DECORANA and CANOCO to the major environmental variables at work in demarcating 12 zones. Axis 1 relies on summer and winter temperatures, rainfall, position, slope, the extent of arable, managed grass and urban land. This is hardly surprising but Axis 2 picks up deciduous woodland and gley soil, as well as distance from the sea. The zones appear to work well for beetle distribution, and will form a basis of discussion when the British Atlas is revised (only another 150,000 records to go!). The separation of the coastal fringe zones is fine, but the extreme Atlantic species (*Paracymus scutellaris, Ochthebius punctatus, O. viridis*) demand a rethink.

Integrating several data-bases is particularly useful in that "biodiversity hotspots" are highlighted. Those for invertebrates fit in well with water beetle hotspots, though with less dots in the Vale of York than might be expected.

The address given is Margaret's new one, not the one in the text.

PALMER, M.A. 1999. The application of biogeographical zonation and biodiversity assessment to the conservation of freshwater habitats in Great Britain. *Aquatic Conservation: Marine and Freshwater Ecosystems* **9** 179-208.

OLD LADYBIRD IS A HYDROPHILID AND A FALSE DARKLING WAS A FALSE *PARNUS*

Two Sri Lankan taxa, once thought to be coccinellids, turn out to be one species, reassigned to *Psalitrus* d'Orchymont. New material collected by Viggo Mahler in 1979 includes a male on which the redescription is based.

Fabricius described *Parnus obscurus* from "Germania". Examination of the type proves Csiki's earlier proposal that it is a *Zilora*, a melandryid or False Darkling Beetle.

HANSEN, M. 1998. *"Oeneis" nigritula* and *flavescens* Motschulsky, 1866: the first described omicrine hydrophilids (Coleoptera, Hydrophilidae, Coccinellidae). *Entomologischer Blätter* **94** 119-125.

JÄCH, M.A. & KODADA, J. 1999. *Parnus obscurus* Fabricius is a melandryid! (Coleoptera, Dryopidae, Elmidae, Melandryidae). *Entomologische Blätter* **95** 81-83.

THE CHROMOSOMES OF THE BRITISH SPECIES OF *SPHAERIDIUM*

by Robert Angus, Fatma Shaarawi & Christine Wilson

Fatma Shaarawi's Ph D work, supervised by Robert Angus, on hydrophilid chromosomes (Shaarawi 1989) included information on three of the species, and work now being done by Christine Wilson on dung-inhabiting beetles has not only revealed the karyotype of the fourth species (*S. marginatum* Fab., see van Berge Henegouwen 1989), but has also resulted in the discovery of the egg-cocoons of two of the species (see Wilson's paper in this issue). Since egg cocoons are most easily identified by examination of the chromosomes of the developing embryos it is necessary to have a published account of the karyotypes.

Material and Methods

The *S. marginatum* and all the embryo material are Wilson's work, the rest is from Shaarawi (1989). Table 1 gives the sources of the material. Embryo preparations were made following the methods described by Angus (1982) and mid-gut and testis preparations by those described by Shaarawi & Angus (1991). Most of the terms used in chromosome descriptions are given by Angus (1989).

TABLE 1 Sources of chromosome material for *Sphaeridium* species

Species	locality of origin	tissues used
S. scarabaeoides (L.)	Egham, Surrey	mid-gut, testis
	Staines Moor, Middlesex	embryo
S. lunatum Fab.	Tilford, Surrey	mid-gut, testis
S. bipustulatum Fab.	Tilford, Surrey	mid-gut, testis
	Staines Moor, Middlesex	embryo
	Chalfont, Buckinghamshire	embryo
S. marginatum Fab.	Chalfont, Buckinghamshire	mid-gut, testis

Results

Mitotic chromosomes, arranged as karyotypes, of the four species are shown in figures 1 – 8. In all cases 2N = 22 autosomes plus sex chromosomes which are XY (♂), XX (♀). The Y-chromosome is dot-like and forms the "parachute" association with the X during first division of meiosis (Xy_p). The autosomes are arranged in order of decreasing size. The two larger species (*S. scarabaeoides* and *lunatum*) are characterised by two more or less acrocentric chromosomes, placed as pairs 4 and 5, with Relative Chromosome Lengths (RCL, the measured length of a chromosome expressed as a percentage of half the total of the measured autosome lengths in the nucleus – a way of compensating for different degrees of chromosomal condensation in different nuclei) of about 11 and

10. The smaller species (*S. bipustulatum* and *S. marginatum*) have only one such chromosome, placed as pair 4.

Separation of the larger species is less clear, but in *S. scarabaeoides* (figs 1 & 2) two of the first three pairs of autosomes are more or less metacentric, with only one pair (placed as pair 3) with the centromere distinctly away from the middle of the chromosome – about halfway between the metacentric condition and the almost acrocentric one shown by pair 4. This is true of both the rather condensed mid-gut preparation and the more stretched embryo chromosomes shown in fig. 2. Note that this embryo appears to have two Y-chromosomes – present in all the cells, as in the Swedish *Helophorus griseus* figured by Angus (1989). In *S. lunatum* (figs 3 & 4) two of the first three pairs of chromosomes (placed as pairs 1 & 3) are clearly not metacentric.

