

SOME FRESHWATER OSTRACODS (CRUSTACEA: OSTRACODA) FROM SOUTH WALES

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Introduction

Ostracods are small, poorly-segmented entomostracan Crustacea in which the body parts are enclosed within a calcareous bivalved carapace. As ostracods occur in almost all aquatic habitats, the extreme antiquity of the group and the ready preservation of their valves in a wide variety of depositional environments make them an important tool in both palaeoecological and biostratigraphic analysis (Brasier 1980). Because ostracods are so small, sediment samples and lake core horizons may contain valves in great numbers and represent a variety of species as well as a range of their ontogenic stages. Thus a comparatively small sample provides high resolution information at both the community and population levels that is unavailable to other palaeozoologists constrained by the sizes of sample available.

As background to a study of the application of ostracods in environmental archaeology, a number of sites in South Wales were visited and sampled. The results presented here are anecdotal rather than quantitative, but represent the first systematic attempt to document Welsh ostracod faunas and report at least seven species new to the Principality.

Sampling

As wide a variety of habitat types as was practicably possible was visited between 1 October 1989 and 31 October 1990 and qualitatively sampled. Animals were hand-picked from sieve residues, prepared for identification by the method of Athersuch et al. (1989) and determined using Henderson (1990). The systematic nomenclature used here largely conforms to that of Henderson, although it should be noted that many workers would consider this scheme to be somewhat conservative (for an alternative approach, see Meisch et al. 1990). The geographic distribution of the sites visited is shown in Fig. 1.

Sampling sites included seven broad environmental categories:

- (1) *Lakes*: Cosmeston lakes near Cardiff (see map) and Kenfig (site 6).

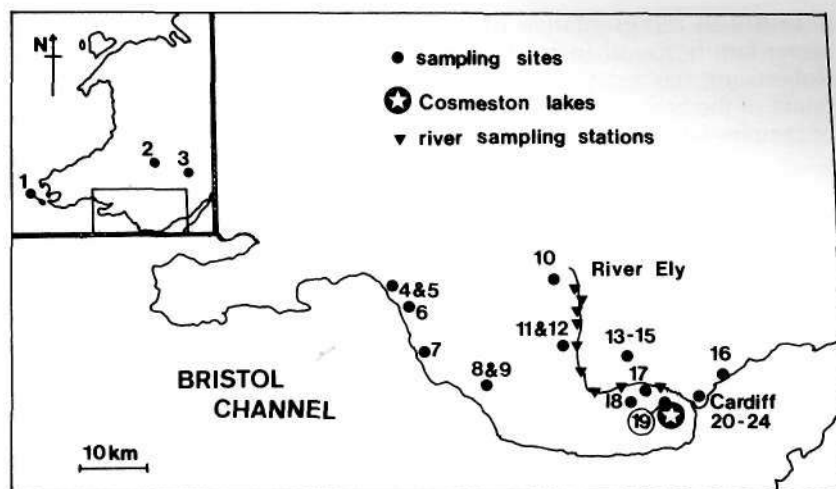


FIG. 1. Location of sites in South Wales mentioned in the text.

(2) *Permanent ponds of various sizes and depths*: Llysdinam (site 2), Blaenavon (site 3), Porthcawl duck pond (site 7), St. Bride's Major (site 9), Glyn Cornell (site 10), Llanharan (site 12), St.-y-Nyll (site 17), Pysgodlyn mawr (site 18) and Colchester avenue, Cardiff (site 23). Of these, site 3 is a tarn at 470 metres above sea-level, whilst sites 2 and 17 are situated in deciduous woodland. Site 18 is in coniferous forestry.

(3) *Non-permanent ponds*: Skomer Island (site 1), Brynna (site 11), Forest farm, Cardiff (site 21), Fairwater dell, Cardiff (site 22) and Heol hir, Cardiff (site 24).

(4) *Semi-static canals and reens (drainage ditches)*: Baglan (site 4), Peterstone-Wentloog (site 16) and Whitchurch, Cardiff (site 20).

(5) *Non-permanent, small lotic water-bodies*: Broughton (site 8), Nantgarw (site 13) and the feeder stream to Dragonfly pond (site 19).

(6) *Permanent, fast-flowing waters*: Baglan (site 5) and nine stations on the River Ely.

(7) *Wells*: Nantgarw (sites 14 & 15).

A more detailed list of sites (including National Grid References) is available from the authors on request.

General characteristics of the fauna

In all, twenty-three species were recorded from a total of twenty-six sites (Fig. 2). With the exception of *Limnocythere inopinata* (Baird) (a cytheroid), all belong to the predominately freshwater Cypridoidea. The

sole British representative of the Darwinuloidea (the third ostracod super-family found in fresh waters) *Darwinula stevensoni* (Brady & Robertson), has yet to be recorded from South Wales. In general the fauna of the area is restricted and repetitive, reflecting a preponderance of samples taken from small, lentic water-bodies.

