



J. Plankton Res. (2018) 00(00): 1–11. doi:10.1093/plankt/fby036

Revising the taxonomic status and distribution of the *Paracalanus parvus* species complex (Copepoda, Calanoida) in the Mediterranean and Black Seas through an integrated analysis of morphology and molecular taxonomy

PANAGIOTIS KASAPIDIS^{1*}, IOANNA SIOKOU², MERIEM KHELIFI-TOUHAMI³, MARIA GRAZIA MAZZOCCHI⁴, MARIA MATTHAIAKI¹, EPAMINONDAS CHRISTOU², MARIA LUZ FERNANDEZ DE PUELLES⁵, ALEXANDRA GUBANOVA⁶, IOLE DI CAPUA⁴, STRATOS BATZIAKAS⁷ AND CONSTANTIN FRANGOULIS⁷

¹HELLENIC CENTRE FOR MARINE RESEARCH, INSTITUTE OF MARINE BIOLOGY BIOTECHNOLOGY AND AQUACULTURE, PO BOX 2214, 71003 HERAKLION, GREECE, ²HELLENIC CENTRE FOR MARINE RESEARCH, INSTITUTE OF OCEANOGRAPHY, PO BOX 712, 19013 ANAVYSSOS, GREECE, ³DEPARTMENT OF MARINE SCIENCE, UNIVERSITY BADJI MOKHTAR, PO BOX 12, SIDI AMAR 23052, ALGERIA, ⁴STAZIONE ZOOLOGICA ANTON DOHRN, VILLA COMUNALE, NAPOLI 80121, ITALY, ⁵CENTRO OCEANOGRÁFICO DE BALEARES, INSTITUTO ESPAÑOL DE OCEANOGRAFÍA, MUELLE DE PONIENTE S/N, PALMA DE MALLORCA 07015, SPAIN, ⁶PLANKTON DEPARTMENT, KOVALEVSKY INSTITUTE OF MARINE BIOLOGICAL RESEARCH, NAKHIMOVA AVE. 2, SEVASTOPOL 299011, CRIMEA AND ⁷HELLENIC CENTRE FOR MARINE RESEARCH, INSTITUTE OF OCEANOGRAPHY, PO BOX 2214, HERAKLION 71003, GREECE

*CORRESPONDING AUTHOR: kasapidi@hcmr.gr

Received December 13, 2017; editorial decision August 8, 2018; accepted September 2, 2018

Corresponding Editor: Marja Koski

The marine copepod *Paracalanus parvus* has long been considered the most abundant representative of the genus and one of the main components of coastal zooplankton in the Mediterranean and Black Seas. However, subtle morphological differences between *P. parvus*, *P. indicus* and *P. quasimodo* hamper correct taxonomic identification. To clarify the taxonomic status and distribution of this species complex in the Mediterranean and Black Seas, DNA barcoding as well as an integrated morphological and molecular analysis was conducted on samples collected across these two basins. DNA barcoding confirmed the presence of *P. parvus* s.s. in the Black Sea and revealed four *Paracalanus* species in the Mediterranean Sea, including the morphologically undescribed *Paracalanus* sp. F. The most abundant species in all coastal areas was *P. quasimodo*, while *P. parvus* s.s. was confined to areas of the northern Mediterranean Sea. The phylogeographic analysis indicated that the boreal species *P. parvus* s.s. has a relic distribution in the Mediterranean and may have been displaced by the subtropical *P. quasimodo* during the last interglacial period. The