Book Review

Kudrna, O., 2002. The Distribution Atlas of European Butterflies. – Oedippus **20**: 1–342. Naturschutzbund Deutschland e.V. & Gesellschaft für Schmetterlingsschutz e.V. in cooperation with Apollo Books, Stenstrup, Denmark. – ISBN 87-88757-56-0. Price: € 50.00.

This book embodies the first tangible result of a very ambitious undertaking, the ongoing project Mapping European Butterflies (MEB). Conceived and headed with remarkable energy and determination by the well-known lepidopterist Dr. Otakar Kudrna, this project has been made possible by the selfless participation of as many as 254 contributors. It has only taken about six years to get this far – not a small feat considering the multitude of bureaucratic, logistical, methodological and financial obstacles that have plagued MEB from the beginning. These preliminary statistics are impressive and this book will surely attract considerable interest.

Kudrna's views on butterfly taxonomy and conservation present many points of interest. The checklist of species makes fascinating reading for those with a penchant for taxonomy and nomenclature of European butterflies, whether they agree with Kudrna's opinions or not. His views on the often bureaucratic approach to butterfly study and conservation in Europe are doubtlessly going to find a sympathetic audience. On the taxonomic side, I personally applaud the decision to 'lump' many traditionally recognized genera (e.g. *Brintesia*, *Kanetisa*, *Chazara*, *Pseudochazara*, *Neohipparchia*, *Pseudotergumia*, *Parahipparchia*, *Arethusana*, *Satyrus* and *Minois* are all rolled into *Hipparchia*) which I see as a step in the right direction – away, that is, from the splitter-dominated mentality of the past several decades. The species list likewise presents numerous points of interest to the taxonomist, and will stir up a storm of conflicting opinions depending on one's side on the splitter/lumper barricade. I found myself in agreement with e.g. the treatment of *Pieris balcana*, *Coenonympha darwiniana*, *C. elbana*, *Polyommatus sagratrox* and *P. abdon* as belonging to *P. napi*, *C. gardetta*, *C. corinna*, *P. golgus* and *P. icarus* respectively. On the other hand, treating e.g. *Colias werdandi*, *Coenonympha iphioides*, *Erebia arvenensis* [recte *arvernensis*], *E. serotina*, *Hipparchia amymone*, *H. tisiphone*, *Polyommatus exuberans* and *P. violetae* as *bona species* seems poorly if at all justified. The taxon *Callophrys butlerovi* is not a synonym of *C. rubi* (Kudrna 1996) but of *C. suaveola* (Gorbunov 2001). *Polyommatus fulgens* is not a synonym of *P. ripartii* as it belongs to a species group with blue, not brown males. *Polyommatus menelaos*, endemic to Mt. Taygetos (S Greece), is not even mentioned as a synonym under either *P. eros* or *P. eroides*. Two other recently described *Polyommatus* are also omitted without explanation: *P. slovacus*, a bivoltine relative of the univoltine *P. coridon*, and *P. andronicus*, a univoltine montane taxon endemic to the Balkans and closely related to the ubiquitous plurivoltine *P. icarus*. However, Kudrna's book is not intended as a comprehensive taxonomic revision of the European butterfly fauna and certainly should not be regarded as such. So let us concentrate on its main point: the distribution of the European butterflies.

The 451 maps look good though their typographical quality could be better. Records are mapped by means of three symbols according to date. Because of the controversial status of some taxa, or the inability of all recorders to differentiate between similar species, in many cases several such taxa had to be united and plotted on a single map.

