



INQUA



SEQS



**International Union for Quaternary Research (INQUA)
Section on European Quaternary Stratigraphy (SEQS)
Southern Scientific Centre, Russian Academy of Sciences
Geological Institute, Russian Academy of Sciences**

QUATERNARY STRATIGRAPHY AND PALEONTOLOGY OF THE SOUTHERN RUSSIA: connections between Europe, Africa and Asia

**Abstract volume
2010 annual meeting INQUA-SEQS**

**Rostov-on-Don, Russia
June 21–26, 2010**

Rostov-on-Don
2010

BIOSTRATIGRAPHY OF ARVICOLINE ASSEMBLAGES FROM THE ZUURLAND (THE NETHERLANDS) DRILLING PROJECT

Thijs van KOLFSHOTEN. Leiden University, Faculty of Archaeology, Leiden, The Netherlands. t.van.kolfschoten@arch.leidenuniv.nl

Alexey TESAKOV. Geological Institute of the Russian Academy of Sciences, Moscow, Russia. tesak@ginras.ru

The well-known Zuurland drilling project (Brielle, the Netherlands) produced a uniquely complete stratified record of terrestrial biota during the last 2.5 Ma. The rich information on various groups of organisms gives a unique opportunity to cross-check the results derived from different biostratigraphic approaches elsewhere in middle latitudes of Europe and Northern Asia.

The biostratigraphic framework of the Zuurland sequence is formed by more than ten levels of arvicoline assemblages exposed by multiple parallel boreholes drilled by Mr. Leen Hordijk, Brielle. Some other important results are derived from the analysis of other small mammal groups too. Based on the evolutionary level of arvicolids, five major biostratigraphic units can be recognized in the Zuurland sequence (Units 1 to 5) ranging from the earliest Pleistocene (Gelasian) to the Holocene.

Unit 1 faunas with *Microtus oeconomus*, *Microtus* gr. *arvalis*, and *Arvicola terrestris* occur in the uppermost levels of the sequence (ca. 14–26 m). The advanced evolutionary features of *Arvicola* indicate a latest Pleistocene to Holocene age of Unit 1, and a correlation with the Toringian biochron.

Unit 2 (27–37 m) faunas include a mixed association combining Late Pleistocene and early Middle Pleistocene, and even Early Pleistocene elements: *Arvicola* sp., *Microtus* ex-gr. *arvalis*, *Dicrostonyx* sp., *Lemmus* sp., *Mimomys savini*, *Clethrionomys* cf. *acrorhiza*, *Microtus gregaloides*, *Mimomys* gr. *reidi-pusillus*, *Allophaiomys* sp.

Unit 3 (39–54 m) faunas include *Mimomys savini*, *Mimomys* ex-gr. *reidi-pusillus*, *Allophaiomys deucalion*, *Ungaromys dehmi*, *Lemmus kowalskii*, *Clethrionomys kretzoi*, *Craseomys* aff. *major*, and *Mimomys pliocaenicus*. This faunal composition suggests an Early Pleistocene/early Biharian age. Some forms (*Ungaromys*, *M. pliocaenicus*) may represent an earliest Pleistocene (Gelasian) taphonomic admixture.

Unit 4 (61–65 m). This richest assemblage of the Zuurland sequence includes *Lemmus kowalskii*, *Clethrionomys kretzoi*, *Ungaromys dehmi*, *Borsodia newtoni*, *Mimomys pliocaenicus*, *Mimomys tigliensis*, *Mimomys pitymyoides*, *Mimomys hordijki*, *Mimomys reidi*. The fauna from Unit 4 has an Early Pleistocene (Gelasian) age; a conclusion that is based on the features of several species characteristic of European late Villanyian (MN17) faunas.

Unit 5 (91–101 m) is the lowermost part of the section. The fauna of this unit includes typical Early Pleistocene (Gelasian), Late Villanyian forms such as *Clethrionomys kretzoi*, *Mimomys tigliensis*, *Mimomys reidi*, *Mimomys* cf. *praepliocaenicus*.

The Zuurland sequence is particularly important for the detailed evidence of Late Villanyian arvicoline faunas of the northwestern Europe and their transformation into early Biharian faunas.