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Short Note

New Stands of *Paramecium tetraurelia* (Ciliophora, Protozoa) in Australia and Europe

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New stands of *Paramecium tetraurelia* were revealed in Australia (Melbourne) and Europe (Spain, Madrid).

Key words: *Paramecium aurelia* species complex, geographical distribution, intra-specific polymorphism.

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Paramecium tetraurelia is a cosmopolitan species of the *P. aurelia* complex known from North, Central, and South America, Asia, Australia, and Europe (SONNEBORN 1975; PRZYBOŚ & FOKIN 2000). However, the numbers of known habitats of particular species is different on different continents. According to SONNEBORN (1975), *P. tetraurelia* is a species "cosmopolitan in temperate and subtropical climates; reported from some 30 localities, not reported north of Pennsylvania in North America." In Asia, the species was found in Japan (SONNEBORN 1956, 1975; KOŚCIUSZKO & KOIZUMI 1984) and Israel (PRZYBOŚ 1995; PRZYBOŚ & FOKIN 1999). Only one habitat of *P. tetraurelia* was known in Australia, in Sydney (SONNEBORN 1975). In Europe, *P. tetraurelia* was reported from several countries, Finland (KOŚCIUSZKO & PRAJER 1988), Great Britain (TAIT *et al*. 1971), France (PRZYBOŚ 2005), Holland (SONNEBORN *et al*. 1959), Poland (cf PRZYBOŚ & KOMALA 1993; PRZYBOŚ & FOKIN 2000; PRZYBOŚ 2005, 2008), Czech Republic (KOMALA & KOŚCIUSZKO 1963), Slovakia (DUBIS & KOMALA 1963), Italy (SONNEBORN *et al*. 1959), Bulgaria (KOMALA & KOŚCIUSZKO 1963), Spain (PRZYBOŚ 1980, 1991), and Russia (PRZYBOŚ *et al*. 2007).

The present paper presents new stands of the species found in Melbourne Australia, and in Madrid, Spain.

Material and Methods

Material

The strains were established from water samples collected in 2005 in Melbourne, Australia from five collecting sites, and in 2007 from a water sample collected in Madrid, Spain. Details are given in Table 1.

Methods

Paramecia cultivation and identification were performed according to SONNEBORN's (1970) methods. The paramecia were cultivated on a lettuce medium inoculated with *Enterobacter aerogenes*. The species of the *Paramecium aurelia* complex was identified by mating the investigated strains with mating types of the standard strain from Sydney, Australia of *P. tetraurelia* on the basis of strong conjugation between strains. Other strains were also used for the preliminary tests:

strain 90 of *P. primaurelia*, strain 87 of *P. pentaurelia*, strain 159 of *P. sexaurelia*, strains 38 of *P. septaurelia.*

P. multimicronucleatum was identified in two collecting sites on the basis of analysis of the type

Table 1

Paramecium tetraurelia and *Paramecium multimicronucleatum* in the studied sampling sites

	Sampling site	Kind of water habitat	Remarks – Other *Paramecium* species
Australia	Melbourne, School of Botany, Melbourne University	pond	*P. tetraurelia, P. multimicronucleatum*
		small tank	*P. multimicronucleatum*
	Melbourne, Victoria Garden	pond	*P. tetraurelia*
	Melbourne, Botanical Garden	pond number 1	*P. tetraurelia*
		pond number 2	*P. tetraurelia*
Europe, Spain	Madrid, Atocha railway station	artificial pond	*P. tetraurelia*

and number of micronuclei (VIVIER 1974) on slides stained using aceto-carmine and Giemsa (after fixation and hydrolysis, cf PRZYBOŚ 1978).

Results and Discussion

The presence of *Paramecium tetraurelia* in Australia was confirmed. Previously the species was recorded in Sydney (SONNEBORN 1975), and now it was found in four ponds in Melbourne. However, the Australian territory is still "terra incognita" as far as the occurrence of *P. aurelia* species is concerned. In Australia only, beside *P. tetraurelia*, the presence of *P. quadecaurelia* was reported from Emily Gap.

Spain has been investigated more extensively as far as the presence of species of the *P. aurelia* complex is concerned (PRZYBOŚ 1991). The following species were reported there: *P. primaurelia, P. biaurelia, P. triaurelia, P. tetraurelia, P. sexaurelia, P. novaurelia* (PRZYBOŚ 1980, 1990, 1991). *P. tetraurelia* was reported from four stands, two in the Castile region, i.e. a stream in the Casa del Campo, Madrid and Guadarrama River, and two from Andalusia, a pond in the Maria Luiza park, Sevilla, and pond in a village in south-east from Sevilla. At present, a new stand of this species was found in Madrid.

Molecular studies carried out in *P. tetraurelia* have revealed the existence of intra-specific polymorphism (PRZYBOŚ *et al*. 2007 a,b) within the species, correlated with characteristic, extreme inbreeding. Six strains originating from remote stands were used for the analyses, i.e. Australia, Sydney; Spain, Madrid; Slovakia, Strbske Pleso in Tatras; Israel, Tabga; Japan, Honshu Island; Poland, Kraków. RAPD analysis distinguished three genotypes within *P. tetraurelia*, based on similarity of strain band patterns, and ARDRA analysis with application of *Taq*I restriction enzyme revealed a different band pattern from the Slovakian strain (PRZYBOŚ *et al*. 2007a). The RAPD band pattern of newly identified strains of *P. tetraurelia* from the Black Sea coast of Russia was also compared with band patterns of the previously studied strains of the species. Polymorphism within the species was confirmed and only a low similarity of band patterns from Black Sea strain compared to other strains was shown (PRZYBOŚ *et al*. 2007b).

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