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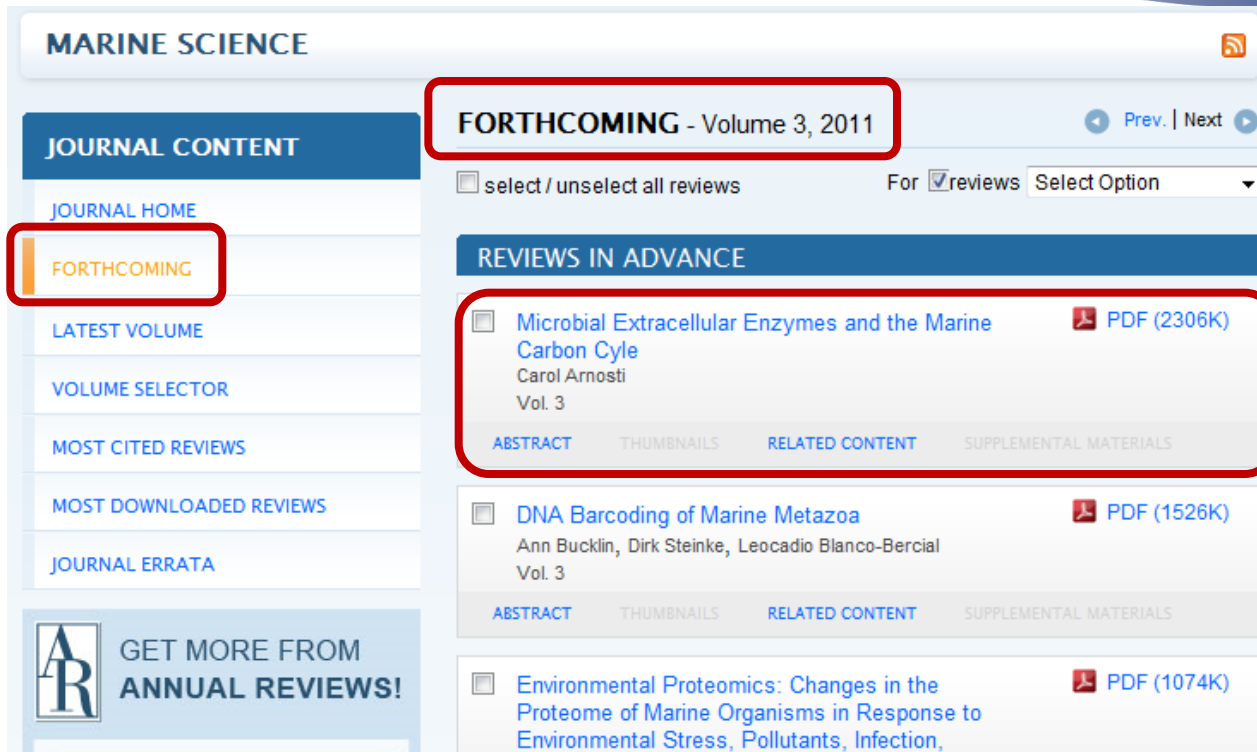
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Royce W. Murray

Annual Review of Analytical Chemistry, 2010, Vol. 3 : 1-18

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Eun Jeong Cho, Joo-Woon Lee, Andrew D. Ellington

Annual Review of Analytical Chemistry, 2009, Vol. 2 : 241-264

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### Coherent Anti-Stokes Raman Scattering Microscopy and Medicine

