# Some conjugate WP-Bailey pairs and transformation formulas for $q$-series 

H. M. Srivastava ${ }^{1,2}$, S. N. SingH ${ }^{3}$, S. P. SingH ${ }^{3}$ and Vijay Yadav ${ }^{4}$

## ABSTRACT.

In this paper, the authors prove several theorems involving $q$-series identities by applying a certain family of conjugate WP-Bailey pairs. Making use of these theorems in conjunction with some WP-Bailey pairs, various transformation formulas for $q$-series are also established.

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## References

[1] Andrews, G. E., Bailey's transform, lemma, chains and tree, in Special Functions 2000 : Current Perspective and Future Directions, (Proceedings of the NATO Advanced Study Institute; Tempe, Arizona, May 29June 9, 2000), NATO Sci. Ser. II Math. Phys. Chem., Vol. 30, Kluwer Academic Publishers, Dordrecht, Boston and London, 2001, pp. 1-22
[2] Bailey, W. N., Identities of the Rogers-Ramanujan type, Proc. London Math Soc., (Ser. 2). 50 (1949), 1-10
[3] Cao, J. and Srivastava,H. M., Some q-generating functions of the Carlitz and Srivastava-Agarwal types associated with the generalized Hahn polynomials and the generalized Rogers-Szegö polynomials, Appl. Math. Comput., 219 (2013), 8398-8406
[4] Choi, J. and Srivastava, H. M., $q$-Extensions of a multivariable and multiparameter generalization of the Gottlieb polynomials in several variables, Tokyo J. Math., 37 (2014), 111-125
[5] Luo, Q.-M. and Srivastava, H. M., $q$-Extensions of some relationships between the Bernoulli and Euler polynomials, Taiwanese J. Math., 15 (2011), 241-257
[6] Gasper, G. and Rahman, M., Basic Hypergeometric Series (with a Foreword by Richard Askey), Encyclopedia of Mathematics and Its Applications, Vol. 35, Cambridge University Press, Cambridge, New York, Port Chester, Melbourne and Sydney, 1990; Second edition, Encyclopedia of Mathematics and Its Applications, Vol. 96, Cambridge University Press, Cambridge, London and New York, 2004
[7] McLaughlin, J., Sills, A. V. and Zimmer, P., Lifting Bailey pairs to WP-Bailey pairs, Discrete Math., 309 (2009), 5077-5091
[8] Srivastava, H. M., Some generalizations and basic (or $q$-) extensions of the Bernoulli, Euler and Genocchi polynomials, Appl. Math. Inform. Sci., 5 (2011), 390-444
[9] Srivastava, H. M. and Choi, J., Zeta and q-Zeta Functions and Associated Series and Integrals, Elsevier Science Publishers, Amsterdam, London and New York, 2012
[10] Srivastava, H. M. and Karlsson, P. W., Multiple Gaussian Hypergeometric Series, Halsted Press (Ellis Horwood Limited, Chichester), John Wiley and Sons, New York, Chichester, Brisbane and Toronto, 1985
[11] Verma, A., On identities of Rogers-Ramanujan type, Indian J. Pure Appl. Math., 11 (1980), 770-790
[12] Verma, A. and Jain, V. K., Certain summation formulas for $q$-series, J. Indian Math. Soc. (New Ser.), 47 (1983), 71-85
${ }^{1}$ Department of Mathematics and Statistics
University of Victoria
Victoria, British Columbia V8W 3R4, Canada
${ }^{2}$ China Medical University
TAICHUNG 40402, TAIWAN, REpUBLIC OF CHINA
E-mail address: harimsri@math.uvic.ca
${ }^{3}$ Department of Mathematics
Tilak Dhari Post-Graduate College
JaUnPUR 222002, UtTAR Pradesh, India
E-mail address: snsp39@gmail.com, snsp39@yahoo.com
${ }^{4}$ Department of Mathematics and Statistics
S. P. D. T. College

Andheri (EAST), Mumbai 400059, Maharashtra, India
E-mail address: vi jaychottu@yahoo.com

