Intraspecific taxonomy in the Lepidoptera

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INTRASPECIFIC TAXONOMY IN THE LEPIDOPTERA

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ABSTRACT

The validity of naming and describing intraspecific taxa, and the subsequent grouping of such named entities into distinct taxonomic categories, is briefly considered and evaluated. The intraspecific taxonomic categories of aberration, variety, form, race and sub-species are defined and examples given as to their usage. The naming of unique mutants such as sexual and teratological abnormalities, and the means of abbreviated reference to phenotypic clines are also discussed.

INTRODUCTION

Much contention exists regarding the practice of ascribing scientific names to individuals or groups within a species – so-called infra- or intraspecific names. Both terms, ''infraspecific'' and ''intraspecific'', have been used variously throughout the literature (e.g. Kloet & Hincks, 1972; Underwood, 2008) and, while both are acceptable, it is always desirable to have a single term which is universally applied. It is my opinion that ''intraspecific'' is preferable given that the Latin prefix ''intra'' means ''within'' while ''infra'' means ''below'', the former more accurately reflects the diverse nature of the *forms* of variation which the different named groups represent; not merely a single, lower rung on a classificatory hierarchy.

Such names were commonly applied and utilised in the past by entomologists, particularly those studying the Lepidoptera in the latter part of the nineteenth century, when volumes such as those of Tutt's *The British Noctuae and their Varieties* (1891; 1892a; 1892b; 1892c) appeared. However, subsequently many have seemingly abandoned the practice; for example, the Natural History Museum (London) states that it is ''no longer Museum policy to describe new aberrations of Lepidoptera'' (NHM, n.d.). Indeed, all intraspecific names, other than sub-species, have been specifically excluded from the provisions of the International Code on Zoological Nomenclature (ICZN, 2012), under Article 1.3.4, which might be construed as official repudiation of the entire concept. Yet, reference is still frequently made to such names in the entomological literature (e.g. Howarth, 1973; Goater, 1986; Skinner, 2009).

Given this state of confusion and disagreement, some theoretical reconsideration of the practice is required. In considering both the necessity and practicality of the application of intraspecific names, two distinct questions must be addressed, which are often conflated: (i) the assignation of names to individuals or groups within a species; and, (ii) the aggregation of these names into discrete taxonomic categories.

(i) Naming Intraspecific Taxa

This would seem to require little defence; naming something allows it to be easily referred to without constant, lengthy description. This is a crucial consideration for entomologists dealing with variations which cannot be concisely defined in and of themselves. However, Edwards (1954) criticised the current conventions of intraspecific nomenclature arguing that, rather than ascribing variations latinised scientific names governed by the Law of Priority, they should be ''referred to by

vernacular descriptive terminology". He suggested, by way of example, the "'striped morph', 'willow morph' [. . .] 'slender pale morph'" or, where the "morph" is limited in geographical distribution, he suggested that the locality might be incorporated into the name. He regarded this as the only way to avoid zoological nomenclature becoming "overwhelmed by these insignificant minor-category names". While at least implicitly acknowledging the utility of intraspecific naming, Edwards's advocacy of the use of vernacular names is a poor one, open to precisely the same criticisms which might be levelled at the vernacular naming of species; with no definite type description for reference, nor with a universal language analogous to Latin, how is anyone to know if the "striped morph" referred to by one author is the same as the "forme rayée" discussed by another. Furthermore, it is not clear that all variations which might be of interest to entomologists could be referred to in this manner. How could the aberration of *Callophrys rubi* (L.) where the white submarginal spots on the posterior wings are extended and broadened into parallel streaks (known as ab. *radiata* Frost under current naming conventions) be described in a few words? How would one describe ab. *infra-pallida* Lempke and ab. *pallens* Schultz of *Aphantopus hyperantus* (L.), briefly, in a manner which might easily differentiate them and prompt universal recognition?