Conor L. Evans, X. Sunney Xie

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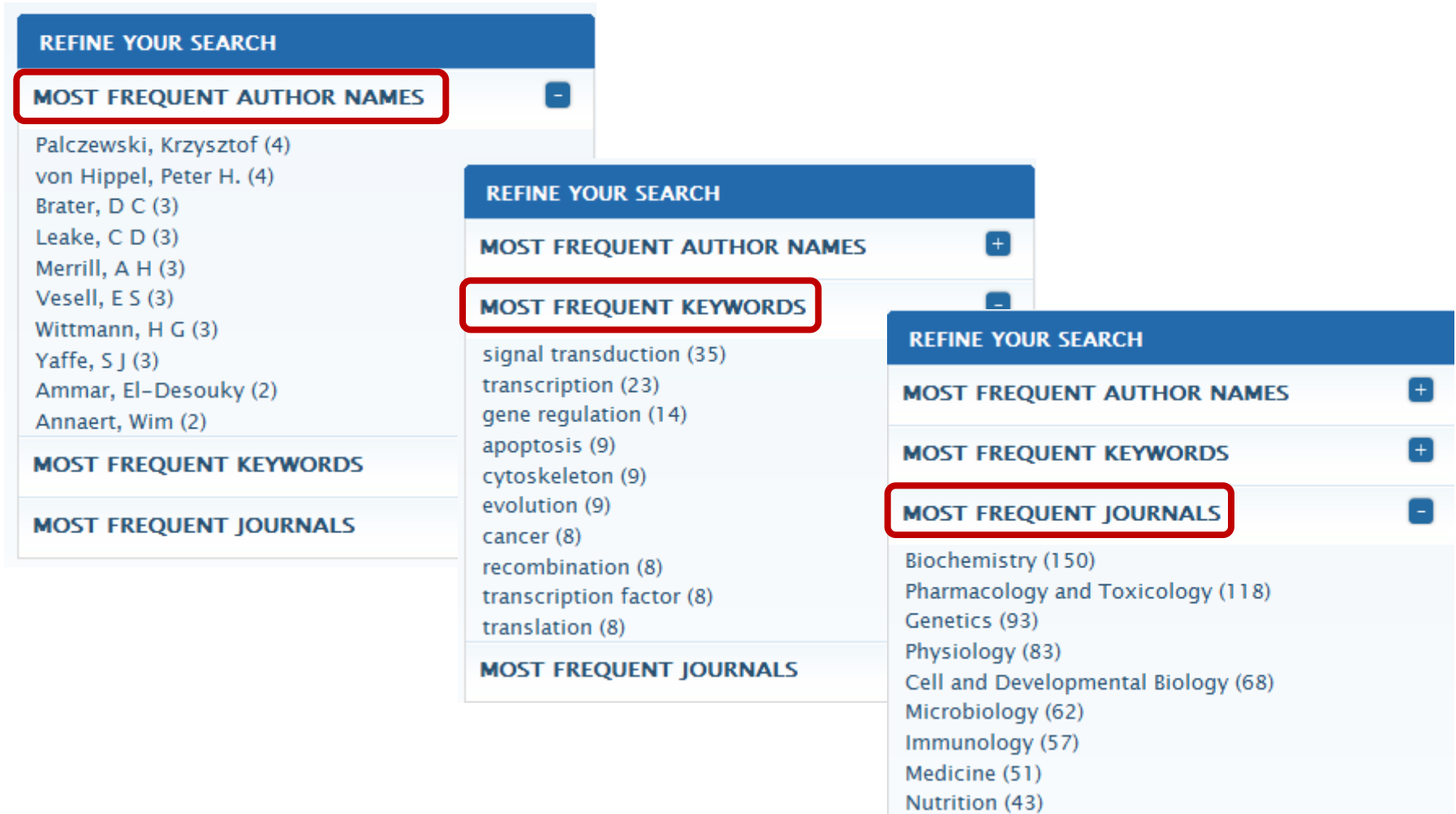
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- DNA Conformation and Protein Binding**  
A A Travers  
Annual Review of Biochemistry Vol. 58 (1989): 427-452  
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Tigran V. Chalikian  
Annual Review of Biophysics and Biomolecular Structure Vol. 32 (2003): 207-235  
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DOI: 10.1146/annurev.biophys.29.1.497