The geographical scope is probably one of the main selling points of the book. In a most welcome departure from the annoying tradition of 'European' butterfly guides, it includes the eastern part of the continent up to its natural eastern border with Asia (the Urals), while North Africa is rightly excluded. However, the choice of an arbitrary south-eastern border for Europe – across the foothills and plains north of the Caucasus – is poor judgement. The border between Europe and Asia in the area between the Caspian and Black Seas lies unambiguously along the main ridge of the Great Caucasus, just as the main ridge of Ural Mts. forms the eastern border between these two continents. Excluding the northern Great Caucasus from Kudrna's 'Europe' is unfortunate, as this is a region very rich in butterfly species (at least 196), no fewer than 21 of which occur nowhere else in Europe (Gorbunov 2001). There are a few false or doubtful identities. The records of "*Colias hyale*" from the southern Balkans are, in my opinion, suspect and most probably refer to misidentified specimens of the similar *C. alfacariensis*; true *hyale* has so far

been found in the northern and central Balkans only. The records of "*Spialia sertorius*" from the southern part of the Balkan Peninsula actually refer to *S. orbifer*, while those of "*Plebejus pylaon*" from Greece and Crimea belong to *P. sephirus*. The closely related and probably conspecific taxa *Aricia artaxerxes* and *A. montensis* are shown in two separate maps, according to which both taxa occur in the Iberian Peninsula (moreover, the dots are exactly the same on both maps): a clear error, as only *montensis* occurs there (Tolman & Lewington 1997). The records of "*Polyommatus eros*" from polar Ural belong to *P. kamtshadalis* (Gorbunov 2001). The dot marking the occurrence of "*Hipparchia cingovskii*" in NW Greece is attributable to "*H.* [*mniczechii*] *tisiphone*"; *cingovskii* is endemic to the Republic of Macedonia (Tolman & Lewington 1997). But all these are trivial points. The most serious problem of MEB is the project's very core, the Reference Locality System (RLS) for data mapping. To put it simply, it does not work, and below I am going to show why this is so.

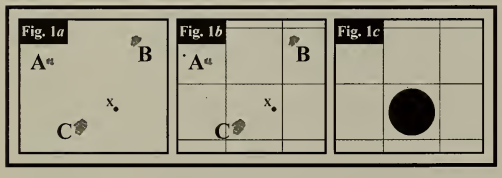
Kudrna argues that existing mapping systems and particularly the popular UTM (Universal Transverse Mercator) grid system are unsuitable for the purposes of MEB. He writes (p. 9): "[The UTM grid] would be a wonderful universal system if the Earth were flat, which it is not. Because the Earth is round compensating triangles are necessary to counterbalance the squares. This means that the ideally shaped square, the only true reason for using this system, is not generally available on the map." This puzzling statement shows that Kudrna has missed the idea of UTM by a very wide margin indeed, which is remarkable considering how simple it is: to identify each point on the Earth's surface by means of a unique 'map address', i.e. full UTM coordinates measured east and north from two perpendicular reference baselines. Which the UTM does quite well, hence its popularity. Besides, an increasingly important practical reason to use UTM in mapping distributions of living organisms is that the use of GPS receivers in the field is rapidly becoming a popular way for determining the precise coordinates of localities, and most GPS receivers offer UTM as a coordinate system option. Kudrna deems working directly with latitude/longitude data equally unsuited for MEB as the use of co-ordinates "would have made the data subject to many errors and their input very awkward, and certainly subject to further errors" (p. 10). This statement is ironic since the author's own system can – and does – produce errors of unsurpassed magnitude. The subsequent claim that "it is much easier to check any record under the name of a reference locality [see the definition below] than under the impersonal geographical co-ordinates" (p. 10) is simply ludicrous. All these introductory remarks on the subject of mapping do nothing to boost one's belief in the author's competence and ability to design a functioning mapping system. For, having decided that no existing system lives up to MEB, this is exactly what he has done. The prototype is an obsolete invention from Communist Czechoslovakia (Kudrna is Czech-born) where until 1989 the general use of detailed topographical maps was forbidden. Under these conditions "a useful system of pre-selected localities referring to map 'squares'" has been designed. Not deterred by the fact that the socio-political environment in which this system had been conceived is long since extinct, the author applies it, under the name Reference Locality System (RLS), to the whole of Europe. This is supported with the argument that apart from the Czech Republic "a similar system is also being used in Norway and *possibly* [my italics] in other European countries" (p. 10). At the same time, the rejection of UTM is backed with the claim that "the UTM grid is not a standard European system" (p. 9). This may be so – but RLS does not come even close. The examples of comprehensive projects using UTM for mapping the distributions of various groups of organisms, including butterflies, are just too numerous to be listed here. But let us judge RLS on its own merits.