Edwards's main concern seems to have been that the stringent application of the Law of Priority to intraspecific names leads to the build up of a morass of useless synonymy, forever to be enshrined in taxonomic checklists. Unless this was to stop he foresaw "confusion [. . .] overwhelming our nomenclatural machinery" and the "rapid disintegration of intraspecific taxonomy from an orderly regime toward chaotic proliferation". There is some substance to this fear – as lepidopterists in particular will acknowledge – but it is not an ongoing problem for, where unnecessarily excessive, these names are primarily the product of a few overzealous historical collectors. Chaos will ensue, however, if entomologists do not approach the naming of intraspecific taxa with the same care and scientific seriousness as they do the naming of species; excessive synonymy is a problem generated by the Law of Priority only where the practice of description is treated frivolously.

(ii) Classification of Named Intraspecific Taxa

A distinct consideration is that of the grouping of named intraspecific entities into different taxonomic categories. It is conceivable that, for example, one might name taxa which represent entirely different *forms of variation* and make no distinction in the way in which one refers to them. For instance, there exists a rare form of *Pararge aegeria* (L.) called *atavica* Verity, where the black areas of the wings are reduced in extent, and a Scottish form named *oblita* Harrison, where the usually yellowish spots on the dorsal surface of the wings are white (Verity, 1919; Harrison, 1949). These could be referred to as trinomials, such as *Pararge aegeria atavica* and *Pararge aegeria oblita,* respectively, or in each case the intraspecific name could be preceded by a universal, abbreviated designation, such as "v." (variation). However, this is not the most desirable practice to adopt for it gives no indication as to the *nature* of the variation being described, which differs significantly from an evolutionary perspective; despite superficial similarities in their attributes, *atavica* is a rare – likely deleterious – genetic mutant, while *oblita* is a locally adapted variation of limited geographical distribution.

Yet, this pattern of trinomial-reference is one which is seemingly becoming more and more widespread. As a direct result of the ICZN's apparent indifference to the whole subject of intraspecific taxonomy, the use of the term "sub-species" has

ballooned into grotesque proportions, a potential problem recognised earlier by Edwards (1954). Many different populations and groups which it is useful to name for reference purposes, representing entirely different forms of variation, are inappropriately assigned sub-specific status due to official recognition of this taxonomic category alone. Dennis (1977), for instance, describes all variants of British butterflies limited in geographical extent as sub-species, despite the fact that the degree of divergence displayed by them varies dramatically – not all can be said to be incipient species, as is implied by ''sub-species''.

Where this is not the case and terms traditionally used by lepidopterists such as ''form'', ''aberration'' and ''race'' are employed, their use is highly inconsistent (Askew, 1970). Skinner (2009), for example, defines the term ''form'' as ''synonymous with aberration [denoting] a variety which predominates in part or throughout the range of the species''. Ford (1953), however, used the term ''form'' to describe a population of a sub-species which may ''be distinguished from the others by constant features'' and that might be considered an evolutionarily ''potential sub-species'', a concept which Askew himself would have understood as a ''race'' and Tutt and Wheeler (1910–14) as a ''variety''. This is a deeply unsatisfactory state of affairs and the establishment of, and adherence to, well-defined intraspecific taxonomic categories would greatly increase the scientific usefulness of the names, as well as introducing some much needed concision and clarity into entomological discourse.

Proposed Intraspecific Categories

I therefore present the following scheme of categorisation (Table 1). While there is considerable merit in the intraspecific taxonomy proposed by Askew (1970), it is overcomplicated in some respects, using unfamiliar terminology and often requiring prior knowledge as to the genetic or environmental basis of a variation before appropriate classification. Such information is simply unavailable in most cases. The following attempts to reconcile practicality and utility in this respect, as well as maintaining as many traditional definitions and conventions as possible, to minimise upheaval.

Aberration (ab.) – Individuals within a population which differ morphologically from the remainder of the population in some discrete respect, being differentiated from ''varieties'' in that, while not being unique occurrences, they appear very rarely. Most aberrations will likely result from homozygosity for a rare recessive allele, such as *Pieris napi* ab. *hibernica* Schmidt where the usual white ground-colour is replaced on both the dorsal and ventral surfaces by bright yellow. Specimens of the aberration have only been taken in the wild on a handful of occasions (Ford, 1953) and breeding experiments have demonstrated its recessive nature (Shepherd, 1942). However, dominant mutations might also manifest themselves as aberrations, as in *Pyronia tithonus* ab. *lugens* Oberthür. This is an extremely dramatic aberration which affects the colouration of an individual to such an extent that it is rendered near-unrecognisable (Harmer, 2000). Aberrations which are due to dominant alleles are likely to occur far more rarely and be due mainly to direct mutation given that, if they are deleterious to an individual's fitness, dominant alleles are more readily removed from a population by selection than recessive alleles, which can be ''masked'' in heterozygotes. In both cases, however, a further advantage to be derived from assigning aberrations scientific names, governed by the Law of Priority, is that, where they have a genotypic basis, the same name may be applied to the gene responsible; thus, we might refer to the *lugens* and *hibernica* genes.

