Although asymptotic nonparametric confidence bands have been constructed in the last decade in some inverse problems, like density deconvolution, inverse regression with a convolution operator and regression with errors in variables, there seems to be no such construction for practically important inverse problems of stereology. We partially fill this gap by constructing a kernel-type nonparametric estimator for the density of squared radii in the stereological Wicksell's problem, along with corresponding asymptotic uniform confidence bands and an automatic bandwidth selection method, tuned to perform well in finite samples in terms of both area and coverage probability of the confidence bands. The performance of the new procedures is investigated in a simulation experiment and demonstrated with some real astronomical data related to M62 globular cluster.