (1965). However, such vagueness might be important as a requirement for the availability of names, provided ICZN would be changed as proposed by KEVAN.

The system I have proposed (1969, 1973) included fundamental changes of systematic concepts and of names. If KEVAN's proposals were followed, the nomenclatorial consequences would be much less drastic. As he rightly explained in a letter, his scheme would describe my classification like this (in an abbreviated form):

Order: Plecoptera Burmeister

Suborder: Eustheniodea Tillyard (Antarctoperlaria Zwick)
Infraorder: Eustheniidea Tillyard
Infraorder: Gripopterygidea Enderlein
Suborder: Perlodea Latreille (Nemourodea Billberg; Arctoperlaria Zwick)

Infraorder: Nemourldea Billberg
Infraorder: Pteronarcidea Yakobson + Bianki
Infraorder: Perlidea Latreille

Such stability of nomenclature is really impressive. In the present state of knowledge, it cannot be stable if it reflects our concepts. To obtain stability, the principle of coordinate categories is used to strip names of their sense and then a stable list of names can be drawn. This, to me, appears rather senseless. If such restrictions were accepted, taxonomic texts would really not often have to change. Hopefully, their users will not be satisfied by learning lists of empty names. Rather, they will remain interested to know that (as I put it before) plecopterologists have been living on their refrigerator and washing machine for 150 years and will be interested to know why this happened. Those who have to (but sometimes do not like to) pay insect taxonomists, will be pleased to have it documented that taxonomists have achieved near to nothing since LATREILLE and BILLBERG, and that systematic problems have been solved, if not by LINNAEUS, then not long after him.

Of course I realize that the present ruling (as proposed by KEVAN) is already established for taxa up to superfamilies. This is the realm of almost innumerable taxa, the domain of specialists with a knowledge of problems and concepts, be they apparent in nomenclature or not. The number of taxa to which KEVAN wants the present ruling extended is relatively modest, and this is the area of interest to non-specialists. They need help, even though taxonomy must always be expected to move as long as it is a living science.

I believe that help is under way, but from the opposite direction than the one suggested by KEVAN. "Let us not worry, therefore, about stability as it applies to biological concepts in classification; rather, we should be concerned about ways of achieving better phylogenetic analyses. Only as phylogenetic analyses progress toward an evergreater degree of probability in expressing the actual path of evolution will our classifications become increasingly stable" (The late H. H. ROSS in a discussion; reprint withoutbibliographical data). Progress could be made almost accidentally only as long as no scientific theory of systematics was available. However, almost 200 years after LINNAEUS, it has become available through the works of HENNIG. Certainly, the English translation of his book on insect

phylogeny (which is presently being prepared) will provide strong stimuli. I also agree with GRIFFITHS (1976) that we should free ourselves of Linnean categories. These categories had been proposed for what was thought to be classification of an unchanging product of creation, but we try to apply the same categories in the reconstruction of the evolutionary process, which LINNAEUS did not understand. His categories were meant as a support, but on different, theoretical grounds they have turned into a fence. We should leap over this instead of setting up new and even higher fences. Instead of extending this practice, ICZN should stop prescribing suffixes for categorical levels. The scale of categories is rigid and logical but it has nothing to do with evolution.

In a letter, Prof. KEVAN said that giving up fixed categorical levels would be retrograde and would lead to anarchy (which we are said to be close to anyway). This need not be. Nomenclature was correctly called our book-keeping by H. H. ROSS and modern technology should allow us to fit our book-keeping to our results, and no longer do the reverse.

There seems to be no need for a full bibliography here, so I list only the two papers describing the controversial views most clearly. Prof. KEVAN's paper was first presented, and a limited first edition of copies was distributed, during the XV International Congress of Entomology, Washington (1976). A second edition appeared as 'Notes from the Lyman Entomological Museum and Research Laboratory, No. 2' (1977a) and the complete text (1977b) is the one listed below.

GRIFFITHS, D.C.G. (1976): The Future of Linnean Nomenclature. - Syst. Zool., 25: 168-173.

KEVAN, D.K.McE. (1977): The Higher Classification of the Orthopteroid Insects: a General View. (Papers presented at Section 1 Symposium, XV International Congress of Entomology, Washington, D.C., U.S.A., August, 1976). - Memoirs of the Lyman Entomol. Mus. and Res. Lab., 4:1-31, plus Appendix of 26 pages.

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