Table 1. Summary of proposed intraspecfic taxonomic categories. Described taxa are classified based on their particular mode of variation – that is, how the morphologically distinct entity concerned arose within an evolutionary context, such as rare genetic or developmental mutants (aberrations), seasonal variations (forms), variations limited in geographical extent (races and sub-species), etc.

Taxonomic Category	Abbreviation	Definition	Examples of Application
Aberration	ab.	Individuals morphologically distinct from the remainder of the population in some discrete respect. Not unique, but occur rarely in nature, cf. variety.	*Pieris napi* ab. *hibernica* *Pyronia tithonus* ab. *lugens* *Boloria euphrosyne* ab. *edna*
Variety	var.	Group of individuals in a population which share discrete morphological characteristic/s differing from the remainder of the population. Occur at frequency too high to be maintained by recurrent mutation. A polymorphic variant.	*Colias croceus* var. *helice* *Noctua comes* var. *curtisii* *Argynnis paphia* var. *valezina*
Form	f.	A generation/brood, in any given year, morphologically distinct from the individuals of a different generation in the same population, in that year. A seasonal variant.	*Pieris napi* f. *napaeae*, f. *napi* *Pararge aegeria* f. *aestivalis*
Race	r.	Individuals possess a small number of distinct characters. Vary in degree and consistency of distinct characters. A potential sub-species. A population composed of individuals morphologically distinct from the individuals of other populations.	*Polyommatus icarus* r. *mariscolore* *Argynnis aglaja* r. *scotica* *Coenonympha tullia* r. *scotica*, r. *davus*, r. *polydama* *Anthocharis cardamines* r. *britannica*
Sub-species	ssp.	Individuals possess several distinct characters. Distinct characters universal and consistent. A potential species.	*Anthocharis cardamines* ssp. *hibernica* *Pararge aegeria* ssp. *oblita*

In addition, aberrations may also be due to the exposure of an individual to unusual or extreme environmental conditions during its development, sometimes operating in concert with a particular genetic predisposition. For example, while melanic individuals of *Heliothis peltigera* (D. & S.) result from decreased temperature applied to the pupae (Ford, 1955), the melanic aberration *Boloria euphrosyne* ab. *edna* Lobb is thought to be due to a particular gene which only becomes activated by high temperatures (Harmer, 2000). The latter situation has been demonstrated by Kettlewell (1944) in various aberrations of *Callimorpha dominula* (L.). In all cases, rarity of frequency is a key characteristic of an aberration.

Variety (var.) – A group of individuals within a population of a species which share discrete morphological characteristic/s differing from the remainder of the population of that species, this group generally being a participant in a polymorphism with several other such groups. Individuals of any particular variety occur at "proportions [which] cannot be maintained by recurrent mutation" (Ford, 1953), differentiating them from aberrations. The number of varieties comprising a polymorphism can vary dramatically; for instance, *Colias croceus* var. *helice* Hübner is a whitish variety, found only among females, which exists in equilibrium with the typical form alone. In contrast, *Noctua comes* Hübner is so variable that there is no "typical" colouration, with Tutt (1892a) listing seven major varieties. Furthermore, the different varieties which form a polymorphism will often vary geographically in their relative frequencies, as is the case with *N. comes* var. *curtisii* Newman which makes up a higher proportion of the overall population in Scotland than elsewhere in Great Britain (Kettlewell, 1973). The olive green variety of the *Argynnis paphia* (L.) called var. *valezina* Esper is, like *C. croceus* var. *helice*, an exclusively female form but it occurs alongside the typical form in varying relative frequencies across the species' range – from 10 to 0.2% (Ford, 1953). Given that some polymorphic varieties are practically limited in geographical distribution, it is their distinct and discrete polychotomous nature within a population which generally differentiates them from races (that is, there is no smooth gradation of one variant into another within a population – individuals may be classified with relative ease as either one or the other). In contrast, within a race, individuals may occur alongside the regionally adapted variations which more or less closely resemble "typical" individuals.