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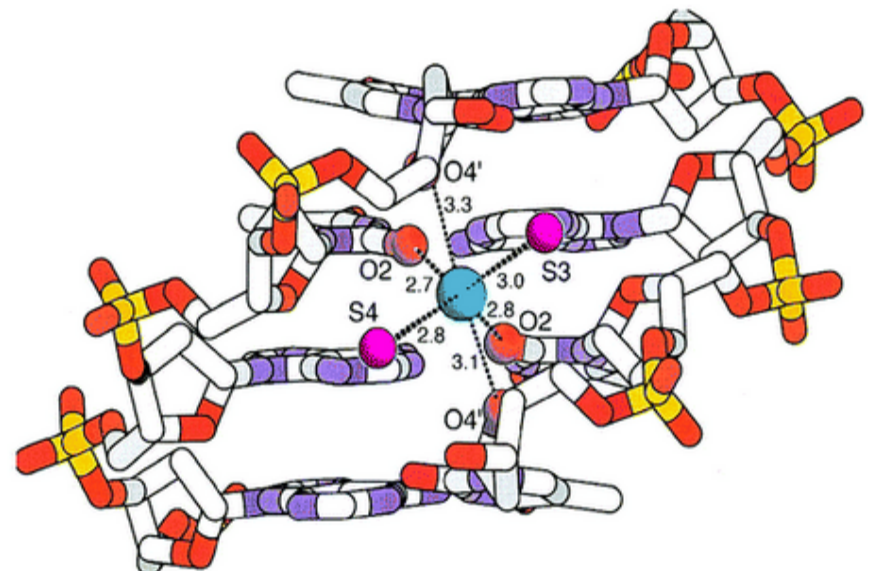
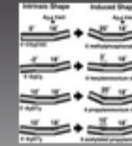
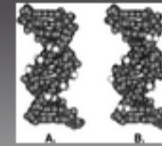
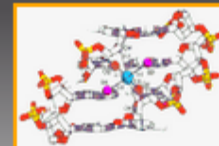
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- + 1. Bartenev VN, Golovamov EI, Kapitonova KA, Mokulskii MA, Volkova LI, Skuratovskii IY. 1983. Structure of the B DNA cationic shell as revealed by an X-ray diffraction study of CsDNA. Sequence-specific cationic stabilization of B form DNA. *J. Mol. Biol.* 169:217-34  
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- 2. Baumann C, Smith S, Bloomfield V, Bustamante C. 1997. Ionic effects on the elasticity of single DNA molecules. *Proc. Natl. Acad. Sci. USA* 94:6185-90 [CrossRef] [Medline] [Web of Science ®] [Open URL](#)

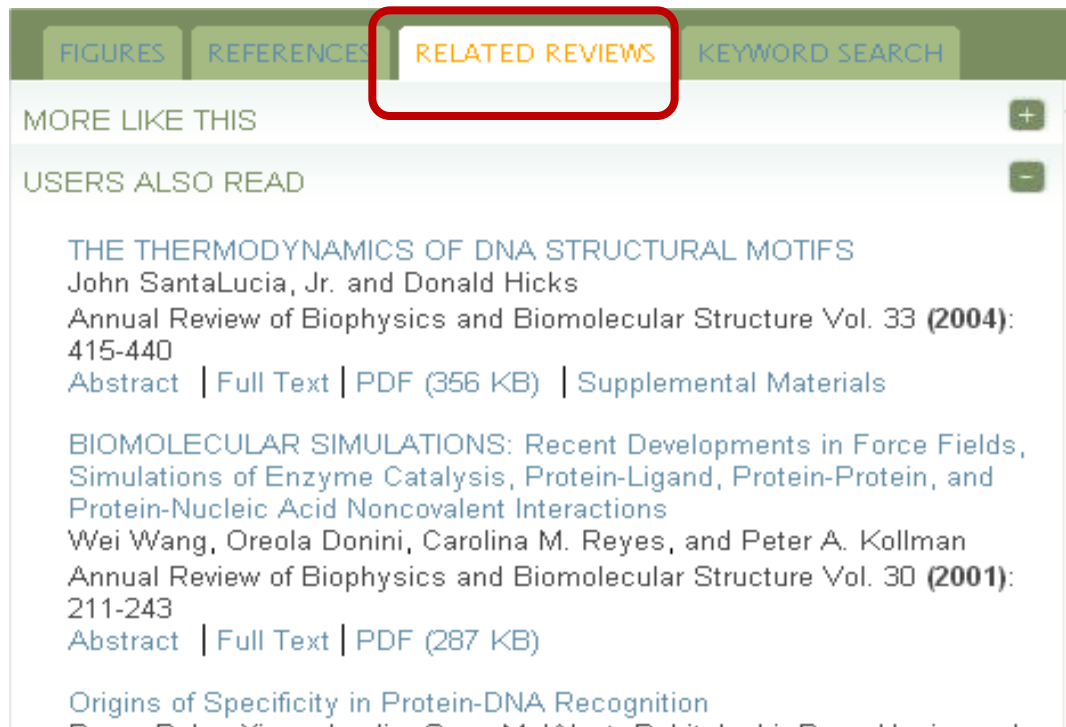
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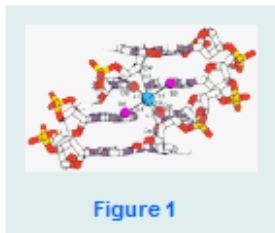
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Sugestões de novos termos de busca e busca pelos autores desta revisão