● Live animals recorded
○ Valves only

	Skomer Island	Llysennon	Blisnavon	Baglan canal	Baglan stream	Kenfig	Portkewi	Broughton	St. Brides Major	Glyn Cornell	Bryna	Llanharan	Nantgarw stream	Nantgarw well 1	Nantgarw well 2	Peterstone rean	St. y Nyl	Pygodryn mawr	Dragonfly pond	Whitchurch canal	Forest farm	Fairwater dell	Colchester ave.	Heol hir	Coemeston lakes	River Ely
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
<i>Limnocythere inopinata</i> (Baird)																										
<i>Ilyocypris bradyi</i> Sars																			●	○						●
<i>Ilyocypris gibba</i> (Ramdohr)				●																						●
<i>Candona angulata</i> G.W.Müller																										●
<i>Candona candida</i> O.F.Müller				●						●	●			●	●						●					●
<i>Candona lectea</i> Baird																			●							●
<i>Candona pratensis</i> Hartwig													●													●
<i>Candona</i> (Pseudocandona) sp.																			●							●
<i>Cyclocypris ovum</i> (Jurine)		●				●				●	●	●							●							●
<i>Cypria ophthalmica</i> (Jurine)			●	●			●		●	●	●								●							●
<i>Heterocypris incongruens</i> (Ramdohr)				●																						●
<i>Notodromus monacha</i> (O.F.Müller)				○								●	●													●
<i>Eucypris liljeborgi</i> (O.F.Müller)																										●
<i>Eucypris virens</i> (Jurine)								●																		●
<i>Herpetocypris chevreuxi</i> (Sars)				●				●																		●
<i>Herpetocypris reptans</i> (Baird)						○						●									○	●				●
<i>Psychodromus olivaceus</i> (Brady & Norman)					●																					●
<i>Cypridopsis obesa</i> Brady & Robertson																										●
<i>Cypridopsis vidua</i> O.F.Müller						●														●						●
<i>Potamocypris pallida</i> Alm																				●						●
<i>Potamocypris similis</i> G.W.Müller																										●
<i>Potamocypris variegata</i> (Brady & Norman)														●												●
<i>Potamocypris villosa</i> (Jurine)	●											●														●

FIG. 2. Ostracod species recorded from South Wales.

Of those habitats visited, the lowest numbers of species were recorded from tarns, woodland ponds and fast-flowing permanent streams and rivers; the former typified by *Cypria ophthalmica* (Jurine) or *Cyclocypris ovum* (Jurine), the latter by *Psychodromus olivaceus* (Brady & Norman). In the case of the River Ely, timed and replicated Surber samples allowed the estimation of population densities at a maximum level of 40 individuals per m². However, ostracod distribution was patchy and live animals were recovered exclusively from the five upstream sampling stations (Fig. 1). Although only riffles were sampled, no other species were found amongst the valves collected from river sediments. Thus it is unlikely that additional species remain uncollected in the intervening pools.

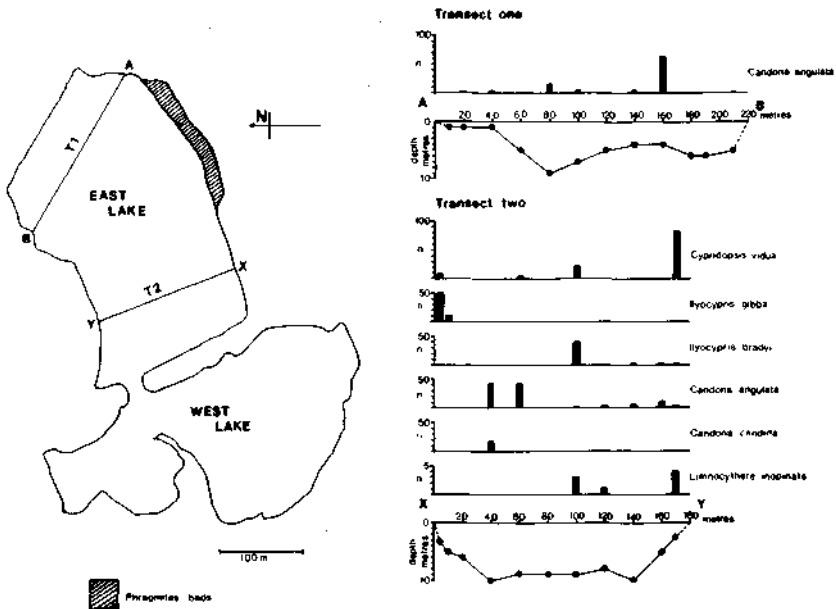


FIG. 3. Transect results from the eastern lake at Cosmeston, South Wales.

basic assemblage may be augmented with benthic detritivores such as *Candona* spp., or *Herpetocypris* spp. when macrophyte debris is available. The meniscus of calm waters may be exploited by *Notodromas monacha* (O. F. Muller). If the habitat is either spring- or seepage-fed, *Potamocypris* spp. may also be present, different species of which are either benthic-reptant or benthic-pelagic and display a wide range of distributions (Meisch 1984, 1985).