Form (f.) – The individuals of a particular generation/brood within a population of a species, in any given year, which differ morphologically from the individuals of a different generation within the same population in the same year; so-called seasonal variation. These different forms will often be due to environmental changes, and the direct effect of the differing conditions upon development. Named examples of this phenomenon in Great Britain include: *Pieris napi* f. *napaeae* Esper and f. *napi* L., which represent the spring and summer broods of this insect, respectively, differing in the extent and degree of the black wing-markings and the intensity of the yellow colour on the ventral side; and, *Pararge aegeria* f. *aestivalis* Fruhstorfer – the summer form of this species – which possesses dorsal wing-spots which are reduced in size and of a somewhat lighter shade. Among species of Lepidoptera from the tropics, this system would be applied to the variation between the wet- and dry-seasons.

Race (r.) and Sub-species (ssp.) – A population of a species in which the individuals possess certain characteristics rendering them morphologically distinct from the individuals of other populations of that species. My concept of these two taxonomic groups largely agrees with that of Askew (1970). Both the "race" and the

"sub-species" should be viewed as categories describing the same phenomenon – geographical divergence based upon local adaptation – the distinction being one of degree (Fig. 1). Thus, the characteristics used to define or separate races will be fewer or more subtle than those used to describe a sub-species. It might appear superfluous to divide named entities, which vary in the same manner (i.e. geographically), between two different groupings, but in practice this is highly necessary if an overuse of the term "sub-species" is to be avoided. It is an attempt to solve the problem of delineating where the sub-species begins by reserving "the taxon subspecies [. . .] only for populations apparently just falling short of representing good species" (Askew, 1970). This stands in contrast to the adoption of arbitrary DNA sequence percentage-difference rules, where a number is plucked from the air to represent how genetically distinct a population must be before it might be regarded as a sub-species. The term "race" can therefore be applied to less distinct geographical variations and should encompass, as Askew (1970) argues, "isolated, allopatric populations consisting of a high percentage of a distinctive form, together with other individuals which are typical [. . .]. Whilst the presence of the form indicates that the gene pool of the [population] is distinctive, the continued presence of typical individuals would
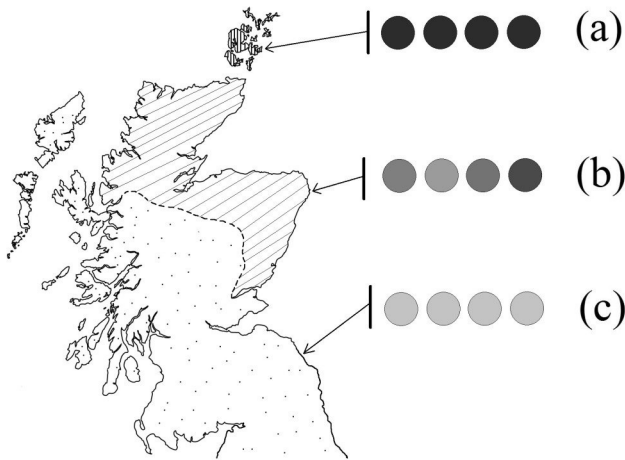

Fig. 1. Geographical variation in an hypothetical British species of Lepidoptera. The coloured circles represent individual insects and their respective morphologies, taken in samples from various parts of this species' northern British range. Individuals of the "typical" colouration (that displayed by the species throughout the greater part of its distribution) are distributed in the grained area. Typical specimens are pale grey in colour, as shown in sample (c). The diagonally shaded area represents the distribution of a geographical variation, examples of which are shown in sample (b). These insects are generally of a slightly different colouration to that of typical individuals, though they vary in both the consistency and degree of distinctness; occasionally individuals may occur in this population which greatly resemble typicals. However, when taken as a whole, this geographically limited population forms a quite distinct grouping which would be categorised as a *race*. The vertically shaded area represents the distribution of another geographically limited variation which, although a member of the same species, is consistently distinct to a significant degree, as in sample (a). Hence, this would be categorised as a *sub-species*. Give sufficient time, the action of natural selection and genetic drift may increase the phenotypic divergence between the typicals and race (b), such that the latter would then be better considered a sub-species.

