

## Taxonomic harmonisation and calibration of nonmarine ostracods for palaeoclimate applications: the case of *Candona acutula* DELORME, 1967

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*Candona acutula* (Fig. 1) was first described by DELORME (1967) from Kitako Lake, Saskatchewan, Canada; he found it mainly in the transition zone between prairie and forest of the Canadian Prairies, in shallow waterbodies with abundant vegetation (DELORME 1970).

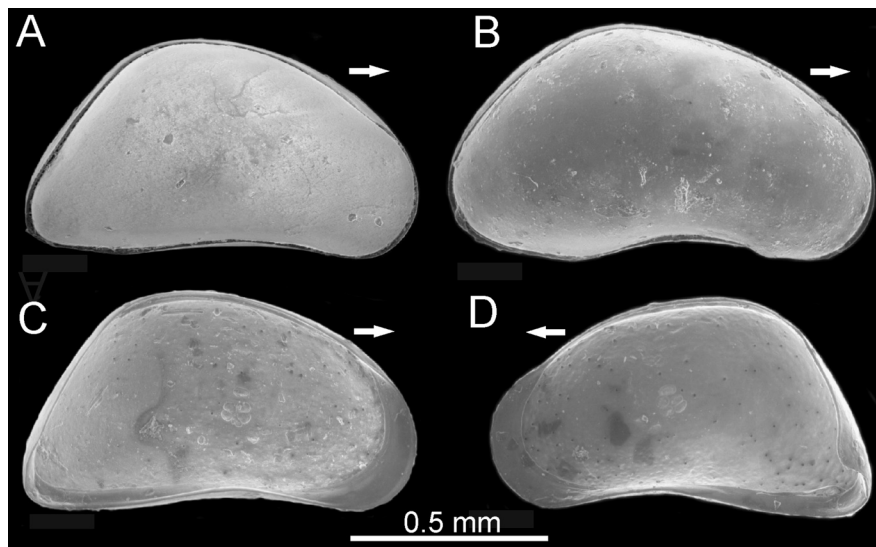


Fig. 1: *Candona acutula* Delorme, 1967. A: female carapace, right side, CMNC2011-0118; B, male carapace, right side, CMNC2011-0114; C: female left valve internal, paratype, CMNC2009-0018; D: female right valve internal, holotype, CMNC2009-0017. (Canadian Museum of Nature Collection numbers).

The Delorme Ostracode Autecological Database at the Canadian Museum of Nature contains 474 records of *Candona acutula*, of which 115 are categorised as “mature live” at the time of collection, the remainder being represented by immature live

specimens (4 records) or empty shells only (355 records). The distribution of the “mature live” records (Fig. 2) has its southern limit coincident with latitude 49°N and its eastern limit at longitude 100°W.

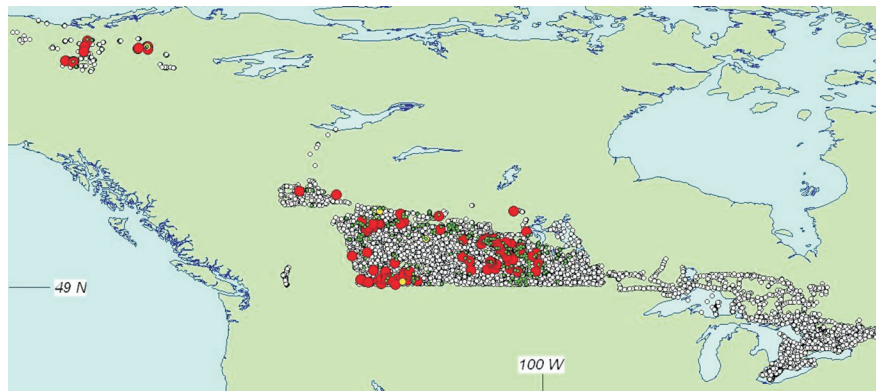


Fig. 2: Distribution of *Candona acutula* in the Delorme Ostracode Autecological Database. Large red dots = mature live; medium yellow dots = immature live; small green dots = empty shells only; small white dots = all sites in database.

However, the apparently sharp southerly boundary of its occurrence may be an artefact of the extent of the database, coverage of which is constrained by the Canada-USA border. This suggests that the NANODE database (FORESTER et al. 2005) has potential to extend our coverage of the range of this species, but so far *C. acutula* has not been recorded in the USA and as yet we have not been able to identify any other North American candonid that might be a synonym.

Abundant shells of *Candona acutula* have been recorded in late Holocene sediment core from Jenny Lake, southwest Yukon Territory, Canada (61°2.4'N, 138°21.6'W; Fig. 3), leading to interest in its palaeoclimatic and palaeoenvironmental significance.

A calibration of the mean monthly air temperature ranges (Fig. 4) occupied by *C. acutula*, using the method described by HORNE (2007) and based on “mature live” records in the Delorme Autecological Database, has yielded the following results: July +12 to +20°C, January -30 to -7°C.

However, since it seems unlikely (as noted above) that the records in the Delorme Database capture fully the geographical range of the species, it is possible that both of these ranges extend to warmer temperatures than have been so far observed, although the mapped temperature ranges (Fig. 4) show potential for more southerly records to be included in the future without requiring a change to the calibrated values.