Separation of *S. bipustulatum* and *S. marginatum* is rather easier. In *S. bipustulatum* (figures 5 and 6) there is a sharp difference between the lengths of the three smallest pairs of autosomes (pairs 9 – 11, RCL 5 – 6) and the next pair (8, RCL of about 9). In *S. marginatum* (figures 7 and 8) the sharp difference is between the four smallest pairs (pairs 8 – 11, RCL 5 – 6.5) and pair 7, RCL about 9.

Figures 1 – 8: Mitotic chromosomes of *Sphaeridium* spp. 1. *S. scarabaeoides*, mid-gut, Egham; 2. *S. scarabaeoides*, embryo, Staines Moor; 3 & 4. *S. lunatum*, mid-gut, Tilford; 5. *S. bipustulatum*, mid-gut, Tilford; 6. *S. bipustulatum*, embryo, Chalfont; 7 & 8. *S. marginatum*, mid-gut, Chalfont.

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EGGS AND EGG COCOONS OF *SPHAERIDIUM* by Christine Wilson

Despite the recent upsurge in interest in the immature stages of the Sphaeridiinae (Archangelsky 1997, 1999), knowledge of the egg cocoons of *Sphaeridium* appears to be based on the description given by Schiødte (1862), supplemented by Richmond's (1920) statement that he had seen a single egg mass of *Sphaeridium* in which the eggs were clearly visible, covered only by loosely woven silk. Schiødte described the cocoons of both *Sphaeridium* and *Cercyon* as being "unarmed" (i.e. without a mast) and occurring in damp ground or dung. Schiødte's description, supplemented by Richmond's note on *Sphaeridium*, appears to be the basis upon which both Richmond and Bøving & Henriksen (1938) key these cocoons as leaving the eggs visible, though Bøving and Henriksen, after citing Schiødte as characterising these cocoons, state that *Sphaeridium* cocoons occur "in the same kind of half dry cow-dung" as the larva and are "somewhat larger than those of *Cercyon* and likewise as in that genus only with a slight covering of loose web, through which the eggs are visible". This seems to imply that they had personal experience of these cocoons. Archangelsky (1997) refers to the egg cocoon as being similar to that of *Cercyon* but adds that the number of eggs is unknown. In answer to an e-mail enquiry he confirmed that he did not know the cocoon, and had taken his information from the literature.

In the course of a Ph D research project on the chromosomes of dung-inhabiting beetles (mainly Scarabaeidae) currently being undertaken at Royal Holloway, University of London, I found numbers of fairly large hydrophilid egg cocoons similar to those of *Cercyon impressus* (Sturm) described by Shaarawi (1989), but larger. *Sphaeridium* was an obvious candidate for these cocoons, and chromosome preparations from developing embryos confirmed that they belonged to *S. scarabaeoides* (L.) and *S. bipustulatum* Fab.

Figures 1 & 2: Egg cocoons of *Sphaeridium* spp. 1. *S. scarabaeoides*, Staines Moor, Middlesex. 2. *S. bipustulatum*, Chalfont, Buckinghamshire. In both cocoons the silk cover-sheet is folded upwards at the left (for extraction of the eggs).

The egg cocoons of the two species are shown in figs 1 & 2. In both cases the egg bag is deeply conical, with an oval sheet of silk covering the top. The sheet is closely-woven and the eggs are not visible in an unopened cocoon. Unlike the cocoon of *Coelostoma*, the sheet does not overlap the top of the egg bag. The egg bag is inserted in the dung (cow, sheep and horse), generally at the bottom of the mass, but sometimes under the crust at the top (cow) or generally in the dung (horse, with its looser and more fibrous texture). The egg bag has dung adhering to it, but the silk covering-sheet does not. Robert Angus tells me that in *Helophorus* the egg bag normally has substratum adhering to it, but the mast, even when buried, never does. In very new cocoons the covering-sheet is pink, but it