# Figuras

hybrids, which are partially occupied by monovalent cations ([Figure 1](#); see color insert). The greater occupancies of water over monovalent cations in hybrid solvent sites present difficult analytical challenges during X-ray structure determination. However, these challenges are now being at least partially overcome with high-resolution data, ion substitution, and other techniques ([82](#), [83](#), [96](#)).





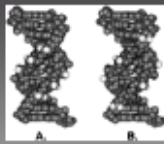
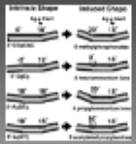
In purely polyelectrolyte solution models, cations around DNA are mobile and are distributed with radial dependence ([70](#), [71](#)). Several lines of evidence suggest that a modest modification of these powerful models may be in order. The mobile cation atmosphere, whether monovalent or divalent, appears to be perturbed by DNA functional groups and is sequence dependent.

Crystallographic observations of monovalent cation-water hybrids within the minor groove of A-tracts ([82](#), [83](#), [96](#)) suggest selective partitioning into that region. In addition, fully hydrated magnesium ions have been shown to avoid DNA amino groups in X-ray structures ([83](#)), consistent with nuclear magnetic resonance (NMR) evidence for perturbations of divalent cations from purely radial distributions in solution ([29](#)). The influence of DNA functional groups on cation distribution appears to cause a superimposition of peaks and troughs on purely polyelectrolyte radial cation distributions.

## Additional Evidence of Influence of DNA Functional Groups on Cation Distributions

The first observation of a cation within the minor groove of an AT-tract was made in 1973 by Rosenberg et al, who used single-crystal diffraction to identify a sodium ion near the floor of an abbreviated minor groove of a dinucleotide duplex ([75](#)). The relevance of that structure was discounted during initial interpretations of the Dickerson dodecamer. Those interpretations described a purely aqueous "spine of hydration" in the AT-tract minor groove ([46](#)). However, additional support for monovalent

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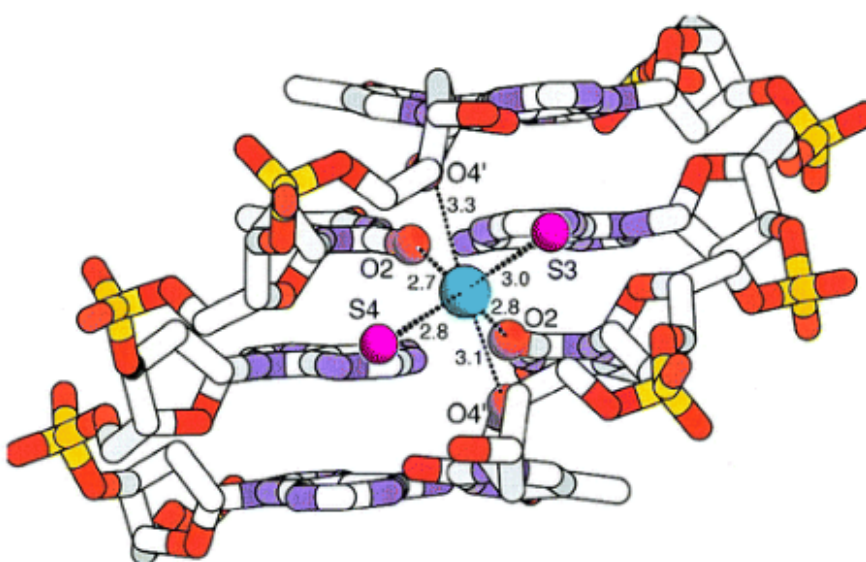



FIGURE CAPTION
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Loren Dean Williams, L. James Maher III

