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Stars, co-stars and understudies in planktonic protist communities: an analysis of niche separation among species in the tintinnid ciliate community of the Bay Villefranche (NW Mediterranean Sea)

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Tintinnid ciliates provide an excellent example of the paradox of the plankton as a single sample of 5 liters can contain over 20 tintinnid species. Thus there is co-existence of a large number of apparently ecologically similar species. In tintinnid ciliates features of the lorica classically distinguishes species. Moreover, lorica oral diameter, a taxonomically conservative character, correlates with several ecological traits including the size of prey consumed and maximum growth rate. Here temporal changes in the tintinnid community of the Bay of Villefranche are explored based on weekly sampling over an annual cycle. The characteristics of the most abundant species, the "star", the second most abundant, the "co-star", and the third most abundant, the "understudy" were compared. The existence of niche separation was assessed by examining differences between the star, co-star and understudy in terms of lorica oral diameter. Changes in the identity of the star species were accompanied by changes of the co-star and understudy species. The lorica oral diameters of co-star and understudy species differed from the star species and differences were similar in magnitude and scaled with the size of the star species. Overall, the lorica oral diameters of the co-star and understudy differed by 50% from that of the star species. Deviations from the average of 50% decreased with numerical dominance of the star species. In the Bay of Villefranche a difference of 50% in lorica oral diameter separates tintinnid stars from their co-stars and understudies with the relationship strongest when the star species numerically dominates the tintinnid community.