suggest the probability of rapid hybridisation with a typical population should the two become sympatric. It would therefore seem unwise to give a population sub-specific status so long as typical individuals are present at a frequency which indicates that they are not merely sporadic variants.''

It is obvious that there is a degree of subjectivity in this classification, but this is so with all taxonomy; the question of where one species ends and another begins is no less complex, nor any less significant, than limits of sub-species and races. These categories mark important steps in a continuum from total genetic interchange and uniformity to complete distinction and divergence – and are thus necessary for describing biological reality – though none can be precisely delimited.

Given the inherent complexity of this, it is my opinion that the categories of race and sub-species are the most likely to be misunderstood or misused. Therefore, below I have included several specific examples from the British fauna which I hope will illustrate this continuum of divergence and give a clearer idea of how these categories ought to be used if they are to relate a scientifically informative distinction.

The geographical variant of *Polyommatus icarus* (Rottemburg) referred to as *mariscolore* Kane occurs in Ireland, and is distinct in that it is larger and the female possesses much expanded blue markings on the dorsal wing surface and exaggerated sub-marginal orange lunules (Ford, 1953; Howarth, 1973; Dennis, 1977). It is found widely in Ireland, though the diagnostic characteristics are said to vary from a reduced state to very extreme expression (Lipscomb, 1963; Dennis, 1977). However, the description also appears to apply to many populations in the Hebrides, Northumberland and Durham, though once again variation is observed between individual populations (Heslop-Harrison, 1953; Dennis, 1977, Riley, 2007). The variation *Argynnis aglaja* (L.) named *scotica* Watkins is strikingly similar to *mariscolore* in its disposition. It is widely distributed throughout the Outer and Inner Hebrides and has a larger wingspan, darker green ventral colouration and is overall far more heavily marked (Watkins, 1923). Populations which inhabit different islands vary considerably in the degree to which they express *scotica* characteristics, and it is reputed that on the Isle of Rhum populations of both typical *aglaja* and *scotica* fly, with intermediates (Ford, 1953). Furthermore, as with *mariscolore, scotica* has been recorded from woodlands in Northumberland and Durham (Dennis, 1977). Despite both of these taxa being regarded by many authorities as sub-species (e.g. Howarth, 1973; Dennis, 1977), the evidence presented here would seem to suggest a lesser degree of geographical divergence; in both instances it appears that, taken overall, a morphologically distinct western/north-western metapopulation does exist, though there is a considerable degree of variation between the constituent populations. This is perhaps suggestive of only limited local adaptation, of natural selection tending to drive populations in this geographical area toward a common phenotypic response, but not of an historically (or currently) isolated, genetically distinct population, almost representing a distinct species. Hence, on current evidence, these these two intraspecific taxa would better be regarded as races; *Polyommatus icarus* r. *mariscolore* and *Argynnis aglaja* r. *scotica*.

Equally, the different geographic variants of *Coenonympha tullia* Müller, often referred to as sub-species (e.g. Riley, 2007; Thomas & Lewington, 2010), would be better considered races. While there are reasonable morphological differences (primarily in the prominence of the eye-spots) between r. *scotica* Staudinger which occurs in the Highlands, r. *davus* F. which occurs in southern Yorkshire and the surrounding counties, and r. *polydama* Haworth which is intermediate in distribution and appearance, it is not uncommon for specimens resembling one population to occur in another. For instance, Ford (1953) writes that "[i]t appears that in the

island of Islay *scotica* predominates, but that the intermediate sub-species *tullia* [=*polydama*] is not uncommon and that even specimens closely approaching *philoxenus* [=*davus*] occur" and that in Ireland "[t]he sub-species *philoxenus* [=*davus*] does not occur, but *scotica* and *tullia* [=*polydama*], with their intermediates, fly together in the same localities." These facts serve to demonstrate a less distinct degree of evolutionary divergence; that the gene pool of these populations is less distinct than one might expect of sub-species.

