tric distances similar to the distances found in this work. Indeed, infrared observations of the bulge, like those from the COBE/DIRBE satellite (Weiland et al. 1994), support these results. From their Figure 1, it is clear that the nuclear radius of the bulge is between 10° and 15°. For the canonical solar distance to the galactic center of 8 kpc adopted in this work, the bulge longer radius is between 1.4 and 2.1 kpc.

From the point of view of giant stars, Tiede & Terndrup (1999) performed photometric and spectroscopic observations of 503 stars in four windows toward the bulge, with coordinates ($\ell$,$b$) of (−28.8°,−6°), (−8.7°,6.0°), (8.4°,−6.0°) and (24.4°, 6.1°). According to their results, the abundance distribution in the inner Galaxy presents a discontinuity. The authors argue that such a difference is larger than any bias in the sample selection and not due to errors in the abundances. As we are suggesting, they assign the difference found to the different populations in the line of sight.

Smartt et al. (2001) observed type-B stars located between 2.5 and 5 kpc from the galactic center. Due to the young nature of these stars, their photospheric abundances reflect the present day abundances of the ISM. Their results agree with ours in the sense that the oxygen abundance decreases for distances smaller than 3 kpc, as can be seen from their Figure 3. However, the error bars are large and it is only possible to say that the oxygen abundances do not follow the radial gradient of the disk toward the galactic center, since they are 0.3 to 0.4 dex lower than what we expected from the Rolleston et al. (2000) radial gradient, given their position.

In the light of recent studies using PNe, Gutenkunst et al. (2008) point to a discontinuity in the abundance gradient towards the galactic center, in the sense that the abundances of bulge PNe do not follow the trend of those from the disk, as can be seen in their Figure 4. The same trend can be seen in Figure 3 of Stanghellini & Haywood (2010). Considering PNe type III as defined by Peimbert (1978), which represent the old disk population, it is possible to note from their figure that oxygen abundances are smaller for galactocentric distances of less than 4 kpc.

Finally, Mishurov, Lépine, & Acharova (2002) proposed a galactic formation model where the spiral arms are inductors of stellar formation and they can exist only between the internal and external Lindblad resonances. As a consequence, the SFR decreases strongly outside these limits, and the chemical abundances are depleted in these regions. Combining these evidences with our results, we can point out to a bulge-disk interface for the intermediate mass population, marking therefore the transition between the disk and the bulge populations, at a galactocentric distance of 1.5 for the Z95 distance scale. On the other hand, for the SSV08 distance scale the Kolmogorov-Smirnov test was not conclusive, and we can point out that, for galactocentric distances smaller than 2.9 kpc, the $\alpha$-elements abundances do not follow the disk radial gradient towards the center of the Milky Way galaxy.

## 5. SUMMARY AND CONCLUSION

This work reports an important result concerning PNe and the chemical evolution of the Galaxy. In addition to our previous work (Cavichia et al. 2010, Paper I), where we presented the chemical abundances and the analysis of these abundances for a sample of 56 PNe in the direction of the galactic bulge, among which 35 PNe have their abundances derived for the first time, we extended our data base to 140 PNe in order to study the chemical abundance distribution in the inner disk and bulge of the Galaxy.

In this work, a statistical analysis was performed in order to find the galactocentric distance where bulge and disk characteristics intersect. Two distance scales were used: Zhang (1995) and Stanghellini et al. (2008). Applying the Kolmogorov-Smirnov test, the former results in a distance of 1.5 kpc, while for the latter the test was not conclusive. Nevertheless, the radial $\alpha$-elements abundance distributions for both scales indicate that they do not follow the trend of the disk. On average, the abundances for objects with galactocentric distances smaller than 1.5 and 2.2 kpc for the Z95 and SSV08 distance scales, respectively, are lower than for objects with distances greater than this limit, although this difference is not larger than the errors in individual abundances. Considering the SSV08 distance scale, the abundance difference between the two groups of PNe is based on 68, 62, 53, and 56 PNe of Group I (bulge) for O, S, Ar, and Ne, respectively, and 16, 15, 14, 12 PNe of Group II (inner disk) for the same elements. For the Z95 distance scale, the abundance difference is based on 72, 66, 50, and 43 PNe of Group I, and 41, 39, 28, 29 of Group II, for the same elements. Furthermore the combined error of the four elements (O, S, Ar, Ne) of each group is considerably smaller than the abundance difference between the two groups derived from the average difference of the four elements.

Taking into account the results derived in this work as well as other evidences from the literature, we propose the galactocentric distance of 1.5 kpc (for