

LETTERS TO THE EDITOR

	PAGE		PAGE
A Note on Self-Reciprocal Functions. BY BRIJ MOHAN	207	Origin of the Inferior Ovary in the Amaryllidaceæ. BY A. C. JOSHI AND J. V. PANTULU	212
Benzylidene-Flavanones considered as Chalkones. BY R. N. KULKARNI, R. C. SHAH AND T. S. WHEELER	207	The Occurrence and Inheritance of Purple Blotched Grains in Sorghum. BY G. N. RANGASWAMI AYYANGAR, V. PANDURANGA RAO AND A. KUNHI KORAN NAMBIAR	213
A New Synthesis of 3-Aminocoumarin. BY K. C. PANDYA AND TEJPAL SINGH SODHI	208	Genic Differences Governing the Distribution of Stigmatic Feathers in Sorghum. BY G. N. RANGASWAMI AYYANGAR AND A. KUNHI KORAN NAMBIAR	214
Molecular Complexes in Chloroform Solution. BY G. V. L. NARASIMHA MURTI AND T. R. SESHADRI	209	On the Life-History of <i>Cylindrocapsa geminella</i> Wolle. BY M. O. P. IYENGAR	216
Vitamin C in Pulmonary Tuberculosis. BY M. N. RUDRA	210	A Metal Image of Manjusri. BY C. MINAKSHI	218
Supernumerary Chromosomes in Para-Sorghum. BY E. K. JANAKI AMMAL	210	Grafting of Apples on <i>Eriobotrya japonica</i> Stocks. BY L. S. DORASAMI	219
How Mid-Rib Hardness affords Resistance to the Sugarcane Top-borer <i>Scirpophaga nivella</i> F., in India. BY P. V. ISAAC	211		

A Note on Self-Reciprocal Functions

I WILL say that a function is $\pm R_\nu$, according as it is self-reciprocal or skew-reciprocal for Hankel Transforms of order ν ; that is, according as it satisfies the integral equation

$$f(x) = \pm \int_0^\infty \sqrt{xy} J_\nu(xy) f(y) dy, \quad (\nu > -1)$$

with the upper or the lower sign.

In a recent paper¹ I have proved the theorem: If $f(x)$ is R_ν , the function

$$\phi(x) = a^\alpha f(xv^\alpha) \pm \frac{1}{a^\alpha} f\left(\frac{x}{v^\alpha}\right),$$

where $a > 0$, $v > 0$, is $\pm R_\nu$.

The object of this note is to give an easy generalisation of this theorem.

2. *Theorem I.*—If $f(x)$ is R_ν , the function

$$\phi(x) = F(a) f\{xF^2(a)\} \pm \frac{1}{F(a)} f\left\{\frac{x}{F^2(a)}\right\}, \quad (2.1)$$

where a is a constant, and $F(a) \neq 0$, is R_ν .

We have

$$\begin{aligned} & \int_0^\infty \sqrt{xt} J_\nu(xt) \phi(t) dt \\ &= \int_0^\infty \sqrt{xt} J_\nu(xt) \left[F(a) f\{tF^2(a)\} \right. \\ & \quad \left. \pm \frac{1}{F(a)} f\left\{\frac{t}{F^2(a)}\right\} \right] dt \end{aligned}$$

$$\begin{aligned} &= F(a) \int_0^\infty \sqrt{xt} J_\nu(xt) f\{tF^2(a)\} dt \\ & \pm \frac{1}{F(a)} \int_0^\infty \sqrt{xt} J_\nu(xt) f\left\{\frac{t}{F^2(a)}\right\} dt \\ &= \frac{1}{F(a)} \int_0^\infty \sqrt{\frac{xu}{F^2(a)}} J_\nu\left\{\frac{xu}{F^2(a)}\right\} f(u) du \\ & \pm F(a) \int_0^\infty \sqrt{xu F^2(a)} J_\nu\{xuF^2(a)\} f(u) du \\ &= \frac{1}{F(a)} f\left\{\frac{x}{F^2(a)}\right\} \pm F(a) f\{xF^2(a)\} \\ &= \pm \phi(x). \end{aligned}$$

Theorem II.—If $f(x)$ is $-R_\nu$, the function (2.1) is $\mp R_\nu$.

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¹ "A few Self-Reciprocal Functions," *Proc. Physico-Math. Society of Japan*, 1934, 273-74.

Benzylidene-Flavanones considered as Chalkones

PANSE AND WHEELER¹ have shown that Benzylidene-Coumaranones like chalkones condense with acetoacetic ester, desoxybenzoin, cyclohexanone, etc. It is now found that