Anthocharis cardamines (L.) represents a particularly interesting situation. It was originally described from specimens taken in Sweden and those occurring in Great Britain are said to belong to a distinct sub-species referred to as *britannica* Verity, characterised by somewhat elongated anterior wings and the black apical spot being expanded and ill-defined (Verity, 1908). However, Dennis (1977) notes that these characters "deviate only slightly" from those of continental individuals and that, indeed, these characters often occur with equivalent frequencies across many British and continental populations; even Verity (1908) acknowledged that continental specimens could often be said to possess these characters. As such, we might conclude that the British population represented only a slightly divergent geographical race, rather than a sub-species. In contrast, Irish specimens of *A. cardamines,* referable to as *hibernica* Williams, are smaller and possess expanded dorsal black markings, the dorsal surface of the female posterior wings is flushed with orange and the ventral surface of the male anterior wings is tinged with yellow (Williams, 1916). The endemism of *some* of these characteristics to the Irish population has been disputed (Dennis, 1977) and they might initially seem very slight and indistinct. However, several facts must be borne in mind: even excluding disputed characteristics, *hibernica* is more distinct than *britannica*; *A. cardamines* typically shows little inter- and intra-population variation, such that we might expect any geographical variants to be less distinct that those of other species – that is, the expectation of distinctness for certain classificatory thresholds (i.e. race, sub-species) is adjusted based on biological knowledge of the species; and, these characters are apparently consistent across Ireland. Taken together, these facts might suggest that *hibernica* is more evolutionarily divergent than *britannica*, and warrants true sub-specific status.

The geographical variant of *Pararge aegeria* L. referred to as *oblita* Heslop-Harrison represents a further example which is best described as a sub-species. It is distinct in that the wing markings are creamy white as opposed to the typical yellow or orange, and the overall appearance is one of increased contrast between the black and white wing markings (Dennis, 1977; Riley, 2007; Thomas & Lewington, 2010). It is distributed continuously throughout the Hebrides and the north-west of Scotland, being for the most part isolated from the typical form which occurs in the rest of the British Isles by large distances (Dennis, 1977; Riley, 2007; Thomas & Lewington, 2010). This suggests that this variant has arisen in isolation and given the stability and consistency of its derived characteristics across *oblita* populations it would appear to represent a strongly morphologically and genetically distinct lineage, worthy of sub-specific rank.

Thus, geographical variations must be visualised as populations or groups of populations moving along an axis of differentiation and divergence where, as they become more distinct, the populations move toward speciation. It ought to be a guiding taxonomic principle that just as a sub-species should to be considered a potential species, given sufficient time and the action of evolution, so to a race should be considered a potential sub-species. As such, the categories of race (weakly divergent population), sub-species (significantly divergent) and species (completely

divergent) are helpful in that when used they convey something of the biological and evolutionary situation of a particular population/meta-population – an indication of its position along the pathway to complete, specific divergence.

Sexual and Teratological Abnormalities, etc. – The assignation of scientific names to sexual abnormalities (such as gynandromorphic or intersex specimens), teratological aberrants, homeotic mutants, and somatic mosaics deserves special consideration because it presents particular difficulties to the taxonomist. Under the category definitions outlined above, such specimens ought to be classed as aberrations. However, for the most part, these particular aberrations are morphologically unique, due to the the stochastic nature of the environmental events which affect post-embryonic / pre-imaginal development, and lead to their production. In such instances, it is neither scientifically informative nor taxonomically useful to name these aberrants, for to do so would be to effectively name an individual specimen. However, it may be that unique aberrants of a particular sort occur with such frequency that it might be desirable to ascribe a name to them, collectively – that is, while all individuals of this aberration are strictly speaking morphologically unique, they all share a common *form* of aberration.

