

Book review (Dec. 2014)

BEN ROWSON, JAMES TURNER, ROY ANDERSON & BILL SYMONDSON (2014): Slugs of Britain and Ireland: identification, understanding and control. — iv + 136 pp., with numerous colour illustrations and maps, Field Studies Council, Telford, UK. ISBN 978-1-908819-13-0, £14.50.

This book sets a new standard for an identification guide to a local slug fauna. Beautifully produced, it is not only comprehensive but presents numerous new findings about the taxonomy and identification characters. The origin was a project to document the range of external variation in British slugs by photographing under standard studio conditions (ROWSON & al. 2012). Crucially, DNA of these individuals was sequenced. This indicated the existence of several unrecognised species, most of which could, in retrospect, be identified morphologically. Some are believed to be introductions of recognised continental species, but others seem never to have been described. The shocking result was a 20% increase in the number of slug species in the UK, even though this fauna has been exceptionally well researched. The molecular results have been presented in a free-to-download research article (ROWSON & al. 2014) and this book applies this knowledge to guide species identification by conventional means.

The meat of this book is the species accounts, each usually allocated a two-page spread, one of text and one of annotated photographs. The text follows a consistent format with sections entitled Identification, Similar species, Pest status, Range, Habitat and Biology. Also included is a UK distribution map—unfortunately single isolated dots can be hard to spot on these. It is helpful that, within each family, the book runs through the same set of identification characters for each species. The excellent photographs reveal much of the external variation within species, showing multiple individuals and multiple views, including close-ups of critical features. It is only a shame that no details were provided of the tricks used to get slugs to crawl so enthusiastically over a clean white background. Importantly, juveniles are fully considered both in the text and the photographs and there are even additional sections at the end detailing the inter-generic variation in eggs and shells.

Photographs of the genitalia are also grouped together at the end. Personally we tend to find drawings of critical features of the genitalia more informative than photographs. However, we can understand that fresh drawings of so many species would have been too demanding a task, and these photographs are very good (exceptions are that the *Arion silvaticus* and *Semilimax pyrenaicus* are not fully mature and that the penial glands of *Deroceras reticulatum* and *D. agreste* appear rather untypical, which might hinder separation of these species). Additional photographs zoom in on particular critical features where required, for instance on the epiphallus structure in the *Arion* subgenus *Kobeltia*. One individual deficiency in this regard is an adequate illustration of the ligula margin in a new species of large *Arion* defined by this character. Genitalia are figured only when the authors considered them necessary for identification, so there are no illustrations of milacid genitalia, nor of the distal genitalia of *Arion subfuscus*, for instance. And it is a pity that no use is made of characters of the digestive tract, which can be useful, particularly in distinguishing juveniles. Although there are some pages explaining how to dissect, the only text explaining specific anatomical distinctions is the rather brief, though pertinent, annotation on the photographs.

So, the emphasis is firmly on identifying living slugs, and, to further aid their identification, 19 pages are used for a pictorial identification chart highlighting the external characters of most use in distinguishing similar species. This works much better than a dichotomous key. A particularly convenient feature for beginners is that a pictorial index shows photographs of all species together roughly life size. A further section of eight pages provides a general introduction to slug biology, including some sensible advice how to combat pest slugs in the garden.

Although we are generally very positive about this book we hope that three general criticisms will improve a second edition. (1) The text includes numerous up-to-date citations, but some statements are not so supported, particularly those concerning identification features and those in the Introduction. This leaves it ambiguous whether the assertion is copied uncritically from other literature, copied but carefully confirmed by the authors, or original. This is not such a problem if the statement is uncontroversial, and it is reasonable in a popular handbook like this to economise on citations. However, we felt sometimes that the authors slightly misjudged which statements others might want to

check or to find more information about. Also, we suspect that many of the useful distinguishing characters provided do originate from the careful observations of the authors and it is a pity that the lack of attribution may mean that they do not receive fair credit.

(2) Sometimes missing are external characters useful for identifying slugs that have been preserved in alcohol for some time. We suspect that malacologists, ecologists, and agricultural advisers are very often trying to identify material in this state. For instance, there is no mention of the dots along the upper margin of the foot sole in *Arion intermedius* (whereas this character does appear in the predecessor to this book: CAMERON & al. 1983). Similarly there is no comment that once the yellow colour of *Malacolimax tenellus* is rapidly washed out in alcohol, it is easily mistaken for a species of *Deroceras*; this omission is compounded by providing no illustration of this species' genitalia, which are also reminiscent of *Deroceras*.

(3) Our greatest concern is that too often the text says that a species can be identified without dissection; this is the implication of "Dissection is recommended in doubtful cases". For many of these species we would advise the routine use of dissection. As examples, we would always dissect to distinguish *Arion hortensis* from *A. distinctus* or *Arion flagellus* from *A. rufus*. Similarly we find it inappropriate to write that dissection of *Deroceras invadens* is not necessary unless *D. panormitanum* is suspected: that way nobody will find further British colonies of *D. panormitanum*, nobody will detect the expected arrival of *D. sturanyi*, and our experience is that *D. laeve* and *D. invadens* will occasionally be confused with one another. We agree that external characters are useful in suggesting which individuals are worth dissecting, and that locally certain external characters may enable reliable determinations even if they break down elsewhere. But in the cases listed above, and others, even if the external distinguishing characters are valid, it is only experts familiar with a local fauna who might be able to use them with any confidence. For the rest of us, particularly beginners, anatomical characters provide a much more reliable and satisfying means of identification. We worry therefore that this book may instil a false confidence in external characters and that consequent misidentifications risk polluting the uniquely detailed recording schemes in the British Isles (KERNEY 1999). On the other hand, the section explaining how to dissect will encourage beginners to have a go.

We have a number of more minor quibbles, a few of which we detail as a flavour. Do not some *Arion fasciatus* have somewhat yellow mucus, not colourless? The term "vagina" is used but not defined, and it is also potentially confusing that the spermooviduct is not distinguished from the oviduct. Although the single former occurrence of *Milax nigricans* in Britain is mentioned in the section on *Milax gagates*, the anatomical characters necessary to distinguish them are not explained; the species occurs just over the Channel in France so is liable to colonise again (HUTCHINSON & REISE 2013). *Deroceras reticulatum* is stated in the same paragraph both to be annual and to produce two or more generations in the same year; the true situation requires some further explanation (SOUTH 1992). Comments about the breeding biology of *Deroceras invadens* imply a misreading of QUICK (1960); it was QUICK who recognised that a GREGG's (1944) captive California population was likely mixed with *D. laeve* and that thus we should disregard this evidence of aphyllity and of a female phase preceding a male one.

Should you buy this book if you live elsewhere than in the British Isles? Certainly most of the British fauna occurs in Germany, and other continents have also been colonised by a number of the species dealt with here. The proviso is that those working on the Continent are advised to be especially circumspect about relying on the external characters recommended as reliable, both because the range of intraspecific variation may exceed that in the British Isles and because there are extra species liable to cause confusion. The research underlying this publication (ROWSON & al. 2014) also has some valuable lessons that may apply more widely: that we should be on the look out for unrecorded species, especially introduced ones, that COI sequencing is a valuable tool in detecting such species, and that hybridisation between good species does occur. The price of the book makes it a bargain, so yes, do buy it!

Literature

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