The majority of these species are either obligately or facultatively parthenogenetic. However, ultimately, survival in these unstable habitats depends on the ability of individual species to withstand pond-drying. Often this facility is provided by the production of desiccation-resistant, diapausing eggs as reported for *Notodromas monacha*, *Herpetocypris reptans* (Baird) and *Heterocypris incongruens* (Ramdohr) (Tetart 1971; McLay 1978; Angell & Hancock 1989). In other species, either the juveniles or the adults themselves may represent the drought-hardy stage; in *Candona rawsoni* Tressler, both have been shown to survive in the dried mud of ponds (Delorme & Donaldson 1969).

Eucypris spp. tend to utilise a similar, but more extreme strategy, being typical "r"-strategists. In South Wales both *E. virens* (Jurine) and

E. lilljeborgi (O. F. Müller) have been collected in vast, autumnal, juvenile assemblages, the former from the seasonally inundated *Phragmites* beds at Cosmeston lakes, the latter from the grass-bottomed portions of the pond at Heol hir in Cardiff. These species hatch soon after breaking diapause, grow rapidly, reproduce and then die within a period of some eight to ten weeks. Most species of this genus are univoltine, although others (especially those more characteristically found in permanent habitats) may produce two generations each year (Bronstein 1947).

The biology of species from non-permanent lotic waters appears to be similar, although it is considerably less well known. Local faunas include *Ilyocypris bradyi* Sars, *Potamocypris* spp. and *Candona* (*Pseudocandona*) sp., although strictly speaking, the latter are often components of the interstitial fauna. There is a degree of species overlap between these lentic and lotic habitat types that many early workers ascribed to inwash, although in reality many ostracod species are more rheotolerant than previously believed (Ham 1982; Marmonier 1985).

The similarity of faunas from non-permanent habitats is almost certainly enhanced by vectored transport of parthenogenetic species. Proctor (1964) showed that ostracod eggs could be passaged alive through the gastero-intestinal tracts of wildfowl, and Seidel (1989) has demonstrated ectophoretic transport of *Cyclocypris ovum* on the skin of urodele and anuran amphibians. The same phenomenon may also take place by the attachment of ostracods to the feet or feathers of birds or the hair of mammals. Ectophoresis of ostracods by aquatic insects such as notonectids has been remarked on by Bronstein (1947) and Williams (1987, p. 109).

Permanence of a water body allows the development of ostracod communities that are probably determined largely by niche availability and habitat structural complexity (see Hildrew 1987). However, most workers have concentrated on the distribution of individual species within a given region, rather than upon community structure and composition (e.g. Nuchterlein 1969; Hiller 1972), thus the relationship between these effects and the resulting ostracod taxocene is very poorly understood.

The faunas of permanent ponds, reens and canals are similar in structure and composition and represent the layered augmentation of species assemblages from temporary habitats. The same appears to be the case for lotic water ostracod communities. Fryer (1985) was able to show a significant relationship between crustacean species-richness and the size of water-bodies by using a large data set that included ostracods. Thus, the build-up of species-rich, taxonomically diverse ostracod assemblages would be expected only in large, stable environments.

Certainly, rich faunas featuring a high degree of endemism have been recorded for ancient lakes such as Lake Ohrid (Petkovski 1969), Lake Baikal (Bronshstein 1947) and Lake Tanganyika (Martens 1985). In such environments the cytheroids are often a more important component of the fauna, suggesting that different biogeographic processes are at work.

Welsh Ostracoda in context

There has been little previous work on Welsh ostracod faunas other than scattered references in Brady (1868), Brady & Norman (1889), Scourfield (1904), Fox (1967), Jefferson (1976) and Brooker & Edwards (1974). From these records and those cited in Henderson (1990), it would appear that *Ilyocypris bradyi*, *Candona pratensis*, *Eucypris lilljeborgi*, *Herpetocypris chevreuxi*, *Potamocypris variegata*, *P. similis* and *P. pallida* are new additions to the Welsh fauna. Given the poor state of knowledge of the distribution of Ostracoda in Wales, the findings presented here reflect a lack of previous records rather than novelty in the fauna encountered.

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