For example, specimens of *Maniola jurtina* (L.) are frequently encountered with patches or "flushes" of pale, almost translucent scales on the wings, which contrast greatly with the typical deep brown ground-colouration. This is thought to be due to a developmental defect preventing the scales from forming correctly, and aberrational names have been coined for this same developmental aberration occurring in different parts of the wings (Thomson, 1969). There can be little benefit in naming based on the arbitrary distinction of where the defect occurs, given that this is entirely due to chance. Therefore, Thomson (1969) proposed that all such aberrations of this sort be grouped under a single aberrational name – a name to describe this particular developmental error, if not a precisely morphologically similar set of specimens. This is the only sense in which I consider it helpful to name "unique" developmental aberrants of this sort, where, although each aberrant specimen is unlikely to be exactly similar to another, they yet display a common *form* of aberration. Similarly, a particular teratological or sexual aberration, such as a gynandromorph, of a particular morphology might occur with such unusual frequency that it may be desirable to give it a name for ease of reference.

Clines – "Cline" is a term used to describe the character-gradient generated when a species varies continuously and gradually across a large area (Ford, 1953). These gradual changes are brought about by equally gradual changes in environmental conditions, with the corresponding proportional variation in the action and pressures of selection. The term, abbreviated to the prefix "cl.", may be used to concisely refer to any such occurrence, e.g. *Coenonympha tullia* cl. *scotica-davus*.

CONCLUSIONS

Scientific intraspecific names, governed by the Law of Priority, are very useful to those who study the variation and evolution of insect species. This is particularly the case in the Lepidoptera, where variation in their wing colouration is easily appreciated and compared. Where ascribed prudently, intraspecific names facilitate easy and unambiguous reference to a particular variation which has been taxonomically described in the literature, previously. Furthermore, the classification of variations into clearly delimited taxonomic categories at the intraspecific level reflects inherent evolutionary differences, and the abbreviated use of these categories

when referring to such variations immediately relates their general nature. While no such classificatory arrangement is perfect and universally applicable, this is not an argument against the use of a system which is generally practicable, and it falls to the individual entomologist to use his discretion in difficult cases and be in full possession of the facts, as far as possible, before venturing to publish any descriptions. In addition, there is no outstanding reason why this arrangement could not be applied to other groups of organisms with only minor adjustments.

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SHORT COMMUNICATIONS

Some Hemiptera new to Kent from Greenwich Park. – Survey work in Greenwich Park, West Kent (VC16) in 2016 yielded some interesting bug species, some of which appear to be the first records for Kent.

On the 5th July, I beat several Turkey Oaks *Quercus cerris* and was rewarded with large numbers of the mirids *Psallus anaemicus* Seidenstücker, *Psallus helenae* Josifov on trees in the deer park (TQ395770) and both were also frequent in the north of the Park (TQ389774) where I also took a single female of *Psallus lucanicus* Wagner. All three have recently been added to the British list and are likely to be widespread. I also took *P. anaemicus* in Surrey and North Hampshire in 2016.

On 30th August I beat several adult *Arocatus longiceps* Spinola (Lygaeidae), from various trees including Holm Oak *Q. ilex,* and found two more under bark of a dead standing oak. Although now widespread in Greater London on Plane trees, these may be the first county records.

An ornamental golden variety of Lawson's Cypress *Chamaecyparis lawsoniana* in the gardens supported large numbers of adults of the cicadellid hopper *Liguropia juniperi* Lethierry, which is spreading rapidly (already breeding in Oxfordshire) and is likely to be widespread in Kent, but these maybe the first published record for the county.

Phryganea grandis L. **(Trichoptera: Phryganeidae) in north Kent.** – A specimen of our largest UK caddisfly *P.grandis* (see *BJENH* **28**: Plate 7) appeared in one of the light-traps operated on a Bat and Moth evening organised at the Gunpowder Works, Faversham (TR002624) on the night of 24th July 2016. Although a widespread species in the UK (Barnard & Ross, 2012), there are few records from Kent. The specimen, which probably represents an emergent from the nearby lakes, is the 8th record for north Kent and the 16th for the entire county (Tony Witts, *pers.comm.*). If so, it was lucky to have missed the patrolling Daubenton's bats *Myotis daubentonii* (Kuhl) which we observed by torch light skimming low over large areas of the main fishing lake. – J*OHN* B*ADMIN*, Coppice Place, Selling, Kent ME13 9RP.

R*EFERENCE*

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