In carapace morphology *Candona acutula* bears a striking resemblance to a European species, *Candona levanderi* HIRSCHMANN, 1912. A determination of whether or not the two are synonymous would be valuable for establishing their palaeoclimatic significance; if they are a single species then its temperature calibration could be refined

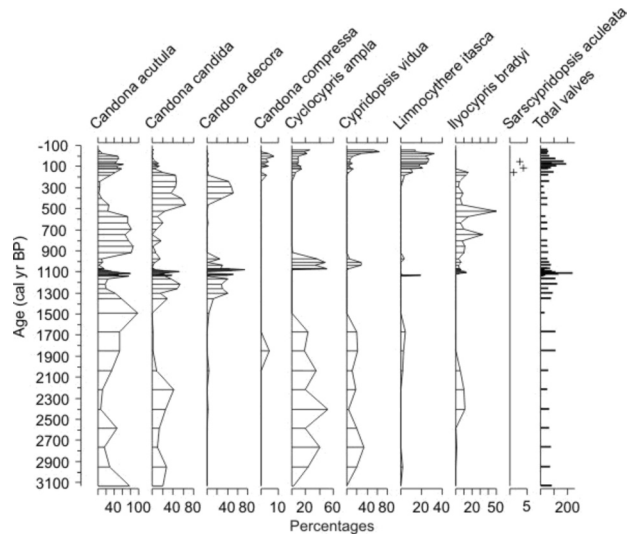


Fig. 3: Ostracod data from a late Holocene sediment core, Jenny Lake, southwest Yukon Territory, Canada. Modified from BUNBURY & GAJEWSKI (submitted).

by combining the North American and European records. This will require a careful comparison of soft-part characters, particularly the detailed shapes of the male hemipenes and fifth limb prehensile palps, and an appreciation of the range of intraspecific variation that occurs in both carapace and appendage morphology.

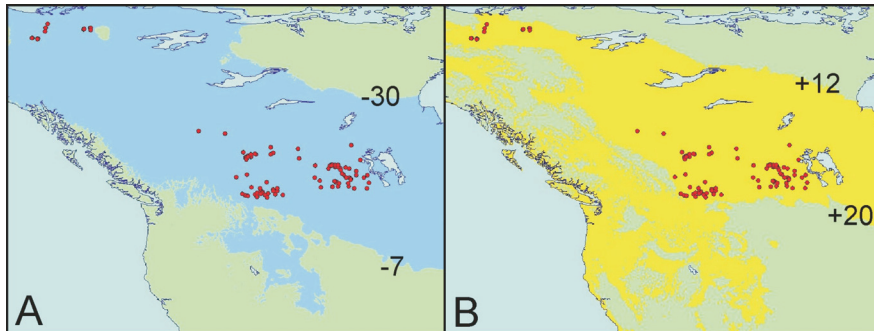


Fig. 4: Maps showing calibrated Mean Monthly Air Temperature ranges for *Candona acutula*: A = January (blue), B = July (yellow).

Another European species, *Candona balatonica* (DADAY, 1894), has been regarded by some authors (e.g., BRONSTEIN 1947) as synonymous with *C. levanderi* but others (e.g., MEISCH 2000) have made it clear that they are distinct from each other. Both *C. levanderi* and *C. balatonica* are reported from various sites in the European Quaternary and it is likely that they have been confused in some cases.

These issues are further complicated by the fact while all three species can now be assigned to the genus *Fabaeformiscandona* KRSTIC, 1972, originally based on fossil material but subsequently extended to living taxa (see, e.g., MEISCH 2000), *C. balatonica* is the type-species of *Eucandona* DADAY, 1900, a genus resurrected by PETKOVSKI & KARANOVICH (2000) who regard it as a senior synonym of *Fabaeformiscandona*.

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## References

- BUNBURY, J. & GAJEWSKI, K.: Climates of the past 2000 years, southwest Yukon Territory, Canada. Submitted. – Quaternary Research (submitted).
- BRONSTEIN, Z.S. (1947): Rakoobraznie, Ostracoda presnyh vod. – Fauna SSR, Moskva (Nov. Ser. 31), 2(1): 1-339, Moskva-Leningrad.
- DELORME, L.D. (1967): New freshwater Ostracoda from Saskatchewan, Canada. – Canadian Journal of Zoology, 45: 357-363, Ottawa.
- DELORME, L.D. (1970): Freshwater ostracodes of Canada. Part III. Family Candonidae. – Canadian Journal of Zoology, 48: 1099-1127, Ottawa.
- FORESTER, R.M., SMITH, A.J., PALMER, D.F. & CURRY, B.B. (2005): North American Non-Marine Ostracode Database "NANODE" Version 1, –<http://www.kent.edu/NANODE>, Kent State University, Kent, Ohio, U.S.
- HORNE, D.J. (2007): A Mutual Temperature Range method for Quaternary palaeoclimatic analysis using European nonmarine Ostracoda. – Quaternary Science Reviews, 26: 1398-1415, Oxford.
- MEISCH, C. (2000): Freshwater Ostracoda of Western and Central Europe. – In: SCHWOERBEL, J. & ZWICK, P. (eds): Süßwasserfauna von Mitteleuropa, 8(3): 1-522, Spektrum Akademischer Verlag, Heidelberg.
- PETKOVSKI, T. & KARANOVICH, I. (2000): On *Eucandona balatonica* (Daday, 1894) and *Eucandona levanderi* (Hirschmann, 1912), two rare and little-known ostracod species (Crustacea, Ostracoda). – Mesogee, 58: 77-84, Marseille.

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