

A previously unknown nonmarine ostracod fauna from the Wessex Formation (Early Cretaceous) of the Isle of Wight, southern England, with implications for the origins of hyponeustic feeding in ostracods

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Screening of large quantities of sediment for studies of the plant debris beds of the Wessex Formation (Wealden Group, Barremian) on the Isle of Wight (Fig. 1) and their associated vertebrate and invertebrate fauna (SWEETMAN & INSOLE 2010) has revealed hitherto unknown nonmarine ostracod assemblages.

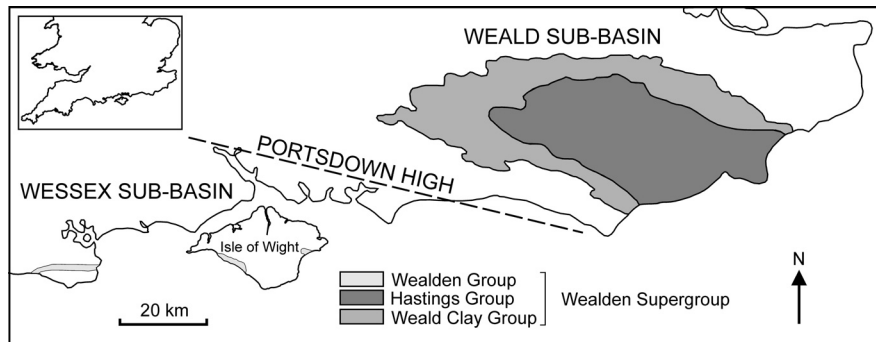


Fig. 1: Location map; modified after SWEETMAN & INSOLE (2010).

On the Isle of Wight the exposed Wessex Formation of the Wessex Sub-basin is considered to be of Barremian age (Fig. 2) on the basis of palynological, magnetostratigraphic and fossil wood carbon isotope data (KERTH & HAILWOOD 1988; HUGHES & MCDUGALL 1990; ROBINSON & HESSELBO 2004) and is equivalent to the lower part of the Upper Weald Clay Formation of the Weald Sub-basin. It represents high sinuosity fluvial, lacustrine and terrestrial deposition on a low relief floodplain. Plant debris beds form a very small proportion of the succession and represent locally derived debris flows, which randomly sampled diverse terrestrial and aquatic floodplain habitats prior to deposition. They are the main source of vertebrate fossils, including dinosaurs and also contain freshwater molluscs and mainly terrestrial plant remains.

Several of the beds have yielded nonmarine ostracods, including species of *Cypridea* and *Theriosynoecum*. The ostracod assemblage of one bed, situated a few metres below the Chine Farm Sandstone, is of particular interest. It comprises at least four species of *Cypridea*, a new species of *Pinnocypridea*, and a new genus and species of the cypridoidean Subfamily Notodromadinae; the diversity of *Cypridea* and the absence of taxa requiring permanent waters (such as darwinulids and *Theriosynoecum*) implies derivation from temporary waterbodies.

The occurrence of genus *Pinnocypridea* SHI & Ho, 1963 in England was first noted by LI (1988) who commented that *Mantelliana cyrton* ANDERSON, 1971 from the Purbeck Limestone Group (Berriasian) should be reassigned to *Pinnocypridea*; apart from that, the genus does not seem to have been noticed previously in Europe. First described from the Chentsyanyan Formation of Sichuan Province in China (originally regarded as Late Cretaceous but now considered to be of Early Cretaceous age), the genus is represented by several species in the latest Jurassic to Early Cretaceous of China (e.g., YE 1994; HOU et al. 2002); LUGER & SCHUDACK (2001) have reported it from the early Aptian of Somalia.

Lithostratigraphical divisions		Stage	Ostracod zonation (Horne, 1995)		
Wessex Sub-basin	Weald Sub-basin				
Vectis Formation	Wealden Group	APTIAN (part)	<i>Cypridea fasciata</i> Subzone	<i>Theriosynoecum littori</i> Zone	
Wessex Formation		BARREMIAN			
	Upper Weald Clay Formation				
	Weald Clay Group	HAUTERIVIAN	<i>Cypridea pumila</i> Subzone	<i>Theriosynoecum allenii</i> Zone	
			Lower Weald Clay Formation		<i>Cypridea dorsispinata</i> Subzone
	Hastings Group	VALANGINIAN	<i>Cypridea bispinosa</i> Subzone		<i>Theriosynoecum allenii</i> Zone
			Upper Tunbridge Wells Sand Formation		
			Grinstead Clay Formation		
			Lower Tunbridge Wells Sand Formation		
	Wadhurst Clay Formation		<i>Cypridea menevensis</i> Subzone		
	Ashdown Formation	BERRIASIAN (part)	<i>Cypridea propunctata</i> Subzone (part)	<i>Theriosynoecum forbesi</i> Zone (part)	

Fig. 2: Wealden (Early Cretaceous) stratigraphy of southern England; that of the Wessex Sub-basin reflects strata exposed on the Isle of Wight (modified after HORNE 2009).