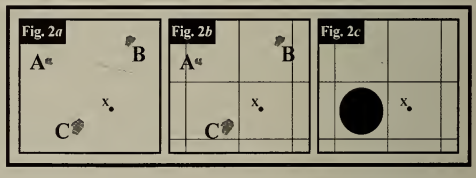
The basic idea of the RLS is to convert coordinates of real localities into coordinates of "reference localities" (RLs), meaning human settlements or, exceptionally, prominent landmarks (such as mountain summits) rather arbitrarily picked out of the Times Atlas. These are then plotted into a 60' × 30' (called by Kudrna "30' × 60'") grid by a computer program specially written for MEB. Theoretically this procedure might work quite well for a densely populated territory (such as the Czech Republic) where one can hope to find a convenient RL for most if not all actual localities. But huge territories in northern Europe are much more sparsely populated. There is a tacit admission of this 'inconvenience' since tens of localities not found in the Times Atlas map have been added in the case of Russia. Even so, the map on p. 32 shows that eastern Europe has many 60' × 30' grid units not covered by a single RL. Finally, the density of RLs varies immensely between countries, and one wonders how Kudrna has decided what is a sufficient number of RLs for a given country: witness the disparity between Bulgaria (111000 km^2, 110 RLs)

and its southern neighbour Greece (132000 km^2, 372 RLs), or between Italy (301000 km^2, 797 RLs) and Finland (338000 km^2, 230 RLs)! This means an extremely uneven RL/km^2 coverage, which in turn means that the distance between a random locality and the nearest RL will vary greatly. While it should be obvious to anyone that such factors should never be allowed to bias the performance of any mapping system, they are unfortunately by no means the worst flaws of MEB's RLS.

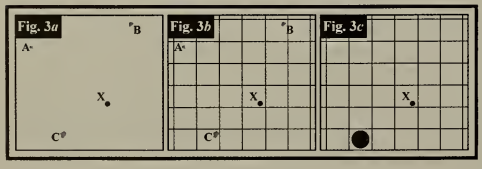
The handbook for recorders (Kudrna 1996) details the procedure for compiling records in RLS-compatible form. Each recorder is provided with 1) a species list, 2) a list of RLs for the respective country, 3) detailed instructions for filling in the forms, down to the type of pen and colour of ink to use, and 4) a photocopy of the relevant country map from the Times Atlas. For each actual locality the recorder is to 1) determine the nearest pre-approved RL from the map, and either 2a) fill in the name of that RL in the appropriate field, or 2b) if there is "good reason" to use a RL which is on the Times Atlas map but not on the list, its coordinates must be written down as given in the Times Atlas. With these clear instructions, can anything possibly go wrong? Oh yes.

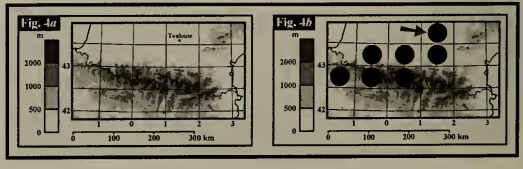
RLS might have actually worked had Kudrna taken the extra step of sending the recorders, together with the copy of the map, the actual grid in which the dots will finally appear. This would have been vital considering the way RLS works, which shall be demonstrated with the aid of the following hypothetical situation (Fig. 1a). A, B and C are legitimate RLs and the black dot marks the site X of a butterfly record. Following Kudrna's instructions there is no difficulty in converting X to the clearly nearest RL, C. The recorder's job is done and the computer's job begins. It should be remembered at this point that the mapping software will plot the co-ordinates of the RL in 60' × 30' grid. Let us also keep in mind that we have no idea what this grid is nor is there anything in the detailed instructions to suggest to us that it is of any significance. The grid has therefore not influenced our choice, but it does influence that of the computer. So the program, using the pre-programmed (hypothetical) grid (Fig. 1b), plots the dot (Fig. 1c). Well, this is just what one expects of a properly working mapping system: the dot and the actual locality are in the same grid unit. But in fact this is a matter of pure chance in the case of RLS, as in exactly the same situation (Fig. 2a) the grid might as well be something like in Fig. 2b …





