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# The separation of *Agonum emarginatum* (Gyllenhal) from *A. viduum* (Panzer) (Carabidae)

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A study was carried out in May 2018 on the ground beetles of the Avon Valley, Dorset/Hampshire. Many *Agonum* spp. are typical of damp, marshy areas so to find four species of *Agonum* was not surprising. A pair of *Agonum* spp. that are sometimes confused are *A. emarginatum* (Gyllenhal) and *A. viduum* (Panzer). *A. emarginatum* is black whilst *A. viduum* is black with a greenish, metallic sheen (Fig. 1). The sheen is more evident in fluid but does vary in intensity. On occasions the green sheen is difficult to detect whilst some *A. emarginatum* can appear to almost have a metallic gloss. To be sure of identification when the sheen is not easy to see, it is necessary to resort to genitalia dissection. The illustrations of the aedeagi shown by Lindroth (1974) are not particularly informative; those produced by Luff (2007) are better. The difference in aedeagus structure between the two species is subtle and not always straightforward, especially when comparative material is not available.

Whilst dissecting the aedeagi for study it was noticed that there is a much more obvious difference between the species in the structures of the ring sclerites. The ring sclerite encircles the aedeagus holding it in a rigid position. The ventral edge of each ring sclerite carries a marginal plate. The marginal plate in *A. emarginatum* is relatively narrow, considerably narrower than the thick marginal plate in *A. viduum* (Fig. 2). Several examples of males of the two species were dissected to check for the levels of within-species variation and whether the differences in the structure of the ring sclerites were consistent between the species. There was substantial variation among individuals within both species. Dimensions of the sclerites were measured using DsCap software. The average maximum width of the marginal plate in *A. viduum* was 555µm (min 504µm, max 652µm) whilst the average marginal plate width in *A. emarginatum* was 249µm (min 188µm, max 332µm). The average ratio of the marginal plate width to the internal diameter of the ring sclerite in *A. viduum* was 0.74 (min 0.66, max 0.86) whilst the average ratio of the marginal plate width to internal ring diameter in *A. emarginatum* was 0.34 (min 0.25, max 0.5).

The value of using ring sclerite structure to separate *Agonum* species has previously been noted by Schmidt (1994) where *A. emarginatum* was treated under the preoccupied name *afrum* (Duftschmid) but this feature has not been adopted in keys to British Carabidae. The current study suggests that ring sclerite structure might have considerable value in helping to separate *A. viduum* from

*A. emarginatum*: if the marginal plate is narrow and the ratio of plate width over internal ring diameter is  $1/2$  or less it is *A. emarginatum*, if the marginal plate is thick and broad and the corresponding ratio is  $2/3$  or more it is *A. viduum*. More individuals need to be examined to establish the true range of values but the differences between the species in the current study were obvious, much more evident than the differences in aedeagus structure.



**Fig. 1** *Agonum emarginatum* (left) and *A. viduum* (right). Note the metallic sheen on *A. viduum*, especially the elytra.



**Fig. 2** Three ring sclerites from male *Agonum viduum* (upper series) and six ring sclerites from male *Agonum emarginatum* (lower series).

### Acknowledgements

We are grateful to Clive Bealey for assistance with collecting samples in the field, an anonymous referee who brought Schmidt (1994) to our attention and to Darren Mann (Oxford University Museum of Natural History) for his advice on nomenclature.

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