The Family Notodromadidae today includes the subfamilies Notodromadinae and Cyproidinae; a member of the latter, *Mantelliana phillipsiana* (JONES, 1888), occurs in the Wadhurst Clay Formation of the Hastings Group (Valanginian) and at the base of the Lower Weald Clay Formation (early Hauterivian) (ANDERSON 1985; HORNE & MARTENS 1998). The new Wessex Formation genus is assigned to the Notodromadinae on the basis of the peculiar morphology of its flattened ventral surface, a diagnostic feature of the subfamily, which represents an adaptation allowing the ostracods to attach themselves upside-down to the water surface (e.g., species of *Notodromas* and *Newnhamia*) where they feed on the hyponeuston (DE DECKKER 1979; GEORGE & MARTENS 2003). The Wessex Formation notodromadine ostracod thus constitutes the oldest known evidence of hyponeustic feeding in Ostracoda (and possibly in any crustacean) and has implications for the phylogeny and biogeography of the Notodromadidae.

References

- ANDERSON, F.W. (1985): Ostracod faunas in the Purbeck and Wealden of England. – *Journal of Micropalaeontology*, 4(2): 1-67, London.
- DE DECKKER, P. (1979): Comparative morphology and review of Australian Notodromadinae Kaufmann, 1900. – *Senckenbergiana biologia*, 59(5/6): 417-463, Stuttgart.
- GEORGE, S. & MARTENS, K. (2003): On a new species of the genus *Newnhamia* King, 1855 (Crustacea, Ostracoda) raised from Chalakkudy River sand, (Kerala, India), with notes on the taxonomy and distribution of the Notodromadidae. – *Hydrobiologia*, 497: 25-37, Dordrecht.
- HORNE, D.J. (2009): Purbeck – Wealden. – In: WHITTAKER, J.E. & HART, M.B. (eds.): *Ostracods in British Stratigraphy*. – 289-308, The Micropalaeontological Society, Special Publications, The Geological Society, London.
- HORNE, D.J. & MARTENS, K. (1998): An assessment of the importance of resting eggs for the evolutionary success of Mesozoic non-marine cypridoidean Ostracoda (Crustacea). – *Archiv für Hydrobiologie*, 52: 549-561.
- HOU, Y.T., GOU, Y.S. & CHEN, D.Q. (2002): *Fossil Ostracoda of China*. – XII + 1090 p., Science Press, Beijing. [in Chinese, English summary].
- HUGHES, N.F. & McDOUGALL, A.B. (1990): New Wealden Correlation for the Wessex Basin. – *Proceedings of the Geologists' Association*, 100: 85-90, Middlesex.
- KERTH, M. & HAILWOOD, E.A. (1988): Magnetostratigraphy of the Lower Cretaceous Vectis Formation (Wealden Group) on the Isle of Wight, southern England. – *Journal of the Geological Society of London*, 145: 351-360, London.
- LI, Y.-W. (1988): The application of Ostracoda to the location of the non-marine Jurassic-Cretaceous boundary in the Sichuan Basin of China. – In: HANAI, T., IKEYA, N. & ISHIZAKI, K. (eds.): *Evolutionary Biology of Ostracoda - its fundamentals and applications*. – *Developments in Palaeontology and Stratigraphy*, 11: 1245-1260, Kodansha/Elsevier, Tokyo-Amsterdam.

- LUGER, P. & SCHUDACK, M. (2001): On Early Cretaceous (earliest Aptian) freshwater Charophyta and Ostracoda from Northern Somalia. – *Neues Jahrbuch für Geologie und Paläontologie, Abhandlungen*, 220: 245-266, Stuttgart.
- ROBINSON, S.A. & HESSELBO, S.P. (2004): Fossil-wood carbon-isotope stratigraphy of the non-marine Wealden Group (Lower Cretaceous, southern England). – *Journal of the Geological Society of London*, 16: 133-145, London.
- SHI, T.-G. & HO, J.-D. (1963): Discovery of fossil ostracoda in the Khan-Yanpu Beds of the Chentsyanyan Formation in the Province Sechuan. – *Acta Palaeontologica Sinica*, 11: 92-107, Beijing. [in Chinese, Russian summary].
- SWEETMAN, S.C. & INSOLE, A.N. (2010): The plant debris beds of the Early Cretaceous (Barremian) Wessex Formation of the Isle of Wight, southern England: their genesis and palaeontological significance. – *Palaeogeography, Palaeoclimatology, Palaeoecology*, 292: 409-424, Amsterdam.
- YE, C. (1994): Succession of Cypridacea (Ostracoda) and nonmarine Cretaceous stratigraphy of China. – *Cretaceous Research*, 15: 285-303, London.

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