Now *this* is not what one expects of a properly working system. And this is why Kudrna's RLS is not one. Had the grid been available to recorders together with instructions to choose not the nearest RL but one in the same grid unit as the actual locality, the system would have worked, though clumsily. But no. RLS can therefore only work for localities situated either inside or in the immediate vicinity of the pre-approved RLs. One may object that in the densely populated regions of western and central Europe there is a good chance that a random actual locality and the nearest RL will happen to be situated in the same grid unit. This may indeed be so, but what practical value does this system have if, looking at the maps, one can *never* be sure whether a given dot *is* in the same grid unit as the locality represented by that dot? Moreover, it is easy to see that the probability of error increases dramatically with the increase of distances between RLs, as in northern or eastern Europe. There our example may well look like Fig. 3. In fact, in very sparsely populated regions the probability that a random locality and the nearest RL (meaning the final dot) will happen to be in the same grid unit becomes very slim.





The above example is purely hypothetical but the point it makes is only too real. No great effort is needed to detect such errors on the maps in the book. As an example let us take the distribution of the following 17 species in the Pyrenees: *Boloria napaea*, *B. pales*, *Colias phicomone*, *Erebia arvenensis* [sic], *E. epiphron*, *E. gorge*, *E. gorgone*, *E. hispania*, *E. lefebvrei*, *E. manto*, *E. oeme*, *E. pronoe*, *E. sthennyo*, *Pieris callidice*, *Polyommatus eros*, *Pyrgus andromedae* and *P. cacaliae*. These all have a dot (marked with an arrow) in the grid containing the city of Toulouse, as exemplified by the distribution of *Erebia sthennyo* and *E. pronoe* (Fig. 4b). However these species are found in the subalpine and alpine zone of the Pyrenees, generally above 1500 m (Tolman & Lewington 1997), while the area inside the grid in question does not exceed 500 m altitude (Fig. 4a) – in fact most of it is even below 200 m. The 'presence' of such a species-rich, specialized high-mountain butterfly fauna in the lowlands covered by this grid unit is clearly an artifact of MEB's system.

In conclusion, this book fails to deliver what the back cover so exuberantly promises: that "for the first time Europe will be the first continent ever to have all its butterfly species plotted on precise and comprehensive distribution maps". While one might put up with the fact that many of these maps are far from being comprehensive (which is only natural), or that not all European species are included (which could be corrected in subsequent editions), the fact that the maps are inherently imprecise can neither be overlooked nor downplayed. The points appealing to me personally, such as some of Kudrna's bold and unorthodox views on butterfly taxonomy and conservation, are side issues in a work purporting to be above all a distribution atlas. In this light I consider € 50 an exorbitant price for a volume that, in addition to being of little if any practical use, has soft cover and less-than-excellent print on rough, cheap-looking paper.

Yet all of the above pales next to the staggering realization that the most valuable asset of MEB, the huge and in other circumstances priceless database which has taken countless hours of enthusiastic labour to compile, has been 'polluted' beyond repair due to flawed methodology. As this database contains no actual latitude/longitude data, there is no way to convert the records back into a meaningful form. Unfortunately, Kudrna's system can neither be mended nor improved: it can only be scrapped. The only way forward is then to start from square one. And preferably a UTM one at that.

References

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