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A child's eye view of the insect world: perceptions of insect diversity

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SUMMARY

Insects worldwide are undergoing unprecedented rates of decline, with many species severely threatened or already extinct. Despite their extreme diversity and functional importance in ecosystems, this extinction crisis has seldom gained media attention; endangered large mammals and birds receive much greater coverage. In the UK, where the insect fauna is relatively depauperate and well known, this bias has recently been redressed by a range of initiatives that highlighted the importance of insect conservation. This study investigated the popularity of different arthropod groups drawn by children (as part of one such event), in modern culture and in the scientific literature. Children's preference for insect groups strongly correlated with their representation in modern culture and in the scientific literature. However none of the measures of popularity of each group correlated with their abundance or conservation status in the UK. The profile of lesser-known groups therefore needs to be raised to reduce the chance that threatened taxa are overlooked for conservation action.

Keywords: conservation, National Insect Week, public awareness

INTRODUCTION

Arthropods, and insects in particular, are the most species-rich group of organisms on the planet. They dominate every major terrestrial biome and are responsible for many essential ecosystem processes (Samways 2005). The biological value that insects provide, by means of ecological services, has been estimated at US$57 billion per year in the USA alone (Losey & Vaughan 2006). Conserving insects during the current extinction crisis (Thomas *et al.* 2004; Dunn 2005; McCarthy 2006) is therefore of paramount importance. Several popular events have recently taken place in the UK, including 'National Insect Week' and 'Save Our Butterflies Week', to raise public awareness of insect conservation (Butterfly Conservation 2006; Royal Entomological Society 2006). This public understanding of the diversity of arthropods is a vital first step in their conservation. Although awareness itself may not result in conservation protection, without previous knowledge of a group's existence, the public is unlikely to assign it conservation value (Balmford *et al.* 2002). This may reduce the chance that funding bodies will allocate resources to its protection. Raising the profile of insects is also important in encouraging young people to pursue a career in entomology and ultimately to implement insect conservation procedures in the future (D. Lewis, P. Hodge, D. May & K. Pitts, personal communication 2006).

We investigated the attention that children, the media and the scientific community gave to different groups of insects and other invertebrates. We investigated whether this reflected the abundance or conservation status of insects in the UK and, therefore, whether the public would assign conservation protection to endangered insect groups. Worldwide, insects are still a little known group, with most species yet to be recorded (Grimaldi & Engel 2005). In the UK, however, most species have already been described (Wilson 1985) and their distribution is fairly well known, providing an opportunity to study the public awareness and conservation status of insects.

METHODS

Through a children's drawing competition held as part of National Insect Week in the University Museum of Zoology Cambridge, we assessed the types of arthropods most popular with children in the UK. Sheets with an instruction to 'draw your favourite insect' were handed out to individuals visiting the museum. The use of the term 'favourite insect' encouraged children to draw the insect taxa that they were most aware of in everyday circumstances and therefore would notice most if they became extinct. Returned entries were categorized to insect order (13 groups, with Lepidoptera split into butterflies, moths and caterpillars and Hymenoptera split into bees, wasps and ants) or other invertebrate groups (six groups: spiders, scorpions, centipedes, millipedes and snails) (Fig. 1). Popularity was assessed for the different groups in modern culture by searching for 'common group name' on the internet (using Google URL http://www.google.co.uk; range 9560–1.25 × 10^8 hits) and in the scientific literature from the last ten years (using ISI Web of Knowledge URL http://wok.mimas.ac.uk; range 3–8919 articles found) for all insect orders (again with Lepidoptera split into butterflies, moths and caterpillars and Hymenoptera split into bees, wasps and ants) and eight categories of other invertebrates (springtails, diplurans, spiders, scorpions, centipedes, millipedes and snails) without

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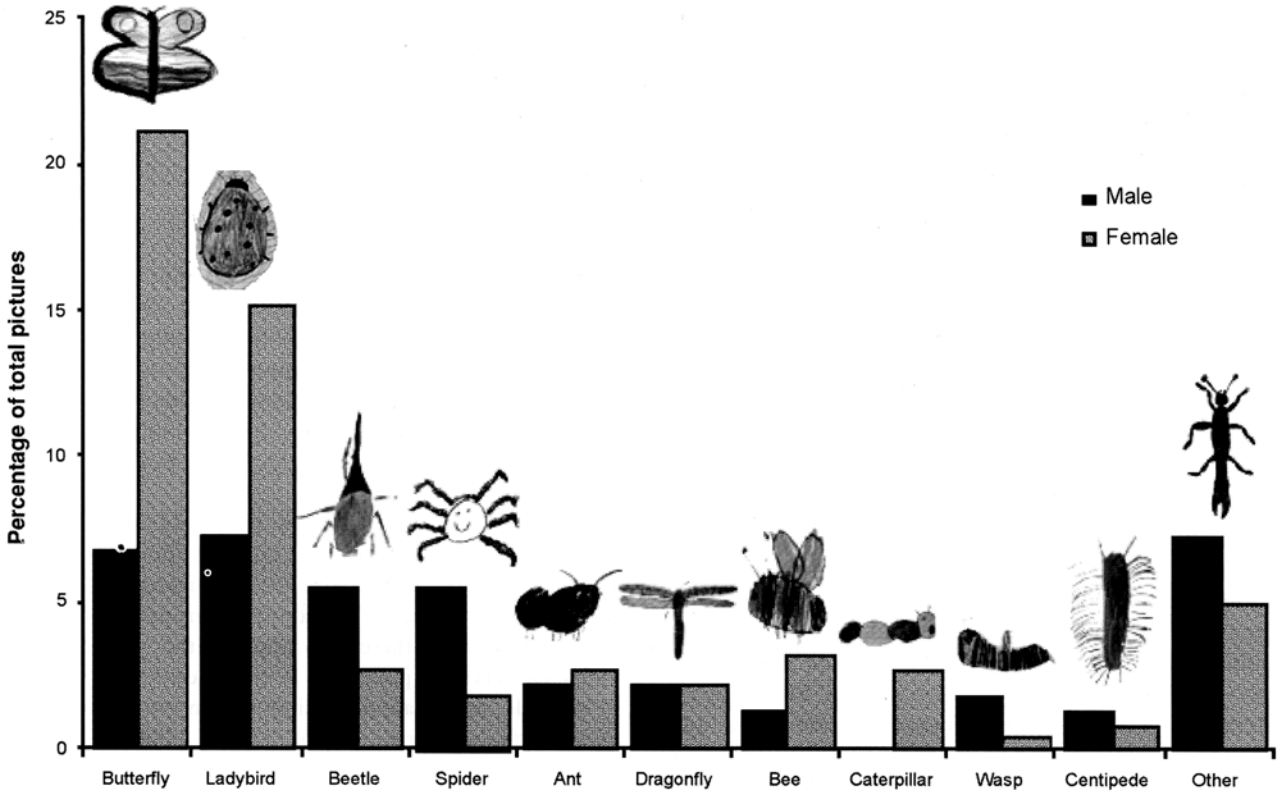

