RESEARCH ITEMS.

On Bounded Power Series.—Rogosinski (*Comp. Math.*, 5, pp. 67–106) has obtained some interesting results concerning the distribution of values of a function bounded in the unit circle. A few years ago Nevanlinna had discussed the existence of a function $f(z)$ analytic and $\leqslant 1$ in absolute value in the unit circle which takes values $\{w_k\}$ at a given sequence of points $\{z_k\}$. Now Rogosinski has considered the case when $w_k = w$ for all k, and has obtained results concerning this particular case in greater detail. His results are the following:—

Let E denote the class of functions $f(z) = \alpha z + \beta z^2 + \cdots$ analytic and < 1 in $|z| < 1$, and $E_{|\alpha|}$ those $f(z)$ with fixed $|\alpha|$. When $f'(0) \geqslant 0$, let the same classes be represented by E_+, and F_α. Let $\{t_k\}$ be a sequence of points in the unit circle such that $0 < t_k \leqslant t_{k+1}$. Suppose $f(z)$ is to take the common value w at the points of this sequence. If α is fixed then can w be arbitrary or is to be restricted? This is the problem that he solves. The proof he gives is extremely simple and makes use of only Schwarz's lemma and Lindlof's principle. He has divided his work into two parts the first of which has appeared now. This part deals with the case when $f(z)$ need not be restricted to take the value w *only* at the point of the sequence. In the second part, which is to appear in the same journal, he considers the latter—the more interesting case. Some of his results are given below:

(1) If $w = 0$. Then $\alpha \leqslant \prod_k |t_k| = P_0$. From this it is obvious that if the density of the points of the sequence is too great, *i.e.*, $\prod_k |t_k| = 0$, $[k = 1, \cdots \infty]$, then the function should be identically zero.

(2) for $|z| \leqslant r < 1$,

$$\left| \frac{f(z)}{z \prod_k \dfrac{z - t_k}{1 - t_k z}} \right| \leqslant \underset{|z| = r}{\mathrm{Max}} \left| \frac{z - \dfrac{\alpha}{P_0}}{z \dfrac{\alpha}{P_0} - 1} \right| = \frac{r + \dfrac{\alpha}{P_0}}{1 + \dfrac{r\alpha}{P_0}}$$

with the corresponding inequality for the minimum. (A slightly more precise result is also given by the author.)

(3) For the class $E\alpha$, if the function takes the value w [it may also take the value at other points also] at $\{t_k\}$, then the following inequality is to be satisfied and *vice versa*

$$\left| \alpha \frac{1 - |w|^2}{|w|} - \Sigma \frac{1 - |t_k|^2}{t_k} \right| \leqslant \frac{P_0}{|w|} - \frac{|w|}{P_0}.$$

This is the best possible constant.

(4) Every function belonging to E_α is for $\dfrac{2z}{1 + |z|^2} \leqslant \alpha$ is star-formed (*stern-formig*) with the centre of the star at the origin. This is also the best possible constant.

Various other bounds for higher differential coefficients as well as extensions to functions meromorphic in the unit circle as well as extensions to the family of functions, a finite number of differential coefficients (at the origin) of which are given are also considered by the author.

K. V. I.

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Mechanism of the Dehydration of Zeolites.—Milligan and Harry B. Weiser (*J. Phys. Chem.*, 1937, **41**, 1029) have shown by studies of the dehydration isobar and X-radiogram that calcium sulphate hemihydrate or plaster of Paris is a definite chemical hydrate and not a zeolite as believed from previous investigations. The manner in which water is bound in zeolites has been explained by early workers by the following three proposed theories: (*a*) Solid solution theory, (*b*) "Vagabond water" theory, (*c*) Adsorption theory. Study of the several zeolites by the present authors by the above two methods reveals the fact that some are definite hydrates, some are mixtures of two hydrates and some others are not hydrates at all, but hold water by adsorption forces within channels in the lattice. Obviously the binding forces differ from zeolite to zeolite, some hold water by definite chemical forces and others by adsorption forces. Since some zeolites are definite hydrates, and some are not, the authors believe that there is nothing to be gained by the use of the expression "zeolitic water".

K. S. RAO.

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Effect of Temperature on Mitochondria.—R. C. MacCardle (*Journ. Morph.*, December 1937, 61, No. 3) has studied the effect of heat on the mitochondria of the liver cells of *Fundulus* and *Carassius*. The fishes were subjected to temperatures varying from 0° to 60° C. and the livers fixed cytologically to show the effects of temperature on the mitochondria as well as other cell constituents. The mitochondria vesiculate, fragment, globulate and dissolve after subjection to temperatures of about 37° to 42° C. The Golgi apparatus becomes swollen, breaks into smaller bodies which migrate to the periphery and then dissolves. Fat increases in amount. The vacuoles increase in number.

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Effect of X-Rays on Chromosomes.—Fresh light on the effect of X-rays on chromosomes during the first meiotic division is thrown by M. J. D. White (*Proc. Roy. Soc. Lond.*, Ser. B, November 1937, **124**, No. 835) who, working on three species of Orthoptera, has shown that X-rays do not affect the Prophase chromosomes, *i.e.*, so long as there is a nuclear membrane, which therefore probably acts as a protecting structure. Once the nuclear membrane disappears and the chromosomes are free in the cytoplasm, the latter are affected by the X-rays with the result that at first an alteration in physical consistency and later a fragmentation of the chromosomes occurs. It is suggested by the author that the disintegrating effect is due to the production of an enzymatic substance in the cytoplasm which acts on the chromosomes freely placed in it. It is also shown that "the substance, whatever its nature, is not produced immediately after irradiation but developes gradually" till its destructive effect reaches a maximum after which time the substance is destroyed or prevented from acting.