Annual Review of Biophysics and Biomolecular Structure, Vol. 29: 497 -521  
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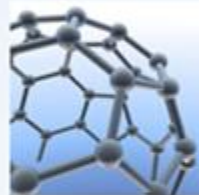
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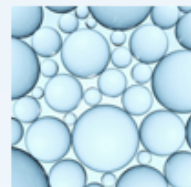
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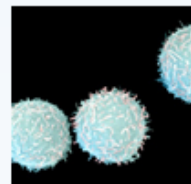
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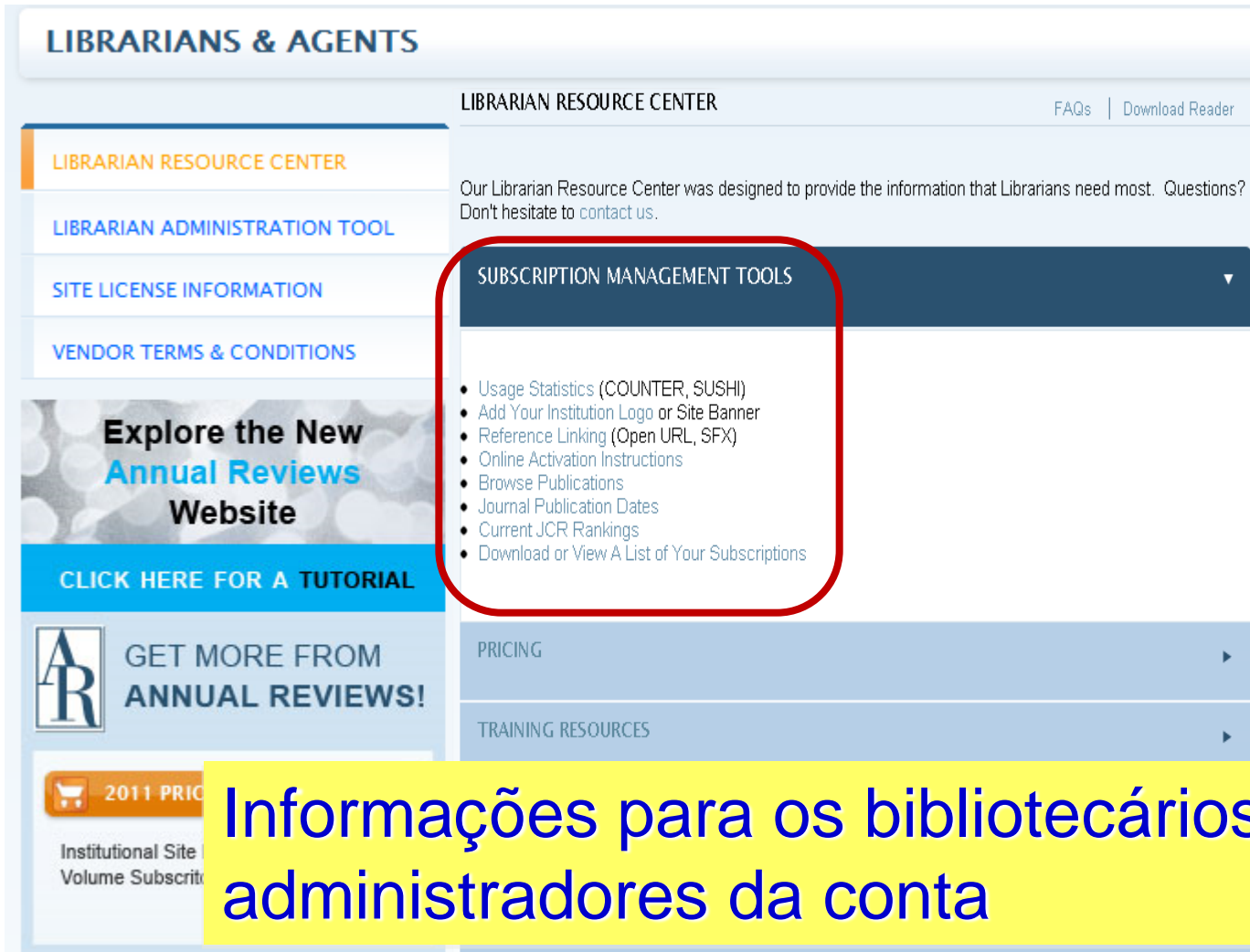
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