Figure 1 The percentage of total pictures of each taxa drawn by male and female children ($n = 218$). 'Other' includes moths, bugs, flies, grasshoppers, earwigs, mayflies, stick insects, millipedes, scorpions and snails.

restriction of region. Flies and bugs had to be excluded from these searches as 'fly' found records relating to flying and 'bug' found generic insect references. The abundances of individuals within arthropod groups in UK gardens were calculated from malaise trap records from the most comprehensive study available (Owen 1991) and included data from 11 groups (dragonflies, butterflies, moths, beetles, bees, wasps, flies, bugs, mayflies, centipedes and millipedes). Conservation status for each group was quantified by dividing the total number of species in the UK by the number of species listed as 'Biodiversity Action Plan priority species' plus one, to adjust for groups that contained no conservation priority species (English Nature 2006). We analysed the frequency of different groups drawn by boys and girls using a χ^2 test of difference on the top ten most abundant groups drawn (with the rest pooled into an 'other' category, as represented in Fig. 1). Correlations were carried out between the various indices of popularity and between these and the abundance and conservation status of each group. Where necessary, data were transformed to meet assumptions of normality.

RESULTS

A total of 218 pictures, representing 20 different groups were returned by children aged between two and 13. Butterflies and ladybirds were the most popular (27.9% and 22.5% of the total number of pictures, respectively). Boys and girls differed markedly in their choice of favourite insect ($\chi^2 = 33.23$, $df = 10$, $p < 0.001$), with boys having a relatively greater preference for beetles and spiders, and girls having a greater preference for butterflies and ladybirds (Fig. 1).

We found that there was a positive correlation between the number of pictures and the number of 'Google hits' (Spearman's correlation, $n = 17$, $r = 0.73$, $p = 0.001$) and scientific publications (Spearman's correlation, $N = 17$, $r = 0.51$, $p = 0.037$). There was also a significant correlation between the number of 'google hits' and scientific publications (Pearson's correlation, $n = 33$, $r = 0.929$, $p < 0.001$). However, there was no significant correlation between the number of pictures of different groups and their abundance (Pearson's correlation, $n = 11$, $r = 0.25$, $p = 0.457$) or conservation status (Pearson's correlation, $n = 16$, $r = -0.125$, $p = 0.646$). Nor was there correlation between number of 'Google hits' and abundance (Pearson's correlation, $n = 9$, $r = 0.611$, $p = 0.081$) or conservation status (Pearson's correlation, $n = 30$, $r = 0.160$, $p = 0.399$), or between number of scientific publications and abundance (Spearman's correlation, $n = 9$, $r = 0.644$, $p = 0.061$) or conservation status (Pearson's correlation, $n = 30$, $r = 0.253$, $p = 0.177$).

DISCUSSION

The awareness of children across a range of ages of a wide diversity of arthropods is supported by previous findings

(Shepardson 2002), and there is a clear difference in preference between the genders. Some groups are far more popular than others and are over-represented in the children's drawing competition, on the Internet and in the scientific literature compared to their abundance in nature and their conservation status. Such a finding indicates that taxa most in need of protection are not necessarily those which are most exposed to media attention. Emphasizing the existence of lesser-known taxa would lead to a more balanced view of each group's conservation needs and open the door to a greater interest in their natural history. A biased perception of the insect world may reduce the funding available for the conservation of lesser-known groups in future and potentially lead to higher rates of extinction. This, in turn, may have environmental consequences, as some of these groups may prove vital to the functioning of ecosystems.

CONCLUSIONS

Our data are from a local study and are based on very crude divisions between the different insect taxa. However our results are clear and demonstrate a widespread bias in the popularity of groups. To redress this bias more research needs to be implemented to increase the scientific knowledge of lesser-known taxa. Lesser-known groups should be publicized more widely in the media and included, together with a greater emphasis on biological diversity, in the UK National Curriculum. Only by addressing all of these influences can we alter children's perceptions of the insect world and benefit insect conservation in the future.

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